Schitsu'umsh

Coeur d'Alene Tribe | the discovered people

COEUR D'ALENE RESERVATION
TRIBAL HAZARD MITIGATION PLAN 2011

TRIBAL HAZARDS MITIGATION PLAN

August 17, 2011

This **Coeur d'Alene Reservation Tribal Hazards Mitigation Plan**
Is completed in the fulfillment of guidelines administered by
Federal Emergency Management Administration for a
Tribal Hazards Mitigation Plan

Tribal Council:

Chief Allan, Tribal Chairman
Ernest Stensgar, Vice-Chairman
Norma Jeanie Louie, Secretary Treasurer
Paulette Jordan, Council Member
Charlotte Nilson, Council Member
Alfred Nomee, Council Member
Roberta Juneau, Council Member
Vicki Mahoney, Council Assistant

Project Leadership provided by the

Public Works Department
Coeur d'Alene Tribe
Jim Kackman, Director
Lance Mueller, Planning Technician
850 A Street
Plummer, ID 83851

Planning services, analysis, and document authorship provided by

William E. Schlosser, Ph.D.
Kamiak Ridge, LLC
1525 NW Kenny Dr.
Pullman WA 99163
www.Resource-Analysis.com

This planning effort has been completed with the consultation by a Planning Committee comprised of representatives of administrative Departments from the Coeur d'Alene Tribe, representatives from adjacent government agencies such as the USDI Bureau of Land Management, Benewah County, Kootenai County, fire protection districts, highway districts, and planning consultants from Kamiak Ridge, LLC.

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Figure I. Youth Art Contest, 12 and Younger, First Place Winner: Gloria Trevino.

Chapter 1. Organization, Adoptions, Promulgations, and Acceptance

1.1. Organization of this Document

The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan is organized into several chapters, each addressing a specific component of the natural hazards risk assessment, exposure to risk, resources available for mitigation work, the response to natural disasters, and potential mitigation measures.

Chapter 1 of this document addresses the review by Idaho Bureau of Homeland Security and acceptance by FEMA Region X, and the adoption by the Coeur d'Alene Tribal Council.

Chapter 2 of this plan lays out a wide overview of the Coeur d'Alene Reservation to describe the demographics, population centers, histories, population density and development, resource economics, land cover, and the valuation of property improvements on the Coeur d'Alene Reservation. Chapter 2 presents an historic and current picture of the people, places, and lands – all independent from natural hazards and the risks of those hazards.

Chapter 3 addresses the planning environment to include FEMA's guidance for the expectations of the Tribal Hazards Mitigation Plan, and the development of the planning team's mission, vision, and goals. Chapter 3 provides detailed linkages to how this effort integrates with existing plans, programs, and policies of the Coeur d'Alene Tribe. The planning process is documented and includes details about public involvement conducted throughout the planning process.

Chapter 4 evaluates the overall risk profile for the Coeur d'Alene Reservation in terms of historical occurrence, current exposure to risks, and estimated probability of future risks. Each natural hazard defined in Chapter 4 is evaluated and considered on a Reservation-wide basis with the financial potential for losses from each hazard.

Chapter 5 looks closely at each populated place in the Coeur d'Alene Reservation and documents the level of risk exposure to each hazard for each location. Chapter 5 also includes presentations of potential mitigation measures appropriate for each populated place.

Chapter 6 details a discussion of the resources, capabilities, and needs of the Coeur d'Alene Tribe, and associated agencies and organizations, in terms of what is available to serve the citizens of the Reservation and what is needed in terms of the risk exposure identified in this planning document.

Chapter 7 provides a lengthy discussion of how this plan will be implemented, funded, and administered during the next 5 years specifically, and beyond that, in more general terms. Detailed mitigation measures are proposed in four specific categories of 1) policy related activities, 2) activities to reduce loss potential, 3) resource and capabilities enhancements, and 4) activities to change the characteristics of risk. All combined, this plan details 151 unique mitigation measures to be implemented over the next 10 years on Coeur d'Alene Reservation. Chapter 7 concludes with a formal program of plan maintenance and continued public involvement.

Finally, Chapter 8 provides the reader with additional information including acronyms and abbreviations used in this report, a glossary of technical terms and their definitions, and a Literature Cited section.

This Coeur d'Alene Reservation Tribal Hazards Mitigation Plan has been developed through the efforts of various Tribal Department employees, Reservation-based organizations, Tribal Council, and other agency representatives in an effort to better prepare Coeur d'Alene Reservation residents against natural disasters.

1.2. FEMA Region X Letter of Approval

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

August 17, 2011

Honorable Chief James Allan
Chairman, Coeur d'Alene Tribe
850 A Street
Plummer, Idaho 83851

Dear Chairman Allan:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***Coeur d'Alene Reservation Tribal Hazards Mitigation Plan*** as a Tribal Mitigation Plan, in accordance with 44 CFR Part 201. The Coeur d'Alene Tribe is now eligible to apply directly to FEMA as a grantee for Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) non-emergency programs through August 17, 2016. To continue eligibility, the plan must be reviewed, revised as appropriate and re-submitted for approval within five years from the date of this letter.

As a result of the Disaster Mitigation Act of 2000, States and Tribes are required to develop and maintain hazard mitigation plans compliant with FEMA standards as a condition for receiving non-emergency Stafford Act assistance. Applicable Stafford Act assistance includes Public Assistance (Categories C-G), Fire Management Assistance, Hazard Mitigation Grant Program, and Pre-Disaster Mitigation grants.

FEMA's approval of your updated plan as a Tribal Mitigation Plan provides the Coeur d'Alene Tribe's eligibility to apply for various Stafford Act programs. All requests for assistance, however, will be evaluated individually according to the specific eligibility and other requirements of the particular programs. For example, a mitigation action identified in the approved plan may or may not meet the eligibility requirements for Hazard Mitigation Grant Program (HMGP) funding. If you have any questions regarding specific program requirements and eligibility, please contact Braden Allen, Hazard Mitigation Assistance (HMA) Specialist for HMA programs, (425) 487-4749.

We look forward to continuing a productive relationship between FEMA Region 10 and the Coeur d'Alene Tribe. Please contact our Regional Tribal Liaison, Richard Krikava, at (425) 487-4540, or our Regional Mitigation Planning Manager, Kristen Meyers, at (425) 487-4543 with any plan-specific questions or for further assistance.

Sincerely,

Kenneth D. Murphy
Regional Administrator

cc: David Jackson, Idaho Bureau of Homeland Security

Electronic cc: Jim Kackman, Coeur d'Alene Tribe
Dr. William E. Schlosser, Kamiak Ridge, LLC

Enclosure

BH:bb

www.fema.gov

1.3. State of Idaho letter of Support

STATE OF IDAHO
BUREAU OF HOMELAND SECURITY
4040 W. GUARD STREET, BLDG. 600
BOISE, IDAHO 83705-5004

C.L. "BUTCH" OTTER
GOVERNOR

Maj Gen GARY L. SAYLER
ADJUTANT GENERAL

Brig Gen BILL SHAWVER
DIRECTOR

RECEIVED
MAY 23 2011
CHAIRMAN'S OFFICE

May 16, 2011

The Honorable Chief J. Allan, Tribal Chairman
Coeur d'Alene Tribe
P.O. Box 408
Plummer, ID 83851

RE: Coeur d'Alene Reservation Tribal Hazard Mitigation Plan 2011

Dear Mr. Allan:

The Idaho Bureau of Homeland Security appreciates its partnership with the Coeur d'Alene Tribe and your hazard mitigation efforts on behalf of both tribal and non-tribal members within your jurisdiction. In light of the recent flooding events and the potential for floods and landslides in the immediate future, we have reviewed the draft Coeur d'Alene Reservation Tribal Hazard Mitigation Plan 2011 (THMP) for coordination and consistency with the Idaho State Hazard Mitigation Plan (SHMP). We find the draft THMP to be compatible with the SHMP and consistent with its strategies, goals, and objectives.

We understand that, as of this date, the THMP is with FEMA Region X pending their final review. Based on our review, we have high confidence your plan will receive a favorable analysis and acceptance by FEMA.

If you have any questions or if this office can be of any assistance, please do not hesitate to contact Mark Stephensen, Mitigation Planner at (208) 422-5726.

Sincerely,

Bill Shawver, Brigadier General
Director, Bureau of Homeland Security

BS/dj

CC: Jay Baker, North Area Field Office
Kristen Meyers, Mitigation Planner FEMA Region X
Braden Allen, HMA Specialist FEMA Region X

Phone: (208) 422-3040 • Fax: (208) 422-3044 • 24-Hour Emergency Notification: (208) 846-7610

1.4. Authorship and Conveyance

Development of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan was completed by Kamiak Ridge, LLC, in association with the Planning Committee members. Project Management duties and Lead Authorship of this plan have been supplied by William E. Schlosser, Ph.D., a Regional Planner and Environmental Scientist.

The undersigned do hereby attest and affirm that the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan was completed using information available at the time of its writing. Furthermore, analysis techniques were implemented as appropriate to provide a clear and reasonable assessment of hazard risk exposure within the Coeur d'Alene Reservation. Recommendations made in this Plan have been based on the information and feedback from the Planning Committee members and others, and are proposed with the reasonable expectation that once implemented through a holistic hazard mitigation approach, the results will serve to protect people, structures, infrastructure, the regional economy, and the way of life on the Coeur d'Alene Reservation.

By: William E. Schlosser, Ph.D.
Kamiak Ridge, LLC
Environmental Scientist & Regional Planner
Lead Author and Project Mananger

June 20, 2011
Date

By: Birgit R. Schlosser, B.A.
Kamiak Ridge, LLC
Co-Owner & Planning Specialist

June 20, 2011
Date

1.5. Coeur d'Alene Tribe Resolution of Adoption

PUBLIC WORKS DEPARTMENT
PLANNING DIVISION
2011 TRIBAL HAZARDS MITIGATION PLAN **CDA RESOLUTION 196 (2011)**

WHEREAS, the Coeur d'Alene Tribal Council has been empowered to act for and on behalf of the Coeur d'Alene Tribe pursuant to the revised Constitution and Bylaws, adopted by the Coeur d'Alene Tribe by referendum November 10, 1984, and approved by the Secretary of the Interior, Bureau of Indian Affairs, December 21, 1984; and

WHEREAS, the Coeur d'Alene Tribal Council has a responsibility for the Health, Welfare, and Economic Development of the Tribe and its members; and

WHEREAS, the Coeur d'Alene Tribe Public Works Department has been delegated the responsibility of coordinating homeland security and emergency management programs; and

WHEREAS, the Tribe was awarded and accepted a grant from the Federal Emergency Management Agency to complete a Tribal Hazards Mitigation Plan for the Coeur d'Alene Indian Reservation; and

WHEREAS, the Tribe contracted with Kamiak Ridge L.L.C., a consulting firm, to develop said plan; and

WHEREAS, said plan has been reviewed by the public and approved pending adoption by the Federal Emergency Management Agency (FEMA); and

WHEREAS, after said plan is approved by tribal council, the Tribe will be eligible to apply directly to FEMA (government to government) with project funding requests for the projects listed in the plan; and

NOW, THEREFORE, BE IT RESOLVED, That the Coeur d'Alene Tribal Council hereby approves the 2011 Coeur d'Alene Tribal Hazards Mitigation Plan; and

BE IT FUTHER RESOLVED, That the Coeur d'Alene Tribal Chairman, or his designee, is authorized to sign all documents related to the Tribal Hazards Mitigation Plan on behalf of the Coeur d'Alene Tribe.

CERTIFICATION

The foregoing resolution was adopted by the Coeur d'Alene Tribal Council at a meeting held at the Tribal Administrative Building at 850 A Street, Plummer, Idaho on July 28th, 2011 with the required quorum present by a vote of 6 FOR 0 AGAINST

CHIEF J. ALLAN, CHAIRMAN
COEUR D'ALENE TRIBAL COUNCIL

NORMA JEAN LOUIE, SECRETARY
COEUR D'ALENE TRIBAL COUNCIL

1.6. Acknowledgments and Thanks

Scientific analyses, expertise of the people, the contents of previous written works, and photographic evidence have been pulled together for the development of this Coeur d'Alene Reservation Tribal Hazards Mitigation Plan. The Coeur d'Alene Tribe Hazards Mitigation Planning Committee has been instrumental in providing ideas, data, collaborative discussions, and information needed to make this hazard risk assessment and set of mitigation recommendations a reality.

Several people have contributed to this effort. This prologue is written from the perspective of the Project's Lead Author, "Dr. Bill" Schlosser, and I wish to offer special thanks to ***Coeur d'Alene Tribal Elder, Felix Aripa***.

Felix Aripa was first recommended as a "person we should speak with" by **Louis H. Aripa, Sr.**, the nephew of Felix Aripa. Louis H. Aripa, Sr., is a member of the Planning Committee and employee of the Coeur d'Alene Tribe in the capacity of Tribal Housing Authority. Felix Aripa was introduced to us as a long-time roads engineer for the Coeur d'Alene Tribe and the Bureau of Indian Affairs.

We made contact with him through **Raymond Brinkman** of the Coeur d'Alene Language Center. There we met with **Felix Aripa** and **Irene Lowley**, both Tribal Elders. Our discussions began with the projections made to show flood zones within the Coeur d'Alene Reservation, especially along Hangman Creek where both of the two Tribal Elders grew up.

The meeting lasted two hours and was full of the sharing of facts for us to learn, become aware of, and, sometimes, be amazed by. Both individuals shined with a sharing personality and eagerness to talk with us. At the conclusion of the meeting, we made another appointment to go into the field with Felix Aripa and view some of the bridge work along Hangman Creek that has led to increased flooding within this drainage.

The staff of the Coeur d'Alene Tribe's Language Center was a great asset to this effort as both **Raymond Brinkman** and **Kim Matheson** conducted a dictation during the meeting and recorded the entire session on video. Raymond Brinkman also coordinated all of the scheduling for our meetings with these two remarkable people.

When we did meet with Felix Aripa in DeSmet on June 10, we were joined by another Coeur d'Alene Tribe employee, **Gerald I. Green**, a Wildlife Mitigation Biologist. The four of us (including Birgit Schlosser) visited two bridge crossings identified by Felix Aripa along Hangman Creek. His identification of the causes of the problems and the damages these crossing have caused to the river ecosystem were insightful and educational. We also talked about beaver populations and the efforts to establish the historic populations of these animals within the Reservation. Gerald Green shared his past work with us concerning a survey he conducted of current use of beaver along Hangman Creek. The importance of the beaver as an indicator of a healthy wetland ecosystem was discussed, and Felix Aripa pointed to the opportunity to bring school children to these sites to learn more about the land they live in.

Before leaving the last site visited, we walked into an adjacent area. We talked about the area's geology, the parent materials we observed, and Felix Aripa shared with us how "the state" wanted to set up a rock crushing facility in that location many years before. Felix Aripa warned them about the unsuitability of the materials found in this location for the purposes they desired.

While talking, an adolescent Great Horned Owl (identified by our Wildlife Mitigation Biologist companion) flew in front of us and landed on one of the rock structures we were viewing. The bird watched us while we watched him. After a short while we left the site and our sightseer with a feeling of appreciation for the dialogue, the landscape, and the visiting wildlife.

Figure II. Moose calf near the DeSmet Tribal School in the spring of 2010.

Figure III. Youth Art Contest, 13 and Older, First Place Winner: Kara Lenoir.

Chapter 2. Coeur d'Alene Reservation Background

2.1. History of the Schitsu'umsh

When the European "discovery" of North America was made, the region that became the United States already contained approximately 500 independent nations. Each nation possessed its own government, culture, language, traditions, customs and beliefs (O'Brien 1989, Deloria 1994). These independent nations traded with each other, sometimes fought, sometimes negotiated with each other, and forever co-existed.

The cultures of the aboriginal peoples share histories in the form of verbal stories recounted by elders with the younger generations. These stories are often told in the form of legends or epics. These histories have been shared between the generations continuously and provide the continuity of culture and place.

2.1.1. From Time Immemorial

Some of the earliest accounts of the Schitsu'umsh[1] people are retold by Frey (1995) and offered here to illuminate "the creation".

> "Before the coming of Human Peoples, the world was inhabited by powerful Animal Peoples, also known as the "First Peoples." Prominent among them were Coyote, Crane, and Chief Child of the Yellow Root. It was through their actions that the world was prepared for the coming of Human Peoples. It was a time in which dangerous monsters were slain, the features of the landscape were formed and implanted with "gifts" to sustain body and spirit, and the ceremonies, social practices and "teachings" necessary to bring order and happiness were brought forth.
>
> "In a canoe made from the throat of Monster Fish, Chief Child of the Yellow Root traveled the waters of Lake Coeur d'Alene and slew numerous monsters. The Awl, Comb, Bladder and Lasso were transformed from "man-eaters" into items helpful to the Human Peoples. Upon completing his journey, Chief Child of the Yellow Root became the Moon. Concerned about each other's welfare during a severe winter, Rabbit and Jack Rabbit traveled to the other's home, bringing camas and pitch with them. Upon meeting on Tekoa Mountain and finding the other doing well, they left their "gifts" on the mountain's slopes. Crane would teach of the importance of sharing with those in need, as he hunts the deer and unselfishly provides venison to the starving villagers. Going up the Columbia River, it was Coyote who released the Salmon and other Fish Peoples trapped by the Swallow Sisters at Celilo Falls. The camas and fish would help nourish and the pitch help warm those who would be coming. Coyote tricked Rock into chasing him throughout the country and eventually into the Lake, ridding the land of the monster who had been crushing the lodges of the other Animal Peoples. And in so doing many of the near-by mountains and prairies were created, as well as the "blue" of Lake Coeur d'Alene. As he hunted the deer and unselfishly gave the venison to starving villagers, it

[1] References to the Schitsu'umsh people or Tribe, in this document, are generally used to refer to the people and government today called the Coeur d'Alene Tribe (the people) or Coeur d'Alene Reservation (current Reservation) in the times before the treaties with the United States were signed or ratified. The transition of the reference to Coeur d'Alene Tribe or Coeur d'Alene Reservation are made to refer to times after the treaties were signed. Confusion should be avoided as these references can generally be used interchangeably as the Schitsu'umsh people and the Coeur d'Alene Tribe are the same and a part of this land.

was Crane who taught of the importance of sharing with those in need. It is also Crane who taught of the consequences of selfishness. But the trickster Coyote did not always learn his lessons and inevitably attempted to hunt "too many deer" or foolishly "take the easy way out." When Coyote was self-serving, he often failed in his schemes and deceptions, resulting in his own death. It would then be his wife, Mrs. Mole, who would have to jump over him several times to bring him back to life. But when Coyote sought to assist others, he was rewarded with success.

"After the Gobbler Monster had swallowed most of the Animal Peoples, Coyote tricked the Monster into swallowing him as well. Once inside the monster's stomach, Coyote was able to free the other Animal Peoples and kill the monster. From the parts of the Gobbler Monster the various Human Peoples, including the Schitsu'umsh, were created and placed on their respective lands. To the west and northwest of the Coeur d'Alene were the Spokane and Kalispel, to the north and northeast the Kootenai and Pend Oreille, to the east the Flathead, and placed to the south and southwest of the Coeur d'Alene were the Nez Perce and Palus."

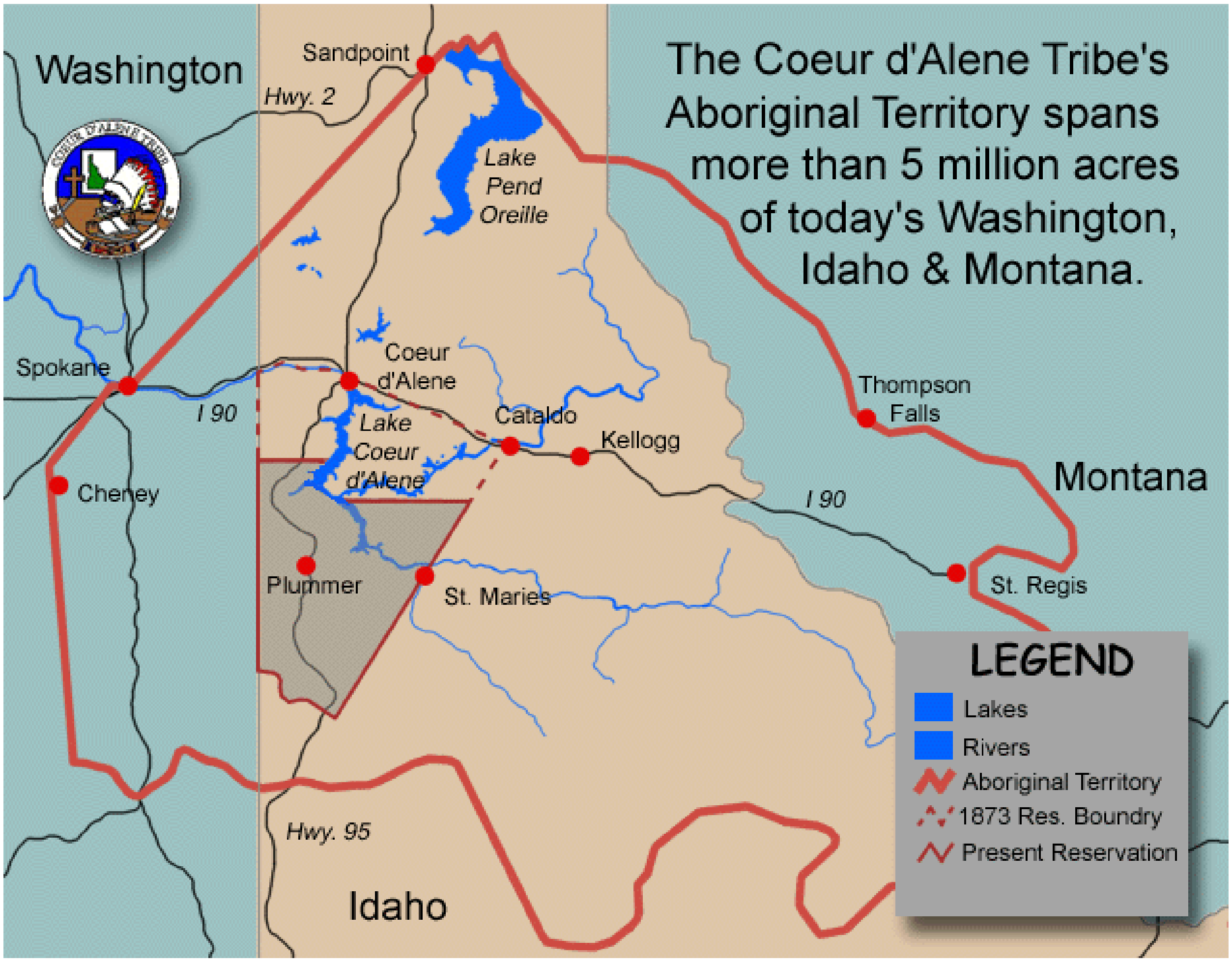
The Schitsu'umsh people were placed by the creator in what would become the Panhandle region of Idaho and adjoining parts of what would be named Washington to the west and Montana to the east. It was a landscape of some 5 million acres of Douglas-fir, grand fir, ponderosa pine, western white pine, and western red cedar forested mountains, freshwater rivers, lakes and marshlands, perennial bunchgrass and fescue wheatgrass-covered rolling hills and prairie (Figure IV). At the heart of this region was Coeur d'Alene Lake. It was a homeland inundated with "gifts" from the Animal Peoples that would provide for some 5,000 Schitsu'umsh (Frey 1995).

The Schitsu'umsh were historically organized into three bands located at the north end of Coeur d'Alene Lake and along the Spokane River, and along the St. Joe and Coeur d'Alene Rivers. Each band comprised several extended families who led an autonomous lifestyle. There were no hereditary clans and slavery was not practiced (Frey 1995). Elected chiefs and sub-chiefs had primarily an advisory role, leading by example and ruling by consensus, having no punitive power. They often exhibited qualities of cooperation and generosity as taught by the stories of Coyote (Frey 1995, Kevis 1999). Schitsu'umsh Indians were traditionally on friendly terms with other Salish-speaking Tribes of the area, such as Spokane, Flathead, Kalispel and Pend Oreille. They often travelled with members of these Tribes to distant salmon fishing sites, and, after the coming of the horse, into the buffalo hunting country of Montana, renewing established trading partnerships.

The influence of the Euro-Americans on the Schitsu'umsh Indians occurred long before the actual first-contact. By the second half of the 18th century the horse had become integrated into Schitsu'umsh lifestyles.

According to Walter Prescott Webb in "The Great Plains", anthropologists hold that the spread and use of the horse among the Plains Indians began after 1540, when the horse was reintroduced into Indian country by the Spanish through intertribal trade, and as wild herds began spreading out over the land. The Plateau Indians including the Flatheads and Schitsu'umsh being neighbors to Blackfeet and the western Plains Indians surely got their horses about this time. Obtaining horses changed the lifestyle and economy of the Schitsu'umsh Indians. Traveling to distant places such as locations east of the Bitterroot Mountains to hunt buffalo or to Kettle Falls to the northwest to trade for salmon became a feasible option. No longer were the Schitsu'umsh dependent only on fish, roots, berries and the hunt on foot (Kevis 1999).

Figure IV. Coeur d'Alene Reservation Locator Map within upper Columbia region (CDAT 2010).



Oral tradition was an important way of educating children and preparing them for an adult life. It was also a way to preserve customs and culture of the Tribe.

> "Storytelling was one of the most popular pastimes in the winter for both children and adults. The old traditions were shared during long winter nights. Most old men and women could recount stories, but there were some particularly famed for their talents in this respect who acted as superb performers. Their facial expressions, voices and gestures almost told the story without words as they entertained eager listeners with amusing stories, tales of adventure and war, horror stories, and myths and legends of the wondrous days of long ago. In fact, some stories were told graphically in the sign language!" (Clark 1966).

However, storytelling was more than mere entertainment. Oral tradition taught children in story form preparing them for their lives as adults close to nature. Stories provided the information about animals and birds, tribal ways of doing things, tribal history, rituals, the origin of sacred objects and ceremonies (LLO 2002).

"The Indians are possessed of peculiarly retentive memories," wrote the famous trapper and guide George Belden, "and are always respectful and attentive to the narratives of their old men. A tale once told is remembered for years, and in like manner is handed down to another generation." One of the sacred duties of Tribal Elders was, and continues to be, to hand down the traditions to the younger generations, thus preserving the continuity of the tribe by keeping alive its history and traditions.

As Henry SiJohn, a contemporary Coeur d'Alene Tribal Elder, stated, "we survive by our oral traditions, which are our basic truths, our basic facts, handed down from our elders. They are the basis of our songs, our vision quests, our sharing". Despite overwhelming Euro-American societal forms that inadvertently, or overtly, sought their demise, the teachings of the Animal People and the Coeur d'Alene Peoples continue to be heard as the oral traditions are shared by the elders and as suumesh songs are sung.

According to oral tradition conveyed by Chief Joseph Seltice (Kevis 1999);

> "Fossil remains show that the horse developed on this continent from a little three-toed species. Immense herds survived year after year for over a thousand years."

2.1.1.1. The Horse and the Coyote

"In the days of the Circling Raven, the story of the first horse was told in a fairy tale that had more truth to it than the "superhuman" stories of today. In this story, three-toed Horse said to Fox, "My three toes are a bother. I want only two toes, so I can go and roam the plains."

Fox then told Horse, "My power has been taken away from me by my 'sdum-chin', the Coyote. Go see him, for he possesses all power."

So Horse went to Coyote and said, "Your 'sdum-chin' sent me here. My three toes are bothersome. Can you remove one toe so I can roam the prairies?"

Coyote said, "Yes, I can, but on one condition. You must get out of the mountains and roam the plains. I have already removed the deer's third toe, and he seems happy. He now roams the valleys as well as the mountains, and has to do very little sneaking around to feed. He is really proud of having only two toes."

"Are you ready to have your third toe removed? All right, '*We-le-we-le-ma-sha!*' There you are. Now you have only two toes, not only on one foot, but on all four. Now remember what I said."

Horse then thanked Coyote and left for the plains, forgetting about the mountains. But about a year later, Horse returned to Coyote and said, "I want only one toe on each hoof. I've had some close calls out in the valley where wolves track like a deer."

Coyote replied, "The deer never complains. Of course he is lighter and quicker than you, therefore he can travel much faster than you can."

Horse insisted, "Fix me up with only one toe."

So Coyote said, "All right, under the condition that you will keep out of the mountains altogether. The day will come when the Indians will want you to carry them on their travels. They will treat you well and provide you with shelter and feed on the winter days. Ready now, 'We-le-we-le-ma-sha!' There you are with only one toe on each foot. Now go and do as I have told you."

Horse followed the orders of Coyote. He grazed and roamed over the plains and valleys, really proud of his single hoof. He allowed the Indians to come close to him without fear. They noticed it too, and they caught the horse. They placed a small rope in his mouth to guide him wherever they wanted to go."

Pursuit of the buffalo heightened tension with traditional enemies, such as the Blackfeet and Crow Indians who inhabited the buffalo country east of the Rocky mountains. The dangers inherent with travel in buffalo country led Plateau hunters to adopt the practice of moving together in large camps. European traders reported parties ranging in size from several hundred to over two thousand, including women and children. The Flathead and Kootenai were often joined by Schitsu'umsh, Spokane, Yakama, Palus and Cayuse Bands (Frey 1995).

One of the European traders described a buffalo hunt as a proof of what he called the Schitsu'umsh Indians' "in conquerable" love of the chase (Vibert 1996). As Lawrence Aripa pointed out, "We did not go to buffalo country just to hunt. We always had plenty of deer and elk to hunt right here. We went to learn different things. The children would leave as children and come back as grown-ups" (Frey 1995).

Trading encounters were an important part of social and cultural life of the Schitsu'umsh. During trading gatherings they exchanged dried venison and deer hides for salmon at Spokane Falls and Kettle Falls. They also renewed social ties with ceremonial dancing and feasting.

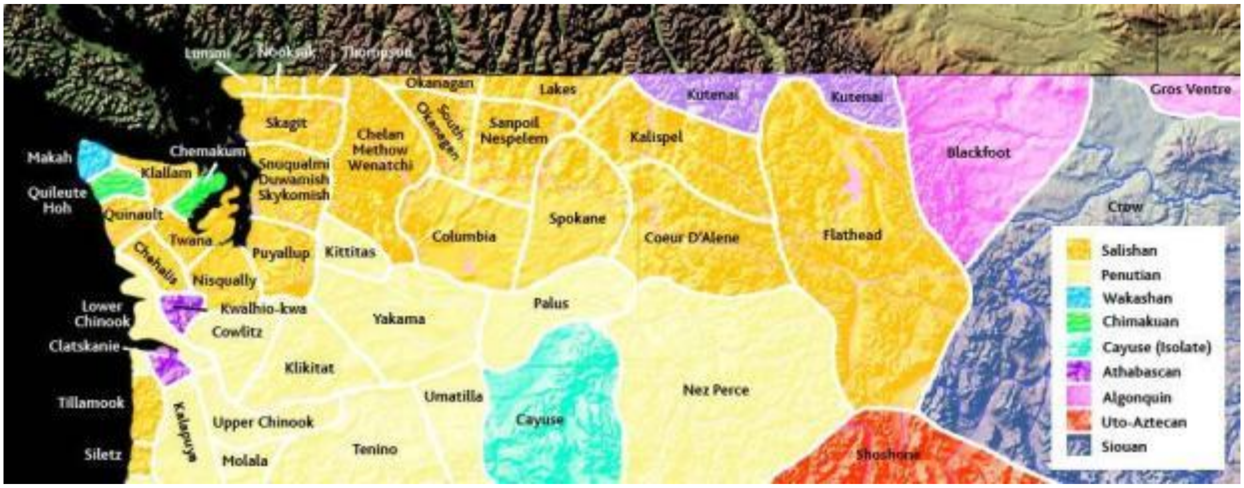
Conflicts periodically occurred with Kootenai, and the Sahaptian-speaking Nez Perce and Palus Indians. Warfare typically resulted from avenging a transgression without territorial conquest or enslavement of people (Seltice 1999):

> "Since the time of the Circling Raven the [Schitsu'umsh] had made peace settlements that lasted over hundreds of years. They did this with the Flatheads [today of Montana] and the Spokanes [today of Eastern Washington]. Of course, in 1750 there were no [American states], but the peace brought about much friendship and intermarriage between the three tribes."

2.1.2. Salishan Language

Native languages can be described as having groups and subgroups. The Salishan family group includes as many as 23 unique languages. This was one of the largest language groups before European arrival in what became the Washington and Oregon Territories (circa 1853) and later, the Washington and Idaho Territories (circa 1863) (Rumsey 2010). Figure V shows where Salishan-speakers lived along the upper Columbia River, and in lands across the northern part of the area into what is today Canada. Speakers of the Salishan language group spread from the coast far into the entirely different climate and culture area of the Columbia River plateau and over the Rocky Mountain range. A few additional languages were scattered among these dominant forms (WSHS 2010).

Figure V. Dominant Language Groups spoke by Indians, pre-European colonization (WSHS 2010).



The Interior Salish languages are one of the two main subgroups of the Salishan language family, the other being Coast Salish. It can be further subdivided into Northern and Southern Interior Salish (Flucke 1952). The first Salishan people encountered by non-native explorers were the Flathead people, or "Selisch", among the most easterly of the group (Figure V). Schitsu'umshtsn is an Interior Salish language. Other peoples throughout the Plateau region who are a part of the Salishan language family include the Colville, Flathead (Bitterroot Salish), Kalispel, Okanagan, Pend Oreille, Sanpoil, Spokane, and Wenatchee. The Nez Perce to the south speak a Sahaptin language, while the Kootenai to the north speak a language unique to the area (LLO 2002).

The Schitsu'umsh name literally means "the ones that were found here", or “the Discovered People”. Early French fur traders in the late 18th or early 19th century gave them their non-native name. The phrase “Coeur d'Alène” means Heart of an Awl, referring to the perceived shrewdness of the trading skills exhibited by the Schitsu'umsh (Chalfant 1974).

Language is not a neutral medium: the language of any cultural or social group, in any epoch, reflects and helps to shape that group’s view of the world. Since social and political boundaries separating various tribes were fluid, language has always served as an important means of communication between tribes. Fur traders’ accounts that have survived the passage of time, make it very clear that multilingualism was commonplace within the Upper Columbia Plateau. Intermarriage among members of language groups and extensive travel for trade, resource gathering, gambling, and other activities required facility in more than one language. Language was little obstacle to the movement of people, goods and ideas in the Upper Columbia Plateau.

By the twentieth century the Indian world had been all but replaced by that of the white men, whose civilization, also changing, raced on at a quickening pace sweeping Indian culture aside. The struggle for Indian identity has started not so long ago and is still in progress. The greatest of all Indian wars continues to be their struggle to adapt to a world not of their choosing. Adaptation has been so effective in some cases that Indians, who formerly were encouraged to adopt the ways of the white man, now fear that such acceptance will destroy the last vestiges of their culture. The physical survival of the Indians was assured at the turn of the 20th century when improved health programs turned the tide of decreasing populations (Ruby & Brown 1988). Preservation of the entire Indian culture has proved to be more challenging.

In the little more than eighty years since Anglo-European people have been actively concerned with changing Coeur d'Alene ways, a significant amount of the old culture had been lost. Myths and tales of the Schitsu'umsh have been secured through informants long after they had changed their original way of life. Informants were interested to share about the customs of their forefathers, and the only way to do that was through legend. Some fragments of the weakened culture can still be saved through a concentrated effort of those who want to remember who they are and where they come from (Reichard 1947). Although some tribal languages have been preserved, those who speak them become fewer with each year.

Coeur d'Alene Tribal Elders such as Lawrence Nicodemus, Lavinia "Vinnie" Felsman, Felix Aripa, and Irene Lowley have championed the importance of their language (LLO 2002). These Elders, and others, have been instrumental in teaching the language and writing language texts. Felix Aripa, and Irene Lowley continue to be active in the Coeur d'Alene Tribe's Language Center today. With only a handful of fluent speakers still living, the revitalization of the language among the Schitsu'umsh is an essential component of instilling a sense of cultural identity and pride in one's heritage, and in reclaiming tribal sovereignty.

2.1.3. History of US Federal Indian Policy

The account of historical federal policy concerning Indians in the United States shows the way it has meandered over time like a river through the floodplain, sometimes cutting deeper into the soil, and at other times dropping sediment to build it up again. Although generalizations about these policies are prone to over-simplification, there have been extremes of events to sometimes annihilate Indians, and sometimes to support sovereign tribal self-governance and autonomy. Pevar (2002) conducted an intensive review of US Federal policy in respect to Indian Tribes, that was released in 2002 by the American Civil Liberties Union (ACLU). The subtitles of this section follow the same generalizations utilized by Pevar (2002).

2.1.3.1. Pre-1492

Before Christopher Columbus "Discovered America" in 1492, the tribal nations living in what is today called North America, existed with well defined governments, societies, culture, religion, and trade customs (Deloria 1994). Although several languages were developed by these independent cultures, there were often "trade languages" shared between groups living in the same large geographical region. The "Chinook Jargon" was one such mixed language that many of the Columbia River Tribes used (Mithun 1999, Gibbs 1863). This combination of languages into a jargon held a relatively limited lexicon but was useful for trading and making basic communications between people of different linguistic groups. This jargon should not be confused by the formal "Chinook Tribe" language of the Indians who lived near the Pacific Ocean coast along the Columbia River (Gibbs 1863).

The Schitsu'umsh historically occupied the area that would later become the Panhandle of Idaho, parts of Eastern Washington and Western Montana. It amounted to around 5 million acres of beautiful forests, mountains, rivers and lakes that abounded in natural riches. Their territory extended from the northern end of Lake Pend Oreille in the north running along the Bitterroot Range of Montana in the east to the Palouse and North Fork of the Clearwater River, in the south to Steptoe Butte and up to east of Spokane Falls in the west (using current location names to describe the ancestral homelands). Some 5,000 Schitsu'umsh lived in the area (Frey 1995).

The Schitsu'umsh Indians used canoes for transportation along the waterways and followed seasonal patterns of movement in search of food and for social gatherings. The Schitsu'umsh have followed the plan and purpose of nature in their lifestyle. Most were living in semipermanent winter villages, over thirty in number, along the shores of Coeur d'Alene Lake, and along the banks of St. Joe, Spokane and Coeur d'Alene Rivers. In the springtime the villages became abandoned for the root gathering located in the prairie country. In summer they would gather roots and in the fall they came the time for berry picking in the higher hills and mountain creeks. "When the camas was flowering, the entire valley of Potlatch turned a bluish color and was a beautiful sight in the early days" (Kevis 1999).

Schitsu'umsh, like most Indian cultures, have long held the belief that there are spirits everywhere in nature. These spirits "made the grass and plants to grow, they caused the winds to blow and the clouds to float across the sky". Every animal and bird has been endowed with a spirit. To obtain some of the mystery power from nature, thought to be much stronger than human power, and to secure a lifelong protection of an individual spirit, every boy and girl at a certain age spends a night or a few days and nights alone, in a solitary place believed to be especially strong in supernatural power (Clark 1966).

This important ritual of initiation would usually take place in summer, when they were fasting and going to the mountains to seek visions and wait for the spirit of Animal Peoples to appear to the seeker and endow him with 'suumesh', medicine, or "spiritual power". The most important event in the life of a young man was securing the aid of a powerful spirit. Spiritual quest as the central aspect of the Schitsu'umsh prepared the initiates on the quest for guardian spirits to acquire supernatural powers based on individual talents. Long training in the meaning of the legends of the Schitsu'umsh culture, together with isolation, fasting, and other means of spiritual and physical preparation, prepared the ground for visionary experiences (Kevis 1999).

> "As the Animal Peoples had originally prepared the world, they continued to prepare and nurture the lives of individual Human Peoples. After giving up food and water for a certain number of days, the Spirit of one of the Animal Peoples, such as Elk, Wolf, or Hawk, might appear to the vision of the seeker and bestow suumesh, "medicine", translated as "spiritual power". Often in the form of a "song", suumesh could provide hunting or healing powers, and help guide an individual throughout his or her life. Acquiring suumesh was an important part of becoming an adult. Suumesh songs might entitle an individual to be acknowledged and relied upon as a shaman. The shamans would help coordinate hunting rituals and the burial of the dead, and apply their powers in healing and during collective ceremonies, such as the Winter Medical Dances" (Frey 1995).

The sweat house or sweat lodge was probably known to all Indian Tribes north of Mexico and was a very important feature in the ceremonial life of the Upper Columbia Plateau Indians. Nothing of significance was undertaken by an individual or a group without the sweat bath and its accompanying rites. Even the construction of the lodge was done according to tradition. The sweat bath had purposes of purifying the body and spirit and propitiating the spirits before the war or any other serious endeavor; it was used to invigorate the body after a hunt; to cure illness by influencing the disease, as well as to enjoy the company of other men appreciating the luxury of the steam bath (Clark 1966).

Native ceremonies were often associated with activities performed by the Schitsu'umsh as part of the food cycle. In the spring when the first bitterroot and camas were dug, they gathered together, and the chief of a camp prayed a long prayer of gratitude to Amotken, the Creator. A similar ceremony was held when the first berry crop was ripe. They also prayed to the sun for success when the buffalo hunt was about to begin.

In the fall, the hunting season started for deer, moose and black bear whose meat was an important part of the diet.

> "They killed their elk on the Clearwater Range, where they sometimes saw as many as two hundred elk at some of the licks. At the head of the Little Fork of the Clearwater, they hooked salmon out of the water as fast as they could throw them. Each family had seven or eight pack horses, and it was no hardship for them to load the entire pack train of two or three hundred horses with dry elk, mule deer and salmon" (Kevis 1999).

With the coming of winter, the Schitsu'umsh families returned to their winter houses at village sites located usually along the lake's shores and rivers' banks. The communal lodges, up to 90 feet in length, accommodated several families, each represented by a separate fire pit. Winter was the time for recreational activities, such as Winter Medicine Dances. Deer hunting and ice fishing continued throughout the winter, culminating a yearly subsistence cycle: roots and berries, fish and salmon, and game meat – each comprised about a third of the total diet (Kevis 1999).

2.1.3.2. 1492-1787: Tribal Independence

As European expansion became established within the North American Continent, treaties and formal agreements were established between the new arrivals and the established peoples. These exchanges of considerations were made to facilitate the barter of European goods for land, food, and assistance. Several historians have documented that the survival of the European settlers could not have been successful without the assistance provided by Indians (Pevar 2002).

As European settlement expanded and moved into new lands, open conflicts between the native peoples and the European settlers flared. Most controversy centered around land. Sometimes, the settlement "rights" of opposing European countries (e.g., the British and the French) would seek to create alliances with Indian Tribes with one European side to seek aid from Indians in the battle against the other European side. The Tribes would be promised peace or a cessation of land settlement encroachments. Although the foreign government leadership, on a different continent, would proclaim a cessation of the taking of Indian lands in exchange for tribal alliances in certain European conflicts, the settlers/colonists would mostly ignore the guidance of the European leader and settle Indian lands anyway (Galloway 1995).

When the American/British Revolutionary War broke into open conflict, most eastern Indian tribes initially stayed away from the conflict, regarding the fight as a "family quarrel" and leaving the dispute to settle itself (Galloway 1995). The battles that ensued spilled over into Indian Country and resulted in Indian villages being burned, battles that killed innocent Indian people, crops that were plundered, and trade routes that were disrupted during critical times of the years. All of the Revolutionary War was fought on Indian lands (Galloway 1995).

Although the European conflicts for land and domination during this time were mainly concentrated in the eastern half of the continent, the influence of the European population's spread reached from shore to shore and touched the Upper Columbia Indian tribes in a very dramatic way. As early as the mid-1770s contact with the European settlers resulted in smallpox and other disease epidemics ravaging the population of the Schitsu'umsh and brought down their population to about 500 people by 1854, from what was believed to be about 5,000 people. Human devastation had a negative effect on the social and cultural life of the Schitsu'umsh and, since the number of Tribal warriors decreased considerably, they became more vulnerable to attack.

The demographic effects of the epidemics were devastating and will never be fully understood. It may have seemed at the time to be a "spiritual apocalypse." Epidemics created a deep spiritual unease. But, except in very tragic cases, the tribes did not succumb and responded within the framework of indigenous beliefs and practices. The "natives were strong to live" according to one of the fur trader's comments. All serious diseases were interpreted as a sign of a deep unease or spiritual imbalance in the spirit world and responded to in accordance with the accepted rituals of the Tribe (Vibert 1997).

> "Native people dealt with even the most cataclysmic consequence of the early colonial encounter from within a framework of indigenous beliefs and practices. Dancing had a deep symbolical significance for the [Upper Columbia] Plateau Indians. At a large-scale religious ceremony of the year, the annual winter dance, people affirmed and displayed the power of their personal guardian spirits; "the dance itself" was a ritual means of spiritual and physical betterment." Dance has developed as a long-established response to extraordinary happenings: volcanic eruptions, earthquakes, and the like"(Vibert 1997).

2.1.3.3. 1787-1828: Agreements Between Equals

After the United States Government was formed and a Constitution was ratified, the official US position was to regard Indian tribes as having equal status with foreign nations, and efforts were made to maintain good relationships with these Indian nations (Pevar 2002). The United States government was weakened after years of Revolutionary War with England, their desire was to avoid open conflict with Indian tribes. "Indian nations were militarily powerful and still a threat to the young United States" (Porter 1998).

Indian tribes were concerned about the security of land occupancy and the protection of their sovereignty. The US Congress quickly passed laws to assure them that they would not be infringed in those respects. The Northwest Ordinance of 1787 declared: "The utmost good faith shall always be observed toward Indians; their land and property shall never be taken away from them without their consent" (US Congress 1789). In 1790, the US Congress prohibited whites from settling on Indian lands without the consent of the US federal government, restricted Euro-Americans from trading with Indians except within strict standards of conduct defined by the US federal government, and authorized the persecution of Euro-Americans that committed crimes against Indians (Porter 1998). During this time, no US federal laws were passed that limited or questioned the sovereignty of Indian tribes.

Although the US federal policies were in support of this view of Indian sovereignty, the practice of Euro-American settlers moving west into the country occupied by Indians was mostly overlooked by the US Government. Settlers moved into Indian lands, resources were taken, and open conflicts were common (Prucha 1962).

As in many other regions of North America, fur traders were the first Europeans who came into a direct contact with Indians of the Upper Columbia Plateau; at the beginning of the 1800s European fur trappers had already established their presence in the area. Their journals and trade records provide the earliest written historical record of Indian societies in the Upper Columbia. The documents written about the fur trade are many and varied, offering rich insight into a fascinating era of the initial drama of cultural encounter between the Euro-Americans and Indians (Vibert 1997).

The Lewis & Clark Expedition (1804-06) followed by the opening of the Oregon Trail (1841), opened this region to new European settlers from the east who sought property to settle in and start farming. In the 1820s, Euro-American trappers, traders and settlers began to homestead the Schitsu'umsh Territory and other Upper Columbia Tribal homelands. Industry followed homesteading as whites began to tap into the area's natural resources. Fishing, hunting (including furs), mining, and lumber communities mushroomed and dotted the region. Although the Schitsu'umsh Indians were initially friendly and helped their new European neighbors, increasing numbers of pioneers arrived with their radically different ways, which created friction (USH 2010).

Several years after meeting with Lewis and Clark (1809), David Thompson of the North West Company built the "Kullyspell House"[2] on the shores of Lake Pend Oreille, to be followed by founding the Spokane House a year later not far from Spokane Falls. Guns and other trade goods were exchanged for beaver furs. During that era, most Upper Columbia Indians were less involved in trapping furs for trade, which is explained in large part, by their different economic strategies based on gathering vegetable foods and fish rather than the products of trapping. Despite the limited nature of the trade between Indians and Euro-American people as an economic venture, it definitely proved to have had profound and long-lasting repercussions for both sides. Though short-lived, it had a lasting influence on the Schitsu'umsh. It opened access to the convenience of using European goods, making life easier; however, introduction into the Indian culture of "strong water" and further exposure to new diseases brought further ruin (Frey 1995).

2.1.3.4. 1828-1887: Relocation of the Indians

The US Federal government's position to the Indian population in the United States took an abrupt change in 1828 as Andrew Jackson took the Presidency. President Jackson's stated goal became the removal of the eastern Indian tribes to the west. This policy became the formal "removal policy" of the US federal government (Deloria 1985).

In 1846, the Columbia District, including the Upper Columbia, was divided at 49 degrees north latitude to define the separation of the British and American jurisdictions. A joint-occupancy agreement assured both Britain and the United States open trapping and trading rights in the region. The year of the boundary settlement represents an important transition in the history of Indian and non-Indian relationships in the Upper Columbia Plateau. In the 1830s, American trappers and traders were followed by missionaries and military officers on official survey duties; by late in the decade, small parties of American settlers were arriving on the Oregon Trail. At this time missionaries and settlers became the dominant Euro-American presence in the southern half of the region. Just over a decade later, miners would make their appearance in the area. By 1846, missionaries had been active in the eastern and southern plateau (Vibert 1997).

Long before the arrival of Catholic missionaries, their coming was foretold in the Schitsu'umsh oral tradition. Beginning in 1831 regional Indians kept requesting the presence of the "Black Robes" on their land. In 1842 Father DeSmet journeyed among the Schitsu'umsh and in 1848 the first mission of the Sacred Heart of Jesus was established in Cataldo to bring a dramatic change in the lifestyle of the Schitsu'umsh. They brought a new form of prayer and succeeded in establishing self-sufficient communities. They started introducing European values among the Schitsu'umsh and other tribes (Frey 1995).

The first St. Joseph Mission was built in 1842 on St. Joe River and abandoned in 1845 due to lowland flooding, it was removed to a site overlooking the Coeur d'Alene River, later named the Cataldo Mission. It was there from 1846-1853 that the missionaries and Schitsu'umsh Indians constructed a second church by hand, which is now the oldest standing building in Idaho, and a national historic landmark. In 1877, the Mission of the Sacred Heart was moved to DeSmet because of constant flooding. Initially, many families resisted religious conversion and alien theological concepts such as "redemption" and "hell". The Jesuits suppressed many ceremonial

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[2] Kullyspell House (also spelled Kullyspel House) was located on the northeast shore of Lake Pend Oreille on the Hope Peninsula, near the mouth of the Clark Fork river, just southeast of present-day Hope, Idaho. Kullyspell House was abandoned in 1811.

practices, such as the use of “*suumesh*” and the Winter Medicine Dances. Children were forced to attend the Catholic boarding school at DeSmet where they had their hair cut and were prevented from speaking their native language. Despite its initial harshness, Catholicism has become an integral part of the Coeur d’Alene Indian identity and religious practice (Frey 1995, Kevis 1999).

As early as the 1820s, before the arrival of missionaries, the Schitsu’umsh had begun cultivating their first domesticated crop – the potato. It is likely that the art of potato raising had been the result of contact with fur traders from Fort Spokane. While continuing to move with the changing seasons to hunt, fish, gather berries and dig for roots, they gradually integrated farming into their lives (Frey 1995).

In 1830, the US Congress passed the “Indian Removal Act” to authorize the President to “negotiate” with the eastern Indian tribes for their relocation to west of the Mississippi River (Pevar 2002). The discovery of gold in California in 1848 and in the Black Hills of South Dakota in 1874 brought thousands of settlers to the west who moved into Indian lands. The US Cavalry travelled with settlers to facilitate their settlement of these lands. Treaties were negotiated between the US President and the Indian tribes.

Beginning in the 1850s America's Manifest Destiny confronted the Schitsu’umsh with an ever-increasing stream of immigrants, either passing through or settling in their country. Many Euro-American people were lured by the hope of striking it rich from the gold deposits discovered in the nearby streams and mountains, and later by hard-rock mining. Others saw the fertile soils of the region as promising farm land (LLO 2002).

After the US Congress established the Washington Territory on February 8, 1853, Territorial Governor and Indian Agent, Isaac I. Stevens began acquiring title to lands held by native peoples to make it “available to white settlers” in what has been characterized as a "rather heavy-handed" and "intimidating" manner. His negotiations established a series of treaties with the areas’ tribes. To accommodate land-hungry Euro-American settlers, Territorial Governor Stevens drew up treaties for the Indians to sign, which said Indian Tribes would relinquish claim to a substantial portion of their homelands in exchange for promises from the US Government to be provided in the future (Pevar 2002).

By the 1850s, the Indians of the Pacific Northwest were beginning to lose their traditional homelands through government treaties, American military force, and a relentless increase of land settlement by European settlers in the region. By 1855, Territorial Governor Stevens had negotiated treaties with several Indian tribes in the region, but “as Superintendent of Indian Affairs” he had not negotiated with many others, including the Schitsu'umsh (Kevis 1999).

It was the West Point-trained Governor Steven’s intention to confine as many tribes as possible to rather limited reservations, thus opening up vast tracks of the land for Euro-American immigrant settlement. As a treaty was not at the time initiated with the Schitsu’umsh, the entire 5-million acre aboriginal territory of the tribe remained the sovereign domain of the Schitsu’umsh. In 1854, Governor Stevens directed Capt. John Mullan to survey and begin construction of a 600-mile road linking Fort Benton on the Missouri River with Fort Walla Walla near the Columbia River, running through the heart of Schitsu’umsh country. The consent of the tribe was neither sought nor given. With the steady stream of Euro-American settler encroachment onto Indian lands, and the U.S. government unable and unwilling to control these unlawful trespasses, tensions steadily escalated (LLO 2002).

As the Northwest region became settled by Euro-Americans, immigrants demanded military protection by the US Government along with roads and railroads to meet their growing economic and social needs. With this increasing regional pressure by Euro-American settlers (miners, railroad exploration parties, fur trappers) onto the Schitsu'umsh lands in the second half of the 19th century, tensions between Indians and Euro-Americans became more pronounced and led to open conflicts (Kevis 1999). Discontent spread among Indians over the situation. The US Government sent military troops to confront the interior region Indians (Ruby & Brown 1988).

In 1854, the watercourse known as "Latah Creek" received its current name, "Hangman Creek". According to reports, a Palouse Indian named Qualchan, discovered an American cavalry outpost while traveling alone. He was said to have prayed to the god of the mist to disarm the camp's sentries, and as a result, it began to snow, and when the snow had changed into a blizzard, Qualchan led the whites' horses out of the camp, and took them to his camp on the Columbia River (Frey 2001). His war party was later discovered, and after a brief war, called the "George Wright War", "Spokane-Coeur d'Aléne War", or the "Big Fight", Qualchan and six other Palouses were captured and hanged along Latah Creek, giving it the now more commonly used name, Hangman Creek. On 5 October 1854, four more Indians were hanged alongside the creek. In November, 33 Indian hostages were released, ending the war (Ruby & Brown 1988).

In May 1858, Lieutenant Colonel E. Steptoe led a detachment of some 150 poorly equipped troops and 50 Nez Perce Indian scouts through *Schitsu'umsh* Tribal territory. The *Schitsu'umsh* warriors outnumbered the American soldiers and defeat of the American armed forces was imminent. The *Schitsu'umsh* forces negotiated the American Soldiers' retreat in exchange for a promise that the American armed forces would leave the area. The *Schitsu'umsh* forces guaranteed the soldiers' safe passage out of *Schitsu'umsh* country. Although the confrontation ended without the annihilation of either side, the American forces took the retreat as an embarrassment.

The Coeur d'Alene War (1858) was fought (also called the Spokan War or the Steptoe-Wright War) between the US Calvary and the Schitsu'umsh, Spokan, Palouse, Yakama, and Northern Paiute Tribes (Whitman Mission 2002). This was a campaign by the American forces led by Colonel G. Wright against the Indians which ended in total defeat of the Indian alliance in the Battle of Four Lakes (September 1) and the Battle of Spokane Prairie (September 9). Wright's forces included 600 troops (Whitman Mission 2002).

In 1859, the Schitsu'umsh signed a Peace Treaty with the United States under the terms of which they agreed to open up their land for the construction of the military road from Fort Walla Walla to Fort Benton (the Mullan Trail). Later, in the 1870s, the Schitsu'umsh also granted a right-of-way for building the railroad through their lands to Wardner, Idaho Territory.

The Schitsu'umsh Tribe and the US Federal Government negotiated during the course of two decades to determine the extent of the Coeur d'Alene Reservation (Camden 2001):

1867: President Andrew Johnson sets aside the first Reservation land for the Coeur d'Alene Tribe, although the Bureau of Indian Affairs never told the Tribe of President Johnson's executive order.

1871: The Tribe petitioned for a Reservation, and was told of the boundaries in Johnson's order but replied that the boundaries were not adequate because they did not provide for fishing and other traditional uses of the lake.

1871: The US Congress abolished the treaty process recognizing tribes as sovereign nations. The US Government then followed a policy of creating "agreements" by Presidential Executive Order pertaining to the creation or redefinition of reservations.

1873: The Coeur d'Alene Tribe agreed to give up claims to land outside the new Reservation if it would be compensated. The new Reservation was negotiated to include all of Coeur d'Alene Lake and part of the St. Joe River. Congress never ratified the agreement and payment to the Tribe was never made, but President Ulysses S. Grant ordered the Reservation boundaries to be identified.

1885: The Coeur d'Alene Tribe again petitioned the US Government for a treaty because Congress had not ratified the previous agreement. Congress passed a law to again negotiate the 1873 boundaries with the Coeur d'Alene Tribe.

1887: The Coeur d'Alene Tribe again agreed to give up its claim to land outside the Reservation if it would be compensated. In exchange, the Reservation, which would include the lake, "would be held forever as Indian land." The agreement was never ratified by Congress and the Coeur d'Alene Tribe was never compensated.

1888: The Secretary of the Interior told Congress that the Coeur d'Alene Tribe retained navigation rights to all the lake except for a small sliver of the north side. Congress granted a railroad a right of way through the Coeur d'Alene Reservation in exchange for payment to Coeur d'Alene Tribe.

1889: The Coeur d'Alene Tribe and the US Government negotiated a new treaty.

June 1890: The Senate ratified the agreement with Coeur d'Alene Tribe, and sent it to the House.

1891: The House ratified the agreement with the Coeur d'Alene Tribe for the Coeur d'Alene Reservation.

The new Euro-American settlers soon discovered the exploitable riches of the Schitsu'umsh territory: minerals in their mountains, vast stands of timber in the hills, navigable waters on the lakes and rivers, and fertile farmlands in the valleys. During a series of treaty negotiations and congressional actions the Schitsu'umsh were pressured to vacate their rich mountains, hills, waters and valleys, and to remove to a southwestern corner of their ancestral homelands (Palladino 2000). Under these pressures, the Schitsu'umsh signed agreements to reduce their approximately 5 million acres to 345,000 acres in 1889. That Treaty was ratified by the US Congress on March 3, 1891. It included Coeur d'Alene Lake; reserved for the "exclusive use of the Coeur d'Alene Indians" (Ruby & Brown 1988, Palladino 2000).

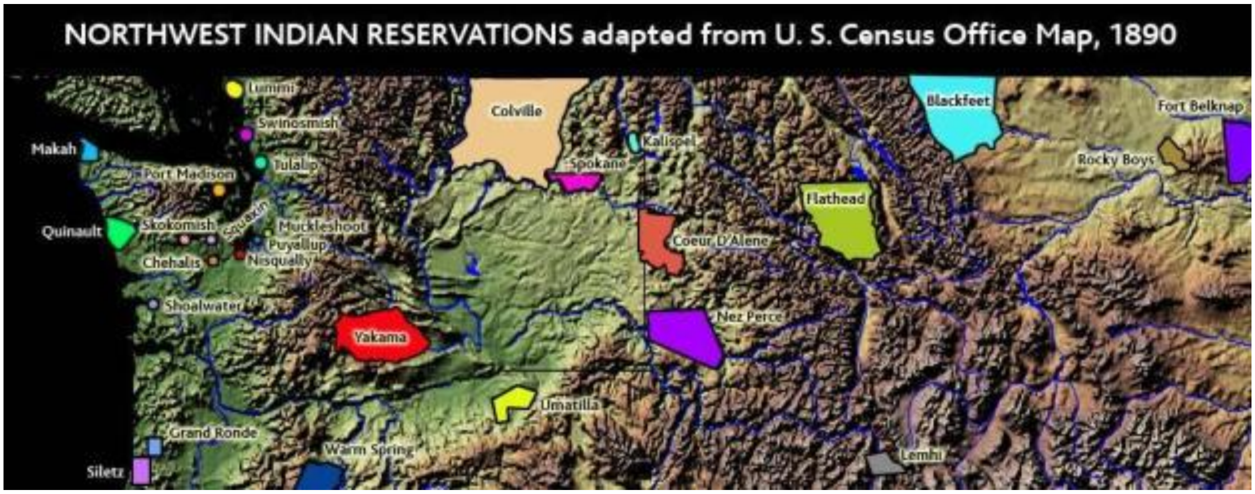
Much of the former territory was taken away without remuneration for ceded lands. Treaties were negotiated but not ratified by congress. After more petitioning, another Indian Commission came to the Coeur d'Alene Indians in 1888 wanting to buy the northern part of the reservation for the US Government. Andrew Seltice was the Coeur d'Alene Tribal Chief at the time. He commented on endless procrastination of the US Government on the issue (Kevis 1999):

> "What was done by the last commission is like cooking dinner, then setting it to one side to wait; you do not cook a dinner and set it aside, then cook another dinner before you have eaten the first; it is the way with these treaties.
>
> "I, as an Indian, like my land, am very anxious to have my land, I do not care about money.
>
> "My dear friends, if our object was money, you would be correct, but money is no object; our land we wish to keep."

The ratification of the 1889 Treaty, on March 3, 1891, ended many years of treaty negotiations between the US Government and the Schitsu'umsh Tribe. The Schitsu'umsh Tribe yielded

2,389,924 acres of their lands, or nearly forty percent of the northeastern portion of the ancestral homelands, where Euro-Americans had established themselves (Figure VI). Through a series of compromises, the Schitsu'umsh Indians received title to a portion of their original homeland. Unlike some other Indian tribes, they were not moved to a reservation away from their own historical lands (Ruby & Brown 1988).

Figure VI. Northwest Indian Reservations, circa 1890 (WSHS 2010).



2.1.3.5. 1887-1934: Allotment and Assimilation

US Federal Indian policy between 1887 and 1934 was forged by the desire to acquire additional lands from Indians for settlement by Euro-Americans, and the desire to assimilate Indians into Euro-American society.

The Dawes Act of 1887 (General Allotment Act) adopted by the US Congress, sought to break up the large communal Indian treaty lands throughout the country by granting individual allotments and then opening up the rest of the reservations for Euro-American settlers. The Coeur d'Alene Tribe energetically resisted this individual allotment process until 1909, when Congress mandated that the Coeur d'Alene Reservation lands be "allotted in severalty" to each individual living Indian, and that remainder be "opened to public entry" (Palladino 2000).

By the 1890s, the Coeur d'Alene Indians were known as successful farmers of oats, potatoes, and wheat using the state-of-the art farm equipment, and living in permanent homes. In 1893 the Coeur d'Alene Indians were considered the wealthiest Tribe in the Pacific Northwest (Peltier 1975). They continued to diversify their crops, buy machinery and equipment and invest their treaty settlements. Colonel John Lane, U.S. Special Indian Agent, reported from DeSmet, February 6, 1894 (Kevis 1999).

> "It has been my pleasure to visit many reservations, but this one surpasses by far any that I have ever seen for nice homes and beautiful farms".

In 1909, the Allotment Act resulted in a reduction in size of individual holdings and an opening up of the unused land to Euro-American ownership. Each living Coeur d'Alene Indian, and other Indians living with them, received an individual restricted "trust" title to 160 acres of their choosing. This process required merely 104,076 acres for Indian allotments, about one third of the reservation. The remaining two thirds, 219,767 acres, were opened by the US Government to public entry (Palladino 2000, Ruby & Brown 1988).

The Allotment Act of 1909 resulted in a significant reduction in size of individual land holdings, rendering most agricultural practices infeasible. Once successful farmers, by 1921 only four Coeur d'Alene Tribal families were able to productively continue farming their allotments (Frey 1995). In the short space of eighty years the Coeur d'Alene Tribe changed from food gatherers and hunters of small game, to horsemen and buffalo hunters, then to farmers and, finally, to owners of land that they do not themselves use, but from which they live through land rents paid by non-Indians (Reichard 1947).

In the greatest lottery of Idaho's history, over 100,000 eager individuals crowded into the City of Coeur d'Alene in 1909. They drew lots on 1,350 parcels of Indian land that the government opened to legal settlement. By the following year, Tribally-owned land on the Coeur d'Alene Reservation was reduced in size by two thirds, and their land became checker-boarded, between Indian and non-Indian settlers (Palladino 2000).

The Dawes Act was calculated "to hasten the process of making Indians more individualistic in the American style" by breaking down Tribal sovereignty. Allotments were held in fee simple status for a twenty-five year period, which some agents urged be reduced for "advanced age" Indians. The allotment system created many problems for not only those receiving tracts but also those administering them. The Federal Indian Office was swamped with numerous inquiries from agents, many pertained to people's eligibility for allotments (Ruby & Brown 1988).

In some areas Indian land patents needed to be protected in the face of strong railroad and land-company opposition. During the 1880s, George A. Truax, a Farmington, Washington, Euro-American pioneer became interested in securing a right-of-way across the Coeur d'Alene Reservation for the Washington and Idaho Railroad. The railroad was supposed to provide transportation to the mining areas of the Silver Valley of the Coeur d'Alene Mountains, and at the same time provide for the transportation of the Tribal members' crops. Reimbursement was granted for the right-of-way (Kevis 1999). A late 19th century railroad promoter wrote "when the locomotive came the red man knew his fight against the civilization was at an end." The statement was an oversimplification, yet railroads had important repercussions on Reservation Indians, as they did on the population at large. The railroads' major impact on the Tribe was felt by the end of the 19th century with the passage of an act on March 2, 1899, by which railroad companies could receive blanket approval from the Secretary of Interior for a right-of-way through Indian lands without Tribal consent.

2.1.3.6. 1934-1953: Indian Reorganization

Indian landholdings in the United States were reduced by nearly two-thirds between 1887 and 1934. Thirty years after passage of the Dawes Act, approximately three million Reservation acres had been alienated in Washington, Oregon and Idaho alone. The process was reversed by passage of the Wheeler-Howard Indian Reorganization Act (IRA) of 1934 (see below), which returned to Indian Tribes some autonomy and ended the loss of Reservation lands by Indians and encouraged Tribes "to set up democratic governments for management of their Reservations". The Farm Chapter was organized by the Coeur d'Alene Tribe to help assimilate the benefits of the change of policies and compensate for losses to Coeur d'Alene Indians from the Indian wars of 1850s. Subsequent federal legislation permitting Indians social and economic programs meant further assimilation of the white culture.

The worldwide Great Depression greatly affected the US government by limiting the ability and the desire for non-Indians to acquire Indian lands. Cultural movements within the US began to educate non-Indians about the shaping of federal policies during the previous 150 years that led to extreme poverty, devastating epidemics, inadequate food, and substandard education. Public criticism by non-Indians, spurred President Franklin D. Roosevelt to drastically change many important federal policies in regards to Indians and tribes (Pevar 2002).

Discontent with the allotment policy caused the President Roosevelt appointed Commissioner of Indian Affairs, John Collier, to urge Congress to pass the Indian Reorganization Act (IRA) of 1934, [25 U.S.C. Sec. 461-479]. The goal of the IRA was to stem the loss of Indian lands and to assist Indians in acquiring land adequate for self-support. The purpose of the Act was "to rehabilitate the Indian's economic life and to give them a chance to develop the initiative destroyed by a century of oppression and paternalism." (quoting H.R.Rep. No. 1804, 73d Cong. 2d Sess., 1 (1934)). The IRA rejected assimilation as a goal and instead sought Indian self-determination. The Act specifically addressed the problem of the loss of Indian land and authorized the Secretary of Interior to acquire land in trust "for the purpose of providing land for Indians" (Courts.gov 2010).

The IRA sought to revitalize tribal governments and tribal members. It strengthened tribal rights to hold title to land and to acquire additional lands, and to stop the allotment process that caused substantial tribal holdings to be divested without their consent.

In addition, the IRA facilitated the US Federal recognition of tribal constitutions and self-governance policies. Although the tribes exercised self-determination since time-immemorial, the recognition of tribal governments through a process of formalization led to several significant cooperative arrangements between recognized tribes and the US Federal government. Shortly after the passage of the IRA, the Secretary of the Interior drafted a model constitution for tribes to consider for adoption. This model constitution called for the formal, written identification of the adopting Tribes' governmental structure and governmental powers (Pevar 2002).

In addition to the written consistency for adopting tribal governments, the IRA created several programs for those tribes that adopted a "consistent constitutional format" intended to benefit the tribe. These programs included: the power to employ legal counsel (recognized by the US government), negotiate contracts with state, federal, and local governments, and to prevent the disposition of tribal property by the Secretary of Interior or Congress without the tribe's permission.

Title 25, U.S. Code, Chapter 14, Subchapter V § 476: Organization of Indian tribes; constitution and bylaws and amendment thereof (LII 2010).

"(d) Approval or disapproval by Secretary; enforcement

> (1) If an election called under subsection (a) of this section results in the adoption by the tribe of the proposed constitution and bylaws or amendments thereto, the Secretary shall approve the constitution and bylaws or amendments thereto within forty-five days after the election unless the Secretary finds that the proposed constitution and bylaws or any amendments are contrary to applicable laws.
>
> (2) If the Secretary does not approve or disapprove the constitution and bylaws or amendments within the forty-five days, the Secretary's approval shall be considered as given. Actions to enforce the provisions of this section may be brought in the appropriate Federal district court.

"(e) Vested rights and powers; advisement of presubmitted budget estimates

> In addition to all powers vested in any Indian tribe or tribal council by existing law, the constitution adopted by said tribe shall also vest in such tribe or its tribal council the following rights and powers: To employ legal counsel; to prevent the sale, disposition, lease, or encumbrance of tribal lands, interests in lands, or

other tribal assets without the consent of the tribe; and to negotiate with the Federal, State, and local governments. The Secretary shall advise such tribe or its tribal council of all appropriation estimates or Federal projects for the benefit of the tribe prior to the submission of such estimates to the Office of Management and Budget and the Congress.

"(f) Privileges and immunities of Indian tribes; prohibition on new regulations

Departments or agencies of the United States shall not promulgate any regulation or make any decision or determination pursuant to the Act of June 18, 1934 (25 U.S.C. 461 et seq., 48 Stat. 984) as amended, or any other Act of Congress, with respect to a federally recognized Indian tribe that classifies, enhances, or diminishes the privileges and immunities available to the Indian tribe relative to other federally recognized tribes by virtue of their status as Indian tribes.

"(h) Tribal sovereignty

Notwithstanding any other provision of this Act—

(1) each Indian tribe shall retain inherent sovereign power to adopt governing documents under procedures other than those specified in this section; and

(2) nothing in this Act invalidates any constitution or other governing document adopted by an Indian tribe after June 18, 1934, in accordance with the authority described in paragraph (1)."

In order for a tribe to "qualify" under the IRA, the tribe's constitution had to be "approved" by the Secretary of Interior (see item (d) above). The Secretary of Interior required the constitutions that were submitted for approval to hold clauses that subjected the tribes to receive Secretarial approval to every tribal ordinance before it could become effective. This clause was viewed by many tribes as a means of limiting tribal sovereignty and as a result many tribes rejected the IRA's participation requirements. The IRA was accepted by 181 Tribes nationally, and rejected by 77 Tribes.

Since that time, the Secretary of Interior has notified "IRA Tribes" (those that formed a government structure under the requirements of the IRA), that they may amend their constitutions and eliminate the requirement of Secretarial approval of their ordinances. Many tribes, but not all, have made this modification (Pevar 2002).

Today, many tribes, including the Coeur d'Alene Tribe, have a government based on executive, legislative and judicial branches. The Coeur d'Alene Tribal Council has seven members and operates on a parliamentary system, with members elected by tribal vote and the chairman elected by vote on the Council. Although he or she would serve as chief executive, the Chairman only votes in the case of a tie and does not have veto power.

The Coeur d'Alene Tribe and all federally recognized tribes in the United States are sovereign in their own lands. That Sovereignty is inherent in the U.S. Constitution, meaning that tribes were recognized as sovereign before the US constitution was written. Tribes and the U.S. government have a long series of treaties or executive orders establishing reservations and tribal rights and authorities. Tribal treaty-making also existed with the British, French, Dutch, and Spanish governments before the birth of the United States as an independent nation.

As elected officials, members of the Coeur d'Alene Tribal Council have a unique governing experience. Their responsibilities include maintaining a government-to-government relationship with federal and state governments. The Coeur d'Alene Tribal government also must deal with elected officials from city and county governments within the Reservation.

Coeur d'Alene Tribal Council members meet with members of the US Congress, cabinet, state governors and even the president of the United States, resolving issues and conducting government business.

During the years following the IRA, new options for tribal self-government within the recognition of the US government was realized. The decades following 1931 witnessed an increased federal-state cooperation toward improved Indian health care, welfare, agriculture and education. Congress created the Indian Claims Commission to work with Indian tribes to seek fair settlement for their land claims. That allowed the Coeur d'Alene Tribe to receive some form of compensation for their losses in land and resources as a percentage of their true value.

After the Second World War the government became ever more entangled by conflicting ideologies in its Indian policies. Some spokesmen continued the suppression of traditional Indian culture, while others tried to rectify previous wrongs done to Indians. A program adopted in the 1950s to terminate reservations failed to take into account the basic Indian need for land and was soon reversed (Ruby & Brown 1981).

2.1.3.7. 1953-1968: Termination

The benevolent attitude reflected in the IRA was short-lived. In 1949, the Hoover Commission issued a report recommending the "complete integration" of Indians into white society. It gave support from the supposition that this process was "in the Indians' best interests", and would also save the US Federal Government money (Pevar 2002). President Dwight D. Eisenhower took office in 1953 and directed the abandonment of the IRA's goals. The policy that replaced the IRA was called the "termination" of the tribes' trust relationship (Norton 2002).

In 1953, Congress adopted House Concurrent Resolution 108 (popularly known as the "termination policy"). In order "to end [Indians'] status as wards of the United States," this resolution sought to extinguish the political status of tribes and their trust relationship with the United States. Between 1953 and 1968, more than 100 American Indian tribes were "legally terminated", thus severing federal trust obligations, and more than 1,360,000 acres of Tribal land were transferred to the public domain, privatized, and sold. To make matters worse, the BIA, through its Direct Employment Program (better known as the "relocation program"), induced American Indians to move from rural to urban areas, where employment prospects were thought to be better. Between 1953 and 1970, "relocation centers" in Los Angeles, San Francisco, Denver, Minneapolis, and Chicago drew more than 90,000 Indians away from their reservations. In effect, termination was the ultimate assimilation policy (Buck 2008).

Given the absolute linkage between tribal culture, the sense of place, and the dependence on the land they live on, the liquidation of a reservation and the disposal of tribal lands as surplus to be sold "at auction" was a threat felt acutely by all Indians and tribes (Deloria 1969).

2.1.3.8. 1968-Present: Tribal Self-Determination

Tribal Sovereignty was again recognized as Federal Indian Policy by the US government shifted again. President Lyndon Johnson declared, "We must affirm the right of the first Americans to remain Indians while exercising their rights of Americans. We must affirm their rights to freedom of choice and self-determination" (Pevar 2002).

The civil rights movement of the 1960s led to the re-examination by the federal government of the termination policy (Etcitty 2004). In a 1970 special message to Congress, President Richard M. Nixon, the Vice-President during the termination era, called for a new federal policy of "self-determination" for Indian nations by denouncing it when he stated, "this, then, must be the goal of any new national policy toward the Indian people; to strengthen the Indian sense of autonomy without threatening his sense of community" (Rothenberg 2006). Thereafter, Congress enacted numerous laws that ostensibly supported self-determination and economic development for Indian tribes, including the Indian Tribal Government Tax Status Act of 1982.

This policy has received continued support through both congressional and presidential actions, as indicated by the following remarks by President Ronald Reagan in his January 24, 1983, American Indian policy statement (Etcitty 2004):

> ". . . Instead of fostering and encouraging self-government, [f]ederal policies have by and large inhibited the political and economic development of the tribes. Excessive regulation and self-perpetuating bureaucracy have stifled local decision-making, thwarted Indian control of Indian resources, and promoted dependency rather than self-sufficiency . . . The economics of American Indian reservations are extremely depressed with unemployment rates among the highest of the country. Indian leaders have told this Administration that the development of reservation economies is their number one priority. Growing economies provide jobs, promote self-sufficiency, and provide revenue for essential services . . . Tribes have had limited opportunities to invest in their own economies because often there has been no established resource base for community investment and development. Many reservations lack a developed physical infrastructure including utilities, transportation and other public services . . .The federal government's responsibility should not be used to hinder tribes from taking advantage of economic development opportunities . . . A full economic recovery will unleash the potential strength of this private sector and ensure a vigorous economic climate for development which will benefit not only Indian people, but all other Americans as well."

The Self-Determination Act of 1975 and the Self-Governance Act of 1995 opened the way for Indian Tribes and the US Government to enter a new relationship. This was the beginning of significant changes in the federal policies after nearly a century of forceful assimilation and establishment of sovereign rights of tribal governments. The IRA meant the end of the allotment process and more religious and cultural freedom for Indians. In 1968 the US Government amended the existing law to require the consent of Indian Nations before states could assume jurisdiction. By 1986 Congress renewed its nation-to-nation relationship with many of the previously terminated tribes.

The members of the Coeur d'Alene Tribal Council were elected in 1936. In 1947 the Coeur d'Alene Tribe established its own Constitution under which a council form of government was accepted. The council is made up of an elected chairman and six board members, each serving three-year terms.

In 1992, the Coeur d'Alene Tribe's Department of Natural Resources assumed complete administrative responsibilities from the Bureau of Indian Affairs for the environmental and natural resource management of the reservation. The department expanded its scope to include programs in fisheries, forestry, wildlife, water resources, air quality, pesticides management, and environmental programs. In coordination with various state and federal agencies, the Coeur d'Alene Tribe has adopted the program of mining pollution cleanup efforts throughout the Coeur d'Alene River basin. The over hundred years of mining along the south fork of the Coeur d'Alene River has produced heavy metal pollution of such contaminants as lead, cadmium, mercury and arsenic. With the annual spring runoffs and flooding, the pollution has extended into Coeur d'Alene Lake and the Spokane River. To address and reclaim the health and wellbeing of the lake and rivers, and the animals and plants of the area, the Coeur d'Alene

Tribe's Department of Natural Resources initiated its own Natural Resource Damage Assessment and began litigation with the mining companies (Frey 2002).

President Barak Obama, in 2009, stated (White House 2009):

> "My Indian policy starts with honoring the unique government to government relationship between tribes and the federal government and ensuring that our treaty obligations are met and ensuring that Native Americans have a voice in the White House.
>
> "Indian nations have never asked much of the United States, only for what was promised by the treaty obligations made by their forebears. So let me be clear: I believe that treaty commitments are paramount law, I'll fulfill those commitments as President of the United States."

Currently, the Coeur d'Alene Tribal government functions as any other sovereign nation. It has its own police force and court system as well as 18 separate tribal departments. As a function of the Justice Department, the Tribe asserts civil jurisdiction over all inhabitants living within the Reservation's boundaries. Health care is provided by the Tribe's Benewah Medical Center and Wellness Center, both located in Plummer. In addition to public school system, a tribal school at DeSmet serves children of the elementary grade levels. These facilities provide educational, health and wellness services for all the residents of the reservation, both Indian and non-Indian alike. A tribally run farm of about 6,000 acres is one of the operations overseen by the Tribe's Economic Development Corporation (LLO 2002).

The Reservation's economy is based mostly on its productive agriculture. The Coeur d'Alene Tribe's 6,000 acre farm produces wheat, barley, peas, lentils and canola. The Reservation's countryside includes about 180,000 acres of forest and 150,000 acres of farmland, most of that farmland owned by private farmers. The Reservation's land also produces about 30,000 acres of Kentucky Blue Grass. Logging is another important component of the economy and source of revenue for the Tribe. Only selective cutting of forests is undertaken on Tribal land. Clear cuts are banned.

Tourism, including tribal gaming operations (Coeur d'Alene Casino near Worley), continues to grow and positively impact the local and regional economy.

"The shadowy St. Joe" is one of North America's premier trout streams, flowing from the Idaho-Montana line down to the south end of Lake Coeur d'Alene. The lower St. Joe is the highest elevation navigable stream in the world, and a waterway for the tugboats that push giant log booms to lumber mills along the Spokane River far to the north.

2.2. Demographics

In 2009, the Coeur d'Alene Reservation had a population of about 6,000 (Census 2000). Approximately 22% of the population on the Coeur d'Alene Reservation is American Indian or Alaska Native. The majority of the population is composed of non-Indian people representing 78% of the total population. Coeur d'Alene Tribal population is approximately 2,100 tribal members and about half of the Coeur d'Alene Tribe's members reside on the Reservation (CEDS 2009).

The population and demographic statistics (Table 1) are extracted from the Coeur d'Alene Tribe 2009 CEDS unless otherwise noted. Across the Coeur d'Alene Reservation, approximately 56% of the total population range between the ages of 20 and 64, and according to the Census (2000).

Table 1. Population and Demographics, Census (2000).

Attribute	Number
Coeur d'Alene Indian Enrollment (CEDS 2009)	**2,100**
• Living on the Coeur d'Alene Reservation	1,050
• Living off the Coeur d'Alene Reservation	1,050
Population Living on Coeur d'Alene Reservation	**6,551**
• American Indian or Alaskan Native	1,251
• Non-Indian and non-Alaskan Native	5,300
Total Population by Age (living on Coeur d'Alene Reservation)	
• Less than 19 years	2,006
• 20 to 64 years	3,672
• 65+ years	873
Housing Tenure	
• Occupied Housing Units	**2,486**
○ Owner-occupied housing units	1,963
○ Renter-occupied housing units	523
• Vacant Housing Units (seasonal, recreational, occasional use)	1,308

2.3. Cultural Resource DRAFT Policy

For all Cultural Resource information and consultation: be aware that this is confidential information for the purposes of the project at hand only. The level of sensitivity of the information will vary by project.

The Tribal Historic Preservation Officer (THPO) has prepared a summary of tribal policies related to cultural resources as they relate to potential pre-disaster mitigation measures and emergency responses to natural disasters. These statements of policy should be considered for planning purposes related to the preparation of this document and not taken as a specific statement to tribal policies related to all cultural resources for other situations.

Cultural resources include artifacts, land use practices, traditions, language and more. Impacts to these that involve federal triggers (e.g. federal grant or agency money, permits, lands, etc.) require THPO involvement per Section 106 of the National Historic Preservation Act, 36 CFR 800, http://www.achp.gov/nhpa.html. For other projects, it is prudent to involve the THPO and/or cultural resource program early in the process to avoid potential costly delays in implementation. Removing or disturbing cultural resources prior to planning or designing or implementing or funding a project in order to circumvent cultural resource law is illegal.

For projects with design and/or planning stages:

- Contact THPO early in the process. Ground disturbance, changes to structures, and even priorities planning can have cultural resources impacts.
- Information helpful to the cultural resource assessment:
  - maps, design plans, proposed areas for materials staging, depth of ground disturbance, planned changes to structures (e.g. weatherization, fire proofing, etc), proposed work schedule, reference any federal money, permit, license, or land that may possibly be involved, contact person for the project. A copy of the current internal information sheet is available from the Tribal Historic Preservation Officer.
- If there is federal money, permit, license, etc., involved with the project, the lead federal agency will do the consultation or delegate it to the Tribe or other local entity.

- Include inadvertent discoveries plans in the project plans and contracts.

For projects with no design or planning stage (e.g. fire, tornado, landslide):

- Contact THPO or designee as soon as possible.
- Cultural resources do not take precedence over immediate threats to life.
- Involve THPO or designee in clean up or other post-crisis planning.
- Note that THPO and other cultural resource staff are hazmat and/or First Aid/CPR trained and qualified to be on cleanup and disaster sites.

For Inadvertent Discoveries of Cultural Resources:

- Contact THPO or designee immediately.
- Do not move, photograph, or discuss the items with anyone other than cultural resource staff.
- Stop work in immediate area, generally considered to be a 100 foot radius, and remove staff/contractors from that area.
- THPO or designee will come as soon as possible. Usually within the hour.

For Inadvertent Discoveries of Possible Human Remains:

- Contact THPO or designee immediately.
- Remember that this could be a crime scene. If it obviously is, contact Tribal law enforcement.
- Absolutely no photography (no cell phone photos, no cameras, etc).
- Cover the suspected remains with soil, plain cloth, or similar.
- Stop work and remove staff/contractors in a 100 foot radius around the remains.
- Inform those present about the confidential nature of the issue.
- Provide security by having a senior staff/contractor stay with the remains, at the edge of the 100 foot radius until THPO or cultural resource staff arrive.

2.4. Schools

Traditionally, extended families sharing life in a single household provided many teachers for their children. As children grew up, they learned about all aspects of Schitsu'umsh life and participated in the life of the parents and community. They learned practical skills, including weaving, tool construction, carving, hunting, fishing, root and plant gathering, culture, and other aptitudes. Parents, with tribal elders, were the main instructors of language, oral history, legends, plant use and social development. This kind of education provided Schitsu'umsh children with necessary survival skills and intellectual challenges; it also encouraged community support and cooperation among all members of the family through study of natural environment and legends.

The Office of Indian Affairs believed that “civilizing” the Indians by separating them from their traditional ways of life and surrounding would only be succeeded through instruction in the English language and exposure to western religion.

The Coeur d'Alene Tribal School is a tribally controlled Grant School funded by the Bureau of Indian Affairs. Enrollment is approximately 80 students in grades K-8. The school is located in DeSmet, Idaho on the southern end of the Coeur d'Alene Reservation. The Mission of the Sacred Heart was originally established on the St. Joe River and then moved to DeSmet in

1877. A year later a Mission School was started. When it closed in 1978 the Coeur d'Alene Tribal School was established (CdA Tribal School 2010).

2.5. Population Density Indices

Current population density trends on the Coeur d'Alene Reservation have been determined based on the location of structures within the Coeur d'Alene Reservation and extending 5 miles in each direction surrounding it. This analysis approach has been defined by Schlosser (2010) in the development of Wildland-Urban Interface (WUI) population density indices and is used here (Figure VII). These assessments indicate where the relative density of structures is located. Structures are used as a surrogate for population density, although the number of people living in each structure is not consistent between neighborhoods, and not within one community. As a planning tool, these population density indices indicate where high density is currently located in juxtaposition to other high and low density areas.

In Figure VII, the limited white colored areas, located inside the northeastern exterior boundary of the Coeur d'Alene Reservation indicate areas of wildlands; where no structures currently exist. More expansive bright-yellow colored areas can be referred to as rural lands where there are a scattered number of structures located. The rural areas identified within the Coeur d'Alene Reservation encompass approximately 152,357 acres and include 310 structures giving a density of about 491 acres per structure (Table 2). The areas colored in shades of brown represent the suburban population densities (the higher the concentration of structures the darker the brown shading) on the Coeur d'Alene Reservation. Approximately 186,257 acres are in this category of population density with about 3,700 structures, giving a structure density of roughly 50 acres per structure. All of the brown-shaded colored areas are consistent with a suburban population density (Table 2). Within the City of St. Maries the density of structures increases to the level of what can be considered low density urban. In this area of 386 acres (including only areas within the Coeur d'Alene Reservation), the number of structures is approximately 210, giving a structure density of approximately 1.84 acres per structure.

Because this area of high population density is split almost perfectly in half by the external boundary of the Coeur d'Alene Reservation, and because this high population density area is surrounded by areas not currently available to housing expansion (within the St. Joe River floodplain and to the south of St. Maries where many acres of forest industry lands are located), the areas surrounding the low density urban give way to a 'rapid decompression' of structure density as the move to high density suburban is seen (Table 2). The transition from high density suburban with 19 acres per structure, transitions to 8 acres per structure in the moderate density suburban because of the land tenure characteristics of this area, and which properties are available for developments, and which are not available.

Table 2. Structure Density on the Coeur d'Alene Reservation.

Population Density Classification	Acres (approximate)	Number of Structures	Density (Acres per Structure)
Low Density Urban	386	210	1.84
High Density Suburban	2,295	119	19.28
Moderate Density Suburban	5,063	634	7.95
Low Density Suburban	178,909	2,737	65.37
Rural Lands	152,357	310	491.47
Wildlands	4,960	0	N/A
Total, Average	343,970	4,010	81.51

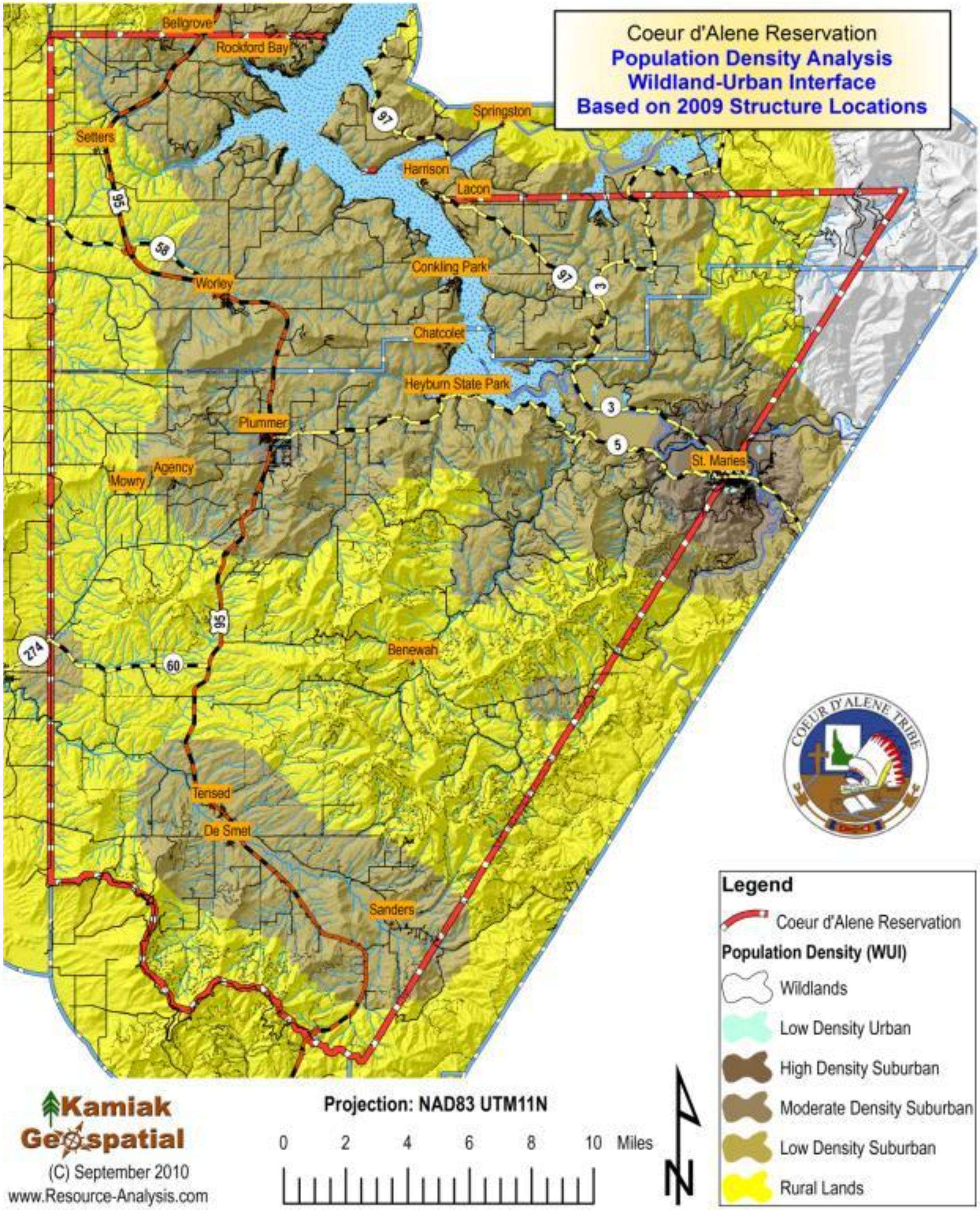
A time-series study of this analysis procedure in this region, and other areas, has revealed that populations will tend to grow into two different areas unless regulated through planning and zoning efforts to direct or limit the expansion of growth.

The first area of growth pressures is the occupation of those areas that are in the low density suburban category and located between two disjunctive areas of higher population density. This is the case as seen (Figure VII) between DeSmet/Tensed and Sanders along US95. When compared with the estimates of population density using 2004 data, both of these communities were considered in the lowest density suburban category with rural lands separating the two (Schlosser 2005). Today, these communities are joined together in low density suburban structure density. A similar increase of structure density can be observed between Plummer and St. Maries. The analysis completed by Schlosser (2005) using structure locations in 2004 revealed a narrow corridor along State Highway 5 with a density profile consistent with rural lands and low density suburban. As of 2009, the structure density has expanded considerably into low density suburban to the complete exclusion of rural lands along this corridor. In addition, the expansion within and adjacent to recognized communities (such as Plummer and St. Maries) has increased.

The second area of development pressures are generally in those areas that are in the situation of rural lands (yellow zones on Figure VII). Development trends also attempt to populate those areas of “remoteness” and seclusion. This case is apparent within the Benewah Valley. The analysis completed by Schlosser (2005) using structure locations in 2004 revealed that all of the Benewah Valley was in the category of rural lands just 5 years previous. As of 2009, the structure density along the northern extent of this valley (leading to Coeur d’Alene Lake) has increased to the category of low density suburban (Figure VII).

Other factors of population density growth are expected along major transportation corridors such as state and federal highways and within areas with services such as fire protection. Planning and zoning efforts often attempt to favor desirable growth management areas.

Figure VII. Population Density Indices (Wildland-Urban Interface) for the Coeur d'Alene Reservation Based on 2009 Structure Locations (2010).



2.6. Structure Assessment & Values

The summary of structure values within the Coeur d'Alene Reservation has been brought together from different sources. The first data source included the building locations (in GIS) for the entire Coeur d'Alene Reservation assembled by the Kamiak Ridge, LLC. The data were combined with assessed valuations of structures by the Benewah County Assessor and the Kootenai County Assessor offices to determine the assessed value of the structures on each parcel. While this provides an expansive property valuation assessment, it is not complete. The data miss the valuation of non-county-assessed properties such as tribally owned properties and other non-county-assessed properties held by the counties, state, churches, public support groups (fire protection, ambulance, etc.), and other entities.

Both Benewah County and Kootenai County provided these data to the Coeur d'Alene Tribe for use in extracting structure values within the Coeur d'Alene Reservation and previously determined during the preparation of each County's Multi-Jurisdictional Hazards Mitigation Plans (both approved by FEMA in 2010).

The Coeur d'Alene Tribe also assembled similar data for Tribal housing structures that are owned by the Coeur d'Alene Tribe by identifying the physical locations and insured values of each structure.

The result of the combined data on the Coeur d'Alene Reservation is an encompassing assessment of structure values for use in determining the loss exposure potential posed by natural disasters. This summary will be referenced throughout this document to refer to the structural valuations of the Coeur d'Alene Reservation and the exposure to risk presented by natural disasters.

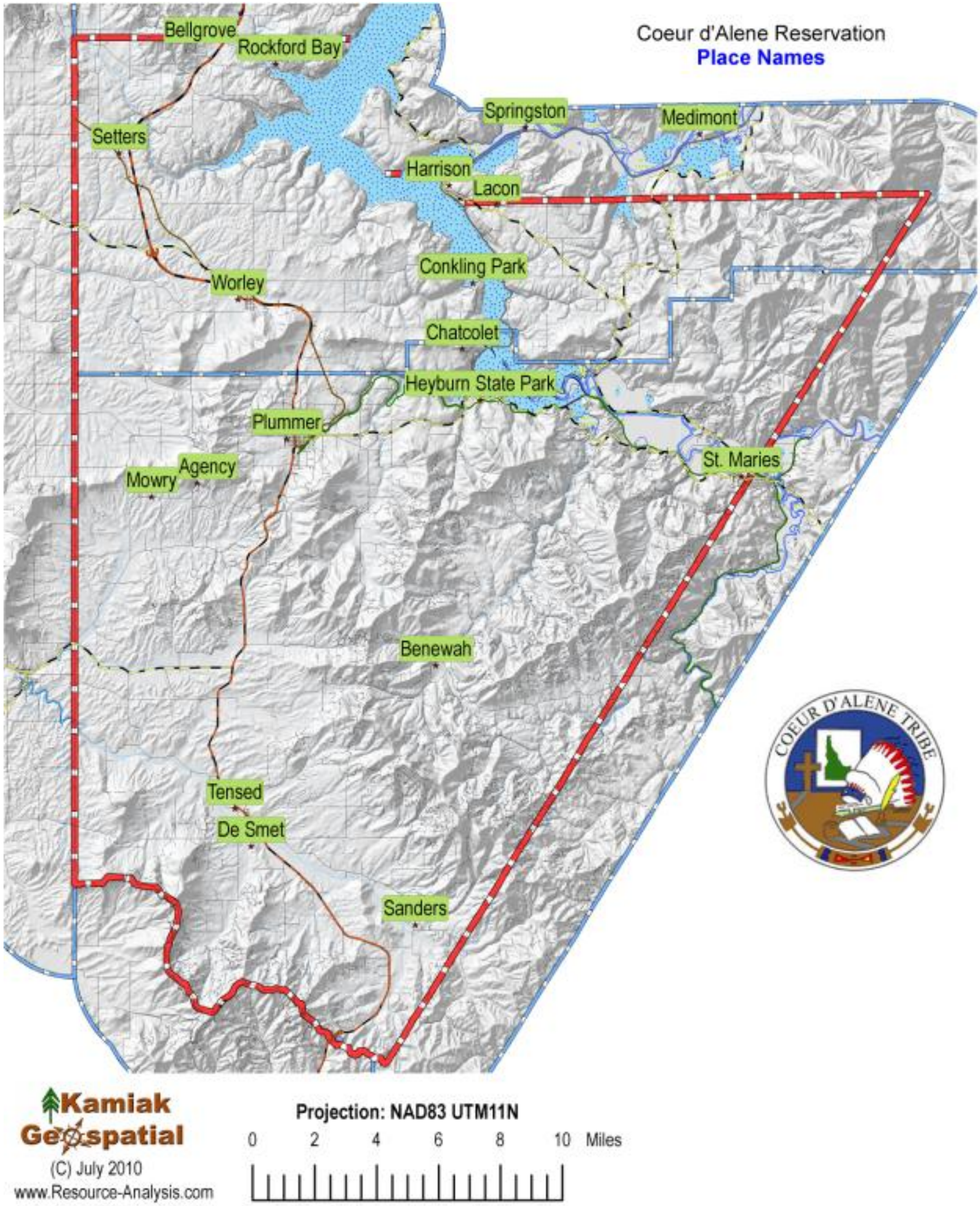
The results of this analysis determined that there are approximately 3,890 structures located on the Coeur d'Alene Reservation with a total value of approximately $524 million (Table 3). These values are illustrative of the resources potentially at risk to loss from natural disasters on the Coeur d'Alene Reservation. It is important to recognize, however, that these values only articulate the financial investment in structures used for residences, businesses, government services, and community infrastructure (water and waste). These values do not articulate the potential loss of life, damages to the ecosystem, or the traditional way of life for the residents living on the Coeur d'Alene Reservation.

It is also necessary to note that the structures included in this analysis include homes, businesses, offices, and community structures, as well as garages, sheds, equipment storage buildings and associated structures. The 3,890 structures identified in this assessment are not solely used for housing (Table 3). All place names referenced in Table 3 refer to the closest place name location of the structures (Figure VIII). Although a structure may be listed within the Plummer "Community Name", that should not be interpreted as necessarily being within the city limits of the place by that name. It should be interpreted as all structures that are closest to that location as opposed to any other location (Figure VIII).

Table 3. Value of structural improvements within Coeur d'Alene Reservation, sorted by community area.

Community Name	Private Structures		Public Structures		Total All Structures	
	Number of Structures	Value	Number of Structures	Value	Number of Structures	Value
AGENCY	0	$-	7	$1,303,983	7	$1,303,983
BELLGROVE	28	$1,789,557	0	$-	27	$1,789,557
BENEWAH	179	$10,513,909	0	$-	179	$10,513,909
CHATCOLET	183	$13,696,782	4	$2,750,000	187	$16,446,782
CONKLING PARK	233	$14,464,779	5	$1,372,688	238	$15,837,467
DE SMET	47	$2,302,246	42	$15,247,304	89	$17,549,550
HARRISON	171	$18,406,579	5	$674,000	176	$19,080,579
HEYBURN STATE PARK	0	$-	13	$8,600,000	13	$8,600,000
LACON	108	$4,779,068	2	$112,680	110	$4,891,748
MEDIMONT	145	$4,211,021	0	$-	145	$4,211,021
MOWRY	65	$4,096,955	2	$304,000	67	$4,400,955
PLUMMER	494	$39,750,434	96	$40,144,417	590	$79,894,851
ROCKFORD BAY	703	$85,079,556	9	$1,060,424	712	$86,139,980
SANDERS	97	$6,580,739	2	$304,000	99	$6,884,739
SETTERS	89	$6,772,985	1	$12,000,000	90	$18,772,985
ST. MARIES	719	$73,916,733	30	$12,171,841	749	$86,088,574
TENSED	127	$5,053,210	13	$2,269,387	140	$7,322,597
WORLEY	190	$7,067,214	82	$127,968,593	272	$135,035,807
Total	**3,578**	**$298,481,767**	**313**	**$226,283,317**	**3,890**	**$524,765,084**

Figure VIII. Place name locator on the Coeur d'Alene Reservation.



2.7. Population Growth Projections

Population projections have been made within the Comprehensive Plan for the Coeur d'Alene Reservation (SiJohn 2005), within the Comprehensive Economic Development Strategy (CEDS 2009), within the Coeur d'Alene Reservation Economic Analysis (Murphy 2010), and within the Coeur d'Alene Tribe Integrated Resource Management Plan's Final Programmatic Environmental Impact Statement (FPEIS 2007). Until recently (2011), the US Census Bureau has not collected and released population data for Indian reservations, focusing instead on cities, counties, and states, but not Indian reservations. Estimates have been made by researchers and analysts to quantify the population on the Coeur d'Alene Reservation (Table 4).

SiJohn (2005) provided estimates of the total population on the Coeur d'Alene Reservation in 1973 as 2,545 people with a tribal member population of 360 (Table 4). Further estimates by SiJohn through 1990 established a Coeur d'Alene Reservation population of 5,775 people with a Tribal membership total of 1,100 people. The CEDS (Arnold 2009) population estimate for 2009 was approximately 6,000 people with a Tribal membership total of 1,589 people (Table 4). This estimate also established the ratio of Tribal members living on Reservation in contrast to living off-Reservation at approximately 50%.

The FPEIS (2007) cited the US Census (2000) to identify the population of the Coeur d'Alene Reservation as growing by 13.4% between 1990 and 2000. During the same time period the population of Benewah County grew at a rate of 15.5% while Kootenai grew at a 55.7% rate of increase. Almost two-thirds of the Coeur d'Alene Reservation's population growth was associated with the more rapid growth of the Native American population as compared to the non-Indian population growth rate. As the Coeur d'Alene Reservation's Indian population grew at 65%, the non-Indian population grew by only 5.5%. By comparison, the population of Idaho increased by 28.5% and the nation increased by 13.1% (FPEIS 2007).

Future estimates of the population living on the Reservation and the total projected number of Coeur d'Alene Tribal members is highly variable. Based on the population estimates presented in Table 4, the growth rate has fluctuated from a high of 9.85% per year between 1973 and 1980, and a low of 0.20% per year from 1990 to 2010. There may be several explanations for this variability ranging from data collection technique changes during these times, to actual dramatic changes in population dynamics. An estimate of 1.90% per year has been used in Table 4 and is derived from several sources including the US Census (2010) growth projections for Benewah County, and other non-Urban locations in North Idaho and Eastern Washington. Based on the projection of a 1.90% per year rate of population growth on the Coeur d'Alene Reservation, the 7,000 person threshold will be met in 2023 while the 8,000 person limit will be seen before 2030.

The projections into the future of the Coeur d'Alene Tribal population are less predictable using these techniques. The unique demographic structure of tribal member families is significantly different than the non-tribal member characteristics (Table 4). Historical population estimates from 1973 to 1980 show an increase in population of 5.91% per year while the rate of change was as high as 7.41% per year between 1980 and 1990. More recent population changes have met with 3.63% per year (Table 4). Anecdotal references to the rate of tribal member number increases have identified approximately 2.03% per year and are used here (Table 4).

All of these population estimates are used for reference purposes only and should not be used to verify confirmed population counts.

Table 4. Population Trends and Projections 1973 – 2030.

Year	Population on Reservation	←Percent Growth per Year	Tribal Population (Total)	←Percent Growth per Year	Source
1973	2,545		360		(SiJohn 2005)
1980	4,911	9.85%	538	5.91%	(SiJohn 2005)
1990	5,775	1.63%	1,100	7.41%	(SiJohn 2005)
2000	5,891	0.20%	1,589	3.75%	*estimated*
2005	5,949	0.20%	1,899	3.63%	*estimated*
2009	6,000	0.21%	2,190	3.63%	*(Arnold 2009)*
2010	6,009	0.15%	2,312	2.74%	*estimated*
2015	6,069	0.20%	2,650	2.03%	*estimated*
2020	6,668	1.90%	2,840	2.03%	*estimated*
2025	7,326	1.90%	3,140	2.03%	*estimated*
2030	8,049	1.90%	3,470	2.03%	*estimated*

The Planning and Zoning responses to increasing population on the Coeur d'Alene Reservation must look closely at helping to direct the placement and attributes of new construction. This "close look" and direction to new building construction must account for ownership rights, the preference to not participate in "takings" from members by absolutely preventing construction, but instead to assist with site selection and specific hazard resilient structure attributes. These pre-construction mitigation measures include structures elevated above a Base Flood Elevation, building with seismic shaking tolerant building materials and the use of appropriate design techniques, roofing stabilization against high winds, pre-construction wildfire fuels mitigation activities, or design to prevent expansive soil responses from structure compromise. These activities can be considered with building inspection, planning, and zoning implementation.

2.8. Transportation Systems

The Coeur d'Alene Reservation is accessed through a combination of US highways, State highways, County roads, local access roads, and the Indian Reservation Roads (IRR) system. One of the most travelled access routes is US Highway 95 transecting the Coeur d'Alene Reservation running north and south along the Reservation's western side. US Highway 95 is a major access route for the State of Idaho providing the only in-state linkage from the northern boundary with Canada to the southern Idaho cities, where it intersects with US Interstate 84. Locally, US Highway 95 provides linkages through DeSmet, Tensed, Plummer, and Worley, to the City of Coeur d'Alene to the north, and to Moscow to the south.

State Highway 5 links Plummer to St. Maries. State Highway 60 connects US 95 (between Plummer and Tensed) with the City of Tekoa, Washington, located to the west of the external boundary of the Coeur d'Alene Reservation. State Highway 3 provides access from St. Maries to Cave Lake located along the northern extent of the Coeur d'Alene Reservation. State Highway 3 is joined by State Highway 97 (Harrison Road) near Harrison Elementary School and provides access to Harrison, Idaho. State Highway 58 connects US Highway 95 near the Coeur d'Alene Casino located north of Worley, to Rockford, Washington, west of the Coeur d'Alene Reservation.

Other local access roads provide access to populated places, homes, wildlands, farms, and other locations. While use of these access routes is important for local residents, natural resource workers, and others, the linkages of these access routes to the major access routes (US and State Highways) on the Coeur d'Alene Reservation is critical in terms of the ability of people to escape threatening situations related to natural hazards and for emergency responders to take action to events.

Access routes are displayed on most of the area maps shown in this planning document. Over 2,325 miles of roads blanket the Coeur d'Alene Reservation. Approximately 56 miles of those roads are maintained as US Highways, 52 miles are State Highways, 655 miles are seasonal roads, 626 miles are local roads, and over 52 miles of roadway is uncategorized (Godfrey 2010).

Figure IX. Youth Art Contest, 12 and Older, Second Place Winner: Bella Goddard.

Chapter 3.
Planning Process

The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan has been developed by representatives of the Coeur d'Alene Tribe during 2009 and 2010 and focuses on short-term and long-term measures with a detailed 5-year implementation strategy.

The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan has been completed to be consistent with the Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended by the Disaster Mitigation Act of 2000 (P.L. 106-390); the National Flood Insurance Act of 1968, as amended by the National Flood Insurance Reform Act of 2004 (P.L. 108-264); and 44 Code of Federal Regulations (CFR) Part 201 – Mitigation Planning, inclusive of all amendments through November 30, 2009. The requirements have been summarized in the Federal Emergency Management Agency (FEMA) Crosswalk used to analyze a plan's compliance with these federal regulations (release date March 2010).

Planning leadership was provided by the Coeur d'Alene Tribe Public Works Department, Planning Division. The Coeur d'Alene Tribe contracted with Kamiak Ridge, LLC, of Pullman, Washington, through a competitive bidding process, to assist the Tribe in developing the Tribal Hazards Mitigation Plan. Representatives from many of the Tribe's Departments participated in the plan's development through attendance at planning meetings, by providing important planning documents to the planning team's efforts, and by collaborating during information exchange, planning meetings, and with the document's development.

Public involvement activities included planning committee meetings, press releases, a residential survey, a youth art contest, public meetings and open public review opportunities during the plan's development (each will be described in detail in this planning document).

Effective November 1, 2004, a Local Hazard Mitigation Plan approved by FEMA became a requirement for Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Program (PDM) eligibility. The HMGP and PDM programs provide funding through state emergency management agencies to support local mitigation planning and projects to reduce potential disaster damages.

The Tribal Hazard Mitigation Plan requirements for HMGP and PDM eligibility are based on the Disaster Mitigation Act of 2000, which amended the Stafford Disaster Relief Act, to promote and integrate cost-effective mitigation activities on Tribal Reservations. Local hazard mitigation plans are required to meet minimum requirements of the Stafford Act-Section 322, as outlined in the criteria contained in 44 CFR Part 201. The Plan's criteria summarized for this effort cover the planning process, risk assessment, mitigation strategy, plan maintenance, and adoption process.

3.1. Development and Approval Process

The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan was drafted in sections by Kamiak Ridge, LLC, led by the Kamiak Ridge Environmental Planner, William E. Schlosser, Ph.D. All sections of the plan were subjected to an internal review at Kamiak Ridge when first written. After the internal review of sections of the document, it was submitted to the Tribal Hazards Mitigation Planning Committee to be released to a wider distribution of non-Tribal representatives on the Planning Committee, next to the Tribal Council, and then an open public review.

Four public meetings were conducted in June 2010, prior to the assemblage of the draft Tribal Hazards Mitigation Plan. The suggestions and recommendations from the public meetings were incorporated into the draft that was provided to the Tribal Hazards Mitigation Planning Committee members and the Tribal Council for review. Public review of the document was conducted during April 2011. Public review comment opportunities were made open for all residents of the Coeur d'Alene Reservation, representatives from neighboring jurisdictions, and other interested parties. Once received, these comments were incorporated into the final Coeur d'Alene Reservation Tribal Hazards Mitigation Plan.

This process provided an opportunity for Tribal agencies, neighboring governments, regional agencies, businesses, academia, and non-profit interests to be involved in the planning process. It also facilitated the review and incorporation of existing plans, studies, reports, and technical information throughout the Tribal Hazards Mitigation Plan's development. This effort utilizes the best and most appropriate science from all partners and integrates local and regional knowledge about hazard risks and exposure, while meeting the needs of Coeur d'Alene Reservation residents and visitors.

Shortly after the formation of the Coeur d'Alene Reservation Tribal Hazards Mitigation Planning Committee, from January through July 2010, the Mission, Vision, and Goal statements were drafted, revised, debated, re-drafted, and then agreed on by the Planning Committee members to reflect a holistic and comprehensive expression of these planning efforts.

During the initial Planning Committee meetings, the extent of the analysis and the protection afforded by projects implemented through this Tribal Hazards Mitigation Plan were discussed. The **definition of "public"** for this effort was determined to be all residents and visitors on the Coeur d'Alene Reservation. No distinction was made between Indian and non-Indian, Tribal member and non-Tribal member. The extent of the analysis was determined to be all areas within the Coeur d'Alene Reservation. The efforts detailed for this entire Tribal Hazards Mitigation Plan focus on the approximately 343,208 acres of the Coeur d'Alene Reservation (Figure VIII).

3.1.1. Mission Statement

To make Coeur d'Alene Reservation residents, communities, and businesses, less vulnerable to the negative effects of natural hazards through the effective administration of hazard mitigation grant programs, hazard risk assessments, wise and efficient mitigation measures, and a coordinated approach to mitigation policy through interagency planning efforts.

3.1.2. Vision Statement

Institutionalize and promote a Reservation-wide hazard mitigation ethic through leadership, professionalism, and excellence, leading the way to a safe, sustainable Coeur d'Alene Reservation for the Coeur d'Alene Tribe, all residents, and visitors.

3.1.3. Goals

The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan Committee has adopted a series of primary goals intended to benefit the Reservation.

- Prioritize the protection of people, structures, infrastructure, Tribal Cultural Resources and unique ecosystems, and traditional way of life that contribute to the sustainability of the local and regional economy.
- Reduce the threats to public health and safety posed by natural hazards.

- Reduce the area of land damaged and the long-term costs of disaster recovery experienced because of natural hazards, where these risks threaten communities on the Reservation, through intelligent and strategic mitigation policies and practices.
- Identify and facilitate the management for sustainable land use in light of natural hazards and the management of the land resources.
- Promote and implement disaster-resistant development policies.
- Establish mitigation priorities and develop mitigation strategies.
- Strategically locate, plan, and implement hazard reduction projects.
- Provide recommendations for alternative treatment methods that can impact the exposure to multiple hazards at one time.
- Build and support local capacity to enable the Tribal government and the community to prepare for, respond to, and recover from disasters.

3.1.3.1. Objectives to Meet Goals

This Coeur d'Alene Reservation Tribal Hazards Mitigation Plan will implement the following practices in order to achieve the goals outlined in this plan:

- Improve hazard area identification and emergency warnings to citizens and visitors.
- Increase public awareness of natural hazards and improve appropriate preparation for and response to such hazards.
- Prevent new development in areas that are vulnerable to hazards or ensure that development occurs in such a way as to mitigate risks to the new development without putting others at increased risk.
- Assess, protect, alter, and/or relocate existing developments in those areas where developments are at current risk to natural hazards, to make them less susceptible to catastrophic loss.
- Educate communities about the unique challenges of pre-disaster hazard mitigation and post-disaster response.
- Ensure that the implementation plan developed to protect existing developments is the most cost-effective alternative, given considerations for:
    - Personal and business investments
    - Natural and cultural resources
    - Existing land use plans
    - Economy of Coeur d'Alene Reservation
- Utilize the cost / benefit analysis criteria when evaluating implementation plans for mitigation measures (during implementation) to ensure that the benefits of the plan outweigh the costs of implementation – both short-term and long-term.
- Maintain, improve, and formalize policy coordination and consistency between the Coeur d'Alene Tribe and neighboring jurisdictions and governmental activities including:
    - State of Idaho
        - Benewah County
        - Kootenai County
        - Latah County
        - Shoshone County
    - State of Washington
        - Spokane County
        - Whitman County
    - Idaho State Agencies
        - Idaho Bureau of Homeland Security
        - Idaho Department of Environmental Quality

    - Idaho Department of Lands
    - Idaho Department of Parks and Recreation
    - Idaho Transportation Department
    - Panhandle Health District
  - Federal Governmental Organizations:
    - Homeland Security: Federal Emergency Management Agency (FEMA)
    - U.S. Army Corps of Engineers (USACE)
    - U.S. Environmental Protection Agency (EPA)
    - USDA: Forest Service (USFS)
    - USDI: Bureau of Indian Affairs (BIA)
    - USDI: Bureau of Land Management (BLM)

3.2. FEMA Disaster Mitigation Planning

FEMA conducts reviews of all local and Tribal Hazard Mitigation Plans submitted through the appropriate State Hazard Mitigation Officer (SHMO). FEMA reviews the final version of a plan prior to Tribal adoption to determine if the plan meets the criteria defined in the CFRs, but FEMA is unable to review or approve any plan prior to adoption by the local jurisdiction. The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan has been developed and internally evaluated to adhere to a variety of FEMA developed criteria specifically defined in the Tribal Multi-Hazard Mitigation Plan Review Crosswalk (FEMA Region 10, released March 2010).

3.3. State Hazard Mitigation Plan

The Idaho State Hazard Mitigation Plan was prepared by the Idaho Bureau of Homeland Security (IBHS) to reduce disaster assistance costs and preserve disaster assistance eligibility for the State and the local governments within its borders. It was approved by FEMA and adopted by the state in November 2007. The Plan was a comprehensive, statewide mitigation planning effort conducted in Idaho. It identified hazards and associated vulnerabilities within the State and provided a comprehensive statewide strategy to reduce future disaster losses through sound mitigation projects. Specifically, the Plan:

- Identified and profiled hazards in the State of Idaho
- Assessed statewide risks from hazards present in the State.
- Established a Framework for statewide Mitigation Planning and Implementation.
- Developed Opportunities for State, Regional, Tribal, and Local Mitigation Planning and Implementation.
- Facilitated Integration of Mitigation into community development before disasters occur, and during disaster recovery.

The 2007 Idaho State Hazard Mitigation Plan was a major, FEMA-required update and revision of the 2004 plan. As of 2010 it is being updated again on this regularly scheduled update of every three years.

3.4. Tribal Hazard Mitigation Planning

In 2007, FEMA released Hazard Mitigation Plan regulations that define Hazard Mitigation Plan requirements specifically designed to account for the unique hazard mitigation planning needs of Tribal governments. A Tribal Hazards Mitigation Plan requires a different and often broader planning process than a State Plan. The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan has used this set of criteria as a template for assessing potential risks on the Coeur d'Alene Reservation and developing a comprehensive and integrated disaster mitigation approach.

The Coeur d'Alene Reservation is located in the Upper Columbia Plateau east of the Rocky Mountains and west of the Great Basin. Today, the Coeur d'Alene Reservation is located within the State of Idaho, primarily where western Benewah County is located, with a smaller portion of the Reservation, to the north, overlapping with Kootenai County. The Coeur d'Alene Reservation has a land area of approximately 343,208 acres. There are four incorporated cities on the Reservation: Tensed, Plummer, Worley, and St. Maries. The city of Harrison is adjacent to the exterior boundary of the Coeur d'Alene Reservation.

The Coeur d'Alene Reservation today represents approximately 47% of the total Benewah County land area (Benewah County is approximately 502,978 acres of land and lake). The Coeur d'Alene Reservation today represents approximately 13% of the total Kootenai County land area (Kootenai County is approximately 842,361 acres of land and lake). The Coeur d'Alene Tribe was informed of the development of the Kootenai County and the Benewah County Hazard Mitigation Plans. The Coeur d'Alene Tribe's Planning Department participated with Benewah County's Hazard Mitigation Plan update (2009-2010) and was an active member in that effort.

The invitation to participate in the development of the Coeur d'Alene Reservation Tribal Hazard Mitigation Plan was extended to Kootenai County and Benewah County Emergency Service Departments, and to the Idaho Department of Homeland Security. The invitation was accepted by both county jurisdictions and the state (North Area Field Office) to participate as planning members in this effort. Through this endeavor it is expected that the cross-jurisdictional cooperation between the Coeur d'Alene Tribe and the Counties and State will be enhanced in terms of disaster preparedness and pre-disaster hazard mitigation.

3.5. Guidance and Integration with Tribal Planning Activities

The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan effort was initiated by the Coeur d'Alene Tribe in 2008 with the application for funding assistance from FEMA Region X. Funding from FEMA for the preparation of the Tribal Hazards Mitigation Plan was received in 2009.

The Coeur d'Alene Tribe strives to develop practices and policies consistent with the theme of self-reliance, while developing relationships and coordinated approaches to hazard mitigation that build on the themes of cooperation and collaboration with neighboring jurisdictions from Counties (Benewah and Kootenai), the State of Idaho, FEMA Region X, and the organizations and agencies operating in the region (private, state, federal, and other Tribes).

3.6. Planning Committee Membership

Leadership for the Coeur d'Alene Tribe's hazard mitigation planning effort was provided by the Coeur d'Alene Tribe's Planning Division of the Public Works Department, Jim Kackman with Planning Technician, Lance Mueller. Project Management by the contractor, Kamiak Ridge, LLC, was provided by Project Manager Dr. William E. Schlosser, an Environmental Scientist and Regional Planner. Together, these three individuals provided leadership for the Planning Committee and cooperated in all phases of the plan's development.

Committee communication and information dissemination was facilitated by the Project Manager through the provision of available information via e-mail and a project File Transfer Protocol (FTP) internet site for sharing electronic files used in the development of the planning document. These data included information about the Committee meetings, copies of FEMA guidance for developing plans, and other relevant documents for the Planning Committee use, as well as the schedule of meetings and outreach efforts.

The FTP internet site established for use by the Planning Committee (hosted by Kamiak Ridge) allowed the Planning Committee members and the Project Manager to share documents, photographs, and other electronic files for use in the planning process. In addition, the large map set files, which were created and stored in Adobe Acrobat PDF (Portable Document Format) files, were made available for download by all Planning Committee members. These document sets included detailed mapping for all populated areas of the Reservation. One map set was also created for the entire Reservation. Each map set was formatted to display on a variety of sizes from 24”x24” sheets to 44”x44’ within Adobe Acrobat Reader. Each set included between 5 and 11 individual maps of each specific area.

This format of providing mapping analysis products (in PDF format and at high resolution) was selected for the ability to display detailed attributes otherwise not recognizable when reduced to a normal page size of 8½”x11”. These maps were used by the Planning Committee members, participating agencies, organizations and local citizenry while developing an understanding of risk exposure and potential mitigation measures and incorporating the “sense of place”.

Committee members were provided draft sections of the analysis as they were developed. This issuance of sections, as developed, allowed the Planning Committee members an ability to comment and provide feedback as the analysis progressed. Thus, the entire Planning Committee shared to the same perspective of risk exposure, vulnerability to losses, and potential mitigation measures.

At the launch of the planning process, potential Planning Committee members were invited by the Planning Committee leadership. The invited members included representatives from each Tribal Department, adjacent agency representatives (regional, city, state, and federal), fire protection organizations, school districts, and public service organizations.

Formal letters of invitation to serve on the Planning Committee were sent on behalf of the Coeur d’Alene Tribe. The invitation was met by over 20 dedicated individuals. These respondents became the core of the Planning Committee. All Coeur d’Alene Tribal Departments were invited to attend and participate on this Planning Committee. Invitation letters were also sent to administrative representatives of organizations and agencies, including:

- Benewah County Emergency Management
- Kootenai County Emergency Management
- Idaho Bureau of Homeland Security (North Idaho Field Office)
- State of Idaho Transportation Department
- Idaho Department of Lands
- Heyburn State Park
- USDI: Bureau of Indian Affairs
- USDI Bureau of Land Management
- National Weather Service (from National Oceanic and Atmospheric Administration – NOAA)
- Incorporated Cities within and adjacent to the Coeur d’Alene Reservation
    - City of Harrison
    - City of Plummer
    - City of St. Maries
    - City of Tensed
    - City of Worley
- Fire Protection Departments
    - Eastside Fire District

        - Plummer Gateway Fire
        - St. Maries Fire District
        - Worley Fire District
    - School Districts
        - Coeur d'Alene Tribal School
        - St. Maries School District
        - Worley School District
    - Highway Districts:
        - Eastside Highway District
        - Plummer-Gateway Highway District
        - Worley Highway District

The participation indicated by the Planning Committee attendance in Table 5 should not be considered the sole means of participation. People also participated in joint work through correspondence, discussions, the sharing of materials and collaboration with others. Many of the participants, such as the school district representatives, were faced with shrinking budgets and limited staff availability that prevented their monthly attendance. Other representatives from fire departments were unable to attend the Planning Committee meetings because of work commitments that required their physical presence elsewhere. This was a repeated scenario with many of the Tribal Department representatives. These individuals were all kept up to date through regular e-mails and information sharing strategies that allowed a broad-based sharing of ideas and insights.

3.7. Planning Committee Meetings

Planning meetings were held monthly from February 2010 through September 2010, on the third Thursday of each month. Meeting attendance is summarized in Table 5 and graphically shown in Figure X. A summary of the Planning Committee meeting discussion points is included in this section.

February 18, 2010: Two meetings were held, the first conducted for only Tribal Department representatives. This introductory meeting to orient Tribal Departments to the hazard mitigation planning approach included a slide presentation communicating the purpose and components of a FEMA Tribal Hazards Mitigation Plan. FEMA definitions were provided, plan requirements were detailed and the Phase I Hazard Profile (Table 17) was introduced. The Risk Assessment approach, vulnerability appraisal and mitigation strategies were outlined for attendees. Additional Potential Planning Committee members were identified and the importance of public involvement was emphasized.

The second meeting of this day included representatives from all of the non-Tribal cooperator organizations to summarize the planning approach used for this plan. An effort to identify, and where applicable, to incorporate neighboring jurisdictional hazard mitigation and disaster planning strategies was discussed.

March 18, 2010: The Planning Committee meeting was attended by representatives from Tribal Divisions and Departments as well as representatives from other organizations and agencies and followed a progressive schedule of accomplishments based on themed meetings. This "meeting theme" technique began with the discussion and identification of the goals, objectives, and vision of the planning process. This meeting also included Phase I Hazard Profile (Table 17) discussions and update, which identified the combined potential for a hazard to occur and the potential of disaster events to impact people, structures, infrastructure, the economy, and traditional way of life of the Coeur d'Alene Tribe. At this meeting, the Planning Committee identified and endorsed the plan of work to accomplish a hazard resistant community philosophy. Existing Coeur d'Alene Tribe policies, plans and programs were identified for inclusion in the plan. Tribal Division Surveys and Resources, Capabilities, and Needs Surveys began to be returned for summary into the plan. Outreach efforts and public involvement plans were initiated.

Attendees participated in a discussion concerning a hazard risk profile developed for the disasters identified in the Phase I Hazard Profile (Table 17), including wildfire, earthquakes, seismic shaking hazards, and erosion potential. We shared other sources of data including the integration of assessments of value for structures on the Coeur d'Alene Reservation.

The public outreach program was also discussed to agree on the approach to be used in this planning process. The public outreach program developed by the Planning Committee included a residential mail survey, public meetings, press releases, and a Youth Art Contest.

April 15, 2010: Planning meeting discussions took place about the risk exposures across the Coeur d'Alene Reservation. A presentation and extended discussions were augmented with large-size formatted map sets including aerial photography, "potential floodplains" (FEMA has not mapped Flood Insurance Rate Maps (FIRM) on most of the Reservation, and, as a result, Kamiak Ridge developed a "potential floodplain" assessment to be able to locate and quantify flood risks on the Coeur d'Alene Reservation), landslide prone landscapes, wildfire risk quantification including fire-prone landscapes, seismic shaking hazards and fault lines, high wind and severe weather landscapes, as well as other descriptive mapping products. These map sets were provided to the Planning Committee members and others as requested.

Public outreach efforts were discussed at great length concerning the Youth Art Contest and a local Planning Committee member who would share the program with the youth on the Reservation. The "Champion" of the Youth Art Contest was identified as Laura Laumatia, University of Idaho Cooperative Extension Educator, federally Recognized Tribal Extension Program. She volunteered to take the Youth Art Contest to the summer youth program "Rockin' the Rez!", where annually hundreds of area youth gather to participate in a summer youth education program. Additional public outreach activities included setting dates (early- to mid-June) and venue for the public meetings (4 total), the format and content of the residential mail survey, and press releases to the Council Fires newsletter (Tribal newspaper). Ongoing discussions continued at this planning meeting regarding Coeur d'Alene Tribal policies, plans and programs for inclusion in the Tribal Hazards Mitigation Plan.

May 20, 2010: The Planning Committee reviewed flood mapping presented by Kamiak Ridge in April with significant updates provided through commentary and ideas from the Planning Committee members. Hazard Risk Assessments for Landslides, Seismic Shaking Hazards, and Wildfire were viewed and discussed. A summary of "normal weather" on the Coeur d'Alene Reservation was shared in a sub-chapter format. The weather discussion was prepared by Dr. Schlosser and pre-edited by the Planning Committee member, John Livingston, of the National Weather Service, prior to sharing it with the audience.

An initial risk exposure profile was shared with the Planning Committee to detail the value and number of structures at risk from each natural hazard evaluated. Ideas for presentation and augmentation were discussed. These exposure profiles also assisted with the discussion of potential mitigation measures.

Discussions regarding plans, programs, and policies, and the Youth Art Contest continued. The initial findings from the residential mail survey were shared with the Planning Committee and discussed at length.

All Planning Committee members were urged to share potential mitigation measures on the Coeur d'Alene Reservation based on observations in their daily lives on the Reservation, the information being shared for hazard risk assessments, and the findings of the residential Mail Survey.

June 8, 2010: A special meeting of the Coeur d'Alene Tribal Department representatives involved in the development of the Tribal Hazards Mitigation Plan was conducted. This meeting focused on a review and revision of the Plan's Mission, Vision, Goals and Objectives, and a discussion of other topics pertinent to the Tribal Department representatives. This meeting was to heighten Tribal Department awareness of FEMA-related hazard mitigation planning and how these issues integrate into existing Tribal programs. A decision was also made by the Tribal Department representatives to hold an additional meeting on the same day as the regularly scheduled Panning Committee meeting (third Thursday of each month). The first meeting, was scheduled for 11:00 A.M. on the monthly meeting date only for Tribal Department Representatives, and the planning consultant. It was decided that the second meeting on that day each month would be held at the normally scheduled 1:00 P.M. time and include all of the Planning Committee representatives, including the Tribal Department representatives.

June 17, 2010: Two planning committee meetings were held on this day. The first was held at 11:00 AM for only Tribal Department representatives to familiarize participants with a completed FEMA Tribal Hazards Mitigation Plan. This overview provided participants with an example of a completed plan and facilitated discussions of mitigation planning. The topics of the meeting addressed the Mission, Vision, Goals, and Objectives of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan.

The 1:00 PM meeting of the entire Planning Committee discussed potential mitigation measures specifically for flooding and wildfire mitigation. These two natural hazards represent significant physical risks for the Coeur d'Alene Reservation. These hazards can be mitigated and this is an opportunity to articulate, designate, and identify potential mitigation items for this plan. Maps of the hazard risks, aerial photography, and significant infrastructure were used to mark out areas of needed mitigation measures such as Wildland-Urban Interface Wildfire Mitigation projects along roads, power lines, and homes. Other mitigation measures focused on flood problems and their causes that are made worse because of developments, such as small culverts and low clearance bridges. This interactive activity exercise was productive and brought the attendees together in a shared approach to mitigation planning.

The meeting concluded with a discussion about an additional natural disaster identified by the planning consultant, Expansive Soils and Expansive Clays. Although neither identified by the Planning Committee, nor in the Idaho State Hazard Mitigation Plan, this natural disaster has been stipulated as one of the most widespread natural hazards on the continent. Kamiak Ridge completed an assessment of the extent of the hazard within the Coeur d'Alene Reservation and shared those findings with the Planning Committee. Examples of the losses witnessed in and around the Reservation were shared. These findings were also shared with the attendees to the public meetings held earlier in June.

July 15, 2010: Planning meetings:

11:00 with Tribal Department Representatives discussed the reviews of the previously written works provided to the team members. New written works were shared with the Tribal Department Representative Planning Committee members for review and editing.

1:00 with the entire Planning Committee focused on developing and discussing potential mitigation measures for landslides, high winds, severe weather, and expansive soils.

August 19, 2010: The draft of the Coeur d'Alene Reservation Tribal Hazard Mitigation Plan was delivered to the Tribal Representatives Planning Committee for internal review starting on August 1. At this meeting the structure of the plan was discussed as well as components of the plan developed for this release. Initial edits from the Tribal Planning Committee members were shared and discussed.

September 16, 2010: This planning committee meeting was provided for members to review the plan, discuss changes, additions, and the schedule of review for the Tribal Council and the Public. The process of State BHS and FEMA review was discussed.

Table 5. Planning Committee Membership and Attendance.

		Planning Committee Meetings Held During 2010								
Name	**Representing**	**Feb 18**	**Mar 18**	**Apr 15**	**May 20**	**Jun 8**	**Jun 17**	**Jul 15**	**Aug 19**	**Sept 21**
Allgood, Tiffany	Environmental Action Plan Coordinator, Environmental Programs Office Manager, Natural Resource Department Coeur d'Alene Tribe	√	√	√	√	√	√		√	√
Anderson, John / Eric Kendra	Coeur d'Alene Tribal School	√	√							
Aripa, Louie H., Sr.	Accounts Payable, Coeur d'Alene Tribal Housing Authority	√	√	√	√					
Arnold, Joshua	Planning Division Public Works Department Coeur d'Alene Tribe	√	√	√	√	√	√	√	No longer employed by the Tribe	
Denny, Jack	Chairman Plummer-Gateway Highway District	√					√			
Baker, Jay D.	North Area Field ID-BHS	√		√	√		√			√
Benzon, Jeff	Kootenai County GIS	√								
Brown, Jason	Coeur d'Alene Tribe Recreation Management Program						√	√		
Cox, Dave	Superintendant St Maries School District	√								
Denton, Bill	Environmental Health Specialist Coeur d'Alene Tribe	√		√		√	√	√	Retired	
Gibson, Cielo	Housing Director Coeur d'Alene Tribe Housing Authority Coeur d'Alene Tribe		√							
Green, Gerald	Coeur d'Alene Tribe Wildlife Mitigation Biologist	√			√					
Hise, Ron	Heyburn State Park	√		√						
Howard, Kevin	Supervisor Worley Highway District	√	√	√						
Kackman, Jim	Director Public Works Department Coeur d'Alene Tribe							√	√	√
Laumatia, Laura	University of Idaho Extension Educator, FRTEP	√								
Livingston, John	National Weather Service, NOAA				√		√	√		
Martin, Jerry	City of St. Maries	√		√						
Mueller, Lance	Transportation Planner Public Works Department Coeur d'Alene Tribe						√	√	√	√
Naccarato, Larry	Fire Chief St. Maries Fire District		√	√	√		√			

Table 5. Planning Committee Membership and Attendance.

Name	Representing	Planning Committee Meetings Held During 2010								
		Feb 18	Mar 18	Apr 15	May 20	Jun 8	Jun 17	Jul 15	Aug 19	Sept 21
Nomee, Alfred	Natural Resource Director Coeur d'Alene Tribe	√								
Pakootas, Tom	Fire Management Coeur d'Alene Tribe	√	√		√	√	√	√		
Pavlat, Kurt / Pindell, Kurt	Field Manager U.S. Bureau of Land Management	√	√	√	√					√
Pittsley, Bob	Office of Emergency Management, Kootenai County	√	No Longer with Kootenai County Emergency Management							
Porter, Ralph	Eastside fire Department	√	√	√	√		√	√		√
Raskell, Sandra	Hazardous Waste Program, Engineer, Coeur d'Alene Tribe							√	√	√
Richel, Carl	Plummer/Worley School District	√								
Robinson, Karen	St. Maries School District	√								
Schlosser, Birgit	Resource Protection Kamiak Ridge, LLC	√	√	√	√	√	√		√	√
Schlosser, William	Environmental Planner Kamiak Ridge, LLC	√	√	√	√	√	√	√	√	√
Sharrett, Judi	Superintendant Plummer / Worley School District	√								
Spaulding, Bob	Grants Management Officer Public Works Department Coeur d'Alene Tribe		√	√		√	√	√		√
Suenkel, Norm	Emergency Manager Benewah County	√		√	√		√			√
Wagner, Jill	Cultural Department Coeur d'Alene Tribe	√	√	√		√				
Willard, Rod	City of Plummer	√								
Invited and cooperating, but not able to attend planning committee meetings										
Cernera, Phil	Lake Management Director, Coeur d'Alene Tribe									
Gardipe, Lyle	Water Systems Specialist, Facilities Department, Coeur d'Alene Tribe									
Fields, Scott	Water Resources Program Manager in the Lake Management Department, Coeur d'Alene Tribe									
Groom, Debbie	Finance Director, Finance Department, Coeur d'Alene Tribe									
Hutcheson, Keith	Chief of Policet, Coeur d'Alene Tribe									
Kager, Robert	Facilities Director, Facilities Department, Coeur d'Alene Tribe									
Meagher, Mike	Fire Chief, Plummer Gateway Fire District									
Mettler, Kurt	Forest Manager, Coeur d'Alene Tribe									
Sabotta, Bob	Superintendant, Coeur d'Alene Tribal School									
Sonder, JoAnn	Property Insurance, Capital Assets / Insurance, Coeur d'Alene Tribe									
Spier, Donna	City Clerk, Risk Manager, City of Plummer									
Vitale, Angelo	Supervising Fisheries Biologist for the Coeur d'Alene Tribe									
Von Behren, Sandy	Director, Office of Emergency Management, Kootenai County									

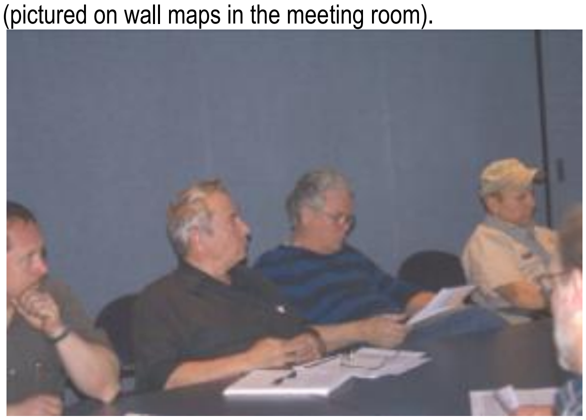
Figure X. Selection of Planning Committee Meeting Photographs.

February 18, 2010, Planning Committee meeting discussed the Mission, Vision, and Goals of the planning effort and an initial hazard risk profile of the Coeur d'Alene Reservation.

February 18, 2010, Planning Committee members review hazard risk assessments on planning maps alongside jurisdictional boundaries.

March 18, 2010, Planning Committee members consider hazard risk assessments of the region, especially wildfire (pictured on wall maps in the meeting room).

March 18, 2010, discussions concerning wildfire mitigation and integration of measures into existing programs of the Coeur d'Alene Tribe are discussed.



April 15, 2010, discussions concerned the risk exposure to the various natural hazards found within the Coeur d'Alene Reservation

April 15, 2010, tabular summaries of resources at risk were shared and discussed during the planning committee meeting.

Figure X. Selection of Planning Committee Meeting Photographs.

July 15, 2010, planning committee efforts concentrated on identifying potential mitigation measures within the Coeur d'Alene Reservation

July 15, 2010, planning efforts identified several "problem areas" and locations where future developments should be fortified with specific pre-construction techniques.

September 16, 2010, a planning member from the USDI BLM proposed additional wildfire mitigation measures to compliment other efforts being planning by the Tribe.

September 16, 2010, planning meeting concentrated on discussing the components of the DRAFT plan being prepared for Tribal Council release to public review.

June 17, 2010, Planning Committee members design the location and design of critical mitigation measures for wildland fire and flooding.

3.8. Public Involvement

Public involvement in this planning process was important to the success of this planning effort. Public involvement included press releases, and a Youth Art Contest designed to develop awareness in the schools, and within families, of natural hazard risks. Four Public Meetings were held in June.

3.8.1. Press Releases

An initial press release was issued in March 2010 to the Council Fires newspaper (Tribal newspaper publication of the Coeur d'Alene Tribe – Figure XI) and introduced the Tribe's launch of the planning effort made possible by the FEMA funding award. Subsequent progress of the planning process was achieved mainly through the publication of press releases in the Council Fires newsletter, which is the only widely distributed media source specific to the Coeur d'Alene Reservation and delivered to all Tribal members regardless of where they live (on and off Reservation). Council Fires newspaper is available to anyone, regardless of where they live, and can be downloaded monthly from the Coeur d'Alene Tribe's website.

Figure XI. Council Fires Banner.

In April 2010, a press release to Council Fires announced the Youth Art Contest including guidelines for submission, an announcement of cash prizes for the selected artwork, and the contacts to make artwork submissions (Figure XV). A second press release to Council Fires announced the mailings of the residential survey, its purpose, and details about the incentive for the randomly selected participants to receive a free map print of Coeur d'Alene Lake for participating (Figure XVIII).

In May 2010, a press release was sent to Council Fires (Figure XXI), the St. Maries Gazette Record, and the Coeur d'Alene News Press, announcing the public meetings to share information about the planning process and hazard risk profiles. The dates and locations of the meetings were announced as: June 8, Plummer; June 9, Worley; June 10, DeSmet; and June 15, St. Maries. In addition to the press releases, posters advertising these meetings were distributed and hung around the Reservation. Participants in the Residential Survey were given their free participant maps including the public meeting announcement flyer.

Subsequent press releases were published in Council Fires and included the announcement of the public review of the Coeur d'Alene Reservation Tribal hazards Mitigation Plan, and a general interest article about the floodplain analysis completed for the Coeur d'Alene Reservation.

Figure XII. Council Fires Article announces public review is open.

Public Review for Hazards Mitigation

By William E. Schlosser, Ph.D.
Kamiak Ridge, LLC

A planning committee of Tribal Departments and neighboring agencies have been progressing with the work of identifying natural hazards for the Coeur d'Alene Reservation and discussing measures to mitigate their negative impacts on the life of the Reservation's people, traditional way of life, the environment, and the economy.

During the previous year, readers of the Council Fires have read highlighted aspects of this work within several articles on public meetings, severe weather, floods, and landslides hazards. Public meetings were held in Plummer, DeSmet, St. Maries, and Worley to meet with people and discuss the information accumulated in the course of the project.

March finds us finalizing work on this Tribal Hazard Mitigation Plan project. At this time we are offering it for public review starting on April 1st and lasting until the end of the month. Everyone on the Coeur d'Alene Reservation who would like to read the draft document is welcome to contact Lance Mueller (lmueller@cdatribe-nsn.gov) 208-686-5702, at the Tribal Public Works Department to get an electronic copy. The PDF of the plan is available on the Tribe's website at http://www.cdatribe-nsn.gov/.

It seems that everyone is very busy, and even "busier than busy". However, it is a matter of just making time for things we consider a priority. Getting in touch with the current effort on hazard mitigation planning, spending some time reading the document and formulating a personal perspective of the accomplished work, might be what is important for you today. We offer for your consideration a document which might be fascinating to read, educational to contemplate, and definitely in need of your comments and edits.

This document shares perceptions of the environment, the people, and how they lived here in the past, and now in the present. As the authors of this planning effort, we found very good people to work with, and to learn from. We have come to know much of the history of this land and the culture of the Schitsu'umsh people. Now we want to share with you perceptions about the story of this beautiful part of the Upper Columbia Plateau, and how to better take care of this land and your home, if a natural disaster should strike.

Figure XIII. Council Fires Article Explains Floodplain Analysis.

Floodplain Analysis of the Coeur d'Alene Reservation

By William E. Schlosser, Ph.D.
Kamiak Ridge, LLC

The Upper Columbia Plateau is home to people who have lived here since time immemorial. The Schitsu'umsh have always been a part of this region, and will always be. Over the times since long, long ago, rains have fallen to replenish the land with life-giving waters. Sometimes, these rains have fallen in great downbursts, and at other times these rains have fallen with warm weather fronts on a deep snowpack. These rain-on-snow events quickly translate into raging rivers that combine the rainfall with melting snow.

When these events happen, waters leave the rivers where they are expected to stay, and cause flooding of the areas adjacent to the rivers. Sometimes, flooding even takes the shape of surface waters that cannot seem to make it quickly to the rivers. We call these waters "storm-water" events, while water that leaves the river is generally called "flood waters". The result of either type of flooding brings the potential for damage to roads, road and stream crossings, structures, the environment, and people caught in the path of the waters.

Deep waters created during high-water events are a common occurrence all across the Coeur d'Alene Reservation. The St. Joe River sees ice-jam flooding about once every two to four years. St. Maries River and Benewah Creek and all of their tributaries witness elevated water levels and increased stream velocity almost every year. Rock Creek, from Worley to the western edge of the Reservation, has seen high-water events just as frequently as the rest of the region. Even in Plummer, where Plummer Creek provides a quick and efficient drainage of stream waters, the occurrence of storm water accumulation around homes, businesses, and the Tribal Wellness Center is seen. These storm-water accumulations are generally seen when there is a deep snowpack created between November and February, followed by a warm-front weather system rolling up the Columbia River and bringing rains that drop on the snowpack in January or February. The result is the accumulation of surface waters that struggle to make it to Plummer Creek and ultimately Coeur d'Alene Lake. The Tribal Wellness Center is often in the path of these seasonal storm-water events.

Another large watershed system of the Coeur d'Alene Reservation is the Hangman Creek Watershed. This watershed drains much of the southern reaches of the Coeur d'Alene Reservation, past DeSmet and Tensed, and the western edge of the Coeur d'Alene Reservation. This watershed has been developed and modified substantially over the past hundred-fifty years, especially in terms of agriculture, forestry practices, and transportation. Highway US95 traverses this watershed in common with several surface streets. The two population centers of DeSmet and Tensed are joined by several scattered home sites across this area.

The Federal Emergency Management Agency (FEMA), has completed a partial floodplain analysis of the Coeur d'Alene Reservation. All of the analyses FEMA has completed concentrated on the lands within the Incorporated Cities and the lands held in Tribal Trust status. This left all of the fee-simple lands, allotment lands, and tribally owned, but not in Trust status lands, without a floodplain analysis.

In December 2009, the Coeur d'Alene Tribe launched an effort to create a FEMA-compatible Tribal Hazards Mitigation Plan. When completed, this plan will be approved by FEMA and adopted by the Tribal Council. The completion of this planning effort will enable the Coeur d'Alene Tribe to apply for, and be awarded, pre-disaster mitigation grants from FEMA to reduce the negative impacts of future natural disasters. This planning effort also provides the Tribal Departments with the tools needed to make better decisions about where to locate future structures, where roads can be safely placed, and what types of modifications can be made to structures and roads already in place to reduce their exposure to these negative events.

The Coeur d'Alene Tribe entered a contract with Kamiak Ridge, LLC, to work with Tribal Departments in the development of this effort. Kamiak Ridge completed an assessment of the floodplains and storm-water accumulation areas for all of the Coeur d'Alene Reservation. This analysis does not replace the FEMA-determined floodplain analysis nor does it qualify residents for participation in the National Flood Insurance Program. This analysis can be used by residents and planners to consider floodplain-related decisions such as structure modification, and the impacts of roads within the floodplain.

The floodplain analysis of the Hangman Creek watershed provides insights about the movementofsurfacewaterthrough this system. The first revelation concerns roads. Highway US95 crosses Hangman Creek east of DeSmet. While most of the year the crossing functions normally, during high-water events the river is constrained by the floodplain's narrowing at the bridge crossing and the limited height of the bottom of the bridge. Debris hanging in the streamside bushes upstream of the bridge reveals that high water frequently reaches the bottom height of the bridge. This constriction causes sediment in the river to be dropped upstream of the bridge where waters are pooled, while the water that passes under the bridge is released to flow at higher velocity leading to a cutting into the valley floor downstream. When the natural meander of a stream is reduced, it becomes "incised" downstream of the river constriction. When streams are allowed to naturally move across their floodplain, they meander widely within the natural stream bottom.

Further downstream of DeSmet, another crossing of Hangman Creek is present at a local access road to Andrews Spring Creek intersecting Hangman Creek Road east of Tyler Road. This bridge crossing's height over the river is substantially higher than the crossing of Highway US95, but the confinement of the stream (narrowing of the stream's width) has substantially altered the functioning of the floodplain. Immediately upstream of this constriction, Hangman Creek's floodplain widens substantially. During high-water events the stream water gets backed up, with sediment dropped, and downstream of the bridge crossing, it flows faster allowing the river's waters to cut deeper into the floodplain.

The Old Mills road crossing of Hangman Creek (between the previous site and DeSmet) poses similar problems for the management of Hangman Creek.

FLOOD: continued on page 11

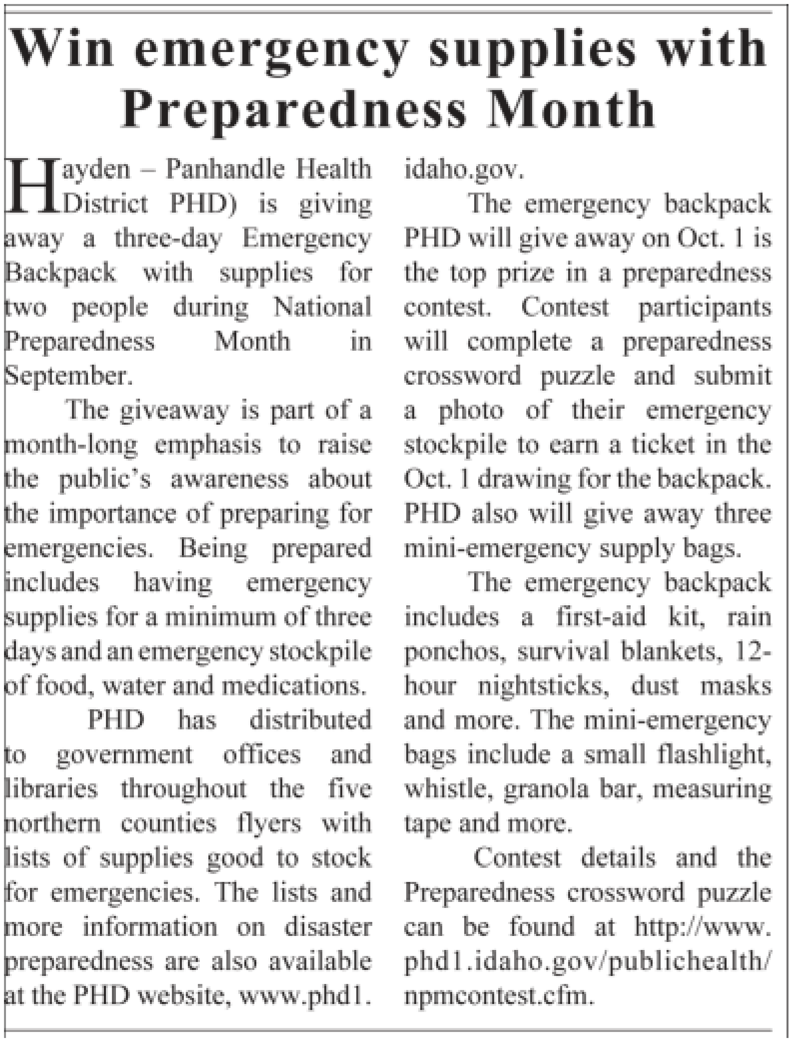
FLOOD: continued from page 9

Structures such as homes and businesses located within the floodplain can alter the normal functioning of the stream during high-water events. However, the negative impact caused by roads with narrow and low-relief bridges and culverts can be more significant.

Floodplain restoration that the Coeur d'Alene Tribe has been conducting aims at reconsidering past farming practices. Several sites within the Hangman Creek Watershed have previously been functionally modified which called for placing tiles under surface. This practice allowed locations that used to be wetlands to become productive farmlands. However, when wetlands are converted to farmlands, the stream water previously detained in the wetlands is "flushed" downstream where flood impacts may be more severe. To mitigate this negative impact, the Coeur d'Alene Tribe has been acquiring lands where these tiles were placed, to remove the tiles, and return the sites to original wetland status. This improvement to the Hangman Creek Watershed is viewed as substantial and positive.

Several discussions about the floodplain analysis completed for this planning effort leading to the completed Coeur d'Alene Reservation Tribal Hazards Mitigation Plan are presented for Public Review during the month of November. Anyone on the Coeur d'Alene Reservation who would like to read the draft document is welcome to contact Lance Mueller (lmueller@cdatribe-nsn.gov) 208-686-5702, at the Tribal Public Works Department to get an electronic copy. The PDF of the plan is available on the Tribe's website at http://www.cdatribe-nsn.gov/.

Figure XIV. Council Fires article discussed Coeur d'Alene Tribe participation in National Preparedness Month.



Win emergency supplies with Preparedness Month

Hayden – Panhandle Health District PHD) is giving away a three-day Emergency Backpack with supplies for two people during National Preparedness Month in September.

The giveaway is part of a month-long emphasis to raise the public's awareness about the importance of preparing for emergencies. Being prepared includes having emergency supplies for a minimum of three days and an emergency stockpile of food, water and medications.

PHD has distributed to government offices and libraries throughout the five northern counties flyers with lists of supplies good to stock for emergencies. The lists and more information on disaster preparedness are also available at the PHD website, www.phd1.idaho.gov.

The emergency backpack PHD will give away on Oct. 1 is the top prize in a preparedness contest. Contest participants will complete a preparedness crossword puzzle and submit a photo of their emergency stockpile to earn a ticket in the Oct. 1 drawing for the backpack. PHD also will give away three mini-emergency supply bags.

The emergency backpack includes a first-aid kit, rain ponchos, survival blankets, 12-hour nightsticks, dust masks and more. The mini-emergency bags include a small flashlight, whistle, granola bar, measuring tape and more.

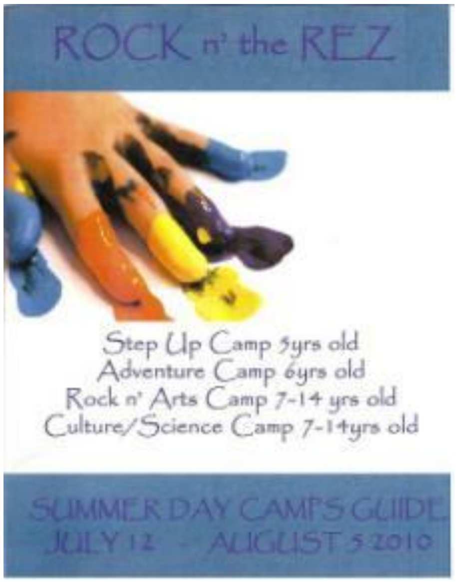
Contest details and the Preparedness crossword puzzle can be found at http://www.phd1.idaho.gov/publichealth/npmcontest.cfm.

3.8.2. Youth Art Contest

The Coeur d'Alene Reservation Tribal Hazards Mitigation Plan Committee launched a Youth Art Contest to develop awareness in the schools, and within families, about natural hazard risks on the Coeur d'Alene Reservation. Young people were engaged in important discussions regarding the effects of natural hazards and how to mitigate the negative effects within their communities.

The activity was made part of the "Rock n' the Rez!" program sponsored by the Coeur d'Alene Tribe and held in July 12 – August 19, 2010 (Figure XV).

Figure XV. Announcement of Rock n' the Rez! where the Youth Art Contest was integrated as an activity.



An article was published in the Council Fires Newsletter announcing the Youth Art Contest (Figure XVI) as a component of the THMP.

Figure XVI. Council Fires Newsletter article announcing the Youth Art Contest.

Contest gives kids chance to explore creative side

The Coeur d'Alene Reservation: Tribal Hazards Mitigation Plan Planning Committee was formed this year to collaborate in the development of the Tribal Hazards Mitigation Plan; a Federal Emergency Management Agency (FEMA) pre-disaster mitigation effort. It consists of representatives from Coeur d'Alene Reservation Tribal Departments, Tribal organizations, Kootenai and Benewah Counties, Federal and State agencies, and emergency responders on the Reservation.

An initial natural hazards profile was developed through scientific analyses and thoughtful discussions of the potential hazard exposures that are faced on the Coeur d'Alene Reservation. Planning sessions have included discussions led by Project Manager, Dr. Schlosser, of Kamiak Ridge, LLC, detailing flooding, wildfires, landslides, and seismic shaking hazards that were augmented by wall maps of the hazard risk exposures overlaid with the locations of structure and infrastructure on the Reservation. Planning Committee members have provided valuable clarification by marking maps with additional detail, as well as participating in discussions about each of the risks.

The connection between natural resources, health of the Coeur d'Alene Reservation economy, and way of life is undeniably the cornerstone of this vitally important effort.

In order to promote public awareness of the Coeur d'Alene Reservation: Tribal Hazard Mitigation Plan, the Tribe is sponsoring a **Youth Art Contest**. Children under 18 years old and enrolled in school, and either 1) living on the Coeur d'Alene Reservation, or 2) attending school on the Coeur d'Alene Reservation are eligible to participate. All submissions should be hand-drawn original artwork in color, drawn on non-lined paper. No computer aided graphics will be accepted. Artwork should measure between 5"x5" and 8"x11".

All artwork should incorporate the themes of natural hazard preparedness, Coeur d'Alene Reservation life, and mother Earth! Two age groups will compete for the recognition; 12 and under and 13 and over. The winners of the Youth Artwork Contest will not only receive cash prizes (for first second and third in each age group), but they will also be featured in a Council Fires article, with the first place artwork featured on the cover of the Hazard Mitigation Plan. The other winners' artwork will be featured on chapter headings.

Submittals should be made to Laura Laumatia, Extension Educator – Coeur d'Alene Reservation [208-686-1716], by **Friday, July 23, 2010**, at 3:00. Submittals can also be made to Joshua Arnold [208-686-0750] at the Tribal Planning Department at 850 A Street, Plummer.

Anyone with questions about this project should contact Dr. Schlosser, at the Kamiak Ridge, LLC, office in Pullman, WA, at 509-592-7650, or Joshua Arnold [208-686-0750] at the Tribal Planning Department at 850 A Street, Plummer.

Posters and tri-fold handouts were used as invitations to participate in the contest and were distributed to the schools on the Reservation as well as to local youth centers (Figure XVII). Council Fires also included invitations for youth on the Coeur d'Alene Reservation to participate.

The artwork was collected through September 2010, and the winners were awarded cash prizes. The winning art work has been included in this plan as chapter and section dividers.

Figure XVII. Coeur d'Alene Tribe Youth Art Contest! 2010, invitation to participate poster.

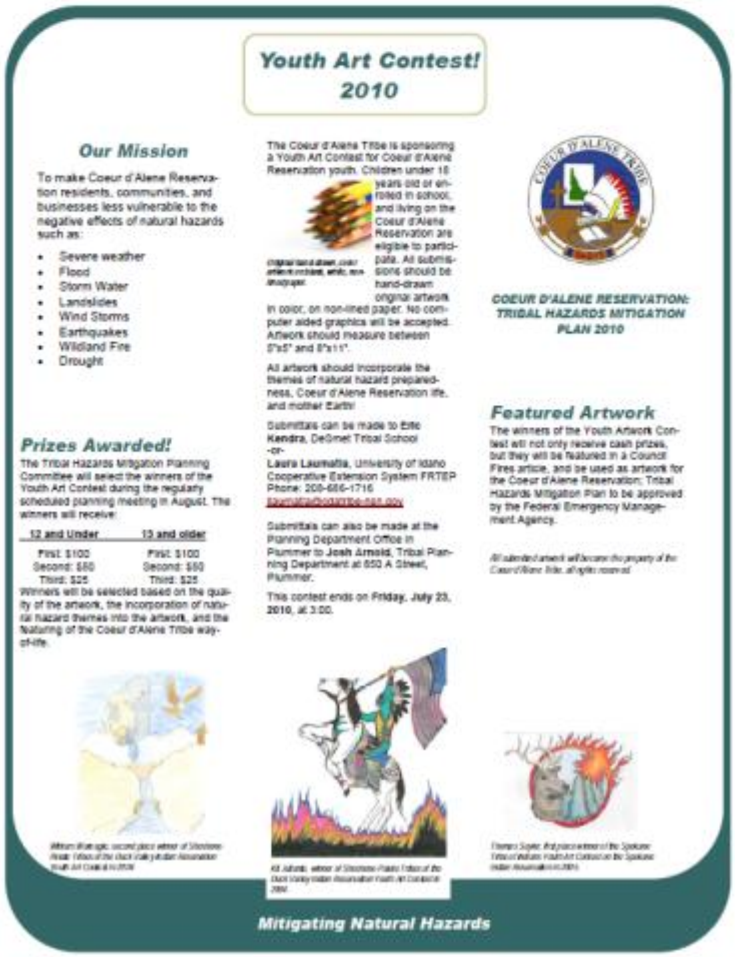
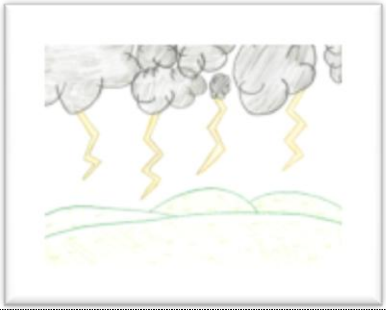


Table 6. Youth Art Contest Winners and Art Work.

		
First Place Winner Kara Lenoir	Second Place Winner Bella Goddard	Third Place Winner Dylan Vincent
	↑ Winners 13 and over ↑	
		
First Place Winner Gloria Trevino	Second Place Winner Brianna Pluff	Third Place Winner Justine Laumatia
	↑ Winners 12 and under ↑	

3.8.3. Residential Survey

A Residential Survey was developed for use in this planning process. The Residential Survey was intended to collect information from a wide selection of residents living on the Coeur d'Alene Reservation concerning past experiences with natural hazards, the characteristics of risk and past losses for those homes, and overall preparedness for natural hazards.

The April 2010 press release printed in the Council Fires (Figure XVIII) gave an update on the Planning Committee's activities and asked for input from Coeur d'Alene Reservation residents by filling out a Residential Survey. Details were provided about the random sample nature of the Residential Survey and how these data would be used.

Figure XVIII. Council Fires Newsletter article requesting participation in the Residential Survey.

Recipients of mitigation survey urged to send back

About 250 residents of the Coeur d'Alene Reservation received a survey during April from Kamiak Ridge, LLC, asking recipients to complete a short survey concerning natural hazards where they live.

This survey is part of the Coeur d'Alene Tribe's efforts to prepare a Coeur d'Alene Reservation; Tribal Hazards Mitigation Plan for the Federal Emergency Management Agency (FEMA). Once completed, adopted by the Coeur d'Alene Tribe, and approved by FEMA, this document will serve the Tribe's efforts to identify, plan for, fund, and implement pre-disaster mitigation activities on the Reservation.

Those who received a residential survey are offered an incentive to complete and return the survey: an aerial map art print of Lake Coeur d'Alene. The print is suitable for framing and measures 14"x17" and will be sent to everyone who completes and returns the survey. These residential surveys are instrumental to the success of this project and already dozens of homes have returned their completed surveys.

Anyone with questions about this project should contact Dr. Schlosser, at the Kamiak Ridge, LLC, office in Pullman, WA, at 509-592-7650, or Joshua Arnold at 208-686-0750, Tribal Planning Department at 850 A Street, Plummer.

The selection of residential homeowners on the Coeur d'Alene Reservation was made from the list of property owners maintained by the Benewah County Assessor and the Kootenai County Assessor. Additional mailings were provided by a Tribal Member Housing mailing list of the members that live on the Coeur d'Alene Reservation. The random selection of homeowners included 240 unique owners and addresses. Since the first list of residential property owners (190 unique names and addresses) was generated from County Assessor lists of properties, it included only homeowners who live on the property (not renters), and whose mailing address is on the Coeur d'Alene Reservation (residential owners only). The Tribal Housing list of Tribal Members living on the Coeur d'Alene Reservation (50 more names and addresses) included a mix of residential characteristics.

In order to ensure a broad-based query of Reservation residents, a uniform selection probability was employed in each populated place. A standard probability of selection in the Reservation, with this sample size, was approximately 1.0%. The 240 homes sampled were sent a mailing on April 21, 2010.

The initial mailing included a cover letter sent from William Schlosser, Project Manager, from Kamiak Ridge. The cover letter briefly explained the project efforts and introduced a one-page, tri-fold survey asking for participation (Figure XIX). A return envelope was provided. As an incentive for participation, respondents were offered a free aerial photography map print of Coeur d'Alene Lake.

Figure XIX. Residential Survey brochure sent to a random selection of residents on the Coeur d'Alene Reservation.

Approximately one week after the launch of the initial mailing, a postcard reminder was sent to the non-respondents, again asking them to complete and return the survey for consideration. A week after the postcard reminder was sent to non-respondents, another mailing was sent (May 6, 2010) with a cover letter, replacement survey, and a replacement return envelope, urging the non-respondents to take the time to fill out the survey and return it to the Kamiak Ridge office in Pullman. This sample procedure followed the Dillman Total Design Method recommended for mail surveys (Dillman 1978).

The result of the repeated mailings, press releases, and public meetings was a total response rate of 51%, from 110 returned surveys, and 24 return to sender – address unknown. All responses provided the planning-effort valuable information, which is summarized here.

Response rates by community were moderately variable, ranging from a low of 3% of those residences sampled in the community of Benewah Valley, to a high response rate of 27% from the households sampled in the city of Worley. The response rate from residences in and around St. Maries was 26%, City of Plummer response rate totaled 16% of those sampled, residences in DeSmet – 9%, City of Harrison – 8%, City of Tensed – 6%, and the community of Sanders – 6%. It is important to note that the responses by community were tallied by the community the respondent indicated on their survey, not their mailing address.

A majority of the respondents (89%) identified that they have emergency 9-1-1 service at their home. Only 77% of the respondents indicated that they have a landline- based telephone service at their home, while 83% have alternate communication options at their homes. The homes without a landline telephone service rely primarily on cellular phone service (88%) for communication needs. Overall, cellular phone service was reported by 82% of the respondents. Approximately 67% of the respondents to the survey indicated a working internet communication connection at their homes.

Several respondents to the survey identified a need for the development of reliable cellular communications services within the Coeur d'Alene Reservation.

Approximately 75% of the respondents indicated that their home is located in a structural fire protection coverage area. Conversely, approximately 25% of the respondents indicated that their home is not protected by a structural fire department. There are a few areas of the Coeur d'Alene Reservation without structural fire protection. The first, and largest area, is in the

Benewah Valley located along the western edge of the Coeur d'Alene Reservation, south of Coeur d'Alene Lake. The second area is located along the northeastern side of the external boundary of the Coeur d'Alene Reservation, east of Harrison. Both areas are populated with structures and people living full-time in those structures. Other structures on the Coeur d'Alene Reservation are located outside of existing structural fire protection boundaries, such as several located north of the St. Maries Fire Protection District.

Interestingly, all of the respondents to the Residential Survey, who indicated living within the Benewah Valley, noted they have a structural fire protection, although there exists no current fire protection in this area. All of the respondents, who indicated living close to Harrison, reported they have no structural fire protection, although fire protection services near Harrison provide extensive services in this area. It is uncertain how many of the respondents may live in those limited areas outside current fire protection boundaries.

Of the remaining respondents, who live in areas generally protected by structural fire protection services, noting the exceptions above, approximately 68% reported protection by a structural fire protection service, while the remaining 32% indicated its absence.

These findings may indicate a need for homeowner education about the existence and current protection boundaries of a structural fire protection within the Coeur d'Alene Reservation. These findings indicate that potentially a large share of the 32% of respondents to the residential survey who believe they are not within a structural fire protection service area may be incorrect in their assessment, as the areas they report as their "closest community" are in fact within the structural fire protection service area. Conversely, there are several respondents to the residential survey that believe they are within a structural fire protection boundary, when it would appear they are not currently protected by one of the service organizations in the region.

The survey respondents indicated the type of roofing materials covering their home. Approximately 50% indicated a metal roof, while 45% indicated a composite roofing material. For the remaining respondents, only 2% specified a wood shingle roofing and 1% a ceramic roofing material.

From a wildfire mitigation standpoint, this is a rather good set of factors as the indicated roofing material shows only 2% of the total number of homes are covered by media ignitable by wildfire brands or embers.

The average driveway length listed by survey respondents was about 520 feet long, with 2% of the respondents reporting a driveway longer than 1 mile. Approximately 41% of the driveways were listed as less than 100 feet, 25% were listed as being between 100 and 250 feet in length, 11% were reported as being between 250 feet and 500 feet long, 9% – between 50 and 1,000 feet, and approximately 12% were between 1,000 feet and one mile long.

Respondents indicated the driveway surfaces were predominately gravel (70%) and paved (15%), with the remaining 21% bearing a dirt surface. The most limiting (narrowest) driveway width indicated by respondents was 5 to 10 feet wide by 18%, 10 to 15 feet wide by 37%, 15 to 20 feet wide by 22%, and greater than 20 feet wide by 22% of the survey's respondents.

Survey respondents provided information about the steepness, or grade, of their driveways. Roughly 25% indicated a flat grade, 28% showed a slight grade, 38% signaled a moderate grade, and the remaining 8% of respondents indicated a steep grade to access their homes. At the same time, approximately 53% of the respondents to the survey indicated that they do not have alternative access to and from their home in the event the primary access route was cut off due to a natural hazard such as wildfire, flood, or landslide.

Survey recipients were asked to identify if their address numbers are clearly visible from the nearest public road. Almost 67% of respondents signified a positive response to this question. During natural hazards, power supplies are often compromised. Survey responses indicated that about 39% of residents have alternative power supplies available at their home.

Emergency services training within the household is an indicator of a family's exposure to safety issues and awareness in emergency situations. This training can include one or more family members participating in volunteer activities (such as volunteer fire fighting), from employment based training, or from other venues. Respondents indicated training in the following areas within the last 10 years: 19% – wildland fire, 10% – city or rural fire fighting, 11% – paramedic or Emergency Medical Technician (EMT), 46% – basic first aid, and 13% – in search and rescue. Overall, about 51% of respondents reported at least one of these training activities for at least one member of the household during the past 10 years. Approximately 61% of the households reported at least one member of the home had attended at least one of these training opportunities more than 10 years ago. About 11% of the respondents reported that no one in the household had attended any of these training opportunities in the past. Conversely, approximately 89% of the households reported training by at least one member of the home had received training in one of these categories at some point in the past.

As discussed in subsequent sections of this plan (Chapter 4, Natural Hazards Assessment), severe weather, wildfire, and flooding risks on the Coeur d'Alene Reservation are the most widespread natural hazards experienced here. Wildfire risks are often very pronounced because of the vastness of the areas potentially impacted each summer. Homes and businesses are scattered around populated places and into rural and often very remote places. Respondents to the survey were asked to evaluate four categories of wildfire risk in the areas immediately surrounding their homes (Table 7). The right column reports the average response frequency by category, as summarized further in Table 8.

Table 7. Wildfire Fuel Hazard Rating Worksheet (Carree *et al.* 1998).

		Rating	Results
Fuel Hazard	Small, light fuels (grasses, forbs, weeds, shrubs)	1	40%
	Medium size fuels (brush, large shrubs, small trees)	2	27%
	Heavy, large fuels (woodlands, timber, heavy brush)	3	33%
Slope Hazard	Mild slopes (0-5%)	1	49%
	Moderate slope (6-20%)	2	33%
	Steep Slopes (21-40%)	3	14%
	Extreme slopes (41% and greater)	4	4%
Structure Hazard	Noncombustible roof and noncombustible siding materials	1	35%
	Noncombustible roof and combustible siding material	3	45%
	Combustible roof and noncombustible siding material	7	6%
	Combustible roof and combustible siding materials	10	14%
Additional Factors	Rough topography that contains several steep canyons or ridges	+2	Average: 5.9 pts
	Areas having history of higher than average fire occurrence	+3	
	Areas exposed to severe fire weather and strong winds	+4	
	Areas with existing fuel modifications or usable fire breaks	-3	
	Areas with local facilities (water systems, rural fire districts, dozers)	-3	

Fuel hazard 1.92 x Slope Hazard 1.73 = 3.32
Structural hazard + 3.49
Additional factors (+ or -) -1.06
Average Hazard Points = 5.75

The relative risk scores of respondents who live within city limits were compared to those living in rural areas. This comparison revealed no statistically significant difference between these two populations. The overall self-evaluation performed by the homeowners places approximately 59% of the homes at low risk, 35% at a moderate risk, and the remaining 6% at high risk, with none reporting factors leading to an assessment of to extreme risk factors to loss from wildfire (Table 8).

Table 8. Percent of respondents in each wildfire risk category as determined by the survey responses (Carree *et al.* 1998).

00% – Extreme Risk = 26 + points
06% – High Risk = 16–25 points
35% – Moderate Risk = 7–15 points
59% – Low Risk = 6 or less points

Three survey respondents wrote similar comments on their survey to state that although past wildfire mitigation activities were implemented around their home, the brush and young trees resprouted faster after the treatment (more sunlight). This necessitated re-applying the service by 2 of the homeowners, and frustration by another who stated that their abilities to keep up with the treatment of areas, surpassed their capabilities. When the latter respondent was contacted, she said that her and her husband are elderly and cannot operate the equipment to treat the site again. Reapplication of wildfire mitigation measures on homes previously treated and the application of new treatments for homes appears to be justified and warranted.

Survey recipients were asked to rate their home exposure to natural disasters. Responses indicated that 75% of respondents believe that their homes are exposed to high wind storm damage. At the same time, approximately 73% of respondents indicated their homes have risk exposure to snowstorm damages, and 71% gave the same assessment to wildfire risks for their home. Although still significant, other natural hazards were rated lower by survey respondents in the chance of the disaster to threaten homes with earthquake risks reported by 38% of respondents, landslides reported by 18% of respondents, and flooding with storm water damage potential reported by 15% of survey respondents.

Respondents to the survey reported the exposure of their home and access to their home by natural disasters by completing a tabular summary of these factors and the natural disasters (Table 9). The resulting summary by respondents illuminates the overall high frequency of exposure of homes and access by high and damaging winds (75% and 54% respectively), wildfire (71% and 44% respectively), and earthquakes (55% and 36% respectively) (Table 9).

In unison with these data, respondents reported disaster events that did affect their homes and access to their homes and the out-of-pocket losses caused by these natural disaster events. Approximately 12% of respondents reported that high winds have caused damages to their home with 8% reporting compromise to the access to their home. When the respondent did experience a financial loss, the out-of-pocket loss averaged $3,480 (Table 9). Although flood loss exposure was considered a risk to homes by 17% of survey respondents, approximately 5% of respondents reported experiencing a damage to their homes and 10% of respondents reported a loss of access from flooding. When a loss was experienced by the survey respondent, the average out-of-pocket loss was approximately $2,160. Severe winter weather in the form of snowstorm losses were reported by survey respondents at 3% of the homes and 7% of the access routes to those homes. The average loss, when a loss was encountered by the respondent, was approximately $800 (Table 9).

Financial losses reported in Table 9 are residential out-of-pocket losses and not the insured losses or the financial burden caused by the natural disaster event. When damages are witnessed there may be losses borne by the homeowner in the form of loss of work, personal labor to clean-up or repair their home and personal access routes, and even personal injury. At the same time, these natural disasters may be responded to by emergency responders, emergency services organizations, and Tribal services. The losses reported in Table 9 include only the residential out-of-pocket losses associated with the natural disaster events.

Table 9. Respondent self-assessment of home site risk exposure.

Hazard	Exposure to HOME by risks	Exposure to ACCESS by risks	History of Loss to HOME by disaster	History of Loss of ACCESS by disaster	Average Loss to HOME by disaster
Flood	17%	26%	5%	10%	$2,160
Storm Water Accumulation	19%	32%	4%	7%	$150
Wildfire	71%	44%	1%	1%	--
Landslides	16%	15%	1%	2%	--
Earthquakes	55%	36%	1%	0%	--
High & Damaging Winds	75%	54%	12%	8%	$3,480
Severe Snow Storms	17%	12%	3%	7%	$800

While the comparison of these data is extremely valuable in recognizing the recent historical impact of these natural hazards, it is critical to understand that these losses are not representative of commercial business losses, municipality, Tribal, or county government losses, or agency losses from these hazards. Neither are these decadal summaries of losses reflective of the expenditures in Tribal, agency, municipality, county, state, or federal dollars to mitigate these natural disasters. For instance, substantial budget amounts are expended annually by Tribal, state, and federal forest protection agencies to mitigate wildfire losses, fight wildfires, and prevent wildfire spread.

Survey respondents were asked how hazard mitigation projects should be funded in the areas surrounding homes, communities, and infrastructure such as power lines and major roads. As shown in Table 10, approximately 41% of respondents indicated a preference for cost-share funding of home defensibility projects to reduce the exposure of individual homes to natural hazards. Conversely, about 51% of respondents indicated a public funding preference for community defensibility projects, with 35% opted for a cost-share approach. Public funding options were preferred by 69% of respondents for infrastructure hazard mitigation projects (Table 10).

Table 10. Public opinions of hazard mitigation funding preferences.

	Public Funding	Cost-Share (Public & Private)	Privately Funded (Owner or Company)
Home Defensibility Projects →	23%	41%	36%
Community Defensibility Projects →	51%	35%	14%
Infrastructure Projects Roads, Bridges, Power Lines, Etc. →	69%	23%	8%

All survey recipients were offered an incentive to participate in the project in the form of a custom made color aerial photography wall map for completing and returning the survey (Figure XX). All of the survey recipients will remain anonymous. The Tribal Hazards Mitigation Planning Committee extends its appreciation to all those who participated in the survey.

Figure XX. Aerial image of Coeur d'Alene Lake offered to Survey Respondents for completing and returning the Residential Survey.

3.8.4. Public Meetings

Four public meetings were announced in the Council Fires paper (Figure XXI), and held during June 2010. All of the meetings were held in the evenings, starting at 6:30 PM and lasted for approximately 1½ hours with additional time spent in discussions and interactions between the attendees and the Planning Committee members present at the meetings. The meetings were held 1) June 8 in Plummer, at the Tribal Wellness Center, 2) June 9 in Worley, at the Long House, 3) June 10 in DeSmet, at the Long House, and 4) June 15 in St. Maries, at the St. Maries Fire Station.

Figure XXI. Council Fires press release for the THMP Public Meetings.

Meetings will be held for Mitigation Hazards Plan

The Coeur d'Alene Tribe has initiated a Tribal Hazards Mitigation Plan that started at the end of 2009 to develop an integrated approach to disaster mitigation efforts on the Coeur d'Alene Reservation.

The effort is funded by the Federal Emergency Management Agency (FEMA) and the Coeur d'Alene Tribe. Four public meetings will be held in June to share with attendees the assessments of natural disaster risks, the exposure of residents to those risks, and potential mitigation measures the planning committee is considering. The planning committee includes representatives from Tribal Departments,

Cities within the Coeur d'Alene Reservation, Emergency Managers from both Kootenai County and Benewah County, fire districts, highway districts, and Environmental and Planning Consultants from Kamiak Ridge, LLC.

All public meetings will include an interactive presentation and be augmented with wall maps, posters, and discussions. The goal of the meetings includes sharing the findings from the risk assessments and to gather ideas from the attendees for potential mitigation measures that can be implemented on the Coeur d'Alene Reservation.

The dates and locations of the meetings are: June 8, Plummer, Tribal Wellness Center Room A; June 9, Worley, Long House; June 10, DeSmet, Long House; June 15, St. Maries, Fire Station meeting room. All meetings will start at 6:30 and conclude by 8:00.

Anyone with questions about this project should contact Dr. Schlosser, at the Kamiak Ridge, LLC, office in Pullman, WA, at 509-592-7650, or Joshua Arnold at 208-686-0750, Tribal Planning Department at 850 A Street, Plummer.

The public meetings were held using a slide-show presentation (Figure XXII) format to share with attendees information about the planning process, a summary of past disasters and the exposure of the residents on the Coeur d'Alene Reservation to these natural disasters. The discussions at each meeting centered around the most important topics for the Reservation: expansive soils, floods, forest fires, landslides, earthquakes, and windstorms. One of the goals of the discussions was to identify potential mitigation measures to make it easier to deal with a disaster when it happens. Some of the ideas brought up at the meetings by the audience concerned storm water drainage, flood impacts along Hangman Creek with respect to infrastructure, wildfire mitigation measures, and disaster preparedness.

Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.

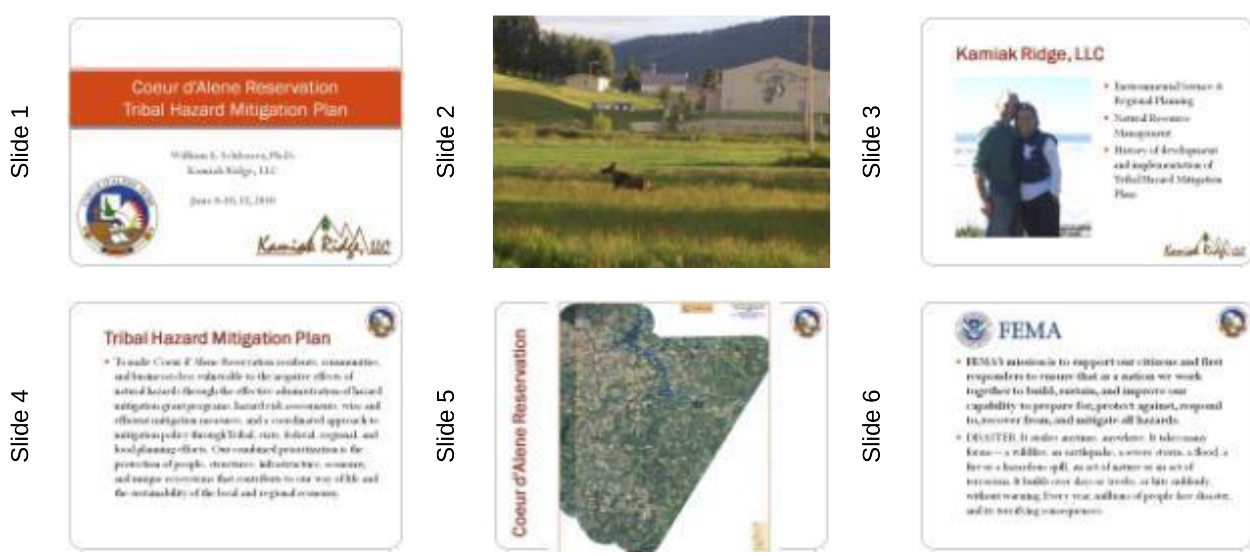


Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.

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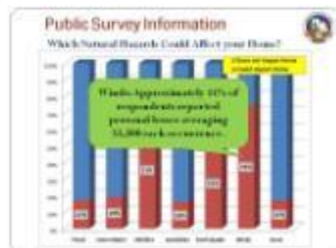

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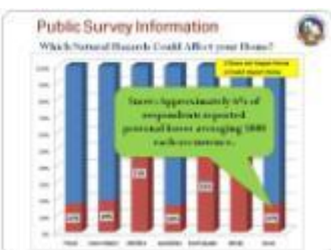

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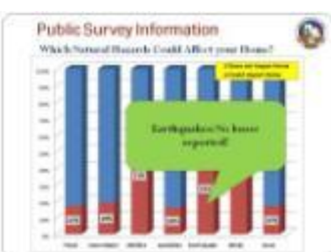

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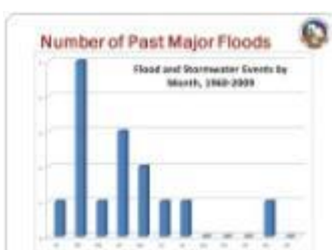

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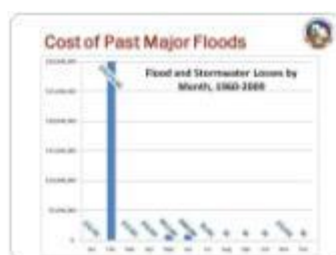

Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.

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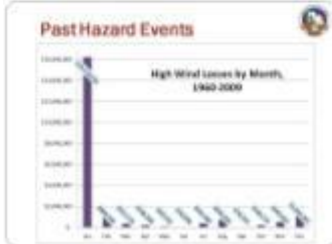

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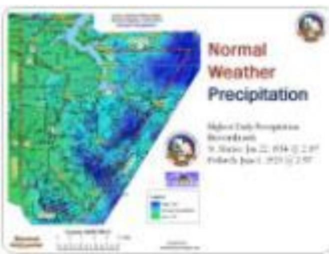

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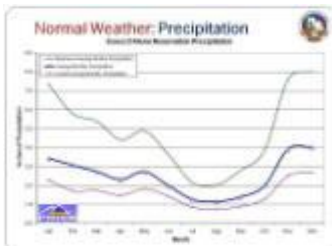

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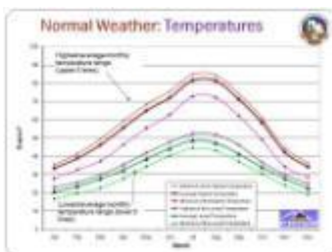

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Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.

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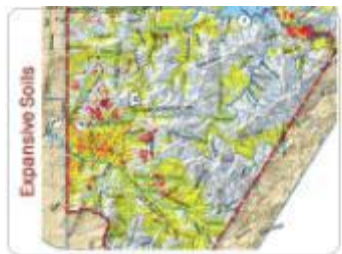

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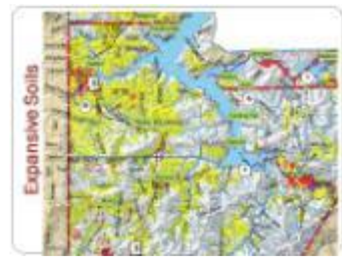

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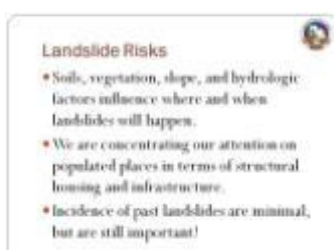

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Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.

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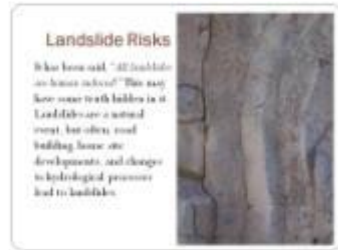

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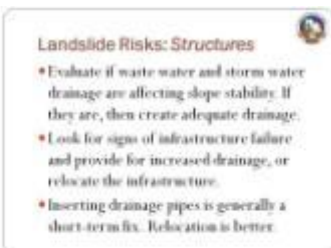

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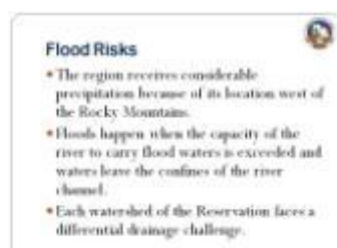

Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.

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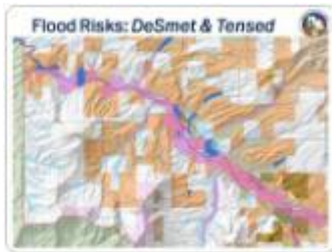

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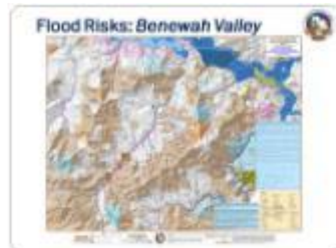

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Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.

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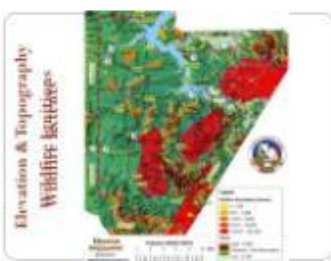

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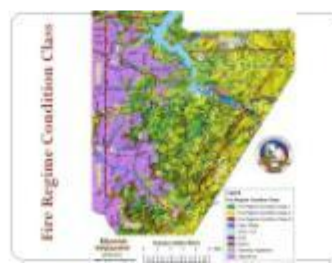

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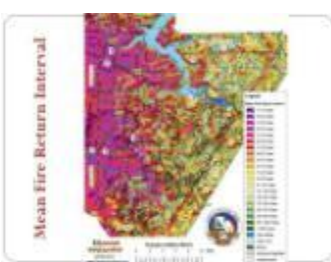

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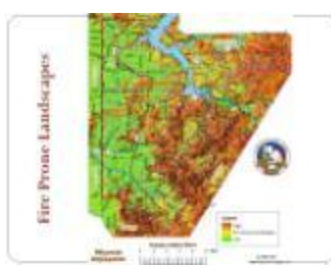

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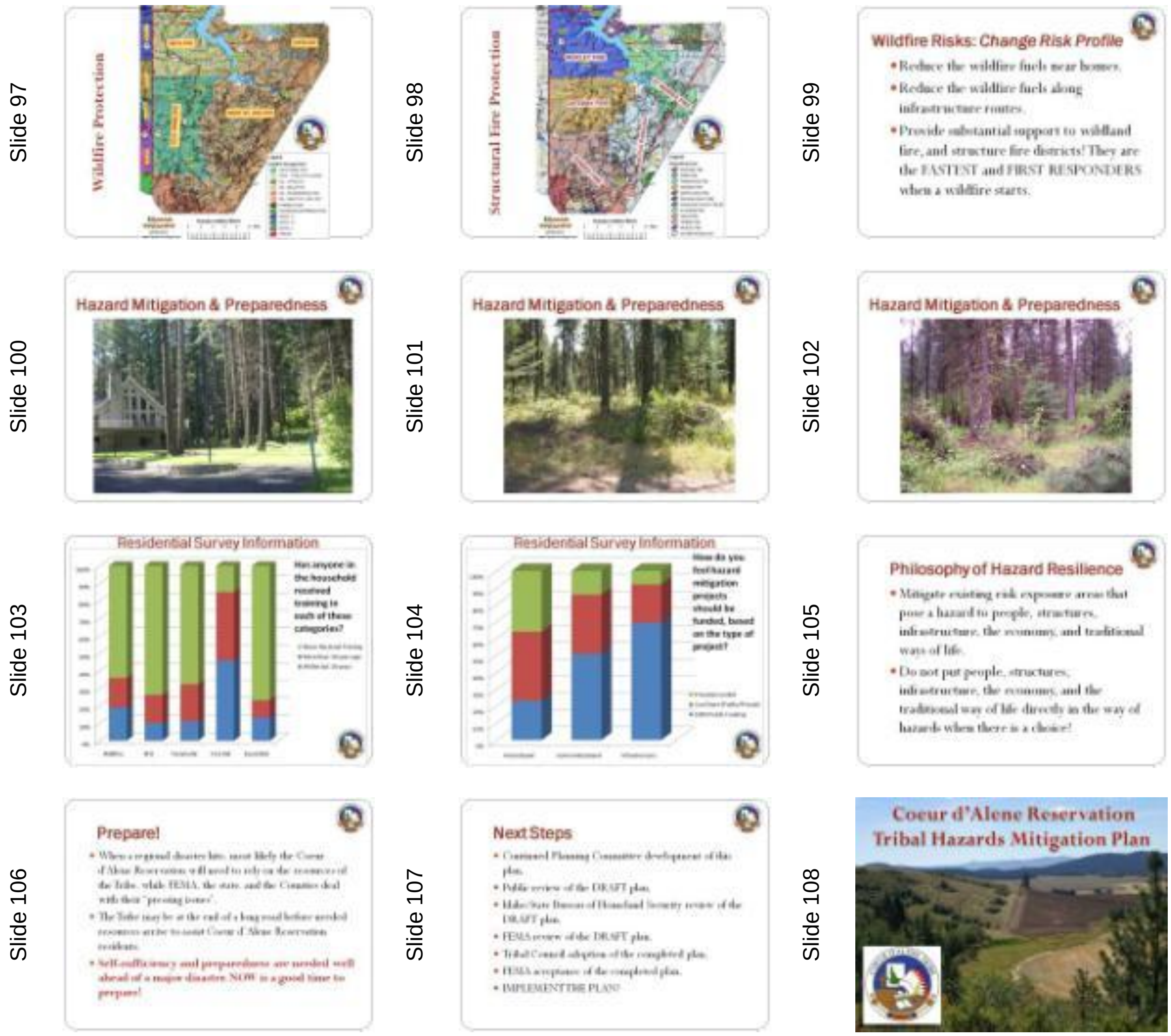
Figure XXII. Public Meeting slide show used in Plummer, DeSmet, Worley, and St. Maries.



All photographs, charts, and GIS Maps were taken or derived by Kamiak Ridge, LLC, for this project except as indicated here.
Slide 74 & 75: Photos provided by Norm Suenkel (2009), Benewah County Emergency Manager.
Slides 76, 77, 79, 80, 83: Photos by Bruce Kinkead, provided by Gerald I. Green, both of Coeur d'Alene Tribe. Circa 2004 & 2009.

3.8.5. Public Review

Public Review of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan was held during April 2011. The Council Fires newspaper announced the public review period on October 1, 2010 and again on April 1, 2011, (Figure XII). The plan was offered on the Tribal website for download, and interested people were encouraged to contact the Tribal Public Works Department to receive copies of the plan for review. All comments were provided before the end of April 2011 and incorporated into the final version.

3.9. Coeur d’Alene Tribal Structure

In order to formally assess and provide an opportunity for all Coeur d’Alene Tribe Departments to participate in providing unique information for the readiness assessment of this project, a Coeur d’Alene Tribe Readiness Survey was developed and distributed to Coeur d’Alene Tribe Department Leaders. This survey provides an insight to existing preparedness, resources available for mitigation, active response, and post-disaster responses at the Department level.

The Coeur d’Alene Tribe maintains a centralized organizational framework supporting the provision of essential governmental services. The legislative branch of the Tribal Government is composed of a seven member Tribal Council who delegates authority to an Administrative Director for the overall management of the daily governmental activities.

The Coeur d'Alene Tribal government operates with 18 departments, each with staff and various divisions of operations. The department heads report to the Administrative Director, their responsibilities range from finance to public relations to natural resources. The direction from the Chairman and the Council is to look ahead, move ahead and create progress for the Coeur d'Alene Tribe. Department heads enjoy the Council's trust and are, in turn, expected to make independent decisions within the bounds of their responsibilities. Everyday Tribal government operations are headed by the Administrative Director. Together with the Tribal membership, elected leaders and the staff have set forth the goal of restoring the Tribe's self-sufficiency. That will come with economic development, high employment, and the provision of educational opportunities (CDAT 2010).

Although all of the Tribal Departments operate in unison to provide continuity of services to the Coeur d’Alene Tribe and exercise their sovereign rights of self governance, a few of the Tribal Departments are specifically identified here for their specific relevance to this Tribal Hazard Mitigation Plan implementation and are defined within this sub-section.

3.9.1. Information Technology Department

The mission of the Information Technology (IT) department is to provide innovative and accessible technical solutions in computing, media and communication services to enable the Coeur d’Alene Tribe to effectively meet their goals as a learning community and to preserve Tribal culture.

The IT Department is responsible for maintaining all computer systems within the Tribal Government, as well as implementing network security and Tribal communications. Currently the IT Department manages Red Spectrum Communications through the award of $12.3 Million in funding from the U.S. Department of Agriculture to construct a broadband network that will provide high-speed internet access for the rural communities and surrounding areas on the Coeur d’Alene Reservation.

The Information Technology Department consists of three programs:

- IT Government Services
- Broadband Operations
- Geographic Information System (GIS)

3.9.1.1. Tribal GIS

The Coeur d'Alene Tribe has operated an active GIS program since 1992. The Tribe uses GIS technology to collect, store, and analyze information about the lands it has traditionally used.

Information is collected for environmental, social, and cultural geographic features. At this time over 3,000 different GIS databases are stored on the Tribe's GIS server.

The goal of the GIS includes:

- Provide information to Tribal Council and Tribal Managers to allow them to make the best decisions possible for the future generations.
- Create a central location for Tribal information and make that information more accessible to the Tribe.
- Provide the Tribe with accurate information about their resources.
- Preserve information about past activities that have occurred within the Tribe's aboriginal territory.

3.9.2. Coeur d'Alene Tribal Housing Authority Department

The Coeur d'Alene Tribal Housing Authority provides all property management functions including but not limited to oversight of all tenant issues; admissions and occupancy for rentals and other programs; interior and exterior inspections; recertification; monitoring of lease compliance, preparation of corrective action notices to residents, coordination of clean-ups; general tenant counseling.

3.9.2.1. Mission Statement

The mission of the Coeur d'Alene Tribal Housing Authority is to create opportunities to meet the housing needs of enrolled members of the Coeur d'Alene Tribe by:

1. Maximizing the utilization of available resources to ensure services are provided in an efficient, professional, economical and timely manner;
2. Forming and enhancing partnerships between the Coeur d'Alene Tribal Housing Authority and Tribal, state, local and private entities; and
3. Promoting self-sufficiency and improving the quality of life.

In order to address the critical shortage of housing for the members of the Coeur d'Alene Tribe, the Coeur d'Alene Tribal Housing Authority was organized pursuant to Coeur d'Alene Tribe Ordinance CDA 205(1963) and designated as the Tribally Designated Housing Entity by Resolution No. 98(1998) dated March 30, 1998. The Authority, as a subdivision of the Coeur d'Alene Tribal Government, exists as a legal nonprofit entity empowered to issue bonds, provide financing, and enter into contracts with the federal government and private groups for the purpose of planning, developing and implementing comprehensive housing assistance plans. It is also charged with the responsibility to administer, direct and manage all operations pertaining to the housing needs of Native people residing on the Coeur d'Alene Reservation.

3.9.2.2. Housing Counseling Services Department

Staff includes a Housing Counseling Manager and a Housing Counselor Trainee who plan, organize, and conduct homebuyer education classes for the community; provide prequalifying assistance, budgeting, credit counseling, and loan application assistance. Plans and implements activities designed to increase knowledge about the home buying process, home maintenance, budget/credit and debt management.

3.9.2.3. Coeur d'Alene Tribal Housing Authority Departments

The Coeur d'Alene Tribal Housing Authority maintains a centralized organization with an Executive Director being responsible for day-to-day operations involving the following departments:

3.9.2.3.1. Administration/Finance Department

The Executive Director is responsible for overall direction and management of housing administration operations including human resources, procurement; accounting; housing development and management; planning; program/policy development; staff and Board development, needs assessment, financial management and analysis, fund raising, public relations, etc.

3.9.2.3.2. Facilities and Construction Services Department

The Facilities Construction Director is responsible for organizing and supervising the completion of all repair and modernization activities, including cost estimating, work write-ups, scheduling, physical needs assessments, and inspection for all Coeur d'Alene Tribal Housing Authority work activities, including contracted activities. The Facilities Construction Director also coordinates all activities needed to carry out work order requests and associated construction and rehab functions. Staff includes a Facilities Construction/Maintenance Director, Maintenance Coordinator, work order/scheduling clerk, cleaning crew, and temporary and regular construction and maintenance crew.

3.9.3. Lake Management Department

The Lake Management Department is dedicated to protecting the Coeur d'Alene Reservation through management programs and activities designed to preserve, protect, restore and promote aquatic resources within the historical and cultural territories of the Coeur d'Alene Tribe and to promote and protect the health, welfare and safety relating to those resources for the benefit of present and future generations of Tribal members and the public.

To fulfill this mission, the Department represents the Tribe's sovereign interests at local, regional and national levels and seeks to take advantage of all opportunities to protect, enhance and restore aquatic resources for present and future generations. The Department also manages and controls those beds and banks of navigable waters belonging to the Tribe or otherwise subject to Tribal jurisdiction consistent with Reservation purposes to protect those resources. The Department, with the policy of the Tribe, as expressed through Tribal laws, provides opportunities for public use of those resources in specific and well defined ways. In doing so, the Department seeks to protect public health, safety and welfare as related to these resources. The Department works to the extent practicable and permissible with other Tribal programs, government agencies and education institutions to fulfill its mission.

The Tribe's Lake Management Department was formed by the Coeur d'Alene Tribal Council in March 2003. This formation was the official acknowledgement that the Tribe's jurisdiction over waters within the Reservation boundaries (i.e. Tribal waters) had been reaffirmed by the United States District and Supreme Courts, and that the Tribe has the responsibility to manage and protect these waters. The organization of this Department falls under the direct supervision of the Administrative Director. Department responsibilities include but are not limited to; management of lake and river encroachments, water quality protection, lake improvements, aquatic invasive species management, wetlands and riparian lands mitigation, shoreline erosion management, debris management, safe boating, implementation of the recently adopted Tribal /State Coeur d'Alene Lake Management Plan, recreation on Tribal waters (including operation and maintenance of the Trail of the Coeur d'Alenes), and hazardous waste management as it pertains to mining related contamination. The Department Director is designated as lead contact in the Avista / Spokane River Project dam relicensing effort.

3.9.4. Public Works Department

The mission of the Coeur d’Alene Tribal Public Works Department is to empower the Coeur d’Alene Tribal people and community through:

- Building safe and healthy communities and public facilities
- Encouraging sustainable economic and community development
- Facilitating and promoting public participation in our community
- Promoting educational and innovative planning concepts
- Developing regulatory guidelines to ensure our vision and mission

The Public Works Department consists of three (3) divisions and eleven (11) employees.

3.9.4.1. Public Works Department Goals

- The Public Works Department will design Tribal projects in accordance with current engineering design standards and construction codes in order to ensure that the Tribe’s investments in infrastructure benefit future generations of Tribal members.
- The Public Works Department will actively participate in local, state, and federal planning and development initiatives.
- The Public Works Department will coordinate the development and organization of infrastructure systems on the Reservation, including, but not limited to, water and wastewater facilities, storm water collection systems, and solid waste.
- The Public Works Department will develop a comprehensive plan and work with the tribal council to implement an appropriate zoning, building, and permitting process to address Reservation needs.
- The Public Works Department, in coordination with other programs and entities, will work to balance economic development and growth on the Reservation, while preserving the Tribe’s culture and rural character.
- The Public Works Department will identify development projects consistent with community needs; and seek to secure financial resources for the timely completion of projects.
- The Public Works Department will establish communication with community residents by conducting appropriate community meetings.

Currently, incorporated municipalities and county governments within the external boundaries of the Coeur d'Alene Reservation exercise planning and zoning authority on non-tribal lands. The Coeur d'Alene Tribal Council administers land use controls, planning, and zoning regulations on lands under its jurisdiction. In the future, the Coeur d'Alene Tribe may endeavor to work with these entities to create a joint land use planning process in order to further enhance the coordination of proper land use planning and reduce the potential for land use incompatibilities.

3.9.5. Natural Resources Department

The Coeur d'Alene Tribe's Natural Resource Department is committed to the preservation, protection, enhancement, and management of the Tribe's natural resources, as well as being dedicated to restoring the environment within traditional cultural and historical boundaries of the Coeur d'Alene Tribe to improve the quality of life and provide direct social and economic benefit for the Tribe and its people.

3.9.5.1. Programs

The Natural Resource Department's Administrative office consists of two staff people, a Director and the Administrative Assistant. The Administrative office provides program review, oversight, and coordination.

- Smoke Management
- Air Quality
- Pesticide Enforcement
- Fisheries
- Wildlife / BPA Land Acquisition
- Forestry / Fire / Fuels/ Wildland-Urban Interface (WUI) /Forestry Roads
- Environmental Programs Office
- Land Services / Noxious Weeds / Lease Compliance / Smoke Management
- Federally Recognized Tribal Extension Program (FRTEP)

Natural Resource Department's Administration was created in 1992 when the Coeur d'Alene Tribe contracted former BIA programs under P.L. 93-638; this action allowed the Tribe to consolidate all of the Natural Resource programs into a single department and provided program coordination to ensure that information and program recommendations being provided to the Tribal Council were comprehensive and accurate prior to Council action and that jurisdictional interests of the Tribe are preserved and protected.

The Natural Resource Department's Administration coordinates the activities of seven major programs and related program budgets within the department and provides for the budget reviews, coordination and development of funding proposals for submission to at least five federal agencies, as well as reviews the accuracy and completeness of all technical reports and policy documents prepared by Tribal staff for submission to the Tribe and the funding agencies. The Natural Resource Department's Administration also facilitates and develops cooperative relationships between federal, state, and local governments and communities on the Coeur d'Alene Reservation.

The Natural Resource Department's Director is responsible for all personnel issues that may arise within the programs and works to develop the capabilities and skills of staff working in the department. The Director serves as a representative for the Tribe with federal agencies, and develops educational training programs that assist the staff members to learn and understand the importance of Tribal resource and environmental management.

The Natural Resource Department's Administrative office also reviews letters and documents from outside agencies to assess and determine the impacts on the Coeur d'Alene Tribe, and develops as necessary appropriate responses.

Although most of the Natural Resources Department's activities are related to natural disaster preparedness and response, the Forestry and Fire Management and Environmental Programs Office activities are the most pertinent to this discussion and are summarized here.

3.9.5.2. Forestry and Fire Management

The Coeur d'Alene Tribal Forestry program has three major responsibilities: Forest Management, Forest Development and Fire Management. The program consists of ten positions filled by twenty-two employees. The positions include: Forest Manager, Foresters, Forest Development Forester, Forestry Technicians, Fire Management Officer, Fuels Technician, Fleet Manager, Firefighters, Timber Accountant and Administrative Assistant.

3.9.5.2.1. Forest Management

The Forest Manager administers the Tribal forestry and fire management programs. These programs strive to maintain an environmentally healthy forest to ensure future production of desired forest products. Management guidelines are established for both Tribal and allotted lands in a forest management plan. Foresters are responsible for planning, scheduling, directing and managing all forest management and development activities. Forestry Technicians assist the Foresters, as well as work independently to conduct seedling survival studies, timber marking, timber and realty cruises and fire suppression activities.

3.9.5.2.2. Forest Development

This program focuses on applying silviculture activities such as reforestation, pre-commercial thinning, pruning, site preparation, cone collection and tree improvement.

3.9.5.2.3. Fire Management

The Fire Management Officer is assisted by a Fuels Technician, Fleet Manager, and nine seasonal fire fighters. They work cooperatively with local, state, and federal agencies to protect Tribal, allotted, and fee lands against catastrophic wildfires. They also use prescribed burning to prepare planting sites, initiate underburning to increase forage and reduce fuel loading, and maintain a defensible space program to protect Tribal homes from fire within the WUI.

3.9.5.2.4. Wildland-Urban Interface

The Coeur d'Alene Tribe Natural Resources Department has identified the definition of the Wildland-Urban Interface (WUI) within the Coeur d'Alene Reservation. It is consistent with the definition of the WUI introduced in Section 2.5, Population Density Indices and Figure VII. The Coeur d'Alene Tribe's Fire Management Plan includes activities to manage the risks from wildfire within this zone of human habitation referred to as the WUI. The management of the WUI rests solely with the Natural Resources Department by combining the forest management expertise of Forestry and Fire Management.

3.9.5.2.5. Forestry Roads

The Forestry Roads Program is responsible for operations of the tribal rock pit in Plummer. Other responsibilities include maintaining tribal roads leading to tribal forest lands.

3.9.5.3. Environmental Programs Office

The mission of the Environmental Programs Office is to conduct multi-disciplinary work in support of the Natural Resource Department's mission statement.

Examples of current projects administered by the Environmental Programs Office include: assisting in comment preparation on proposed projects that may affect Tribal resources, conducting food-handling classes and regular safety inspections of Tribal facilities, coordinating the development of the Tribe's Integrated Resource Management Plan (in draft), the Tribe's Source Water Protection Plan, and the Tribe's Integrated Solid Waste Management Plan.

3.10. Coeur d'Alene Tribal Operations

In order to assess the preparedness and capabilities of the Tribal Departments involved in the preparation of the Tribal Hazard Mitigation Plan, surveys were prepared. These surveys were completed and returned by a total of eleven (11) respondents (Table 11).

Table 11. Respondent Information from the Department Surveys.

Department/Program	Address	Survey Respondent	Department Head/Program Head	Services Provided
Air Quality Management	PO Box 408 Plummer, ID 83851 850 A St. Plummer, ID 83851	Lester C. Higgins Air Quality Manager	Alfred Nomee/Lester C. Higgins	Monitor air quality and do Inspections for point sources within reservation boundaries.
Hndesnet / Culture Department	850 A Street, Plummer, ID 83851	Jill Wagner THPO, and Acting CRM Program Manager	Quanah Matheson	Language, Culture, history, Cultural resource reviews for NEPA and Section 106 on federal undertakings, coordination regarding cultural resources and language needs for other departments and non-tribal agencies.
Natural Resource Department – Environmental Programs Office	232 Agency Loop Road, Plummer, ID 83851	Tiffany Allgood Environmental Action Plan (EAP) Coordinator	Alfred Nomee/Tiffany Allgood	Environmental services such as environmental planning, environmental health inspections, environmental policy analysis, etc.
Natural Resources Department – Fisheries	401 Anne Antelope Rd, Plummer, ID 83851	Angelo Vitale, Department HeadHead	Alfred Nomee/Angelo Vitale	Fisheries related activities; restoration, monitoring, evaluation, recommendations concerning regulatory issues, recreation fishery.
Natural Resources Department – Forestry – Fire – Fuels	181 Agency Loop Road Plummer, Idaho 83851	Thomas A. Pakootas Fire Management Officer	Alfred Nomee/Kurt Mettler	Forest Management –timber harvest, timber salvage, forest health. Fire Management – fire suppression, prescribed fire, fire preparedness Fuels – hazard fuel reduction, treatment of fuels in the Wildland Urban Interface
Natural Resources Department – Forestry & Wildfire (Forestry Roads & WUI)	PO Box 408	Kurt Mettler Forest Manager	Alfred Nomee/Kurt Mettler	The Forestry Roads Program is responsible for operations of the tribal rock pit in Plummer. Other responsibilities include maintaining tribal roads leading to tribal forest lands.
Natural Resources Department – Land Services	850 A Street, Plummer, ID 83851	John M. Abraham Land Services Manager	Alfred Nomee/John Abraham	Conservation Planning, Trust Management, Leasing, and Smoke Management.

Table 11. Respondent Information from the Department Surveys.

Department/Program	Address	Survey Respondent	Department Head/Program Head	Services Provided
Natural Resources Department - Wildlife Program	401 Anne Antelope Rd, Plummer, ID 83851	C. Heusser Wildlife Program Manager	Alfred Nomee/Cam Heusser	The Wildlife Program is responsible for ensuring the protection and preservation of wildlife resources.
Natural Resources Department – Pesticide Enforcement	PO Box 408 Plummer, ID 83851 Agency Road Building 132 Plummer, ID 83851	Eric Gjevre Pesticide Specialist	Alfred Nomee/Eric Gjerve	Pesticide Enforcement - complaint response follow up, compliance inspections, outreach/education/compliance assistance.
Lake Management Department	PO Box 408 850 A Street Plummer, ID 83851 208-686-1800	Sandra Raskell, Project Engineer	Phil Cernera	Department responsibilities include but are not limited to; management of lake and river encroachments, water quality protection, lake improvements, aquatic invasive species management, wetlands and riparian lands mitigation, shoreline erosion management, debris management, safe boating, implementation of the recently adopted Tribal /State Coeur d'Alene Lake Management Plan, recreation on Tribal waters (including operation and maintenance of the Trail of the Coeur d'Alenes), and hazardous waste management as it pertains to mining related contamination. The Department Director is designated as lead contact in the Avista / Spokane River Project dam relicensing effort.
Public Works Department	P.O. Box 408 850 A Street, Plummer, ID 83851	Jim Kackman Department Director	Jim Kackman	The mission of the Coeur d'Alene Tribal Public Works department is to empower the Coeur d'Alene Tribal people and community through: • The building of safe and healthy communities and public facilities • The encouragement of sustainable economic and community development • Facilitating and promoting public participation in our community • Promoting educational and innovative planning concepts • Developing regulatory guidelines to ensure our vision and mission The Public Works Department consists of three (3) divisions and eleven (11) employees.

Table 11. Respondent Information from the Department Surveys.

Department/Program	Address	Survey Respondent	Department Head/Program Head	Services Provided
Tribal Housing Authority	1005 8th St. P.O. Box 267 Plummer, ID 83851	Cielo Gibson, Department Head	Cielo Gibson	Make sure housing stock is safe to occupy after or during a hazard event. Provide services of housing, homebuyer education, Idaho's down payment assistance, Mortgage Financing Rehabilitation.

The results of the completed surveys demonstrate the differing levels of preparedness across the critical divisions of the Coeur d'Alene Tribe, whose responsibilities encompass disaster mitigation and response. These results were used to help direct mitigation measures and to assist Tribal Departments with hazard preparedness.

Survey respondents represented 105 full-time employees and 39 seasonal employees. The Tribal Housing Authority represented the most full-time employees with 25. The Fire Management Program combined with the Forestry Program showed the greatest fluctuation in the number of staff with 19 full-time employees and 31 seasonal employees. The average Coeur d'Alene Tribe Department participating in this survey employed 9.5 people full-time, and 3.5 people part-time.

Training associated with a general level of preparedness for natural disasters was assessed by the respondents to the survey (Table 12). Seven of the eleven reporting departments (78%) indicated that 25% or less of their employees possess either City or Rural Firefighter training, while the Fire Management and Forestry Departments reported a highest percentage of trained staff in this category (>75%) in wildland fire fighting. Training as an EMT was indicated for less than 25% of employees in all Divisions except the Tribal Housing Authority where more than 76% of employees were trained in this service. Basic First Aid was also reported for the great majority (>76%) within the Tribal Housing Authority Department, while one department reported greater than 50% of their staff is trained in Basic First Aid, four reported between 26% and 50% of staff with this training, and another five departments reported 25% or less of staff with this training (Table 12).

Table 12. General Level of Emergency Response Training by Department Staff.

Type of Training	25% or less of employees	26% to 50% of employees	51% to 75% of employees	More than 76% of employees
Wildland Firefighting	78%	0%	22%	0%
City or Rural Firefighting	100%	0%	0%	0%
EMT	89%	0%	0%	11%
Basic First Aid	45%	36%	9%	9%
National Incident Management System (NIMS)	90%	0%	10%	0%
Hazardous Materials (HazMat)	90%	10%	0%	0%

Survey respondents indicated if their office headquarters is exposed to risks from a list of natural hazards (Table 13). The results of this assessment indicate that almost all Department responders (91%) report that their office headquarters face exposure to a disruption as a result of either wind storms or winter storms (or both). The Coeur d'Alene Tribe has a main Tribal Center in Plummer that houses most critical functions for the Department Managers responding to the survey. Past winter storm occurrence was reported by 10 out of 11 of the responding Departments (91%), followed by wind storms or tornado past occurrence (18%). Wildland fire was reported by one department responding to the survey. None of the other disasters listed were reported by the responding departments as natural disasters that have affected their operations (Table 13).

Table 13. Respondent Assessment of Operations Exposure to Natural Hazards.

Type of Hazard	No	Yes
Flood	100%	0%
Wildland Fire	91%	9%
Earthquake	100%	0%
Landslide	100%	0%
Wind Storm/Tornado	82%	18%
Winter Storm	9%	91%

Respondents reported a number of additional potential hazards which could impact their normal operations. These included (quoted from the surveys):

- The loss of power lines or communication towers from any event will cause the internet connections and telephone to go out.
- Water outage, electrical outage, HazMat situations, severe weather could affect the functioning of the Department.
- One that has affected our work: the building one of our people works in was hit by a carnival ride (*seriously*). The truck transporting the ride went off the road and hit the pre-fabricated unit housing the department of education and our one staff member. This necessitated a temporary move for them and disrupted work for several days. The staff member was out of her office for an extended period working in a temporary location. The temporary location was a building that another portion of our department had just moved out of but was using as storage. We had to stop other work and clean out the space for them.
- There have been times when the water in the building does not work and we are asked/allowed to leave due to unsanitary conditions. This is usually due to power outages but also some equipment failure.
- Water supply failure and related water problems required devices and drainage of water related devices.
- Electrical failure/malfunction, heating / air conditioning, or other, causing air quality issues and/or fire.
- Acts of GOD
- Since the office building is adjacent to major highway a tanker spill could be harmful.
- Sometimes people dump debris in drainage ditches causing blockages. Utility infrastructure can be damaged by both natural and man-made hazards.

Approximately 18% of the responding Departments reported access to a backup power generator to use for operations if the power grid fails due to a natural disaster. At the same time, approximately 73% of the respondents indicated that there is an alternative access route to their office base of operations if the main access route is compromised. Approximately 56% of the reporting Departments indicated they have the ability to operate from an alternative location. However, only one of the reporting Departments indicated that they have a written plan in place to operate from another location during or after a disaster event (Planning Department).

Responding Departments were asked to provide historic information on the impact of hazards that have affected their ability to operate during the past 10 years (Table 14). These examples illustrate the complications provided to the operations of the Tribal Departments in respect to natural hazards. The most influential of the natural hazards has been winter storms and wind storms.

Table 14. Historical Impact of Hazards that have Affected Departmental Ability to Operate.

Did Hazard Affect your Department? ↓Hazard↓	If YES, Complete these questions… Yes	→	Did this hazard cause damage to or affect: General Office Operations	Reduced ability to provide services	Equipment Operations	Briefly describe impact on your department. (i.e., employee ability to get to work, etc.)
Flood	0%	→	0%	0%	0%	
Wildfire	9%	→	0%	0%	0%	
Earthquake	0%	→	0%	0%	0%	
Landslide	0%	→	0%	0%	0%	
Wind Storm/ Tornado	18%	→	0%	9%	9%	Affected power line of Tribe's equipment on hill. Consequently, power off, phone was down, etc. Because of cold weather, frozen pipes burst. During two winters water was shut off and we experienced power outages.

Table 14. Historical Impact of Hazards that have Affected Departmental Ability to Operate.

Did Hazard Affect your Department? ↓Hazard↓	If YES, Complete these questions… Yes	→	Did this hazard cause damage to or affect: General Office Operations	Reduced ability to provide services	Equipment Operations	Briefly describe impact on your department. (i.e., employee ability to get to work, etc.)
Winter Storm	91%	→	27%	73%	27%	Employees unable to get to work. Power outage. Limited access to office, no backup power. At times during harsh winters it was difficult to keep up with snow removal and plowing. Snow damage to buildings and road closures. Could not get to work safely; power outages occasionally and cannot use computer (internet and email, too) or Tribal phone service. Office closure, Administrative pay for employees or PTO depending on the circumstance. Difficult for employees to get to work. Snowplows were sometimes damaged. A sand storage building collapsed. Tribal offices closure 2-3 days

Respondents indicated that 100% have alternative communications available in the case of a disaster. All departments (100%) report that employees have personal cell phones for this purpose. Other communication devices available to staff include two-way radios in common use by the Natural Resources employees. It is important to note that alternative communication devices such as cell phones rely on an operational electrical power grid and operational cell phone towers to be effective.

Respondents were asked to rank the perceived relative threat posed by a variety of natural hazards (Table 15). Based on this assessment, winter storms ranked as the highest threat in the list of potential impacts (33 points where total agreement on the highest risk hazard would score 33 points). Wind storm / tornado was ranked second overall (26 points), followed by wildfire (23 points), flood (18 points), landslides (13 points), and earthquakes (12 points) (Table 15).

Table 15. Relative Ranking of Various Hazards.

Type of Hazard	Rank	Composite Score
Winter Storm	1	33
Wind Storm/ Tornado	2	26
Wildfire	3	23
Flood	4	18
Landslide	5	13
Earthquake	6	12

Relative risk scores reported for each hazard (Table 15) were determined by assigning a point score of 6 to the highest ranked hazard, 5 to the next lowest, and so forth to the lowest ranked risk, which received a 1. All respondent scores were added together for each hazard and the risk with the highest score received the ranking as the largest comparative risk exposure.

The Fisheries Department, Planning Department, and Natural Resources Department – Pesticides Enforcement, indicated they have Emergency Operations Plans (EOP) for their departments. The Fisheries plan was last updated on December 2, 2009, and the Planning Department's plan and the Natural Resources Pesticides Enforcement Department were both updated in May 2010. The remaining respondents indicated no EOP, although a few respondents reported to be currently working on these documents.

3.11. Legal and Regulatory Tribal Resources Related to Hazard Mitigation

A summary of legal and regulatory resources developed and adopted by the Coeur d'Alene Tribe is summarized in Table 16. A further discussion of these items is presented in subsequent sections of this sub-chapter. These plans, policies, and programs provide a framework for implementing the mitigation items termed as "policy" recommendations. Many of the potential mitigation measures referenced in Table 72 will be implemented through the existing framework of plans, policies, and programs already established within the Coeur d'Alene Tribe. Through the utilization of existing Coeur d'Alene Tribe plans, policies, and programs, the implementation of the THMP will be met with high success, and both financial and administrative achievement.

As used in this context, a **"plan"** is typically a formally written document by the Coeur d'Alene Tribe and is used to direct administrative operations with the approval and support of the Coeur d'Alene Tribal Council. These "plans" will normally be formally adopted by the Coeur d'Alene Tribal Council. A **"policy"**, as used in this context, is a formal code of operations administered by the Department Leadership to execute the duties assigned to the Department. "Policies" may or may not be formally adopted by Tribal Council, but are utilized on behalf of the Tribe by an authorized administrator. The third category, **"programs"**, are formal implementation strategies of the Coeur d'Alene Tribe to enact a variety of efforts from minor activities to major undertakings. Some of the "programs" may be adopted formally by the Tribal Council, while others may not be.

Examples of these three variations of sovereign authority are seen as 1) Plan – such as this Tribal Hazards Mitigation Plan or adopting the International Building Code, 2) Policy – such as the process of sharing GIS data with cooperating parties not directly affiliated with the Tribe, and 3) Program – the implementation of a Lake Management Plan or the administration of Fire Management activities. Often, the designation of these labels is ambiguous, but their categorization into one category or another category is not critical.

All of these documents, listed in Table 16 are incorporated into this effort through this reference and are cited at the end of this document (Section 8.3 Literature Cited).

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Plans	**Coeur d'Alene Tribe Emergency Operations Plan**	Tribal EOP: • Protect human life and public health. • Protect public property and infrastructure. • Provide reasonable assistance to individuals to protect property consistent with constitutional requirements, Tribal functions and funding. • Protect the environment	• Hazardous Material Release • Fire • Construction and Transportation Accidents • Vandalism, Riots, Strikes, and Terrorism • Extended Power Outages • Natural Disasters ○ Earthquake ○ Extreme Weather ○ Flooding ○ Waterborne Diseases	**Adopted by Tribal Council CDA 108(2010) May 6, 2010**
Category: Policy	**Comprehensive Economic Development Strategy (CEDS) 2009**	The intent of the CEDS is to provide an understanding of the regional economy and how the Coeur d'Alene Reservation interacts with the regional economic structure. The CEDS develops the extent of the economic footprint of the Coeur d'Alene Reservation while establishing an economic development strategy.	The plan references the climate and topography of the Coeur d'Alene Reservation but no recommendations for hazard mitigation are addressed.	Resolution of Adoption 265(2009) **July 15, 2009**
Category: Policy	**Comprehensive Plan for the Coeur d'Alene Tribe**	The purpose of this document is to provide consistent direction for the Coeur d'Alene Tribe in its policy practices, and to provide a clear vision for the future. With such a compellation of goals, requirements, objectives, and policy guidelines, the Tribe can assure its members, and those non-member Reservation residents, of a certain quality of life.	The Plan discourages construction in floodplains, recommends the development and implementation of Tribal building codes and accompanying building inspections, and the Reservation of natural water drainage systems and snow storage areas.	2005 *Draft*

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Plans	**Comprehensive Transportation Plan for Fiscal Year 2003**	The transportation plan was drafted in 1998 with updates through 2002. This plan developed a comprehensive, structured effort to develop an effective transportation component with the Coeur d'Alene Tribe. The plan includes a history of the Tribal transportation initiatives, current Indian Reservation Roads (IRR) inventory, Average Daily Traffic on primary and secondary roadways, forecasted traffic volumes, and a Transportation Improvement Plan.	Reference is made to the impact of soils on road construction and refers to what is considered potential flood damage and expansive soils and expansive clays risks (reduces the potential for roadway deterioration due to freezing).	Adopted by Tribal Council **April 1, 2004**
Category: Program	**Public Transit and Human Services Transportation Coordination Action Plan**	Coordinated action plan is established to create an Elderly and Disabled Program Capital Assistance for Specialized Transit Vehicles, Job Access and Reverse Commute, and Ne Freedom and Mobility Management Programs on the Coeur d'Alene Reservation and adjacent regions.	Natural Hazards are not addressed.	Resolution of Adoption 32(2009) **December 4, 2008**

Category: Plans	**Emergency Response Plan for the Coeur d'Alene Tribal Water System**	This emergency response plan (ERP) is specific to the Coeur d'Alene Tribal water systems that serve the Coeur d'Alene/Plummer, Sub-Agency, DeSmet, and Camp Larson facilities (Tribal water systems).	• Hazardous Material Release
			• Fire
			• Construction and Transportation Accidents
			• Vandalism, Riots, Strikes, and Terrorism
			• Extended Power Outages
			• Natural Disasters
			  ○ Earthquake
			  ○ Extreme Weather
			  ○ Flooding
			  ○ Waterborne Diseases
				September 2008, Approved by Tribal Council Resolution on December 4, 2008.

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Plans	**Emergency Response Plan for the Coeur d'Alene Casino Water System**	The purpose of this ERP is to provide water utility personnel, Tribal staff and government and other stakeholders a formal outline of emergency planning and response measures and tools that have been implemented for casino water system	• Hazardous Material Release • Fire • Construction and Transportation Accidents • Vandalism, Riots, Strikes, and Terrorism • Extended Power Outages • Natural Disasters o Earthquake o Extreme Weather o Flooding o Waterborne Diseases	September 2008
Category: Plans	**Coeur d'Alene Tribal Drinking Water Protection Plan**	This report comprises the Wellhead Protection Plan for the Coeur d'Alene Tribe, and updates and supplements the 2005 Source Water Assessment. This report also includes a source water assessment for Camp Roger Larson, updates source water assessments for the four other Tribal water systems, and provides a susceptibility analysis and risk ranking for all five Tribal water systems.	Groundwater contamination susceptibility posed by: o Physical integrity of the well, o Hydrogeologic characteristics, and o Land use with associated potential contaminant sources.	September 2007
Category: Plans	**Integrated Resource Management Plan (in draft)** and the **Final Programmatic Environmental Impact Statement** for the Integrated Resource Management Plan	k'wne' chstqhessiple' hnkhwlkhwlstsutnet "The future course of our renewal" A programmatic level recommendation for land use, natural resource enhancement and protection, residential/commercial growth and development planning, and cultural Preservation for the Coeur d'Alene Reservation. The Tribe also developed a programmatic level recommendations for the management of natural, cultural and environmental resources for the Tribe's aboriginal territory	From perspective of land management all natural hazards. Specifically referenced flood programs at FEMA, and floodplains within Reservation. Wind erosion and wind damage to trees is addressed. Snow melt cycles are addressed. Wildfire receives an in-depth assessment.	FPEIS: October 2007.

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Program	**Environmental Action Plan** (EAP) Assessment of Environmental Concerns on and near the Coeur d'Alene Reservation report for the Coeur d'Alene Tribe	The Assessment of Environmental Concerns report is designed to articulate and quantify information about the natural environment to the Tribe, Tribal Members, Reservation residents and other interested parties. It articulates and ranks risks to human health, ecology and quality of life of a comprehensive list of environmental concerns regarding the Reservation's natural, environmental and cultural environment , as it relates to the natural environment..	Natural Hazards Addressed Include: • Atmospheric Changes • Hydrologic Changes • Wetlands • Human Caused Disruptions	Adopted July 2000
Category: Plans	Coeur d'Alene Reservation **Forest Management Plan 2003 to 2017** and Environmental Assessment	The plan's purpose is to guide management of the forest resources of the Coeur d'Alene Reservation to produce the desired mix of goods and noncommercial values from Tribal and allotted forests. Well-known resources, such as wildlife habitat, watershed protection and forest products, are important and addressed in this plan. Forest resources are also critical to the cultural, spiritual and economic well being of present and future generations of Coeur d'Alene People and the community as a whole.	Climate factors that create natural disasters from flooding, high winds, severe snow storms, and wildfires is addressed. Guidelines for riparian buffers and Best Management Practices are established.	Resolution of Adoption 70(03) **Dec 12, 2002**
Category: Plans	Coeur d'Alene Reservation **Fire Management Plan 2004**	The Fire Management Plan is developed to provide direction and continuity and to establish operational procedures to guide all wildland fire program activities to insure that fire is properly used as a means of resource management. The Fire Management Plan presents actions that will integrate fire management with resource management goals.	Extensive and comprehensive analysis of wildland fire issues on the Coeur d'Alene Reservation.	July 2004

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Plans	2009 Coeur d'Alene **Lake Management Plan**	Prepared jointly by the State of Idaho Department of Environmental Quality and the Coeur d'Alene Tribe. The goal of this plan is to protect and improve lake water quality by limiting basin-wide nutrient inputs that impair lake water quality conditions, which in turn influence the solubility of mining-related metals contamination contained in lake sediments.	Addresses human caused disasters from mining in the upper Coeur d'Alene River Basin and those effects on Coeur d'Alene Lake and relates those damages to flooding, heavy snowfall, and high winds.	**Tribal Council adopted**, Chairman Allan signed it with Idaho Governor Otter in March 2009
Category: Program	**Coeur d'Alene Reservation Economic Analysis 2010**	The purpose of this market analysis effort is to provide the Coeur d'Alene Tribe with a market-based assessment of the Tribe's economic development opportunities.	No recommendations for hazard mitigation are addressed.	**May 6, 2010 CDA Resolution 106(2010)**
Category: Policy	**Construction Codes**	The Coeur d'Alene Tribe is currently (as of July 2010) considering the formal adoption of a Construction Code that includes a Building Code, Plumbing Code, Mechanical Code, Energy Code, Electrical Code, Fuel Gas Code, Fire Code, and Straw Bale Construction Code for use on the Reservation.	While this code is being considered by Tribal Council, the Planning Department is implementing the recommendations in the exercise of sovereign authority.	Being considered by Tribal Council as of July 2010.
Category: Policy	**2006 International Building Code & 2006 International Residential Code**	The 2006 International Building Code addresses the design and installation of building systems through requirements that emphasize performance. Fully compatible with all the International Codes, the 2006 Edition provides up-to-date, comprehensive coverage that establishes minimum regulations for building systems using prescriptive- and performance-related provisions.	Addresses building codes administered by the Coeur d'Alene Tribe for contracts administered through the Planning Department.	**Jan 11, 2007, Resolution of Adoption 109(2007)**

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Programs	**Wildlife Management Plans**	Several Wildlife Management Plans have been developed, including: ○ Windy Bay Wildlife Mitigation Unit Management Plan, March 2008 ○ hnt'k'wipn Management Plan (Upper Hangman Watershed), May 2008 ○ Hepton Lake Management Plan, April 2008 ○ Goose Haven Lake Wildlife Management Unit Management Plan, March 2008 ○ Benewah Creek Wildlife Mitigation Unit Management Plan, June 2006	Land management and natural disasters are considered in relation to wildlife management planning. The hnt'k'wipn plan includes specific reference to re-establishment of beaver within the watershed and the changes of the historic floodplain to current conditions (entrenched).	Various dates of implementation from 2005 through 2009
Category: Policies	**Coeur d'Alene Tribal Housing Authority Roles & Responsibilities Handbook**	In order to address the critical shortage of housing on the Coeur d'Alene Reservation for the members of the Coeur d'Alene Tribe, the CDTHA was organized pursuant to Coeur d'Alene Tribe Ordinance CDA 205(1963) and designated as the Tribally Designated Housing Entity (TDHE) by Resolution No. 98(1998) dated March 30, 1998. The Authority, as a subdivision of the Coeur d'Alene Tribal Government, exists as a legal nonprofit entity empowered to issue bonds, provide financing, and enter into contracts with the federal government and private groups for the purpose of planning, developing and implementing comprehensive housing assistance plans. It is also charged with the responsibility to administer, direct and manage all operations pertaining to the housing needs of native people residing on the Reservation.	Natural disasters are not addressed.	September 2005
Category: Programs	**Tribal Code: Chapter 43, Boating on Tribal Waters**	The Tribal Council finds that there is a need to regulate the actions of persons who use the waters of the Coeur d'Alene Reservation. This action is taken to protect the public safety and because the use of said waters has a direct effect on the political integrity, the economic security and the health and welfare of the Tribe.	Among other specifications, this Chapter limits the negative impacts of boating operations on shorelines of the Lakes and Rivers within the external boundaries of the Coeur d'Alene Reservation.	Adopted by Tribal Council and Amended 06/19/08 by Resolution 181(2008), Amended 07/19/2000 by Resolution 264 (2000), and Amended 09/28/2000 by Resolution 307(2000)

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Programs	**Tribal Code: Chapter 44, Encroachments**	The Coeur d'Alene Tribe has exercised exclusive sovereignty and dominion over the submerged lands and waters within the area now known as the Coeur d'Alene Reservation since time immemorial. The submerged lands and waters within the Coeur d'Alene Reservation are owned by the Coeur d'Alene Tribe and the Tribe is legally entitled to the exclusive use and occupancy of them. These submerged lands and waters are essential to the Tribe's "dignity and ancient right." Idaho v. The United States and Coeur d'Alene Tribe 533 U.S. 262 (2001). The regulation of use of the submerged lands and waters are an essential governmental function of the Tribe. The Tribal and public health, safety and welfare requires that any allowed use of an encroachment upon these waters and submerged lands be regulated to protect water quality and quantity, navigation, fish and wildlife habitat, aquatic life, aesthetic beauty and Tribal values.	This effort guides the development associated with shorelines and submerged waters within the Coeur d'Alene Reservation. It specifically directs activities related to dikes, levees, fills, jetties, and piers within the Coeur d'Alene Reservation. It also articulates the water rights reserved by the Coeur d'Alene Tribe.	Coeur d'Alene Tribal Code Amended 04-10-03 by Resolution 172(2003) Amended 08-12-99 by Resolution 333 (99) Amended 04-14-03 by Resolution 180 (2003) Amended 09-28-02 by Resolution 307 (2000) Amended 01-20-05 by Resolution 86(2005) Amended 03-07-02 by Resolution 106 (2002) Amended 06-30-05 by Resolution 222(2005) Amended 03-27-03 by Resolution 161(2003) Amended 04-13-06 by Resolution 117(2006) Amended 06-19-08 by Resolution 182(2008)
Category: Programs	**Encroachment Standards**	These standards are intended to allow use of Tribal Waters under well-defined conditions as stated in Tribal Code. Encroachment structures are allowed only when they support an historic use that requires a structure and that the Tribe wishes to continue or a new use that provides a benefit to the public or the Tribe. No structure will be permitted unless it is essential to the use it serves. These standards apply to all structures or encroachments on or above Tribal Waters and submerged lands and to all owners of structures or encroachments on or above Tribal Waters and submerged lands.	Directly these standards establish authority of the Coeur d'Alene Tribe to regulate and authorize developments in juxtaposition to water and the impacts on water rights, as well as the use of ground, surface, lake and river waters.	Adopted 6-30-05 by Resolution 222(2005) Amended 4-13-05 by Resolution 117(2006) Amended 6-19-08 by Resolution 182(2008)

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Policies	**TRAIL OF THE COEUR D'ALENES General Management Principles And Operating Guidelines**	The General Management Principles and Operating Guidelines (GMPOG) sets forth how the State of Idaho and the Coeur d'Alene Tribe will provide for unified management and seamless operation of the Trail of the Coeur d'Alenes and the right-of-way (ROW) on which it resides, consistent with their existing authorities and legal requirements found in the Consent Decree (CD) between the State of Idaho, the Coeur d'Alene Tribe, United States and the Union Pacific Railroad (UPRR), and the subsequent State-Tribe Agreement.	Specifically addresses the jurisdiction of specific lands and authority to exercise management activities on those lands.	
Category: Policies	**Heyburn Park Trail/ROW Operations Plan**	The purpose of this Plan is to provide mutually agreed upon user standards and requirements for the portion of the Trail/ROW through the Park. The Plan also provides the routine operation, maintenance and repair activities by the State of Idaho and the Coeur d'Alene Tribe on the portion of the Trail/ROW through the Park.	Establishes an agreed to standard and requirements to uses of the Trail and ROW through the Park.	
Category: Policies	**Heyburn Park Trail/ROW Long-Term Management Plan**	The purpose of this Plan is to provide the State and Tribe's shared vision for the operation and management of the portion of the Trail/ROW through the Park and to provide the mechanisms for implementing that vision.	Joint management of the present and future lands, features, structures, activities and uses of the portion of the Trail/ROW through Heyburn Park.	
Category: Policies	**Response Action Maintenance Plan for the Trail of the Coeur d'Alenes**	The mission of the Response Action Maintenance Plan is to protect human health and the environment from the presence of contaminants that remain in place following response actions within the railroad right-of-way (ROW)1 formerly operated by Union Pacific Railroad (UPRR) and other railroads, which has been converted into a recreational trail known as the Trail of the Coeur d'Alenes (Trail).	Response to potential for human health impacts from past mining contamination along the railroad ROW crossing through the Coeur d'Alene Reservation.	

Table 16. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts.

Regulatory Tool	Name	Description	Hazards Addressed	Date of Adoption
Category: Programs	**Indian Reservation Roads Program Inventory (2009 & 2010) in support of the Coeur d'Alene Tribe's Long Range Transportation Plan**	Transportation planning is a high priority identified by the Tribal Council affecting societal and economic development.	Transportation and access exposure to natural disaster events is addressed.	**CDA Resolution 177(2009) updated with CDA Resolution 123(2010)**
Category: Programs	**Solid Waste Assessments I and II of the Coeur d'Alene Reservation**	This report provides an analysis of the solid waste flows on the Coeur d'Alene Reservation, including current volumes, components, transportation, costs, and final disposal. The analysis also provides projections for future waste volumes and recommendations for maintaining the systems.	Assessment of abandoned landfills was conducted to provide a screening level assessment of six abandoned landfill sites in terms of potential threats to human health and safety, adverse environmental impacts, and potential for contamination of nearby groundwater and surface waters.	**SWA I** approved in **November 2002** by Tribal Council resolution and **SWA II** approved by Tribal Council resolution in **July 2006**
Category: Policies	**Facility Needs Assessment for the Coeur d'Alene Reservation (draft 6/25/06)**	Capital Facilities included major activities: a comprehensive needs assessment and a community visioning task leading to a Comprehensive Plan for the Coeur d'Alene Reservation.	Addresses roads, water systems, sewer systems, solid waste facilities, public safety facilities, health facilities, social service facilities, community centers, and parks.	Working draft 2006

3.11.1. Coeur d'Alene Tribe Emergency Operations Plan

The goals of the Coeur d'Alene Tribal Emergency Operations Plan:

- Protect human life and public health.
- Protect public property and infrastructure.
- Provide reasonable assistance to individuals to protect property consistent with constitutional requirements, Tribal functions and funding.
- Protect the environment

The purpose of the Coeur d'Alene Tribe EOP is to develop a simple emergency management system capability that can take immediate steps to respond to the effects of an emergency, preserve life, minimize damage, provide necessary assistance, and coordinate in the Tribe's recovery in an effort to return the community to its normal state of affairs.

This Plan attempts to define clearly who does what, when, where, and how, along with the legal authority to act, in order to prepare for, respond to, and recover from the effects of an emergency within the Coeur d'Alene Indian Reservation. The Tribe recognizes that mutual aid agreements/memorandums of understanding (MAA/MOUs) among signatory agencies, counties, and states are a critical component of interagency cooperation. These documents will identify and coordinate the use of resources and personnel between agencies during an emergency incident. It is the responsibility of an agency to identify where resource shortfalls may be expected within their organization during an extended emergency event.

Citizens are also encouraged to be self-sufficient for at least seventy-two hours after a disaster.

3.11.2. Comprehensive Economic Development Strategy (2009)

The intent of the CEDS is to provide an understanding of the regional economy and how the Coeur d'Alene Reservation interacts with the regional economic structure. The CEDS develops the extent of the economic footprint of the Coeur d'Alene Reservation while establishing an economic development strategy.

The US Department of Commerce, Bureau of Economic Analysis, has identified 181 different economic areas throughout the country. The Coeur d'Alene Reservation is located in the Spokane Regional Economic Area (Spokane EA). This area is comprised of all North Idaho and northeast Washington counties and is centered around the Spokane-Coeur d'Alene metropolitan area.

This economic development strategy draws from the review of the environmental, social, and economic analysis including information gathered from community participation meetings. A plan of action including suggested projects to implement goals and objectives set forth in the strategy are provided. Performance measures were used to evaluate whether and to what extent goals and objectives are being met. The long-term goal of the Tribe is to overcome the adversity in its economic history and provide clean, stable, and sustainable economic growth for Tribal members and the Reservation.

3.11.3. Comprehensive Plan for the Coeur d'Alene Reservation

The purpose of this document is to provide consistent direction for the Coeur d'Alene Tribe in its policy practices, and to provide a clear vision for the future. With such a compilation of goals, requirements, objectives, and policy guidelines, the Tribe can assure its members, and those non-member Reservation residents, of a certain quality of life.

3.11.4. Comprehensive Transportation Plan for Fiscal Year 2003

The Comprehensive Transportation Plan for Fiscal Year 2003 was drafted in 1998 with updates through 2001 and 2002. This plan developed a comprehensive, structured effort to develop an effective transportation component with the Coeur d'Alene Tribe. The plan includes a history of the Tribal transportation initiatives, current IRR system inventory, Average Daily Traffic on primary and secondary roadways, forecasted traffic volumes, and a Transportation Improvement Plan.

3.11.5. Public Transit and Human Services Transportation Coordination Action Plan

The Public Transit and Human Services Transportation Coordination Action Plan (2008) is established to create an Elderly and Disabled Program Capital Assistance for Specialized Transit Vehicles, Job Access and Reverse Commute, and Needs, Freedom and Mobility Management Programs on the Coeur d'Alene Reservation and adjacent regions.

3.11.6. Emergency Response Plan for the Coeur d'Alene Tribal Water System

The Tribal Water System ERP is specific to the Coeur d'Alene Tribal water systems that serve the Coeur d'Alene/Plummer, Sub-Agency, DeSmet, and Camp Larson facilities (Tribal water systems). The purpose of this ERP is to provide water utility personnel, Tribal staff and government and other stakeholders a formal outline of emergency planning and response measures and tools that have been implemented for Tribal water systems.

The goals of this plan, stated below, are based on the 2005 DRAFT Tribal Emergency Operations Plan:

- Protect human life and public health.
- Protect public property and infrastructure.
- Provide reasonable assistance to individuals to protect property consistent with constitutional requirements, Tribal functions and funding.
- Protect the environment.

3.11.7. Coeur d'Alene Tribal Drinking Water Protection Plan

The Coeur d'Alene Tribal Drinking Water Protection Plan comprises the Wellhead Protection Plan for the Coeur d'Alene Tribe, and updates and supplements the 2005 Source Water Assessment. This report also includes a source water assessment for Camp Roger Larson, updates source water assessments for the four other Tribal water systems, and provides a susceptibility analysis and risk ranking for all five Tribal water systems.

The report gives water utilities and community members the information needed to decide how to protect their drinking water sources, the federal Safe Drinking Water Act (SDWA) requires that states develop EPA-approved programs to carry out assessments of all source waters in the state. In 2004, the Coeur d'Alene Tribe initiated efforts to develop source water assessments and protection plans for all Tribally operated water systems on the Coeur d'Alene Reservation.

The Coeur d'Alene Tribe has developed its Wellhead Protection Program based on national guidance as well as guidance developed by the State of Idaho as part of its 1999 "Idaho Source Water Assessment Plan".

Figure XXIII. Council Fires article updating the Coeur d'Alene Tribe's Water Awareness Activities (May 2010).

Tribe's annual Water Awareness Week set for May

By Lorraina Gentry

Council Fires archive photo from a Water Awareness Week workshop held near Lake Creek.

Water Awareness Week, held May 3-7, 2010, has become a major event for the Fisheries department. What started off in the mid 90's with humble beginnings has now turned into a weeklong occasion that has hundreds of 6th grade students travel afar just take part in this educational outing mixed with a bit of Native American culture.

This is an inimitable opportunity for the city students to see the work that is entailed in the rural fisheries program, being able to observe the watersheds and all of the work that goes into weighing and tracking the fish.

"There is Arbor Day, Earth Day, a lot of these types of functions that are put on by all of these other entities, groups and communities," explained Fisheries Technician Supervisor Daniel Jolibois. "Through Mark [Stanger] and the fisheries program we are taking the goal of representing the Tribe."

Many departments have since taken part in the weeklong environmental learning workshop. This is a copy of the tentative schedule; the event is located at Lake Creek.

Station 1 - Trout Life Cycle: Each group of students will observe fish catching, processing and release practices at the migration trap and be introduced to the lifecycle of cutthroat trout. A demonstration of technical equipment or electro fishing will be given if time permits.

Station 2 - Macro invertebrate Sampling and Analysis: Students will collect and identify macro invertebrates in order to learn about the diversity of life in the Lake Creek watershed. Special emphasis will be made on the connections between the macro invertebrate community and water quality.

Station 3 - Wildlife Habitat Usage: Students will investigate wildlife habitat structure and function in a riparian zone. Each group will be shown how to identify common plant and animal species and learn how specific habitat components are used.

Station 4 - Watersheds: Students will learn about watersheds and how each land-use activity could have a potential threat to surface and ground water. The instructors will be utilizing the enviroscape model to demonstrate how water moves throughout a watershed. Students will be asked to provide solutions to pollution once it enters a watershed.

Station 5 – Forestry Function: Students will learn about proper function in forestry. As an exercise, students could learn to read a basic forestry plant & tree keys and/or locate several common plants & trees off a list with the help of personal & pictures.

Station 6 - Tribal Culture and Language: Students will have an opportunity to learn about Coeur d'Alene Tribal culture and the importance of water in traditional lifestyles. A tribal elder will share Indian names for common plants and animals.

Bonneville Power Administration is the main sponsor for this activity. What many people do not know is this is a State wide event. But unlike many of the other facilities the Tribal Fisheries Department is able to offer a unique cultural approach. Among the schools that will be attending there is Coeur d'Alene Charter, Sagle Ray Bird, Havermale Native Alternative, Plummer/Worley, Barbie Hunt, Cocalala School, and Coeur d'Alene Tribal. For more information please contact Fish Water and Wildlife at 686-5302.

3.11.8. Emergency Response Plan for the Coeur d'Alene Casino Water System

The Coeur d'Alene Casino Water System ERP is to provide water utility personnel, Tribal staff and government and other stakeholders a formal outline of emergency planning and response measures and tools that have been implemented for casino water system. The purpose of this ERP is to provide water utility personnel, Tribal staff and government and other stakeholders a formal outline of emergency planning and response measures and tools that have been implemented for the Casino water systems.

The goals of this plan, stated below, are based on the 2005 DRAFT Tribal Emergency Operations Plan:

- Protect human life and public health.
- Protect public property and infrastructure.
- Provide reasonable assistance to individuals to protect property consistent with constitutional requirements, Tribal functions and funding.
- Protect the environment.

3.11.9. Integrated Resource Management Plan and Final Programmatic Environmental Impact Statement

The Coeur d'Alene Tribe is developing a programmatic level recommendation for land use, natural resource enhancement and protection, residential/commercial growth and development planning, and cultural preservation for the Coeur d'Alene Reservation. The Tribe is also developing programmatic level recommendations for the management of natural, cultural and environmental resources for the Tribe's aboriginal territory. The Integrated Resource Management Plan (IRMP) and Final Programmatic Environmental Impact Statement (FPEIS) was adopted by Tribal Council in October 2007. The resulting IRMP is currently being finalized by the Tribe.

Input from an Interdisciplinary Team, Community Advisory Committee, the public, and government agencies was used to establish both 100-year desired future conditions and 20-year management goals. These desired future conditions and goals were developed for the IRMP resource categories and are assessed and compared in the Final Programmatic Environmental Impact Statement (FPEIS). The desired future condition for the Reservation is to maintain its current rural character.

A Preferred Alternative was selected by the Tribe and the U.S. Bureau of Indian Affairs in March 2008 in order to protect the natural and cultural environment while supporting overall social and economic needs. The Preferred Alternative is a combination of the agencies' and public's long-term vision for the Coeur d'Alene Reservation based on IDT, CAC, and public input. Specific alternative elements, desired future conditions and specific resource goals were discussed, Alternatives Including the Proposed Action.

This FPEIS complies with the National Environmental Policy Act (NEPA) as set forth in 40 CFR Part 1500 through 1508. This FPEIS also complies with the U.S. Department of Interior (USDI) Bureau of Indian Affairs (BIA) regulations set forth in 516 Departmental Manual (DM) 6, Appendix 4 [61 Federal Register 67845 (1996)]. Additionally, it follows the BIA policy regarding protection and enhancement of environmental quality, as published in 30 Bureau of Indian Affairs Manual Supplement 1. The BIA is the federal agency responsible for the FPEIS.

3.11.10. Environmental Action Plan (EAP) Assessment of Environmental Concerns on and Near the Coeur d'Alene Reservation report (2000)

The EAP Assessment of Environmental Concerns on and near the Coeur d'Alene Reservation report identifies and ranks a list of environmental concerns for their potential impacts to human health, ecology and quality of life (including Tribal culture). The EAP is designed to articulate and quantify information about the natural environment for the Tribe, Tribal members, Reservation residents and other interested parties. It includes a comprehensive environmental assessment of the Reservation's natural environment.

This assessment of environmental concerns on and near the Coeur d'Alene Reservation strived to:

- Improve local environmental conditions to benefit human health, ecology and quality of life,
- Involve the public throughout the planning process,
- Provide tools for the tribal and community environmental planning and action, and
- Increase communication and cooperation to improve environmental management.

The Coeur d'Alene Tribe's assessment of environmental concerns has been prepared to provide information about the natural environment of the Coeur d'Alene Reservation and nearby lands. The study includes an extensive consideration of environmental concerns that includes several natural hazard conditions.

3.11.11. Coeur d'Alene Reservation Forest Management Plan 2003 to 2017 and Environmental Assessment

The plan's purpose is to guide management of the forest resources of the Coeur d'Alene Reservation to produce the desired mix of goods and noncommercial values from Tribal and allotted forests. Well-known resources, such as wildlife habitat, watershed protection and forest products, are important and addressed in this plan. Forest resources are also critical to the cultural, spiritual and economic wellbeing of present and future generations of Coeur d'Alene People and the community as a whole.

The Coeur d'Alene Reservation Forest Management Plan 2003 to 2017 was completed prior to the completion of the Integrated Resource Management Plan (in draft) and because of this, it was created as a stand-alone management plan. The plan addresses forest management with the concurrence of Tribal Council, to manage Tribal and allotted forests.

Figure XXIV. Council Fires articles in July 2010 updates the forestry program.

July 2010 — *'yalstq - Summer*

Forestry programs kick into high gear for summer

General: Market conditions for delivered logs continue to lag but have improved over the last 3-4 months. Our most recent appraisal for the Tribal sale on Cherry Creek saw a marked increase and has resulted in our moving to advertise. We hope to continue to see an upward swing this summer although it appears prices won't return to levels of 3 years ago for some time.

We have begun issuing Wood Cutting permits to CDA Tribal members. The firewood season started June 1. However, please be mindful of driving off of major roads. With the wet weather we have experienced this spring, we continue to see road damage due to folks driving on unimproved dirt roads. Please refrain from driving on those type roads when it is wet to prevent damage to the road and increased erosion. Use common sense and don't push the road's limits. Thanks.

Fuels Program: The first fuels contract of the year was advertised and awarded on June 3, to Empire L & C for road clearing in the Eagle Peak area. The project should start by late June and runs through the end of August. This project is being coordinated through the Timber sales program in advance of the timber sale work planned for this area.

The second contract of the year is the 2010 Timber Agriculture Interface Fuel Break Project 3 in the DeSmet area and will begin as soon as awarded and contract packet's completion. The bid date is June 11. There will be two additional contracts to begin at the end of this month and early July in the Little Butte area. The Cherry Creek Shaded Fuel Break Project has an estimated 46.5 acres of hazardous fuels reduction, and 2.4 miles of road brushing that have been accomplished at this time.

The fuels crew has started an estimated 90 acres of hazardous fuels reduction treatments in T1082 (the old agency) by thinning, hand piling, mechanically masticating slash and downed and dead fuels and biomass. This includes clearing of the area along agency road to reduce fuel buildup and limit potential damage from wildfire. Please be cautious near the above mentioned areas and signs are posted during active operations. If you have any questions, contact Chuck Simpson – Fuels Specialist - at (208) 686-5030.

Timber Sales: Forestry technicians are receiving insect and disease identification training from the Forest Service up in Coeur d'Alene. They will also attend a timber cruising training put on by the Forest Service out of Missoula, Montana. They will be able to teach the five summer youth working in the Forestry Department what current research shows about managing for insect and disease outbreaks in North Idaho, and also how to measure trees correctly.

The T331 Timber Sale is still shut down indefinitely and is expected to resume harvest activities this summer once weather conditions allow the soils to dry out.

The paperwork for the blowdown that occurred in the Eagle Peak Area has been completed and the appraised prices are awaiting approval by Tribal Council. This covers the salvage operations for a large blowdown of timber in October 2009 known as the Ten Three Salvage Logging Unit.

The Moose Paddle Logging Unit appraised prices are also awaiting approval by Tribal Council. Watch bulletin boards for an advertisement in the near future.

Work is nearly complete on two timber sale packages planned for an early summer sale if the lumber market is favorable. These are Chadalamalqwn and Sachri and both cover the allotments near Plummer. A third timber sale package will be coming up soon after the first two.

Roads: With the weather drying out we have started up the processing of materials and looking forward to providing a larger selection of materials for the reservation communities such as decoration rock, boulders, garden mulch, topsoil, gravel and drain rock. Along with these products we are working towards making colored mulches in the near future. Keep in mind we are currently stockpiling wood to process into cordwood and bundles for next year's firewood needs. Although we are a tribal program, we are self funded so costs for materials and services cannot be discounted below actual costs even for Tribal members. Call Cindy Dubois at 568-0804 / Email: ldubois@cdatribe-nsn.gov or George Torpey at 582-2517 / Email: gtorpey@cdatribe-nsn.gov

Forest Development: The spring tree planting on 242 acres was completed May 7 on parts of allotments 44, 63, 314, 428, 466, 592 and T567. Thanks to Fire Management and others who participated on prescribed burns on allotments 63 and 466, there should be a flush of nutrients available to the seedlings. The grass and snowberry were quick to respond to the extra nutrients with rapid green up in the burns. Spot spraying to reduce competition is planned on most of these plantations, but wind and rain have caused numerous delays. Although frequent spring rains have provided more than enough moisture for the seedlings, grass and brush have benefited even more because they thrive on spring rain. If it ever dries out this summer, the extra competition from the lush spring growth will be a problem for tree seedlings. The first few years are critical for seedlings trying to establish roots and grow past the grass and brush.

The Environmental Quality Incentive Program (EQIP) applications for Windfall Pass and Cherry Creek were approved, essentially doubling the funding available for thinning and pruning projects. Projects in the Windfall Pass area are being prepared for bidding in early July. The Cherry Creek projects will be advertised later in the summer, with expectation of some work to be completed this fall and most work to be done next summer.

Forest Management Inventory & Planning: Data checking is 93% done on the Continuous Forest Inventory (CFI) plot data and should be complete by late June. The completed database will soon be submitted to the Bureau of Indian Affairs, Branch of Forest Resource Planning. They will provide the analysis program to Tribal Forestry, so we can complete the analysis and prepare a report on growth, mortality, harvest and other trends. The Inventory Analysis Report will calculate the volume of timber that can be sustainably harvested from allotments and Tribal lands, and help determine whether the Annual Allowable Cut (AAC) as designated in the Forest Management Plan should be revised before it expires in 2017.

Wildland Fire Prevention: URBAN WILDLAND FIRE SAFETY TIPS:

If you chooseto construct a house in a wooded area, please remember: Build with fire-retardant materials from the roof down. Make sure your lot is properly cleared of

Figure XXIV. Council Fires articles in July 2010 updates the forestry program.

dead brush and trees and any other natural combustibles. Grow trees and bushes at a safe distance from the house; prune them regularly.

If an urban wildfire threats your home: Don't wait until the last minute to get out. Give yourself plenty of time so there is still an available exit route. Know your escape route to safety. Take only what you can safely carry with you. Make sure you know how to call for emergency assistance in your area, and be sure you can provide accurate directions to your home.

Fire Management: Fire Management is completing all of the required training that is required of us to perform our duties as wildland firefighters and looking forward to a busy fire season. The latest predictions are for an active fire season and continued drought over the summer months. So as the weather starts to dry and temperatures rise we would caution everyone to be careful while enjoying the outdoors. Make sure your vehicles have mufflers, your equipment has spark arresters, that camp fires are extinguished, and use good common sense when using any type of fire.

We have been implementing prescribed fire throughout the reservation. We hope that our smoke was not too much of an inconvenience for anyone. We have completed close to more than a hundred acres of broadcast burning this spring. We would like to emphasize the reasons why we use prescribed fire.

Prescribed burning of Hazardous Fuels: Prescribed burning removes accumulated fuels and therefore reduces the risk of intense fires. Fire suppression and lack of natural fires over the last 50 plus years has resulted in large amounts of branches, needles and blowdown trees to remain on the forest floor. In addition, brush species are larger and more numerous since fire has not knocked them back.

Arson, human carelessness, and lightning will inevitably ignite fires on or near Trust lands within the Reservation. The rate of spread and damage caused by the resulting fires are directly related to fuel types and volumes. Fire intensity is much lower in grasses and small shrubs. Fuel reduction will not necessarily decrease the number of fires on Trust lands, but will make those fires easier to control. Prescribed burning must be repeated at regular intervals to maintain the protective effect of reduced vegetative fuels. In the long growing seasons of the Northwest, it takes only four to five years for fuels to return to hazardous levels. If you have any questions on this you can call the fire management office at 686-1199.

The entire article is included for reference purposes and to demonstrate how the Coeur d'Alene Tribal Forestry program, as well as other Tribal programs, have exhibited the capacity, personnel, and technical excellence to execute the management of these programs, and other programs, to the benefit of the Reservation's population.

3.11.12. Coeur d'Alene Reservation Fire Management Plan 2004

The Fire Management Plan is developed to provide direction and continuity and to establish operational procedures to guide all wildland fire program activities to ensure that fire is properly used as a means of resource management. The Fire Management Plan presents actions that will integrate fire management with resource management goals. This plan will be evaluated and updated in future years as required by changes in policy, management actions, and priorities.

This Fire Management Plan will be incorporated into the Forest Management Plan when it is updated during the next planning cycle (2002 - 2011). The Fire Management Plan will also be coordinated with the Tribe's Integrated Resource Management Plan as it is developed and be made consistent with the IRMP once its approved by the Tribal Council.

Planning objectives for Fire Management for the next 10-year planning period are:

A. Continue to maintain adequate wildfire suppression capabilities,
B. Utilize prescribed fire at a level consistent with goals of the Tribe,
C. Enhance interagency fire cooperation on a regional and national level,
D. Provide employment opportunities,
E. Integrate fire and fuels management into all timber sale activities,
F. Implement the National Fire Management Analysis System (NFMAS), to help minimize loss and cost in wildland fire program.

The Coeur d'Alene Tribe has identified the definition of the Wildland-Urban Interface (WUI) within the Coeur d'Alene Reservation. It is consistent with the definition of the WUI introduced in Section 2.5, Population Density Indices and Figure VII. The Coeur d'Alene Tribe's Fire Management Plan includes activities to manage the risks from wildfire within this zone of human habitation referred to as the WUI.

3.11.13. Coeur d'Alene Lake Management Plan (2009)

The following is summarized completely from the Coeur d'Alene Lake Management Plan (2009), a major effort by the Coeur d'Alene Tribe Lake Management Department and the Idaho Department of Environmental Quality.

> "Coeur d'Alene Lake is an increasingly popular recreational destination, an economic catalyst for Northern Idaho and Eastern Washington and the heart of the local community. The lake is part of the aboriginal homeland of the Coeur d'Alene Tribe, and their Reservation is located within the Lake's basin. Development along the lake's shoreline has been dramatic in recent years, and it now features multiple resorts and an ever-increasing number of homes. Counties, cities, and towns in the Coeur d'Alene Lake Basin are growing, and the lake is a significant factor in that growth.
>
> "As a result of historical mining activity in the Silver Valley, millions of tons of metals contaminated sediments (e.g., zinc, lead, and cadmium) are present on the lake bottom. Other human activities around the basin, such as logging, farming, and home building, contribute sediments and nutrients (phosphorus and nitrogen) into the lake, often as a result of natural events such as snow, rain, and floods. Water quality in the lake has generally improved since the mid-1970s as the era of large-scale upstream mining-related activities tapered off, environmental cleanup activities got underway in the Silver Valley, and environmental regulations were implemented throughout the basin. The challenge today is to ensure that land use activity is managed in ways that will protect the lake's water quality.
>
> "Authority to manage the lake's water quality rests with the Tribe, State and Federal governments. However, authority to manage activities around the basin that impact water quality in the lake is the responsibility of many other local, state, federal, and Tribal agencies. For example, county governments in the basin use their authority under State law to promulgate zoning ordinances that regulate private land uses that can affect water quality conditions in the lake. Federal and State resource agencies also exercise authorities over upland activities that may influence water quality conditions in tributary waters and the lake.
>
> "In an effort to address the many issues facing Coeur d'Alene Lake, the Coeur d'Alene Tribe and the State of Idaho Department of Environmental Quality (IDEQ) have collaboratively developed the 2009 Lake Management Plan (2009 LMP) with the goal: to protect and improve lake water quality by limiting basin-wide nutrient inputs that impair lake water quality conditions, which in turn influence the solubility of mining-related metals contamination contained in lake sediments. The EPA assisted the Tribe and DEQ in developing the LMP by convening and participating in an Alternative Dispute Resolution process.
>
> "Achieving this water quality goal will require concerted, coordinated, and ongoing actions by these government agencies as well as those local, State, and Federal government agencies that manage or regulate activities in the Coeur d'Alene Lake Basin that affects lake water quality. Protecting the lake's water quality depends upon multi-level partnership between governments and the public. Education, understanding, and support from business organizations, environmental groups, and individual residents and visitors are essential. Finally, water quality protection requires funding from diverse sources to support the activities described in the 2009 LMP."

The scope of the 2009 LMP encompasses the entire Coeur d'Alene Lake Basin. The reason for this is practical: loading of the lake with metals, sediments, and nutrients results from activities that occur around the lake, in upland areas, and along tributary streams and rivers. This scope is essential to effectively address the key influences on water quality. The scope is intended to follow natural boundaries, promote integrated solutions, and maximize the use of available resources to benefit water quality.

Figure XXV. Council Fires article in May 2010 providing update of Lake Management Plan implementation.

Page 2 *stoq'wg'yalqw - Tree bark is loose* *May 2010*

Cd'A Tribe's Lake Management department and IDEQ work to implement Plan

Photo and Story By Rebecca Stevens, Coeur d'Alene Tribe Lake Mgt. Dept.

The Coeur d'Alene Lake Management Plan (LMP) was completed in March 2009 through a collaborative effort between the Coeur d'Alene Tribe (Tribe) and the Idaho Department of Environmental Quality (IDEQ). The goal, as stated in the LMP, is "to protect and improve lake water quality by limiting basin-wide nutrient inputs that impair lake water quality conditions, which in turn influence the solubility of mining-related metals contamination contained in lake sediments."

The Tribe and IDEQ are collaborating to implement the LMP. As part of this ongoing effort, we are working on activities related to coordination, monitoring, inventory, and outreach. Implementation will rely on the support of stakeholders and the community at large in order to be successful.

Both Tribal and IDEQ staff are presenting LMP activities throughout the basin upon request. The Tribal and State LMP Coordinators just presented an LMP update at the Spokane River Forum on March 22nd which brought in over 175 water quality professionals from both Idaho and Washington. Staff from the Tribe and IDEQ actively participate in the Lower Basin Project Focus Team (PFT) which is under the auspices of the Coeur d'Alene Basin Environmental Improvement Project Commission (BEIPC). This PFT works to continue the investigation of nutrient inputs into the lake. We have been coordinating with Avista on the nutrient source inventory, aquatic plant surveys, and erosion assessments along the St. Joe River.

The Joint Tribe/IDEQ water quality monitoring report for July 2007 – December 2008 was recently completed and was presented to the BEIPC Technical Leadership Group (TLG) to solicit comments on the draft report by April 1, 2010. Lake monitoring was also completed in December 2009 and March 2010.

As the first step to the education and outreach plan, we have identified a consultant to help us design and implement a needs assessment. The assessment will obtain information from stakeholders throughout the Coeur d'Alene Basin regarding information needs and preferred sources of information. The assessment will aid us in developing a more targeted and refined education and outreach plan (refer to page 26 of the LMP). In the coming months, a survey will be conducted on the reservation as a part of the needs assessment, so please let us know what your concerns are regarding water quality of Coeur d'Alene Lake and how we can keep you informed about what is going on throughout the basin.

We are in the process of updating the 'Our Gem' map of Coeur d'Alene Lake for re-printing to be utilized as an outreach tool. The updated version will have added information on aquatic invasive species, including the quagga mussels and Eurasian watermilfoil.

Tribe and DEQ staff are in the process of conducting a 3-year nutrient source inventory, which began in March. The inventory will initially focus on the St. Joe/St. Maries River basins as the starting point. This approach is due to known, significant phosphorus and nitrogen loadings at the mouth of the St Joe River as well as large data gaps upstream of the mouth. The sources of nutrients are unknown at this time and staff started their water quality monitoring in March to look at temperature, pH, specific conductivity, dissolved oxygen percentages, total phosphorus, total dissolved phosphorus, ortho phosphorus, nitrate/nitrite, total suspended sediment, and discharge. Tribal water quality scientists Dale Chess (PHD Limnologist) and Scott Fields (Water Resources Program Manger) both under the Lake Management Department are pictured in this article from a sampling run that was conducted on March 24th, 2010. The 3 Year Nutrient Source Inventory will assist in the development of a Nutrient Reduction Plan as well as aid in the prioritization of nutrient reduction projects. Nutrient reduction projects include but may not be limited to: wastewater treatment facility upgrades, subsurface sewage system upgrades, agricultural land restoration, riparian restoration, streambank stabilization, invasive aquatic weed control, and improvement/maintenance of road systems.

Eurasian Watermilfoil (EWM) control efforts in 2010 will include herbicide application, diver/suction treatment, and additional aquatic plant survey activities. Other on the ground practices that can reduce sediment and nutrient inputs to Coeur d'Alene Lake and its tributaries have been identified as worthwhile activities to protect water quality. We are currently looking for potential funding sources to implement specific projects related to stormwater treatment and streambank riparian plantings. If you have any ideas for projects, please contact us!

If you would like to access the 2009 Coeur d'Alene Lake Management Plan, visit the Tribe's website at http://www.cdatribe-nsn.gov/Departments/PublicNotices.aspx. You may also contact Rebecca Stevens, LMP Coordinator in the Tribe's Lake Management Department at, 208-667-5772.

Dale Chess and Scott Fields take water samples for nutrient levels for the Lake Management Plan.

Coeur d'Alene Tribe Council Fires

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3.11.14. Coeur d'Alene Reservation Economic Analysis (2010)

The purpose of this market analysis effort is to provide the Coeur d'Alene Tribe with a market-based assessment of the Tribe's economic development opportunities. By determining which opportunities are best supported by the local and regional markets, the Tribal Council can integrate this understanding with the full range of community values and objectives established in the CEDS to prioritize the Tribe's policies and actions.

As the Tribe prioritizes its economic development policies, it should be guided by its goals and desired outcomes. In the CEDS, the long-term goal of the Tribe is to "overcome the adversity in its economic history and provide clean, stable, and sustainable economic growth for Tribal members and the Reservation." Determining how to best achieve this broad goal can be set by answering the question: what outcomes are we working to achieve? Undoubtedly the Tribe will have a number of desired specific outcomes to achieve its broader goal. Potential economic development goals the Tribe could consider include:

- **Increase in regional wealth retention:** capturing local spending to stimulate additional economic activity and wealth generation before these dollars "leak" out of the area;
- **Employment and income growth:** ensuring Tribal members and Tribal families can achieve economic prosperity by obtaining living wage employment;
  - Supporting strategies may include training and workforce development.
- **Economic sustainability/self-sufficiency for the Tribe:** generating Tribal government revenues that can be invested for the good of Tribal members;
  - A related goal would be diversification of Tribal revenue beyond the casino.
- **Quality of life improvements:** improving local access to employment, shopping goods, and services so Tribal members don't have to travel as far to work, shop, eat out, or obtain services;
  - A related goal might be enhancing the City of Plummer's tax base to strengthen the City's ability to provide quality services for local residents

3.11.15. Coeur d'Alene Tribe Construction Code

The Coeur d'Alene Tribe, as of July 2010, is considering the formal adoption and enforcement of a Construction Code that includes a Building Code, Plumbing Code, Mechanical Code, Energy Code, Electrical Code, Fuel Gas Code, Fire Code, and Straw Bale Construction Code for use on the Reservation.

The purpose of this Construction Code is to:

(a) Promote and protect the health, safety, and welfare by regulating the quality of construction, within the jurisdiction of the Coeur d'Alene Tribe;

(b) Require minimum performance standards and requirements for construction and construction materials, consistent with accepted standards of engineering, fire safety, life safety and accessibility for those with disabilities; and

(c) Permit the use of modern technical methods, devices and improvements.

The provisions of this construction code ordinance would be applicable within the exterior boundaries of the Coeur d'Alene Reservation.

3.11.16. International Building Code & International Residential Code

The 2006 International Building Code addresses the design and installation of building systems through requirements that emphasize performance. Fully compatible with all the International Codes, the 2006 Edition provides up-to-date, comprehensive coverage that establishes minimum regulations for building systems using prescriptive- and performance-related provisions. The 2006 International Residential Code is a comprehensive, stand-alone residential code establishing minimum regulations for one- and two-family dwellings of three stories or less.

It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences. This code was adopted by the Coeur d'Alene Tribal Council on January 11, 2007.

The administration of this code by the Coeur d'Alene Tribe is partially accomplished through contractual agreements with construction firms that enter into a contractual agreement with the Tribe to complete construction projects. The Coeur d'Alene Tribe inspects its buildings for compliance with the 2006 International Building Code and the 2006 International Residential Code.

3.11.17. Wildlife Management Plans of the Coeur d'Alene Tribe

Several Wildlife Management Plans have been recently developed and are being implemented by the Coeur d'Alene Tribe, including:

- Windy Bay Wildlife Mitigation Unit Management Plan, March 2008
- hnt'k'wipn Management Plan (Upper Hangman Watershed), May 2008
- Hepton Lake Management Plan, April 2008
- Goose Haven Lake Wildlife Management Unit Management Plan, March 2008
- Benewah Creek Wildlife Mitigation Unit Management Plan, June 2006

The Coeur d'Alene Tribe, using funding provided by the Bonneville Power Administration, has purchased lands on the Coeur d'Alene Reservation as partial mitigation for Construction and Inundation losses attributed to Albeni Falls Dam. Management Plans for these properties are based largely on the biological/hydrological assessments specific to each site evaluated.

Hydrologic dams built to generate power, control flooding, and provide navigation, irrigation, and recreation, have altered streams draining the Columbia River Basin. Twenty-nine federal hydroelectric dams and numerous other dams now regulate the flow of many of these streams. The development of the hydropower system has had far-reaching effects on wildlife and wildlife habitat. Many floodplain and riparian habitats important to wildlife were inundated by reservoirs caused by the system. Streams were channelized as roads and power distribution facilities were constructed (IDFG 1987).

3.11.18. Coeur d'Alene Tribal Housing Authority Roles & Responsibilities Handbook

In order to address the critical shortage of housing on the Coeur d'Alene Reservation for the members of the Coeur d'Alene Tribe, the CDTHA was organized pursuant to Coeur d'Alene Tribe Ordinance CDA 205(1963) and designated as the TDHE by Resolution No. 98(1998) dated March 30, 1998. The Authority, as a subdivision of the Coeur d'Alene Tribal Government, exists as a legal nonprofit entity empowered to issue bonds, provide financing, and enter into contracts with the federal government and private groups for the purpose of planning, developing and implementing comprehensive housing assistance plans. It is also charged with the responsibility to administer, direct and manage all operations pertaining to the housing needs of Native people residing on the Coeur d'Alene Reservation.

Although CDTHA is a separate legal entity, its mission is mandated by the Tribal Ordinance creating the Authority and reaffirmed more specifically by a comprehensive housing assistance strategy. Functioning as the Tribe's principal housing agency (in Housing and Urban Development (HUD) terms, Tribally Designated Housing Entity), administrators will focus upon community needs that require understanding, dedication, enthusiasm, vision, and experience. Board members serve as a principal advisor on housing issues facing the Coeur d'Alene people and as a policymaker for the CDTHA.

3.11.19. Chapter 43, Boating on Tribal Waters

The Tribal Council finds that there is a need to regulate the actions of persons who use the waters of the Coeur d'Alene Reservation. This action is taken to protect the public safety and because the use of said waters has a direct effect on the political integrity, the economic security and the health and welfare of the Tribe. Any person using the waters within the Coeur d'Alene Reservation is deemed to have consented to the jurisdiction and laws of the Coeur d'Alene Tribe.

3.11.20. Chapter 44, Encroachments

The Coeur d'Alene Tribe has exercised exclusive sovereignty and dominion over the submerged lands and waters within the area now known as the Coeur d'Alene Reservation since time immemorial. The submerged lands and waters within the Coeur d'Alene Reservation are owned by the Coeur d'Alene Tribe and the Tribe is legally entitled to the exclusive use and occupancy of them. These submerged lands and waters are essential to the Tribe's "dignity and ancient right." Idaho v. The United States and Coeur d'Alene Tribe 533 U.S. 262 (2001). The regulation of use of the submerged lands and waters are an essential governmental function of the Tribe. The Tribal and public health, safety and welfare requires that any allowed use of an encroachment upon these waters and submerged lands be regulated to protect water quality and quantity, navigation, fish and wildlife habitat, aquatic life, aesthetic beauty and Tribal values.

Although the Coeur d'Alene Tribe has the right of exclusive use and occupancy and to exclude non-Tribal member uses of the waters and submerged lands within the Reservation, the Coeur d'Alene Tribe may permit non-Tribal members the privilege to use these waters and submerged lands in certain specific, well-defined ways. This non-Tribal member use is by permission only and is to be narrowly construed. Except as specifically otherwise authorized in this Chapter, it is the intent of the Coeur d'Alene Tribe to reserve for enrolled members of the Coeur d'Alene Tribe the exclusive use and occupancy of all waters within the Coeur d'Alene Reservation and of all submerged lands underlying navigable waters within the Coeur d'Alene Reservation.

3.11.20.1. Water Rights.

It is the policy of the Coeur d'Alene Tribe to retain the use of all waters within the Reservation, regardless of navigability, but to allow use by others subject to specific limitations.

3.11.20.2. Standards - Water Rights

The Tribal Staff is authorized to adopt appropriate standards and procedures for application and implementation of Tribal water permits in compliance with this Section.

3.11.20.3. Exclusive Tribal Water Right

The Tribe has the exclusive right of use to all surface and ground water within the Coeur d'Alene Reservation with a priority date of time immemorial.

3.11.20.4. Other Water Permits

The Tribe recognizes other water permits as subordinate to the Tribe's water rights as follows:

1) Subject to the limitations contained herein, all water rights previously granted by the state of Idaho affecting waters on the Reservation are recognized as Tribal water use permits with the priority date, place of division and quantity as recognized by the State.

2) All Tribal water use permits hereafter permitted by the Tribe shall be with a priority date of the date of issuance. Such water permits shall be only for such quantity of water that the applicant can reasonably put to beneficial use.
3) All holders of Tribal water permits are liable to the Tribe for past and future compensation for the use of waters on the Reservation, except that no compensation is required for individual domestic use.

3.11.21. Encroachment Standards

These standards are intended to allow use of Tribal Waters under well-defined conditions as stated in Tribal Code. Encroachment structures are allowed only when they support an historic use that requires a structure and that the Tribe wishes to continue or a new use that provides a benefit to the public or the Tribe. No structure will be permitted unless it is essential to the use it serves.

These standards apply to all structures or encroachments on or above Tribal Waters and submerged lands and to all owners of structures or encroachments on or above Tribal Waters and submerged lands.

Section 5.02 Specific Limitations

(a) No new encroachments will be allowed on the eastern shore of Coeur d'Alene Lake along the Trail of the Coeur d'Alene.

(b) Existing encroachments along the Trail of the Coeur d'Alene will have an access clause included in the encroachment permit.

(c) Any improvements to access an encroachment across the Trail must be approved by the Trail Manager.

(d) Termination of the encroachment permit will also terminate access across the Trail and require removal of improvements associated with the access.

3.11.22. TRAIL OF THE COEUR D'ALENES General Management Principles And Operating Guidelines

The General Management Principles and Operating Guidelines (GMPOG) sets forth how the State of Idaho and the Coeur d'Alene Tribe will provide for unified management and seamless operation of the Trail of the Coeur d'Alenes and the ROW on which it resides, consistent with their existing authorities and legal requirements found in the Consent Decree (CD) between the State, Coeur d'Alene Tribe, United States and the Union Pacific Railroad (UPRR), and the subsequent State-Tribe Agreement. With conveyance of the title to the UPRR ROW and the conversion of the ROW for trail use, the State of Idaho and the Coeur d'Alene Tribe have a unique opportunity to establish cooperative partnerships for development of a world-class, recreational and economic asset. The Trail/ROW will provide numerous benefits for Trail users and local communities and, at the same time, complement efforts to protect public health and the environment, conserve open space, plants and wildlife, and promote important historic and cultural values.

As a result of the CD between the Tribe, the State, the United States and UPRR, the Wallace-Mullan branch of the UPRR ROW in Northern Idaho was converted for interim use into a recreational trail known as "the Trail of the Coeur d'Alenes" (Trail). Pursuant to the CD, mining-related hazardous substances within the ROW were removed, contained beneath engineered barriers, and/or managed by installing other protective features, e.g., oases, hostile vegetation, and signage. The resulting Trail is one of the longest of its kind in the United States and serves to protect public health and the environment, provide visitors and residents with recreation opportunities, and benefit local communities along its route. It is the Governments' intent to manage and operate the Trail/ROW in a coordinated manner that revitalizes the culture, history, and economic vitality of adversely impacted communities along its route.

The Trail/ROW is owned and managed by the State of Idaho, Department of Parks and Recreation (State or IDPR) and the Coeur d'Alene Tribe as provided through several agreements between the Governments. The State-Tribe Agreement is the umbrella agreement between the Governments, which establishes a long-term cooperative partnership to manage and operate the Trail/ROW consistent with a single-trail principle.

Under the State-Tribe Agreement, the State of Idaho owns and is primarily responsible for managing the Trail/ROW outside the exterior boundaries of the Coeur d'Alene Reservation. The Coeur d'Alene Tribe owns and is primarily responsible for managing the Trail/ROW within the exterior boundaries of the Reservation but outside of Heyburn Park. The State of Idaho and the Coeur d'Alene Tribe jointly own and co-manage the portion of the Trail/ROW through Heyburn Park.

The State-Tribe Agreement also includes four sub-agreements addressing the Governments' management and operation of the Trail/ROW. The present GMPOG is one of those sub-agreements.

The GMPOG provides for coordinated and unified management and operation of the Trail/ROW through the oversight of a Trail Commission, the Governments' long-term shared vision for the Trail/ROW, Trail user standards and requirements, routine maintenance, review of economic and recreational development plans, and involvement of local governments, adjacent landowners and other members of the public.

3.11.23. Heyburn Park Trail/ROW Operations Plan

The purpose of this Plan is to provide mutually agreed upon user standards and requirements for the portion of the Trail/ROW through the Park. The Plan also provides the routine operation, maintenance and repair activities by the State of Idaho and the Coeur d'Alene Tribe on the portion of the Trail/ROW through the Park.

3.11.24. Heyburn Park Trail/ROW Long-Term Management Plan

The purpose of this Plan is to provide the State and Tribe's shared vision for the operation and management of the portion of the Trail/ROW through the Park and to provide the mechanisms for implementing that vision.

The Trail/ROW brings a new dimension and range of opportunities to the Park and the surrounding area, functioning to protect health and welfare while also providing recreational opportunities, historical and cultural experiences and economic benefits to the region. The portion of the Trail/ROW through the Park will be jointly owned and co-managed by the State of Idaho and Coeur d'Alene Tribe as an integral and seamless part of the entire Trail/ROW and consistent with the Governments' shared desire to enhance recreational opportunities while preserving the natural beauty and habitat of the area.

The goals of this plan are to:

1) Jointly manage the present and future lands, features, structures, activities and uses of the portion of the Trail/ROW through the Park;
2) Jointly manage the portion of the Trail/ROW through the Park as an integral and seamless part of the entire Trail/ROW;
3) Retain and protect the natural beauty and habitat of the area;

4) Promote the use of the Trail for health and wellness;
5) Preserve cultural and historical sites along the Trail/ROW;
6) Enhance recreational and educational opportunities;
7) Foster economic development opportunities; and
8) Integrate trail use and opportunities with existing Park use.

3.11.25. Response Action Maintenance Plan for the Trail of the Coeur d'Alenes

The mission of the Response Action Maintenance Plan (RAMP) is to protect human health and the environment from the presence of contaminants that remain in place following response actions within the railroad ROW formerly operated by UPRR and other railroads, which has been converted into a recreational trail known as the Trail of the Coeur d'Alenes.

The UPRR rail line was constructed in the late 1800s to serve the mining industry in the Silver Valley of Northern Idaho. When the rail line was built, mine waste rock and tailings containing heavy metals were used at some locations for the original rail bed. In addition, the ROW was contaminated by ore concentrate spillage and by the fluvial deposition of contaminated materials within the floodplain. The contaminants of concern include lead, arsenic, cadmium and zinc.

In 1991, the Coeur d'Alene Tribe filed a Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA) lawsuit against UPRR to address releases of hazardous substances in the Coeur d'Alene basin, including contamination along the Wallace-Mullan Branch of the UPRR ROW. The Coeur d'Alene Tribe's lawsuit resulted in multi-year negotiations between the United States, the Coeur d'Alene Tribe, the State of Idaho and UPRR which resulted in the entry of the CD between the parties in 2000.

The CD requires UPRR to conduct certain response activities on the ROW, including but not limited to, certain contaminant removals, Trail construction and Maintenance and Repair (M&R) activities to preserve the condition of the Trail. The CD also requires UPRR to transfer by quitclaim deed(s) all of its right, title and interest in the ROW to the State of Idaho and the Coeur d'Alene Tribe.

The CD also provides for Operation and Maintenance to be performed or funded by the State of Idaho and the Coeur d'Alene Tribe in connection with the ROW Trail. These Operation and Maintenance -Trail (O&M – Trail) activities encompass all maintenance and repair activities in connection with the ROW Trail which are not specifically identified within the Statement of Work (SOW), Appendix G to the CD, as M&R activities for which UPRR is responsible. UPRR has established an escrow account for O&M activities. The State of Idaho and the Coeur d'Alene Tribe are required to use the monies from the escrow account to perform or fund O&M – Trail activities as provided by the State-Tribe Agreement.

3.11.26. Indian Reservation Roads Program Inventory

Transportation planning is a high priority identified by the Tribal Council affecting societal and economic development. Transportation and access exposure to natural disaster events is addressed in these assessments. The Coeur d'Alene Tribe annually addresses the IRR system to determine transportation needs, continuity of operations, and infrastructure longevity within the Coeur d'Alene Reservation.

3.11.27. Solid Waste Assessments I and II of the Coeur d'Alene Reservation

These reports provide an analysis of the solid waste flows on the Coeur d'Alene Reservation, including current volumes, components, transportation, costs, and final disposal. The analyses also provide projections for future waste volumes and recommendations for maintaining the systems. Assessment of abandoned landfills was conducted to provide a screening level assessment of six abandoned landfill sites in terms of potential threats to human health and safety, adverse environmental impacts, and potential for contamination of nearby groundwater and surface waters.

3.11.28. Facility Needs Assessment for the Coeur d'Alene Reservation

The Facility Needs Assessment for the Coeur d'Alene Reservation (draft 6/25/06), addressed Capital Facilities including major activities to develop a comprehensive needs assessment and a community visioning task leading to a Comprehensive Plan for the Coeur d'Alene Reservation. This effort addressed roads, water systems, sewer systems, solid waste facilities, public safety facilities, health facilities, social service facilities, community centers, and parks.

The overall objective of the study was to complete a needs assessment and goal setting activity associated with community facilities on the Coeur d'Alene Reservation.

3.11.29. Integration of Hazard Mitigation Actions with Existing Policies and Plans

The expectation of the Coeur d'Alene Tribe is to implement Pre-Disaster Mitigation Activities within the context of current Tribal policies, plans, and programs while strengthening those actions to administer pre-disaster mitigation actions on the Coeur d'Alene Reservation. To accomplish these actions, some of the stated plans and policies (of this Section 3.11) will be strengthened, while some new activities will be drafted and woven into the tapestry of the existing regulatory Tribal framework. Extensive regulatory experience of the Coeur d'Alene Tribe in exercising sovereign authority of self-governance for the land of the Coeur d'Alene Reservation and the people of the Coeur d'Alene Tribe ensures that when adopted by the Tribal Council, this Tribal Hazards Mitigation Plan will receive the serious attention it merits for long-term benefits defined here.

While administering their sovereign rights and considering the consequences of natural disasters, the Coeur d'Alene Tribe seeks to build and foster relationships with neighboring jurisdictions to help ensure the safety of human life, the protection of investments in real property and infrastructure, the regional economy, the traditional way of life, and the natural environment. This aim of building relationships and cooperation with neighboring jurisdictions from the States of Idaho and Washington to the Counties of Benewah, Kootenai, Latah (in Idaho) and the Counties of Whitman and Spokane (in Washington), and all of the municipal city jurisdictions located within the exterior boundaries of the Coeur d'Alene Reservation can be facilitated through an understanding of the goals, objectives, and procedures expressed in this planning document. Some pre-disaster mitigation activities expressed in this document (Chapter 7) are targeted at actions to be carried out by the Coeur d'Alene Tribe, while other activities rely on neighboring jurisdictions to complete their pre-disaster mitigation actions. Activities to be carried out by the Coeur d'Alene Tribe will be facilitated through the existing programmatic infrastructure expressed in this section of this document.

Chapter 4. Natural Hazards Assessment

Chapter 4 presents hazard profiles for the Coeur d'Alene Reservation as developed from the Phase I Hazard Profile completed by the Planning Committee in 2010, plus additional items identified during the planning process. Historical hazards experienced in this region are presented, including State and Presidential Hazard Declarations in the area. The extent and location of each hazard's profile is discussed. The overview of this Chapter includes:

During the first four Coeur d'Alene Reservation Tribal Hazards Mitigation Plan Committee meetings, the attendees participated in a scoping exercise to subjectively place all relevant hazards into a matrix used to compare various hazard-importance levels, based on the potential for the hazard to occur, and its capacity to negatively affect people, structures, infrastructure, environment, the economy, and the traditional way of life on the Coeur d'Alene Reservation. This exercise helped to spark discussions about relative risks and the types of impacts commonly experienced. Resources for this discussion included the tabular risk-analysis data presented in Table 20 and Table 21, augmented with the extensive personal experiences of the combined Planning Committee membership.

For the purposes of the Planning Committee discussion while creating the data found within Table 17, the relative categories of Low, Medium, and High were considered as follows:

- Probability of Occurrence
    - Low – historically, the listed hazard has been observed with a frequency of one or fewer notable events within a ten-year period. This category also includes infrequent hazard events that may occur only once a century.
    - Medium – the occurrence of the listed hazard has been observed more frequently than once in a ten year period, but less frequently than twice every five year period, on average.
    - High – the listed hazard has occurred more than twice every five years, and includes annual event hazards, and even multiple times per-year hazards. To be considered for this ranking, the hazard does not necessarily occur every year, but when considered over a five-year period, the hazard is witnessed three or more times per five-year period.
- Potential to Impact People, Structures, Infrastructure, the Economy, and Traditional Way of Life
    - Low – the occurrence of the listed hazard has low potential to negatively impact the listed resources based on the exposure to developments and population

centers, coupled with considerations for available resources to respond to these threats. The risk exposure potentially impacts no lives and less than 25 structures when it is witnessed.

- Medium – the occurrence of the listed hazard has moderate potential to negatively impact the listed resources based on the exposure to developments and population centers, coupled with considerations for available resources to respond to these threats. The risk exposure potentially impacts fewer than 5 lives or less than 50 structures when it is witnessed.
- High – the occurrence of the listed hazard has high potential to negatively impact the listed resources based on the exposure to developments and population centers, coupled with considerations for available resources to respond to these threats. The risk exposure potentially impacts more than 5 lives or more than 50 structures with each occurrence.

The findings of the Planning Committee are summarized in Table 17.

Table 17. Phase I Hazard Assessment of Coeur d'Alene Reservation.

Probability of Occurrence				
	High		Storm Water	Wildland Fire Wind Storms Severe Winter Weather
	Medium	Landslides	Expansive Soils	Flood
	Low		Earthquake / Seismic Shaking	Radon Risk
		Low	**Medium**	**High**
		Potential to Impact People, Structures, Infrastructure, the Economy, and Traditional Way of Life		

These data presented the basis for evaluation in the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan with the determination that the hazards to be considered in this effort include:

1. Flood & Storm Water Drainage
2. Wildland Fire
3. Earthquakes & Seismic Shaking Hazards
4. Landslides
5. Expansive Soils
6. Radon Risk from Soils
7. Severe Winter Weather & Wind Storms

The planning committee widely recognized the existence of additional potential risks, but felt that the inclusion of additional hazards could not be justified in terms of the magnitude of these listed natural hazards.

Additional discussions during these meetings and during subsequent considerations between Planning Committee members included attention given to:

1. Past mining contamination within the Silver Valley situated within the Coeur d'Alene River watershed extending east of the current borders of the Coeur d'Alene Reservation, but within the ancestral lands of the Coeur d'Alene Tribe, causing catastrophic contamination to Coeur d'Alene Lake,

2. Potential for Hazardous Materials spills along US95, and in commercial locations,
3. Civil Unrest and Terrorism incidents,
4. Mass Epidemics (human health),

These additional potential disasters (numbered 1-4, above) are not considered natural disasters and will not be directly addressed in this plan. However, there is a need for the Coeur d'Alene Tribe to address these other potential events, and it is recommended that once the infrastructure of this "natural disasters" Tribal Hazards Mitigation Plan is established, the Coeur d'Alene Tribe will initiate the needed planning and adoption of appropriate measures detailed in an appropriate planning document. The Coeur d'Alene Tribe has been intimately involved in the assessment and remediation effort of contamination in Coeur d'Alene Lake and along the Coeur d'Alene River where mining activities caused the contamination.

A summary of the hazards addressed by the State of Idaho Hazard Mitigation Plan (2007), past state or federal disaster declarations for the two counties where the Coeur d'Alene Reservation is located, and inclusion within this planning document are summarized in Table 18.

Table 18. Hazard Screening for the Coeur d'Alene Reservation.

Hazard Type	Hazard Identified in State HMP (2007)	Past State or Presidential Disaster Declaration	Hazard Profiled in this Plan
Avalanche	Yes	No	No
Coastal Erosion	No	No	No
Dam Failure	Yes	No	No
Drought	Yes	No	No
Expansive Soils & Clays	No	No	Yes
Flood	Yes	Yes	Yes
Hailstorm	Yes	No	Yes
Heat	Yes	No	Yes
Hurricane / Cyclone	No	No	No
Land Subsidence	No	No	No
Landslide	Yes	Yes	Yes
Seismic Shaking Hazards	Yes	No	Yes
Snow/Ice	Yes	Yes	Yes
Tornado	Yes	No	Yes
Volcano	Yes	Yes	No
Tsunami	No	No	No
Wildfire	Yes	Yes	Yes
Wind	Yes	No	Yes
Civil Unrest	No	No	No
Terrorism	No	No	No

Further correlation of the natural hazards profile addressed in this Tribal Hazards Mitigation Plan are listed in Table 19 and verify the assessments completed here in the determination of these potential events. The columns of 'N' and 'S' are used by State and FEMA reviewers of the Tribal Hazards Mitigation Plan to determine "Needs Improvement", or 'Satisfactory'. All components are required to achieve a rating of 'S' (satisfactory) for the plan to be approved.

Table 19. Hazard Profile Format Suggested by FEMA (March 2010), Optional.										
Hazard Type	**Hazards Identified Per Requirement 201.7(c)(2)(i)**		**A. Location**		**B. Extent**		**C. Previous Occurrences**		**D. Probability of Future Events**	
	Not a Hazard	Yes	N	S	N	S	N	S	N	S
Avalanche	★									
Coastal Erosion	★									
Coastal Storm	★									
Dam Failure	★									
Drought	★									
Earthquake		★		★		★		★		★
Expansive Soils		★		★		★		★		★
Extreme Heat		★		★		★		★		★
Flood		★		★		★		★		★
Hailstorm		★		★		★		★		★
Hurricane	★									
Land Subsidence	★									
Landslide		★		★		★		★		★
Severe Winter Storm		★		★		★		★		★
Tornado		★		★		★		★		★
Tsunami	★									
Volcano	★									
Wildfire		★		★		★		★		★
Windstorm		★		★		★		★		★

Legend: 201.7(c)(2)(i) Profiling Hazards
A. Does the risk assessment identify the location (i.e., geographic area affected) of each hazard addressed in the new or updated plan?
B. Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?
C. Does the plan provide information on previous occurrences of each natural hazard addressed in the new or updated plan?
D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?

4.1. History of Past Natural Disasters

4.1.1. Major Presidential Disaster Declarations within and Adjacent to the Coeur d'Alene Reservation

When an emergency incident exceeds the capability of the jurisdiction to adequately respond it requires assistance by the federal government. The State's Governor can request the US President to make a major disaster declaration. While only a state Governor, or his representative, can create a state declaration of emergency or disaster to the US President, the Tribal Chairman can make a disaster or emergency declaration for the Reservation and forward that to FEMA when a formal relationship between the Tribe and FEMA exists. The Coeur d'Alene Tribe Emergency Operations Plan (2010) provides the mechanism for the Tribe to make declarations of this nature.

The Code of Federal Regulations has defined a major disaster as:

> "Any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood, or explosion, in any part of the U.S., which in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts

and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby" (GPO 2007).

Table 20. Major Disaster Declarations that Included the Extent of the Coeur d'Alene Reservation (FEMA 2010).

Year	Time Period	Event	Disaster Number	Extent
2009	January (Benewah County) March (IBHS & FEMA)	Ice jam flooding	M1825	St. Joe River in Shoshone and **Benewah County** (BCEMD 2009). Severe Winter Storm and Record and Near Record Snow (FEMA 2009).
2009	January – March	Heavy snow loads		During January to March 2009, heavy snow loads were observed across most of **North Idaho**, including Benewah County and Kootenai County. Several structures were destroyed by the "wet snow" pack that accumulated up to 2 feet of snow on roofs. No reports of life lost were made.
2008	May	Flooding	1781	North Idaho's flood emergency declaration included **Kootenai** and Shoshone Counties, and listed **Benewah**, Clearwater, Idaho, Bonner, and Boundary Counties, Idaho (FEMA 2009). State Disaster Declaration ID-02-2008.
2006	July	Hail		During the morning of June 13 a severe thunderstorm tracked out of southeast Washington into north Idaho. A hail storm causing local disruption and damage in **St. Maries**, 4 Miles southeast of Santa, and 6 Miles northwest of **Tensed**, in **Benewah County,** were reported (NOAA 2009).
2006	May	Hail, high winds		Scattered thunderstorms led to severe weather over portions of north central Idaho. These storms began to produce severe weather at **St. Maries** where penny sized hail was observed with wind gusts of 40-50 MPH. As the storms moved north, more severe weather occurred in the form of strong wind gusts (NOAA 2009).
1999	February	Flood		FEMA press release (HQ-99-053) announces that in **Benewah County** a dike is being compromised by rising water, posing a threat to houses in the area (FEMA 2009). Heavy rain caused **Hangman Creek** to flood in the **City of Tensed** and the Tribal community of DeSmet (NOAA 2009).
1998	August	Wildfire		Lightning sparked 25 small fires within the **St. Joe Watershed**, each ranging 1-5 acres in size (NOAA 2009).
1998	July	Thunderstorm, high winds		In the area of **St. Maries**, numerous trees were downed along the **St. Joe River**. A tree fell on a pickup truck. High winds forced cars off the road into a sewer pond (NOAA 2009).
1998	July	Hail		One inch diameter hail fell in the areas within, and west of and adjacent to the Coeur d'Alene Reservation causing local damages (NOAA 2009).
1998	July	Wildfire		A 2 acre wildfire threatened the **St. Maries High School** (NOAA 2009, BCEMD 2009).
1997	Spring	Flooding		Spring flooding in Southeastern and **Northern counties** (IBHS 2009).

Table 20. Major Disaster Declarations that Included the Extent of the Coeur d'Alene Reservation (FEMA 2010).

Year	Time Period	Event	Disaster Number	Extent
1997	May 31	Thunderstorm, high winds		Along the **St. Joe River**, high winds and a thunderstorm blew down trees and ripped roofing materials loose in the area of **St. Maries** (BCEMD 2009, NOAA 2009).
1997	March 6	Landslide		Landslides in various locations in Northern Idaho (**Benewah**, Bonner, Boundary, **Kootenai**, Shoshone), (BCEMD 2009, IBHS 2009)
1997	March 20	Flooding	1177	Rain showers led to flooding in **North Idaho counties** (FEMA 2009, IBHS 2009).
1996-97	November – January	Landslide		Landslides in various locations in Northern Idaho Counties - Adams, **Benewah**, Boise, Bonner, Boundary, Clearwater, Elmore, Gem, Idaho, **Kootenai**, Latah, Nez Perce, Owyhee, Payette, Shoshone, Valley, Washington (IBHS 2009)
1996-97	Winter	Winter storm	1154	Heavy snow, landslides, and floods from winter storms. **North Idaho** (FEMA 2009).
1996	February	Winter storm	1102	Counties – **Benewah**, Bonner, Boundary, Clearwater, Idaho, **Kootenai**, Latah, Lewis, Nez Perce, Shoshone (FEMA 2009).
1996	Spring	Flooding		Flooding throughout **Northern Idaho** (IBHS 2009)
1996	February	Severe storm		The worst flooding in 30 years forced thousands to flee. "*One week deep freeze, the next deep water*". The deluge was triggered from fast-melting snow and days of heavy rains. Approximately $5 million worth of damage occurred to highways from Bonners Ferry to Grangeville. **North Idaho was declared a state disaster area.** The town of **St. Maries** was flooded. Approximately $7 million damage to roads occurred because of this storm (IBHS 2009). Several roads were closed due to flooding from the **St. Joe River**. Some fields were closed as well. Highway 3 was closed in the **St Maries and Santa** areas due to water on the road. Approximately 400 people were evacuated when the **St. Maries and St. Joe Rivers** reached record levels. Nearly 200 buildings were damaged. A total damage estimate was $18 million (IBHS 2009).
1995	November - December	Flooding		Significant flooding occurred during the last week of November though the first week of December in 1995, impacting homes along all major river drainages in **Kootenai County and Benewah County**, especially along the **St. Joe River** (NOAA 2009).
1995	December 12	High winds		High winds cut across the western side of **Benewah County** to cause trees to blow down and roofing materials to be torn off with losses in the Sanders area estimated at $50,000 (NOAA 2009).
1995	December 3	High winds		High winds were reported in **St. Maries** causing trees to blow down causing approximately $5,000 in damages (NOAA 2009).
1992	June 11	Thunderstorm, high winds		Thunderstorms were reported in **Kootenai County and Benewah County** causing local damages (NOAA 2009).
1989	August 12	Thunderstorm, high winds		Thunderstorms were reported in **Kootenai County** and **Benewah County** causing local damages (NOAA 2009).

Table 20. Major Disaster Declarations that Included the Extent of the Coeur d'Alene Reservation (FEMA 2010).

Year	Time Period	Event	Disaster Number	Extent
1984	February	Ice jams, flooding	697	Ice Jam flooding along the **St. Joe River** (FEMA 2009, BCEMD 2009).
1983	November 18	Earthquake	694	Borah Peak earthquake (M7.3) centered in central Idaho with shocks felt in **Kootenai County and Benewah County** (FEMA 2009).
1982	February 15	Flooding		A warm, damp weekend weather system caused spotty erosion in farm fields and converted **north central Idaho**'s deep snow pack into a serious flood hazard. **St. Maries Creek**, a tributary of **St. Maries River**, flooded the logging communities between **Bovill and Fernwood**. Many buildings had up to 10 inches of water in them. A mudslide occurred near Orofino due to the large amounts of rain (NOAA 2009, IBHS 2009).
1981	Fall	Algae bloom		An explosion of blue-green algae in **Black Lake (within the Coeur d'Alene watershed)** occurred after unusually warm days. While it often is present in small amounts, this year it was in much larger quantities, later in the year than normal, and did not occur in other lakes in the area. Nine head of cattle and two dogs died from blue-green algae poising in Black Lake. Hunting, fishing, and swimming were advised against in the lake (IBHS 2009).
1980	May 18 Eruption May 19 Fallout	Volcanic eruption	624	Mount St. Helens erupted from Washington spewing volcanic ash over several states. Ash fallout covered cities and contaminated drinking water. The fallout prompted Governor Evans to declare a state of emergency. The **counties in the panhandle** received from 1 inch to 3-inches of an ash blanket. Costs for increased unemployment, destruction of vehicles and other equipment, damage to crops, livestock and timber, and lost tax revenues were about $13.7 million. This does not include loss to residents, local businesses and government (FEMA 2009).
1977	May 5	Drought	3040	Situation of widespread drought was declared by Idaho's Governor and the US President for **all of Idaho**. Although Southern Idaho was the hardest hit with this drought, all of the Idaho Panhandle was impacted by changing climate patterns and increased droughty conditions.
1975	July 6	Thunderstorm, high winds		Thunderstorms were reported in **Kootenai County and Benewah County** causing local damages (NOAA 2009).
1974	January	Floods		Flood waters isolated much of the **Coeur d'Alene mining district**. The waters burst dams, blocked major roadways and forced evacuation of at least 1,000 persons. About $65 million in damages. Shoshone and **Benewah Counties** were the hardest hit. $9.5 million in damage to road systems. $51.4 million in damage to private property. Governor Andrus declared the counties as disaster areas. More than 30 bridges were destroyed in 3 counties. Total damages for the region were estimated at $116 million. **St. Joe River** rampaged through **St. Maries**, Idaho. Parts of St. Maries were buried under 2½ feet of mud. Idaho National Guard was dispatched to St. Maries. At least 50 homes were destroyed from the St. Joe River (IBHS 2009).

Table 20. Major Disaster Declarations that Included the Extent of the Coeur d'Alene Reservation (FEMA 2010).

Year	Time Period	Event	Disaster Number	Extent
1964	December 21-23	Flooding	186	During the end of December 1964, warm weather combined with heavy rains and melting snow, causing flooding along the Payette, Big Wood, Little Wood, Portneuf, Clearwater and Boise River drainages. Hwy 21 and 15, US 95N and 30E were closed. Over 100 homes were damaged, numerous bridges were washed out, and thousands of acres of farmlands were flooded. Two deaths were attributed to the flood. A state of emergency was declared. The **Benewah-Shoshone-Kootenai County** area was the hardest hit in northern Idaho. Communities were isolated by small mountain streams that had become torrents (FEMA 2009).
1964	July 8	Thunderstorm, high winds		Thunderstorms were reported in **Benewah County** causing local damages (NOAA 2009).
1963	February 14	Flooding	143	Cold weather created ice jams and cloudbursts created flooding throughout several counties in the Panhandle including **Benewah County and Kootenai County**. President Kennedy authorized $250,000 in flood relief loans. Approximately $4.7 million in damage was caused throughout the state this year. Ice jam was about 2 miles in length from Lost Creek to Jupiter Creek. A giant ice jam occurred on the **St. Joe River** that threatened residents near **St. Maries** (FEMA 2009).
1948	May 23-June 5	Flood emergency declared		**Benewah County:** The 1948 flood was caused by abnormal snowmelt augmented by rainstorms in the latter part of May and in June. The floods caused contamination of the water system, which left residents without drinking water. Over $3.7 million damage to roads and highways and $30 million damage to crops (IBHS 2009, BCEMD 2009).
1938	April 18	Flooding		Heavy rains lead to flooding of **Benewah County**. The **St. Joe River** flooded **St. Maries**, and sustained approximately $100,000 in damage (IBHS 2009, BCEMD 2009).
1934	March 27-29	Flooding		Heavy rains lead to flooding in all of **North Idaho** (NOAA 2009).
1933	December 21-23	Flooding		A sudden thaw in December accompanied by heavy rains (over 20 inches in 23 days) caused landslides and flooding. **Coeur d'Alene Lake** reached an all time high level. The **South Fork of the Coeur d'Alene River and the St. Joe River** went over their banks. Thousands of people fled their homes and 11 were reported dead. Coeur d'Alene Lake reached 100-year flood levels. Nearly $1.5 million in property damage was reported in the St. Maries area alone. **Benewah County** reported over $4.2 million in damages (FEMA 2009).
1910**	August 21-22	Wildfire		In a brief 48-hour span, fires carried by hurricane-force winds burned more than 3 million acres, killed over 300 persons and destroyed between 7 and 8 billion board-feet of timber. The winds, which gave **The Big Blowup** its horror, came up from the southwest in the Nez Perce National Forest near Elk City. The government paid $5.4 million in claims of fire-related injuries alone. This $25.4 million in 1910 losses would equate to approximately $697 million in 2008 dollars.

4.1.2. SHELDUS Hazard Event Profile

SHELDUS (University of South Carolina 2009) is a county-level hazard data set for the U.S. for 18 different natural hazard event types such as thunderstorms, hurricanes, floods, wildfires, tsunami, and high winds maintained by the Hazards & Vulnerability Research Institute at the University of South Carolina. For each event the database includes the beginning date, location (county and state), property losses, crop losses, injuries, and fatalities that were attributed to each county. SHELDUS Hazard Profile for Benewah County and Kootenai County, Idaho, 1960-2008 have been combined into a summary of natural disasters that either resulted in damages on the Coeur d'Alene Reservation, or adjacent to the Coeur d'Alene Reservation. The damages summarized in Table 21 do not represent damages just on the Coeur d'Alene Reservation. This summary is inclusive of the listed disasters in their effect across the region. Some of these events were also reported in Table 20. At this time, there is not a comprehensive disaster summary database created for Indian Reservations in the USA. Summaries (Table 20 and Table 21) are intended to represent the natural disasters that have generally impacted the region of the Coeur d'Alene Reservation.

Table 21. SHELDUS Hazard Profile for Coeur d'Alene Reservation and Adjacent Counties in Idaho (University of South Carolina 2009).

Begin Date	End Date	Hazard Type	Remarks	Injuries	Fatalities	Property Damage	Crop Damage	Property Damage 2008
9/3/1960	9/4/1960	Lightning, Wind	WINDSTORM AND LIGHTNING	0.05	0	$1,136.36	$ -	$8,441.24
1/1/1961	1/3/1961	Winter Weather	Rime Ice	0	0	$1,000.00	$ -	$7,428.32
4/12/1961	4/13/1961	Wind	Wind	0.07	0	$ 113.64	$ -	$ 844.15
7/23/1961	7/23/1961	Lightning	Lightning	0	0	$5,000.00	$ -	$ 37,141.58
12/17/1961	12/19/1961	Winter Weather	HEAVY SNOW	1	0	$5,000.00	$ -	$ 37,141.58
4/6/1962	4/7/1962	Wind	Wind	0	0	$ 111.11	$ -	$ 770.37
4/19/1962	4/20/1962	Wind	WIND AND DUST	0.39	0	$ 113.64	$113.64	$ 787.91
11/19/1962	11/20/1962	Wind	Wind	0	0	$10,000.00	$ -	$ 69,333.70
12/16/1962	12/21/1962	Fog, Winter Weather	Fog, rime ice	0.16	0	$-	$ -	$-
1/1/1963	1/31/1963	Winter Weather	Snow and Ice	0.44	0	$-	$ -	$-
4/14/1963	4/14/1963	Wind	Wind	0.04	0	$ 111.11	$ -	$ 770.37
12/1/1963	12/31/1963	Fog, Winter Weather	Snow, ice and fog	0.27	0	$ 111.11	$ -	$ 770.37
1/1/1964	1/31/1964	Wind, Winter Weather	Snow, wind	0.22	0	$ 111.11	$ -	$ 770.37
2/15/1964	2/15/1964	Winter Weather	Snow and ice	2	0	$-	$ -	$-
3/11/1964	3/13/1964	Wind, Winter Weather	Snow and wind	0.16	0	$-	$ -	$-
8/30/1964	8/30/1964	Lightning	Lightning	0	0	$5,000.00	$ -	$ 34,666.85
12/20/1964	12/24/1964	Severe Storm, Thunder Storm, Wind, Winter Weather	Snow, rain, and wind	0	0	$ 111,111.11	$ -	$ 770,374.47
7/8/1965	7/8/1965	Hail, Severe Storm, Thunder Storm,	HAIL, RAIN	0	0	$-	$ 1,136.36	$-
7/26/1965	7/26/1965	Lightning, Wind	Wind, lightning	0	0	$ 111.11	$ -	$ 770.37
8/2/1965	8/2/1965	Hail, Severe Storm, Thunder Storm,	Hail, wind and rain	0	0	$ 111.11	$111.11	$ 770.37
8/19/1965	8/19/1965	Severe Storm, Thunder Storm, Wind,	Thunderstorm, wind, and rain	0	0.5	$ 250.00	$ -	$1,733.34
8/21/1965	8/21/1965	Hail, Wind	Hail and wind	1	0	$ 50.00	$ 5,000.00	$ 346.67
8/25/1966	8/26/1966	Wind	Wind	0	0	$ 111.11	$111.11	$ 722.20
8/26/1967	8/26/1967	Wildfire	Wildfire	0	0	$2,255,454.54	$ -	$14,660,088.01
7/19/1968	7/20/1968	Wind	Wind	0	0	$1,136.36	$113.64	$6,951.91
8/10/1968	8/23/1968	Severe Storm, Thunder Storm	Rain	0	0	$-	$11,363.64	$-
1/6/1969	1/7/1969	Winter Weather	SNOW STORM	0	0	$11,627.91	$ -	$ 67,182.29
1/26/1969	1/26/1969	Winter Weather	SNOW STORM	0	0	$11,627.91	$ -	$ 67,182.29
3/22/1969	3/23/1969	Wind	Wind	0	0	$ 111.11	$ -	$ 641.96

Table 21. SHELDUS Hazard Profile for Coeur d'Alene Reservation and Adjacent Counties in Idaho (University of South Carolina 2009).

Begin Date	End Date	Hazard Type	Remarks	Injuries	Fatalities	Property Damage	Crop Damage	Property Damage 2008
7/16/1970	7/16/1970	Hail, Lightning, Wind,	HAIL, LIGHTNING, WIND	0	0	$ 277.78	$27,777.78	$1,520.50
7/27/1970	7/27/1970	Wind	Wind	0	0	$5,000.00	$ -	$ 27,368.77
12/4/1970	12/5/1970	Winter Weather	Snowstorm	0	0	$ 50.00	$ -	$ 273.69
1/21/1971	1/21/1971	Wind	Windstorm	0	0	$1,000.00	$ -	$5,199.94
3/26/1971	3/26/1971	Wind	STRONG WIND	1	1	$50,000.00	$ -	$ 259,996.88
8/2/1971	8/2/1971	Severe Storm, Thunder Storm	Thunderstorm	0	0	$ 50.00	$5.00	$ 260.00
10/27/1971	10/27/1971	Winter Weather	Snow	0.07	0	$ 17.86	$ -	$ 92.87
12/8/1971	12/9/1971	Winter Weather	Snow	0	0	$ 50.00	$ -	$ 260.00
1/9/1972	1/12/1972	Wind, Winter Weather	WIND AND SNOW	0.07	0	$ 113,636.36	$ -	$ 590,901.98
1/23/1972	1/23/1972	Wind, Winter Weather	Wind, Snow	0	0.05	$ 227.27	$ -	$1,181.79
2/29/1972	2/29/1972	Wind	Wind	0	0	$ 555.56	$ -	$2,888.88
7/6/1972	7/6/1972	Lightning	Lightning	0	0	$ 500.00	$ -	$2,599.97
7/18/1972	7/18/1972	Lightning, Wind	Lightning, wind	0	0	$ 555.56	$ -	$2,888.88
8/9/1972	8/9/1972	Lightning, Wind	Wind, lightning	0	0	$ 166.67	$ -	$ 866.67
8/14/1972	8/15/1972	Severe Storm, Thunder Storm, Wind,	Thunderstorm, wind	0	0	$ 555.56	$ -	$2,888.88
12/6/1972	12/8/1972	Winter Weather	Freeze	0	0	$ 111.11	$ -	$ 577.77
6/22/1973	6/23/1973	Lightning, Wind	Wind, lightning	0	0	$ 161.29	$ -	$ 798.78
8/13/1973	8/25/1973	Lightning, Wind	Dry Lightning, Wind	0	0	$-	$111.11	$-
11/1/1973	11/30/1973	Severe Storm, Thunder Storm, Wind, Winter Weather	Snow, Rain, Wind	0.02	0	$ 111.11	$ -	$ 550.27
1/14/1974	1/18/1974	Severe Storm, Thunder Storm, Wind,	WIND/RAIN	0	0	$3,571,428.57	$ -	$15,476,138.88
9/29/1974	9/29/1974	Wind	Wind	0.13	0	$ 625.00	$ -	$2,708.32
1/7/1975	1/10/1975	Severe Storm, Thunder Storm, Winter Weather,	Heavy Rain, Snow	0	0.02	$1,136.36	$ -	$4,545.44
2/4/1975	2/6/1975	Wind, Winter Weather	wind, heavy snow	0	0	$ 111.11	$ -	$ 444.44
2/9/1975	2/13/1975	Winter Weather	heavy snow	0	0	$ 113.64	$ -	$ 454.56
6/2/1975	6/2/1975	Hail, Lightning, Severe Storm, Wind	Electrical storm, wind, rain, hail	0	0	$ 111.11	$11.11	$ 444.44
6/23/1975	6/23/1975	Hail, Lightning, Severe Storm, Wind	Electrical storm, wind, rain, hail	0	0	$ 111.11	$11.11	$ 444.44
7/6/1975	7/6/1975	Lightning, Wind	Lightning, wind	0.07	0	$ 357.14	$ -	$1,428.56

Table 21. SHELDUS Hazard Profile for Coeur d'Alene Reservation and Adjacent Counties in Idaho (University of South Carolina 2009).

Begin Date	End Date	Hazard Type	Remarks	Injuries	Fatalities	Property Damage	Crop Damage	Property Damage 2008
7/14/1975	7/14/1975	Hail, Lightning, Severe Storm, Wind	hail, wind, rain, lightning	0	0	$ 11.36	$113.64	$ 45.44
11/10/1975	11/10/1975	Wind, Winter Weather	Wind, SNOW	0	0	$1,136.36	$ -	$4,545.44
11/26/1975	11/27/1975	Winter Weather	Snowstorm	0	0	$ 11.36	$ -	$ 45.44
11/30/1975	11/30/1975	Winter Weather	Snowstorm	0	0	$ 113.64	$ -	$ 454.56
12/2/1975	12/2/1975	Wind	Wind	0	0	$ 500.00	$ -	$2,000.00
2/16/1976	2/17/1976	Wind, Winter Weather	Snow and Wind	0	0	$1,136.36	$ -	$4,377.01
5/10/1976	5/10/1976	Lightning, Severe Storm, Thunder Storm, Wind	Wind, Lightning and Rain	0	0	$7,142.86	$ -	$ 27,512.75
8/6/1976	8/6/1976	Lightning, Wind	Wind, Lightning	0.67	0	$ 166,666.67	$ -	$ 641,963.91
8/12/1978	8/31/1978	Severe Storm, Thunder Storm	Rain	0	0	$-	$62,500.00	$-
11/4/1978	11/4/1978	Wind	Wind	0	0	$12,500.00	$ -	$ 40,625.30
1/1/1979	1/31/1979	Winter Weather	Extreme Cold	0	0	$11,363.60	$ -	$ 33,765.97
2/1/1979	2/13/1979	Winter Weather	Extreme Cold	0	0	$1,136.36	$ -	$3,376.60
7/5/1979	7/5/1979	Lightning, Wind	wind, lightning	0	0	$16,666.67	$ -	$ 49,523.59
4/28/1980	4/28/1980	Wind	Wind	0	0	$50,000.00	$ -	$ 129,998.44
11/13/1981	11/14/1981	Wind	Wind	0	0	$55,555.56	$ -	$ 131,312.19
1/23/1982	1/23/1982	Wind, Winter Weather	Snow/wind	0	0	$25,000.00	$ -	$ 55,319.53
2/15/1982	2/15/1982	Flood	Flooding	0	0	$1,000,000.00	$ -	$2,212,781.02
2/16/1982	2/16/1982	Wind	Wind	0	0	$50,000.00	$ -	$ 110,639.05
3/18/1982	3/18/1982	Wind	Wind	0	0	$8,333.00	$ -	$ 18,439.10
4/23/1985	4/23/1985	Wind	Wind	0	0	$7,142.86	$ -	$ 14,285.72
12/9/1987	12/9/1987	Wind	High Winds	0	0	$7,142.86	$ -	$ 13,506.40
12/20/1987	12/21/1987	Winter Weather	Heavy Snow	0	0	$7,142.86	$ -	$ 13,506.40
12/22/1987	12/22/1987	Winter Weather	Heavy Snow	0.61	0	$1,136.36	$ -	$2,148.74
8/1/1988	8/31/1988	Drought	Drought	0	0	$-	$11,363.64	$-
10/1/1988	10/31/1988	Drought	Drought	0	0	$11,363.64	$11,363.64	$ 20,733.54
12/12/1988	12/13/1988	Wind	Wind	0	0	$10,000.00	$ -	$ 18,245.51
12/30/1988	12/30/1988	Winter Weather	Extreme Cold	0	0	$7,142.86	$ -	$ 13,032.51
1/31/1989	1/31/1989	Winter Weather	BLIZZARD, SNOW	0.29	0	$71,428.57	$ 7,142.86	$ 123,810.18
3/2/1989	3/2/1989	Flood	Flood	0	0	$7,142.86	$ -	$ 12,381.02
1/8/1990	1/8/1990	Wind	High Wind	0.03	0	$16,129.00	$ -	$ 26,625.62
11/20/1990	11/21/1990	Winter Weather	Heavy Snow	0	0	$4,166.67	$ -	$6,878.30
11/23/1990	11/23/1990	Wind	High Winds	0	0	$ 100,000.00	$ -	$ 165,079.16

Table 21. SHELDUS Hazard Profile for Coeur d'Alene Reservation and Adjacent Counties in Idaho (University of South Carolina 2009).

Begin Date	End Date	Hazard Type	Remarks	Injuries	Fatalities	Property Damage	Crop Damage	Property Damage 2008
11/24/1990	11/26/1990	Flood	Flooding	0	0	$10,000.00	$ -	$ 16,507.92
12/4/1990	12/4/1990	Wind	High Winds	0.13	0	$6,250.00	$ -	$ 10,317.45
12/18/1990	12/31/1990	Winter Weather	Extreme Cold	0.68	0.02	$11,363.64	$113,636.36	$ 18,759.00
12/30/1990	12/31/1990	Winter Weather	Blizzard	0	0	$2,500.00	$ -	$4,126.98
2/28/1991	2/28/1991	Winter Weather	Snow	0.29	0	$7,142.86	$ -	$ 11,255.33
3/3/1991	3/3/1991	Wind	High Wind	0	0	$1,136.36	$ -	$1,790.61
10/16/1991	10/16/1991	Wind	Wind	1.14	0.14	$71,428.57	$ 7,142.86	$ 112,553.29
4/9/1992	4/9/1992	Wind	Dust Storm	0	0	$1,724.14	$ -	$2,636.90
4/17/1992	4/17/1992	Wind	Wind	0	0	$11,363.64	$11,363.64	$ 17,379.58
6/1/1992	6/30/1992	Drought	Drought	0	0	$-	$ 1,136,363.64	$-
7/1/1992	7/31/1992	Drought	Drought	0	0	$-	$ 1,136,363.64	$-
8/1/1992	8/31/1992	Drought	Drought	0	0	$-	$ 1,136,363.64	$-
8/11/1992	8/15/1992	Lightning	Dry Lightning	0	0	$1,136.36	$113.64	$1,737.95
8/20/1992	8/20/1992	Heat, Wind	Wind, Dry Heat	0	0	$26,315.79	$26,315.79	$ 40,247.44
8/21/1992	8/21/1992	Winter Weather	Cold Front	0	0	$5,555.56	$55,555.56	$8,496.69
8/24/1992	8/26/1992	Winter Weather	Freeze	0	0	$ 138.89	$13,888.89	$ 212.42
9/1/1992	9/30/1992	Drought	Drought	0	0	$-	$ 1,136,363.64	$-
10/1/1992	10/31/1992	Drought	Drought	0	0	$ 113,636.36	$ 1,136,363.64	$ 173,795.76
11/19/1992	11/20/1992	Winter Weather	Heavy Snow	0	0.15	$2,500.00	$ -	$3,823.51
11/21/1992	11/21/1992	Winter Weather	Heavy Snow	0	0	$12,500.00	$125,000.00	$ 19,117.53
1/1/1993	3/15/1993	Winter Weather	Weather Stress	0	0	$-	$ 7,142.85	$-
1/7/1993	1/7/1993	Winter Weather	Snow	0	0	$10,000.00	$ -	$ 14,857.07
1/20/1993	1/20/1993	Wind	Wind	0.25	3	$ 125.00	$ -	$ 185.71
9/1/1993	9/30/1993	Winter Weather	Cool and Wet Growing Season	0	0	$-	$11,363.64	$-
11/12/1993	11/12/1993	Wind	High Winds	0	0	$12,500.00	$ -	$ 18,571.34
5/15/1994	5/15/1994	Wind	HIGH WINDS	0	0	$16,666.67	$ -	$ 24,074.00
10/20/1994	10/20/1994	Severe Storm, Thunder Storm, Wind,	THUNDERSTORM WINDS	0	0	$50,000.00	$ -	$ 72,221.98
11/1/1994	11/1/1994	Wind	HIGH WINDS	0.1	0	$5,000.00	$ -	$7,222.20
12/1/1994	12/1/1994	Severe Storm, Thunder Storm, Winter Weather,	HEAVY RAIN/SNOW	0	0	$1,136.36	$ -	$1,641.40
12/5/1994	12/5/1994	Winter Weather	HEAVY SNOW	0	0	$7,142.86	$ -	$ 10,317.43
2/19/1995	2/20/1995	Flood	FLOODS	0	0	$25,000.00	$ -	$ 35,135.06
4/15/1995	4/15/1995	Winter Weather	FROST	0	0	$-	$100,000.00	$-

Table 21. SHELDUS Hazard Profile for Coeur d'Alene Reservation and Adjacent Counties in Idaho (University of South Carolina 2009).

Begin Date	End Date	Hazard Type	Remarks	Injuries	Fatalities	Property Damage	Crop Damage	Property Damage 2008
1/16/1996	1/16/1996	Wind	HIGH WIND	0	0	$10,000.00	$ -	$ 13,684.20
1/23/1996	1/23/1996	Winter Weather	WINTER STORM	0	0	$3,600.00	$ -	$4,926.31
2/8/1996	2/8/1996	Flood	FLOODS	0.17	0	$20,000,000.00	$ -	$27,368,392.24
4/24/1996	4/26/1996	Flood	FLOODS	0	0	$16,666.67	$ -	$ 22,807.00
11/16/1996	11/16/1996	Winter Weather	HEAVY SNOW	0	0	$ 857,142.86	$ -	$1,172,931.10
5/1/1997	5/31/1997	Flood	FLOODS	0	0	$ 571,428.57	$ -	$ 761,904.76
5/31/1997	5/31/1997	Tornado		0	0	$50,000.00	$ -	$ 66,666.67
6/1/1997	6/15/1997	Flood	FLOODS	0	0	$ 666,666.67	$ -	$ 888,888.89
7/21/1997	7/21/1997	Hail, Severe Storm, Thunder Storm,	THUNDERSTORM WIND/HAIL	0	0	$10,000.00	$ -	$ 13,333.33
12/20/1997	12/20/1997	Winter Weather	HEAVY SNOW	0	1	$-	$ -	$-
1/11/1998	1/11/1998	Winter Weather	EXTREME COLD	0	0	$16,666.67	$ -	$ 21,940.80
3/4/1998	3/5/1998	Winter Weather	HEAVY SNOW	0	0	$3,571.43	$ -	$4,701.60
7/2/1998	7/2/1998	Wildfire	WILD/FOREST FIRE	0	0	$20,000.00	$ -	$ 26,328.95
7/9/1998	7/9/1998	Severe Storm, Thunder Storm, Wind,	THUNDERSTORM WIND	0	0	$50,000.00	$ -	$ 65,822.38
7/31/1998	7/31/1998	Flood	FLOOD	0	0	$5,000.00	$ -	$6,582.24
8/12/1998	8/12/1998	Wildfire	WILD/FOREST FIRE	0	0	$10,000.00	$15,000.00	$ 13,164.48
8/19/1998	8/21/1998	Wildfire	WILD/FOREST FIRE	0	0	$25,000.00	$ -	$ 32,911.19
9/14/1998	9/14/1998	Wildfire	WILD/FOREST FIRE	0	0	$20,000.00	$ -	$ 26,328.95
12/25/1998	12/25/1998	Wind	HIGH WIND	0	0	$ 140,000.00	$ -	$ 184,302.68
2/2/1999	2/2/1999	Wind	HIGH WIND	0	0	$ 600,000.00	$ -	$ 780,000.78
2/6/1999	2/7/1999	Winter Weather	WINTER STORM	5	0	$-	$ -	$-
2/24/1999	2/25/1999	Flood	FLOODS	0	0	$ 250,000.00	$ -	$ 325,000.33
2/25/1999	2/25/1999	Avalanche	AVALANCHE	0	0	$5,000.00	$ -	$6,500.01
7/7/1999	7/7/1999	Hail, Severe Storm, Thunder Storm,	TSTM WIND/HAIL	0	0	$30,000.00	$ -	$ 39,000.04
9/25/1999	9/25/1999	Wind	HIGH WIND	0	0	$10,000.00	$ -	$ 13,000.01
12/18/1999	12/18/1999	Winter Weather	WINTER STORM	2	0	$66,666.67	$ -	$ 86,666.76
1/9/2000	1/9/2000	Wind	HIGH WIND	0	0	$8,000.00	$ -	$ 10,024.06
1/31/2000	1/31/2000	Flood	URBAN/SMALL STREAM FLOOD	0	0	$15,000.00	$ -	$ 18,795.11
4/4/2000	4/4/2000	Severe Storm, Thunder Storm, Wind,	THUNDERSTORM WIND	0	0	$15,000.00	$ -	$ 18,795.11
4/13/2000	4/15/2000	Flood	FLOOD	0	0	$15,000.00	$ -	$ 18,795.11

Table 21. SHELDUS Hazard Profile for Coeur d'Alene Reservation and Adjacent Counties in Idaho (University of South Carolina 2009).

Begin Date	End Date	Hazard Type	Remarks	Injuries	Fatalities	Property Damage	Crop Damage	Property Damage 2008
4/14/2000	4/16/2000	Flood	FLOOD	0	0	$13,333.33	$ -	$ 16,706.76
12/15/2000	12/15/2000	Wind	HIGH WIND	0	0	$7,500.00	$ -	$9,397.55
3/13/2001	3/13/2001	Severe Storm, Thunder Storm, Wind,		0	0	$25,000.00	$ -	$ 30,232.67
12/1/2001	12/1/2001	Winter Weather		0	0	$16,666.67	$ -	$ 20,155.12
5/19/2002	5/19/2002	Severe Storm, Thunder Storm, Wind,		2	0	$15,000.00	$ -	$ 17,931.00
2/1/2003	2/1/2003	Flood		0	0	$30,000.00	$ -	$ 35,056.15
11/19/2003	11/19/2003	Wind		0	0	$50,000.00	$ -	$ 58,426.91
8/2/2004	8/2/2004	Severe Storm, Thunder Storm, Wind,	Thunderstorm Wind	2	0	$5,000.00	$ -	$5,714.29
1/10/2006	1/10/2006	Wind	Strong Wind	0	0	$30,000.00	$ -	$ 32,165.03
1/15/2006	1/20/2006	Landslide	Landslide	0	0	$7,500.00	$ -	$8,041.26
3/8/2006	3/8/2006	Wind	Strong Wind	0	0	$1,000.00	$ -	$1,072.17
5/19/2006	5/19/2006	Lightning	Lightning	0	0	$10,000.00	$ -	$ 10,721.68
7/5/2006	7/5/2006	Lightning	Lightning	0	0	$15,000.00	$ -	$ 16,082.51
12/14/2006	12/15/2006	Wind	High Wind (G76)	0.43	0	$68,000.00	$ -	$ 72,907.40
1/6/2007	1/6/2007	Wind	High Wind (G58)	0	0	$3,000.00	$ -	$3,120.00
1/9/2007	1/10/2007	Wind	Strong Wind	0	0	$ 666.67	$ -	$ 693.34
6/4/2007	6/4/2007	Lightning	Lightning	0	0	$30,000.00	$ -	$ 31,199.95
6/29/2007	6/29/2007	Severe Storm, Thunder Storm, Wind,	Thunderstorm Wind (55EG)	0	0	$33,000.00	$ -	$ 34,319.95
8/31/2007	8/31/2007	Severe Storm, Thunder Storm, Wind,	Thunderstorm Wind	0	0	$2,000.00	$ -	$2,080.00
1/11/2008	1/11/2008	Winter Weather	Winter Weather	0.5	0	$-	$ -	$-
5/18/2008	5/31/2008	Flood	Flood	0	0	$50,000.00	$ -	$ 50,000.00
7/10/2008	7/10/2008	Wind	High Wind	0	0	$ 196,666.67	$ -	$ 196,666.67

Using the summaries, presented in Table 21, several observations concerning the frequency and financial magnitude of natural hazards within and surrounding the Coeur d'Alene Reservation can be made. In terms of frequency of large-scale disaster events, **severe weather** leading to disaster events occurs with the highest frequency in the region. A frequency of 16 **winter weather** events during November and December (each), have been witnessed between 1960 and 2009 (Figure XXVI, Table 21). The frequency of winter weather is highest during the winter months; however, one event that occurred in August, 21,1992, was categorized as winter weather because the storm dropped ice rain and snow, breaking trees over the roadway and dropping power lines. Although August is categorized as the "hottest month" of the year on the Coeur d'Alene Reservation, these seemingly odd weather systems can be witnessed (Figure XXVI, Table 21). Winter weather-related storm events have accounted for approximately $66,000 in losses each year, with a total, 2008 adjusted loss figure, of $3.2 million during this period, and included within the SHELDUS hazard profile (Table 21).

Lightning has represented a loss of approximately $18,000 per year, or $871,000 in losses during this 49 year period (Table 21). Lightning events of significance have been recorded a total of 21 times during the 49 year period of record, and less than once every two years. This should not be considered as the frequency of lightning storms in the region. Lightning is a common evening experience on the Coeur d'Alene Reservation with hundreds of strikes seen on a single night during June through September as the hot summer days cool to chilly summer nights in the Upper Columbia Plateau.

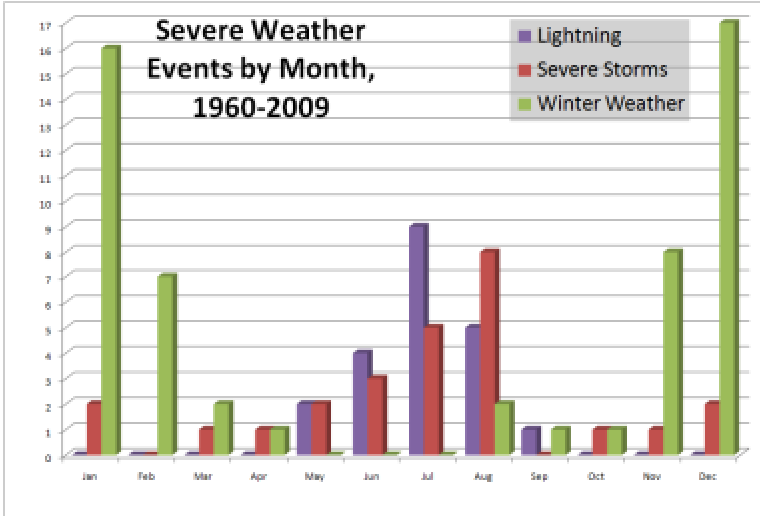
Thunder storms are cataloged separately from lightning storms in the SHELDUS database of natural disasters (Table 21). There have been a total of 23 thunderstorm events within the region between 1960 and 2009, representing slightly less than one damage causing event every two years. Thunderstorm losses have totaled approximately $16.6 million during this 49 year period, or about $339,000 per year.

Other severe weather-related events include **hail storms**, with an average occurrence one event within each 6 year period, for a total of 9 occurrences within the 49 year period of record (Table 21). These events have led to a financial loss of approximately $1,141 per year, or a total period loss of $56,000, as reported in the SHELDUS database, and adjusted for inflation to 2008 dollars.

Drought impacts have been recorded in the region approximately 7 times during the period of record, or about once every 7 years (Table 21). Each of the losses were recorded in October and reflected crop losses. These drought losses have totaled approximately $195,000 during the 49 year period, or on average, $27,800 per event (less than $4,000 per year).

Further discussions of severe weather and "normal weather patterns" are addressed in Section 4.3 (Weather Features of the Upper Columbia Plateau).

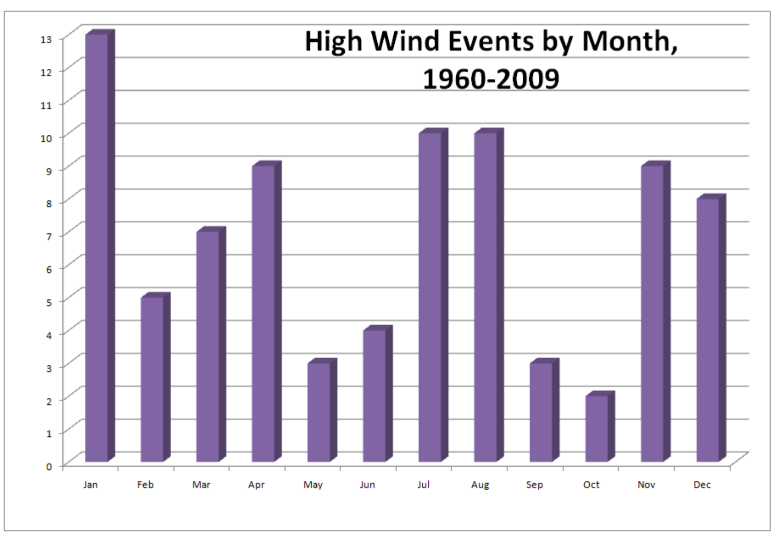
Figure XXVI. Severe Weather Frequency between 1960 and 2009, where the Coeur d'Alene Reservation is Located.



High-wind events are another frequent visitor to the Coeur d'Alene Reservation. The timing and patterns of severe winds are less predictable than some of the other hazards. In general, the classification of "severe winds" are limited to those winds that both exceed 40 miles per hour in gusts, and cause damages to people, structures, infrastructure, crops, or forestlands. Within the SHELDUS database (Table 21), there have been approximately 83 damaging high-wind events within the Coeur d'Alene Reservation between 1960 and 2009, with approximately 5 events witnessed every 3 years, during that period (Figure XXVII). Often, these storm systems are not solely a high-wind event, but are frequently accompanied by lightning, rain, or other weather system components. The financial losses from these wind storms are highly variable, with $20.5 million (2008 dollars) witnessed during this period, or $419,500 per year (Table 21).

Further discussions of high winds and "normal weather patterns" are dealt with in Section 4.3 (Weather Features of the Upper Columbia Plateau)..

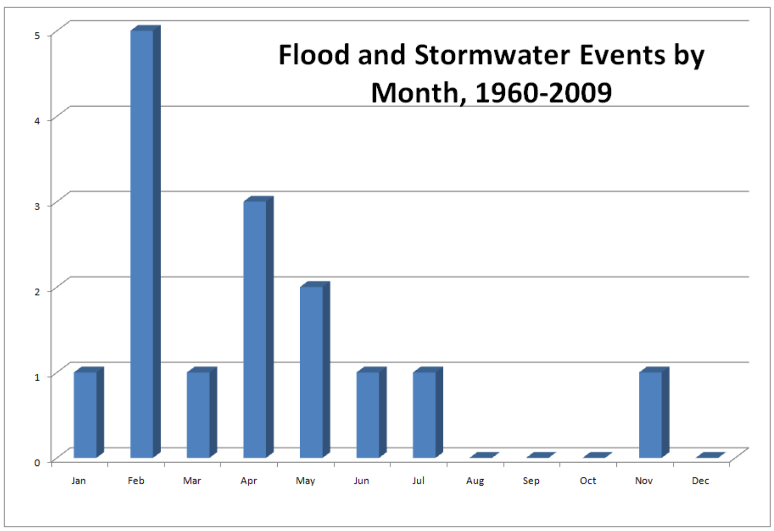
Figure XXVII. High Wind Frequency between 1960 and 2009, Where the Coeur d'Alene Reservation is Located.



The frequency of past flooding events within the Coeur d'Alene Reservation has been confined to winter and spring months, normally between January and July (Figure XXVIII). One event has been noted as occurring on November 24, 1990, when warm rains fell on a light snowpack causing a rapid rain-on-snow event and flooding within the Hangman Creek, St. Joe and St. Maries Rivers. The frequency of rain-on-snow events is witnessed, more often than not, in January, February, and sometimes March, as the heavy winter snows (beginning in November) drop a substantial snowpack on the region (between 2 and 3 feet in depth). Extratropical storms from the Pacific Ocean can move up the Columbia River and into the Upper Columbia Plateau dropping heavy rains on the frozen surface and on the snowpack, leading to rain-on-snow events that quickly translate into flooding events throughout the region. There have been approximately 15 disastrous flood events of note within the region over the 49 year period, with on average, one major event every 3 years.

During the 49 year period, the average annual losses from flooding within the Kootenai County and Benewah County, has equaled approximately $649,000 per year, for a total loss of $31.8 million during the 49 year period (all expressed in adjusted 2008 dollars, Table 21).

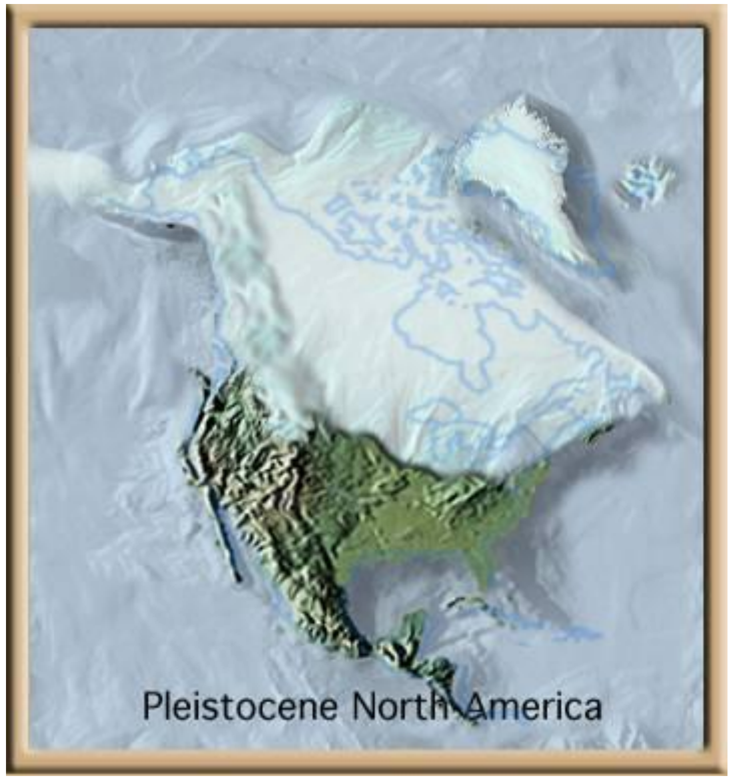
Figure XXVIII. Flooding Frequency between 1960 and 2009, where the Coeur d'Alene Reservation is Located.



4.2. Global Climate Change

During the initial scoping of the Coeur d'Alene Reservation Phase I Hazard Profile by the Planning Committee, discussions included the topic of global climate change and the resulting effects of weather patterns, flood, drought, and other weather changes to the cycle of life on the Coeur d'Alene Reservation. In response to these discussions, this planning effort has been cast in the light of potential changes to natural disasters resulting from global climate change. This section begins with a cursory review of historical changes to the climate, and recent impacts from those changes, then transitions into a look of the future potential impacts.

Figure XXIX. Paleogeography based on The Evolution of North America (Scotese 2003) showing the glacial ice cap over North America during the last ice age.



Many of the sub-sections to this chapter begin by sharing native folklore tales to explain the natural disasters observed over the centuries of oral tradition. These legends are not intended to explain what we today understand to be weather pattern changes or seismic stability. These legends demonstrate that the native cultures of the Pacific Northwest have dealt with the negative effects of natural disasters for the extent of human history within this continent. Historical responses to natural disasters are as important to dealing with them today as they were in the past.

Earthquake and flood references are common in Native oral traditions all along the Upper Columbia Plateau. Some of these stories are literal, and clearly refer to recent historical happenings. Other stories, such as those that refer to earthquake effects, are expressed metaphorically.

About 10,000 to 12,000 years ago, vast continental glaciers were in retreat (Figure XXIX), leaving behind rounded valleys and marshy meadows. There were no dense forests or expansive meadows during the glaciation – all surface vegetation was scraped off by the advancing glaciers moving southward. At the southern edges of the glaciers, and throughout the glacial retreat, elk, bison, wolves and mammoths roamed the newly exposed land, and humans roamed with them (Schirber 2007, NPS 2009). Most speculations about the glacial retreat beginning about 12,000 years ago designate this period as the time when humans began to permanently populate this region.

Coeur d'Alene Lake was once a segment of a pre-glacial river flowing through this region. The ice sheet (Figure XXIX), covered the valleys to the east, and the glaciers overtopped these passageways. During the glacial retreat, melt waters flooded across the outlet of the valley's path located at the northwestern terminus of the current-day Coeur d'Alene Lake. Rock, sand,

and gravel transported by the glacial ice were deposited at the constriction of the river valley and caused floodwaters to form. Some estimates of the depth of the floodwaters within the glacial lake, put the depth of the flood waters to the edges of the current day Plummer, Worley, and DeSmet, now located over 550 feet above the level of the lake. Large geologic debris such as massive boulders, in combination with the finer glacial outwash and glacial ice debris, led to the formation of a glacial lake outburst flood (called Jökulhlaup) when the lake contained by the glacier burst through the ice-sheet dam at the terminus.

The result of that glacial lake formation and its collapse, or Jökulhlaup, created the conditions necessary for Coeur d'Alene Lake to be formed (Figure XXX).

Figure XXX. Present day Coeur d'Alene Lake where glaciers once held back a massive lake that failed in a Jökulhlaup, and then reformed to the lake seen today.

The Columbian mammoth (*Mammuthus columbi*) lived in this region of North America. Mammoths are thought to have first appeared almost four million years ago and became extinct about 10,000 years ago, at the same time as most other Pleistocene megafauna. Though their habitat spanned a large territory, mammoths were most common in ice-age forests within and around the Coeur d'Alene Reservation (Schriber 2007). During the Pleistocene Epoch, 1.6 million to 10,000 years ago, much of North America was covered by great sheets of ice (Scotese 2003) (Figure XXIX).

Partial and complete skeletons of Woolly Mammoths have been recovered from meadowlands around this region to the north from the shores of Lake Pend Oreille through Coeur d'Alene Lake region, and south in the region of Grangeville near Tolo Lake.

The Marmes Rockshelter is an archaeological site first excavated in 1962, near the confluence of the Snake and Palouse Rivers, in present-day Franklin County, southeastern Washington. Findings at this site are remarkable because of the high level of preservation of organic materials, the depth of stratified deposits, and the apparent age of the associated Indian human remains (Hicks 2004). At that time, the site held the oldest found human remains in North America.

Findings at the Marmes Rockshelter revealed evidence of human occupation from a period dating back to approximately 8,000 years ago. Evidence has supported the understanding that the area was home to humans as long as 11,250 years ago (Hicks 2004). The people living at the site hunted game such as elk and deer using atlatls, and also hunted smaller mammals such as beavers, while they gathered mussels from the river (Fiedel 1992). The excavation turned up graves, which included beads carved from shells, sewing needles, and spear points (Peltier 1975). The excavation also turned up chalcedony and chert arrowheads. Those in the upper layers were made of agate, which is not found in the area (Kirk 1970). Stone tools were found as well, such as scrapers for use in tanning hides, and mortars and pestles (Hicks 2004).

In layers dated to 7,000 years ago, large amounts of shells belonging to a snail of the genus *Olivella* were found, which would have been imported from the Pacific Ocean Coast, 250 miles to the west. The majority of the shells had holes drilled through them, indicating that they had adorned necklaces (Kirk 1970).

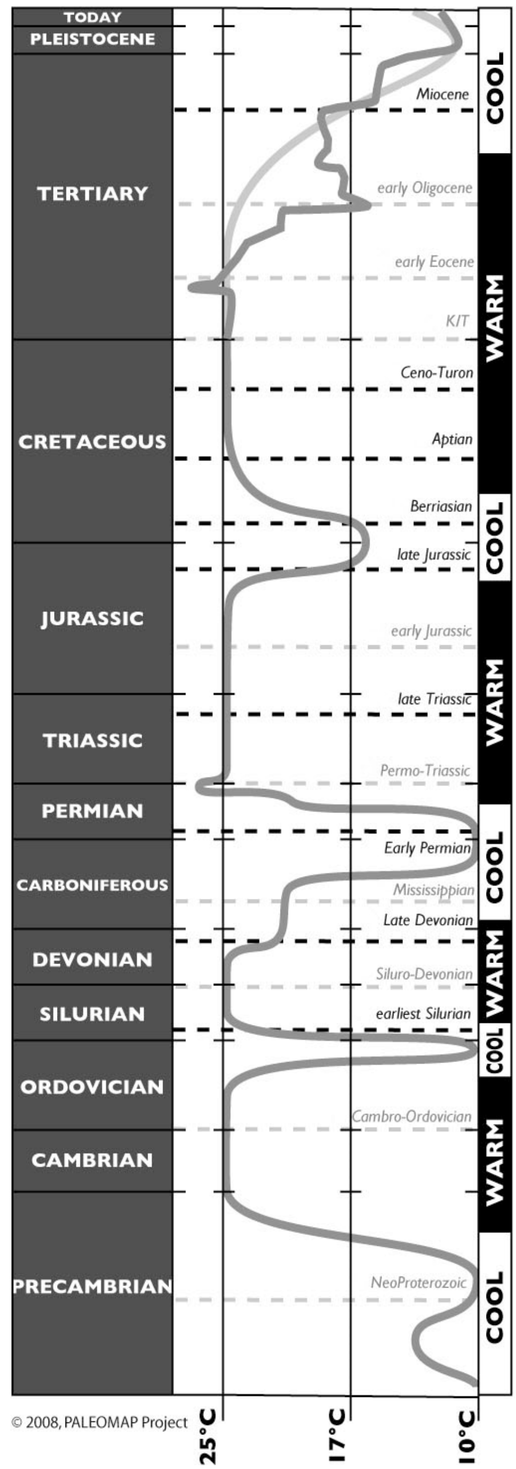
By about 3,000 years ago, as the aboriginal human population increased within the North American Continent, early inhabitants shifted their habitation focus to lowland rivers and lakes. Fishing, gathering, and hunting land mammals formed the foundation of a rich and complex culture (NPS 2009).

Human occupation of this area seems to follow environmental changes of the last 15,000 years. Glaciers covered most of what is now Northern Idaho, Eastern Washington, and Western Montana. They receded and left behind rivers and valleys that people likely followed in pursuit of ice-age mammals such as the mammoth and the giant bison.

The first people arrived in this region sometime before 11,000 years ago. Archeologists have found physical evidence of their presence such as distinctive stone tools, projectile points, and others similar to those located at the Marmes Rockshelter.

As the climate became warmer and drier, the animals, vegetation and human lifestyles also changed. Large ice-age (megafauna) animals that were adapted to cold and wet conditions became extinct. People, who could no longer

Figure XXXI. During the last 2 billion years the Earth's climate has alternated between a frigid "Ice House", like today's world, and a steaming "Hot House", like the world of the dinosaurs (Scotese 2002).



rely on large mammals for food, depended on smaller animals, such as deer, moose, and elk. Plants such as camas, bitterroot, huckleberries, and serviceberries also became important food staples.

Global climate is highly variable, and currently it is in a cycle of warming because we are still leaving the last ice age (Figure XXXI) and because globally, humans are adding greenhouse gases to the atmosphere (Scotese 2002). This cycle of global climate change holds the potential to disproportionately impact agrarian and coastal populations.

Understanding synoptic-scale weather patterns across large landscapes, or mesoscale responses within watersheds, to climate change and sea-level rise is quite underdeveloped (FMI 2008). This is partly because the time scales of concern are short (annual to centennial) and fall between the small scales addressed by most numerical models and the large sales described in the conceptual models of geomorphologists (Figure XXXI). An additional problem is that the type of models often used to bridge this gap are based on the extrapolation of historic behavior and is not precise as the climates change.

<u>Climate Change is not here considered a natural disaster, but instead it is considered a natural part of the global climate cycle of change</u> that took a turn nearly 12,000 years ago when the glaciers began their retreat. This glacial retreat to the north opened up lands held in the lock of glacial ice to make available fertile soils for meadows, forestlands, lakes and valleys. This cycle of change from the last "hot peak" of the Tertiary period to the "cold gorge" of the Pleistoncene period took nearly 50.7 million years to complete (22.0 million years during the Eocene Epoch, 11.0 million years during the Oligocene Epoch, and 17.7 million years of the Miocena Epoch) (Figure XXXI).

Global cooling happened during a 50.7 million-year period of time preceding the current Epoch. The current synoptic-scale (long-term) global climate change development observed is a trend of global warming, started about 12,000 years ago and was signaled by the retreat of the glaciers. *Are anthropogenic carbon emissions increasing the rate of global climate change?* The answers to that question are debated by many scientists around the globe. The speed of changes introduced by climate change and the extremes of that change (hotter and colder, wetter and drier) must be viewed in the long-term synoptic scale looking forward to the coming centuries and millennia, while practitioners are by necessity, focused on the mesoscale profile of the coming months, years, and possibly decades.

In general, the largest impact expected in this short-term (mesoscale) outlook for the Upper Columbia Plateau, is to a trend of global warming that can bring with it warmer temperatures during all months of the year, accompanied by wetter seasons.

Climate change and vegetative responses to those changes are interrelated processes, both of which take place on a global scale (IPCC 2007). Global warming is projected to have significant impacts on conditions affecting vegetative processes (including agriculture), through changes in temperature, atmospheric carbon dioxide content, increased glacial run-off, amplified precipitation, and the interaction of these elements. These conditions determine the vegetative carrying capacity of the biosphere. The overall effect of climate change on vegetative productivity generally, and agriculture specifically, will depend on the balance of these effects.

At the same time, forest growth and agricultural production have been shown to produce significant effects on climate change, primarily through the sequestration of greenhouse gases such as carbon dioxide, methane, and nitrous oxide, but also by altering the Earth's land cover, which can change its ability to absorb or reflect heat and light, thus contributing to radiative forcing. Land-use change such as deforestation and desertification, together with use of fossil fuels, are the major anthropogenic sources of carbon dioxide; agriculture itself is the major contributor to increasing methane and nitrous oxide concentrations in earth's atmosphere (Lobell *et al.* 2008).

Climate change could alter patterns of disease and insect populations within forested environments within the Upper Columbia Plateau, and worldwide, by 1) direct effects on the development, survival, reproduction, dispersal, and distribution and hosts and pathogens, 2) physiological changes in tree defenses, and 3) indirect effects from changes in the abundance of mutualists and competitors (Klopfenstein *et al.* 2009).

The Schitsu'umsh peoples recognized the force of the natural environment on their lives from the times immemorial. One of the tales related to this recognition of natural forces has been conveyed in written form by Teit *et al.* (1917):

> "A LONG time ago conditions on the earth were different from what they are now, and people had a hard time to live. There was much wind and heat, and little rain or snow. It was very dry. Some say thunder was frequent, and lightning killed many people. Many monsters lived on earth and killed people. Gradually these conditions were changed by coyote and others, who made many transformations beneficial to the people. Coyote also introduced the salmon, made fishing places and taught many arts. Giants and dwarfs of several kinds inhabited some parts of the country, particularly mountains and forests. Coyote did not transform all of them, and some are said to exist at the present day. In the same way some "mysteries" - both land and water beings - continue to exist. Even many beings that Coyote transformed had not all their evil powers taken from them, and they sometimes harm people at the present day."

Figure XXXII. Youth Art Contest, 13 and Older, Third Place Winner: Dylan Vincent.

4.3. Weather Features of the Upper Columbia Plateau

The Coeur d'Alene Reservation lies on the eastern edge of the broad Columbia Basin area of Idaho and Washington, bounded by the Cascade Range on the west and the Rocky Mountains on the east. The elevations in this region vary from less than 400 feet above sea level near Pasco, Washington, to over 7,000 feet in the mountain areas to the east. The Coeur d'Alene Reservation is located in the transition area where the long gradual slope of the plateau of the

Columbia Basin meets the sharp rise leading to the Rocky Mountain Ranges (Livingston 2010). Much of the current-day Coeur d'Alene Reservation rests along the southern shores of Coeur d'Alene Lake at elevations between 2,111 feet and 5,458 feet above sea level.

In general, Coeur d'Alene Reservation's weather has the characteristics of a mild, arid climate during the summer months and a cold, coastal type in the winter (Livingston 2010). The weather east of the Cascades is generally characterized by cold winters and hot summers combined with lower precipitation amounts compared to areas west of the mountains. The prevailing winds over the region are from the west and southwest. The spring and autumn have more consistent and stronger winds while summer and winter have generally lighter and more intermittent winds.

The Cascade Mountains provide a permeable barrier to the moderating influence of the Pacific Ocean and explain more extreme temperatures of Eastern Washington and Northern Idaho in comparison with the west side of the Cascades. With winds generally from the west, the Columbia Basin is downwind of the Cascade volcanoes and in the very rare circumstances of an eruption which can cause a significant ash fall (Mass 2008). The region experienced this event during the May 18, 1980 eruption of Mount St. Helens.

The climate of the Coeur d'Alene Reservation combines some of the characteristics of damp coastal type weather and arid interior conditions. Most of the air masses that reach the area are brought in by the prevailing westerly and southwesterly circulations. Frequently, much of the moisture in the storms that move eastward and southeastward from the Gulf of Alaska and the eastern Pacific Ocean is precipitated out as the storms are lifted across the Coast and Cascade Ranges. The precipitation and total cloudiness in North Idaho are greater than that of the desert areas of south-central Washington. The lifting action of the air masses as they move up the east slope of the Columbia Basin frequently produces the cooling and condensation necessary for formation of clouds and precipitation. Infrequently during the winter months, the area comes under the influence of dry continental air masses from the north or east. On occasions when these air masses penetrate into the region the result is high temperatures and very low humidity in the summer and sub-zero temperatures in the winter. In the winter most of the severe arctic outbursts of cold air move southward on the east side of the Continental Divide and do not affect this area (Livingston 2010).

A major factor contributing to the weather patterns of the Columbia Basin is its terrain. Winter weather includes many cloudy or foggy days and below freezing temperatures with occasional snowfall of several inches, to a couple of feet, in depth. Sub-zero temperatures and traffic-stopping snowfalls occur on average about once or twice a year (Livingston 2010). In the winter, the Rocky Mountains oftentimes block the cold air from the Canadian Arctic. If the cold air is deep enough, some of it pushes over the Rockies. Since only a small portion of the arctic outbreaks push south and west over the mountains and into the region, eastern Montana is generally colder than northern Idaho and eastern Washington during the same time of the year (Livingston 2010).

The general lack of precipitation, especially in summer, is explained by presence of the Cascades that form a barrier to the west to eastward moving warm, moist air of the Pacific Ocean. After crossing the Cascade crest, air descends over the eastern slopes of the Cascades into the Columbia Basin producing a sharp decline in clouds. Annual precipitation in the deep basin is generally less than 10 inches a year.

Thunderstorms in this region are intermittent and rarely produce severe localized flooding and debris flows (slope failures). Thunderstorms occur from time to time in the landforms surrounding and within the Coeur d'Alene Reservation. Rarely, slow-moving thunderstorms, forced by terrain features, allow large amounts of water to accumulate in one area. Narrow valleys or watersheds where rain can be concentrated, are also contributors to flash-flooding events (Mass 2008).

4.3.1. Tribal Legends

Within the previous section of this Tribal Hazards Mitigation Plan (Section 4.2, Global Climate Change) discussion was given to the importance of Legends of the *Schitsu'umsh* people. Many of the legends of the *Schitsu'umsh* were focused on the events of the weather and strived to explain the origins and the source of current patterns.

4.3.1.1. The Blowing Wind

One such legend was briefly recounted in a Council Fires article in May 2010 by Raymond Brinkman, of the Coeur d'Alene Language Center.

~ ne' ułchiit'i'ch ~

By Raymond Brinkman

Weather or Not?

If you've lived here any length of time at all would you be surprised to learn that there are a number of terms in the Coeur d'Alene language about the weather? Some make their appearance in the calendar, where we use them to designate the winter months of December, January, and February. The term for the last, in fact, describes a time of rapidly changing, volatile weather. sk'wesus refers to that time of the year when it may be snowing one minute, hailing the next, and sunny and warm later on. In Idaho, that's February, as we transition into syihih, 'early Spring.'

There's nothing unusual about how descriptions of the weather occur in Coeur d'Alene sentences. They conform to the regular rules of the grammar and behave just like our students expect: We can say 'itsq'up't ('it's raining'), q'up't khwa aspa ('it rained yesterday'), and pintch 'atsq'up't 'entsi' ('it always rains there').

However, in the story language of Coyote and his misadventures, the sense of time doesn't necessarily conform to what's predictable. Often a story is set in the present, even as we think of these events as occurring long, long ago. (No doubt it's because the lessons are timeless.) For example, we learned from Lawrence Nicodemus's qine' a version of the Coeur d'Alene story in which Coyote stops Wind's destructive ways. He does so by snaring Wind and striking a bargain. Wind will henceforth blow only on occasion, at more predictable times of year, and often for the benefit of humans (e.g., to dry meat, to blow the snow cover off the ground). In return, Coyote releases Wind and teaches humans to build sturdier houses, to dress for the weather, and to honor Wind's nature to be chilly at times, and sometimes forceful.

Maybe Lawrence's grandmother had this time of year in mind when she began the story, pintch 'iini'wt ła 'atsqhelsq'it 'iini'wt... ('The Wind was always blowing, all day long...').

4.3.1.2. The Hot and the Cold Winds

A Schitsu'umsh legend of the winds is retold by Teit *et al.* (1917):

> "Formerly the Earth was vexed with hot and cold winds, caused by the Wind People, who were striving with each other. The Cold-Wind people lived in the far north, and the Hot-Wind people in the south. The Cold-Wind people would press the bag in which they kept the wind in their house, and immediately a cold wind would rush out, and blow over the country. When it reached the Hot-Wind people, they became cold, and at once pressed their wind-bag, and hot wind rushed north. When it reached the Cold-Wind people, they became sick, and they pressed their bag. Thus the conflict continued constantly between the two. Someone made peace between these people, or curtailed their powers. Therefore, cold and warm winds blow as they do now."

4.3.1.3. The Hot-Wind People and the Cold-Wind People

A Schitsu'umsh legend of the seasons is retold by Teit *et al.* (1917):

> "The Chinook-Wind people lived in the south, in the timbered mountains. The Cold-Wind people lived in the north, in the bare, snowy mountains. Between them lived the Indians, who had no power over the winds. The Chinook-Wind people were friendly with the Indians, and travelled among them. The Cold-Wind people never visited them. Therefore, there was very little cold in the Indian country. The Chinook-Wind's son went north, and married a daughter of the Cold-Wind people, and introduced cold by bringing her back to his home. The annual visits of her people to see her brought on the winter seasons. Before that, the Cold-Wind chief never came out of his house. He always remained in their own country. Their houses were made of ice. Only when they walked about outside did it become cold. When they opened the doors of their houses, cold winds blew out, and it became somewhat cold. They never kept their doors open very long. Thus it was long ago, before the Chinook-Wind's son married."

4.3.1.4. Heat and Cold

A Schitsu'umsh legend of the temperature changes of spring is retold by Teit *et al.* (1917):

> "Heat and Cold were two brothers, the former good-looking, and the latter ugly. One day Heat travelled south, and the Cold made up his mind to kill the people. He made the weather so cold that most of the people died. Heat hurried back to save them, and made the weather so hot that he killed his brother, and the frost and ice and snow which he had made disappeared. It was then ordained that cold should not prevail long at a time, and should always be driven away by heat. We see the killing of Cold by his brother every spring."

4.3.1.5. Thunderer

A Schitsu'umsh legend of the thunder and lightning is retold by Teit *et al.* (1917):

> "Thunder used to kill many people by shooting down large arrow-stones. When he wanted rain, he sang. A man went to his house in the high mountains, and tore up his dress, which was made of feathers. After this the thunder was only able to thunder when it was about to rain, and could not kill any more."

Figure XXXIII. Youth Art Contest, 12 and Younger, Third Place Winner: Justine Laumatia.

4.3.2. Characterizing Normal Weather

There is a high degree of weather variability within the landforms of the Coeur d'Alene Reservation. Topographic variations that begin at the low point of Coeur d'Alene Lake are influenced by the rising hillsides that climb to the ridgelines surrounding the Reservation to the south and east. Stream networks that traverse the Coeur d'Alene Reservation are fed by a combination of foothill and mountain ridgeline sources. Precipitation is highly variable and show tendencies of increasing precipitation amounts with increasing elevation. Annual precipitation ranges from a low of only 20" per year near DeSmet and Mowry to a high of 44" at Moses Mountain and 54" at Eagle Peak (PRISM 2010).

Numerical data for this report concerning monthly weather trends within the Coeur d'Alene Reservation were created using the PRISM (Parameter-elevation Regressions on Independent Slopes Model) climate mapping system, developed by Dr. Christopher Daly, PRISM Climate Group director at Oregon State University. PRISM is a unique knowledge-based system that uses point measurements of precipitation, temperature, and other climatic factors to produce continuous, digital-grid estimates of monthly, yearly, and event-based climatic parameters. Continuously updated, this unique analytical tool incorporates point data, digital elevation models, and expert knowledge of complex climatic extremes, including rain shadows, coastal effects, and temperature inversions. PRISM data sets are recognized world-wide as high-quality spatial climate data sets. PRISM is the USDA's official climatological data source (PRISM 2010).

PRISM is an analytical model that uses point data and an underlying grid such as a digital elevation model (DEM) and a 30-year climatological average (e.g. 1971-2010 average) to generate gridded estimates of monthly and annual precipitation and temperature (as well as other climatic parameters). PRISM is well suited to regions with mountainous terrain, because it incorporates a conceptual framework that addresses the spatial scale and pattern of orographic processes. Grids evaluated for this report have been modeled on a monthly basis (PRISM 2010).

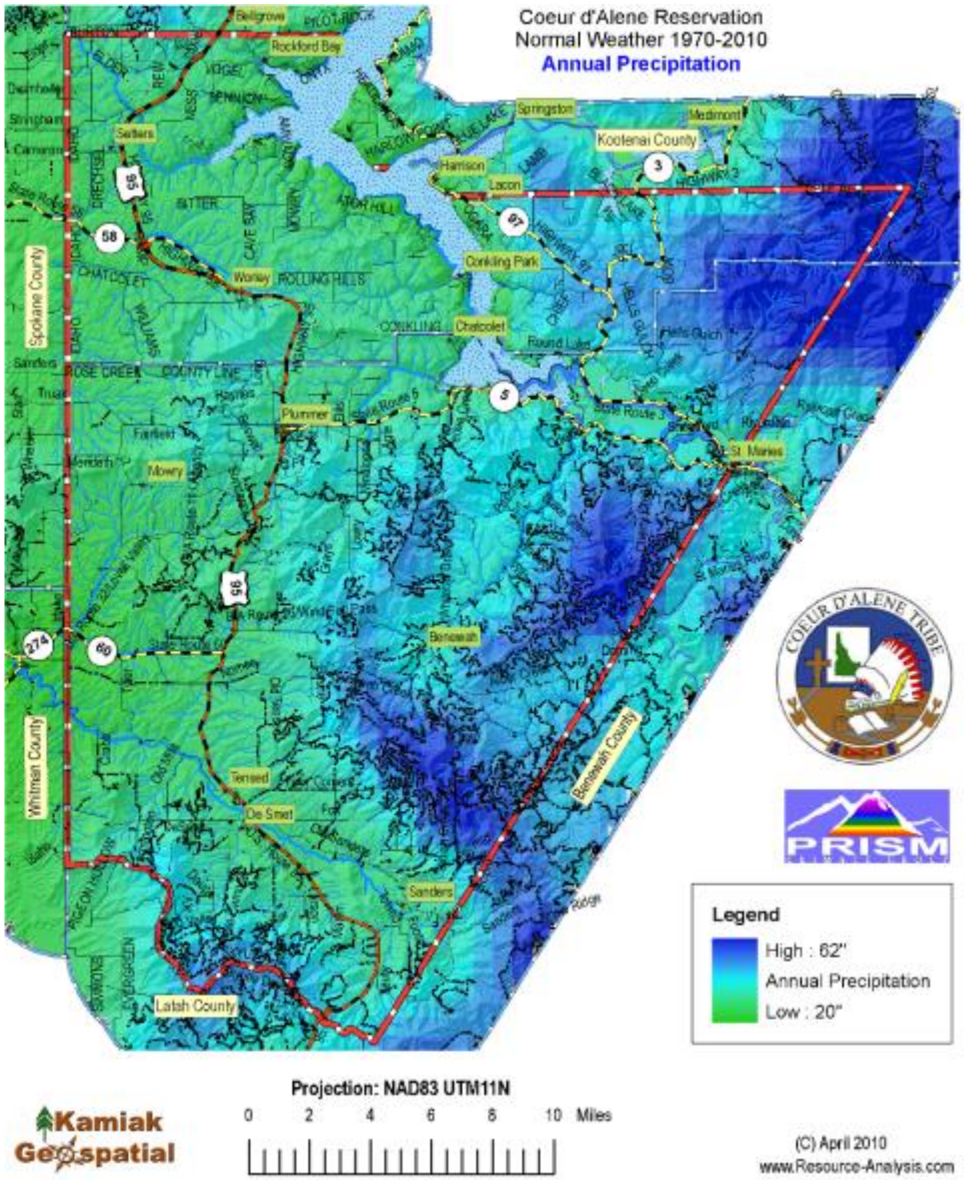
4.3.2.1. Precipitation

Within the Rocky Mountain influence area of the Coeur d'Alene Reservation, winter storms bring moisture from the Pacific Ocean, generally traveling from the southwest to the northeast, and are uplifted by the terrain, creating a precipitation maximum on the windward side (western Cascade Mountain range) and a minimum on the leeward side (eastern Cascade Mountain range) (Mass 2008). Extratropical cyclone storms approach the coastline often drawing their moisture from the equatorial latitudes and the cold air from the Gulf of Alaska. Variations in the approach trajectory from the south to the northwest account for varying amounts of precipitation, wind, and rain versus snow at a given location. Another common vector for storm systems entering the region of the Coeur d'Alene Reservation is from arctic cold fronts anchored in Canada that create moving weather systems from the north to the south and carrying cold temperatures in the winter.

Storms that approach from the north often contain relatively colder air and limited moisture. The rare cases where storms approach from the northeast, east, or southeast are characterized by light precipitation and little temperature change.

The effects of this system of regional weather patterns bring highly variable climate conditions to the Coeur d'Alene Reservation. Precipitation shows monthly variations that are responsive to the topographic variation of the Coeur d'Alene Reservation with the lowest annual precipitation amount (20 inches per year) seen along the eastern extent of the Reservation at Hangman Creek near the communities of DeSmet and Tensed. This pattern yields to the uplift provided by the terrain to witness the highest precipitation amounts along the northeastern corner of the Coeur d'Alene Reservation where totals reach nearly 62 inches per year (Figure XXXIV) (PRISM 2010).

Figure XXXIV. Annual Precipitation Derived from PRISM Datasets from 1971-2009 on the Coeur d'Alene Reservation (PRISM 2010).



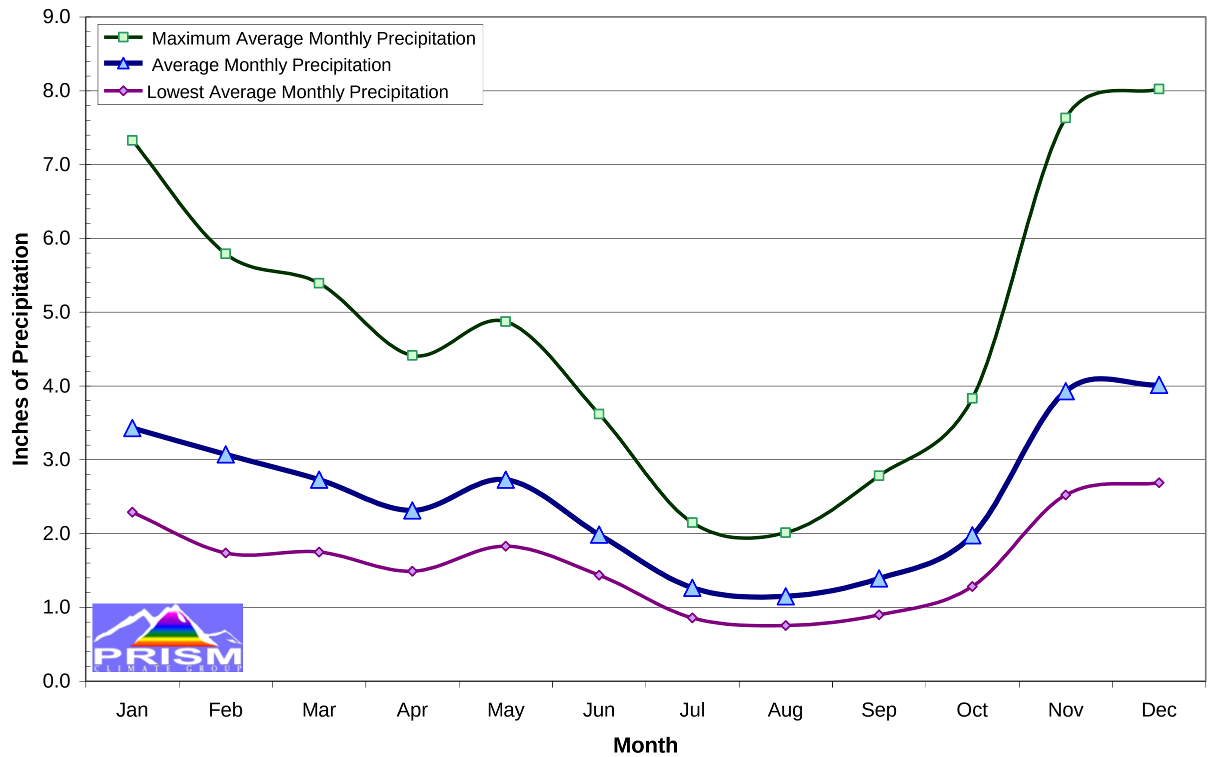
The timing of precipitation events within the Coeur d'Alene Reservation is responsive to the seasons of the year. The months receiving the highest amount of precipitation include November through February when approximately 48% of annual precipitation arrives (Table 22). These reported values represent an average precipitation amount across the entire Coeur d'Alene Reservation, not just selected extreme precipitation locations (where higher or lower amounts can fall with every storm). For this reason, the total precipitation reported here (Table 22) is different than that referenced in Figure XXXIV. The former reference is to minimum and maximum precipitation amounts across the entire Coeur d'Alene Reservation while the latter references average precipitation in specific areas of the Coeur d'Alene Reservation.

Table 22. Average Monthly Precipitation for All of the Coeur d'Alene Reservation (PRISM 2010).

Month	Average Monthly Precipitation (inches)	Percent of Total	Areas of Lowest Precipitation	Areas of Highest Precipitation
Jan	3.4	11%	2.3	7.3
Feb	3.1	10%	1.7	5.8
Mar	2.7	9%	1.7	5.4
Apr	2.3	8%	1.5	4.4
May	2.7	9%	1.8	4.9
Jun	2.0	7%	1.4	3.6
Jul	1.3	4%	0.9	2.1
Aug	1.1	4%	0.8	2.0
Sep	1.4	5%	0.9	2.8
Oct	2.0	7%	1.3	3.8
Nov	3.9	13%	2.5	7.6
Dec	4.0	13%	2.7	8.0
Total	**30.0**		**19.5**	**57.8**

The deviation of precipitation within the Coeur d'Alene Reservation between the areas receiving the highest precipitation and the lowest precipitation is striking. The heavy December showers can deposit almost 8.0 inches of rainfall along the ridgelines of the eastern side of the Reservation while at the same time the western zones from DeSmet to Setters may only receive 2.7 inches from the same storms in December (Figure XXXV).

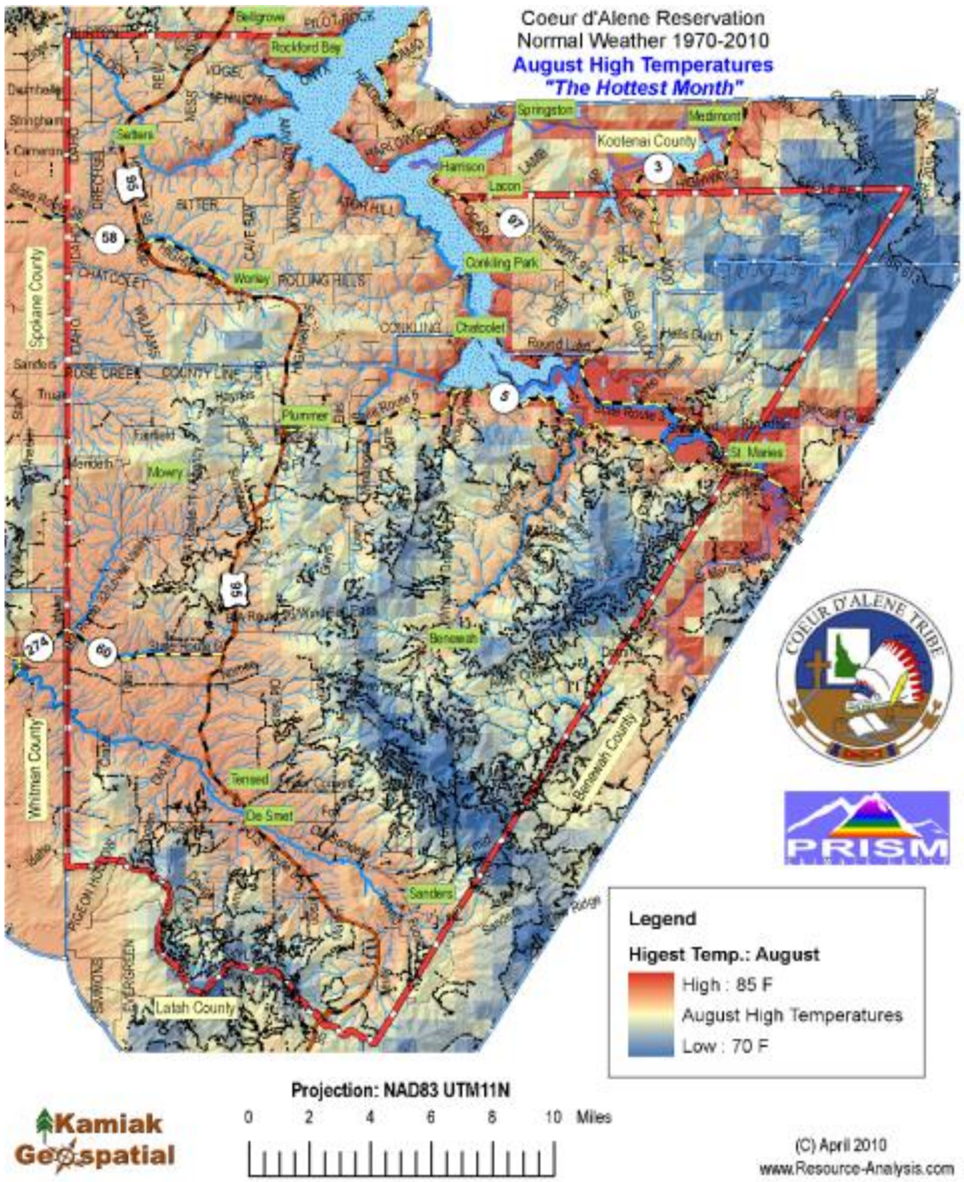
Figure XXXV. Monthly precipitation showing the average normal precipitation on the Coeur d'Alene Reservation, as well as the maximum are minimum precipitation (PRISM 2010).



4.3.2.2. Temperature

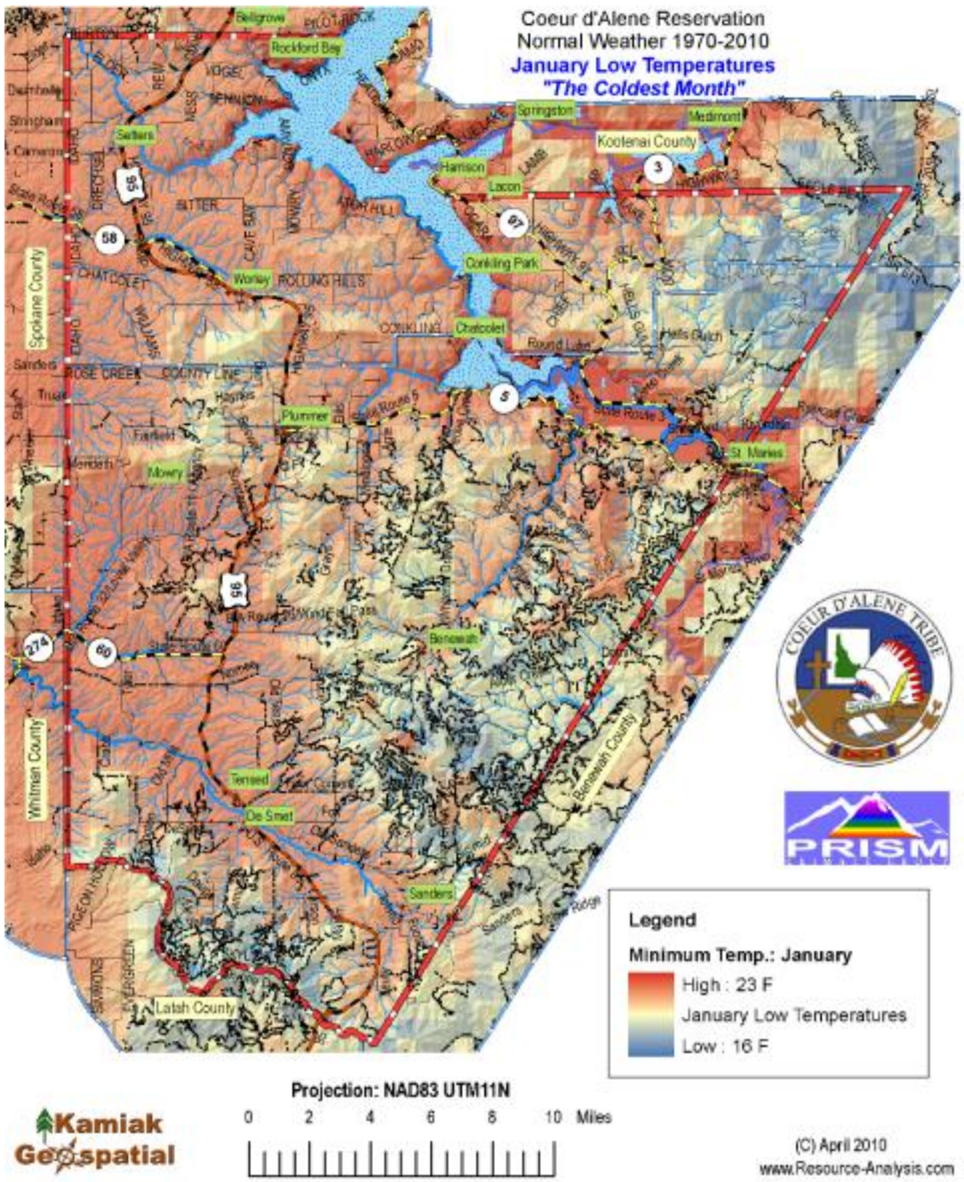
Temperature deviation within the Coeur d'Alene Reservation is equally variable in response to topographic lift and seasonal weather patterns. The average monthly hottest temperatures on the Coeur d'Alene Reservation are observed in July and August when the thermometer can climb to an average temperature of 81º F in St. Maries, Harrison, and other points along Coeur d'Alene Lake. Conversely the average monthly high in July and August is only 72º F along the ridgelines of the Reservation (Figure XXXVI). That is not to say that the temperature on the Coeur d'Alene Reservation does not exceed these values – they do, these numbers are averages. The determination of the highest average temperature is completed by recording the high temperature recorded each day of the month for a 30 year period and creating an average monthly temperature based on those values.

Figure XXXVI. August Average High Temperatures on the Coeur d'Alene Reservation (PRISM 2010).



In contrast, the coolest month of the year on the Coeur d'Alene Reservation is generally seen in January when the average monthly low temperature reaches only 16º F along the upper ridgeline elevations of the northeastern corner and along the ridgelines of the eastern side of the Reservation. At the same time, average monthly low temperatures in St. Maries, Harrison, Rockford Bay and other points along Coeur d'Alene Lake will moderate to only 23º F (Figure XXXVII). The western side of the Reservation, on average, witnesses low temperatures in the neighborhood of 20º F during this coldest month of January. The outcome of these monthly low averages is determined much like the average high temperatures. In this case, the lowest daily temperatures are recorded each day of the month and then averaged for the entire month to determine the average low temperature across the Coeur d'Alene Reservation (PRISM 2010).

Figure XXXVII. January Average Low Temperatures on the Coeur d'Alene Reservation (PRISM 2010).



Monthly extremes of temperature show how the variation from the highest average monthly temperature in a selected month (e.g., August) may differ from the lowest average monthly temperature from the same month on the Coeur d'Alene Reservation by as much as 41º F (Table 23). At the other extreme, lowest average temperatures in January, the difference between the highest of the low daily temperatures and the lowest is nearly 19 º F (Table 23).

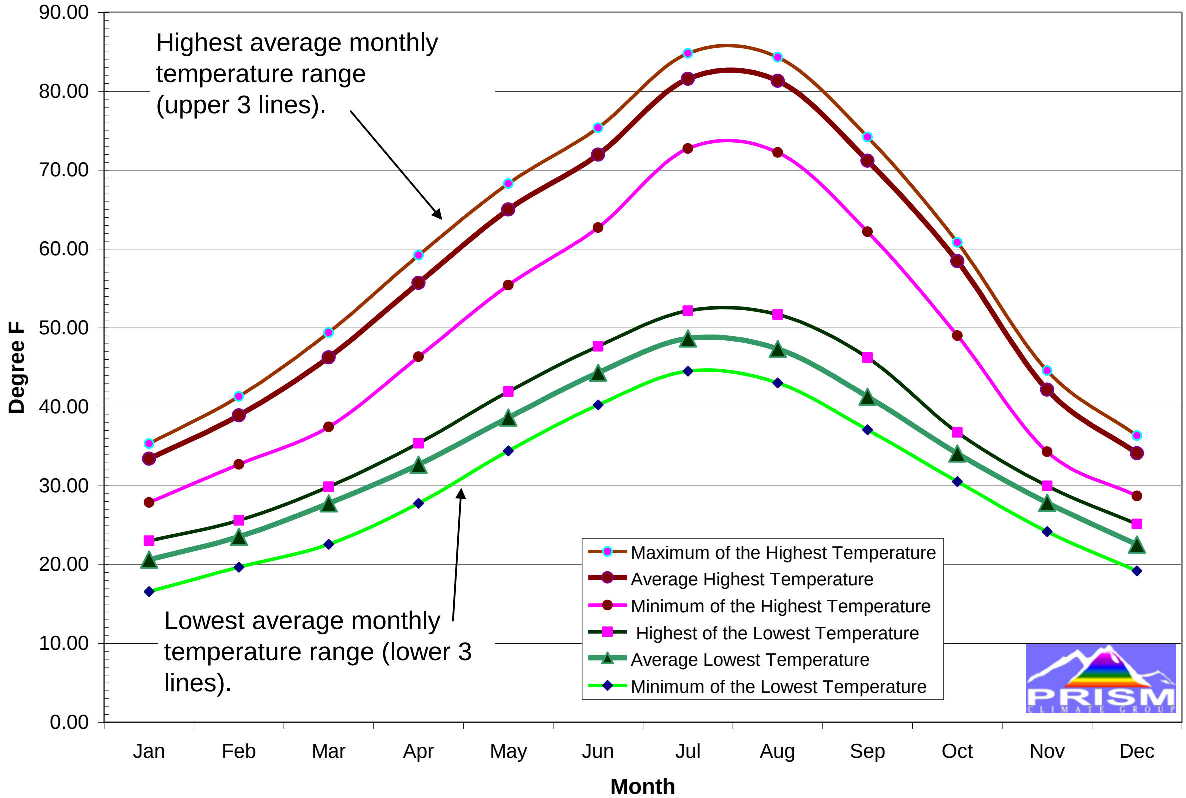
Table 23. Variations in Monthly Temperature Extremes within the Coeur d'Alene Reservation (PRISM 2010).

	Lowest Monthly Temperature Extremes (º F)			Highest Monthly Temperature Extremes (º F)		
Month	Minimum Lowest Monthly Temperature	Average Lowest Monthly Temperature	Maximum Lowest Monthly Temperature	Minimum Highest Monthly Temperature	Average Highest Monthly Temperature	Highest Maximum Monthly Temperature
Jan	16.6	20.6	23.0	27.9	33.4	35.3
Feb	19.7	23.5	25.6	32.7	38.9	41.3
Mar	22.6	27.8	29.9	37.4	46.3	49.4
Apr	27.8	32.7	35.4	46.3	55.7	59.2
May	34.4	38.6	41.9	55.4	65.0	68.3
Jun	40.2	44.3	47.7	62.7	72.0	75.4
Jul	44.5	48.7	52.2	72.8	81.6	84.8
Aug	43.0	47.3	51.7	72.2	81.3	84.3
Sep	37.1	41.3	46.2	62.2	71.2	74.2
Oct	30.5	34.1	36.8	49.0	58.5	60.8
Nov	24.2	27.8	30.0	34.3	42.2	44.6
Dec	19.2	22.5	25.1	28.7	34.1	36.3

While precipitation variations across the Coeur d'Alene Reservation were presented to show the differences in monthly rainfall amounts, the same can be presented for temperature variations (Figure XXXVIII). The high temperatures seen on the Coeur d'Alene Reservation (4.3.2.2) exhibit the greatest variation between coolest and warmest locations during the period March through September (Figure XXXVIII), when the difference between the highest "high temperature" and the lowest "high temperature" is over 12º F. Cool temperature extremes throughout the year generally show a variation between 6º F and 7º F, although September historically has shown variations as much as 9º F between the highest of the "low temperatures" and the lowest of the "low temperatures" (Table 23).

These characteristics define the local temperate and precipitation ecotype known to this region that combines moderated temperatures (few extreme lows and few extreme highs) with infrequent and moderate amounts of rainfall delivered most months of the year.

Figure XXXVIII. Monthly temperatures showing the average temperature variations between the warmest and the coolest temperatures on the Coeur d'Alene Reservation (PRISM 2010).



Clouds and precipitation are greatly enhanced when air is forced to ascend the windward slopes of mountain barriers. Most major Northwest flooding events start with an extensive region of light-to-moderate precipitation linked to a strong Pacific low-pressure system and its associated fronts. This precipitation is then greatly increased, sometimes by factors of two-to-five times, as air ascends the mountains (Mass 2008). When moisture-laden storms move up the Columbia River and are not forced over the Cascade Mountains, where precipitation often is dropped in the process, it results in a storm system composed of rain clouds that will rotate northward to the region of the Coeur d'Alene Reservation. As the front moves eastward, the topographic uplift causes the dropping of often significant amounts of precipitation from the foothills of the eastern side of the Coeur d'Alene Reservation to the ridgeline of the Rocky Mountains. Frequently, these storms in the spring and fall are delivered in combination with high winds, thunder, and lightning.

4.3.3. Characterizing Extreme Weather

The Upper Columbia Plateau is essentially a large topographic bowl surrounded to the west by the Cascade Mountains, to the north by the Okanogan highlands, and to the east by the Rocky Mountains. The Blue Mountains of southeast Washington provide yet another rim to the buffer of the region. Even the exposure to the south in Oregon is met with higher elevations of the Oregon plateau and differential pressure systems. The low topographic relief provided by the Columbia River gorge only yields 750 feet at Lewiston, Idaho, on the Nez Perce Reservation. The exit to the Pacific Ocean by the Columbia River provides only a narrow drainage of atmospheric pressure.

4.3.3.1. Heavy Snowfall

During the winter, cold air is often trapped within this large basin for prolonged periods of time. Conditions leading to an inversion are common in this region during the winter with warmer air trapped above a layer of cold air at the surface.

Weather hazards in this area include the snowfall and subzero temperatures mentioned above. Winter storm winds in excess of 40 mph sustained with gusts over 50 mph occur about once or twice per year with more powerful storms less frequent. Normal rain and snow amounts are considered beneficial for the most part, although excessive heavy rain resulting in localized and more widespread flooding is possible (Livingston 2010).

Prolonged heavy snow can cause interruptions to commerce and over a season can result in a heavy snow pack and the possibility of spring snow melt flooding. Heavy rain-on-snow, coupled with antecedent sub freezing temperatures and a rapid warm up can result in serious stream, river and lake flooding. February 1996 and January 1997 precipitation and warming temperature events hit this area hard and the records show the re-occurrence of this phenomenon has been about once every 15 to 20 years and is expected to continue this frequency into the near future (Livingston 2010).

4.3.3.2. Cold Air Damming

When a Pacific weather system moves across the region in winter, the type of precipitation delivered to the Coeur d'Alene Reservation is determined by the temperature and depth of cold, low-level air in the basin and warmer temperatures above (Garratt 1992). Snow is observed when temperatures below and above are relatively homogeneous and cold. However, in case a layer of above-freezing air is located aloft, rain will fall into a subfreezing layer near the surface resulting in freezing rain or ice pellets (sleet). The temperature and type of precipitation differential occurring in the western and eastern sides of the Columbia Basin can be explained by the phenomenon called cold air damming (Miller 2007). It usually occurs when there is cold Arctic air and high pressure to the north with the cold air moving southward into the Columbia Basin through valleys in the Okanogan Highlands. This results in accumulation of the coldest, densest air on the western side of the basin producing high pressure on the eastern side of the mountain barrier (Mass 2008).

The topography of the Columbia Basin is ideally suited to cold air-damming events in the winter. The dome of cold air that is banked up against the eastern slopes of the Cascades is a critical factor in the weather for this area. Snow levels west of the Cascade crest will often rise to 5,000 feet or more, while on the east side of the Cascade crest, snowfall continues at the surface due to the process of cold air damming. Freezing rain events can be explained through this process as well, as the warmer air aloft from western Washington rides over the cold air dome trapped along the surface (Miller 2007).

4.3.3.3. Severe Thunderstorms

The region of the Coeur d'Alene Reservation has a long history of periodic, but infrequent, severe weather events impacting the economy and lives of the region. These events often come as storms that bring high winds, heavy rains, and are even combined with hail, snow, or freezing rain. Sometimes, the hardest hitting and largest impact storms are short bursts of a leading front moving from the Gulf of Alaska through the Cascade Mountains, into the Columbia Basin, and then into the region of the Coeur d'Alene Reservation where the Rocky Mountain foothills begin to lift the front causing precipitation to fall and the winds to swirl (Mass 2008).

Severe thunderstorms are infrequent with the greatest hazard considered to be wildfire during the dry summer months. Heavy rain from thunderstorms can cause localized flooding and difficult driving conditions, while true "gully washing" flash flooding from thunderstorm rain alone is very rare. Small soft hail is a frequent occurrence in the spring and early summer, but is not usually considered a hazard. Larger, more damaging hail can affect the area, but on an infrequent basis. Damaging tornadoes are also very rare. Red-flag fire conditions occur annually when low humidity and high wind combine leading to dry conditions in the forests of the region. If preceded by a significant number of starts from lightning, the situation can be very hazardous and very difficult to contain (Livingston 2010).

It is expected that these extreme events will continue at this historic frequency into the future, with events recorded as frequently as semi-annually to once every 3 years.

4.3.3.4. Rain-on-Snow Events

Many years have witnessed rain-on-snow events that occur when warm air fronts bring the storms causing flash snow melt, accompanied by rains that can cause landslides and flooding. Although hurricanes are not seen in this region, “funnel clouds” have been reported and tornadoes have been witnessed, with measurable impacts to structures and the economy (2005). Sheered-off trees, broken power poles, torn-off roofs, flying debris (some the size of a car), and other severe weather-associated hazards can occur during these rare events (1995 and 2005 were example years). These are not comprehensive, of course, but they do serve to document the impacts individual storms can have on the residents of the Coeur d’Alene Reservation.

One example of a significant snow and freezing rain event is illustrative of impacts on this region during a November 18-19, 1996 event. Cold arctic air from Alberta and British Columbia was drawn to the south and west at low levels while a potent Pacific storm system brought warm moist air in from the west. Freezing rain collected on trees and power lines eventually becoming heavy enough to break tree limbs with the ice up to 1.5 inches thick. Tree limbs fell on power lines, causing approximately a hundred thousand Spokane County residents (in Washington) to be without electricity; some stayed without power up to nine weeks. Ten deaths and twenty-two million dollars of damage were attributed to the ice storm. A state of emergency was declared in Spokane County with President Clinton naming the region a federal disaster area (Mass 2008). Similar impacts were seen across the region.

In early February, 2009, a storm front moved into the Upper Columbia Plateau, bringing cold temperatures and approximately 24 inches of snowfall within a 72 hour period to the Coeur d’Alene Reservation. Following the deposit of the snowpack, temperatures changed as a warm front moved into the region and dropped rain on the snowpack. The result was a very high snow load on the roofs of many structures, in addition to region-wide flooding. While homeowners and emergency crews were able to shovel snow from the roofs of many buildings, some structures were damaged, while others completely collapsed under the weight of the wet snow on the roof (Figure XXXIX).

It is expected that these extreme events will continue at this historic frequency into the future, with events recorded as frequently as semi-annually to once every 2 years.

Figure XXXIX. Structural collapse under snow load along US 95, south of DeSmet and north of Sanders in February 2009.

4.3.3.5. Ice Storms

A storm producing significant thickness of freezing rain is often referred as an "ice storm". Freezing rain is notorious for causing travel problems on roadways, breaking tree limbs, and downing power lines in its wake. It is also known for being extremely dangerous to aircraft since the ice can effectively 're-mould' the shape of the airfoil (FAA 2010). Usually, freezing rain is associated with the approach of a warm front when cold air, at- or below-freezing temperature, is trapped in the lower levels of the atmosphere as warmth streams in aloft.

Freezing rain often causes major power outages. When the ice layer exceeds 0.2 inches, tree limbs with branches heavily coated in ice can break off under the enormous weight and fall onto power lines (or onto home roofs). Windy conditions, when present, will exacerbate the damage. Power lines coated with ice become extremely heavy as well, causing support poles, insulators, and lines, to break.

The ice that forms on roadways makes vehicle travel dangerous. Unlike snow, wet ice provides almost no traction, and vehicles will slide even on gentle slopes. Because freezing rain does not hit the ground as an ice pellet and is still a rain droplet when it makes contact with the ground, the freezing rain conforms to the shape of the ground surface, or objects such as a tree branches or cars before it freezes. This makes a continuous and thick layer of ice, often called glaze. Since sleet is in pellet form, it can be easily moved around, unlike freezing rain that is a continuous layer of ice and cannot be pushed by a snow plow.

It is expected that these extreme ice storm events will continue at this historic frequency into the future, with events recorded as frequently as annually to once every 5 years.

4.3.3.6. Tornadoes

Tornadoes in the Inland Northwest are rare compared to some other North American locations. East of the Cascades, tornadoes are seen generally only in April and May, when the atmosphere is most unstable. It takes considerable time for the atmosphere to heat up after being chilled all winter, although the land surface is warmed rapidly by the powerful springtime sun. With cool temperatures aloft and warm temperatures near the surface, temperatures decrease rapidly with height: the necessary condition for tornado events. Tornado activity may continue into the summer because the lower atmosphere gets very warm due to a lack of ocean influence. Summertime tornado activity could be enhanced over eastern side of the Cascades due to the subtropical moisture that streams northward out of the Gulf of California into the northwestern interior region from late June into early September (Mass 2008).

On April 5, 1972, the deadliest and most intense Pacific Northwest tornado on record struck the Portland metropolitan area (Oregon). One of only three high intensity tornadoes ever observed over Oregon, Washington, and Idaho with winds estimated between 158 and 206 miles per hour, this storm touched down along Portland's waterfront and then crossed the Columbia into Vancouver, Washington, leaving a wake of destruction nine miles long and a quarter-mile wide. The 1972 tornado was embedded in an unusually strong line of thunderstorms that crossed the Cascade Mountains and produced another high-intensity tornado later that same day outside of Davenport, near Spokane, Washington (Mass 2008).

4.3.4. Probability of Future Events

Severe weather includes a variety of events, generally grouped together into the moniker of "severe weather". These individual events can combine into larger incidents. Taken individually, they include heavy rain, high winds, heavy snowfall, hail, thunder, lightning, extreme and prolonged cold, extreme and prolonged heat, and drought. When considered as individual events, the frequency of severe weather is expected once every five years and more frequently. The future frequency of events is expected to be at least this common.

When considering the influence of global climate changes on the occurrence and behavior of natural disaster events, severe weather appears to be most vulnerable to changes in periodicity and destructive force. Anecdotal reports in the national media, scientific journals, and observations of events, have described increasing rainfall, warming temperatures even at higher elevations, and increased energy delivered by storms. At the same time, human habitation has expanded its reach into areas previously not suited for permanent homes, businesses, or infrastructure. The combined effect of the spread of human developments with increased storm force can lead to frequent (multiple times each year) destructive force events.

Severe weather is a driving force of energy for other hazards such as wildfire and flooding. These disaster events will be discussed in further detail in subsequent sections of this document.

Predicting future severe weather events presents the same nature of predicting the weather next week, or next month. In general terms, the observer would expect that the future nature of severe weather events within the Coeur d'Alene Reservation would be similar to the histories documented in this planning document that illustrate extreme weather fluctuations, from occasional extreme warmth in the winter, to cold in the summer.

Generalizations about this extreme weather probability cannot be articulated as predictably as some of the other natural hazards, but conceptually it can be articulated as being responsive to the impacts of global climate change (Section 4.2, Global Climate Change). The changes to weather patterns have been observed during the past century. Unfortunately, that period of time limits our ability to make meaningful predictions about the ebb and flow of weather pattern changes. It is expected that severe weather impacts to the Coeur d'Alene Reservation will impact the region with the same pattern of damages, although the location and severity will be variable. It is also expected that new extremes will be witnessed during the next 50 to 100 years for all measurements of severity (e.g., wind speed and duration, rainfall daily extremes, drought intensity, river flow minimums and maximums, new high temperatures and new low temperatures).

4.3.5. Potential Mitigation Measures

Hazard exposure to the mix of high winds, high winds in combination with freezing rain or ice rain on the Coeur d'Alene Reservation, can be managed through the identification and trimming of hazard trees near homes and power lines. Ice on lines can cause power-line and telephone-line breakage leading to a disruption of communications and power for prolonged periods of time. Repairs to the system are often complicated because utility company repairmen must navigate stormy conditions while attempting to restore normal operations. Ice on area roadways can cause accidents and pose a hazard to both motorists and pedestrians.

Heavy snows can immobilize the Coeur d'Alene Reservation, isolate rural farms and homes, and cause the death of exposed animals. Heavy snowfall can clog roadways, immobilize transportation assets, and disrupt emergency and medical services. Roof-top snow accumulation can cause the collapse of buildings and death or injury to its inhabitants

The impact of prolonged winter storms on the local economy can be pronounced. The cost of snow plowing, de-icing, and overtime pay, can severely impact the budgets of the Tribe, Counties, Cities, and State jurisdictions. Disruption of transportation resources can impede the flow of food and supplies, and slow the economy.

Winter storms cause multiple fatalities each year resulting from vehicular accidents on icy or snow-clogged roads. Some people may die of heart attacks due to overexertion while shoveling heavy, wet snow. Each year, fatalities result from fires or carbon monoxide poisoning due to the use of alternative heating methods during storm-caused power outages. In more rare cases, individuals die of hypothermia from prolonged exposure to cold.

High winds take two distinctive forms on the Coeur d'Alene Reservation; as straight-line winds approaching from the southwest, west, or northwest and reaching wind gusts exceeding 50 mph or more, and downburst winds. Straight-line winds have caused trees to snap and fall across homes and utility lines, roofs to be ripped from the structures they cover, and even lead to the total displacement of structures. Downburst winds are no less frequent, but their destructive force is often isolated to localized impact areas, resulting in patches of downed trees, damaged buildings, and spoiled crops.

The forests of the Coeur d'Alene Reservation are extensive; the ponderosa pine, Douglas-fir, grand fir, western white pine, and western redcedar grow in sparse to dense forests. The forests have been replanted following timber harvesting activities and they have re-seeded naturally, to dominate open spaces especially along the shores of Coeur d'Alene Lake and the eastern side of the Reservation. Agricultural lands and less densely populated ponderosa pine forests are commonly found within the western side of the Reservation. The location of trees near homes, businesses, and infrastructure (within the WUI), often need to be treated on a frequent cycle (once every 5 years) to keep buildings and infrastructure safe from wind damage. Roads can be blocked and power lines can break during high-wind events. Emergency crews are dispatched to clear the roads and infrastructure when damages are found.

In light of high-wind warnings that have hit the Coeur d'Alene Reservation, it is recommended to initiate the service of incorporating high-wind warnings to the operation of the Emergency Operations Center (EOC). These services would include those presented in the following sub-sections.

Additional action items related specifically to severe weather include:

- Enter into the StormReady Program and facilitate the placement of a NOAA weather radio tower on the Reservation,
- Inspect both public and private buildings for snow-loading capacity (every 10 years),

- Inspect roofing material stability on public and private buildings to sustain high straight-line winds without displacement,
- Integrate severe weather pre-construction mitigation capabilities (roofing fasteners, snow-load capability, and related items) into Tribal building-code requirements,
- Acquire Radio Station equipment, license its use, and begin using as a public service station for residents and visitors to the Coeur d'Alene Reservation that can be activated during emergency situations,
- Purchase and install back-up generators for evacuation site use during emergencies.

4.3.5.1. High Wind Safety Actions – ahead of the storm

- Verify that homes meet current building code requirements for high-winds. Experts agree that structures built to meet or exceed current building code high-wind provisions have a much better chance of surviving violent windstorms.
- Protect windows by installing commercial shutters or preparing 5/8 inch plywood panels that can be installed or disassembled as needed in the face of severe storms.
- Garage doors are frequently the first feature in a home to fail. Reinforce all garage doors so that they are able to withstand high winds.
- Once a year, assess properties to ensure that landscaping and trees do not become a wind hazard from breakage.
    i. Trim dead wood and weak / overhanging branches from all trees.
    ii. Certain trees and bushes are vulnerable to high winds and any dead tree near a home is a hazard.

4.3.5.2. High Wind Safety Actions – as a severe storm approaches

- Most mobile / manufactured homes are not built to withstand severe straight-line or downburst winds. Residents of homes not meeting that level of safety should relocate to a nearby safer structure once Coeur d'Alene Tribe EOC officials issue a severe-wind evacuation order.
- Once a severe-wind evacuation warning is issued by the National Weather Service, time should be sufficient to install window shutters or plywood panels.
- When a severe-wind evacuation warning is issued, residents should secure or bring inside all lawn furniture and other outside objects that could become a projectile in high winds.
- Residents should listen carefully for safety instructions from Coeur d'Alene Tribe EOC officials, and go to designated "Safe Rooms" or "Evacuation Centers" when directed to do so.
- Residents should monitor NOAA Weather Radio channels for updates.
- Residents are encouraged not to leave the "Safe Room" until directed to do so by local officials, even if it appears that the winds calmed.

4.4. Floods

Flooding and storm water accumulation is most widespread along the edges of rivers and lakes. Flooding can impact any area where water accumulates on the surface and reaches a structure, road surface, or sensitive vegetative area.

4.4.1. Tribal Legends

Deluge legends are generally mythical stories of a great flood sent by a deity or deities to destroy civilization as an act of divine retribution, and are featured in the mythology of many cultures.

4.4.1.1. The Nka'memen Water-Mystery

A legend of the water-mystery is retold by Teit *et al.* (1917):

> "Near the head of the St. Joe River is a lake called Nka'memem (Swallowing). When people looked at it, sticks jump out of the water. Once two brothers came out on the ridge above the lake. They had been hunting, and were very thirsty. The elder brother asked the other to bring him some water. The younger brother refused, saying, "No one goes near this lake!" The elder said, "I shall die if water is not brought to me." The younger then descended, drew some water quickly, and ran uphill as fast as he could. The water of the lake followed him. He put down his bucket alongside his brother, and ran down the other side. He looked back, and saw a wave rise over the top of the ridge where his brother was, and stand up there for a while. When it disappeared, he went back and found his elder brother drowned."

4.4.2. Understanding Water Related Damages

Flooding is a natural process that occurs when water leaves river channels, lakes, ponds, and other water bodies where water is normally confined and expected to stay. It is also a serious and costly natural hazard affecting all of the Upper Columbia Plateau when it occurs around buildings and infrastructure. Floods damage roads, farmlands, and structures, often disrupting lives and businesses. Flood-related disasters occur when property and lives are impacted by the flooding water. An understanding of the role of weather, runoff, landscape, and human developments in the floodplain is therefore the key to understanding and controlling flood-related disasters.

Natural flood events on the Coeur d'Alene Reservation are grouped into five general categories:

1. **Riverine Flooding:** a rise in the volume of a stream until that stream exceeds its normal channel and spills onto adjacent lands.
    a. **Slow kinds:** Runoff from sustained rainfall or rapid snowmelt exceeding the capacity of a river's bank-full width. Causes include heavy rains from monsoons, hurricanes and tropical depressions, warm winds and, more commonly on the Coeur d'Alene Reservation, warm rainfall landing on a deep and frozen snow pack (rain-on-snow events).
    b. **Fast kinds:** Runoff causes a flash flood as a result of an intense and often prolonged thunderstorm or a rain-on-snow event coupled with high rainfall in lower altitudes.
2. **Flash Flooding:** Flash flooding results from high water velocity in a small area but may recede relatively quickly. These floods are generally fed by low-order streams and occur in headwater areas. Streams prone to flash flooding do not possess the expansive floodwater storage area that higher-order streams typically possess. Flood storage areas

are identified by wide and flat valley bottoms where flood waters decrease flow velocity, drop sediment load, and then re-enter the main stream channel. Low-order streams, especially in north Idaho, are typically confined to steep “V” shape valley bottom lands where channel widening does not occur. The only path for water to follow is the main stream channel where volume increases with heavy rain and snowmelt, causing water velocity to increase accordingly. Flash flooding is the combination of high water volume with high water velocity. When a topographic widening of the valley is found, a flash flood is the result. The joining of two or more low-order streams into a floodplain, or a floodplain with high-order streams can accelerate into a riverine flood type, often of the “fast kind”.

3. **Ice/Debris Jam Flooding:** Floating debris or ice accumulates at a natural or man-made obstruction in rivers and restricts the flow of water, causing it to leave the bank-full width of the river and spill onto the floodplain and beyond. This flood type is common along the St. Joe River in response to the steep canyon walls geographically arranged to receive little or no water-melting sunlight as the valley drops elevation on its approach to Coeur d’Alene Lake. In the case of the St. Joe River specifically, the constriction is a natural narrowing of the river channel near Calder (in Shoshone County) and the debris is ice accumulation from the river and its tributaries. This natural ice dam can occur anywhere from the general area of Calder all the way into St. Maries. When this is witnessed, flooding around the ice-dam impacted areas can flood homes, roads, and significant infrastructure.
4. **Mud Floods or Muddy Floods:** These flood types result from super-saturated soils on moderate to steep slopes that are generally destabilized by types of development (road building, structure construction) or other disturbance (landslides, or drastic changes in vegetation cover). The flow of these super-saturated soils can follow the same path as water down ravines, and in the process displace flood zones with heavy concentrations of mud and debris. While these are most common on croplands (such as the Hangman Creek watershed), they can also occur on harvested forestlands (such as the Benewah Valley), and in high-impact housing developments (such as those found along the bluffs surrounding Coeur d’Alene Lake and within the Reservation). Muddy floods are a hillside process and not the same as mudflows, which are a mass-wasting process discussed in the Landslides Section (Section 4.6) of this document. Muddy floods primarily lead to damage of road infrastructure (leaving a mud blanket or clogging sewage networks) and private property.
5. **Catastrophic Flooding:** These floods are caused by a significant and unexpected event such as a dam breakage or levee failure. Sometimes these floods are triggered by other natural or man-caused hazards such as an earthquake, landslide, volcanic eruption, or dam failure.

Flood damages are assessed in three related categories:

1. **Primary Effects:**
    a. Physical damage: These damages include harm to buildings, bridges, cars, sewer systems, roadways, canals, and any other type of structures,
    b. Casualties: Described as the number of people and livestock that die due to drowning, leading to epidemics and diseases.
2. **Secondary Effects:**
    a. Water supplies: Can lead to the contamination of water. Clean drinking water becomes scarce.

b. Diseases: Unhygienic conditions are present. Spread of water-borne diseases occurs.
c. Crops and food supplies: Shortage of food crops can be caused due to loss of an entire harvest.
d. Trees: Tree species not tolerant to prolonged subsurface water saturation can die from suffocation.

3. **Tertiary and Other Long-Term Effects:**
    a. Economic: Economic hardship due to a temporary decline in tourism, rebuilding costs, and food shortage leading to price increase.

The most commonly observed flood type on the Coeur d'Alene Reservation is a Riverine Flood. A "base flood" is the magnitude of a flood having a one-percent chance of being equaled or exceeded in any given year. Although unlikely, "base floods" can occur in any year, even successive ones. This magnitude is also referred to as the "100-year Flood" or "Regulatory Flood" by state government (IBHS 2008).

The low-relief areas adjacent to the channel that normally carries water, are collectively referred to as the floodplain. In practical terms, the floodplain is the area that is inundated by floodwaters. In regulatory terms, the floodplain is the area that is under the control of floodplain regulations and programs (such as FEMA's National Flood Insurance Program, which publishes the Federal Insurance Rate Maps, or FIRM maps). Idaho State Code (IBHS 2008) defines the floodplain as:

> *"That land that has been or may be covered by floodwaters, or is surrounded by floodwater and inaccessible, during the occurrence of the regulatory flood."*

4.4.2.1. Beavers

The beaver is considered a keystone species by many wildlife biologists, endowed with the ability to enhance biodiversity through the creation of beaver ponds and wetlands (Wright *et al.* 2002). These riparian habitats enlarge the perimeter of the un-dammed two-bank profile of a stream allowing aquatic plants to colonize newly available habitat. Insect, invertebrate, fish, mammal, and bird diversity are also expanded by the creation of these beaver dams (Rosell *et al.* 2005). Beavers perform a key role in ecosystem processes, because their foraging has a considerable impact on the course of forest succession, species composition and the structure of plant communities.

The presence of beaver dams in streams creates flood conditions behind the dam structure (Pollock *et al.* 2004). The North American Beaver builds lodges along rivers, streams, lakes, and ponds in order to ensure water around their lodges that is deep enough to prevent the freezing of the site during the cold winter months. Beavers dam streams to create a pond where their lodge can be located. During this process of damming the stream, the beaver dams flood areas of surrounding forest and fields, giving the beaver safe water access to leaves, buds, and inner bark of growing trees for food (Rosell *et al.* 2005). Beaver typically prefer hardwoods but will feed on softwood cambium as well and will also eat cattails, water lilies and other aquatic vegetation, especially in the early spring. Contrary to widespread belief, beaver do not eat fish (Young 2007). In areas where their pond freezes in winter, beavers will collect food supplies (tree branches) in late fall, to store them underwater (usually by sticking the sharp chewed base of the branches into the mud on the pond's bottom), where they can be accessed throughout the winter. Often the stockpile of branches will project above the pond and collect snow. This insulates the water below it and keeps the pond open at that location (Rosell *et al.* 2005).

A British fur trader, David Thompson, during the mid 19th century, described the "sagacity" of the beaver. In his written words, "Beaver dams were so cleverly constructed that no amount of water could damage them, whereas those erected 'by the art of man' – apparently a lesser art – were frequently washed away." Another fur trader from the era, Ross Cox, commented on the "dexterity in cutting down trees, their skill in constructing their houses, and their foresight in collecting and storing provisions". Cox was moved to comment on their social organization of labor: nothing could be more wonderful, he suggested, than the skill and patience shown by parties of twenty or thirty beaver coming together to build their winter lodges. A few of the older animals superintended the felling of trees and processing of logs. According to Cox, "it is no unusual sight to see them beating those who exhibit any symptoms of laziness. Should, however, any fellow be incorrigible… he is driven unanimously by the whole beaver tribe to seek shelter and provisions elsewhere." Such outcasts, the Indians called "lazy beaver", according to Cox. Those beaver were condemned to a winter of hunger, and as a result their fur was not half as valuable as that of those beaver whose "persevering industry" assured them of protection from the elements (Verbert 1997).

On the Coeur d'Alene Reservation, beaver activity has been in a documented decline for many decades. The primary issue of Beaver dams on the Coeur d'Alene Reservation is seen when dams block the normal flow of water moving through road/stream crossing structures causing water to backup to form a pond. This occurrence does not usually lead to a disaster event, but, when beaver dams plug culverts or restrict stream flow under bridges, water cannot flow normally past the road crossing. During high flow events the water will release pressure by cresting over the road and eroding it into the stream.

Further complications of these beaver dams happen when beaver dam waters are found in relatively flat terrain (such as within the Hangman Creek watershed), causing water to overtop roads. Vehicle traffic often "splashes" through these wet crossings causing sediment to be pumped off the road bed and into the streams (Green 2010). This causes potentially detrimental effects to fisheries while degrading the road quality.

Although a single beaver dam may have little influence on stream flow quantity, a series of dams can have a significant results (Grasse 1951) by moderating the peaks and troughs of the annual discharge patterns, including flood water events (Naiman *et al.* 1988). During low flow periods of the year, Duncan (1984), working in an Oregon watershed, determined that up to 30% of the stream network's water was retained in beaver ponds. The general hydrologic pattern of the Coeur d'Alene Reservation, and the Upper Columbia Plateau generally, is peak rainfall and stream flows during the winter and spring months with decreasing flows in the late summer and early fall pending the arrival of fall rains. By increasing storage capacity in the form of beaver ponds, it has been suggested that large numbers of beaver dams can lead to greater stream flows during late summer, this low-flow period (Parker 1986), which may result in continual flows in previously intermittent streams (Yeager and Hill 1954, Rutherford 1955).

Beaver dams, depending on their number and location, may decrease peak river discharge and stream velocity during a flood event, thereby reducing erosion potential associated with the flood event (Parker 1986) and possibly reducing flood impacts downstream (Bergstrom 1985).

Although beaver dams can reduce the severity of flooding events, they may contribute to them if dam failure occurs (Butler 1991). The failure of a beaver dam on a small stream in Alberta produced an estimated flood wave which was 3.5 times the maximum discharge recorded over a 23-year period on that stream (Hillman 1998).

4.4.3. Determining the Floodplain on the Coeur d'Alene Reservation

This Tribal Hazard Mitigation Plan effort has defined the floodplain for the Coeur d'Alene Reservation through the FIRM Map designations listed as finalized in September 2009 and shown on several maps referenced in this document. These FIRM maps were approved by FEMA while cooperating with both Kootenai County and Benewah County. While these efforts have mapped some significant floodplains within the Coeur d'Alene Reservation, the efforts failed to capture many of the populated places important to Tribal members on the Reservation. In general, the FIRM mapping completed by FEMA has captured the floodplains of the incorporated cities on the Reservation, the St. Joe River, Coeur d'Alene Lake, and lands held in Trust by the Federal Government for the Coeur d'Alene Tribe. Several populated places, such as the Hangman Creek watershed, Benewah Valley, and others, have not been analyzed for FIRM by FEMA.

FEMA has not mapped the FIRM on much of the Coeur d'Alene Reservation. In an effort to provide the Coeur d'Alene Tribe with an initial regulatory basis to design floodplain protection strategies within the Coeur d'Alene Reservation, Kamiak Ridge developed an assessment of the floodplains within the exterior boundaries of the Coeur d'Alene Reservation (Figure XL).

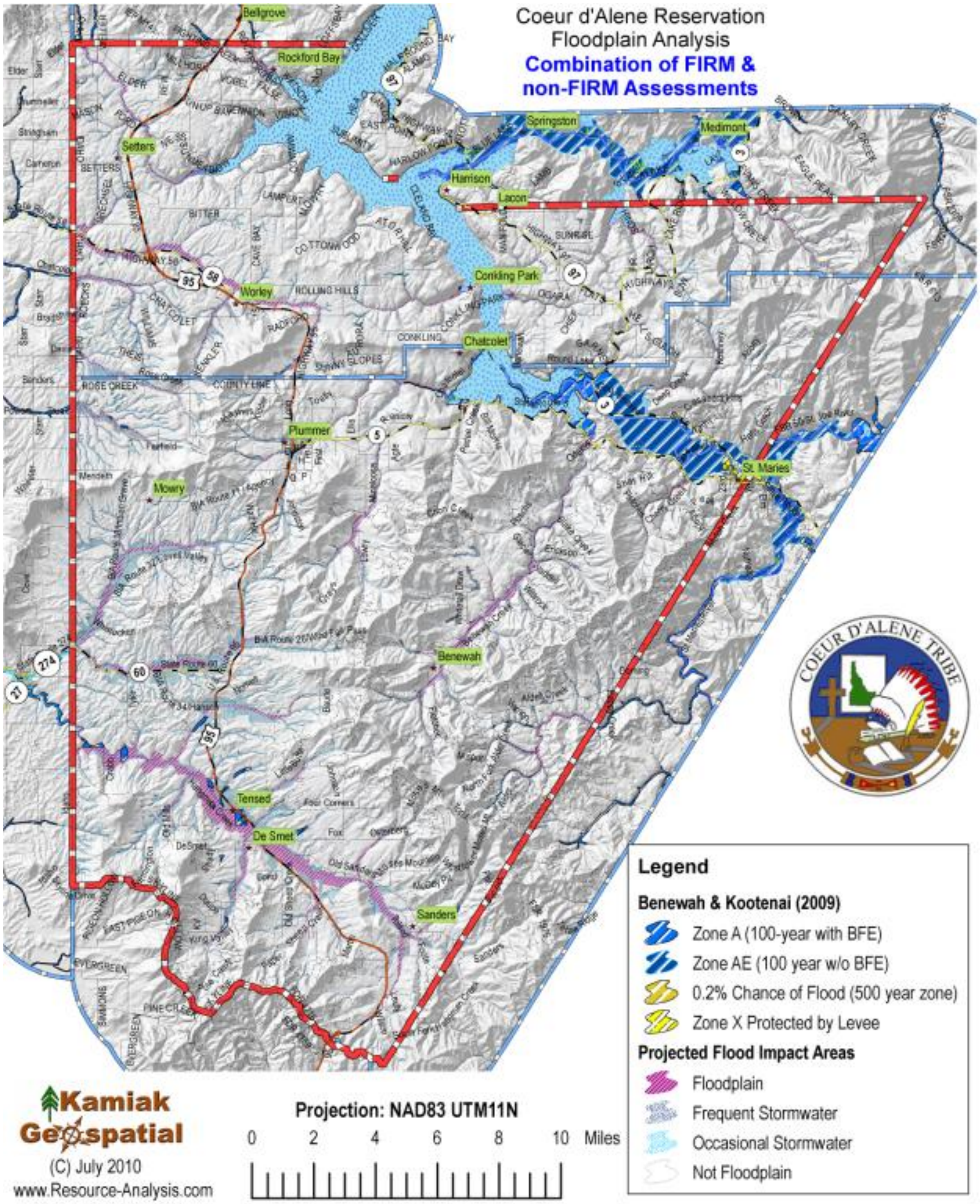
This floodplain assessment utilized soil survey data generated by the Coeur d'Alene Tribal GIS Department, topographic data (1 meter resolution digital elevation models (DEM)), and field sampling of recent historical flood events. These field sampling events involved visits to Hangman Creek watershed, the Benewah Valley, Fighting Creek, Rock Creek, and other locations to record the locations of past floods identified by local residents, and physical evidence, with a portable Global Positioning System (GPS) unit. The year of the flood event and the location were used to create a database to reconcile the flood magnitude with the precipitation and river flow levels when available. These data combined to create an initial assessment of Projected Flood Impact Areas within the Coeur d'Alene Reservation.

These data do not replace FEMA-derived and approved FIRM designations of flood zones. These floodplain estimates do not qualify as floodplain designations for entry into the NFIP. Those decisions must be made by the Coeur d'Alene Tribe leadership in cooperation with FEMA. When, and if, that happens, and if the Coeur d'Alene Tribe enters the NFIP, then FEMA and the Coeur d'Alene Tribe may enter into an agreement to create FEMA-derived FIRM assessments. That process may take years to complete.

The assessment completed for this planning effort is intended to allow the Coeur d'Alene Tribe the tools to begin regulating the development of the critical floodplains on the Coeur d'Alene Reservation in the effort of protecting people, structures, infrastructure, the environment, the economy (especially fisheries), and the traditional way of life.

Maps of predicted flood risks are presented on large-scale and small-scale wall maps and have been used for planning purposes and public display at meetings (Figure XL).

Figure XL. Potential Flood-Impact Areas of the Coeur d'Alene Reservation.



4.4.4. Weather

Winter weather conditions are the main driving force in determining where and when base floods will occur. The type of precipitation that a winter storm produces is dependent on the vertical temperature profile of the atmosphere over a given area. The Upper Columbia Plateau experiences riverine flooding from two distinct types of meteorological events:

- spring runoff and
- winter rain/snowmelt events.

The major source of flood waters in the Upper Columbia Plateau is normal spring snow melt. As spring melt is a "natural" condition, the stream channel is defined by the features established during the average spring high flow (bank-full width). Small flow peaks exceeding this level and the stream's occupation of the floodplain are common events.

Unusually heavy snow packs or unusual spring temperature regimes (e.g., prolonged warmth) may result in the generation of runoff volumes significantly greater than can be conveyed by the confines of the stream and river channels. Such floods are often the ones that lead to widespread damage and disasters. Floods caused by spring snow melt tend to last for a period of several days to several weeks, longer than the floods caused by other meteorological events.

Floods that result from rainfall on frozen ground in the winter, or rainfall associated with a warm, regional frontal system that rapidly melts snow at low and intermediate altitudes (rain-on-snow), can be the most severe. Both of these situations quickly introduce large quantities of water into the stream channel system, easily overloading its capacity.

These situations are also amplified by ice-jam flooding events common to the St. Joe River. This river drainage is especially problematic because it is directionally aligned east to west with steep banks rising over a thousand feet on both sides. The topography eliminates solar radiation to the river bottom during the winter, leading to accumulations of river ice. However, the south facing slopes of the St. Joe River commonly receive enough solar radiation to melt snow accumulations, leading to snowmelt overland flow that eventually mixes with the river ice to cause ice jams.

On small drainages, the most severe floods are usually a result of rainfall on frozen ground but moderate quantities of warm rainfall on a snow pack, especially for one or more days, can also result in rapid runoff and flooding in streams and small rivers. Although meteorological conditions favorable for short-duration warm rainfall are common, conditions for long-duration warm rainfall are relatively rare. Occasionally, however, the polar front becomes situated along a line from Hawaii through Oregon and warm, moist, unstable air moves into the region. Most winter floods develop under these conditions, as was the case with the northern Idaho floods of 1996 (IBHS 2007).

In general, the meteorological factors leading to flooding are well understood. They are also out of human control, so flood mitigation must address the other contributing factors leading to losses.

4.4.5. Topography and Geographic Influences

The nature and extent of a flood event is the result of the hydrologic response of the landscape. Factors that affect this hydrologic response include soil texture and permeability, land cover and vegetation, land use, and land management practices. Precipitation and snowmelt, known collectively as runoff, follow one of three paths, or a combination of these paths, from the point of origin to a stream or depression: overland flow, shallow subsurface flow, or deep subsurface ("ground water") flow. Each of these paths delivers water in differing quantities and rates. The character of the landscape will influence the relative allocation of the runoff and will, accordingly, affect the hydrologic response.

Unlike precipitation and ice formation, steps can be taken to mitigate flooding through manipulation or maintenance of the floodplain. Insufficient natural water-storage capacity and changes to the floodplain landscape can be offset through water storage and conveyance systems that run the gamut from highly engineered structures to constructed wetlands.

Careful planning of land use can build on the natural strengths of the hydrologic response. Re-vegetation of burned slopes diverts overland flow (fast and flood producing) to subsurface flow (slower and flood moderating). Details on rehabilitating burned areas to reduce flash floods, debris flows, and landslides can be found in the Landslide section of this document (Section 4.6).

The amount, location, and timing of water reaching a drainage channel – from natural precipitation and controlled or uncontrolled reservoir releases – determines the flow at downstream locations. Some precipitation evaporates, some slowly percolates through soil, some may be temporarily sequestered as snow or ice, and some may produce rapid runoff from surfaces including rock, pavement, roofs, and saturated, or frozen ground. The fraction of incident precipitation promptly reaching a drainage channel has been observed from nil, for light rain on dry, level ground, to as high as 170 percent for warm rain on accumulated snow (Babbitt & Doland 1949).

One major and three minor stream systems within the Coeur d'Alene Reservation are the St. Joe River (major), and Hangman Creek, Benewah Valley, Plummer Creek, and the Rock Creek systems (minor). The St. Joe River system drains lands to the east all the way to the crest of the Rocky Mountains. Hangman Creek drains the uplands of the southern extent of the Coeur d'Alene Reservation, while Plummer Creek drains much of the central portions of the Reservation. The Benewah Valley drains a relatively narrow high elevation cleft between two parallel ridgelines where precipitation is higher than the lands to the west, and solar radiation is limited in the winter, leading to higher-than-average snow packs. Hangman Creek exits the Coeur d'Alene Reservation where it enters the State of Washington on its journey to Spokane, Washington. Both Plummer Creek and the Benewah Valley cut their way through the upper plateau on its way to Coeur d'Alene Lake. Rock Creek flows past the City of Worley, parallel to US 95, where it crosses near the Coeur d'Alene Casino, and the premiere Circling Raven Golf Club. Rock Creek flows north, then crosses under US95 on its journey westward and off the current Coeur d'Alene Reservation and into the State of Washington, near Rockford in Spokane County.

Although several land-use plans have been developed for floodplains around the world, few are as compatible with the floodplain as this pristine 620 acre golf course.

4.4.5.1. Understanding Stream Order as an Analysis Tool

Stream-order classification is an analysis tool for understanding the mechanisms of stream channels and water conveyance through the network of river systems. Stream-order numbers convey information about the number of streams converging as the network grows. The Shreve Stream Order is a specific variant of this tool. This method of stream ordering by magnitude was proposed by Shreve (1967) and is widely used today. All streams with no contributing tributaries are assigned a magnitude (order) of one. Magnitudes are additive down slope. When two streams intersect, their magnitudes are added and assigned to the downslope link.

Using this set of criteria, low-order streams are typical of headwater streams. High-order streams represent areas where potentially hundreds of "first-order streams" have converged to create a large river system, such as the St. Joe River or the Coeur d'Alene River. Shreve Stream Order values will be discussed in the flood analyses for each community in this document and will be used to express flood characteristics defined above.

Conceptually, the higher the Shreve stream-order value, the higher the potential for that segment of the stream to exhibit characteristics consistent with riverine floods. Shreve stream-order segments with low magnitude are generally more consistent with a flash-flood profile, because in most instances these segments of the system do not possess the flat-valley-bottom profile consistent with a broad flood zone.

4.4.6. History

The Coeur d'Alene Reservation has experienced a long history of high-magnitude floods since first recorded in 1894, typically recorded as "50-year" or "100-year" flood events. The diverse landscape and weather patterns within the Upper Columbia Plateau are the triggers for those high-magnitude floods. Rain-on-snow events and above-normal spring high temperatures are typical antecedents to spring floods. The combination of these two factors can be devastating and can cause extraordinary flooding events. When coupled with ice-jam flooding along the St. Joe River, the combination of flood-event impacts can be unpredictable and disastrous.

Damaging flood events were first recorded in the St. Joe River watershed, in the St. Maries region as early as 1894, with subsequent floods recorded in 1896, 1917, 1933, 1938, 1948, 1956, 1964, 1974, 1996, 1997, and 2008 (Clement & Young 2010, Schlosser 2010).

Major flooding typically occurs during winter and spring seasons and is often triggered by rain-on-snow events. The conditions of an annual winter snow pack with an inversion weather system that brings above-freezing temperature rains to the headwaters of the area lead to the highest stream water flows. These conditions can turn a normal-level water flow in rivers to extreme-flow surges within five days that remain above flood stage for as long as two weeks.

Normal-flow exacerbation of the water transport system in the region's rivers is caused by infrastructure development in the form of bridges and the construction of roads beside rivers during the past 100 years. Additional aggravation of the normal water transport system can be witnessed by structural developments placed within the regulatory flood zone that restrict the functioning of water transport systems. The case of infrastructure developments on the Coeur d'Alene Reservation in the form of bridges and roads beside rivers has caused a definable complication to the normal flow of water in the region's streams and rivers. Examples of this have been seen along the St. Joe River and Hangman Creek systems as bridges have been overtopped or became part of debris dams during high-water events. The St. Joe River Road was placed alongside the major river drainage of the same name and has modified the unrestricted water profile.

Table 20 and Table 21 detail many past hazard events on the Coeur d'Alene Reservation. A cursory look through these events reveals that many were related to flooding. The following discussion looks at some of the recent and more historical flood events impacting the Coeur d'Alene Reservation.

4.4.6.1. 2008 Flood Events

According to the National Weather Service the Idaho Northern Panhandle had been receiving unprecedented snow falls unlike any seen in the previous ten years.

On February 14, 2008 Benewah County started breaking the ice out of Coeur d'Alene Lake to the start of slack water on the St. Joe River. This was to keep ice jams from developing when the spring runoff started.

On February 20, 2008 the National Weather Service projected that the St. Joe River at St. Maries would hit flood stage in late March. They projected a 90% chance the water level at St. Maries would be between 32.2 feet to 33.2 feet with a 10% chance it might be higher than 33.2 feet.

On March 13th, a meeting was held in Pinehurst with emergency responders from Kootenai, Shoshone and Benewah Counties. This was a planning meeting on how counties and agencies would respond to the anticipated 2008 spring flood.

Benewah County started to collect additional sandbags from the Idaho Bureau of Homeland Security in Boise and from the Army Corp of Engineers in Albeni Falls, Idaho.

March 14-15: A "flood-fight" course was held in St. Maries. This class was offered by the Institute of Emergency Management.

April 9: The National Weather Service predicted that the St. Joe River at St. Maries would crest during the 2nd or 3rd week of May between 32 to 34 feet.

April 14: The temperatures turned 10 to 15 degrees below normal with snow levels dropping down to 2,500 feet.

April 16: The National Weather Service predicted that the flood stage at St. Maries would reach 120% to 150% above the normal seasonal flow.

May 9: The National Weather Service predicted that the peak flow of the St. Joe River at St. Maries would be about 35 feet during the first week of June.

May 15: The National Weather Service predicted that the St. Joe River at St. Maries would hit flood stage on Sunday, May 18th, and be at 35.08 feet by mid day on May 21st and then level off to 33.3 feet. They projected that the river elevation could hit 36 feet. The Army Corp of Engineers was notified and they started to be mobilized toward St. Maries. Near-record temperatures were recorded May 16 and 17th. Levee monitoring was started looking for boils and problems along the toe of the levees. Sand was positioned for the filling of sand bags.

May 17: Warm temperatures along with rain started in the region. The National Weather Service forecast the St. Joe River at St. Maries would exceed 36 feet late May 19 or May 20. The elevation of the St. Joe River at St. Maries was affected by the high water conditions in Coeur d'Alene Lake that held back the water flow from the St. Joe River.

May 22: The Benewah County Commissioners declared a State of Emergency due to the anticipated flooding caused by the excessive snow pack and warm temperatures above 80 degrees during the day and temperatures above freezing during the night.

May 22: The St. Joe River Crested at 36.94 feet.

June 9: The St. Joe River at St. Maries dropped below flood stage.

Kootenai County declared a disaster on May 16, 2008, due to the imminent threat of floods. As the Coeur d'Alene River reached flood stage in Cataldo, ground water and seepage from the dike created flooding in that area. A tractor and pump, manned by personnel from the Shoshone County Fire District, was setup in Cataldo and pumping operations began on May 18, 2008. People continued to drive on flooded roads putting themselves as well as emergency responders in danger.

On May 22, 2008, the Benewah County Commissioners declared a State of Emergency due to repetitive winter storms causing a great buildup of snow in Benewah County and the potential for flooding in anticipation of the snowmelt accompanied with the imminent ice-jam flooding along the St. Joe River (Schlosser 2010).

A Presidential Disaster Declaration (1781) for Kootenai and Shoshone Counties was issued for May 15 to June 9, 2008. Latour Creek Road was flooded as well as other roads near the Coeur d'Alene River (Clement & Young 2010).

Figure XLI. Bike trail parking lot at Hwy 3, near South Black Rock Road, on May 20, 2008, along the lower Coeur d'Alene River.

The Kootenai County Sheriff's Marine Division staged in Cataldo with a boat provided transportation to the more than 200 residents cut off from access and services. A pregnant female was evacuated, as birth was imminent, and she resided in a no-access area. An elderly female was evacuated from her home as she did not have basic services. The Kootenai County Mobile Command Center was staged in Cataldo to monitor and coordinate flood operations. It was later positioned in Rose Lake as flood waters moved down the Coeur d'Alene River Basin (Clement & Young 2010).

On May 22, 2008, sandbagging operations began along the Spokane River including Harbor Island. On May 23, 2008, pumps were brought in to pump water out of Harbor Island. Sand and sandbags were delivered out to various sites in the county for sandbagging operations throughout the incident period (Clement & Young 2010).

Many of the damages cited by the Idaho Governor in the State Disaster Declaration recognized severe damages to roads and bridges, with an initial estimate of $1.9 million. On July 31, 2008, President Bush declared a major disaster for Idaho, focused on helping local government and tribal entities and certain nonprofit organizations in the two counties recover from damages caused by flooding between May 15 and June 9, 2008. The counties named in the declaration to receive help were Kootenai and Shoshone (FEMA 2008).

Approximately 19 roads were closed at one time in Kootenai County due to flooding. Various boat launches and ramps were also closed due to high water. A no-wake zone went into effect on the Coeur d'Alene and Spokane Rivers and Coeur d'Alene Lake during high waters to prevent more damage to homes and erosion of the shores, as well as public safety issues due to the excessive debris. Large pieces of debris including docks and whole trees were observed floating in the water systems. The County requested assistance from the state of Idaho to assist with assessment and debris removal (Clement & Young 2010).

The Latour Creek Bridge approach was washed out stranding residents. Many roads throughout the region were damaged due to the high waters, winds, and debris. Portions of "Rails to Trails" system were washed out and flooded (Clement & Young 2010).

Figure XLII. Bridge approaches were compromised along the Coeur d'Alene River during the May 2008 floods.

4.4.6.2. 1996-1997 Flood Events in Benewah, Kootenai, and Surrounding Counties

January through February 1996 - The third week of January 1996 brought large amounts of low-elevation snow, especially in the Idaho Panhandle where weather stations measured an additional 10 inches of snow to the existing snowpack. By the end of January, sites in the north had as much as 2½ feet of snow on the ground. During the last week of January temperatures dropped into the single digits (°F) for highs and below zero for lows. This caused ice to form on many of the rivers where low temperatures were in the range of 20 to 30 degrees below zero. On February 6, a warning was issued indicating that temperatures were warming up, that snow was becoming wet and dense, and although the mainstream rivers were not showing a response, there was a high potential for flooding. By February 7, the Boise National Weather Service began receiving reports of small-stream flooding in the area east of Lewiston including small tributaries to the Clearwater River. Preliminary assessments indicated the most severe impacts were to infrastructure and housing, with approximately 708 family dwelling units affected. Damage to public property, not counting federal highways, was estimated at approximately $12.9 million. A Major Disaster Declaration for Benewah, Bonner, Boundary, Clearwater, Kootenai, Latah, Lewis, Nez Perce, and Shoshone Counties was signed by Governor Batt on February 10, 1996, and by President Clinton the following day.

December 1996 through February 1997 - During middle–to-late December 1996, and January and February of 1997, above-normal snowfall occurred in northern and western Idaho. A warm, moist current of air from the subtropics (known locally as the "Pineapple Express") arrived within the Upper Columbia Plateau, dumping warm rain on melting snow. The result was widespread flooding, power outages, landslides, road closures, and structure damage from crushing snow loads. Riverbank erosion and landslides filled the rivers with thick silt and debris. Large sections of the highway system were damaged or destroyed, isolating several communities for days. Mountain snowpacks in the late winter were holding more than one and a half times the amount of water normally held in the mountain snow at that time of year.

Snowfall was well above average in northern Idaho regions, sometimes exceeding twice the design snowloads of buildings. There was substantial damage to several schools and other public and private structures. The aftermath resulted in over $7 million in damages and over $6 million in clean-up, recovery, and restoration costs (in the Idaho Panhandle).

December 25th – Unseasonably heavy snowfall began throughout north, central, and southwestern Idaho causing localized power failures and road closures, particularly in sparsely populated rural and mountain areas. Warming conditions and continued heavy rainfall created a rapid melting of the snow pack and heavy runoff. The weight of heavy snow caused damage to many structures.

December 26th – The National Weather Service issued a Winter Storm Watch for Central and Northern Idaho.

December 27th – The National Weather Service upgraded the Storm Watch to a Winter Storm Warning for all of Northern Idaho, for 6-12 inches of new snow.

December 29th – The National Weather Service issued a Winter Storm Warning for Northern Idaho for up to 10 more inches of new snow.

December 30th – Boise and Shoshone Counties were issued Disaster Declarations as a result of snow.

December 31st – Idaho State Police reported a high possibility of flooding in Lewiston, Nez Perce County, with 20 inches of snow on the ground. Latah County was issued a Disaster Declaration. A Small-Stream Flood Warning was issued by Emergency Management Systems for northern counties of **Benewah**, Bonner, Boundary, **Kootenai**, Shoshone, Latah, Lewis, and Nez Perce. The National Weather Service issued a Flood Warning for the South Fork of the Palouse River with impact in **Benewah**, Latah, and Lewis Counties.

January 1st – The Emergency Operations Center (EOC) was activated in Moscow.

January 2nd – Thirteen Idaho counties and four cities issued Disaster Declarations and 80 families were displaced. The National Weather Service forecast indicated decreasing rain and lowering of freeze levels to 3000 feet by 1/3/1997.

January 4th – The US President signed a Declaration for disaster assistance, DR-1154-ID, for Individual Assistance, and Categories A and B under the Public Assistance Program. Thirteen counties were designated: Adams, Boise, Bonner, Boundary, Clearwater, Elmore, Gem, Idaho, Latah, Payette, Shoshone, Valley, and Washington. All rivers were receding and recovery efforts were underway in flooded areas.

January 10th – Locations of five disaster Recovery Centers were decided on, one fixed (Payette) and five mobile (Sandpoint/Kellogg, Moscow, Council, Cascade, and Lowman/Garden Valley).

January 22nd – The Presidential Declaration was amended to add **Benewah and Kootenai** Counties for Individual Assistance and Categories A and B under the Public Assistance Program. In addition, Adams, Bonner, Boundary, Clearwater, Elmore, Latah, Nez Perce, Payette, Shoshone, Valley, and Washington Counties were granted Categories C through G and Hazard Mitigation and Public Assistance (no Individual Assistance).

January 24th – A Levee Task Force was formed to coordinate the response of federal agencies to repair levees, dikes, and other water control devices damaged during the disaster.

4.4.7. St. Maries Levee System

Almost 17 miles of levees are managed by dike districts and provide flood protection and the drainage of 3,120 acres. An intricate system of levees totaling 37 segments is present in the area of St. Maries along the St. Joe River banks. These levees were established to minimize the negative impacts on homes, businesses, and commerce linked to the location of this community on the St. Joe River system near Coeur d'Alene Lake, in combination with the water-based transportation system leading to Coeur d'Alene. These levees have served the region although examples of levee failure have resulted in events categorized as disasters.

4.4.7.1. History of the Levees

All of the levee systems along the St. Joe River and the Coeur d'Alene River, have been put in place by Dike Districts formed by the State of Idaho, with local management of the Dikes carried out by Dike District Chairmen. Current management of these levee systems and their designs, have been conducted by the Dike Districts in cooperation with the USACE.

There are many miles of levees along the lower Coeur d'Alene River designed to limit flood damages from the South Fork Coeur d'Alene River and the lower Coeur d'Alene River before it enters Coeur d'Alene Lake near Harrison. The Coeur d'Alene River Basin is of particular concern because its flood-prone profile and the environmental contamination evidenced by the nation's largest Superfund clean-up project (Schlosser 2009). The Coeur d'Alene Tribe has been cooperating with mitigation activities taking place in Shoshone County, located upstream of the current-day exterior boundary of the Coeur d'Alene Reservation, and where significant Superfund clean-up activities are taking place. Several small lakes, referred to as the Chain Lakes are located along the river system and continue to experience development along their shorelines (Clement & Young 2009).

The St. Joe River drains 1,886 square miles and is 130 miles long. It flattens to approximately 1 foot-per-mile gradient in the lower 42 miles before it enters Coeur d'Alene Lake. The annual runoff is 2.33 million acre feet. The St. Maries River drains 480 square miles and drains into the St. Joe River near St. Maries.

The river gauge 0.01 miles upstream from the mouth of the St. Maries River has been in use since 1911. There are 16.7 miles of levees constructed by six levee districts protecting 3,900 acres in the St. Maries area. These levees have failed in 1948, 1956, 1964, and 1996.

The St. Maries levee was constructed by the USACE in 1942. It was designed for a flood stage 5 feet higher than the 1933 flood calculations with an additional two feet of freeboard (height above flood stage). The St. Maries levee is about 6 to 10 feet higher than the dike district levees. It is an earth and earth-filled timber-crib levee. It is 2.5 miles in length consisting of 12,000 feet of earth-levee-style construction and 700 feet of earth-filled timber-crib wall style construction. It was accepted into the 44 CFR 65.10 levee system in 2008.

The Riverdale, Meadowhurst, Cottonwood, and Shepherd Road levees are in the PL 84-99 program.

- The Meadowhurst Dike District 1 was established on March 13, 1916.
- The Shepherds Road Dike District 2 was established on March 13, 1916.
- Dike District 3 was established on January 20, 1917.
- The Cottonwood Dike District 5 was established on August 21, 1925.
- The Riverdale Dike District 7 was established January 24, 1938. It protects 486.89 acres. The average elevation of the levee was 2,140 feet when constructed. Following the breach during the 1996 flood, the elevation was raised.

During the February flood of 1996, the Meadowhurst and Riverdale levees broke at river bottom level, approximately 25 feet deep. The Riverdale levee sustained approximately 250 feet of damage, the Meadowhurst levee sustained approximately 150 feet of damage.

When these dikes failed, 963 acres of land were inundated by floodwaters. It was estimated that the Riverdale Dike area released over 2 billion gallons of water, while Meadowhurst released approximately 426 million gallons within a five-week period.

The flood waters severely impacted Idaho State Highway 3 and the St. Joe River Road (Forest Service Road 50). Highway 3 was under water for two weeks, and the St. Joe River Road was closed for 30 days. The losses to homes and property were estimated at over $3.7 million. There were hazards from water and sewer contamination, sewage backup, electrical problems, fire, and threat to human life. This flooding directly affected 37 businesses (67 unemployment claims were filed), 120 homes were damaged, the schools were closed, and the St. Maries Airport was closed. Local business owners and Benewah County spent over $600,000 in in-kind labor, materials, and equipment during and after the disaster.

Meadowhurst Dike improvements included reconstruction of 8,000 linear feet of State Highway 3, repairing approximately 10,000 linear feet of the Meadowhurst levee, which included dike elevation and installation of a clay-core trench, and elevating approximately 1,500 linear feet of the St. Joe River Road.

Riverdale Dike improvements included elevation of 1,500 linear feet of the Mill Town Road and the elevation and installation of a clay-core trench along the cross-county segment of the levee.

4.4.7.2. US Army Corps of Engineers Inspections

The USACE conducts periodic inspections of the individual levees along the St. Joe River. These inspections involve visual examination of the levee condition to evaluate vegetation, encroachments, and general structural integrity. A current status rating is assigned by the inspector. Table 24 provides a summary of inspections conducted by the USACE on May 23, 2007.

Table 24. Summary of Levee Inspection Reports.

Levee Name	Sponsor	Inspection Date	Status
Shepherd's Road Levee (Dike District 2)	City of St. Maries	23 May 2007	Minimally Acceptable (encroachments)
Comments:	The overall condition of the levee is unknown. There are so many encroachments on the levee, the structural integrity is indiscernible. The number of structures that have been constructed into the levee, close together, is alarming. The compaction and backfill levee material is unknown. Many driveways are paved leaving little pervious surface near the levee and making it hard to determine if seepage is a problem. It is hard to determine where a weak spot will develop. The levee crown is no longer drivable due to the encroachments.		
St. Maries Floodwall and 205 Levee	City of St. Maries	23 May 2007	Acceptable
Comments:	The levee behind the Potlatch Plant has been brushed and trees removed to the toe. The riverward slopes are free of dense vegetation. The landward slope is sod. Areas of potential improvement: Some riprap settlement, but nothing that would impair function of the project. There are a few trees over 4" diameter breast high (DBH) within the levee prism. There is brush along the levee in places.		

Table 24. Summary of Levee Inspection Reports.

Levee Name	Sponsor	Inspection Date	Status
Riverdale Levee (Dike District 7)	Benewah County	23 May 2007	Minimally Acceptable
Comments:	There are many mature cottonwood trees growing within the levee prism that require removal. The levee has been excavated and is not acceptable and could lead to levee failure. There are a number of encroachments within the levee prism. Overall the levee is in minimally acceptable condition. The County, Riverdale Dike District and the Corps should meet to determine if the Riverdale District is interested in continuing in the PL 84-99 program[3]. In order to offer reliable flood protection from this levee system the following improvements must be made prior to the next inspection: A. Remove trees over 4" DBH from the levee prism that pose a threat to the integrity of the levee. There must be a significant improvement in removing the brush along the levee face and toe prior to the next inspection. B. Brush and mow the levee in areas where homeowners don't do the maintenance. C. Inspect encroachments and excavation into the levee to determine if they are a threat to the structural integrity of the levee. D. Remove ecology blocks and return levee to prior level of protection.		
Meadowhurst Levee (Dike District 1)	City of St. Maries	23 May 2007	Acceptable
Comments:	Overall the levee system is in good condition. In order to improve the effectiveness of this levee system and to ensure that it retains Acceptable Rating in the PL84-99 program, the following improvements should be made: A. Remove trees over 4" DBH from the levee prism that pose a threat to the integrity of the levee. B. Continue to perform routine annual maintenance on the levee. The PL 84-99 program requires mowing to minimum of 6 inches along the crown and 12 inches along the landward slope. C. Work with homeowners to remove personal items from the levee driving surface during flood season.		

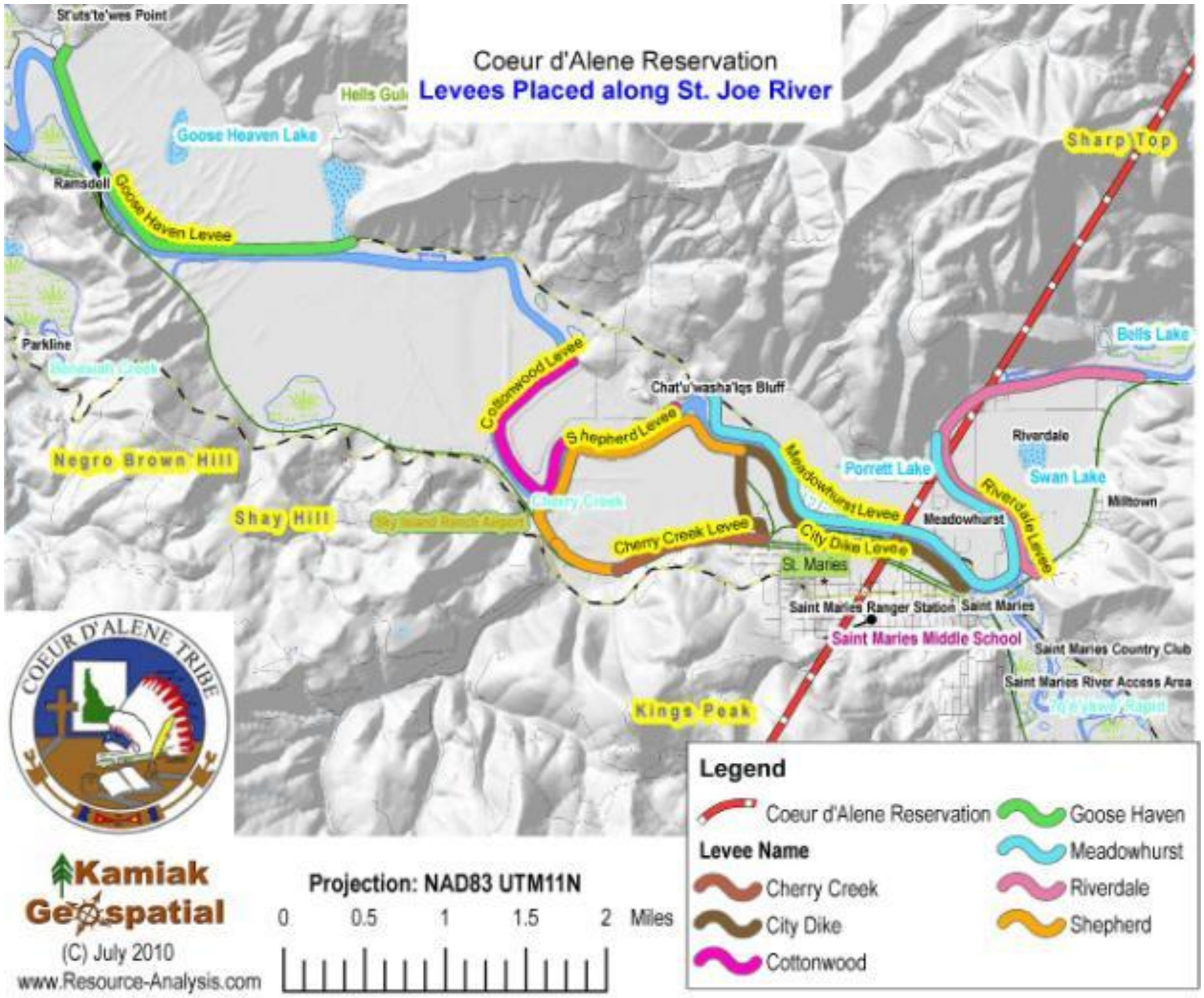
[3] **United States Army Corps of Engineers (USACE) PL84-99 Rehabilitation Program.** The PL 84-99 Rehabilitation Assistance Program is a federal levee rehabilitation program that repairs levees damaged only during declared emergencies for high-water events. "PL 84-99" refers to Public Law 84-99, the federal government's Flood and Coastal Storm Emergencies act. The goal of the program is to provide safety and risk reduction through the evaluation and repair of levees damaged during declared flood emergencies.

Table 24. Summary of Levee Inspection Reports.

Levee Name	Sponsor	Inspection Date	Status
Cherry Creek Levee	City of St. Maries	23 May 2007	Acceptable
Comments:	In order to continue the effectiveness of this levee system and to ensure that it remains eligible in the PL84-99 program, the inspection team recommends continuing with the current maintenance program including: A. Continue with regular mowing and brushing along levee system especially at upstream end. The program requires mowing to a minimum of 6 inches along the crown and 12 inches along the landward slope. B. Monitor levee and remove all trees and shrubs with 4" DBH or greater, especially in the spray field ditch. C. Monitor for burrowing animal activity. D. Routinely open/close the screw gate to ensure operability during high water events.		
Cottonwood Point Levee (District 5)	Benewah County	23 May 2007	Unacceptable
Comments:	The overall levee is in unacceptable condition as a full inspection cannot be completed due to vegetation. It has been rated probationary over the last few inspections and no attempt has been made to perform maintenance. In order for the levee to return to Acceptable Status in the PL84-99 System, the following maintenance must be performed prior to the next levee inspection: A. Remove the fruit and ornamental trees in the levee prism at 275 Cottonwood Drive. These were required to be removed in the past. B. Monitor growth of trees along the levee. Remove all trees over 4" diameter within the levee prism. It is necessary to remove all trees that can cause levee instability. C. Continue with brushing and mowing along the levee system. D. Cooperate with the landowners to ensure the levee is free of encroachments during flood season.		
Goose Haven (Dike District 3)		No Reports	
Comments:	This levee is not in the PL 84-99 Program.		

All of the recommendations in the comments section of these reports have been integrated into the recommendations of the Benewah County Multi-Jurisdictional Hazards Mitigation Plan, adopted by the Benewah County Commissioners, and the St. Maries City Mayor, and approved by FEMA on June 25, 2010 (Schlosser 2010). The location of the levees along the St. Joe River are shown in Figure XLIII.

Figure XLIII. System of Levees along the St. Joe River.



4.4.8. Dams on the Coeur d'Alene Reservation

There are neither hydroelectric dam sites nor flood control dams on the Coeur d'Alene Reservation. There are several small water reservoirs used for municipal water supplies, but the volume of water retained by these structures is minimal (Table 25). A small number of diversion structures and underground conveyance systems on small tributaries could do a fair amount of property damage if they were to fail.

The Hazard rating used by the Idaho Department of Water Resources to classify dams and reservoirs is based on a three-tier system consisting of Low, Significant, and High-hazard categories. It is important to note that the hazard classification assigned to any particular structure is based solely on the potential consequences to downstream life and property that would result from a failure of the dam and sudden release of water. Hazard is not to be used synonymously with the term "Risk" as they are not the same. Risk incorporates a probability of failure; thus risk is equal to the probability of occurrence multiplied by the consequences that would result from a dam failure (IDWR 2009).

- High Hazard - A high-hazard rating does not imply or otherwise suggest that a dam suffers from an increased risk for failure. It simply means that if failure were to occur, the resulting consequences likely would be a direct loss of human life and extensive property damage. For this reason all high-hazard dams must be properly designed, and at all times responsibly maintained and safely operated because the consequences of failure are much too great. IDWR considers the inundation of residential structures with flood water from a dam break to a depth greater than or equal to two (2) feet to be a sufficient reason for assigning a high-hazard rating.

- Significant Hazard - Significant hazard dams are those structures whose failure would result in significant damage to developed downstream property and infrastructure or that may result in an indirect loss of human life. An example of the latter would be a scenario where a roadway is washed out and people are killed or injured in the automobile crash.
- Low Hazard - Low hazard dams typically are located in sparsely populated areas that would be largely unaffected by a breach of the dam. Although the dam and appurtenant works may be totally destroyed, damages to downstream property would be restricted to undeveloped land with minimal impacts to existing infrastructure.

Table 25. Dams registered with the Idaho Department of Water Resources.

Dam Name	State Well ID	Tributary	Hazard Category	Dam Height (feet)
ABELL	91-7138	ST JOE RIVER	Undetermined	-
CHAPMAN	94-2225	SPOKANE RIVER	Undetermined	-
MCCLELLAND NO 1	93-7001	ROCK CREEK	Undetermined	-
MCCLELLAND NO 2	93-7000	ROCK CREEK	Undetermined	-
PUGH	94-XX24	LAMB CREEK	Low hazard	19
SCHNEIDER	95-8650	FIGHTING CREEK	Low hazard	17
SEWELL	93-XX01	HANGMAN CREEK	Low hazard	16
TREFZ	95-9080	LAKE CREEK	Undetermined	-
ZOOK	91-7114	ST. JOE RIVER	Low hazard	17

All of these dams (Table 25) meet the criteria of “low hazard”. The approach for mitigating dam risks includes monitoring these sites for changes in the status of protection.

4.4.9. Coeur d’Alene Reservation Flood Profile

All five types of flood events occur within the Coeur d’Alene Reservation. Riverine flooding occurs along all tributaries and in the main channel to the St. Joe River. The mountainous terrain of the region creates a flood-prone environment. Rain-on-snow events can and do occur at almost all elevations across the Reservation. These events often contain enough moisture to cause flooding on most river systems, not only the St. Joe River and its tributaries.

On the western side of the Coeur d’Alene Reservation, Hangman Creek exhibits the broadest flood profile consistent with a Riverine Flooding of the Slow kind. Although the contributing area of this drainage is significantly less than the area flowing into the St. Joe River System at St. Maries, the impact seen in the region of DeSmet and Tensed is significant. Because of the higher elevation of this region in Benewah County, flood events are frequently rain-on-snow events that cannot drain through the system of culverts and drainage structures along the surface roads. Water-conveyance exacerbated flooding is common when these circumstances occur. The Rock Creek watershed (from Worley to the Washington State line) and the upper Plummer Creek watershed (near Plummer) is much smaller than the Hangman Creek watershed, but the combination of high elevation, the wide floodplain, and the soils of the area can lead to flooding and damages to structures and infrastructure within the zone.

In general, flood events can be predicted 24 to 72 hours in advance of the rising waters. Emergency plans that are in place can be executed before floodwaters overtop the river banks, to minimize loss of life and business disruption. Plans for reducing structural damage need to be put in place and executed long before the rain begins to fall and the snow begins to melt.

Summer thunderstorms can result in flash flooding of specific smaller drainages. Often there is little time to react to the quickly rising waters. Due to the nature of the terrain, localized flooding from thunderstorms tends to be more of a stormwater drainage problem for many smaller communities. Short-term blockage of roads is usually the biggest impact as drainage structures are overwhelmed by the amount of water.

Ice and debris flows can occur as part of riverine and flash-flooding events, usually exacerbating the effects of those types of floods. In the case of a fire or heavy logging activity, flash flooding can result due to the loss of vegetation that would otherwise intercept some of the surface-water flow velocity. Details on reducing the effects of these types of debris flows can be found in the Landslide section of this report (Section 4.6).

4.4.10. Resources at Risk

Floods generally come with warnings and flood waters rarely go where they are totally unexpected based on expert predictions. Those warnings are not always heeded, though, and despite the predictability, flood damage continues.

The failure to recognize or acknowledge the extent of the natural hydrologic forces in an area has led to development and occupation of areas that can clearly be expected to flood on a regular basis or even an infrequent basis. Despite this, communities are often surprised when the stream leaves its channel to occupy its floodplain. A past reliance on structural means to control floodwaters and "reclaim" portions of the floodplain has also contributed to inappropriate development and continued flood-related damages.

Unlike the weather and the landscape, this flood-contributing factor can be controlled. Development and occupation of the floodplain places individuals and property at risk. Such use can also increase the probability and severity of flood events (and consequent damage) downstream by reducing the water-storage capacity of the floodplain, or by pushing the water further from the channel or in larger quantities downstream.

A large array of geospatial data has been collected to better understand and quantify the exposure to flood risks on the Coeur d'Alene Reservation, including flooding. The FIRM maps supplied to Benewah County and Kootenai County by FEMA in September 2009 were used to define the flood-prone areas for 100-year and 500-year flood events. Additional consideration was given to non-FEMA mapped floodplains within the Coeur d'Alene Reservation, as has been summarized in Section 4.4.2.1 and Figure XL. The location of individual structures was mapped for the entire Reservation, combined with values on those structures as determined by the counties, the Tribe, the State, and other public entities. The location of an asset within any of the floodplain zones has justified those structures as being at risk to flooding.

Section 2.6 (Structure Assessment & Values), Table 3, and Figure VIII, have provided details on a database of structure locations and values within the Coeur d'Alene Reservation. This database, with spatial reference, provided the assessment of determining the risk exposure on the Coeur d'Alene Reservation. The analysis procedure began by selecting all structures (embedded with value) within each flood zone.

For the purposes of this assessment, the determination of the floodplain, where consideration was given by FEMA for inclusion or exclusion of FIRM has not been further analyzed for floodplains. In those areas that were not considered by FEMA efforts for assessment of floodplain mapping, the additional assessments were made. In many locations, the FIRM mapping included specific municipalities (such as the City of Tensed, City of Plummer), but not the lands surrounding the municipalities. In other examples, lands held in trust by the Federal

Government were mapped for FIRM, but adjacent properties were not. The additional floodplain mapping conducted for this effort, assumed that any location of formally mapped FIRM would not be challenged. All additional mapping was conducted for those areas where FIRM was not previously considered or published by FEMA.

The determination of the extent of the additional floodplain areas was not articulated as an ‘A’ zone, ‘AE’ zone, ‘0.2% probability of occurrence’, or other FIRM classifications of severity. All of the additional assessments of floodplain mapping provided the sole classification of ‘floodplain’. Additional flood-related assessments included an assessment of stormwater accumulation; surface-water accumulations determined to be ‘frequent’ or ‘occasional’. These determinations were derived from a combination of data from the NRCS Soil Survey for surface-water accumulations, accompanied with the slope of the sites. For these purposes, the determination of ‘frequent’ is expected by be seen at least once a year, and possibly multiple times each year. The ‘occasional’ classification identifies sites where the occurrence may be witnessed as infrequently as once every five years.

For the purposes of this assessment, it is assumed that the improvement value of a parcel with a structure is completely attributed to the structure or structures on that parcel.

4.4.10.1. Private Property Improvement Values at Risk to Flood Loss

The results of this analysis of structures located within the Coeur d’Alene Reservation are summarized for privately owned structures (Table 26). Based on this determination of the structure location in respect to the components of the floodplain, there are approximately 34 privately owned structures, valued at $1.0 million located within the FIRM flood zone ‘A’ (100-year flood zone). Approximately 157 structures valued at $22.4 million are located within the FIRM flood zone ‘AE’ (500 year flood zone). Another 69 structures valued at $6.1 million are in a location protected by a ACOE certified levee (along the St. Joe River and within or adjacent to the City of St. Maries).

Additional assessments of potential floodplains for those areas not previously determined in published FEMA released FIRM assessments, reveals that approximately 61 privately owned structures valued at $5.3 million are located within the areas determined to be within the floodplain. An additional 61 structures, valued at $4.4 million, are in locations where surface-water accumulations leading to stormwater damages could occur at a ‘frequent’ recurrence, and 94 structures, valued at $3.9 million, are located in the ‘occasional’ zone of stormwater accumulations.

4.4.10.2. Non-Private Property Improvement Values at Risk to Flood Loss

The results of this analysis of structures located within the Coeur d’Alene Reservation are summarized for non-privately owned structures (Table 27). Based on this determination of the structure location in respect to the components of the floodplain, there are approximately 9 structures, valued at $3.3 million located within the FIRM flood zone ‘A’ (100-year flood zone). Approximately 15 structures valued at $4.2 million are located within the FIRM flood zone ‘AE’ (500 year flood zone). Another 8 structures valued at $2.1 million are in a location protected by a levee (along the St. Joe River adjacent to the City of St. Maries).

Additional assessments of potential floodplains for those areas not previously determined in published FEMA-released FIRM assessments, reveals approximately 6 structures valued at $14.6 million, are located within the areas determined to be within the floodplain. An additional 8 structures, valued at $26.9 million, are in locations where surface-water accumulations leading to stormwater damages could occur at a ‘frequent’ recurrence, and 16 structures, valued at $10.5 million, are located in the ‘occasional’ zone of stormwater accumulations (Table 27).

Table 26. Value and Number of Private Structures Located within Differing Categories of the Floodplain on the Coeur d'Alene Reservation.

	Tribally Determined			FEMA FIRM Determined (Sept 2009)			Not In Floodplain	
		Storm water Accumulation						
Community Name	Floodplain	Occasional	Frequent	A	AE	X PROTECTED BY LEVEE	Value	Number
BELLGROVE	$-	$470,416	$-	$-	$-	$-	$1,319,141	28
BENEWAH	$948,900	$44,110	$935,329	$-	$-	$-	$8,585,570	179
CHATCOLET	$177,010	$-	$-	$69,810	$-	$-	$13,449,962	183
CONKLING PARK	$274,063	$-	$-	$-	$-	$-	$14,190,716	233
DE SMET	$-	$182,170	$-	$-	$-	$-	$2,120,076	47
HARRISON	$-	$-	$1,692,800	$-	$-	$-	$16,713,779	171
LACON	$72,862	$-	$-	$-	$-	$-	$4,706,206	108
MEDIMONT	$110,040	$-	$10,480	$-	$-	$-	$4,090,501	145
MOWRY	$-	$389,270	$-	$-	$-	$-	$3,707,685	65
PLUMMER	$32,460	$697,197	$106,780	$45,840	$-	$-	$38,868,157	494
ROCKFORD BAY	$-	$68,508	$330,000	$1,270	$-	$-	$84,679,778	703
SANDERS	$26,490	$28,710	$263,020	$-	$-	$-	$6,262,519	97
SETTERS	$533,928	$12,930	$268,670	$-	$-	$-	$5,957,457	89
ST. MARIES	$1,908,543	$165,070	$-	$-	$22,326,830	$6,084,971	$43,431,319	719
TENSED	$268,012	$1,777,844	$-	$895,458	$-	$-	$2,111,896	127
WORLEY	$995,440	$40,890	$772,013	$-	$-	$-	$5,258,871	190
Count	**61**	**94**	**61**	**34**	**157**	**69**		**3,578**
Total Value	**$5,347,748**	**$3,877,115**	**$4,379,092**	**$1,012,378**	**$22,326,830**	**$6,084,971**	**$255,453,633**	

Table 27. Value and Number of Non-Private Structures Located within Differing Categories of the Floodplain on the Coeur d'Alene Reservation.

Community Name	Tribally Determined			FEMA FIRM Determined (Sept 2009)			Not In Floodplain	
		Storm water Accumulation						
	Floodplain	Occasional	Frequent	A	AE	X PROTECTED BY LEVEE	Number	Value
AGENCY	$-	$-	$-	$-	$-	$-	7	$1,303,983
CHATCOLET	$-	$-	$-	$2,600,000	$-	$-	4	$2,750,000
CONKLING PARK	$-	$-	$-	$-	$-	$-	5	$1,372,688
DE SMET	$25,000	$2,500,000	$-	$-	$-	$-	42	$15,247,304
HARRISON	$-	$-	$500,000	$-	$-	$-	5	$674,000
HEYBURN STATE PARK	$-	$-	$-	$500,000	$-	$-	13	$8,600,000
LACON	$-	$-	$-	$-	$-	$-	2	$112,680
MOWRY	$-	$152,000	$-	$-	$-	$-	2	$304,000
PLUMMER	$1,665,000	$5,881,617	$-	$-	$-	$-	96	$40,144,417
ROCKFORD BAY	$-	$10,000	$-	$-	$-	$-	9	$1,060,424
SANDERS	$-	$-	$-	$-	$-	$-	2	$304,000
SETTERS	$12,000,000	$-	$-	$-	$-	$-	1	$12,000,000
ST. MARIES	$-	$-	$-	$-	$4,187,130	$2,108,182	30	$12,171,841
TENSED	$103,262	$1,996,100	$-	$170,025	$-	$-	13	$2,269,387
WORLEY	$757,377	$-	$26,437,506	$-	$-	$-	82	$127,968,593
Count	**6**	**16**	**8**	**9**	**15**	**8**	**313**	
Total Value	**$14,550,639**	**$10,539,717**	**$26,937,506**	**$3,270,025**	**$4,187,130**	**$2,108,182**		**$226,283,317**

4.4.11. Probability of Future Events

The probability of flood events within the Coeur d'Alene Reservation is consistent with the assessment determined by the State of Idaho Hazard Mitigation Plan (November 2007) as follows:

> **High:** Steep, mountainous terrain, history of flooding events, number of new developments and number of rivers, lakes, creeks in vicinity of flood zones, flood-control systems often overwhelmed.
>
> **Medium:** Geography is moderate; fewer susceptible streams and creeks; historically less flood-prone, flood control is normally adequate.
>
> **Low:** Few historical events, Little or no new development in flood zones, geography is less flood-prone, sufficient flood control operations.

Coeur d'Alene Reservation has a high probability of future flooding events with events expected to be seen as frequently as multiple times each year, and no less frequent than once every five years.

Flood frequency on the Coeur d'Alene Reservation has been recorded in conceptual models of personal accounts, news reports of the region, and physical evidence of past flooding. Although illustrative, these accounts fail to apply uniform measures of flood intensity (depth), duration (days), or location (watersheds affected).

These accounts serve to quantify the high frequency of flood related events (1 every 3-5 years). It is likely that this frequency will continue into the future even with significant changes to the global climate weather patterns discussed here. Although frequency may remain relatively consistent, the intensity of flooding events may change. The only sure way of limiting the exposure of residents to these extreme flood events is to locate homes, businesses, and infrastructure outside of the maximum floodplain extent to avoid these catastrophic events.

4.4.12. FEMA Programs Concerning Floods

As of the preparation of this Tribal Hazards Mitigation Plan, the Coeur d'Alene Tribe is not a participant in any of the flood-mitigation programs of FEMA.

The National Flood Insurance Program (NFIP) was created by the Congress of the United States in 1968 through the National Flood Insurance Act of 1968 (P.L. 90-448). The NFIP enables property owners in participating communities to purchase insurance protection from the government against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods (FEMA 2009). Participation in the NFIP is based on an agreement between local communities and the federal government and states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHA), the federal government will make flood insurance available within the community as a financial protection against flood losses. The SFHAs and other risk premium zones applicable to each participating community are depicted on FIRM. The Mitigation Division within the Federal Emergency Management Agency manages the NFIP and oversees the floodplain management and mapping components of the Program (FEMA 2009).

The intent of the act was to reduce future flood damage through community floodplain management ordinances and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection. The NFIP is meant to be self-supporting, though in 2004 Congress found that repetitive-loss properties cost the taxpayer about $200 million annually. Congress originally intended that operating expenses and flood-insurance claims be paid for through the premiums collected for flood-insurance policies. NFIP borrows from the U.S. Treasury for times when losses are heavy, and these loans are paid back with interest.

The program was first amended by the Flood Disaster Protection Act of 1973, which made the purchase of flood insurance mandatory for the protection of property within SFHAs. In 1982, the Act was amended by the Coastal Barrier Resources Act (CBRA). The CBRA enacted a set of maps depicting the John H. Chafee Coastal Barrier Resources System in which federal flood insurance is unavailable for new or significantly improved structures. The program was further amended by the Flood Insurance Reform Act of 2004, with the goal of reducing "losses to properties for which repetitive flood insurance claim payments have been made."

In order for the Coeur d'Alene Tribe to enter the NFIP, discussions between the Tribe and FEMA Region X representatives must reach agreement on the implementation of policies, laws, and programs to be carried out by Coeur d'Alene Tribe to protect the structures and infrastructure located in the floodplain. At the same time, FEMA may launch additional floodplain mapping of the Coeur d'Alene Reservation to consistently define the floodplain.

While these programs are set in place, initial mapping of projected flood-impact areas has been completed as part of this Tribal Hazards Mitigation Plan assessment and can serve the Coeur d'Alene Tribe to establish floodplain protection areas. These projected flood impact areas would be replaced by FEMA-established FIRM maps if they are created, in case the Coeur d'Alene Tribe chooses to enter the NFIP.

4.4.13. Repetitive Loss

The primary objective of the Repetitive Loss Properties Strategy is to eliminate or reduce the damage to property and the disruption of life caused by repeated damages of the same properties. Although mostly recognized within the flood-risk category of losses, the repetitive loss category can be applied to properties that meet the following conditions:

- Four or more paid flood losses (by FEMA) of more than $1,000 each; or
- Two paid flood losses (by FEMA) within a 10-year period that, in the aggregate, equal or exceed the current value of the insured property; or
- Three or more paid losses (by FEMA) that, in the aggregate, equal or exceed the current value of the insured property.

Although there are no formally entered repetitive loss properties within the Coeur d'Alene Reservation, that lack of classification is completely attributable to the lack of participation in insurance coverage offered by FEMA for homeowners. Flood loss damages to personal property are a frequent event that can be witnessed several times each year. The Coeur d'Alene Tribe is not a participant in the National Flood Insurance Program.

4.4.14. Potential Mitigation Measures

In many western countries, rivers prone to floods are often carefully managed. Water management structures such as levees, reservoirs, and weirs have been used to prevent rivers from bursting over their banks. However, these structures only influence flood properties and do not alter the actual floodplain. The floodplain is a natural storage area used by the river to store the high-water levels as it drains downstream. When a levee is placed along a river, the effect is to remove this temporary storage area and displace the needed storage to other stream storage areas immediately upstream (backflow) and adjacent to the levee protected area, and eventually downstream of the protected area. These displacements often mean increased flooding impacts in areas other than those protected by the levee.

The potential exception to this flood-displacement problem occurs when a levee is placed upstream of a managed reservoir, a large lake, or the ocean. When managed well, a reservoir can be lowered in advance of seasonal floodwater accumulation and used to receive the increased flood-storage needs, if required. On the Coeur d'Alene Reservation the flow point for the St. Joe River system is Coeur d'Alene Lake, which can accept sizable amounts of water. A complication to the flood profile of Coeur d'Alene Lake is that another river system, the Coeur d'Alene River generally reaches a high-water level prior to the St. Joe River, thus causing Coeur d'Alene Lake levels to rise. This decreases the ability of Coeur d'Alene Lake to accept the high-water levels from the St. Joe River. Generally the progression of flood waters begins with the St. Maries River, followed by the Coeur d'Alene River, and the St. Joe River.

4.4.14.1. Post Flood Safety

Cleanup activities following floods often pose hazards to workers and volunteers involved in the effort. Potential dangers include electrical hazards, carbon monoxide exposure, musculoskeletal hazards, heat or cold stress, motor vehicle-related dangers, fire, drowning, and exposure to hazardous materials, or contaminated soils and sediment. Because flooded sites are unstable, cleanup workers might encounter sharp, jagged debris, biological hazards in the floodwater, exposed electrical lines, blood or other body fluids, animal, and human remains.

A flood-response plan has not been adopted by Coeur d'Alene Tribe for specifically dealing with flood activities on the Coeur d'Alene Reservation. This plan should be developed in continuation of this planning effort and is recommended in Table 72.

4.4.14.2. Benefits of Flooding

There are many disruptive effects of flooding on human settlements, infrastructure, and economic activities. However, flooding can bring benefits, such as making soil more fertile by providing nutrients in which it is deficient. Periodic flooding was essential to the productivity of lands for the Tribes of the region, who have relied, and still rely, on a productive river ecosystem for food supplies and fish spawning and rearing grounds.

4.4.14.3. Considerations Concerning Flood Policy

The stabilization of the floodplains of the Coeur d'Alene Reservation is essential to the functioning of the Coeur d'Alene Tribe in terms of the economy (especially related to agriculture and forestry), the home sites located adjacent to, and within the floodplains, and the infrastructure that provides water, sewer, power, and critical linkages between communities and to resources located outside the Reservation. This stabilization of the floodplains begins with an assessment of the current functioning of the wetlands within the Coeur d'Alene Reservation. The Coeur d'Alene Tribe has launched an effort to restore wetlands and riparian zones within the Coeur d'Alene Reservation.

Since the program's inception, specific areas have been targeted for restoring sites where subsurface tiles were placed to drain wetlands for use in agriculture. These sites are in a process of restoration to reestablish their normal functioning as riparian areas.

Efforts to solidify the position of the Coeur d'Alene Tribe to restrict human habitation within the floodplains from the standpoint of protecting fisheries and downstream flooding impacts has real and measurable benefits.

As previously discussed, the NFIP is a Federal Program that helps communities reduce flood risks and enables property owners and renters to buy flood insurance. Although the NFIP offers flood insurance to homeowners and renters, this insurance coverage does not reduce the occurrence of flooding. At this time, Reservation-wide FIRM maps of the Coeur d'Alene

Reservation have not been developed and discussions are on-going between the Coeur d'Alene Tribe and FEMA Region X to consider the entry of the Coeur d'Alene Tribe to the NFIP.

The Coeur d'Alene Tribe may decide to participate in the NFIP while enacting and enforcing measures to reduce future flood risks. At a minimum, these regulations govern construction in the SFHAs shown on the FIRM maps. In the interim period, while the FEMA-approved FIRM maps are not available, those areas shown on the Potential Food Impact Areas (developed for this planning effort) can be used by the Coeur d'Alene Tribe for internal policy development and implementation. Participation by homeowners in the FEMA insurance program is optional. If FIRM maps are subsequently developed by FEMA and the Coeur d'Alene Tribe, then the use of the FEMA-approved FIRM maps can be adopted. In addition, many mortgage companies require NFIP coverage for homes in the SFHA when purchased through a mortgage loan.

These NFIP management regulations apply to new construction and substantial improvements to structures in the flood zone. Coeur d'Alene Tribe can consider implementing these measures while using the recently created Potential Flood Impact Areas maps to be updated when FEMA-derived NFIP maps are finalized. Structural improvements that lead to improved protection during flood events include a variety of techniques to elevate structures, so the ground floor is above the base-flood elevation (so called flood proofing). Small-scale levee construction is not a recognized flood mitigation technique for the NFIP program. Other potential mitigation measures are effective at reducing the negative impacts caused by flooding.

Floodplain Ordinances should be considered and enacted within Coeur d'Alene Reservation by the Coeur d'Alene Tribe. It is recommended that these ordinances define a substantial improvement as "any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the 'start of construction' of the improvement." These ordinances should require all new construction or substantial improvements be made using methods and practices that minimize flood damage to the structure while not negatively impacting the floodplain where the structure is located.

4.4.14.4. Potential Mitigation Measures by Flood Hazard Type

Beaver Dam Floods: Several techniques have been developed to limit the financial losses experienced from beaver dam flooding of culverts, bridges, roads, and infrastructure. Many of these solutions are lethal to the beaver, and the Coeur d'Alene Tribe opposes the harvest of beaver seeing the benefit of the animal as a natural component of the environment. The Coeur d'Alene Tribe also recognizes the overwhelming benefit beaver dams have on fisheries. Some practitioners have experimented with protecting culverts with a device called a "Beaver Pipe" (Langlois and Decker 1997) developed in Massachusetts. The Beaver Pipe is installed through the culvert and extends into the water impoundment where intake is provided through a mesh filter and the pour point is extended well beyond the road surface it passes under to return the water to the stream channel. These devices require annual or quarterly maintenance and are not suitable to all culverts (Langlois and Decker 1997). Other efforts have installed protective "beaver fences" both upstream and downstream of culvert openings, but these structures require frequent maintenance in direct correlation with the amount of debris normally transported in the stream system, which is moderate-to-low on most Coeur d'Alene Reservation streams.

Riverine Floods: The mitigation of riverine flooding is mostly effective through the development of an early warning system designed to notify and evacuate people located at risk to rising waters. While family members, pets, and valuables can often be evacuated from homes and businesses, the structures rarely can be moved in an emergency. Equally at risk are the infrastructure components of the region, such as roads, bridges, water supply systems, power supply systems, and sewage treatment plants.

Another partially effective means of mitigating losses from riverine floods is the “flood proofing” of structures discussed in this section.

Flash Flooding: Because the nature of flash flooding greatly precludes advance warnings, these flood types often cause substantial damage and loss of life. Certain areas of Coeur d’Alene Reservation are more prone to these types of floods than others (such as the Benewah Valley), where lower-order streams often possess minimal flood-water storage areas. Larger-order streams, such as the St. Joe system, generally have a substantially larger storage area and can accept these increased volumes on a short-term basis.

Caution and respect for these flash-flood-prone areas is the best defense against losses from these flood types. Development of structures and infrastructure in these locations is not recommended.

Ice and Debris Jam Flooding: These floods will impact areas where excessive debris is available for the floodwaters to recruit and transport from the point of origination to downstream locations. Often debris dams are created where the channel is narrowed due to a road crossing (under or through a culvert), or because of a natural narrowing of the waterway from topographic bridge relief. Debris carried by the river creates a dam that restricts water flow and increases flooding around the entrapment. Ice jams are similar transient dams created by breaking ice and generally occur at the same pinch points as debris dams.

While natural topographic restrictions are difficult to moderate, ice and debris dams against bridges and culverts are possible to avert. Counter measures proposed by the US Department of Transportation (2008) are applicable for bridges and culverts alike, although a few are better applied to one situation than to another.

Culverts:

- **Debris Deflectors** are structures placed at the culvert inlet to deflect the major portion of the debris away from the culvert entrance. They are normally "V"-shaped in plan with the apex upstream.
- **Debris Racks** are structures placed across the stream channel to collect the debris before it reaches the culvert entrance. Debris racks are usually vertical and at right angles to the stream flow, but they may be skewed with the flow or inclined with the vertical.
- **Debris Risers** are a closed-type structure placed directly over the culvert inlet to cause deposition of flowing debris and fine detritus before it reaches the culvert inlet. Risers are usually built of metal pipe. Risers can also be used as relief devices in the event the entrance becomes completely blocked with debris.
- **Debris Cribs** are open crib-type structures placed vertically over the culvert inlet in log-cabin fashion to prevent inflow of coarse bed load and light floating debris.
- **Debris Fins** are walls built in the stream channel upstream of the culvert. Their purpose is to align the debris with the culvert so that the debris would pass through the culvert without accumulating at the inlet. This type of measure can also be used at a bridge.
- **Debris Dams and Basins** are structures placed across well-defined channels to form basins that impede the stream flow and provide storage space for deposits of detritus and floating debris.

- **Combination Devices** are a combination of two or more of the preceding debris-control structures at one site to handle more than one type of debris and to provide additional insurance against the culvert inlet becoming clogged.

The only type of non-structural measure available for ensuring culvert function is to provide emergency and annual maintenance. Although not always feasible for remote culverts or culverts with small drainage areas, maintenance could be a viable option for larger culverts with fairly large drainage basins. Emergency maintenance could involve removing debris from the culvert entrance and/or an existing debris-control structure. Annual maintenance could involve removing debris from within the culvert, at the culvert entrance, and/or immediately upstream of the culvert, or repairing any existing structural measures.

Bridges:

Various types of structural measures are also available for bridges. Some of the measures discussed above for the culvert structures can also be utilized at bridges. The various types include:

- **Debris Fins** are walls built in the stream channel upstream of the bridge to align large floating trees so that their length is parallel to the flow, enabling them to pass under the bridge without incident. This type of measure is also referred to as a "pier nose extension".
- **In-channel Debris Basins** are structures placed across well-defined channels to form basins that impede the stream flow and provide storage space for deposits of detritus and floating debris. These structures can be expensive to construct and maintain.
- **River-Training Structures** are structures placed in the river flow to create counter-rotating streamwise vortices in their wakes, thus modifying the near-bed flow pattern to redistribute flow and sediment transport within the channel cross-section. Examples of this type of structure include Iowa vanes, and impermeable and permeable spurs.
- **Crib Structures** are walls built between open-pile bents to prevent debris lodging between the bents. The walls are typically constructed of timber or metal.
- **Flood Relief Sections** are overtopping or flow through structures that divert excess flow and floating debris away from the bridge structure and through the structure.
- **Debris Deflectors** are structures placed upstream of the bridge piers to deflect and guide debris through the bridge opening. They are normally "V"-shaped in plan with the apex upstream. A special type of debris deflector is a hydrofoil. Hydrofoils are submerged structures placed immediately upstream of bridge piers that create counter-rotating streamwise vortices in their wakes to deflect and divert floating debris around the piers and through the bridge opening.
- **Debris Sweeper** is a polyethylene device that is attached to a vertical stainless steel cable or column affixed to the upstream side of the bridge pier. The polyethylene device travels vertically along the pier as the water surface rises and falls. It is rotated by the flow, causing the debris to be deflected away from the pier and through the opening.
- **Booms** are logs or timbers that float on the water surface to collect floating drift. Drift booms require guides or stays to hold them in place laterally. Booms are very limited in use and their application is not widely used in urban areas, but they may be used in remote forestland areas.
- **Design Features** are structural features that can be implemented in the design of a proposed bridge structure. The first feature is freeboard, which is a safety precaution of

providing additional space between the maximum water surface elevation and the low chord elevation of the bridge. The second feature is related to the type of piers and the location and spacing of the piers. Ideally, the piers should be a solid wall-type pier aligned with the approaching flow. They should also be located and spaced so that the potential for debris accumulation is minimized. The third feature involves the use of special superstructure design, such as thin decks, to prevent or reduce the debris accumulation on the structure when the flood stage rises above the deck. The last feature involves providing adequate access to the structure for emergency and annual maintenance.

There are generally two types of non-structural measures available for bridges. The first type of non-structural measure is emergency and annual maintenance. Emergency maintenance could involve removing debris from the bridge piers and/or abutments; placing riprap near the piers and abutments or where erosion is occurring due to flow impingement created by the debris accumulation; and/or dredging of the channel bottom. Annual maintenance could involve debris removal and repair to any existing structural measures.

The second type of non-structural measure is management of the upstream watershed. The purpose of this measure is to reduce the amount of debris delivered to the structure by reducing the sources of debris, preventing the debris from being introduced into the streams, and clearing debris from the stream channels. The type of management system implemented varies depending on the type of debris. For organic floating debris, the management system could involve removing dead and decayed trees and/or debris jams; providing buffer zones for areas where logging practices exist (such as provided for by the Idaho Forest Practices Act); implementing a cable-assisted felling of trees system; and stabilizing hillside slopes and stream banks.

Muddy Floods: Preventive or curative measures can be implemented to control muddy floods. Preventive measures include limiting runoff generation and sediment production at the source. For instance, farmers can implement alternative farming practices (e.g. reduced tillage) to increase runoff infiltration and limit erosion in their fields. Curative measures generally consist of installing retention ponds at the boundary between cropland and inhabited areas.

An alternative is to apply other measures that can be referred to as intermediate measures. Grass buffer strips along or within fields, a grassed waterway (in the thalwegs of dry valleys), and earthen dams are good examples of this type of measure. They act as a buffer within the landscape, detaining runoff temporarily and trapping sediments.

Implementation of these measures is best coordinated at the catchment scale. However, since there are few acres of farmland in the headwater areas of the Coeur d'Alene Reservation, these mitigation practices are not very practical here.

4.5. Earthquakes

In all parts of the Upper Columbia Plateau, the historical record of seismicity reveals at least a moderate threat from earthquakes. The Idaho Geological Survey (IGS) addresses earthquake concerns by studying faults and seismic activity, and by promoting earthquake education programs. The IGS works closely with other agencies in planning state and regional earthquake policy and response, and participates in regional organizations such as the Western States Seismic Policy Council (WSSPC).

4.5.1. Geological Setting

Geological and seismological studies show that earthquakes are likely to happen in any of several active zones in the Upper Columbia Plateau. Idaho is ranked fifth highest in the nation for earthquake hazard. Only California, Nevada, Utah, and Alaska have a greater overall hazard. Idaho has experienced two substantial earthquakes in the last fifty years—the 1959 Hebgen Lake earthquake (Magnitude 7.5) and the 1983 Borah Peak earthquake (Magnitude 7.3). Both tremors caused fatalities and millions of dollars in damage.

The crust or surface of our planet is broken into large, irregularly shaped pieces called plates. The plates tend to pull apart or push together slowly, but with great force. Stresses build along edges of the plates until part of the crust suddenly gives way in a violent movement. This shaking of the crust is called an earthquake.

The crust breaks along uneven lines called faults. Geologists locate these faults and determine which are active and inactive. This helps identify where the greatest earthquake potential exists. Many faults mapped by geologists are inactive and have little earthquake-induced risk potential; others are active and have a higher earthquake-induced risk potential.

When the crust moves abruptly, the sudden release of stored force in the crust sends waves of energy radiating outward from the fault. Internal waves quickly form surface waves, and these surface waves cause the ground to shake. Buildings may sway, tilt, or collapse as the surface waves pass. Fault-line information used in this report was adopted from research completed by the IGS, a research agency of the University of Idaho (Breckenridge *et al.* 2003).

The constant interaction of crustal plates in western North America creates severe earthquakes. The Upper Columbia Plateau is situated where the Basin and Range and Rocky Mountain geomorphic provinces meet. Most of the Upper Columbia Plateau has undergone the effects of tremendous crustal stretching.

Earthquakes from the crustal movements in the adjoining states of Montana, Utah, and Nevada can also cause severe ground shaking in Idaho. Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated sediment and other unstable soil, as well as trailers and homes not tied to their foundations, are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths, injuries, and extensive property damage.

Aftershocks are smaller earthquakes that follow the main shock and can cause further damage to weakened buildings. Aftershocks can occur in the first hours, days, weeks, or even months after the quake. Some earthquakes are actually foreshocks, and a larger earthquake might subsequently occur.

Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking (FEMA 2009).

4.5.2. Measuring an Earthquake

Earthquakes are measured in two ways. One determines the power; the other describes the physical effects. Magnitude is calculated by seismologists from the relative size of seismograph tracings. This measurement has been named the Richter scale, a logarithmic-numerical gauge of earthquake energy ranging from 1.0 (very weak) to 9.0 (very strong). A Richter scale earthquake of 5.0 is ten times stronger than a 4.0 earthquake. The Richter scale is most useful to scientists who compare the power in earthquakes. Magnitude is less useful to disaster planners and citizens, because power does not describe and classify the damage an earthquake can cause. The damage we see from earthquake shaking is due to several factors including distance from the epicenter and local rock types. Intensity defines a more useful measure of earthquake shaking for any one location. It is represented by the modified Mercalli scale (Table 28). On the Mercalli scale, a value of I is the least intense motion and XII is the greatest ground shaking. Unlike magnitude, intensity can vary from place to place. In addition, intensity is not measured by machines. It is evaluated and categorized from people's reactions to events and the visible damage to man-made structures. Intensity is more useful to planners and communities because it can by reasonably used to predict the effects of violent shaking for a local area.

Table 28. Modified Mercalli Earthquake Intensity Scale (IGS 2008).

Intensity	Description
I.	Only instruments detect the earthquake
II.	A few people notice the shaking
III.	Many people indoors feel the shaking. Hanging objects swing.
IV.	People outdoors may feel ground shaking. Dishes, windows, and doors rattle.
V.	Sleeping people are awakened. Doors swing, objects fall from shelves.
VI.	People have trouble walking. Damage is slight in poorly built buildings.
VII.	People have difficulty standing. Damage is considerable in poorly built buildings.
VIII.	Drivers have trouble steering. Poorly built structures suffer severe damage, chimneys may fall.
IX.	Well-built buildings suffer considerable damage. Some underground pipes are broken.
X.	Most buildings are destroyed. Dams are seriously damaged. Large landslides occur.
XI.	Structures collapse. Underground utilities are destroyed.
XII.	Almost everything is destroyed. Objects are thrown into the air.

4.5.3. Upper Columbia Plateau Geology

The diverse geology of the Upper Columbia Plateau is manifested by the rolling Palouse prairie on the west side, and foothills and steep forested mountains on the east side. The mountains are underlain by the Mesoproterozoic Belt Supergroup, with the Emerald Creek mining district, in the extreme southeastern corner of the Reservation south of Santa, situated in metamorphic rocks of the middle-Belt Wallace Formation. Miocene Columbia River basalts cover the low farming country in the north eastern part of the Reservation and along the eastern side of the Reservation. In addition to these consolidated sediments, there are a few terrace gravels of Tertiary age and the larger stream valleys contain some recent alluvium (Wagner 1949). Lacustrine and river sediments accumulated in valleys that had been dammed up by basalt lava flows. The world famous Clarkia fossil locality formed this way. The St. Joe fault, an Eocene feature related to continental extension and development of metamorphic core complexes, runs eastward through the northeast corner of the Reservation.

The geologic structure of Coeur d'Alene Reservation consists of four main types including 1) metamorphic structures, 2) basalt structures, 3) alluvial floodplain deposits, and 4) windblown fine silt and sand deposits. Metamorphic structures consist of many formations scattered across the region, mainly on the central and eastern side of the Reservation. These formations form the topographic relief seen in the relatively high elevations along the eastern side and northeastern reaches of the Reservation.

Granitic bedrocks are found across the Coeur d'Alene Reservation except in the highest elevations that are dominated by the aforementioned metamorphic structures. These granitic formations are estimated to have been formed during the Mesozoic to early Tertiary period (about 60-65 million years ago).

Alluvial deposits can be identified on all of the major and minor river systems on the Coeur d'Alene Reservation. Silt, sand, river gravel, and even peat make up this hydraulically transported alluvium. This material is common in the major river valleys where human developments have been concentrated, especially along the St. Joe River system.

Windblown loess deposits are observed along the western side of the Coeur d'Alene Reservation and make up a part of the Palouse Hills soil complex. These highly fertile soils are sometimes very deep and often located on moderate slopes where farming activities are successful.

4.5.4. Seismic Shaking Hazards

The USGS has gathered data and produced maps of the nation, depicting earthquake shaking hazards. This information is essential for creating and updating seismic design provisions of building codes. The USGS Shaking Hazard maps for the United States are based on current information about the rate at which earthquakes occur in different areas and on how far strong shaking extends from quake sources. These analyses estimate the level of horizontal shaking that have a 1 in 10 chance of being exceeded in a 50-year period. Shaking is expressed as a percentage of "g" (g is the acceleration of a falling object due to gravity). This analysis is based on seismic activity and fault-slip rates and takes into account the frequency of occurrence of earthquakes of various magnitudes. Locally, risk may be greater than that shown, because site geology may amplify ground motions.

Studies of ground shaking during previous earthquakes have led to better interpretations of the seismic threat to buildings. In areas of severe seismic shaking hazard, older buildings are especially vulnerable to damage. Older buildings are at risk even if their foundations are on solid bedrock, but are at greater risk if their foundations are not stable. Areas with high seismic shaking hazard can experience earthquakes with high intensity where weaker soils exist. Most populated areas on the Coeur d'Alene Reservation are located on or near alluvial deposits that provide poorer building site conditions during earthquakes. Older buildings may suffer damage even in areas of moderate ground shaking hazards (IGS 2008).

4.5.5. Earthquake Profile

Many populated places in the Upper Columbia Plateau are at risk to earthquakes, even small ones, because they were built on unconsolidated sediments that move easily in response to seismic waves. Seismic waves are the form of energy that ripples through Earth when an earthquake occurs. When seismic waves propagate through unconsolidated sediments, the sediments re-organize and move chaotically (like shaking a bowl of marbles). The danger is really two-fold because population centers often contain structures built near rivers below the foothills and mountains, that were then expanded into the foothills with new structures. Mountain foothills contain erosional remnants called alluvial fans. The alluvial fans may either slide down into the valley or simply shake about, creating new topography due to internal settling. These conditions are especially apparent along the eastern side of the Coeur d'Alene Reservation.

Many developments have been built within close proximity to river drainages, often placing the structures at risk to flooding. These zones typically are also found on unconsolidated sediments. The overwhelming majority of structures on the Coeur d'Alene Reservation are located on unconsolidated sediments that respond poorly to seismic shaking. For this reason, these earthquake hazards are more pronounced in the eastern side than the developments located along the western extent of the Reservation.

Ground motion is the shaking of the ground that causes buildings to vibrate. Large structures such as office buildings, dams, and bridges may collapse. Broken gas lines and fallen electrical wires may cause fires, while broken water lines can hinder the capability of controlling fires. Landslides can also be caused by earthquakes.

Geological and seismological studies in combination with local fault lines indicate that earthquakes are likely to occur within the Coeur d'Alene Reservation.

The 1991 Uniform Building Code (UBC), a nationwide industry standard, sets construction standards for different seismic zones in the nation. UBC seismic zone rankings for Idaho are among the highest in the nation. When buildings are built to these standards they have a better chance of withstanding earthquakes. In 2002 the International Building Code (IBC) adopted the 1991 UBC earthquake standards. The Coeur d'Alene Tribe operates with compliance to the 2006 International Building Code and the 2006 International Residential Code. Given the Reservation's risk level, this is adequate caution for all new construction.

The 2006 International Building Code provides an assessment that the area is in a site class 2-B, possessing a 17%-33% chance of experiencing a horizontal spectral response acceleration for 0.2 second period with a 2% probability of exceeding the norm in 50 years (USGS 2008).

More challenging for Coeur d'Alene Reservation residents is dealing with older structures that were built prior to development of the new standards and are not in compliance. There are two main risk categories on the Coeur d'Alene Reservation; 1) unreinforced masonry structures, and 2) brick or masonry chimneys on otherwise stable wood-frame structures. The risks presented by these two categories of construction will be discussed in greater detail in subsequent sections of this plan.

4.5.5.1. Past Earthquake Events

The Upper Columbia Plateau's high mountain ranges are striking evidence of these powerful earth movements over millions of years. This entire region has been shaped by seismic forces although the events are often viewed as once-in-a-lifetime events. Although less than frequent, these events can be dramatic and often are not well predicted.

4.5.5.1.1. Sandpoint 1942

An intensity VI shock, M4.6, on November 1, 1942, centered near Sandpoint, Idaho, affected 25,000 square miles of Washington, Montana, and Idaho. The Northern Pacific Railroad partially suspended operations to inspect the right-of-way for boulders and slides. Church services were interrupted, but only minor home damage was reported.

4.5.5.1.2. Wallace Earthquake 1957

A locally sharp shock was felt at Wallace on December 18, 1957, damaging the Galena Silver Mine and frightening miners working 3,400 feet underground.

4.5.5.1.3. Borah Peak, Idaho, October 28, 1983

The Borah Peak earthquake is the largest ever recorded in Idaho - both in terms of magnitude and in amount of property damage. It caused two deaths in Challis, about 200 kilometers northeast of Boise, and an estimated $12.5 million in damage in the Challis-Mackay area. A maximum MM intensity IX was assigned to this earthquake on the basis of surface faulting. Vibrational damage to structures was assigned intensities in the VI to VII range (EHP 2009).

Spectacular surface faulting was associated with this earthquake - a 34-kilometer-long northwest-trending zone of fresh scarps and ground breakage on the southwest slope of the Lost River Range. The most extensive breakage occurred along the 8-kilometer zone between West Spring and Cedar Creek. Here, the ground surface was shattered into randomly tilted blocks several meters in width. The ground breakage was as wide as 100 meters and commonly had four to eight *en echelon* scarps as high as 1-2 meters. The throw on the faulting ranged from less than 50 centimeters on the southern-most section to 2.7 meters south of Rock Creek at the western base of Borah Peak (EHP 2009).

Other geologic effects included rockfalls and landslides on the steep slopes of the Lost River Range, water fountains and sand boils near the geologic feature of Chilly Buttes and the Mackay Reservoir, increase or decrease in flow of water in springs, and fluctuations in well water levels. A temporary lake was formed by the rising water table south of Dickey (EHP 2009).

The most severe property damage occurred in the towns of Challis and Mackay, where 11 commercial buildings and 39 private houses sustained major damage and 200 houses sustained minor to moderate damage.

At Mackay, about 80 kilometers southeast of Challis, most of the commercial structures on Main Street were damaged to some extent; building inspectors condemned eight of them. Damaged buildings were mainly of masonry construction, including brick, concrete block, or stone. Visible damage consisted of severe cracking or partial collapse of exterior walls, cracking of interior walls, and separation of ceilings and walls at connecting corners. About 90 percent of the residential chimneys were cracked, twisted, or collapsed (EHP 2009).

At Challis, less damage to buildings and chimneys was sustained, but two structures were damaged extensively: the Challis High School and a vacant concrete-block building (100 years old) on Main Street. Many aftershocks occurred through 1983. Also felt in parts in Montana, Nevada, Oregon, Utah, Washington, Wyoming, and in the Provinces of Alberta, British Columbia, and Saskatchewan, Canada.

4.5.5.1.4. Cooper Pass Earthquake 1988 (near Mullan)

A M4.1 earthquake in 1988 on the Montana-Idaho border at Cooper Pass, 7 miles northeast of Mullan was felt over 3,000 square miles with an intensity of IV at Trout Creek, Montana, and Mullan, Idaho.

4.5.5.1.5. Hoyt Mountain Earthquakes March 7 and June 3, 1994

An earthquake at Hoyt Mountain (in Shoshone County within the St. Joe River valley) in 1994 was situated on a thrust-type fault, the only fault line of this type in the area of the earthquake. Hoyt Mountain is only 25 miles east of the Coeur d'Alene Reservation.

On March 7, 1994, an earthquake, M3.5, occurred along the St. Joe River Valley, near Hoyt Mountain and the community of Avery, approximately 30 miles east of the Coeur d'Alene Reservation. On June 3, a M2.9 aftershock occurred at the same location. The main shock, centered very close to Hoyt Mountain about 6 miles southwest of Avery, was the largest earthquake in the northern Idaho region since the 1988 M4.1 Copper Pass event, and one of only a few natural earthquakes in the region since a 1942 M4.6 Sandpoint event.

The initial Hoyt Mountain shock reached a "V" intensity and was felt locally at Marble Creek and Avery and as far west as St. Maries. There were no aftershocks until the M2.9 event almost three months later. Except for a lower magnitude, the aftershock was identical to the main shock in location and focal mechanism. The fault-plane solution indicates either (1) reverse slip, or (2) a low-angle thrust faulting on a plane striking north-northwest and dipping gently northeast. The faults in the area are part of the Lewis and Clark line of fractures that extends from near Coeur d'Alene, passing through the St. Maries area, and extending over 240 miles eastward to Helena, Montana (Sprenke *et al.* 1994).

The Hoyt Mountain earthquake was felt strongly in Hoyt, Marble Creek, and Avery where houses shook, dishes rattled, a lamp "walked on a table", and an outside basketball upright swayed. On the Coeur d'Alene Reservation, the event was felt as far west as St. Maries. There were no reported structures damaged or lives lost from this event (Sprenke *et al.* 1994).

The M3.5 main shock, though small by most seismology standards, is certainly significant in the historic seismicity of the Upper Columbia Plateau.

4.5.5.1.6. Other Earthquakes in the Region

On September 22, 2003 a moderate Magnitude 3.3 earthquake was witnessed near Rathdrum, Idaho, approximately 25 miles north of the Coeur d'Alene Reservation. The quake was only 8.1 miles below the surface and caused no damage to the area (EHP 2009).

A magnitude 5.6 earthquake occurred approximately 14 miles north of Dillon, Montana, on July 26, 2005. Another magnitude 4.5 earthquake occurred about 35 miles northeast of Dillon, Montana, on May 8, 2007. These two events were 200 miles southeast of the Coeur d'Alene Reservation but both were felt by residents on the Reservation. The network of fault lines passing through the entire Upper Columbia Plateau link these areas in a profile of a seismic network. There have been no reports of damage (EHP 2009) from these quakes.

4.5.5.1.7. Rockburst Events

Because of over a century of deep mining activities in nearby Shoshone County, rockbursts are an important risk exposure consideration. Rockbursts are the result of brittle fracturing of rock, causing it to collapse rapidly with violent expulsion of rock that can be 100 to 200 tons or more. This release of energy reduces the potential energy of the rock around the excavation. Further explanation gives rationalization that the changes brought about by the mine's redistribution of stress triggers latent seismic events (Marshak 2001).

The likelihood of rockbursts increase as depth of the mine increases. Rockbursts are also affected by the size of the excavation, becoming more likely as the excavation size increases. Induced seismicity such as faulty mining engineering methods can trigger rockbursts. Other causes of rockbursts are the presence of faults, dykes, or joints in conjunction with mining activity, which are common occurrences (Monroe & Wicander 1997).

4.5.6. Fault Lines

In geology, a fault is a planar fracture or discontinuity in a volume of rock, across which there has been significant displacement. Large faults within the Earth's crust result from the action of tectonic forces. Energy release associated with rapid movement on active faults is the cause of most earthquakes. A fault line is the surface trace of a fault, the line of intersection between the fault plane and the Earth's surface (Tingley & Pizarro 2000).

Since faults do not usually consist of a single, clean fracture, geologists use the term 'fault zone' when referring to the zone of complex deformation associated with the fault plane. Across the Coeur d'Alene Reservation there are approximately 80 individual fault lines (Figure XLVIII).

The two sides of a non-vertical fault are known as the hanging wall and footwall. By definition, the hanging wall occurs above the fault and the footwall occurs below the fault (USGS 2000). Most of the seismic activity takes place where two or more plates meet. Plates may collide, pull apart, or scrape past each other. Because of friction and the rigidity of the rock, the rocks cannot simply glide or flow past each other. Rather, stress builds up in rocks and when it reaches a level that exceeds the strain threshold, the accumulated potential energy is released as strain, which is focused into a plane along which relative motion is accommodated; the fault (Tingley & Pizarro 2000).

All the stress and strain produced by moving plates builds up in the Earth's rocky crust until it cannot store the contained energy any more. Suddenly, the rock breaks and the two blocks move in opposite directions along a more or less planar fracture surface called a fault.

The sudden movement generates an earthquake at a point called the focus. The energy from the earthquake spreads out as seismic waves in all directions. The epicenter of the earthquake is the location where seismic waves reach the surface directly above the focus (USGS 2000).

4.5.6.1. Normal Fault

Faults are classified by how the two rocky blocks on either side of a fault move relative to each other. A normal fault drops rock on one side of the fault down relative to the other side (Figure XLIV).

4.5.6.2. Reverse Fault

Along a reverse fault one rocky block is pushed up relative to rock on the other side (Figure XLV).

4.5.6.3. Strike-slip fault

Strike-slip faults have a different type of movement than normal and reverse faults (Figure XLVI). The blocks that move on either side of a reverse or normal fault slide up or down along a dipping fault surface. The rocky blocks on either side of strike-slip faults scrape along side-by-side. The movement is horizontal and the rock layers beneath the surface are not moved up or down on either side of the fault.

Pure strike-slip faults do not produce fault scarps. There are other changes in the landscape that signal strike-slip faulting. Where the two massive blocks on either side of a strike-slip fault grind against each other, rock is weakened. Streams flowing across strike-slip faults are often diverted to flow along this weakened zone.

4.5.6.4. Real-life

In “real-life” faulting is not always exposed by such a simple pictures (Figure XLIV, Figure XLV, Figure XLVI). Usually faults do not have purely up-and-down or side-by-side movement as described here. It is much more common to have some combination of fault movements occurring together. For example, along California’s famous San Andreas strike-slip fault system, about 95% of the movement is strike-slip, but about 5% of the movement is reverse faulting in some areas (USGS 2000).

Figure XLIV. Normal Fault.

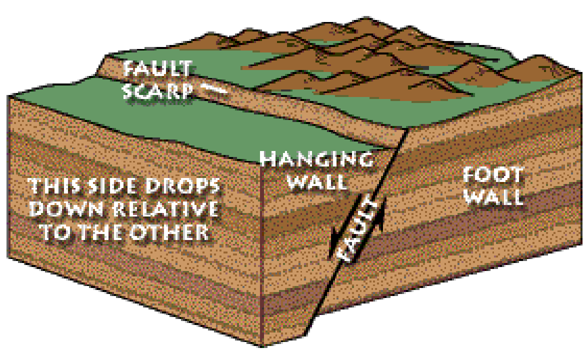


Figure XLV. Reverse Fault.

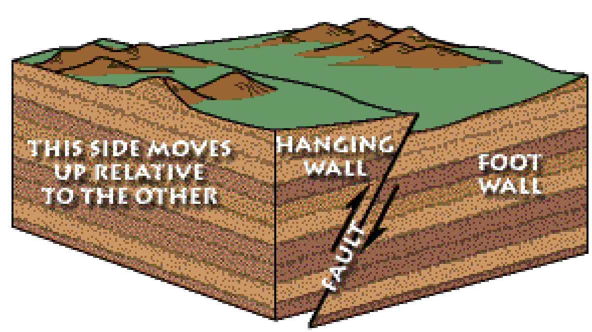


Figure XLVI. Strike-slip Fault

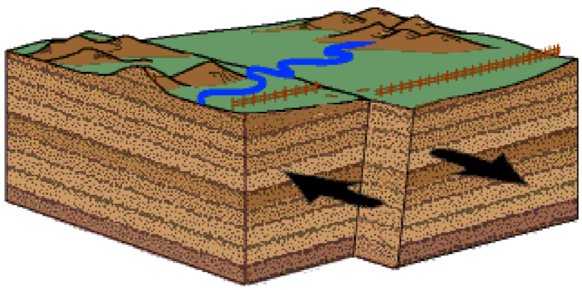


Figure XLIV, Figure XLV, Figure XLVI are all contributed by USGS (2000).

Within the Coeur d'Alene Reservation, the fault lines present are all categorized as "Normal Faults". These normal faults occur in places where the outer shell of the Earth's crust is being stretched. Normal faults can show different geometries. In some situations the faults can become gently dipping at depth so that they have a spoon (or listric) shape. Other normal faults are found in batches, dipping in the same direction, with rotated fault blocks between. These are termed domino faults and can be seen in the northeastern sections of the Coeur d'Alene Reservation (Figure XLVIII).

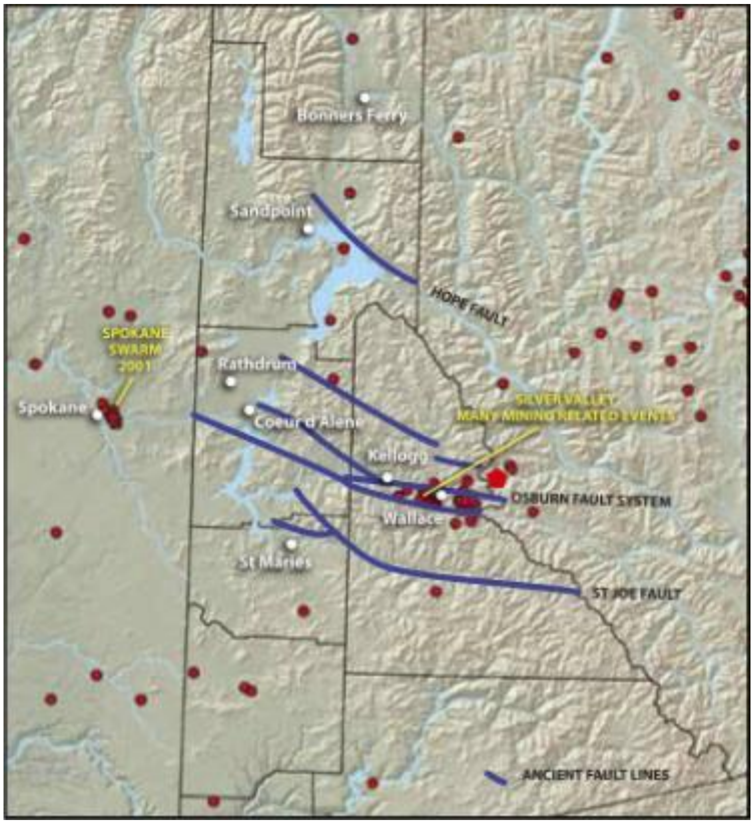
4.5.6.5. Lewis and Clark Fault Zone

The Lewis and Clark Zone is a megashear in the earth's crust, up to 30 miles wide, which cuts some 240 miles through north Idaho and northwestern Montana (Figure XLVII). Geologic studies have shown that the North American plate has been sheared along this zone repeatedly over the past billion years (IBHS 2010). The most obvious manifestation of the zone is a series of valleys that follow brittle fault zones across the grain of the northern Rocky Mountains from Helena through Missoula, Montana, to Coeur d'Alene, Idaho. These valleys provided a natural transportation corridor through the mountains used in part by Lewis and Clark in 1806 and the Mullan Trail of the 1850s, and today by Interstate 90 (IBHS 2010).

The St. Joe River is one such valley that follows the course of one of the fault lines in this zone (Figure XLVII).

Along the Lewis and Clark Zone in Idaho, many mining-related seismic events, called rockbursts, have occurred. The destructive 1935 magnitude 6.25 and 6.0 Helena Valley earthquakes occurred near the eastern end of the Lewis and Clark Fault Zone in Montana (IBHS 2010). The possibility that the western end of the zone is also capable of such large earthquakes, creates a considerable earthquake shaking hazard for the residents of Wallace, Kellogg, Coeur d'Alene, Rathdrum, Sandpoint and all of the Coeur d'Alene Reservation.

Figure XLVII. Lewis and Clark Fault Zone, including the St. Joe Fault Line (IBHS 2010).



4.5.7. Brick and Mortar vs. Seismic Shaking

4.5.7.1. Unreinforced Masonry Buildings

Masonry boasts a remarkable compressive strength (vertical loads) but is much lower in tensile strength (twisting or stretching), unless reinforced. The tensile strength of masonry walls can be increased by thickening the wall, or by building masonry "piers" (vertical columns or ribs) at intervals. Where practical, steel reinforcement also can be introduced vertically and/or horizontally to greatly increase tensile strength, though this is most commonly done with poured walls.

Early 20th century masonry construction techniques did not use the technology of reinforcement as is used today. Unreinforced masonry buildings are a type of structure where load-bearing walls, non-load-bearing walls, or other structures such as chimneys are made of brick, cinderblock, tiles, adobe, or other masonry material that is not braced by reinforcing beams (CSSC 2005). The term is used as a classification of certain structures for earthquake safety purposes, and is subject to some variation from place to place (ABAG 2003).

Unreinforced masonry buildings were constructed in an era when reinforcing was generally not used. Anchorage to floor and roof was generally missing and the use of low-strength lime mortar was common. Construction of reinforced masonry became common sometime between 1933 and 1955, depending on local codes and stringency of code enforcement. Within Benewah County and Kootenai County, unreinforced masonry buildings may have been erected as recently as 1975 and still met the conditions of county building codes.

Unreinforced masonry structures are vulnerable to collapse in an earthquake. One problem is that most mortar used to hold bricks together is not strong enough (CSSC 2005). Additionally, masonry elements may "peel" from the building and fall onto occupants in the building or pedestrians outside (Perkins 2004).

Building retrofits are relatively expensive, and may include tying building walls to the foundation, tying building elements (such as roof and walls) to each other, so the building moves as a single unit rather than creating internal shear during an earthquake, attaching walls more securely to underlying supports so they do not buckle and collapse, and bracing or removing parapets and other unsecured decorative elements (Perkins 2004, CSD 2008). Retrofits are generally intended to prevent injury and death to people, not to preserve the building itself (Perkins 2004).

Earthquake damage to unreinforced masonry structures can be severe and hazardous. The lack of reinforcement coupled with poor mortar and inadequate roof-to-wall ties can result in substantial damage to the building as a whole as well as to specific sections of it. Severely cracked or leaning walls are some of the most common earthquake damages. Also hazardous, but slightly less noticeable, is the damage that may occur between the walls, and roof and floor diaphragms. Separation between the framing and the walls can jeopardize the vertical support of roof and floor systems, which could lead to the collapse of the structure (ABAG 2003).

Although the Coeur d'Alene Reservation contains many buildings constructed from masonry materials that may or may not have been reinforced during or after initial construction, most of these structures are located in City municipalities. Many of the structures in St. Maries, for example, were built early in the 20th century. Today, many of the structures located in the "old town" area of St. Maries along College Ave. and are from an era that used materials and construction techniques that place them at extremely high risk to seismic shaking hazard destruction.

4.5.7.2. Brick Chimneys

Thousands of homes on the Coeur d'Alene Reservation are built with wood-frame construction techniques. These homes and businesses are typically considered resistant to seismic shaking hazards. However, many of these homes have incorporated a brick chimney appendage. Chimneys placed internally to the frame of the home are considered more resistant to loss from shaking hazards. Those that append the chimney to the side of the home are more at risk to falling bricks from earthquake-induced shaking.

When coupled with fault lines across the region and the periodic earthquakes in the region, much of the Coeur d'Alene Reservation is at risk to shaking losses. These losses could be greatly mitigated by reinforcing buildings that lack reinforcement. The goal of reinforcement is not to save the buildings, but to reduce the risk of damaging people in the structure and next to it when a shaking disaster strikes (ABAG 2003).

How to Identify unreinforced masonry buildings (CSSC 2005):

- Bricks or stone can be seen from the outside (unless the walls are covered with stucco).
- Brick walls have "header courses" of bricks turned endways every five or six rows.
- Structure is brick or masonry and is known to be built before 1933.

If visual inspection cannot determine these components from the outside, investigations behind electrical cover plates and electrical outlet boxes on an outside wall may reveal brick or other masonry materials. If the wall is concrete or concrete block, it is very difficult to find out if reinforcing steel was added during construction.

Other sources of verification:

- Look for copies of the structural plans, which may be on file with the Building Department, or

- Consult a licensed engineer to make the determination.

Suggestions:

- It is very expensive to shore up a house, remove damaged walls, and put in new walls.
- Consult a licensed architect or engineer to fix this problem.
- Another solution might involve
    - Tying the walls to the floor and roof.
    - Installing a steel frame and bolting the wall to it.

4.5.8. Probability of Future Events

The probability of earthquake events within the Coeur d'Alene Reservation is a 6% to 15% chance of exceeding 10% peak ground acceleration in 50 years (FEMA 2009). This places the Coeur d'Alene Reservation in the next-to-lowest national classification of likely damages due to earthquakes.

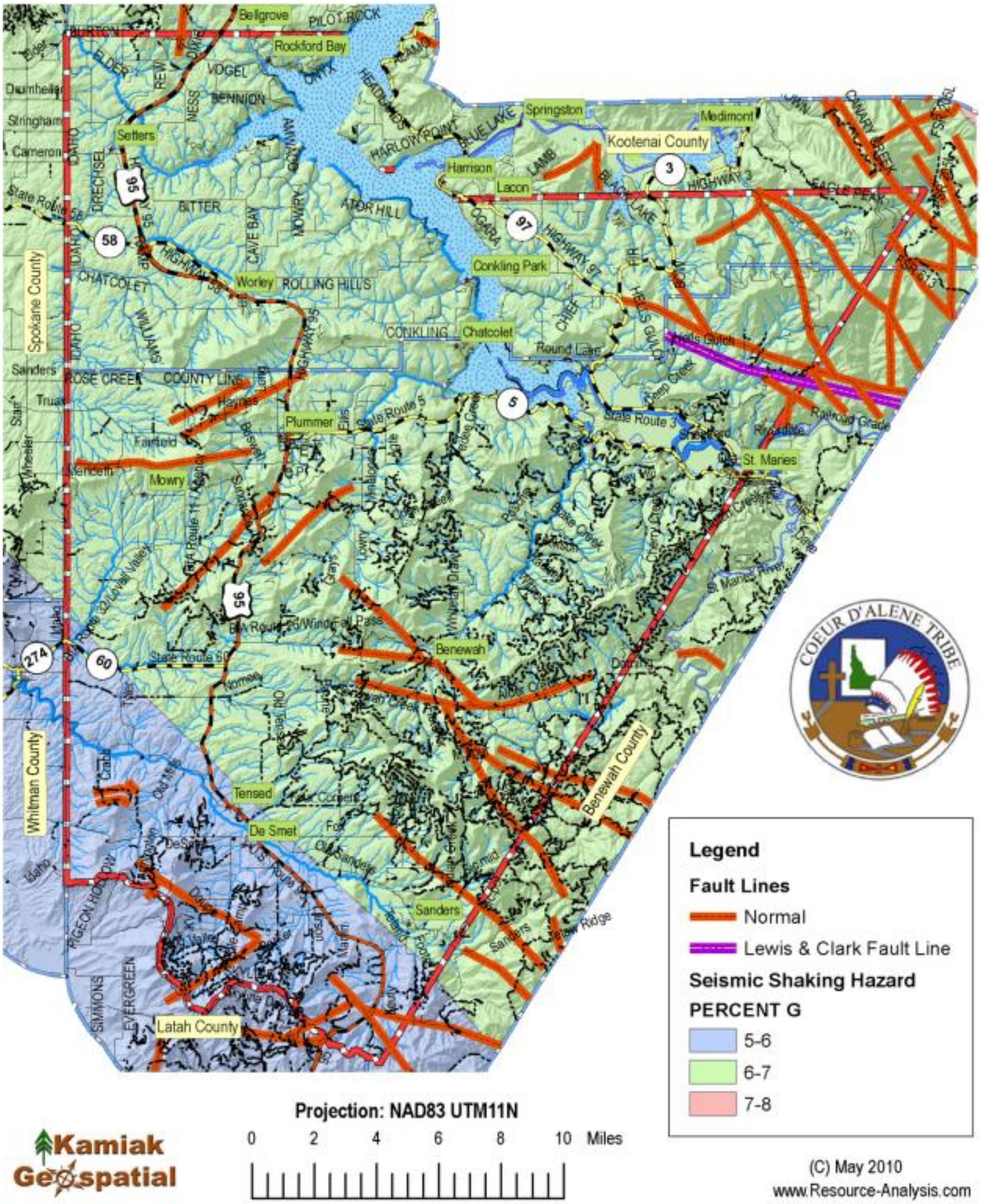
The Coeur d'Alene Reservation has a moderate probability of future earthquake events with those events expected to be seen as infrequently as once every 25 years and with Mercalli magnitudes of IV to VII (Table 28). Although the frequency and the intensity of expected earthquakes is low, the potential for a significant event is real, as indicated by other historical events within the "geologic neighborhood".

4.5.9. Resources at Risk

The exposure of resources on the Coeur d'Alene Reservation to earthquake damage is not localized to small areas. Literally, all of the Coeur d'Alene Reservation is exposed to losses potentially resulting from seismic shaking hazards and fault line tremors. Analysts have estimated that the seismic shaking hazards for all except the most southern part of the Reservation is in the range of moderate risk (6-7%G), encompassing most of the populated places. The most southern extent of the Reservation, including DeSmet, Tensed, and Sanders is in a lower-risk category (5-6%G).

These risk exposures are moderated by the relatively low occurrence of earthquakes of large scale in the region (Figure XLVIII).

Figure XLVIII. Fault lines and Seismic Shaking Hazards of the Coeur d'Alene Reservation.



While all structures are potentially at risk to damage from earthquakes on the Coeur d'Alene Reservation, a special category of structures are at increased risk. These are the previously discussed brick and masonry buildings and chimney structures found throughout the Coeur d'Alene Reservation but concentrated in St. Maries and to a lesser extent in Worley, Plummer, and DeSmet.

In most communities, wood-frame construction dominates the architectural scene. These structures are generally considered at lower risk to earthquake damage. A complete structure level inventory of masonry building construction date, reinforcement condition, or chimney stability has not been completed. A recommendation of this planning effort is to begin the process at the Tribal level to address risk exposure. As these inventories are created, increasing the structural integrity of external wall chimneys by reinforcement can begin.

The value of resources at risk to earthquake losses are partially explained by the seismic shaking hazard risks on the Coeur d'Alene Reservation. There are only two risk categories (6-7%G and 5-6%G) found within the Reservation (Figure XLVIII). Higher risks are witnessed to the east of the present day external boundaries of the Coeur d'Alene Reservation.

The vast majority of the value of all structures on the Coeur d'Alene Reservation (95%) is located within the higher-risk category of 6-7%G located in the northern 90% of the Reservation (Figure XLVIII). The communities with the highest concentration of privately owned structures in the higher seismic shaking category (6-7%G) include St. Maries, Rockford Bay, and Plummer, with values at risk of $45.2 million (719 structures), $45.0 million (703 structures), and $30.6 million (494 structures), respectively (Table 29). The same analysis is consistent for the non-privately owned structures where Plummer and St. Maries represent the highest concentration of structures in the highest category of seismic shaking hazards with $40.1 million (96 structures) and $12.1 million (30 structures), respectively (Table 29). These assessments include only structures located within the external boundaries of the Coeur d'Alene Reservation.

Table 29. Structure values and count, based on location and seismic shaking hazards.

	Privately Owned Structures			Non-Privately Owned Structures		
Community Name	**6-7%G**	**5-6%G**	**Count**	**6-7%G**	**5-6%G**	**Count**
AGENCY	$-	$-	0	$1,303,983	$-	7
BELLGROVE	$1,789,557	$-	28	$-	$-	0
BENEWAH	$10,569,542	$-	179	$-	$-	0
CHATCOLET	$10,856,722	$-	183	$2,750,000	$-	4
CONKLING PARK	$14,462,436	$-	233	$1,372,688	$-	5
DE SMET	$256,868	$2,078,998	47	$-	$15,247,304	42
HARRISON	$9,674,032	$-	171	$674,000	$-	5
HEYBURN STATE PARK	$-	$-	0	$8,600,000	$-	13
LACON	$6,119,520	$-	108	$112,680	$-	2
MEDIMONT	$7,752,370	$-	145	$-	$-	0
MOWRY	$2,974,175	$349,991	65	$304,000	$-	2
PLUMMER	$30,582,542	$-	494	$40,144,417	$-	96
ROCKFORD BAY	$44,967,030	$-	703	$1,060,424	$-	9
SANDERS	$3,129,516	$2,454,984	97	$304,000	$-	2
SETTERS	$5,359,908	$-	89	$12,000,000	$-	1
ST. MARIES	$45,222,390	$-	719	$12,171,841	$-	30
TENSED	$663,070	$6,190,560	127	$-	$2,269,387	13
WORLEY	$11,476,992	$-	190	$127,968,593	$-	82
Summary Count	**3,375**	**203**	**3,578**	**258**	**55**	**313**
Summary Value	**$289,323,901**	**$9,157,866**		**$208,766,626**	**$17,516,691**	

4.5.10. Potential Mitigation Activities

Seismic retrofitting is the modification of existing structures to make them more resistant to seismic activity, ground motion, or soil failure due to earthquakes. With better understanding of seismic demand on structures and with recent experiences with large earthquakes near urban centers, the need of seismic retrofitting is well acknowledged. Prior to the introduction of modern seismic codes in the U.S. during the late 1960s, many structures were designed without adequate detailing and reinforcement for seismic protection (Pampanin 2006). This is the case in much of northern Idaho. In view of the imminent problem, various research work has been carried out worldwide. Furthermore, state-of-the-art technical guidelines for seismic assessment, retrofit and rehabilitation have been published (FEMA P-420 2009).

Retrofit techniques are applicable for other natural hazards such as tornadoes, and severe winds from thunderstorms. While the current practice of seismic retrofitting is concerned with structural improvements to reduce the seismic hazard of using the structures, it is essential to reduce the hazards and losses from non-structural elements as well (FEMA P-420 2009). Methods of reducing hazards within schools, hospitals, homes, office buildings, and other commercial buildings, and general disaster preparation are found in related articles on household seismic safety published by FEMA. It is important to keep in mind that there is no such thing as an earthquake-proof structure, although seismic performance can be greatly enhanced through proper initial design or subsequent modifications (FEMA P-420 2009).

A Coeur d'Alene Tribal Comprehensive Building Plan and strategy for preparing for earthquakes should include (FEMA 2009):

- Assessment of seismic hazards to quantify and understand the threat;
- Adoption and enforcement of seismic building code provisions especially in reference to chimneys and brick or masonry buildings, including pre-existing structures;
- Implementation of land use and development policy to reduce exposure to earthquake hazards;
- Implementation of retrofit, redevelopment, and abatement programs to strengthen existing structures, especially the unreinforced masonry buildings;
- Implementation of reinforcement to extended brick and masonry chimney structures prone to collapse during seismic events;
- Support of ongoing public-education efforts to raise awareness and build support; and
- Development and continuation of collaborative public/private partnerships to build a prepared and resilient community.

The media can raise awareness about earthquakes by providing important information to the community. Here are some suggestions (FEMA 2009):

- Publish a special section in Council Fires with emergency information on earthquakes. Localize the information by printing the phone numbers of local emergency services offices, the American Red Cross, and hospitals.
- Conduct a week-long series on locating earthquake hazards in the home.
- Work with local emergency services and American Red Cross officials to prepare special reports for people with mobility impairments on what to do during an earthquake.
- Provide tips on conducting earthquake drills in the home, schools, and public buildings.
- Interview representatives of the gas, electric, and water companies about shutting off utilities.

4.6. Landslides & Mass Wasting

A landslide is a geological phenomenon that includes a wide range of ground movement such as rock falls, deep failure of slopes, and shallow debris flows. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability. Typically, pre-conditional factors build up specific sub-surface conditions that make a slope prone to failure, although the actual landslide often requires a trigger before being released.

The term “landslide” covers a variety of processes and landforms known as rockslide, rockfall, debris flow, liquefaction, slump, earthflow, and mudflow. The IGS has identified and plotted over 3,000 landslides in Idaho for the USGS's national landslide appraisal. Landslides are a recurrent menace to waterways and highways and a threat to homes, schools, businesses, and other facilities.

Landslides may be triggered by other natural hazards such as earthquakes and floods. Weather and climate factors, such as melting snow and rain, that increase the water content of earth materials may fuel slope instability. The activities of urban and rural living with excavations, roads, drainage ways, landscape watering, logging, and agricultural irrigation may also disturb the stability of landforms. Late spring and early summer is slide season, particularly after days and weeks of greater than normal precipitation.

Landslides are costly. The entire Upper Columbia Plateau faces the challenge of maintaining major travel routes. Redirecting local and through traffic around a landslide is not an option in many places. Alternative routes often do not exist, and detours in steep terrain are difficult or impossible to construct. The unimpeded movement over roads—whether for commerce, public utilities, school, emergencies, police, recreation, or tourism—is essential to a normally functioning society. The disruption and dislocation caused by landslides can quickly jeopardize that freedom and vital services.

State Route 5 connects Plummer to St. Maries. State Routes 3 and 97 connect St. Maries to Harrison. These routes traverse steep canyon walls and a combination of lake valley bottoms, hilltop vistas, and steep slope grades. Falling rocks, mudslides, and earthflows are possible during most of the year when facilitated by triggering events such as freeze / thaw sessions over night / day cycles, heavy rains or snowfall, or uphill site disruptions.

Deep canyons drain toward the network of river systems and cut through the basalt flows that underlie the Coeur d’Alene Reservation. These flows are interbedded with loose, unstable sedimentary layers that are exposed in the deeply incised canyons. Exposure of this unconsolidated sedimentary layer increases landslide potential wherever these deposits are present on steep slopes. Weathering and climatic events lead to landslide activity, with the scale of the event largely dependent on the environmental conditions leading up to the event. Roads and structures in any area where logging roads or other roads have cut through steep basalt fields are also at increased risk.

The Hangman Creek watershed located in the southern portions of the Coeur d’Alene Reservation can be divided into three distinct geological regions; these are 1) a small section of its upper headwaters, 2) a long and broad valley, and 3) channeled scablands. In its headwaters, Hangman Creek flows through steep foothills. The topography here includes steep ridges and peaks dissected by deep, forested close-to-bedrock valleys, drained by rocky and steep streams, with a light covering of soil. After its mountainous headwaters, Hangman Creek passes through the much more flattened, Palouse Hills. Below the deep loess in the Palouse Hills, a basalt layer separates the creek from groundwater, which finally rises to meet the stream’s surface elevation near Tekoa. Most of Hangman Creek flows in a broad and shallow, arid valley atop several hundred feet of alluvial deposits.

A documented landslide (SHELDUS, Table 21) occurred on January 15th, 2006, in the construction of U.S. Highway 95 north of Worley. This landslide occurred as a result of construction which disrupted the natural landscape. It resulted in approximately $7,500 in damages to the project. No injuries were reported.

Most of the landslides on the Coeur d'Alene Reservation recalled in memory by local residents and the Planning Committee members have occurred along County or Forest Service roads and may in some cases be a result of road construction or maintenance activities. A few re-occurring slide areas cause damage to the paved road surface and require cleanup of slide debris on a fairly regular basis – even annually or twice every three years (especially State Highway 97).

4.6.1. Types of Landslides

4.6.1.1. Debris flow

Slope material that becomes saturated with water may develop into a debris flow or mud flow. The resulting slurry of rock and mud may pick up trees, houses, and cars, blocking bridges and tributaries, and causing flooding along its path. Debris flow is often mistaken for flash flood, but they are entirely different processes.

Muddy-debris flows in alpine areas cause severe damage to structures and infrastructure and often claim human lives. Muddy-debris flows can start as a result of slope-related factors, and shallow landslides can dam streambeds, resulting in temporary water blockage. As the impoundments fail, a "domino effect" may be created, with a remarkable growth in the volume of the flowing mass as it takes up the debris in the stream channel. The solid-liquid mixture can reach densities of up to 3,350 pounds per cubic yard and velocities of up to 46 feet per second (Luino 2004; Arattano and Marchi 2005).

These processes normally cause the first severe road interruptions, due not only to deposits accumulated on the road, but in some cases to the complete removal of bridges, roadways, or railways crossing the stream channel. Damage usually derives from a common underestimation of mud-debris flows. In high-elevation valleys, for example, bridges are frequently destroyed by the impact force of the flow because their span is generally calculated to accommodate water discharge.

4.6.1.2. Earth flow

Earthflows are downslope, viscous flows of saturated, fine-grained materials, which move at any speed from slow to fast. Typically, they can move at speeds from 500 feet per hour to 15 miles per hour. Though these are a lot like mudflows, overall they are slower moving and are covered with solid material carried along by flow from within. Clay, fine sand and silt, and fine-grained, pyroclastic material are all susceptible to earthflows. The velocity of the earthflow is all dependent on how much water is contained in the flow itself. The greater the water content in the flow, the higher the velocity will be (Arattano and Marchi 2005).

These flows usually begin when the pore pressures in a fine-grained mass increase until enough of the weight of the material is supported by pore water to significantly decrease the internal shear strength of the material. This thereby creates a bulging lobe that advances with a slow, rolling motion. As these lobes spread out, drainage of the mass increases and the margins dry out, thereby lowering the overall velocity of the flow. This process causes the flow to thicken. The bulbous variety of earthflows is not that spectacular, but they are much more common than their rapid counterparts. This variety develops a sag at its head and is usually derived from slumping at the source.

Earthflows on the Coeur d'Alene Reservation can occur during periods of high precipitation, which saturates the ground and adds water content to the slope. Fissures that develop during the movement of clay-like material allow the intrusion of water into the earthflows. Water then increases the pore-water pressure and reduces the shearing strength of the material (Easterbrook 1999).

4.6.1.3. Debris avalanche and debris slide

A debris avalanche is a type of slide characterized by the chaotic movement of rocks, soil, and debris mixed with water or ice (or both). They are usually triggered by the saturation of thickly vegetated slopes, resulting in an incoherent mixture of broken timber, smaller vegetation and other debris (Easterbrook 1999). Debris avalanches differ from debris slides because their movement is much more rapid. This is usually a result of lower cohesion or higher water content and generally steeper slopes.

Debris slides generally begin with large blocks that slump at the head of the slide and then break apart as they move towards the toe. This process is much slower than that of a debris avalanche. In a debris avalanche this progressive failure is very rapid and the entire mass seems to somewhat liquefy as it moves down the slope. This is caused by the combination of the excessive saturation of the material, and very steep slopes. As the mass moves down the slope it generally follows stream channels, leaving behind a V-shaped scar that spreads out downhill. This differs from the more U-shaped scar of a slump. Debris avalanches can also travel well past the foot of the slope due to their tremendous speed (Schuster and Krizek 1978).

4.6.1.4. Sturzstrom

A sturzstrom is a rare, poorly understood type of landslide, typically with a long run-out. Often very large, these slides are unusually mobile, flowing very far over a low angle, flat, or even slightly uphill terrain. They are suspected of "riding" on a blanket of pressurized air, thus reducing friction with the underlying surface.

4.6.1.5. Shallow landslide

A shallow landslide is common where the sliding surface is located within the soil mantle or on weathered bedrock (typically to a depth from a few feet to many yards). They usually include debris slides, debris flow, and failures of road-cut slopes. Landslides occurring as single large blocks of rock moving slowly down slope are sometimes called block glides.

Shallow landslides can often happen in areas that have slopes with highly permeable soils on top of low-permeability bottom soils or hardpan. The low-permeability bottom soils trap the water in the shallower, highly permeable soils, creating high water pressure in the top soils. As the top soils are filled with water and become heavy, slopes can become very unstable and material will slide over the low permeability bottom soils. This can happen within the Coeur d'Alene Reservation where a slope with silt and sand as its top soil sits on top of bedrock. During an intense rainstorm, the bedrock will keep the rain trapped in the top soils of silt and sand. As the topsoil becomes saturated and heavy, it can start to slide over the bedrock and become a shallow landslide.

4.6.1.6. Deep-seated landslide

In deep-seated landslides the sliding surface is mostly deeply located below the maximum rooting depth of trees (typically to depths greater than 30 feet). Deep-seated landslides usually involve deep regolith, weathered rock, and/or bedrock and include large scale slope failure associated with translational, rotational, or complex movement.

4.6.2. Coeur d'Alene Reservation Landslide Prone Landscapes

All of these landslide types can occur on the Coeur d'Alene Reservation, although the sturzstrom variant is unlikely. The materials may move by falling, toppling, sliding, spreading, or flowing. Some landslides are rapid, occurring in seconds, whereas others may take hours, weeks, or even longer to develop. Although landslides usually occur on steep slopes, they also can occur in areas of low relief. Landslides can occur as ground failure of river bluffs, cut-and-fill failures that may accompany road construction and building excavations, collapse of mine-waste piles, and slope failures associated with quarries and open-pit mines.

The primary factors that increase landslide risk on the Coeur d'Alene Reservation are slope and certain soil characteristics. In general, the potential for landslide occurrence intensifies as slope increases on all soil types and across a wide range of geological formations.

Soil factors that increase the potential for landslide are soils developed from parent materials high in schist and granite, and soils that are less permeable, containing a resistive or hardpan layer. These soils tend to exhibit higher landslide potential under saturated conditions than do well-drained soils. To identify the high-risk soils on the Coeur d'Alene Reservation, the USDA Natural Resources Conservation Service (NRCS) State Soils Geographic Database (STATSGO) layers were used to identify the location and characteristics of all soils on the Reservation. This involved assembling together the datasets for the Coeur d'Alene Reservation and included in the Benewah County (ID607) database, the St. Joe river (parts of Benewah County and Shoshone County – ID608), and Kootenai County (ID606). The specific characteristics of each major soil type within each dataset were reviewed for all of the Coeur d'Alene Reservation.

Soils with very low permeability that characteristically have developed a hardpan layer or have developed from schist and granite parent material were selected as soils with potentially high landslide risk potential. High-risk soils magnify the effect of slope on landslide potential. Soils identified as having high potential landslide risk are further identified with increasing slopes corresponding to increasing landslide risk.

These factors were combined with vegetation characteristics (type of land cover) and canopy cover (vegetation density). Through this analysis, it was determined that while an evergreen forest is a relatively stable site against landslides, it is less stable when on steep slopes, and even more unstable where all vegetation has been removed (from logging or a wildfire, for example).

The features of the local topography are important to consider in terms of the potential to move under landslide forces. The top of an otherwise stable ridgeline is considered less prone to move than a similar combination of factors located lower on the hillside, or even near the bottom of the slope. In order to accommodate these factors, the amount of land surface located uphill of each site was factored into the risk profile for potential landslide occurrence.

To portray areas of probable landslide risk due to elevation, slope, vegetative cover, canopy coverage, and position on the hillside, data for these factors were combined into one predictive model called Landslide Prone Landscapes. This model shows the relative landslide risk on the Coeur d'Alene Reservation; it is based on the technique developed by Schlosser (2003 & 2005) and enhanced by Schlosser (2009). A Landslide Prone Landscapes assessment was completed for this Coeur d'Alene Reservation Tribal Hazards Mitigation Plan analysis (Figure XLIX).

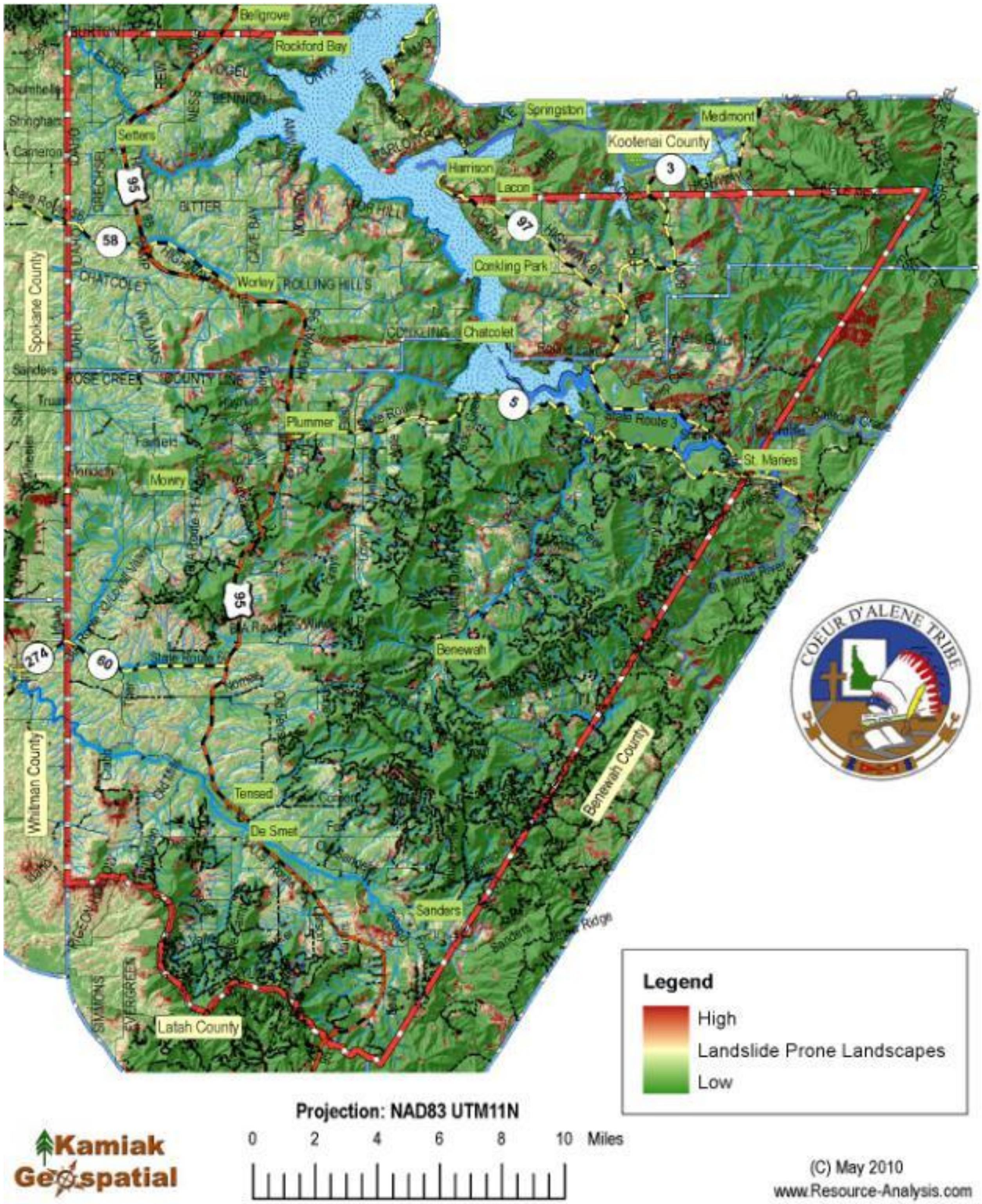
From the Landslide Prone Landscape profile produced, it is possible to depict areas of risk and their proximity to development and human activity. With additional field reconnaissance, the areas of high risk were further defined by overlaying additional data points identifying actual slide locations (although these data were relatively limited), thus improving the resolution by specifically identifying the highest-risk areas. This method of analysis builds on a method developed by the Clearwater National Forest in north-central Idaho (McClelland *et al.* 1997).

A risk-rating score of zero represents no relative risk and a score of one hundred is considered extreme risk. In practice, very few areas of the highest risk category (100) are found. This rating scale should be considered as nominal data, producing values that can be ordered sequentially, but the actual values are not multiplicative. This means that a site ranking 20 on this scale is not "twice as risky" as a site ranking 10. The scale provides relative comparisons between sites.

The analysis of all areas on the Coeur d'Alene Reservation reveals that a significant area of land is not subject to landslide risks without substantial surface disturbances. While these findings would seem to indicate that there is little or no risk of landslide on the Coeur d'Alene Reservation, that would be an incorrect interpretation. This assessment concludes that most slopes are relatively stable until they are disturbed by some activity. These activities could include road building, development, settlement, or mass vegetation characteristic changes. These activities may also involve a combination of several forces such as logging or wildfire followed by heavy rains, or other natural disasters on steep slopes. Once disrupted, sites can become unstable with little or no warning.

An illustrative example is the relatively stable slopes of State Route 97 between Harrison and St. Maries, which seasonally drops rocks onto the road surface because of freeze-thaw transitions between day and night. The slopes are stable, but the ice-wedging along cracks releases rocks to fall.

Figure XLIX. Landslide Prone Landscapes predicted on the Coeur d'Alene Reservation.



Landslides may occur on slopes steepened during construction, or on natural ground never disturbed. However, most slides occur in areas that have had sliding in the past. All landslides are initiated by factors such as weaknesses in the rock and soil, earthquake activity, the occurrence of heavy snow or rainfall, or construction activity that changes a critical factor involved with maintaining stability of the soil or geology of the area. A prime example of this includes previously stable slopes where home construction utilizing independent septic systems are added. The increased moisture in the ground, when coupled with an impermeable layer below the septic systems, leads to surface-soil movements and mass wasting (Figure LI).

Figure L. Development and construction uphill of this site, caused changes to subsurface water flows, leading to this landslide adjacent to State Hwy 97, near Harrison.

Stream and riverbank erosion, road building, or other excavation can remove the toe or lateral slope and exacerbate landslides. Seismic or volcanic activity often triggers landslides as well. Urban and rural developments with excavations, roads, drainage ways, landscape watering, logging, and agricultural irrigation may also disturb the solidity of landforms, triggering landslides. In general, land use changes that affect drainage patterns, increases erosion, or changes ground water levels can augment the potential for landslide activity.

Landslides are a recurrent menace to waterways and highways and a threat to homes, schools, businesses, and other facilities. The unimpeded movement over roads—whether for commerce, public utilities, school, emergencies, police, recreation, or tourism—is essential to a normally functioning landscape. The steep walls of the Reservation's roads along river drainages pose special problems. The disruption and dislocation of these or any other routes caused by landslides and rock fall can quickly jeopardize travel and vital services.

4.6.3. Probability of Future Events

In order to put these Landslide Prone Landscape numbers in terms of probability of occurrence, the Landslide Prone Landscapes rating score can be modified to represent a probability of a landslide event occurring during a given period of time. The lower the Landslide Prone Landscapes rating score, the lower the probability of witnessing a landslide event in that area. Directly, the Landslide Prone Landscapes rating score can be converted to a probability by stating the relative score as a probability of occurrence within a 50-year period. Using the conversion defined by the Extreme Value Theory (Castillo 1988), the 50-year landslide probability event would be stated as the Landslide Prone Landscapes rating score converted to a percent. <u>Thus, a Landslide Prone Landscapes rating score of 25 represents a 25% probability of witnessing a 50-year landslide event.</u> This conversion is intended for illustrative purposes only and the actual probability of occurrence on a particular site may differ from these estimates.

The probability of landslide events within the Coeur d'Alene Reservation is moderate-to-high and greatly dependent on topography, soils, hydrologic functioning, and human-induced land use changes. This places specific points within the Coeur d'Alene Reservation likely to experience damages due to landslides. Other locations, where topography is moderate and surface resources are maintained at stable conditions (native vegetation, sufficient drainage, etc.), landslides are not expected to occur.

Ordinarily, the Coeur d'Alene Reservation is expected to experience landslide events curtailing transportation networks, damaging structures, or blocking streams in a moderate frequency (occurrence about once every 5 to 25 years).

Further extrapolation of these data can be made in order to better understand the probability of future landslide events on the Coeur d'Alene Reservation. If the site is left undisturbed, the risk of future landslide events for each area evaluated can be estimated as the risk-rating score expressed in a percent (rating score of 15, expressed as 15%). This modified score can then be treated as an expression of the likelihood of that area experiencing a landslide event within the next 50-year period. Of course, certain areas that become modified for developments or road building may experience increased landslide periodicity in response to the modification. Off-site modifications, such as developments, logging, or wildfires can also modify this risk-rating scale to cause increased landslide occurrence downslope of the activity. In the same light, mitigation measures can be expected to decrease the likelihood of continued landslide events. This expression of potential probability of occurrence is based on anecdotal information and should be used for general reference only. A comprehensive landslide database should be created and maintained on the Coeur d'Alene Reservation, to better understand the conditions leading to major mass wasting events.

4.6.4. Resources at Risk

Using the approach implemented for assessing flood risk exposure on the Coeur d'Alene Reservation, the value of resources at risk to landslides has been completed. The Landslide Prone Landscapes risk-rating score was assigned to each structure (private and non-private) on the Coeur d'Alene Reservation, then grouped in reference to the closest community location. The individual structure values were summed together in these groups to reveal structural values that are at risk to landslides (tracking the Landslide Prone Landscape scores).

The modal score (value of the dataset mode – analogous to the mean) for these values was determined for each structure on the Coeur d'Alene Reservation. These "risk scores" for each structure were grouped into consolidated risk categories in units arranged for every tenth score. Thus, the consolidated risk score of 5 is the lowest-risk category (0-10), and is followed by consolidated risk category 15 (10-20), then 25 (20-30), and so forth. The higher the consolidated risk category, the higher the comparative risk to structures.

Next, community closeness was determined for each structure (the closest community place), placing each in only one community area based on location. These structure-risk values were summed by community area to record the value of assessed improvements linked with the Landslide Prone Landscapes modal score. The resulting tabular summary provides insights to where risks are present in combination with improvement values (Table 30, Table 31, Figure LI).

It is important to understand that the risk assessment is not considering the structure to be at-risk. The risk analysis is considering the risk on the land where the structure is located. Through reasoning, it can be extrapolated that the land's risk rating will translate directly to the risk of the structure or structures on the land.

The results of this analysis demonstrate that 57% of the value of private improvements on the Coeur d'Alene Reservation ($171 million) are located within the lowest-ranked Landslide Prone Landscapes areas (0-10). Approximately 97% of non-private structures are located on these low-risk sites ($220 million). As the relative landslide risk scores increase, the sum of the value of structures decreases. Only 6% of all parcel improvements are located on sites with an average Landslide Prone Landscape of 30 or greater, and only 1% of the total value of improvements are located on sites scoring greater than 50 (Table 30, Table 31, Figure LI).

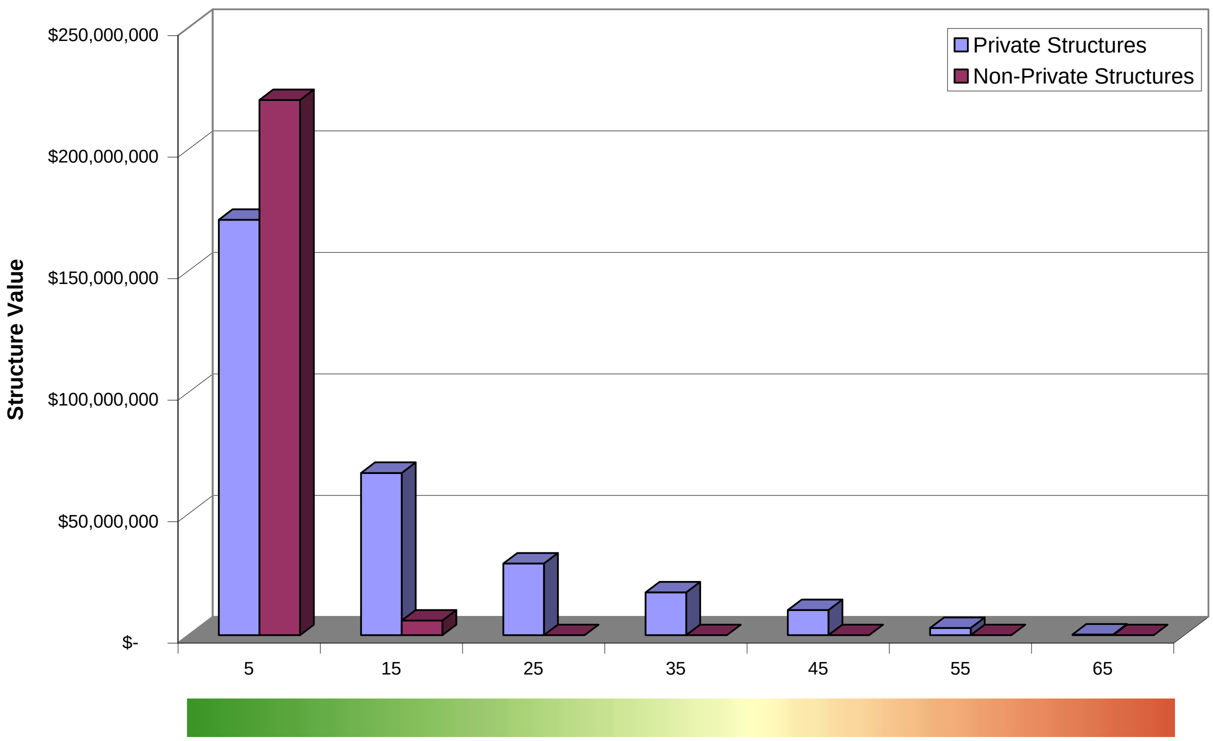
Table 30. Landslide Prone Landscapes Risk Rating (0-100) for private structures, arranged by Community.

Community Name	Landslide Prone Landscape Risk Rating (0-100) 0-10 (5)	10-20 (15)	20-30 (25)	30-40 (35)	40-50 (45)	50-60 (55)	60+ (65)	Number of Structures
BELLGROVE	$803,181	$518,133	$206,220	$262,023	$-	$-	$-	28
BENEWAH	$4,094,303	$3,617,187	$2,321,065	$569,267	$157,790	$62,680	$-	179
CHATCOLET	$6,140,046	$3,022,123	$1,414,123	$328,900	$148,900	$156,250	$560	183
CONKLING PARK	$10,310,111	$3,862,239	$1,121,068	$79,056	$-	$-	$-	233
DE SMET	$1,908,360	$201,277	$163,406	$75,600	$-	$-	$-	47
HARRISON	$8,107,099	$560,945	$799,450	$282,068	$320,350	$182,010	$-	171
LACON	$1,780,196	$2,109,058	$1,065,460	$752,696	$70,800	$110,710	$-	108
MEDIMONT	$4,082,714	$2,741,445	$775,836	$728,736	$350,609	$92,020	$-	145
MOWRY	$2,588,916	$506,100	$65,270	$66,620	$-	$-	$-	65
PLUMMER	$20,209,649	$9,158,934	$2,950,966	$942,050	$-	$-	$-	494
ROCKFORD BAY	$28,749,806	$6,791,659	$4,916,652	$3,701,497	$2,215,415	$404,174	$125,640	703
SANDERS	$2,613,624	$1,653,128	$617,618	$-	$212,320	$-	$-	97
SETTERS	$3,548,226	$875,368	$159,561	$144,000	$270	$-	$-	89
ST. MARIES	$23,792,801	$10,496,599	$7,720,577	$3,532,715	$1,546,200	$769,380	$167,530	719
TENSED	$6,702,693	$549,707	$9,350	$100,250	$-	$-	$-	127
WORLEY	$8,966,115	$2,240,398	$79,312	$270,707	$-	$-	$-	190
Count	**2,158**	**752**	**384**	**169**	**81**	**29**	**5**	**3,578**
Value	**$170,931,123**	**$66,772,740**	**$29,534,735**	**$17,629,257**	**$10,379,859**	**$2,947,733**	**$286,320**	

Table 31. Landslide Prone Landscapes Risk Rating (0-100) for non-private structures, arranged by Community.

Community Name	0-10 (5)	10-20 (15)	20-30 (25)	30-40 (35)	40-50 (45)	50-60 (55)	60+ (65)	Number of Structures
	Landslide Prone Landscape Risk Rating (0-100)							
AGENCY	$1,303,983	$-	$-	$-	$-	$-	$-	7
CHATCOLET	$2,750,000	$-	$-	$-	$-	$-	$-	4
CONKLING PARK	$1,370,688	$2,000	$-	$-	$-	$-	$-	5
DE SMET	$15,176,744	$70,560	$-	$-	$-	$-	$-	42
HARRISON	$674,000	$-	$-	$-	$-	$-	$-	5
HEYBURN STATE PARK	$8,600,000	$-	$-	$-	$-	$-	$-	13
LACON	$-	$78,680	$-	$-	$34,000	$-	$-	2
MOWRY	$152,000	$152,000	$-	$-	$-	$-	$-	2
PLUMMER	$40,144,417	$-	$-	$-	$-	$-	$-	96
ROCKFORD BAY	$1,050,424	$10,000	$-	$-	$-	$-	$-	9
SANDERS	$304,000	$-	$-	$-	$-	$-	$-	2
SETTERS	$12,000,000	$-	$-	$-	$-	$-	$-	1
ST. MARIES	$6,826,841	$5,345,000	$-	$-	$-	$-	$-	30
TENSED	$2,269,387	$-	$-	$-	$-	$-	$-	13
WORLEY	$127,567,227	$401,366	$-	$-	$-	$-	$-	82
Count	**300**	**12**	**0**	**0**	**1**	**0**	**0**	**313**
Value	**$220,189,711**	**$6,059,606**	**$-**	**$-**	**$34,000**	**$-**	**$-**	

Figure LI. Landslide Prone Landscapes Risk Rating (0-100) arranged by group scores and ownership category.



4.6.5. General Landslide Hazards Mitigation Strategies

A number of techniques and practices are available to reduce and cope with losses from landslide hazards. Careful land development can reduce losses by avoiding the hazards or by reducing the damage potential. Following a number of approaches used individually or in combination to mitigate or eliminate losses can reduce landslide risk.

4.6.5.1. Establish a Reservation Landslide Hazard Identification Program

The Coeur d'Alene Tribe should embark on a program to document all landslides, bank failures, "washouts", and man-made embankment failures. Each failure should be located on a map with notations about time of failure, repair (if made), and descriptions of the damaged area. Entering this mapping data into the Tribe's Geospatial Data Library of disaster related information would aid future disaster assessments. These records would be instrumental to further develop the predictive power of the Landslides Prone Landscape assessment on the Coeur d'Alene Reservation and the region.

4.6.5.2. Restrict Development on Landslide Prone Landscapes

Land-use planning is one of the most effective and economical ways to reduce landslide losses by avoiding the hazard and minimizing the risk. This is accomplished by removing or converting existing development or discouraging or regulating new development in unstable areas. Buildings should be located away from known landslides, debris flows, steep slopes, streams and rivers, intermittent stream channels, and the mouths of mountain channels. On the Coeur d'Alene Reservation, restrictions on land use should be considered for implementation by the Tribe in order to help avoid and minimize these risks.

4.6.5.3. Standardize Codes for Excavation, Construction, and Grading

Excavation, construction, and grading codes have been developed for construction in landslide-prone areas; however, there is no nationwide standardization. Instead, Tribal governments apply design construction criteria that fit their specific needs. The Federal Government has developed codes for use on Federal projects. Federal standards for excavation and grading often are used by other organizations in both the public and private sectors.

4.6.5.4. Protect Existing Development

Control of surface-water and ground-water drainage is the most widely used and generally the most successful slope-stabilization method. Stability of a slope can be increased by removing all or part of a landslide mass or by adding earth buttresses placed at the toes of potential slope failures. Retaining walls, piles, caissons, or rock anchors are commonly used to prevent or control slope movement. In most cases, combinations of these measures are most effective.

4.6.5.5. Post Warnings and Educate the Public about Areas to Avoid

Warnings against hazard areas may include the identification of, and posted signs at, the following locations: (a) existing / old landslides, (b) on or at the base of slopes, (c) in or at the base of a minor drainage hollow, (d) at the base or top of an old fill or steep cut slope, and (e) on developed hillsides where leach field septic systems are used. In addition to identifying these at-risk landscapes, it will also serve to begin an educational dialog with landowners on the Coeur d'Alene Reservation, enlightening residents and visitors to the risks associated with landslides.

4.6.5.6. Utilize Monitoring and Warning Systems

Monitoring and warning systems are utilized to protect lives and property, not to prevent landslides. However, these systems often provide warning of slope movement in time to allow the construction of physical measures that will reduce the immediate or long-term hazard. Site-specific monitoring techniques include field observation and the use of various ground-motion instruments, trip wires, radar, laser beams, and vibration meters. Data from these devices can be sent via telemetry for real-time warning. Development of regional real-time landslide warning systems is one of the more significant areas of landslide research (Fragaszy 2002).

4.6.5.7. Public Education

Residents can increase their personal awareness by becoming familiar with the land around their home and community. People can learn about slopes where landslides or debris flows have occurred in the past or are likely to occur in the future. These activities are especially useful for areas where existing structures and improvements are in locations with high risk Landslide Prone Landscape rating scores (Table 30, Table 31).

Educate the public about telltale signs that a landslide is imminent so that personal safety measures may be taken. Some of these signs include:

- Springs, seeps, or saturated ground in areas that have not typically been wet before.
- New cracks or unusual bulges in the ground, street pavements, or sidewalks.
- Soil moving away from foundations, and ancillary structures such as deck-sand patios tilting and/or moving relative to the house.

- Sticking doors and windows, and visible open spaces indicating jams and frames out of plumb.
- Broken water lines and other underground utilities.
- Leaning telephone poles, trees, retaining walls or fences.
- Sunken or dropped-down roadbeds.
- Rapid increase in a stream or creek water levels, possibly accompanied by increased turbidity (soil content).
- Sudden decrease in creek water levels even though rain is still falling or just recently stopped.

Residents or Tribal representatives who live and work in landslide-prone areas should follow these recommendations prior to a storm event:

- Watch the patterns of stormwater drainage on slopes and note places where runoff water converges, increasing flow over soil-covered slopes. Watch the hillsides around your home and community for any signs of land movement, such as small landslides or debris flows or progressively tilting trees.
- Develop emergency response and evacuation plans for individual communities and for travel routes. Individual homeowners and business owners should be encouraged to develop their own evacuation plan.

4.7. Expansive Soils and Expansive Clays

Expansive soils and expansive clays are substrates that are subject to large-scale settlement or expansion when wetted or partially dried (Bekey 1989). Expansive soils contain minerals such as smectite clays that are capable of absorbing water. When these soils absorb water they increase volume. The more water these soils absorb the more their volume increases. Expansions of ten percent or more are not uncommon. This change in volume can exert enough force on a building or other structure resting on top of them to cause damage (GES 2010).

Expansive soils such as clay, claystone, and shale can "swell" in volume when wetted and then shrink when dried (Bekey 1989). This volumetric expansion and contraction can cause houses and other structures to heave, settle, and shift unevenly, resulting in damage that is sometimes severe (PCI 2010). Cracks in building foundations, along floors and within basement walls are typical types of damage done by these swelling soils. Damage to the upper floors of the building can occur when motion in the structure is significant (GES 2010).

Expansive soils will also shrink when they dry out (Bekey 1989). This shrinkage can remove support from buildings or other structures and result in damaging subsidence. Fissures in the soil caused from differential expansion and contraction can also develop. These fissures can facilitate the deep penetration of water when moist conditions or runoff occurs. This produces a cycle of shrinkage and swelling that places repetitive stress on structures (PCI 2010).

When expansive soils are present they will generally not cause a problem if their water content remains constant. The situation where greatest damage occurs is when there are significant or repeated moisture content changes. An example of this condition has been documented in Worley, on the Coeur d'Alene Reservation (Figure LII). The rain gutter spills onto the ground at the edge of the foundation, artificially super-wetting the soil during rainfall periods, leading to soil swelling. When these soils dry in the summer, the soils shrink. This home (Figure LII) has already experienced the detrimental effects of the swelling (wet periods) and shrinking (dry periods) by forming a vertical foundation crack.

Figure LII. Home with a basement, in Worley, placed on Expansive Soils.

With significant real estate development in the region in the past 30 years, the problems caused by expansive soils have become painfully obvious. Homeowners have literally lost their homes due to extensive damage and the high costs of repair. In some cases, class-action lawsuits have been brought against builders and developers for failure to follow the recommendations of soils engineers, or for failure to properly disclose the potential risks associated with purchasing a home built on expansive soil (PCI 2010), and from buyer and seller ignorance about the potential risks.

4.7.1. Extent of the Risk

Expansive soils are present throughout the world and are known in every US state. Every year they cause billions of dollars in damage. The American Society of Civil Engineers estimates that ¼ of all homes in the United States have some damage caused by expansive soils (Snethen 1980). In a typical year in the United States they cause a greater financial loss to property owners than earthquakes, floods, hurricanes and tornadoes combined (GES 2010).

Even though expansive soils cause enormous amounts of damage, most people have never heard of them. This is because their damage is done slowly and not generally attributed to a specific event. The damage done by expansive soils is often attributed to poor construction practices or a misconception that all buildings experience this type of damage as they age (GES 2010).

The Upper Columbia Plateau is at variable levels of risk to factors leading to damages from expansive soils and expansive clays (Bekey 1989). Although clay content in the soil is a major contributing factor to expansive soil reactions, the content of Loess Soils is equally problematic. This region was greatly impacted by the Missoula Flood at the end of the last glacial period

12,000 years ago when wind-borne soils were blown up the Columbia Plateau and into the region. This wind-borne soil is called Loess Soils, and while they contribute greatly to the successful farming of the Palouse, they also lead to substantial risks from expansive soils characteristics (Figure LIII). Site inspections of houses, roads, and other infrastructure components reveals potential signs of prolonged damages consistent with expansive soils and expansive clays (cracked foundations, uneven road surfaces).

Figure LIII. Swell Potential of Reactive Clay Soils in the USA (PCI 2010, reproduced using [USGS 1989] data).

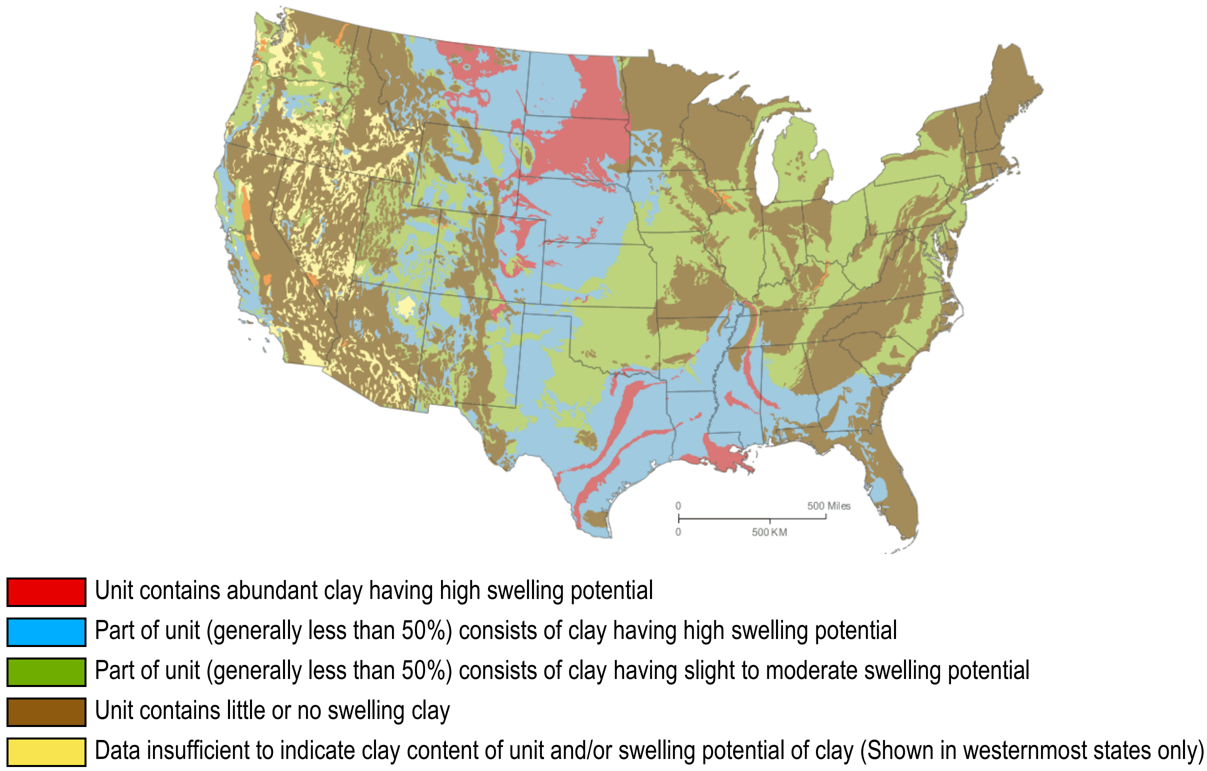


Figure LIII shows the geographic distribution of soils which are known to have expandable characteristics with clay minerals that can cause damage to foundations and structures. It also includes soils that have a clay mineral composition which can potentially cause damage. Soils are composed of a variety of materials, most of which do not expand in the presence of moisture. However, a number of clay minerals are expansive. These include: smectite, bentonite, montmorillonite, beidellite, vermiculite, attapulgite, nontronite, illite and chlorite. There are also some sulfate salts that will expand with changes in temperature and moisture. When a soil contains a large amount of expansive minerals it has the potential of significant expansion. When the soil contains very little expansive minerals it has little expansive potential (PCI 2010).

Bekey (1989) reported four general soil types, beyond just the clay influenced types, that are most prone to expansive soils characteristics:

1. Loess – wind-deposited or eolian silt, termed loess, blankets extensive parts of Upper Columbia Plateau and is a prevalent soil type within the western side of the Coeur d'Alene Reservation.
2. Peat – a very common surface and sub-surface material identified within the eastern side of the Coeur d'Alene Reservation, especially along river valleys and within floodplains. Because of the physical properties of peat, any compression loading on peat results in settlement at the surface. In normal events, roughly half of the settlement

occurs within 6 months to 2 years following construction. The balance of the settlement compaction can take an additional 20 years to be fully seen. Unfortunately, the rate of settlement is not consistent as expansion and contraction will neither be equal nor constant. A common technique used to manage construction of roads and structures on the top of peat materials has been to overtop the material with a fill dirt. When this has been applied, the high organic matter of the peat is trapped under the less permeable layer leading, in many cases, to a bearing capacity failure. Other attempts have combined peat capping with an overtopping layer of rock. Many of these approaches have been met with variable levels of success. Construction within or adjacent to many of lowlands face challenges of peat-related expansive soils.

3. Hydrocompaction – Hydrocompaction occurs when a dry, underconsolidated silty and clayey soil, in an arid or semiarid environment, loses strength on wetting and, as a result, settles or collapses. Although these soil types (silty and clayey soil) are uncommon on the Coeur d’Alene Reservation, the physical conditions of arid or semiarid are not common.
4. Expansive Clay Soils – Expansive clay soils develop at the top of deeply weathered rocks composed on illite and montmorillonite clays. These clay types are common where volcanic ash and feldspar-rich parent materials are seen. Although these conditions are witnessed across the region, the past glaciation (Section 4.2) has transported most of the potentially expansive weathered soil away from its point of origin. Unfortunately, the glaciation that removed the top layer of materials, deposited those sediments at the termination of the glacier and then along the retreat path as it moved up in elevation during its melt. This has left scattered deposits that may hold pockets of expansive clays, especially near (but not necessarily adjacent to) glacier-formed river systems such as the St. Joe River.

4.7.2. Linear Extensibility / Expansive Soils

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change (NRCS 2010).

For each soil layer, the linear extensibility attribute is recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this analysis the "most restrictive" element has been selected for each soil type.

Several soil surveys have been combined for this analysis (Figure LIV, Figure LV). The most relevant are Soil Survey ID606 (Kootenai County) and Soil Survey ID608 (Coeur d'Alene Reservation/Benewah County). All surrounding Soil Survey data from Latah County, the Benewah County / St. Joe River / Shoshone County Soil Survey, Whitman County and Spokane Counties (Washington) were combined for display purposes. Edge matching of these analyses reveals several discontinuities in the risk projection (Figure LIV, Figure LV). These "abrupt changes" in the risk profile are a result of differing ages of the surveys with the Coeur d'Alene Reservation being the most recent data, and Spokane County the oldest.

NRCS soil-survey data has been used to determine the extent of expansive soils and expansive clays within the Coeur d’Alene Reservation (Figure LIV, Figure LV). Rating class terms in this analysis indicate the extent to which the soils are limited by expansive soils and expansive clays that affect building site development.

Two different analyses of exposure to risk have been derived for this effort. The first determines suitability for **'homes without basement, and light commercial'** structures. This is accomplished by analyzing the soil characteristics from a depth of 10 inches to 40 inches (Figure LIV). Each soil type characteristic is evaluated for linear extensibility and given a rating scale from zero (0) to thirty (30).

The second analysis determines suitability for **'homes with a basement, and heavy commercial'** structures. This is accomplished by analyzing the soil characteristics from a depth of 10 inches to 60 inches (Figure LV). Each soil type characteristic is evaluated for linear extensibility and given a rating scale from zero (0) to thirty (30).

A cursory review of Figure LIV and Figure LV allows the reader to observe the elevated risks adjacent to the floodplain of the St. Joe River, and the elevated risks where the wind-deposited or eolian silt (loess), blankets extensive parts of the west side of the Coeur d'Alene Reservation. Additional risks are observed near Setters where clay content is extensive near the surface, and linear extensibility is extreme.

The expansive soils and expansive clays limitations can be overcome or minimized by special planning, design, and installation. Fair performance and moderate maintenance can be expected where appropriate actions are taken and where risks are lower.

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet.

The ratings used here for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (expansive soils potential), and compressibility. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper.

In response to sites with expansive soils, stabilization efforts have included the complete removal attempts of the problem materials, or isolation of the expansive soils by an adequate cap of non-expansive, relatively impervious fill material (Bekey 1989). Where the construction project involves hillsides or the edges of cliffs (such as along the rocky shores of Coeur d'Alene Lake), a combination of partial material removal and the installation of a buttress fill have been used to limit potential sliding of the structure (Bekey 1989). These efforts around the globe have been met with variable levels of success and some notable failures.

Figure LIV. Linear Extensibility Percent (Expansive Soils) for Homes without a Basement and Light Commercial Structures (soil depths 10" to 40").

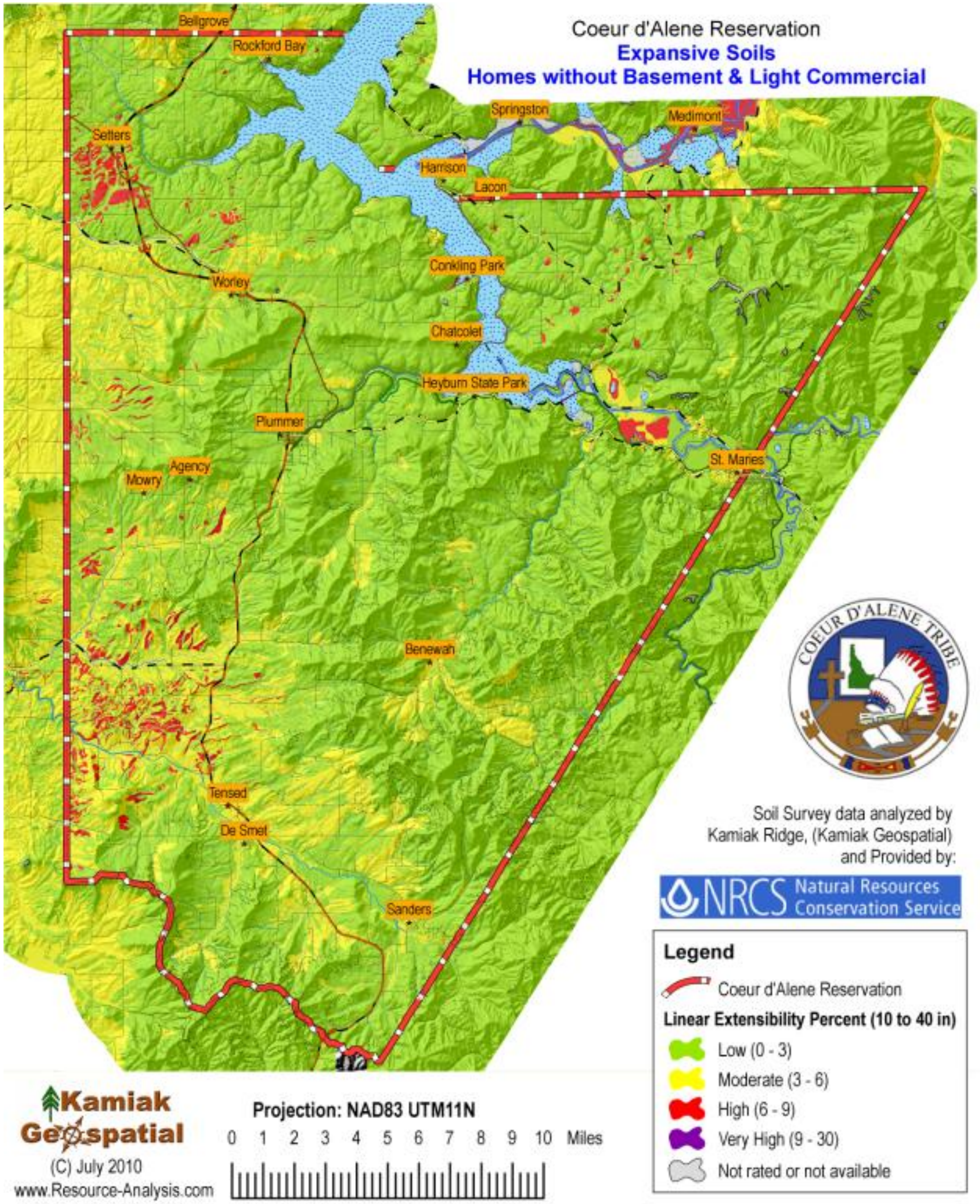
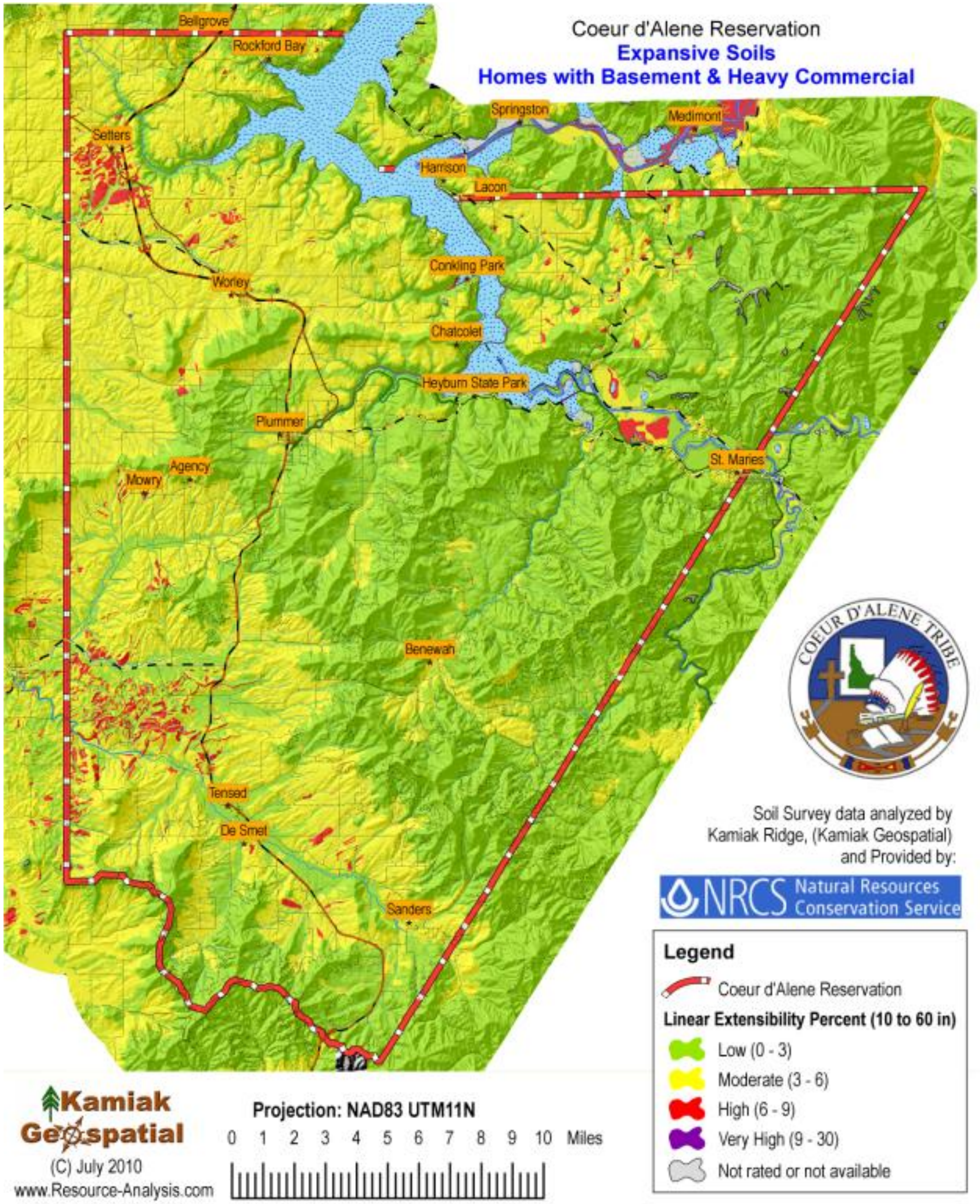


Figure LV. Linear Extensibility Percent (Expansive Soils) for Homes with a Basement and Heavy Commercial Structures (soil depths 10" to 60").



4.7.3. Resources at Risk

Using the approach implemented for assessing risk exposure from other natural hazards on the Coeur d'Alene Reservation, the value of resources at risk to expansive soils and expansive clays has been completed. The linear extensibility risk-rating score was assigned to each structure (private and non-private) on the Coeur d'Alene Reservation, then grouped in reference to the closest community location. The individual structure values were summed together in these groups to reveal structural values that are at risk to expansive soils.

For the purposes of this assessment, all structures were evaluated based on the **'homes with a basement, and heavy commercial'** structures assessment (Figure LIV). This risk rating is slightly elevated for the structures that are single-storey and without a basement, but the overall assessment will illustrate where existing risks are acute (Table 32 & Table 33).

Based on this assessment (Table 32), approximately 62% of the total value ($184 million), and 59% of the total number (2,118 structures), of privately owned structures are located in the lowest expansive soils risk category (0-3%). An additional 40% of structures (1,437 structures), representing approximately 37% of the total private structure value ($111 million) are located on the moderate-risk scale to expansive soils. About 23 privately owned structures (1%), on the Coeur d'Alene Reservation, representing a total appraised value of $2.7 million, are located within areas determined to possess high-risk classifications to expansive soils. There are no privately owned structures located on the very high-risk category within the Coeur d'Alene Reservation.

Table 32. Privately owned structures by community location, values at risk from Expansive Soils.

	Linear Extensibility Extent: Private Structures				
Community Name	**Low (0-3%)**	**Moderate (3-6%)**	**High (6-9%)**	**Very High (>9%)**	**Count**
BELLGROVE	$ 362,032	$1,427,525	$ -	$ -	28
BENEWAH	$7,185,352	$3,636,940	$ -	$ -	179
CHATCOLET	$6,390,681	$4,820,221	$ -	$ -	183
CONKLING PARK	$ 10,457,441	$4,775,203	$ 139,830	$ -	233
DE SMET	$1,117,917	$1,026,161	$ 204,565	$ -	47
HARRISON	$ 10,103,992	$ 147,930	$ -	$ -	171
LACON	$3,468,276	$2,420,644	$ -	$ -	108
MEDIMONT	$5,252,002	$3,475,338	$44,020	$ -	145
MOWRY	$1,142,572	$2,062,994	$21,340	$ -	65
PLUMMER	$ 14,551,122	$18,710,477	$ -	$ -	494
ROCKFORD BAY	$ 39,756,922	$6,921,751	$ 226,170	$ -	703
SANDERS	$2,189,959	$2,906,731	$ -	$ -	97
SETTERS	$ 401,211	$4,213,499	$ 112,715	$ -	89
ST. MARIES	$ 27,579,160	$20,174,352	$ 272,290	$ -	719
TENSED	$5,637,387	$1,723,953	$ 660	$ -	127
WORLEY	$ 356,424	$11,200,108	$ -	$ -	190
Count	**2,118**	**1,437**	**23**	**0**	**3,578**
Value	**$ 184,847,781**	**$110,948,220**	**$2,685,766**	**$ -**	**$298,481,767**

Additional findings indicate that approximately 24% of the total value ($54.3 million), and 44% of the total number (139 structures), of non-privately owned structures are located in the lowest expansive soils risk category (0-3%) (Table 33). An additional 56% of structures (174 structures), representing approximately 76% of the total non-private structure value ($172.0 million) are located on the moderate-risk scale to expansive soils. There are no non-privately owned structures located on the high- or very high-risk category lands within the Coeur d'Alene Reservation.

Table 33. Non-privately owned structures by community location, values at risk from Expansive Soils.

	Linear Extensibility Extent: Non-Private Structures				
Community Name	**Low**	**Moderate**	**High**	**Very High**	**Count**
AGENCY	$ 90,000	$1,213,983	$ -	$ -	7
CHATCOLET	$2,750,000	$ -	$ -	$ -	4
CONKLING PARK	$ 146,900	$1,225,788	$ -	$ -	5
DE SMET	$2,500,000	$12,747,304	$ -	$ -	42
HARRISON	$ 672,000	$2,000	$ -	$ -	5
HEYBURN STATE PARK	$8,600,000	$ -	$ -	$ -	13
LACON	$ 112,680	$ -	$ -	$ -	2
MOWRY	$ 152,000	$ 152,000	$ -	$ -	2
PLUMMER	$ 14,023,324	$26,121,093	$ -	$ -	96
ROCKFORD BAY	$ 484,770	$ 575,654	$ -	$ -	9
SANDERS	$-	$ 304,000	$ -	$ -	2
SETTERS	$ 12,000,000	$ -	$ -	$ -	1
ST. MARIES	$9,490,209	$2,681,632	$ -	$ -	30
TENSED	$2,269,387	$ -	$ -	$ -	13
WORLEY	$ 972,087	$126,996,506	$ -	$ -	82
Count	**139**	**174**	**0**	**0**	**313**
Value	**$ 54,263,357**	**$172,019,960**	**$ -**	**$ -**	**$226,283,317**

The determination of absolute risk of existing structures to expansive soils and clays within the Coeur d'Alene Reservation is difficult to ascertain. Although structures may have been built where linear extensibility percent ratings are high, construction techniques to deal with the problem before beginning construction may have taken place. It is possible to build large structures where linear extensibility percent ratings are high, while still enjoying decades (even more than a century) of life for the structure. Conversely, it is possible to build structures on low-risk rated expansive soil sites, but exacerbate problems by artificially modifying the soil moisture regime (e.g., by draining rain gutters directly onto the soils at the base of the foundation – see Figure LII).

It is advisable that all new construction on the Coeur d'Alene Reservation incorporate expansive soils building techniques while selecting building sites, and determining building architecture characteristics.

4.7.4. Probability of Future Events

Expansive soils represent a physical property of soils that is not dependent on outside factors to realize risks (such as an earthquake or flood). When the at-risk soil components are exposed to compression, wetting and drying, the damages to the structure placed on top of those soils can be realized. If recommended building techniques are not employed during initial construction, then damages are frequently seen. The "laissez-faire builder" may desire to "take a chance" with this disaster not affecting the house built on expansive soils, but if those actions lead to the conditions needed for damage, then the probability of damage is nearly 100% chance of failure within a 25 year period.

4.7.5. Dealing with Damages

Geotechnical engineering and structural engineering have come a long way in the last 20 years, and specific foundation systems have been devised to help counteract some of the problems for buildings inherent with expansive soils. However, the risk of damage to homes can be minimized but cannot always be eliminated (PCI 2010). Because the damages from expansive soils are variable, and often are difficult to visually confirm by the untrained eye, professional inspections of existing structures and of potential building sites is strongly recommended throughout the Coeur d'Alene Reservation.

It is possible to build successfully and safely on expansive soils if stable moisture content can be maintained or if the building can be insulated from any soil-volume change that occurs. The recommended procedures are as follows (GES 2010):

- Professional geotechnical engineering testing to identify any problems,
- Design to minimize moisture-content changes and insulate from soil-volume changes,
- Build in a way that will not change the conditions of the soil,
- Maintain a constant moisture environment after construction,
- Ensure adequate surface-water drainage around building sites and off the site,
- Avoid construction on expansive soils and expansive clays.

Expansive soil conditions are made worse if water collects around a building's foundation. Rainfall and surface-water drainage should run off the property to mitigate the worsening soil condition. Rain gutters and downspouts should direct water away from the structure, discharging it no closer than 3 feet from the foundation (PCI 2010). This drainage should also be conscious of the neighboring structures so that surface water drainage from one building is not diverted into another structure. Well-designed communities will facilitate this stormwater and surface-water drainage to avoid diversions into other structures and into at-risk infrastructure.

The question of the extent of the possible damages to the structures on the Coeur d'Alene Reservation is amplified by annual precipitation received across the Coeur d'Alene Reservation each year (Figure XXXIV and Table 22).

4.8. Radon Risk from Soils

Radon is a naturally occurring colorless, odorless, tasteless radioactive gas that is formed from the normal radioactive decay of uranium. Uranium is present in small amounts in most rocks and soil. It slowly breaks down to other products such as radium, which breaks down to radon. Some of the radon moves to the soil surface and enters the air, while some remains below the soil surface and enters the groundwater (water that flows and collects underground). Uranium has been around since the earth was formed and has a very long half-life (4.5 billion years), which is the amount of time required for one-half of uranium to break down. Uranium, radium, and thus radon, will continue to exist indefinitely at about the same levels as they do now (ATSDR 1990).

Radon also undergoes radioactive decay and has a radioactive half-life of about 4 days. This means that one-half of a given amount of radon will be changed or decayed to other products every 4 days. When radon decays, it divides into two parts. One part is called radiation, and the second part is called a daughter. The daughter, like radon, is not stable; and it also divides into radiation and another daughter. Unlike radon, the daughters are metal and easily attach to dust and other particles in the air. The dividing of daughters continues until a stable, nonradioactive daughter is formed (ATSDR 1990).

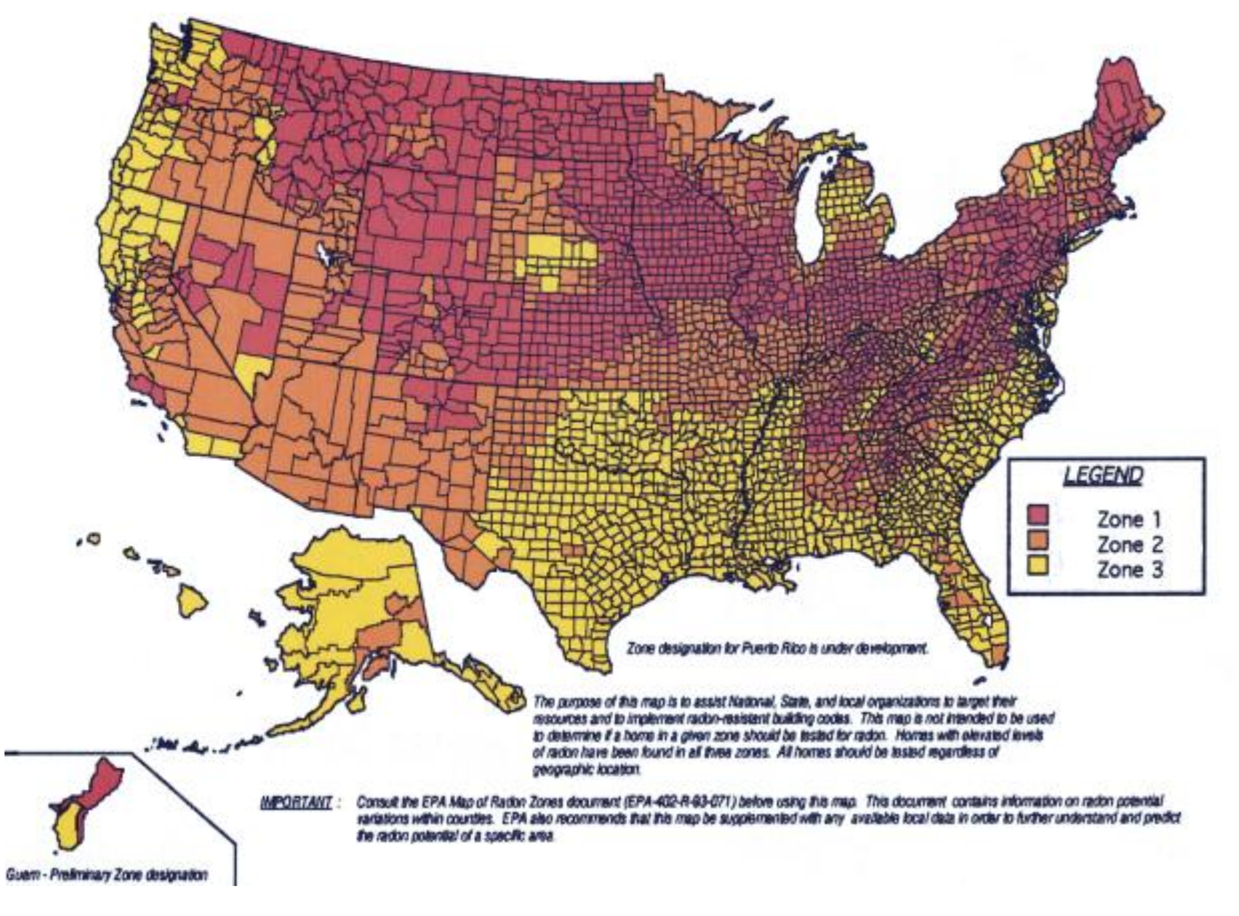
During the decay process, alpha, beta, and gamma radiations are released. Alpha particles can travel only a short distance and cannot go through human skin. Beta particles can penetrate skin, but they cannot go all the way through a human body. Gamma radiation, however, can go all the way through a body. Thus, there are several types of decay products that result from radon decay (EPA 2009).

Radon is responsible for the majority of the public exposure to ionizing radiation. It is often the single largest contributor to an individual's background radiation dose, and is the most variable from location to location. Radon gas from natural sources can accumulate in buildings, especially in confined areas such as attics, and basements. It can also be found in some spring waters and hot springs (EPA 2009). Epidemiological evidence shows a clear link between breathing high concentrations of radon and incidence of lung cancer. Thus, radon is considered a significant contaminant that affects indoor air quality worldwide. According to the USEPA, radon is the second most frequent cause of lung cancer, after cigarette smoking, causing 21,000 lung cancer deaths per year in the United States (EPA 2009).

4.8.1. Extent of the Risk

Radon is a decay product of uranium, which is relatively common in the Earth's crust, but generally concentrated in ore-bearing rocks scattered around the world. Every square mile of surface soil, to a depth of 6 inches, contains approximately 1 gram of radium, which releases radon in small amounts to the atmosphere (ATSDR 1990). On a global scale, it is estimated that 2,400 million curies of radon are released from soil annually (ATSDR 1990, EPA 2009). Most of the US continental batholith presents high risks of radon release from the soil (Figure LVI).

Figure LVI. EPA Map of Radon Zones by County, in the US.



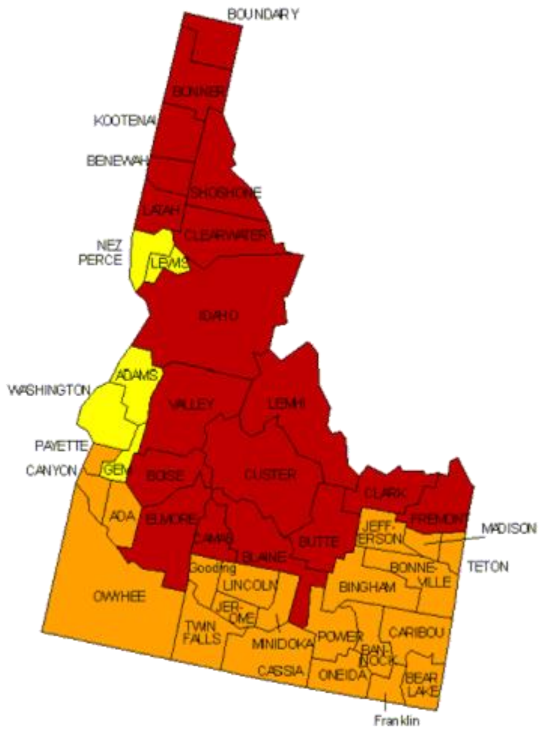
	Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L (pico curies per liter) (red zones)	**Highest Potential**
	Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L (orange zones)	**Moderate Potential**
	Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L (yellow zones)	**Low Potential**

4.8.2. Coeur d'Alene Reservation Radon Exposure

Maps of impacted areas have been developed by the EPA and states using five factors to determine radon potential: 1) indoor radon measurements; 2) geology; 3) aerial radioactivity; 4) soil permeability; and, 5) foundation type. Radon potential assessment is based on geologic provinces. Radon Index Matrix is the quantitative assessment of radon potential. Geologic Provinces were adapted to county boundaries for the Map of Radon Zones (Figure LVI, Figure LVII).

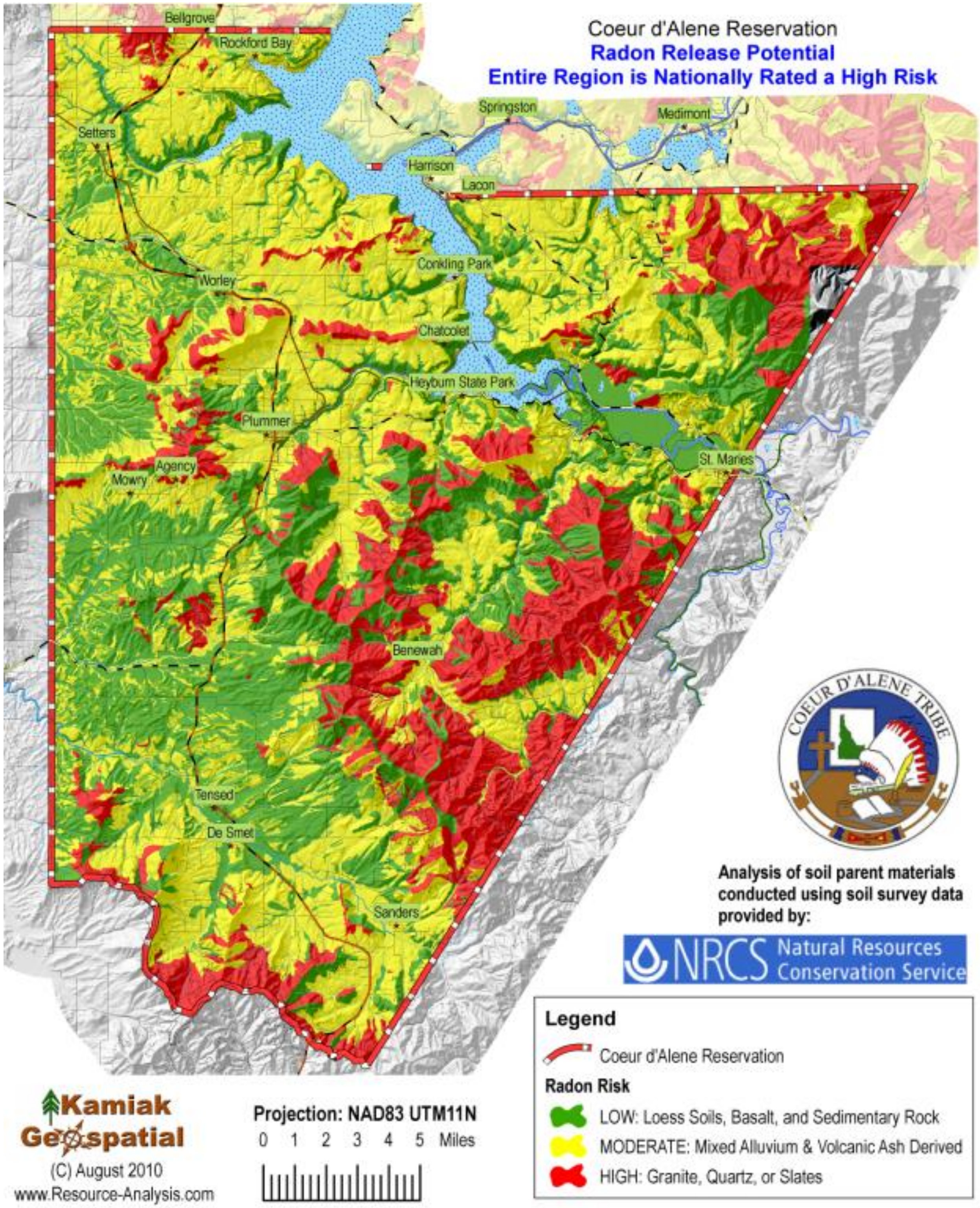
The purpose of these maps is to assist National, State, Tribal, and local organizations to target their resources and to implement radon-resistant building codes. These maps are not intended to be used to determine if a home in a given zone should be tested for radon. Homes with elevated levels of radon have been found in all three zones. All homes should be tested regardless of geographic location.

Figure LVII. Radon Zones for Idaho (EPA 2009).



Although five criteria have been identified to determine radon exposure, this effort has targeted a major vector of radon contact on the Coeur d'Alene Reservation: soil type parent materials (geologic criteria). The NRCS Soil Surveys for the Coeur d'Alene Reservation (Benewah County ID607 and Kootenai County ID606) were used to determine the source of soil parent materials and their transport mechanism (e.g., glacial, volcanic, wind, sedimentation, etc.). Rankings of the type of radon exposure were evaluated and given relative risk ratings (Figure LVIII). This should be viewed as representing only the geologic component and variation of the risk, in an area of high risk.

Figure LVIII. Radon geologic exposure potential based on soil parent materials derived from NRCS Soil Survey data.



- All homes should be tested for radon, regardless of geographic location or zone designation.
- There are many thousands of individual homes with elevated radon levels in Zone 2 and 3. Elevated levels can be found in Zone 2 and Zone 3.
- EPA also recommends that these maps be supplemented with any available local data in order to further understand and predict the radon potential of a specific area.
- These maps should not be used in lieu of testing during real estate transactions.

4.8.3. Radon Exposure Mechanisms

4.8.3.1. Residential

Typical domestic exposures are of approximately 100 Bq/m^3 indoors. Depending on how houses are built and ventilated, radon may accumulate in basements and attics. Radon concentrations in the same location may differ by a factor of two over a period of 1 hour. Also, the concentration in one room of a building may be significantly different than the concentration in an adjoining room (ATSDR 1990).

The geometric mean of radon measurements is generally used for estimating the "average" radon concentration in an area (Tuia *et al.* 2006). The mean concentration ranges from less than 10 Bq/m^3 to over 100 Bq/m^3 in some European countries (UT 2009). Typical geometric standard deviations found in studies concludes that the radon concentration in buildings within the highest risk zones (like the Coeur d'Alene Reservation) is expected to be more than a hundred times the mean concentration for 2 to 3% of the cases (Tuia *et al.* 2006).

The highest average radon concentrations in the United States are found in Iowa and in the Appalachian Mountain areas in southeastern Pennsylvania (Figure LVI). Iowa has the highest average radon concentrations in the United States due to significant glaciation that ground the granitic rocks from the Canadian Shield and deposited it as soils making up the rich Iowa farmland (Figure XXIX). Many cities within the state, such as Iowa City, have passed requirements for radon-resistant construction in new homes. In a few locations, uranium tailings have been used for landfills and were subsequently built on, resulting in possible increased exposure to radon (ATSDR 1990).

4.8.3.2. Industrial production

Radon commercialization is regulated, but it is available in small quantities for the calibration of radon measurement systems, at a price of almost $6,000 per milliliter of radium solution (which only contains about 15 picograms of actual radon at a given moment) (NIST 2008).

4.8.4. Human Health at Risk

Radon has been classified by International Agency for Research on Cancer as being carcinogenic to humans (DHHS 2005), and as a gas that can be inhaled, lung cancer is a particular concern for people exposed to high levels of radon for sustained periods of time.

4.8.4.1. Commercial Exposure

During the 1940s and 50s, when safety standards requiring expensive ventilation in mines were not widely implemented, radon exposure was linked to lung cancer among non-smoking miners of uranium and other hard rock materials in what is now the Czech Republic, and later among miners from the southwestern United States.

Since that time, ventilation and other measures have been used to reduce radon levels in most affected mines that continue to operate. In recent years, the average annual exposure of uranium miners has fallen to levels similar to the concentrations inhaled in some homes. This has reduced the risk of occupationally induced cancer from radon, although health issues may persist for those who are currently employed in affected mines and for those who have been employed in them in the past (Darby *et al.* 2005).

Radon exposure (actually radon progeny) has been directly linked to lung cancer from numerous case-control studies performed in the United States, Europe and China. One of the most comprehensive radon studies performed in the United States found a 50% increased lung cancer risk even at the protracted exposures at the EPA's action level of 4 pCi/L. North American and European Pooled analyses further support these findings (Tuia *et al.* 2006).

The effects of radon if ingested are similarly unknown, although studies have found that its biological half-life ranges from 30–70 minutes, with 90 percent removal at 100 minutes.

4.8.4.2. Domestic Exposure

Radon is considered the second leading cause of lung cancer and leading environmental cause of cancer mortality by the United States Environmental Protection Agency. The United Nation's World Health Organization (WHO) says that radon is a worldwide health risk in homes. Dr. Maria Neira of WHO said that "Most radon-induced lung cancers occur from low and medium dose exposures in people's homes. Radon is the second most important cause of lung cancer after smoking in many countries." (EPA 2009). The United States Environmental Protection Agency encourages that action in homes be taken at concentrations as low as 74 Bq/m3 (2 pCi/L).

Lung cancer kills thousands of Americans every year. Smoking, radon, and secondhand smoke are the leading causes of lung cancer. Although lung cancer can be treated, the survival rate is one of the lowest for those with cancer. From the time of diagnosis, between 11 and 15 percent of those afflicted will live beyond five years, depending upon demographic factors. In many cases lung cancer can be prevented.

Smoking is the leading cause of lung cancer. Smoking causes an estimated 160,000 cancer deaths in the U.S. every year (American Cancer Society 2004). And the rate among women is rising. A smoker who is also exposed to radon has a much higher risk of lung cancer.

Radon is the number one cause of lung cancer among non-smokers, according to EPA estimates. Overall, radon is the second leading cause of lung cancer. Radon is responsible for about 21,000 lung cancer deaths every year. About 2,900 of these deaths occur among people who have never smoked (EPA 2009).

Secondhand smoke is the third leading cause of lung cancer and responsible for an estimated 3,000 lung cancer deaths every year (American Cancer Society 2004).

4.8.4.3. Coeur d'Alene Reservation Exposure Tests

The Coeur d'Alene Tribe, with funding provided by the EPA, conducted an Environmental Action Plan Project; assessment of environmental concerns, published in July 2000 (CdA-EAP 2000). Findings of this section are summarized from published reports contained within that document.

The Coeur d'Alene Tribe conducted radon testing on the Coeur d'Alene Reservation during the first half of 1998. A total of 169 homes were tested for radon using protocols identified by the USEPA. From those homes tested, a total of seven sites (measured during 12 tests), returned results above the EPA action level of 4 pC/L. The Coeur d'Alene Tribe repeated tests on those sites above the EPA action level, and on two of the seven sites, the results indicated below the EPA action level. The other five sites again returned radon concentration levels above the EPA action level for mitigation. The effort concluded that approximately 16% of all tests conducted on the Coeur d'Alene Reservation exceeded the national average of 1.5 pC/L for radon, and about half of the tests returned results of less than 0.5 pC/L (CdA-EAP 2000).

Comprehensive extrapolation of these test results would extend the findings of the effort to conclude that of the 169 radon tests conducted, approximately 7% (12 total) exceeded EPA action levels. Repeated testing of those sites exceeding the action level of 4.0 pC/L, resulted in a potentially false-positive response on two out of the seven sites (28.5%). The remaining five sites showed repeated above action-level results (71.5%), seemingly confirming the high concentrations a second time.

The concern with these results is the so-called "false positive" first test resulting in a positive indication the first time, and then returning a negative indication the second time. While it is not uncommon to see large fluctuations in radon concentrations within one structure, within a few hours of the tests, it does raise the concern that a similar share of the "below action-level" results (during the first tests) may be considered "false negatives". If a similar rate of potentially 'false positive' results is applied to the potential for a 'false negative' result (28.5%), then the reviewer may allocate the potential for the 28.5% of the 157 structures (45 homes) returning negative results during the first test, may have been erroneously determined to be below action-level concentrations. This extrapolation of these potential for false positives and false negatives should not in any way diminish the efforts completed by the Coeur d'Alene Tribe and published in 2000, but serve to reinforce the challenge of reliably measuring radon concentrations in homes and other structures. These findings are not uncommon when conducting repeated testing in moderate- and high-risk areas.

The recommendations stemming from these findings settles on the importance of repeated testing of homes that have not received pre-construction mitigation measures, or that have the characteristics leading to potential exposure. The cost of the testing is low, especially when considering the loss of life and safety that could result from radon exposure.

4.8.5. Probability of Future Events

Radon is formed as part of the normal radioactive decay chain of uranium. Uranium has been around since the earth was formed and its most common isotope has a very long half-life (4.5 billion years), which is the amount of time required for one-half of uranium to break down. Uranium, radium, and thus radon, will continue to occur for millions of years at about the same concentrations as they do now.

Radon concentration varies wildly from place to place; even within the same building. The Coeur d’Alene Reservation is located within a zone of risk exposure rated the highest in Idaho and the highest in the USA. While there is some degree of variability in these estimates within the Coeur d’Alene Reservation (Figure XXIX), these identifications of potentially low exposure should not be interpreted as low risk. The variations of risk exposure are made to show the soil parent materials as the source of potential radon emissions.

All homes and businesses on the Coeur d’Alene Reservation should take precautions against radon gas exposure on existing structures and new construction.

4.8.6. Dealing with Damages

There are relatively simple tests for radon gas, but these tests are not commonly done, even in areas of known systematic hazards. Radon test kits are commercially available. The short-term radon test kits used for screening purposes are inexpensive, in many cases free. The kit includes a collector that the user hangs in the lowest livable floor of the house for 2 to 7 days. The user then sends the collector to a laboratory for analysis. Long term kits, taking collections for up to one year, are also available. An open-land test kit can test radon emissions from the land before construction begins (EPA 2009).

Radon levels fluctuate naturally, due to factors like transient weather conditions, so an initial test might not be an accurate assessment of a home's average radon level. Therefore, a high result (over 4 pCi/L) justifies repeating the test before undertaking more expensive abatement projects. Measurements between 4 and 10 pCi/L warrant a long-term radon test. Measurements over 10 pCi/L warrant only another short-term test so that abatement measures are not unduly delayed. Purchasers of real estate are advised to delay or decline a purchase if the seller has not successfully abated radon to 4 pCi/L or less within the structure.

Because the half-life of radon is only 3.8 days, removing or isolating the source will greatly reduce the hazard within a few weeks. Another method of reducing radon levels is to modify the building's ventilation. Generally, the indoor radon concentrations increase as ventilation rates decrease (ATSDR 1990). In a well ventilated place, the radon concentration tends to align with outdoor values (typically 10 Bq/m3, ranging from 1 to 100 Bq/m3) (EPA 2009).

Radon levels in indoor air can be lowered in a number of ways, from sub-slab depressurization to increasing the ventilation rate of the building. The four principal ways of reducing the amount of radon accumulating in a house are: (EPA 2009, UT 2009)

- Sub-slab depressurization (soil suction) by increasing under-floor ventilation;
- Improving the ventilation of the house and avoiding the transport of radon from the basement into living rooms;
- Installing a radon sump system in the basement;
- Installing a positive pressurization or positive supply ventilation system.

According to the EPA's "A Citizen's Guide to Radon", the method to reduce radon "primarily used is a vent-pipe system and fan, which pulls radon from beneath the house and vents it to the outside", which is also called sub-slab depressurization, active soil depressurization, or soil suction. Generally indoor radon can be mitigated by sub-slab depressurization and exhausting such radon-laden air to the outdoors, away from windows and other building openings. "EPA generally recommends methods that prevent the entry of radon. Soil suction, for example, prevents radon from entering your home by drawing the radon from below the home and venting it through a pipe, or pipes, to the air above the home where it is quickly diluted" and "EPA does not recommend the use of sealing alone to reduce radon because, by itself, sealing has not been shown to lower radon levels significantly or consistently" according to the EPA's "Consumer's Guide to Radon Reduction: How to fix your home" (EPA 2001).

Positive-pressure ventilation systems can be combined with a heat exchanger to recover energy in the process of exchanging air with the outside, and simply exhausting basement air to the outside is not necessarily a viable solution as this can actually draw radon gas into a dwelling. Homes built on a crawl space may benefit from a radon collector installed under a "radon barrier" (a sheet of plastic that covers the crawl space) (EPA 2001, EPA 2009). For crawlspaces, the EPA states “An effective method to reduce radon levels in crawlspace homes involves covering the earth floor with a high-density plastic sheet. A vent pipe and fan are used to draw the radon from under the sheet and vent it to the outdoors. This form of soil suction is called sub-membrane suction, and when properly applied is the most effective way to reduce radon levels in crawlspace homes.” (EPA 2001).

All homes on the Coeur d’Alene Reservation are exposed to the potential for radon gas emissions. All homes should be tested for radon concentrations as described here and appropriate steps should be taken to ensure human health is maintained.

4.9. Wildland Fire

4.9.1. Tribal Legends

Several native legends explain the introduction of fire to the people. Coyote holds a prominent role in the acquisition of fire and instructing the people how to extract it (©1996 StoneE Producktions: http://www.ilhawaii.net/~stony/lore06.html).

4.9.1.1. How Coyote Stole Fire

Long ago, when man was newly come into the world, there were days when he was the happiest creature of all. Those were the days when spring brushed across the willow tails, or when his children ripened with the blueberries in the sun of summer, or when the goldenrod bloomed in the autumn haze.

But always the mists of autumn evenings grew more chill, and the sun's strokes grew shorter. Then man saw winter moving near, and he became fearful and unhappy. He was afraid for his children, and for the grandfathers and grandmothers who carried in their heads the sacred tales of the tribe. Many of these, young and old, would die in the long, ice-bitter months of winter.

Coyote, like the rest of the People, had no need for fire. So he seldom concerned himself with it, until one spring day when he was passing a human village. There the women were singing a song of mourning for the babies and the old ones who had died in the winter. Their voices moaned like the west wind through a buffalo skull, prickling the hairs on Coyote's neck.

"Feel how the sun is now warm on our backs," one of the men was saying. "Feel how it warms the earth and makes these stones hot to the touch. If only we could have had a small piece of the sun in our teepees during the winter."

Coyote, overhearing this, felt sorry for the men and women. He also felt that there was something he could do to help them. He knew of a faraway mountain-top where the three Fire Beings lived. These Beings kept fire to themselves, guarding it carefully for fear that man might somehow acquire it and become as strong as they. Coyote saw that he could do a good turn for man at the expense of these selfish Fire Beings.

So Coyote went to the mountain of the Fire Beings and crept to its top, to watch the way that the Beings guarded their fire. As he came near, the Beings leaped to their feet and gazed searchingly round their camp. Their eyes glinted like bloodstones, and their hands were clawed like the talons of the great black vulture.

"What's that? What's that I hear?" hissed one of the Beings.

"A thief, skulking in the bushes!" screeched another.

The third looked more closely, and saw Coyote. But he had gone to the mountain-top on all fours, so the Being thought she saw only an ordinary coyote slinking among the trees.

"It is no one, it is nothing!" she cried, and the other two looked where she pointed and also saw only a grey coyote. They sat down again by their fire and paid Coyote no more attention.

So he watched all day and night as the Fire Beings guarded their fire. He saw how they fed it pine cones and dry branches from the sycamore trees. He saw how they stamped furiously on runaway rivulets of flame that sometimes nibbled outwards on edges of dry grass. He saw also how, at night, the Beings took turns to sit by the fire. Two would sleep while one was on guard; and at certain times the Being by the fire would get up and go into their teepee, and another would come out to sit by the fire.

Coyote saw that the Beings were always jealously watchful of their fire except during one part of the day. That was in the earliest morning, when the first winds of dawn arose on the mountains. Then the Being by the fire would hurry, shivering, into the teepee calling, "Sister, sister, go out and watch the fire." But the next Being would always be slow to go out for her turn, her head spinning with sleep and the thin dreams of dawn.

Coyote, seeing all this, went down the mountain and spoke to some of his friends among the People. He told them of hairless man, fearing the cold and death of winter. And he told them of the Fire Beings, and the warmth and brightness of the flame. They all agreed that man should have fire, and they all promised to help Coyote's undertaking.

Then Coyote sped again to the mountain-top. Again the Fire Beings leaped up when he came close, and one cried out, "What's that? A thief, a thief!"

But again the others looked closely, and saw only a grey coyote hunting among the bushes. So they sat down again and paid him no more attention.

Coyote waited through the day, and watched as night fell and two of the Beings went off to the teepee to sleep. He watched as they changed over at certain times all the night long, until at last the dawn winds rose.

Then the Being on guard called, "Sister, sister, get up and watch the fire."

And the Being whose turn it was climbed slow and sleepy from her bed, saying, "Yes, yes, I am coming. Do not shout so."

But before she could come out of the teepee, Coyote lunged from the bushes, snatched up a glowing portion of fire, and sprang away down the mountainside.

Screaming, the Fire Beings flew after him. Swift as Coyote ran, they caught up with him, and one of them reached out a clutching hand. Her fingers touched only the tip of the tail, but the touch was enough to turn the hairs white, and coyote tail-tips are white still. Coyote shouted, and flung the fire away from him. But the others of the People had gathered at the mountain's foot, in case they were needed. Squirrel saw the fire falling, and caught it, putting it on her back and fleeing away through the tree-tops. The fire scorched her back so painfully that her tail curled up and back, as squirrels' tails still do today.

The Fire Beings then pursued Squirrel, who threw the fire to Chipmunk. Chattering with fear, Chipmunk stood still as if rooted until the Beings were almost upon her. Then, as she turned to run, one Being clawed at her, tearing down the length of her back and leaving three stripes that are to be seen on chipmunks' backs even today. Chipmunk threw the fire to Frog, and the Beings turned towards him. One of the Beings grasped his tail, but Frog gave a mighty leap and tore himself free, leaving his tail behind in the Being's hand---which is why frogs have had no tails ever since.

As the Beings came after him again, Frog flung the fire on to Wood. And Wood swallowed it.

The Fire Beings gathered round, but they did not know how to get the fire out of Wood. They promised it gifts, sang to it and shouted at it. They twisted it and struck it and tore it with their knives. But Wood did not give up the fire. In the end, defeated, the Beings went back to their mountain-top and left the People alone.

But Coyote knew how to get fire out of Wood. And he went to the village of men and showed them how. He showed them the trick of rubbing two dry sticks together, and the trick of spinning a sharpened stick in a hole made in another piece of wood. So man was from then on warm and safe through the killing cold of winter.

Figure LIX. Youth Art Contest, 12 and Younger, Second Place Winner: Brianna Pluff.

4.9.2. Wildfires in Coeur d'Alene Country

A wildfire, also known as a wildland fire, forest fire, brush fire, or vegetation fire, is an uncontrolled fire often occurring in wildland areas, but also with the potential to consume houses and agricultural resources. Common causes are numerous and can include lightning, human carelessness, slash-and-burn farming, arson, volcanic activity, pyroclastic clouds, and underground coal fire. Heat waves, droughts, and cyclical climate changes such as El Niño can also dramatically increase the risk of wildfires (NWCG 1998).

Wildfires are common in climates that are sufficiently moist to allow the growth of trees but feature extended dry, hot periods, such as can be found in most of the Upper Columbia Plateau in late summer months. Wildfires can be particularly intense during days of strong winds and periods of drought. Fire prevalence is also high during the summer and autumn months, when fallen branches, leaves, grasses, and scrub dry out and become more flammable (NWCG 1998).

Wildfires are considered a natural part of the ecosystem of numerous forestlands and rangelands, where some plants have evolved to tolerate fires through a variety of strategies such as fire-resistant seeds and reserve shoots that sprout after a fire (Agee 1993). Smoke, charred wood, and heat are common fire cues that stimulate the germination of seeds (Agee 1998). Exposure to smoke from burning plants can even promote germination in some types of plants (Barrett 1979).

Natural fire ignition from lightning, as well as human carelessness or arson, are the two main causes for most wildfires in the Upper Columbia Plateau. These fires threaten homes located within the Wildland-Urban Interface (WUI), a zone of transition between developed areas and undeveloped wildland. However, structure fires can also threaten wildlands when these homes are located without a vegetation buffer, allowing the structure fire to spread to forestland or rangeland vegetation, then back to other homes in the area.

4.9.3. Wildfire Threats on the Coeur d'Alene Reservation

Fires can be categorized by their fuel type as follows:

- **Smoldering:** involves the slow combustion of surface fuels without generating flame, spreading slowly and steadily.
- **Crawling:** surface fires that consume low-lying vegetation such as grass, leaf litter, and debris.
- **Ladder:** fires that consume material between low-level vegetation and tree canopies, such as small trees, low branches, vines, and invasive plants.
- **Crown:** fires that consume low-level surface fuels, transition to ladder fuels, and also consume suspended materials at the canopy level. These fires can spread at an incredible pace through the top of a forest canopy, burning entire trees in groups, and can be extremely dangerous (sometimes called a Firestorm).

Smoldering fires involve the slow combustion of surface fuels without generating flame, while spreading slowly and steadily. They can linger for days or weeks after flaming has ceased, resulting in potential large quantities of fuel consumed. They heat the duff and mineral layers, affecting the roots, seeds, and plant stems in the ground. These are most common in peat bogs, but not exclusive to that vegetation.

Wildfires may spread by jumping or spotting, as burning materials are carried by wind or firestorm conditions. Burning materials can jump over roads, rivers, or even firebreaks and start distant fires. The powerful updraft caused by a large wildfire will draw in air from the surrounding area. These self-generated winds can also lead to the phenomenon known as a firestorm.

4.9.4. History

Wildland fire management in the Interior West over the past hundred years has created a modified role for wildland fire. Because of a national awareness of wildfire impacts, forest managers increased protective measures to stop wildfires as soon as they are discovered.

Indigenous wildland fires of this region were allowed to burn unchecked with a fire-return interval ranging from as few as five years to as many as a couple hundred years between fire events (Brown 1995, IFPC 2005). In those locations where fires were a frequent "visitor", the fire intensity was commonly low, and supported by surface fuels such as grasses, forest litter and debris. Occasionally, the fires would torch into single trees (via ladder fuels) or small groups of trees, but rarely were they sustained in the tree crowns (crown fire). Fire intensities created a mosaic of burned and un-burned areas located relatively close to each other.

In less frequent fire-return interval sites, the natural-condition wildfires would burn with more intensity but a lower periodicity. The tree species occupying these sites would often be tolerant of some level of fire activity and sometimes regenerated by fire activity (such as ponderosa pine). These sites experienced wide-scale fires on a return interval of 60 to 120 years between wildfire events.

Other sites witnessed fire reoccurrence very infrequently (as much as 200 years between fire returns), where trees and other vegetation would thrive in the inter-fire period only to be destroyed by the next large event, commonly called a "Stand Replacing Fire" (Brown 1995).

Prior to about 1920, the lack of a well-developed road system in most of this region hindered fire protection services from accessing fires, while they were still small enough to logistically control with hand tools. As the road system of the region was developed through increased timber harvesting activities, fire-response time was greatly aided. After World War II, wildland firefighting agencies added two more features to their anti-incendiary tool-belt: air attack and smoke jumpers.

Both of these tools increased the effectiveness of the wildland firefighters, mainly employed by the USFS, Idaho Department of Lands, forest products companies, and others, to control fires while still small. Fire-suppression efforts were so successful that the number of acres burning annually in north Idaho was only a small fraction of the region's historical average. For instance, the Idaho Panhandle National Forest area averaged 31,000 acres burned each year from 1542 to 1931 (estimated). The average number of acres burned annually between 1969 and 1998 was only 665 (IFPC 2005).

A parallel sequence of events occurred with this scenario. Technology to track lightning strikes as they occur improved critical quick response time in North America in the late 1960s (Brookhouse 1999). Lightning detection systems are able to record various characteristics of lightning strikes, including the type of strike (cloud-to-ground, cloud-to-cloud), polarity, intensity, and approximate location of the discharge. Each lightning strike emanates a radio signal that has a unique signature. USFS and BLM research has been instrumental in establishing lightning detection systems all across the Inland Northwest and all of the United States. The first lightning detectors in this region came into operation in 1968, with the location of ground strikes plotted manually. This manual form of triangulation was replaced by linking detectors to computers. This system is called "Automated Lightning Detection System" (ALDS).

This synergistic combination of resources and technology greatly reduced the average wildland fire size and therefore reduced risks to both the ecosystem and the rural and urban populations living in or near forestlands (such as all communities on the Coeur d'Alene Reservation).

This break in the natural fire cycle introduced by large-scale and effective firefighting led to the accumulation of natural fuels on sites, where fire previously had re-occurred on a semi-predictable cycle. Other disruptions to the natural fire cycle included the introduction of exotic plant diseases, such as the white pine blister rust in 1910, which decimated millions of acres of western white pine (Worrall 2007). By 1940 white pine blister rust was epidemic across the region, infecting over 95% of the standing western white pine. Today, the amount of western white pine growing within the upper Columbia Plateau is only 7% of what it was in 1965 (IFPC 2005).

While wildland fire spread in the region has been drastically reduced, debris and normal forest fuels continue to accumulate in the forest. When fire does occur, it can burn hotter and longer than it did historically. These "out-of-natural historic range of variability" fires are witnessed each summer across the nation.

With extensive urbanization of rangelands and forestlands, these fires often involve destruction of homes located in the WUI. On many occasions, wildfires have caused large-scale damage to private and public property, destroying many homes and causing deaths, particularly when they have reached urban fringe communities (Figure VII).

4.9.5. Wildland Fire History

Throughout the Upper Columbia Plateau, wildfires have been observed on a continuous and frequent cycle in all forested and rangeland ecosystems. Many homes have been built within the WUI, leading to losses of private and public structures from wildfires. The reverse is also true, as homes have ignited and then spread to surrounding rangelands and forestlands, causing the loss of adjacent homes and natural ecosystems.

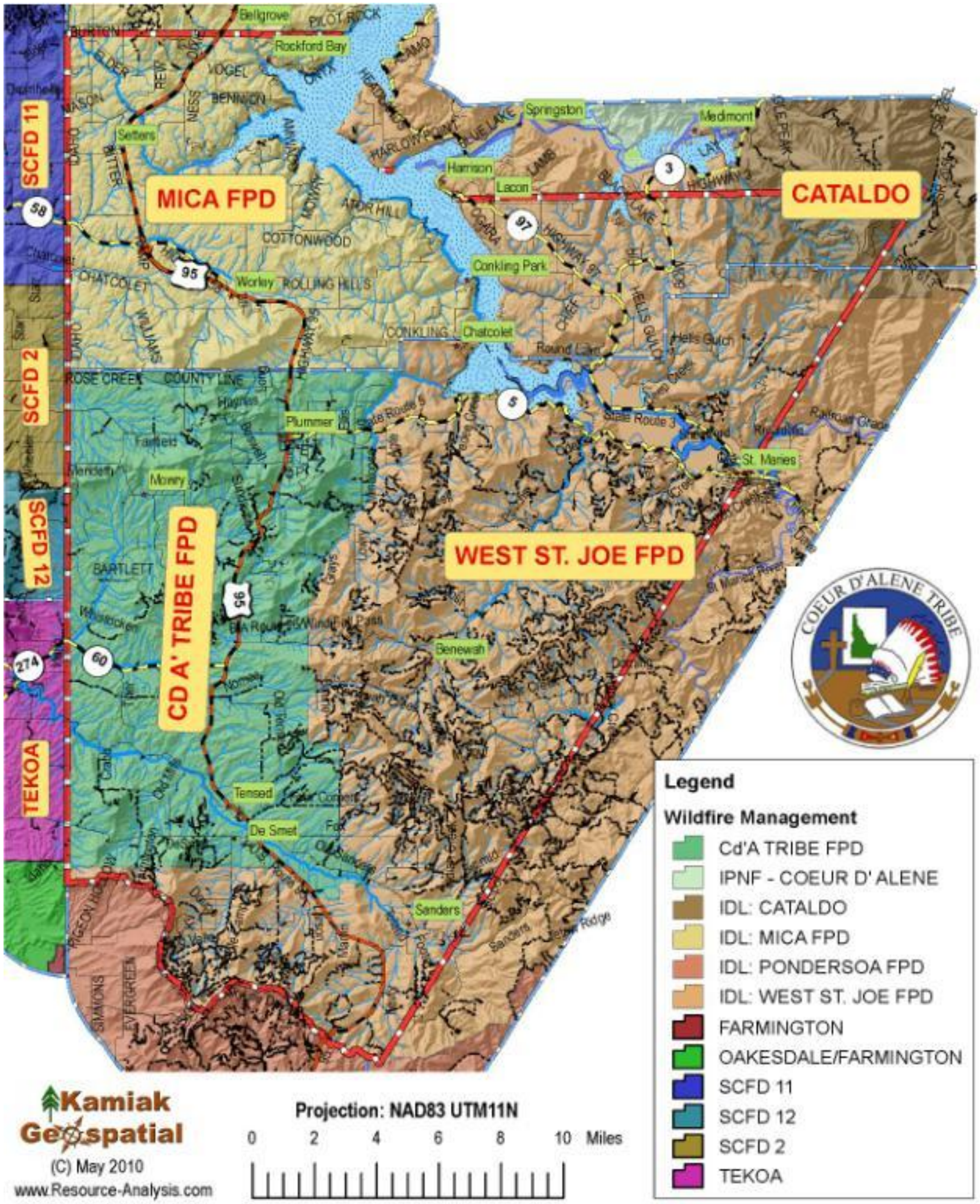
Wildfire events that have impacted the Coeur d'Alene Reservation and surrounding areas are summarized in Table 34.

Table 34. Significant Idaho wildland fires recorded in and near the Coeur d'Alene Reservation.

Year	Disaster Declarations (1976-2000)	WUI Impact	Comments
1889			Legacy Fire dated 1898, burned 320,373 acres in North Idaho, including 395 acres on the Coeur d'Alene Reservation (IPNF 2009).
1900			Legacy Fire dated 1900, burned 61,300 acres in North Idaho, including 21,242 acres on the Coeur d'Alene Reservation (IPNF 2009).
1910	-	X	Eighty-five lives lost; fire consumes 1/6 of North Idaho forests, destroying many communities. The 1910 Wildfire burned approximately 68,169 acres on the Coeur d'Alene Reservation (IBHS 2007).
1919			Legacy Fire dated 1919, burned 133,375 acres in North Idaho (IPNF 2009).
1922			Legacy Fire dated 1922, burned 79,843 acres in North Idaho (IPNF 2009).
1924			Legacy Fire dated 1924, burned 28,304 acres in North Idaho (IPNF 2009).
1927			Legacy Fire dated 1927, burned 31,908 acres in North Idaho (IPNF 2009).
1929			Legacy Fire dated 1929, burned 107,726 acres in North Idaho, including 879 acres on the Coeur d'Alene Reservation (IPNF 2009).
1931			Legacy Fire dated 1931, burned 84,822 acres in North Idaho (IPNF 2009).
1932			Legacy Fire dated 1932, burned 3,027 acres in North Idaho, including 78 acres on the Coeur d'Alene Reservation (IPNF 2009).
1965			Legacy Fire dated 1960, burned 79,843 acres in North Idaho, including 1,407 acres on the Coeur d'Alene Reservation (IPNF 2009).
1967	-		Ten counties in Panhandle affected; 50,000 acres burned in nine hours, and a total wildfire size of 79,843 acres (IBHS 2007).
1985	State (2)		Two State-wide declarations (July and August) (IBHS 2007).
1986	State		State-wide declaration (IBHS 2007).
1989	State	X	The worst fires since 1910 burn thousands of acres in south central Idaho, partially destroying the town of Lowman and leading to State-wide declaration (IBHS 2007).
1992	State (2)	X	One life lost in the worst fire season in Idaho history to date; one of two State-wide declarations was for an unusual spring event (April) (IBHS 2007).
1994	State	X	One life lost and one home lost; summer wildfires burn a total of over 750,000 acres resulting in a State-wide declaration (IBHS 2007).
2000	State, Federal	X	More than 1,500 individual fires (IBHS 2007).
2007	State	X	1,394 Fires, 1,972,643 acres (IBHS 2007).

Within the Coeur d'Alene Reservation, wildfire management is administered by the Coeur d'Alene Tribe and the IDL (Figure LX). While the USFS and BLM have significant landholdings adjacent to the Coeur d'Alene Reservation, the IDL is the lead agency for wildfire initial attack and suppression on much of the Coeur d'Alene Reservation. The Coeur d'Alene Tribe administers initial attack in cooperation with the IDL for much of the southwestern portions of the Reservation (Figure LX).

Figure LX. Wildfire Protection Management within the Coeur d'Alene Reservation.



The IDL and BIA maintain databases of wildfire ignitions and final fire size, in addition to several other wildfire attributes. A review of information in the BIA and IDL wildfire databases reveal that approximately 131 acres burned by wildfires each year on the Coeur d'Alene from an average of approximately 14 ignitions per year (Table 35).

Approximately 35% of ignitions on the Coeur d'Alene Reservation were recorded in the IDL database as lightning-caused wildfires between 1984 and 2008 (Table 36). The BIA managed database includes a place to record identical data, but the cells are not populated with values. However, the BIA database records a general cause as 'human' or 'natural' ignition sources. According to that database, approximately 13% of the ignitions were 'natural' causes (generally lightning), and the remaining 87% were 'human' ignition sources between 1985 and 2008.

Debris burning that escaped to become a wildfire accounted for 30 ignitions (24% of the total), in the IDL wildfire database, while miscellaneous ignitions accounted for another 25 wildfires (20% of the total) in the IDL wildfire database between 1984 and 2008. These statistics (Table 36) are fairly representative of a WUI interface region although the percent of total non-lightning caused ignitions is relatively high. Generally, it is feasible in this region to have ignitions caused by lightning totaling 75% of all ignitions, and non-lightning caused ignitions accounting for only 25% of the total. Instead, these relative proportions are almost completely reversed, with 35% caused by lightning and 65% from human sources.

Table 35. Wildfire ignition and extent history 1984-2008, on the Coeur d'Alene Reservation.

	Acres Burned		Number of Wildfire Ignitions		Combined Total		Average Fire Size (acres ÷ ignitions)
Year	BIA database	IDL database	BIA database	IDL database	Acres	Ignitions	
1984		5.0		7	5.0	7	0.7
1985	4.0	4.0	1	2	8.0	3	2.7
1986	0.0	1.0	1	3	1.0	4	0.3
1987	4.4	24.0	2	7	28.4	9	3.2
1988	0.0	0.0	1	2	-	3	-
1989	3.0	0.0	2	1	3.0	3	1.0
1990	0.0	3.0	0	1	3.0	1	3.0
1991	0.6	3.0	2	5	3.6	7	0.5
1992	1.5	28.0	3	9	29.5	12	2.5
1993	68.4	42.0	6	2	110.4	8	13.8
1994	182.7	68.0	13	16	250.7	29	8.6
1995	223.4	0.0	4	4	223.4	8	27.9
1996	516.2	113.0	9	8	629.2	17	37.0
1997	84.2	5.0	7	2	89.2	9	9.9
1998	50.3	9.0	13	6	59.3	19	3.1
1999	38.8	0.0	10	8	38.8	18	2.2
2000	15.3	0.0	9	4	15.3	13	1.2
2001	28.1	0.0	14	0	28.1	14	2.0
2002	117.5	7.0	14	4	124.5	18	6.9
2003	134.2	12.0	25	7	146.2	32	4.6
2004	39.1	0.0	6	3	39.1	9	4.3
2005	556.3	7.0	25	2	563.3	27	20.9
2006	109.9	32.0	19	7	141.9	26	5.5
2007	28.5	523.0	23	7	551.5	30	18.4
2008	7.1	185.0	5	7	192.1	12	16.0
Totals	**2,213.5**	**1,071.0**	**214**	**124**	**3,284.5**	**338**	**9.7**

Conversely, the number of acres burned each year on the Coeur d'Alene Reservation demonstrate that the wildfire suppression efforts are performing exceptionally well. This is a fire-adapted ecosystem where large wildfires have been witnessed. During the past 25 years, wildfire-suppression efforts have kept the average fire size to about 130 acres per year.

Wildfire-suppression costs have been recorded for each ignition responded to be the IDL on the Coeur d'Alene Reservation. For comparative purposes these annual suppression costs have been adjusted for inflation to represent 2010 dollars (Table 36). Based on these expenditures, the IDL has recorded the expense, adjusted to 2010 dollars, of approximately $74,500 each year to provide initial attack and suppression on the Coeur d'Alene Reservation. Expressing these costs on a per-acre basis is not feasible because many of the ignitions cost resources to provide initial attack, but did not lead to a wildfire extent (fire put out before it burned acres of land).

These annual costs have been extrapolated to estimate the wildfire suppression costs for both the IDL and the BIA, by determining the annual cost per ignition attributed by the IDL, and multiplying it by the total number of ignitions (BIA and IDL) on the Reservation each year (Table 36). Based on this approach, the average annual suppression cost on the Coeur d'Alene Reservation is approximately $203,000 (2010 dollars). This method of extrapolation should not be considered a reliable source of determining to suppression costs on the Coeur d'Alene Reservation. For instance, initial attack costs cannot compare to the costs of a sustained wildfire-suppression effort. However, using only acres burned as a cost indicator would fail to quantify the costs of the initial attack.

These estimates are illustrative of the need for initial attack and resources to fight wildfires through sustained suppression efforts. These numbers also fail to quantify the resources and efforts to implement pre-disaster mitigation projects in the form of residential education about wildfire safety and the extensive WUI treatments around homes and infrastructure in the Coeur d'Alene Reservation.

Table 36. Idaho Department of Lands wildfire cause, cost of suppression, and extrapolation to all wildfires on the Coeur d'Alene Reservation 1984-2008.

	IDL Database		Number of Ignitions by Cause									IDL Cost		Est. cost
Year	Number of Fires	Acres Burned	Lightning	Campfire	Smoking	Debris Burning	Arson	Equipment Use	Railroad	Children	Misc.	adjusted to 2010	IDL Cost / Ignition	per year IDL & BIA
1984	7	5	0	0	0	1	1	0	0	0	5	$10,655	$1,522	$10,655
1985	2	4	0	2	0	0	0	0	0	0	0	$10,091	$5,046	$15,137
1986	3	1	0	0	0	1	0	2	0	0	0	$1,668	$556	$2,223
1987	7	24	1	1	0	1	0	0	0	0	4	$30,532	$4,362	$39,255
1988	2	0	1	0	0	0	0	0	0	1	0	$2,501	$1,250	$3,751
1989	1	0	0	0	1	0	0	0	0	0	0	$630	$630	$1,890
1990	1	3	0	0	0	0	0	0	0	0	1	$6,224	$6,224	$6,224
1991	5	3	3	0	0	0	0	0	0	0	2	$4,190	$838	$5,867
1992	9	28	3	0	1	2	0	1	0	0	2	$55,072	$6,119	$73,429
1993	2	42	0	0	0	2	0	0	0	0	0	$9,557	$4,778	$38,227
1994	16	68	7	1	1	5	0	1	0	0	1	$231,910	$14,494	$420,337
1995	4	0	3	0	0	0	0	0	0	1	0	$3,664	$916	$7,327
1996	8	113	6	0	0	0	0	0	0	0	2	$6,819	$852	$14,491
1997	2	5	2	0	0	0	0	0	0	0	0	$8,610	$4,305	$38,746
1998	6	9	0	1	0	2	0	1	0	0	2	$9,541	$1,590	$30,213
1999	8	0	7	0	0	0	0	1	0	0	0	$4,637	$580	$10,434
2000	4	0	0	0	0	0	0	0	0	1	3	$1,050	$263	$3,413
2001	0	0	0	0	0	0	0	0	0	0	0	$0	$0	$-
2002	4	7	0	0	0	1	2	0	0	0	1	$3,586	$897	$16,139
2003	7	12	5	0	0	2	0	0	0	0	0	$33,459	$4,780	$152,955
2004	3	0	2	0	0	0	0	0	0	0	1	$5,385	$1,795	$16,156
2005	2	7	0	0	0	1	0	0	0	0	1	$24,655	$12,327	$332,837
2006	7	32	3	0	0	4	0	0	0	0	0	$39,374	$5,625	$146,245
2007	7	523	0	0	0	4	0	2	0	1	0	$1,307,485	$186,784	$5,603,508
2008	7	185	0	0	0	4	1	1	1	0	0	$51,449	$7,350	$88,199
Total	**124**	**1,071**	**43**	**5**	**3**	**30**	**4**	**9**	**1**	**4**	**25**	**$1,862,745**	**$15,022**	**$283,106**
	Percent by Cause		**35%**	**4%**	**2%**	**24%**	**3%**	**7%**	**1%**	**3%**	**20%**			
Average/Year	**5**	**42.8**										**$74,510**		

4.9.6. Analysis Tools to Assess Wildfire Risk Exposure

Analysis tools to assess the risk exposure to wildland fires on the Coeur d'Alene Reservation are numerous. Each analysis tool has specific applications to unique needs and can be considered in light of the site being addressed; none of them will replace professional expertise of fire behavior analysts on the ground. These techniques are presented for consideration of the risk exposure to Coeur d'Alene Reservation residents. Wildland fire is arguably one of the most widespread hazards affecting the Coeur d'Alene Reservation.

4.9.6.1. Mean Fire Return Interval

Broad-scale alterations of historical fire regimes and vegetation dynamics have occurred in many landscapes in the U.S. through the combined influence of land management practices, fire exclusion, ungulate herbivory, insect and disease outbreaks, climate change, and invasion of non-native plant species. The LANDFIRE Project (LANDFIRE 2007) produces maps of simulated historical fire regimes and vegetation conditions using the LANDSUM landscape succession and disturbance dynamics model. The LANDFIRE Project also produces maps of current vegetation and measurements of current vegetation departure from simulated historical reference conditions. These maps support fire and landscape management planning outlined in the goals of the National Fire Plan, Federal Wildland Fire Management Policy, and the Healthy Forests Restoration Act.

The Simulated Historical Mean Fire Return Interval data layer (LANDFIRE MFRI 2006) quantifies the average number of years between fires under the presumed historical fire regime. This data layer is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane *et al.* 2002, Keane *et al.* 2006, Pratt *et al.* 2006). LANDSUM simulates fire dynamics as a function of vegetation dynamics, topography, and spatial context in addition to variability introduced by dynamic wind direction and speed, frequency of extremely dry years, and landscape-level fire-size characteristics. This layer is intended to describe one component of simulated historical fire regime characteristics in the context of the broader historical time period represented by the LANDFIRE Biophysical Settings layer and LANDFIRE Biophysical Settings Model Documentation.

Mean fire return interval is calculated from the simulation length divided by the number of fires that were measured on each pixel. The simulations used to produce this layer were 10,000 years in duration to observe the most complete representation of the fire regime characteristics within spatially complex landscapes, given computational limitations. However, it is important to note that these simulations are not intended to accurately represent the last 10,000 years of measurable history, which includes spatially and temporally dynamic factors such as climate change, vegetation species dispersal, and anthropogenic influences on vegetation and fire characteristics.

Simulated historical mean fire return intervals were classified into 22 categories of varying temporal length to preserve finer detail for more frequently burned areas and less detail for rarely burned areas. Additional data layer values were included to represent Water, Snow / Ice, Barren land, and Sparsely Vegetated areas. Vegetated areas that never burned during the simulations were included in the category "Indeterminate Fire Regime Characteristics"; these vegetation types either had no defined fire behavior or had extremely low probabilities of fire ignition (Keane *et al.* 2002).

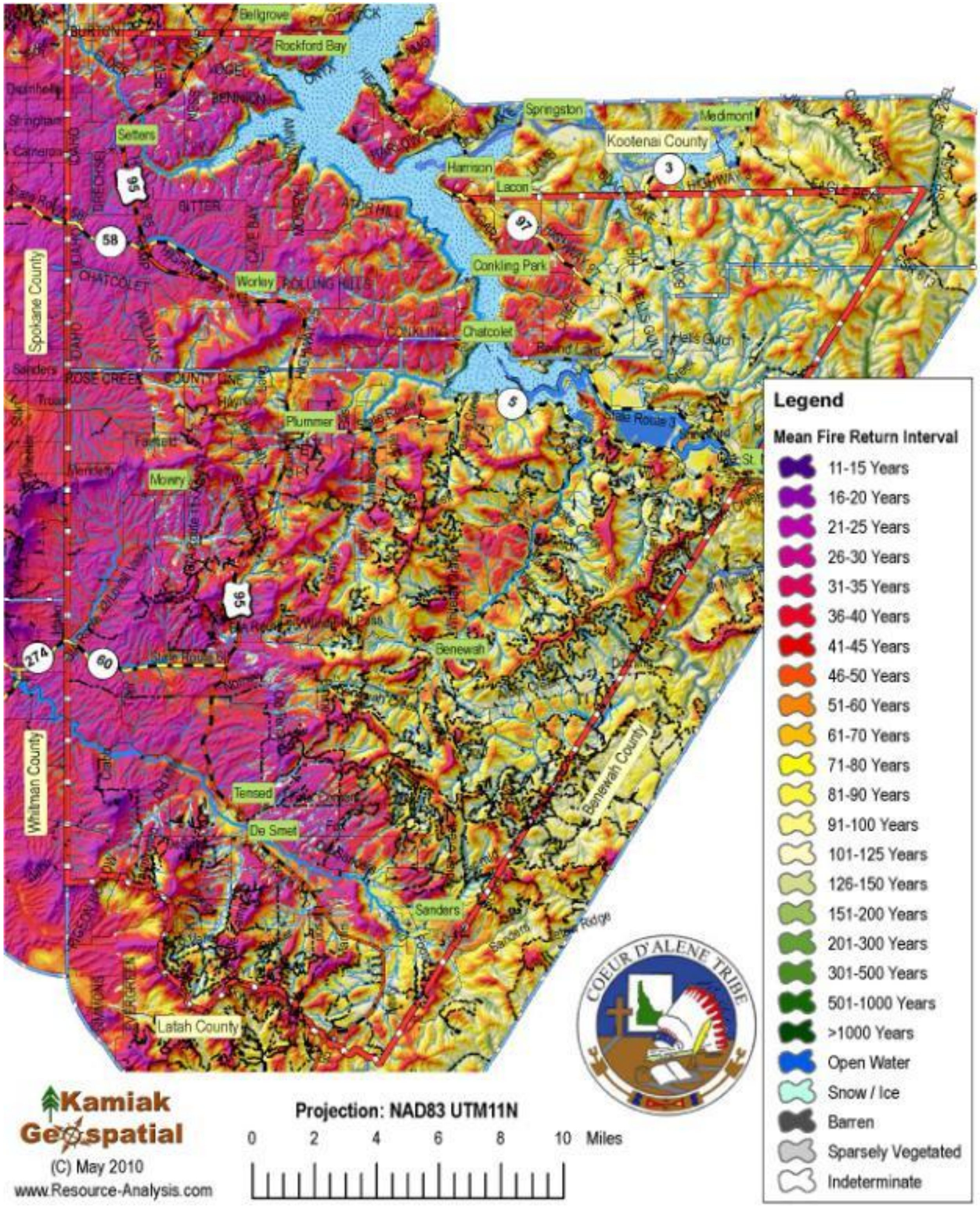
The results of the Mean Fire Return Interval analysis on the Coeur d'Alene Reservation (Table 37) reveals that almost 70% of the land area on the Coeur d'Alene Reservation is subject to a return interval of under 80 years, while the other half of the land area is exposed to mean fire return intervals of greater than 80 years and up to 200 years. Almost 90% of the land area is subject to mean fire return intervals of under 150 years (Table 37). The data are extremely variable, with the largest land area category, representing 12% of the total land area (40,800 acres), situated in the mean fire return interval of 31-35 years. These data indicate that the role of wildland fire is highly variable and operating on temporal scales exceeding most planning efforts.

The spatial distribution of these data is shown in Figure LXI. An investigative study of these maps demonstrates the variability and distribution of this analysis component to understanding the role of wildland fire in this region.

Table 37. Mean Fire Return Intervals on the Coeur d'Alene Reservation.

Mean Fire Return Interval		Acres	Percent of Total Area
11-15 Years		48	0.01%
16-20 Years		1,473	0.42%
21-25 Years		8,529	2.45%
26-30 Years		33,105	9.53%
31-35 Years		40,792	11.74%
36-40 Years		31,501	9.07%
41-45 Years		23,336	6.72%
46-50 Years		19,567	5.63%
51-60 Years		32,687	9.41%
61-70 Years		25,208	7.26%
71-80 Years		20,511	5.90%
81-90 Years		18,219	5.24%
91-100 Years		14,117	4.06%
101-125 Years		24,759	7.13%
126-150 Years		11,109	3.20%
151-200 Years		6,482	1.87%
201-300 Years		1,770	0.51%
301-500 Years		624	0.18%
501-1000 Years		292	0.08%
>1000 Years		201	0.06%
Water		12,435	3.58%
Snow / Ice		121	0.03%
Barren		192	0.06%
Sparsely Vegetated		214	0.06%
Indeterminate Fire Regime Characteristics		20,165	5.80%
(LANDFIRE 2007)	**Total**	**347,458**	

Figure LXI. Mean Fire Return Interval (LANDFIRE MFRI 2006) for the Coeur d'Alene Reservation.



4.9.6.2. Fire Prone Landscapes

Schlosser *et al.* (2002), developed a methodology to assess the location of fire prone landscapes on forested and non-forested ecosystems in the western US. This assessment technique has been completed for tribal- and county-level fire mitigation plans and FEMA hazard mitigation plans, for Bureau of Indian Affairs and BLM Fire Management Plans and Environmental Assessments on over 45 project areas in Idaho, Montana, Nevada, Oregon, and Washington to determine fire prone landscape characteristics.

The goal of developing the Fire Prone Landscapes (FPL) analysis is to make inferences about relative risk factors across large geographical regions for wildfire spread. This analysis uses the extent and occurrence of past fires as an indicator of characteristics for a specific area and its propensity to burn in the future. Concisely, if a certain combination of vegetation cover type, canopy closure, aspect, slope, and position on the hillside, have burned with a high frequency in the past, then it is reasonable to extrapolate that they will have the same tendency in the future, unless mitigation activities are conducted to reduce this potential.

The basis of the analysis technique is to bring all of these factors together in a geospatial model (GIS layers) to determine the area of each combination of input variables that is available to burn, and then determine how much of this area actually burned in past fire events. For this analysis, the areas of Benewah County, Shoshone County, Latah County, and Kootenai County were considered in order to guarantee a robust sample area.

Past fire extents represent those locations on the landscape that have previously burned during a wildfire. Past fire extent maps were obtained from a variety of sources for the north Idaho area including the USFS Panhandle National Forest and the USFS Clearwater National Forest, IDL, BIA, and BLM.

The maximum derived FPL rating score for the Coeur d'Alene Reservation was 80, with a low of 0 (Coeur d'Alene Lake). Table 38 details the distribution of these categories while Figure LXII graphically displays these results. The data are distributed into two modes of distribution with the first occurring at FPL rankings of 11-20 and the second at 61-70 (Table 38).

The FPL analysis is an appropriate tool for assessing the risk in the WUI to people, structures, and infrastructure. This analysis tool geographically shows where landscape components combine to create conditions where past fires have burned. It does not show predicted rate of spread or burn intensity, but it does show where resources are potentially at-risk to wildfire loss. Thus, FPL data are useful for community protection prioritization and WUI home defensibility precedence.

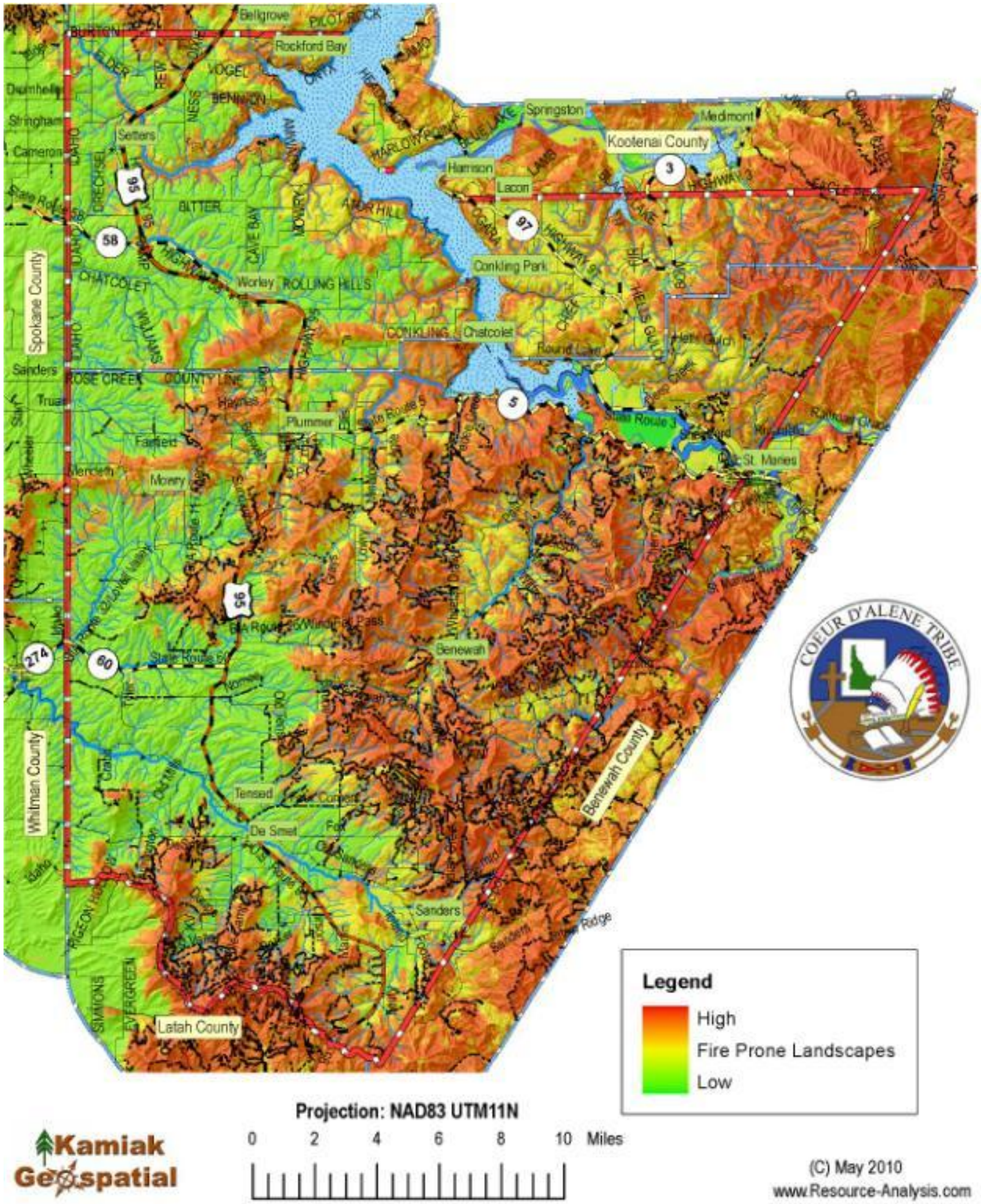
Table 38. Fire Prone Landscapes Analysis Results on the Coeur d'Alene Reservation.

Risk Category	Acres	Percent
0	13,288	4%
1-10	-	0%
11-20	97,078	28%
21-30	13,126	4%
31-40	32,946	9%
41-50	32,042	9%
51-60	40,660	12%
61-70	84,884	24%
71-80	33,428	10%
81-90	-	0%
91-100	-	0%
Total	347,451	

The risk values developed in this analysis should be considered **ordinal data**, that is, while the values presented have a meaningful ranking, they do not have consistent scale between numbers. Rating in the "40" range is not necessarily twice as "risky" as rating in the "20" range. These category values also do not correspond to a rate of fire spread, a fuel loading indicator, or measurable potential fire intensity. Each of those scales is greatly influenced by weather, seasonal and daily variations in moisture (relative humidity), solar radiation, and other factors. The risk rating presented here serves to identify where certain constant variables are present, aiding in identifying where fires typically spread into the largest fires across the landscape.

A risk-rating score of zero represents no relative risk and a score of one hundred is considered extreme risk. In practice, very few areas of the highest risk category (100) are found. This rating scale should be considered as nominal data producing values which can be ordered sequentially, but the actual values are not multiplicative. The scale provides relative comparisons between sites.

Figure LXII. Fire Prone Landscapes of the Coeur d'Alene Reservation.



4.9.6.3. Historic Fire Regime

The USFS, Northern Fire Plan Cohesive Strategy Team, in Kalispell, Montana, completed an analysis of Historic Fire Regime (HFR) in 2002 and revised it again in 2005 for distribution to land managers and analysts. This report uses those data and GIS layers to represent HFR (NFPCST 2005). These data are used for the analysis of the Historic Fire Regime within the Coeur d'Alene Reservation for this analysis effort.

In the fire-adapted ecosystems of the Upper Columbia Plateau, fire is undoubtedly the dominant process in terrestrial systems that constrains vegetation patterns, habitats, and ultimately, species composition. Land managers seek to understand HFR (that is, fire frequency and fire severity prior to settlement by Euro-Americans) to be able to define ecologically appropriate goals and objectives for an area. Moreover, managers strive to grasp the spatially explicit knowledge of how historic fire regimes vary across the landscape.

Many ecological assessments are enhanced by the characterization of the historical range of variability which helps managers understand: (1) how the driving ecosystem processes vary from site to site; (2) how these processes affected ecosystems in the past; and (3) how these processes might affect the ecosystems of today and the future. Obviously, HFR is a critical component for characterizing the historical range of variability in the fire-adapted ecosystems of the Upper Columbia Plateau. Furthermore, understanding ecosystem departures provides the necessary context for managing sustainable ecosystems. Land managers need to understand how ecosystem processes and functions have changed prior to developing strategies to maintain or restore sustainable systems. In addition, the concept of departure is a key factor for assessing risks to ecosystem components. For example, the departure from historical fire regimes may serve as a useful proxy for the potential of severe fire effects from an ecological perspective.

The Simulated Historical Fire Regime Groups (LANDFIRE HFRG 2006) data layer categorizes simulated mean fire-return intervals and fire severities into five fire regimes defined in the Interagency Fire Regime Condition Class Guidebook (Hann *et al.* 2004). The classes are defined as:

- Fire Regime I: 0 to 35 year frequency, low-to-mixed severity
- Fire Regime II: 0 to 35 year frequency, replacement severity
- Fire Regime III: 35 to 200 year frequency, low-to-mixed severity
- Fire Regime IV: 35 to 200 year frequency, replacement severity
- Fire Regime V: 200+ year frequency, any severity

This data layer is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane *et al.* 2002, Keane *et al.* 2006, Pratt *et al.* 2006). LANDSUM simulates fire dynamics as a function of vegetation dynamics, topography, and spatial context in addition to variability introduced by dynamic wind direction and speed, frequency of extremely dry years, and landscape-level fire size characteristics. This layer is intended to describe one component of simulated HFR characteristics in the context of the broader historical time period represented by the LANDFIRE Biophysical Settings layer and LANDFIRE Biophysical Settings Model Documentation.

Fire is the dominant disturbance process that manipulates vegetation patterns in the Upper Columbia Plateau. The HFR data were prepared to supplement other data necessary to assess integrated risks and opportunities at regional and subregional scales. The HFR theme was derived specifically to estimate an index of the relative change of a disturbance process, and the subsequent patterns of vegetation composition and structure.

A historical (natural) fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse scale definitions for natural (historical) fire regimes have been developed by Hardy *et al.* (2001) and Schmidt *et al.* (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001).

As the scale of application becomes finer these five classes may be defined with more detail, or any one class may be split into finer classes, but the hierarchy to the coarse scale definitions should be retained.

General Limitations

These data were derived using fire history information from a variety of different sources. These data were designed to characterize broad scale patterns of HFR for use in regional and subregional assessments. Any decisions based on these data should be supported with field verification, especially at scales finer than 1:100,000. Although the resolution of the HFR theme is a 30 meter cell size, the expected accuracy does not warrant their use for analyses of areas smaller than about 10,000 acres (for example, assessments that typically require 1:24,000 data).

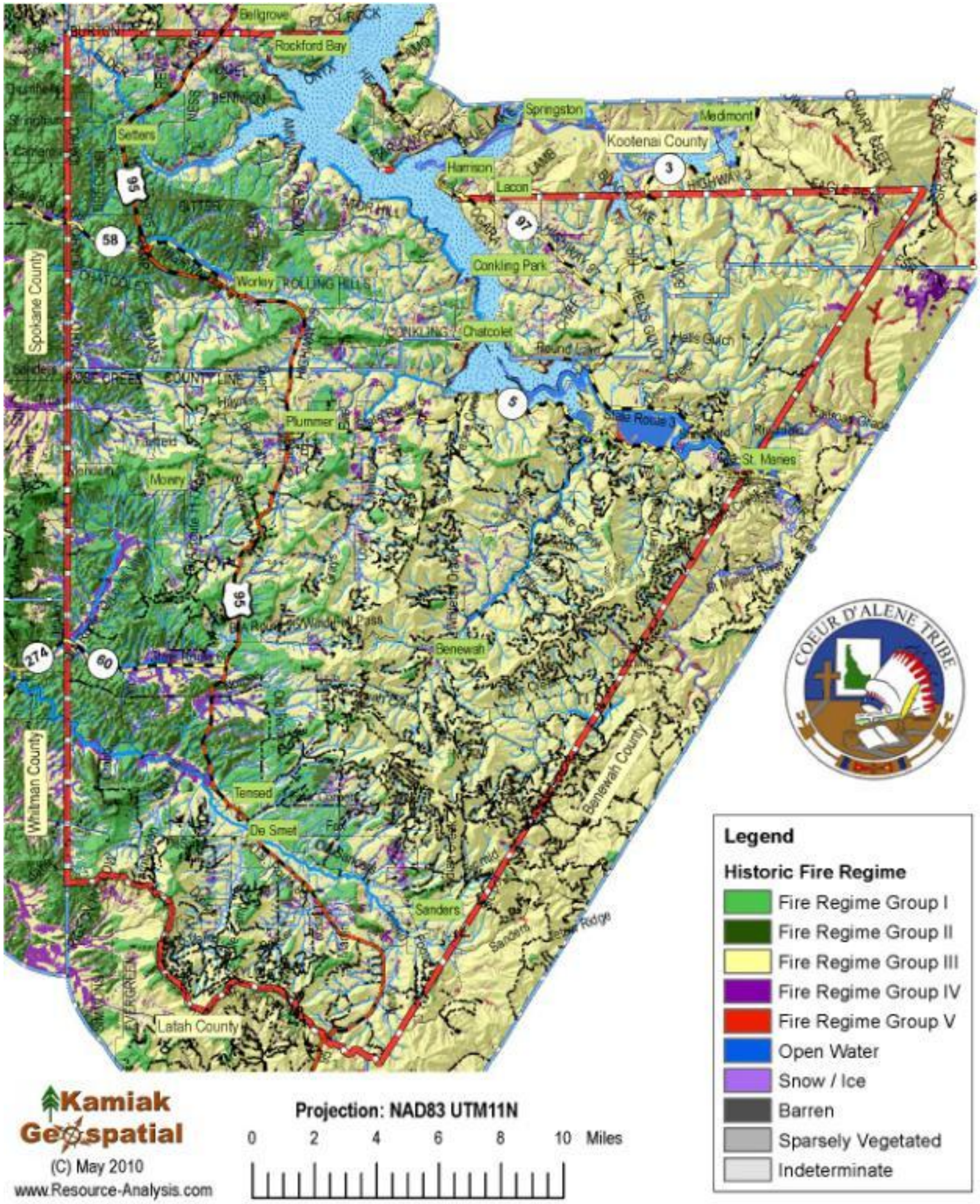
HFR identified in the Coeur d'Alene Reservation are presented in Table 39 and these data labels should be considered nominal data (they are not continuous-scale measurements). The HFR is shown graphically in Figure LXIII.

Table 39. Historic Fire Regime Group Analysis or the Coeur d'Alene Reservation.

Fire Regime	Description	Acres	Percent
Fire Regime Group I	<= 35 Year Fire Return Interval, Low-and-Mixed Severity	52,103	15%
Fire Regime Group II	<= 35 Year Fire Return Interval, Replacement Severity	33,421	10%
Fire Regime Group III	35 - 200 Year Fire Return Interval, Low-and-Mixed Severity	205,727	59%
Fire Regime Group IV	35 - 200 Year Fire Return Interval, Replacement Severity	19,242	6%
Fire Regime Group V	> 200 Year Fire Return Interval, Any Severity	2,086	1%
Water	Water	12,431	4%
Snow / Ice	Snow / Ice	118	0%
Barren	Barren	176	0%
Sparsely Vegetated	Sparsely Vegetated	202	0%
Indeterminate Fire Regime Characteristics	Indeterminate Fire Regime Characteristics	21,953	6%
(LANDFIRE 2007)	Total	347,458	

The most commonly represented HFR on the Coeur d'Alene Reservation (59% of land area, 205,727 acres) is Regime III, characterized by 35 to 200 year fire return intervals and low or mixed severity fires (Table 39). The next most represented historic fire regime is Regime I, characterized by low-or-mixed severity fires of a short interval occurring as frequently as once every 35 years (Table 39).

Figure LXIII. Historic Fire Regime Groups on the Coeur d'Alene Reservation (LANDFIRE 2006).



4.9.6.4. Fire Regime Condition Class

The USFS Northern Fire Plan Cohesive Strategy Team, in Kalispell, Montana, completed an analysis of Fire Regime Condition Class in 2002 and revised it again in 2005 for distribution to land managers and analysts (NFPCST 2005). Since that time, the LANDFIRE (2007) project has revised this analysis substantially to include new and insightful data analysis techniques. These data are used for the analysis of Fire Regime Condition Class (FRCC) on the Coeur d'Alene Reservation for this analysis effort.

A FRCC is a classification of the amount of current departure from the natural fire regime (Hann and Bunnell 2001). Coarse-scale FRCC classes have been defined and mapped by Hardy *et al.* (2001) and Schmidt *et al.* (2001). They include three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing, and drought). All wildland vegetation and fuel conditions or wildland fire situations fit within one of the three classes.

The three classes (nominal data) are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) fire regime (Hann and Bunnell 2001, Hardy *et al.* 2001, Schmidt *et al.* 2002). The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside this range.

Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), "high-graded" forest composition and structure (e.g. large trees removed in a frequent surface fire regime), or repeated annual grazing that maintains grassy fuels across relatively large areas at levels that will not carry a surface fire. Determination of the amount of departure is based on comparison of a composite measure of fire-regime attributes (vegetation characteristics; fuel composition; fire frequency, severity and pattern) to the central tendency of the natural (historical) fire regime. The amount of departure is then classified to determine the FRCC. A simplified description of the FRCC and associated potential risks are presented in Table 40. FRCC is displayed graphically in Figure LXIV.

Table 40. Fire Regime Condition Class Definitions.

Fire Regime Condition Class	Description	Potential Risks
FRCC I	Sites are determined to be within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.
FRCC II	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate. Risk of loss of key ecosystem components is moderate.
FRCC III	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components is high.

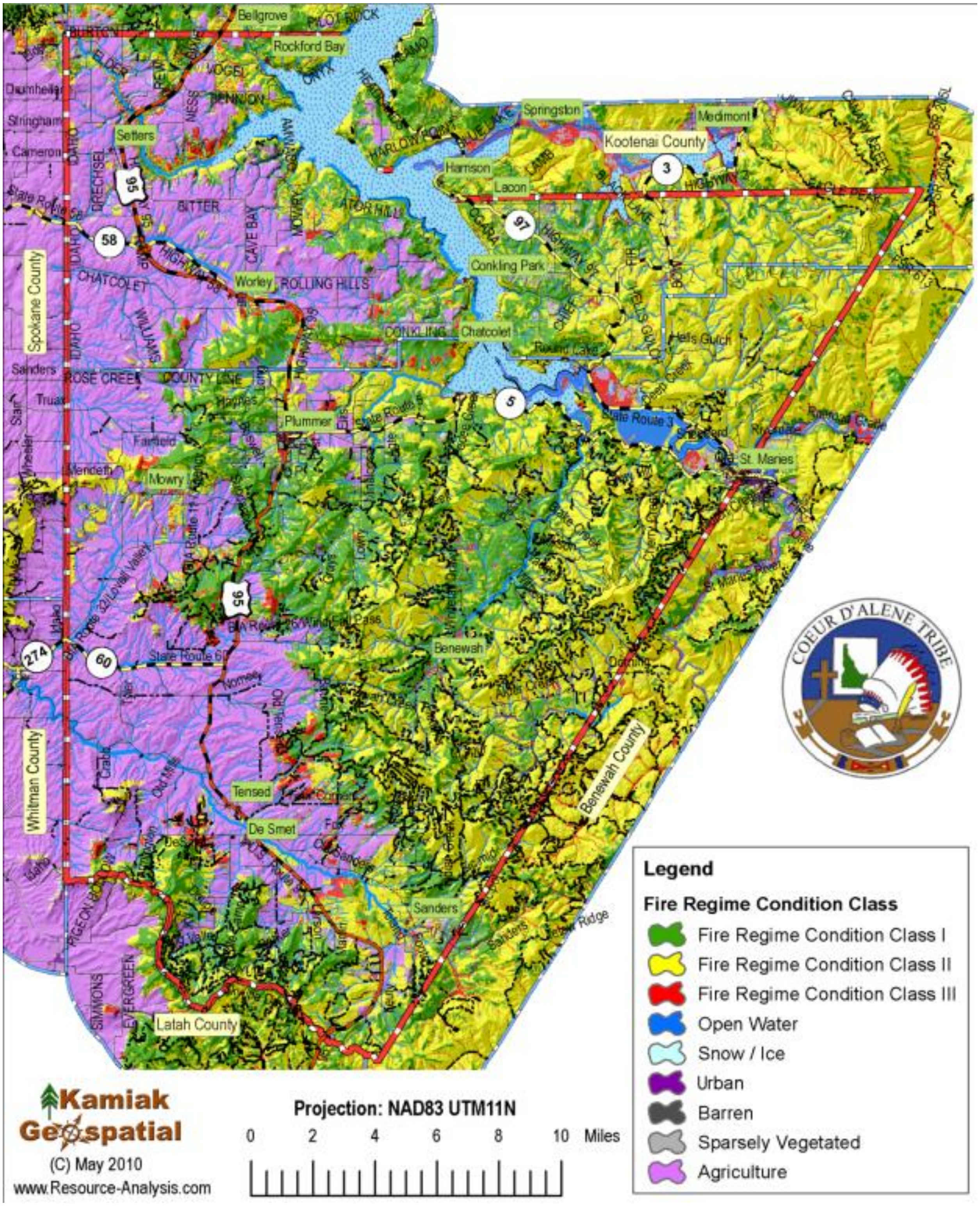
An analysis of FRCC on the Coeur d'Alene Reservation shows that approximately 21% of the land area is in FRCC I (low departure from historical), just about 37% is in FRCC II (moderate departure), with 5% of the area in FRCC III (Table 41).

Table 41. FRCC by Area on the Coeur d'Alene Reservation.

Fire Regime Condition Class		Acres	Percent of Area
Fire Regime Condition Class I	Low Vegetation Departure	72,508	21%
Fire Regime Condition Class II	Moderate Vegetation Departure	129,737	37%
Fire Regime Condition Class III	High Vegetation Departure	15,922	5%
Water		12,428	4%
Snow / Ice		120	0%
Urban		1,488	0%
Barren		158	0%
Sparsely Vegetated		160	0%
Agriculture		86,717	25%
Indeterminate Fire Regime Characteristics		28,220	8%
(LANDFIRE 2007)	**Total**	**347,458**	

These data represent a substantial adjustment to the USFS Northern Fire Plan Cohesive Strategy Team (Kalispell, Montana) analysis of Fire Regime Condition Class in 2002 (NFPCST 2005). The LANDFIRE (2007) data used in this analysis provide a substantially improved analysis basis and updated input data, leading to a better assessment of derivative data for both HFR and FRCC.

Figure LXIV. Fire Regime Condition Class on the Coeur d'Alene Reservation (LANDFIRE 2006).



4.9.6.5. Application of Assessment Tools Presented

The introduction of this section included a statement that each wildfire analysis tool has an appropriate application for illuminating different wildfire management questions. Mean Fire Return Interval, HFR, and FRCC were developed by the federal land management agencies (LANDFIRE 2007) in order to quantify vegetation characteristic departures from historical conditions. These assessments become extremely valuable tools in ecosystem restoration efforts when attempting to return the natural cycle of vegetation, fire, wildlife, soil and water processes, and other ecosystem management questions. Neither Historic Fire Regime nor Current Condition Class can be taken independently from the other; they are an integrated set of analysis tools.

The Fire Prone Landscapes assessment tool was developed specifically to address WUI wildfire risk challenges. This tool is not intended to illuminate the departure from historical conditions. This tool sheds a light of understanding on fire risk based on topographic and vegetative conditions. Where areas possess a high risk rating and those high risk ratings are continuous over large areas (seen as a large “splash of red” on the maps - Figure LXII) surrounding or adjacent to homes and infrastructure, a wildfire risk is interpreted.

4.9.7. Probability of Future Events

The probability of future wildfire events can be interpreted from the Mean Fire Return Interval analysis and the Fire Prone Landscape numbers. The Mean Fire Return Interval assessment considers the historical return interval over a long period (10,000 years) of estimated fire occurrence. Current conditions are not directly integrated into this analysis for determining current probability of wildfire return.

Fire Prone Landscapes can be used to estimate the probability of future wildfire return. In order to put these numbers in terms of probability of occurrence, the FPL rating score can be modified to represent a probability of a wildfire event occurring during a given period of time. The lower the FPL rating score, the lower the probability of witnessing a wildfire event in that area. Directly, the FPL rating score can be converted to a probability by stating the relative score as a probability of occurrence within a 50-year period. Using the conversion defined by the Extreme Value Theory (Castillo 1988), the 50-year wildfire probability event would be stated as the FPL rating score converted to a percent. Thus, a FPL rating score of 25 would represent a 25% probability of witnessing a 50-year wildfire event. This conversion is intended for illustrative purposes only and the actual probability of occurrence may differ from these estimates.

Further extrapolation of these data can be made in order to better understand the probability of future wildfire events on the Coeur d’Alene Reservation. If the site is left undisturbed and unmitigated, the risk of future wildfire events for each area evaluated can be estimated by the risk rating score expressed as a percent (rating score of 15, expressed as 15%). This modified score can then be treated as an expression of the likelihood of that area experiencing a wildfire event within the next 50-year period. Of course, mitigation measures can be expected to decrease the likelihood of large-scale wildfire events.

The probability of wildfire events within the Coeur d’Alene Reservation is moderate to high and greatly dependant on topography, soils, lightning ignitions, and human ignited wildfires. This places specific areas within the Coeur d’Alene Reservation likely to experience damages due to wildfires.

Ordinarily, the Coeur d’Alene Reservation is expected to experience wildfire events to a high frequency (occurrence of multiple ignitions every year).

4.9.8. Resources at Risk

Using the approach implemented for assessing flood-risk exposure on the Coeur d'Alene Reservation, the value of resources at risk to wildfires has been completed. The FPL risk-rating score was assigned to each structure (private and non-private) on the Coeur d'Alene Reservation, then grouped in reference to the closest community location. The individual structure values were summed together in these groups to reveal structural values that are at risk to landslides (tracking the Fire Prone Landscape scores).

The modal score (value of the dataset mode – analogous to the mean) for these values was determined for each structure on the Coeur d'Alene Reservation. These "risk scores" for each structure were grouped into consolidated risk categories in units arranged for every tenth score. Thus, the consolidated risk score of 5 is the lowest-risk category (0-10), and is followed by consolidated-risk category 15 (10-20), then 25 (20-30), and so forth. The higher the consolidated risk category, the higher the comparative risk to structures.

Next, community closeness was determined for each structure (the closest community place), placing each in only one community area based on location. These structure risk values were summed by community area to record the value of assessed improvements linked with the FPL modal score. The resulting tabular summary provides insights to where risks are present in combination with improvement values (Table 42, Table 43, Figure LXV).

It is important to understand that the risk assessment is not considering the structure to be at-risk. The risk analysis is considering the risk on the land where the structure is located. Through reasoning, it can be extrapolated that the land's risk rating will translate directly to the risk of the structure or structures on the land.

The results of this analysis demonstrate that 28% of the privately owned structure value on the Coeur d'Alene Reservation is located within the FPL risk-rating score of 40-50 (the modal score for all private structures); 869 structures with a value of approximately $84.6 million (Table 42, Figure LXV). Approximately, 1,160 privately owned structures with a total appraised value of roughly $108.2 million are located on sites with higher FPL risk rating scores. Conversely, 1,550 privately owned structures, with an appraised value of $105.7 million, are located on sites with lower FPL scores (Table 42, Figure LXV).

The majority of non-privately owned structures on the Coeur d'Alene Reservation, are located on lower FPL risk-rated sites than the privately owned structures. Based on the location of the non-privately owned structures, approximately 59% of the value of these structures (56 structures) are located on the lowest FPL risk-rating score of 0-10 (Table 43, Figure LXV). Only 75 structures, with an estimated value of $37.0 million are located on sites scoring 40 and higher on the FPL risk-rating scale.

Both the privately owned and non-privately owned structures face the same challenges of being located on sites exhibiting increased FPL risk-rating scores (Table 42, Table 43). The highest priority for fuels mitigation in the short-term should be to assess the structures located on the highest-ranked FPL risk-score sites. There are approximately 62 privately owned structures with a value of roughly $4.9 million located on sites with a FPL risk-rating score above 70. Immediate assessment and determination of appropriate mitigation measures should be conducted and then acted on for WUI mitigation measures. The same principle should be applied to the sites with structures within the FPL risk-rating score of 60-70, where 463 privately owned structures with a value of $42.2 million, and 14 non-privately owned structures valued at $18.7 million are located. By progressing through this list for all structures as the FPL risk-rating scores decrease, the ability to prioritize WUI treatments will be most effective.

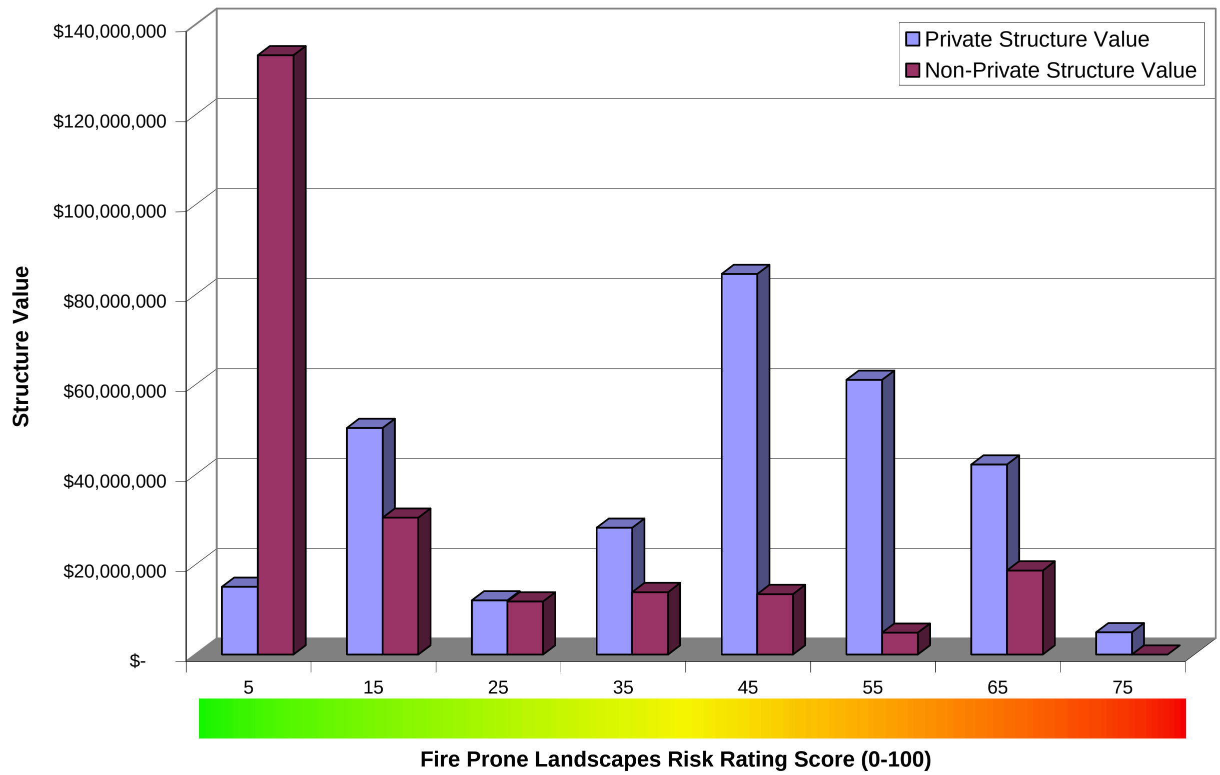
Table 42. Fire Prone Landscapes Risk Rating (0-100) for private structures, arranged by Community.

Community Name	Fire Prone Landscape Risk Rating (0-100) 0-10 (5)	10-20 (15)	20-30 (25)	30-40 (35)	40-50 (45)	50-60 (55)	60-70 (65)	70+	Number of Structures
BELLGROVE	$-	$-	$-	$157,503	$357,209	$335,910	$2,020	$-	28
BENEWAH	$219,805	$5,480,523	$2,937,542	$1,638,128	$5,600,654	$3,918,821	$1,963,020	$-	179
CHATCOLET	$595,480	$6,396,732	$2,512,279	$3,751,419	$5,977,489	$2,465,782	$1,070,032	$-	183
CONKLING PARK	$543,670	$6,030,560	$1,283,954	$3,201,640	$11,427,267	$2,216,035	$1,235,059	$162,990	233
DE SMET	$33,630	$541,892	$41,250	$528,069	$862,118	$102,750	$-	$-	47
HARRISON	$53,160	$5,632,432	$1,463,352	$3,614,857	$4,598,170	$4,587,124	$1,093,025	$-	171
LACON	$-	$-	$157,070	$1,114,330	$3,683,080	$3,036,697	$712,379	$80,450	108
MEDIMONT	$1,228,710	$6,107,954	$237,889	$3,718,469	$4,570,073	$958,191	$243,930	$-	145
MOWRY	$1,056,633	$1,503,730	$212,320	$88,090	$80,450	$95,220	$-	$-	65
PLUMMER	$7,119,760	$20,867,334	$3,130,837	$2,435,095	$8,304,814	$4,236,772	$1,829,960	$-	494
ROCKFORD BAY	$5,149,870	$12,113,994	$704,952	$4,803,880	$13,658,915	$13,301,877	$15,473,487	$2,008,009	703
SANDERS	$231,930	$172,279	$473,260	$33,440	$1,131,465	$3,179,172	$1,543,222	$318,510	97
SETTERS	$1,479,330	$70,700	$-	$-	$710,821	$2,214,196	$1,444,632	$58,090	89
ST. MARIES	$2,950,760	$8,221,043	$2,233,016	$9,108,069	$21,328,254	$10,129,247	$12,954,560	$3,565,710	719
TENSED	$132,380	$1,460,368	$1,287,990	$3,836,399	$2,502,346	$1,327,419	$1,415,794	$149,470	127
WORLEY	$3,976,326	$14,855,203	$1,401,514	$29,969	$316,976	$1,843,457	$564,442	$125,610	190
Count	**215**	**800**	**170**	**365**	**869**	**634**	**463**	**62**	**3,578**
Value	**$15,064,119**	**$50,368,865**	**$12,037,597**	**$28,195,198**	**$84,589,001**	**$61,053,177**	**$42,229,433**	**$4,944,377**	**$298,481,767**

Table 43. Fire Prone Landscapes Risk Rating (0-100) for non-private structures, arranged by Community.

Community Name	0-10 (5)	10-20 (15)	20-30 (25)	30-40 (35)	40-50 (45)	50-60 (55)	60-70 (65)	70+	Number of Structures
	Fire Prone Landscape Risk Rating (0-100)								
AGENCY	$9,531	$209,000	$-	$753,572	$2,000	$4,000	$12,000,000	$-	7
CHATCOLET	$-	$-	$-	$-	$-	$6,000	$2,000	$-	4
CONKLING PARK	$1,734,500	$45,000	$-	$-	$2,000	$-	$-	$-	5
DESMET	$110,527,454	$6,107,699	$626,100	$588,896	$541,654	$690,700	$285,970	$-	42
HARRISON	$-	$344,754	$-	$-	$23,328	$-	$-	$-	5
HEYBURN STATE PARK	$924,000	$1,133,340	$-	$41,990	$-	$95,025	$-	$-	13
LACON	$3,246,000	$1,265,000	$-	$-	$-	$-	$-	$-	2
MOWRY	$3,987,740	$-	$-	$-	$-	$-	$-	$-	2
PLUMMER	$9,608,758	$5,956,153	$9,513,617	$9,894,004	$11,033,807	$3,156,000	$6,300,000	$-	96
ROCKFORD BAY	$-	$5,686,425	$-	$304,000	$304,000	$-	$90,000	$-	9
SANDERS	$-	$-	$-	$152,000	$152,000	$-	$-	$-	2
SETTERS	$-	$152,000	$-	$-	$-	$-	$-	$-	1
ST. MARIES	$152,000	$1,976,000	$152,000	$1,368,000	$760,000	$152,000	$-	$-	30
TENSED	$304,000	$543,300	$-	$-	$456,000	$456,000	$-	$-	13
WORLEY	$2,736,000	$6,992,000	$1,520,000	$760,000	$152,000	$304,000	$-	$-	82
Count	**56**	**116**	**26**	**40**	**35**	**26**	**14**	**0**	**313**
Value	**$133,229,983**	**$30,410,671**	**$11,811,717**	**$13,862,462**	**$13,426,789**	**$4,863,725**	**$18,677,970**	**$-**	

Figure LXV. Fire Prone Landscapes Risk Rating (0-100) arranged by group scores and ownership category.



4.9.9. Potential Mitigation Activities

For many decades in the 20th century the policy of the BIA, USFS, and other agencies, was to suppress all wildfires. This policy was epitomized by the mascot Smokey Bear and was also the basis of parts of the Disney produced Bambi movie. The previous policy of absolute fire suppression in the United States has resulted in the higher-than-historical buildup of fuel in some ecosystems such as dry ponderosa pine forests. In acute cases, forest species composition has transitioned from a fire tolerant species mix of ponderosa pine, lodgepole pine, Douglas-fir, and western larch, to a mixture of these species plus a substantial component of grand fir. When fire is suppressed long enough, grand fir forests can dominate these sites. Grand fir has a significantly different fire-response profile than the species it replaces and also provides substantially altered ecosystem mechanisms for wildlife, watersheds, fisheries, and biodiversity. This example provides only a small insight to the forest ecosystem changes across the Upper Columbia Plateau brought about by 20th century fire management policies.

In addition to the loss of human life from direct firefighting activities, homes designed without consideration of the fire prone environment in which they are built have been a significant reason for the catastrophic losses of property and life experienced in wildfires.

The risk of major wildfires can be reduced partly by a reduction or alteration of fuels present. In wildland areas, reduction can be accomplished by various methods: first, conducting controlled burns (prescribed burning); second, the alteration of fuel mechanics, which involves reducing the structure of fuel ladders. Fuel alteration can be accomplished by hand crews with chainsaws or by large mastication equipment that shreds trees and vegetation to a mulch. Another method is changing the vegetative component by replacing vegetation with less fire-susceptible species. Such techniques are effective within the WUI.

People living in fire prone areas can take a variety of precautions, including building their homes out of flame-resistant materials, reducing the amount of combustible fuel near the home or property (including firebreaks, effectively their own miniature control lines), and investing in their own firefighting tools (hand tools, water tanks, pumps, and fire-hose). Rural farming communities are also often threatened directly by wildfire. Expanding urban fringes have spread into forested areas, and communities have literally built themselves in the middle of highly flammable forests.

In 2004, the Coeur d'Alene Tribe developed and in 2005 adopted a Coeur d'Alene Reservation Fire Management Plan. This plan was developed to provide direction and continuity and to establish operational procedures to guide all wildland fire program activities to ensure that fire is properly used as a means of resource management. The Fire Management Plan presents actions that will integrate fire management with resource management goals. This plan will be evaluated and updated in future years as required by changes in policy, management actions, and priorities.

Planning objectives for Fire Management during 1995-2005 planning period included:

A. Continue to maintain adequate wildfire suppression capabilities,
B. Utilize prescribed fire at a level consistent with goals of the Tribe,
C. Enhance interagency fire cooperation on a regional and national level,
D. Provide employment opportunities,
E. Integrate fire and fuels management into all timber-sale activities,
F. Implement the National Fire Management Analysis System (NFMAS), to help minimize loss and cost in wildland fire program.

That plan identified several potential mitigation activities to reduce the risk of loss of life, destruction of homes and other structures, and the disruption of the local economy, and to facilitate the maintenance of a healthy forestland environment.

A major emphasis in that plan was the creation of defensible spaces around homes and neighborhoods to increase the success potential of fire fighters in the case of wildfire emergency. This reduction of the "resistance to control" focused primarily on removing vegetation immediately adjacent to homes, improving ingress and egress, and replacing flammable structure materials with fire-resistant materials (e.g., decks and roofing).

Since that plan's adoption, implementation has been targeted and effective. Homes have been "protected".

4.9.10. Protection

A key component in meeting the underlying wildfire control need is the protection and treatment of fire hazard in the WUI. These WUI areas encompass not only the interface (areas immediately adjacent to urban development), but also the continuous slopes and fuels that lead directly to a risk to urban developments. Reducing the fire hazard in the WUI requires the efforts of federal, state, and local agencies and private individuals (Norton 2002). "The role of [most] federal agencies in the WUI includes wildland fire fighting, hazard fuels reduction, cooperative prevention and education, and technical experience. Structural fire protection [during a wildfire] in the WUI is [largely] the responsibility of tribal, state, and local governments" (Norton 2002). Property owners share a responsibility to protect their residences and businesses and minimize fire danger by creating defensible areas around them and taking other measures to minimize the fire risks to their structures. With treatment, a WUI area can provide firefighters a defensible area from which to suppress wildland fires or defend communities. In addition, a WUI that is properly thinned will be less likely to sustain a crown fire that enters or originates within it (Norton 2002).

Tools are available to emergency service responders and managers to assess wildfire fuels, structural risks, and infrastructure components. Computer programs such as RedZone® Software are written to assist fire departments and emergency services efforts to assess individual structures, communities, and regions to understand relative risk components of wildfire exposure and delineate these components of risk in a GIS map. RedZone Software's suite of products provides agencies a comprehensive solution to data collection, visualization, and map production (Red Zone Software 2009).

By reducing hazardous fuel loads, ladder fuels, and tree densities, creating new defensible space, and reinforcing existing defensible space, landowners would protect the WUI, the biological resources of the management area, and adjacent property owners by:

- Minimizing the potential of high-severity surface, ladder, and crown fires entering or leaving the area around homes.
- Reducing the potential for firebrands (embers carried by the wind in front of the wildfire) impacting the WUI. Research indicates that flying sparks and embers (firebrands) from a crown fire can ignite additional wildfires as far as 1¼ miles away during periods of extreme fire weather and fire behavior (Norton 2002).
- Improving defensible space in the immediate areas for suppression efforts in the event of wildland fire.

Figure LXVI. Beaver dam pond and den upstream of the Plummer Forest Products facility.

Chapter 5. Community Assessments

The risk exposure discussions provided in Chapter 4 of this document provide the reader with an overview of the types of hazards the Coeur d'Alene Reservation faces and the mechanisms of their impact. These discussions can be used for a consideration of "macro-risk assessment", when hazards such as high winds are considered, because there is little to prevent high winds from negatively impacting homes and businesses anywhere on the Coeur d'Alene Reservation (thus the moniker of "macro"). On the other hand, a hazard such as a wildfire shows specific risks to structures and infrastructure, where certain conditions are present, but are not present in others (a location specific risk). The same comparisons can be applied to all hazards affecting the Coeur d'Alene Reservation.

In this Chapter of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan, we will address the "Macro Hazards" first, and then articulate the risk exposure to the location specific hazards on a community basis. Each discussion will articulate the current exposure to existing structures as well as describe the current exposure challenges for new structures.

5.1. Culturally Significant and Sacred Sites

The involvement of the THPO and Tribal Cultural Resource program when dealing with natural disasters in combination with culturally significant or sacred sites has been introduced in Section 2.3.

Natural hazards as described in this document can impact all culturally significant and sacred resources of the Coeur d'Alene Reservation. In some cases, it is the progression of the natural events of the earth that lends the site a portion of its significance. In other situations, the progression of a cycle of disaster may destroy the physical characteristic of a site, but not the cultural significance of it. Natural processes that can be considered natural disasters today may be considered a part of the larger scheme of cultural significance.

The Coeur d'Alene Tribal THPO office is aware of the extent of natural disasters articulated within this Tribal Hazards Mitigation Plan, participated in the development of it, and will monitor the occurrence of disaster events and participate in emergency response and potential mitigation measures to ensure that culturally significant and scared sites are not artificially or inadvertently disturbed.

Generally speaking, floods, river meandering, and landslides can exert the greatest potential impact on site-based sacred sites where the site is partially defined through the physical presence of past activities such as burial sites, sites with signs of past habitation, or those sites that bear witness to pictographs or other markings. While the natural disaster may destroy or alter the characteristics of the site, the importance of the site is not diminished.

Vandalism, theft, and artificial concealment of a site's physical attributes of cultural significance or sacred nature cannot be tolerated. This form of destruction breaks the natural cycle of earthly changes and leaves scars to the cultural tapestry of the Coeur d'Alene Tribal people.

5.2. Planning and Zoning

A review of the Population Density Indices developed for this planning effort (Figure VII), reveals that there are currently no structures located in the "wildland" category of population density, but this should be expected since the definition of that category is the absence of current structures in the zone. The distribution of the privately owned structures on the Coeur d'Alene Reservation (Table 44) is concentrated within the Low Density Suburban category (65% by value), within the Moderate Density Suburban category (19% by value), within the High Density Suburban category (5% by value), within the Low Density Urban category (5% by value), and in the Rural category (6% by value). Although the highest concentration of structures within a small geographic area is within the area of the City of St. Maries, only about 200 structures are located here, but those structures are all located within a limited area (Figure VII). Most of the structural value on the Coeur d'Alene Reservation is located within the Low Density Suburban zone, where approximately 2,438 structures are located (68% of the total number of privately owned structures)

The non-privately owned structures within the Coeur d'Alene Reservation follow a similar, but not identical, population-distribution pattern (Table 45). The highest concentration of non-privately owned structures is located in the Low Density Suburban category where 28% of the total value of structures is located (58% of the non-privately owned structures). Approximately 31% of the non-privately owned structures, representing 18% of the total value, are located in the Moderate Density Suburban category. Roughly 4% of the structures, representing $4% of the value, are located within the High Density Suburban category. Just over 10 structures (4% of the total number of structures), representing 1% of the total value are located in the Low Density Urban Category. Surprisingly, the remaining structures are located within the Rural population density category with a total value representing 49% of the total non-privately owned structures (3% of the total count of structures). Much of this non-privately owned value can be attributed to the Coeur d'Alene Casino, which is located just inside the Rural population density category of population density (Figure VII).

Table 44. Private Structure values and total number arranged by community area and Population Density Condition.

Community Name	Rural	Low Density Suburban	Moderate Density Suburban	High Density Suburban	Low Density Urban	Count
BELLGROVE	$-	$1,789,557	$-	$-	$-	28
BENEWAH	$8,049,181	$2,773,111	$-	$-	$-	179
CHATCOLET	$224,700	$10,986,202	$-	$-	$-	183
CONKLING PARK	$-	$15,372,474	$-	$-	$-	233
DE SMET	$198,298	$2,150,345	$-	$-	$-	47
HARRISON	$-	$10,251,922	$-	$-	$-	171
LACON	$-	$5,888,920	$-	$-	$-	108
MEDIMONT	$411,236	$8,360,124	$-	$-	$-	145
MOWRY	$2,754,677	$472,229	$-	$-	$-	65
PLUMMER	$819,367	$10,256,897	$22,185,335	$-	$-	494
ROCKFORD BAY	$-	$46,904,843	$-	$-	$-	703
SANDERS	$584,809	$4,511,881	$-	$-	$-	97
SETTERS	$2,129,322	$2,598,103	$-	$-	$-	89
ST. MARIES	$382,750	$19,408,251	$9,399,334	$6,687,489	$12,147,978	719
TENSED	$1,164,320	$6,197,680	$-	$-	$-	127
WORLEY	$506,363	$11,050,169	$-	$-	$-	190
Count	**300**	**2,438**	**536**	**105**	**199**	**3,578**
Value	**$19,248,409**	**$194,584,269**	**$55,754,854**	**$14,949,100**	**$13,945,135**	**$298,481,767**
Value Distribution	**6%**	**65%**	**19%**	**5%**	**5%**	
Structure Count Distribution	**8%**	**68%**	**15%**	**3%**	**6%**	

Table 45. Non-Private Structure values and total number arranged by community area and Population Density Condition.

Community Name	Rural	Low Density Suburban	Moderate Density Suburban	High Density Suburban	Low Density Urban	Count
AGENCY	$-	$1,303,983	$-	$-	$-	7
CHATCOLET	$-	$2,750,000	$-	$-	$-	4
CONKLING PARK	$-	$1,372,688	$-	$-	$-	5
DE SMET	$-	$15,247,304	$-	$-	$-	42
HARRISON	$-	$674,000	$-	$-	$-	5
HEYBURN STATE PARK	$-	$8,600,000	$-	$-	$-	13
LACON	$-	$112,680	$-	$-	$-	2
MOWRY	$304,000	$-	$-	$-	$-	2
PLUMMER	$-	$280,000	$39,864,417	$-	$-	96
ROCKFORD BAY	$-	$1,060,424	$-	$-	$-	9
SANDERS	$-	$304,000	$-	$-	$-	2
SETTERS	$-	$12,000,000	$-	$-	$-	1
ST. MARIES	$-	$-	$361,260	$8,951,228	$2,859,353	30
TENSED	$-	$2,269,387	$-	$-	$-	13
WORLEY	$110,415,268	$17,553,325	$-	$-	$-	82
Count	10	180	98	14	11	313
Value	$110,719,268	$63,527,791	$40,225,677	$8,951,228	$2,859,353	$226,283,317
Value Distribution	49%	28%	18%	4%	1%	
Structure Count Distribution	3%	58%	31%	4%	4%	

5.3. Macro Hazards

Macro hazards are those natural hazards that reach virtually every populated place on the Coeur d'Alene Reservation, with little variability in the magnitude of the severity based on location. These macro hazards can be addressed as a group as the mitigation measures will be generally uniform in prescription and application. All future construction is expected to be vulnerable to these macro-hazards in all locations. Pre-construction design, site selection, building materials, and site preparation should be implemented not only for the macro-hazards described here, but for all hazards described in this document.

5.3.1. Radon Exposure

The Coeur d'Alene Reservation, North Idaho, and most of the US located on the continental batholith is located within a zone of radon exposure that puts people at risk to lung cancer. All existing homes on the Coeur d'Alene Reservation should be tested for radon concentrations and if found high, corrective and appropriate mitigation measures should be taken to reduce the risk. New construction on the Coeur d'Alene Reservation should use pre-construction techniques to limit the vector of radon penetration into the structure. Testing of the new structure's radon levels should be conducted as appropriate.

Periodic testing of structures should be conducted within the Coeur d'Alene Reservation on a frequency of no less than once every 5 years, even if sites have not shown action-level concentrations of radon in previous tests.

5.3.2. High Wind Damage

The first hazard in this category is wind damage to structures and infrastructure on the Coeur d'Alene Reservation. Literally, this hazard can, and does, impact every home, business, and power line on the Coeur d'Alene Reservation. There is no area on the Coeur d'Alene Reservation that has any form of structure or infrastructure that has not been effected by historical windstorms. In addition to the structures and infrastructure that has been impacted by high winds, the losses to standing timber volume have been substantial.

Standing trees can be felled by high winds, tops can be broken off trees, and one tree (or many) can fall against another tree (or many) to cause bark scarring or gouging of the stem. When this happens, the impacted tree might stay standing, but be damaged in a way that allows pathogens or insects to attack the standing tree, resulting in loss of vigor or even causing death to the tree within 5 years.

When trees are felled by high winds, the damage can be in the form of trees dropped in a line (from straight line winds) or in a "jack-straw" pattern from downbursts. In either scenario, the falling trees can easily snap power lines, drop on structures, block roads, or cause river debris jams. The prevention of these episodes is difficult to accomplish without causing a vector for another high wind damage. For instance, if all trees are cut down around a group of homes to prevent wind damage from dropping trees on the homes, the winds may have a more direct access to the homes in a way that roofing materials are compromised during the high winds. At the same time, the removal of the trees from the site may cause the soils to become less stable with the loss of the tree roots leading to more erosive soils and even causing slope stability to weaken and lead to landslides.

These scenarios are not detailed to infer that nothing can be done to reduce wind damage potential, but only to elucidate the interrelatedness of hazard exposures while attempting to mitigate one hazard at a time.

Across the Coeur d'Alene Reservation, forest management activities have treated timberlands adjacent to the major access routes where power lines are located, resulting in a power delivery infrastructure that is currently at reduced risk. These are positive activities that should be conducted when the management of the forestlands can help to protect the investment in the power supply system and not adversely affect homes and businesses on the Coeur d'Alene Reservation. As an example, the powerlines adjacent to US95, at the southern extent of the Coeur d'Alene Reservation have been placed with a right-of-way devoid of trees to prevent wind damage.

Around homes on the Coeur d'Alene Reservation several factors give rise to concerns, one of which is the standing timber within "reach" of structures and the power lines. Thinning of trees may seem like an intuitive way to preserve the aesthetic pleasure of the standing trees around the homes while removing a portion of the risk exposure from falling trees; however, the soils and the forest species of the Coeur d'Alene Reservation may not respond to a large-scale thinning by growing more stable root systems and tree stems. On the contrary, trees in this region may become wind susceptible and fall to a lower velocity wind after thinning (the extreme example of risk is the stands of lodgepole pine). Of course, each site is unique and has a different mix of tree species, some native and some introduced, and tree husbandry must be considered on a case-by-case basis.

Other factors that homeowners, businesses, communities, and the Coeur d'Alene Tribe should consider, include:

- Roofing stability for the roofing materials and the edging around the roofing materials,
- Securing siding attachments,
- Protecting power supply lines from the main line (at the road) to the structure, in terms of trees and branches that can cut the power line during a high wind,
- Conducting verification of the wooden power poles strength (due to a possible wear and tear) along roads and inside communities,
- Installing window shutters on windows exceeding a three-foot span in either direction.

There are several structures located in all of the communities of the Coeur d'Alene Reservation, and most of them that were built more than 25 years ago are showing signs of roofing materials that have either been blown off the structure, or have been dislodged by high winds and falling branches. These structures should be evaluated and improved before more high winds continue the damage. When roofing materials are compromised, rains and more winds have the ability to cause storm damage.

Window shutters are a common fixture in the hurricane zones of the American southeast where -force winds from hurricanes are seen. The utility of window shutters is to secure the breakable glass against the direct force of the winds. Although the force of wind gusts within the Upper Columbia Plateau are moderately comparable to the force of many hurricanes, the attachment of window shutters has been adopted by homeowners much less here. These fixtures should be considered on many homes where the high force of winds is frequently seen, and on new construction where the frequency of high winds may not have yet been documented.

5.3.3. Snow Loading

Snow loading on the roofs of buildings has been a recurrent challenge throughout the Upper Columbia Plateau generally, and within the Coeur d'Alene Reservation specifically (4.3.3.1). Because of the frequency of late winter warm weather systems (generally in February) that drop rain on an established snowpack, the result often leads to heavy weight loads on the roofs of structures. Often, the response by residents has been to shovel the snowload from the roofs as snow accumulates. Some portion of the population cannot access the roof tops to shovel the snow off, and in many cases helping-hand-neighbors and Tribal staff have responded to assist those in need.

A relationship has been made between the synergistic effects of multiple factors that can lead to structural collapse, or structural damage, from heavy snow loads. In general, the factors that lead to an increased risk to structural damage include:

- Flat or low pitch roofs that hold deep accumulations of snow,
- Broad roof surface area (maximum span between vertical supports),
- Roofing material and roofing span supports (material and truss spacing) not suited to bear heavy snow loads,
- Low amounts of ceiling insulation that allows heat to escape to the roof, causing snow accumulations to partially melt – leading to wet and heavy snow,
- Lines of tall vegetation surrounding the home (trees) that cause blown snow to 'drift' onto the structure, but shade solar radiation that would normally melt the snow (requires site investigations to confirm these episodes as they may happen frequently or infrequently on the same structure).

The first three of these components for future developments can be guided through the administration of building codes to ensure that suitable precautions are built into the construction plans of new structures (private, non-private, and commercial). The last two components on this list are driven by the homeowner who must make personal decisions about maintaining adequate levels of insulation in their ceilings, and maintaining vegetation around their homes.

The question of adequate insulation can be addressed by taking advantage of some of the available federal tax incentives in combination with the electric companies of the region, to insulate the attic of a structure, while receiving a reduced cost service and a tax credit on federal income taxes.

The question of managing vegetation around the structure can be addressed not only for snow load issues, but also for reducing wind damage and wildfire risks. In order to implement these activities in a manner that reduces the overall risk to the structures, communities, and the Coeur d'Alene Reservation, site-specific assessments must be made, action plans developed, funded, and implemented.

5.3.4. Seismic Shaking Hazards

Seismic shaking hazards have been addressed in Section 4.5 to address the seismic shaking risks that the entire region faces. The exposure to these risks is generally seen by the preponderance of URM structures on the Coeur d'Alene Reservation. There are also many structures with URM construction chimneys. Roughly 40% of the residential structures on the Coeur d'Alene Reservation use wood burning heat (visual estimate). The other homes use either electric or gas heating with no wood-burning chimney present. Of those homes with brick or masonry chimneys, there is a mix of approximately 50% of homes using URM materials, and the other 50% using stove-pipe construction (metal pipe). This narrows down the number of structures at risk to approximately 20% of the total number of privately owned structures, or approximately 700 homes.

Mitigation measures for homes can be initiated by installing bracing structures vertically on all four corners of the chimney, extending from the top of the chimney to the ground or the entrance to the structure. The bracing structures can be built with angle iron jointed horizontally (welded in place) periodically along the chimney's height, every few feet (a metal wrap around the chimney horizontally, connecting the vertical braces, and welded together). The supports are tethered to the structure's frame through the roofing material. The intent of the support is to ensure that during a seismic event (earthquake) the chimney does not shake apart and fall on people or assets on the ground that could be killed or damaged from the impact. These activities are recommended across all of the Coeur d'Alene Reservation and for all new construction (through building codes) with external chimneys extending more than three feet above the roofing structure. One practitioner even suggested painting the support structures to match the color of the chimney for aesthetic reasons.

5.4. Community Based Risk Exposure

Seven populated places will be addressed in this section of the planning document, to augment the series of tables offered within Chapter 4 dealing with each natural hazard and the value of structures in those locations.

5.4.1. DeSmet & Tensed

The community of DeSmet and the City of Tensed are located at the southern extent of the Coeur d'Alene Reservation on either side of Hangman Creek (Figure LXVIII). Regional access to these population centers is provided by US95, and the communities rest only a few miles from the southern extent of the current external boundaries of the Coeur d'Alene Reservation. The community of DeSmet includes about 47 privately owned structures, and 42 non-privately owned structures. The City of Tensed includes approximately 127 privately owned structures and 13 non-privately owned structures. Combined, these structures represent a total value of approximately $24.8 million (Table 3). These summaries combine all of the structures that are located closest to these communities, not just the structures within the city limits of Tensed, or within the community area locally called DeSmet. This summary includes structures located miles away, that are not 'closer' to any other community.

As already defined in Section 5.3 (Macro Hazards), the risk exposure to high winds is uniformly high in DeSmet & Tensed, as well as the other populated places of the Coeur d'Alene Reservation. There are few softwood trees surrounding homes, but ornamental hardwoods have been planted throughout these communities, and there are a few homes with compromised roofing materials that would benefit from reinforcement . The prevalence of URM chimneys is not extensive in this area.

5.4.1.1. Flood Risks

Flood risks in DeSmet & Tensed are attributed to the shorelines of Hangman Creek (Figure LXXI, Table 26, Table 27). The floodplains determined and approved by FEMA were updated in September 2009 and used for this analysis. As of the time of writing this Tribal Hazards Mitigation Plan, FEMA has been working with the City of Tensed and Benewah County to reassess the floodplain within the City of Tensed. Although new floodplain maps have been made available to the city, the release of new floodplain geospatial data has not been obtained for use in this analysis. The analysis summarized here is based on the September 2009 data.

Floodplain mapping for all of Hangman Creek has been completed and is presented here (Figure LXXI, Table 26, Table 27). These floodplains indicate that several structures all along the Hangman Creek valley are located within the zone considered most at-risk to flooding. Most of the value of structures within this area are located close to, and within the City of Tensed.

Storm-water accumulation within the area of DeSmet & Tensed is isolated generally to areas where rainfall accumulates within small depressions and adjacent to the shoreline of Hangman Creek. These stormwater accumulations have occurred in response to road maintenance, farming, and site clearing activities. Generally, these areas can be mitigated for water accumulation damages by developing drainage ditches that link the water accumulation areas into larger drainage systems.

Caution should always be applied to reducing these surface stormwater accumulations by draining the water directly into the river. These surface-water accumulations can become contaminated by oils, detergents, salts, and other water soluble contaminants that would harm fisheries in the river and degrade water quality. A filtration system should be applied to any such activity. The risks of this occurrence in this area is low because of the residential nature of the communities. However, there are commercial enterprises here including the gas station / mini mart.

Both DeSmet and the City of Tensed maintain wastewater treatment facilities within and adjacent to the floodplain; the City of Tensed within the Hangman Creek watershed, and the community of DeSmet adjacent to the King Valley watershed. The City of Tensed wastewater treatment facility can be overtopped by floodwaters during high water flow conditions. The DeSmet community wastewater treatment facility has little 'freeboard' clearance for highwater from the King Valley stream. Both systems are at risk to being overtopped by floodwaters and eroded by high velocity flows across the boundaries of the systems. Both have been placed in their respective locations for the desire to use gravity to move effluent from homes to the facilities (Figure LXVII).

Figure LXVII. DeSmet Wastewater Treatment Facility (center); farm fields and King Valley drainage in the foreground, the community of DeSmet in the background, and Hangman Creek to the north (left).

The temporary fix of these sites is to build up the retaining walls of the facilities to a height of an additional 3 to 6 feet using large diameter rock. This would serve as a 'levee of sorts' to hold the river's water out of each wastewater treatment facility and vice versa.

A long-term improvement for both the DeSmet & Tensed facilities is to relocate each one to higher ground outside of the floodplain, away from erosion susceptible areas, and where topographic relief allows for a functional sewer main to provide treatment to wastewater from the communities. Cost estimates for this project may easily exceeded $2.0 million for each site (*estimate only!*).

5.4.1.2. Seismic Shaking and Fault Lines

The seismic shaking risk within and around the communities of DeSmet & Tensed is relatively low (Figure LXXII and Table 29), the lowest on the Coeur d'Alene Reservation; the distribution of fault lines is isolated to scattered lines to the south of the communities. The exposure to earthquakes in the areas surrounding homes and businesses within DeSmet and Tensed are documented in Section 5.3.4, Seismic Shaking Hazards.

5.4.1.3. Landslide

Landslide risk assessments in DeSmet and Tensed are responsive to the topographic relief of the area. Within Tensed, the risks are rated as very low (in response to the relatively flat terrain), while isolated places within DeSmet show higher risk attributes in response to steep slopes (Figure LXXIII). This area defines the dividing line between rich farming lowlands and forested uplands. Where forestry practices remove the stable vegetation, the sites can respond with localized landslides, slumping, and erosion. The soils in this area are derived from loess parent materials and can respond to rapid erosion, when vegetation is removed and the slopes are steep.

Landslides within these communities have been rare, and isolated to small events.

5.4.1.4. Expansive Soils

Expansive soils and expansive clays within the area of DeSmet and Tensed, for light residential (without basements) are a mix of low-, to-moderate risks (Figure LXXIV). Within the City of Tensed developments are located on sites rated as moderate for expansive soils, while in DeSmet they are all located on sites rated as low in risk.

Conversely, the profile for light commercial structures (and Residential with a basement) are rated as low risk in Tensed and moderate risk in DeSmet (Figure LXXV). This divergence in ratings is due to the depths of consideration for the light residential (without a basement) allowing for only soils between 10 and 40 inches, while the light commercial and residential with a basement considers the soil characteristics between 10 and 60 inches. The extreme variations in the zone between 40 and 60 inches has led to these differential ratings.

In this entire area, expansive soils require that pre-construction building techniques be considered for all new structures to integrate recommendations. Even low risk soils in the Upper Columbia Plateau can respond with adverse results if the soil moisture is not moderated at near constant levels.

5.4.1.5. Wildfire

Most of the structures located in the area surrounding DeSmet and the City of Tensed are at low risk to wildfire (Figure LXXVI, Table 42, Table 43). These communities are located in close proximity to Hangman Creek, where agricultural enterprises dominate the landscape. Wildland fuels are present south of Hangman Creek, and northeast of the communities. Wildfires are capable of igniting and growing within these areas; access to these sites is rapid and facilitated by US95 and forest roads throughout this area.

Homes scattered around these two communities are located within zones of wildfire risk. Some of the homes have received WUI fuels mitigation work, while others have not. Even some of those homes that have received fuels mitigation attention in the past are facing the need to ‘update’ the treatments and maintain an acceptable level of ‘protection’.

Figure LXVIII. Aerial Imagery of DeSmet & Tensed, 2009.

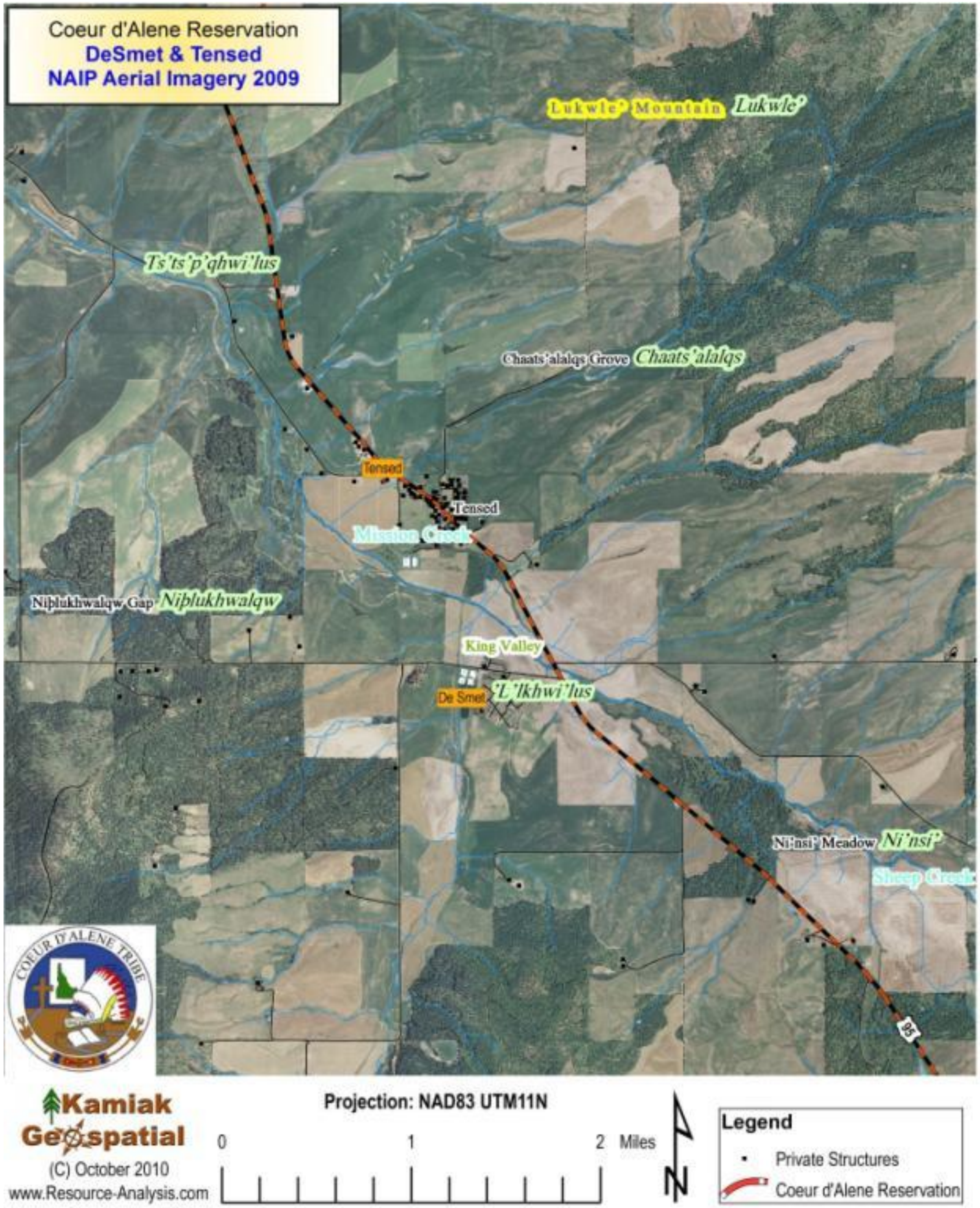


Figure LXIX. Topographic Relief of DeSmet & Tensed.

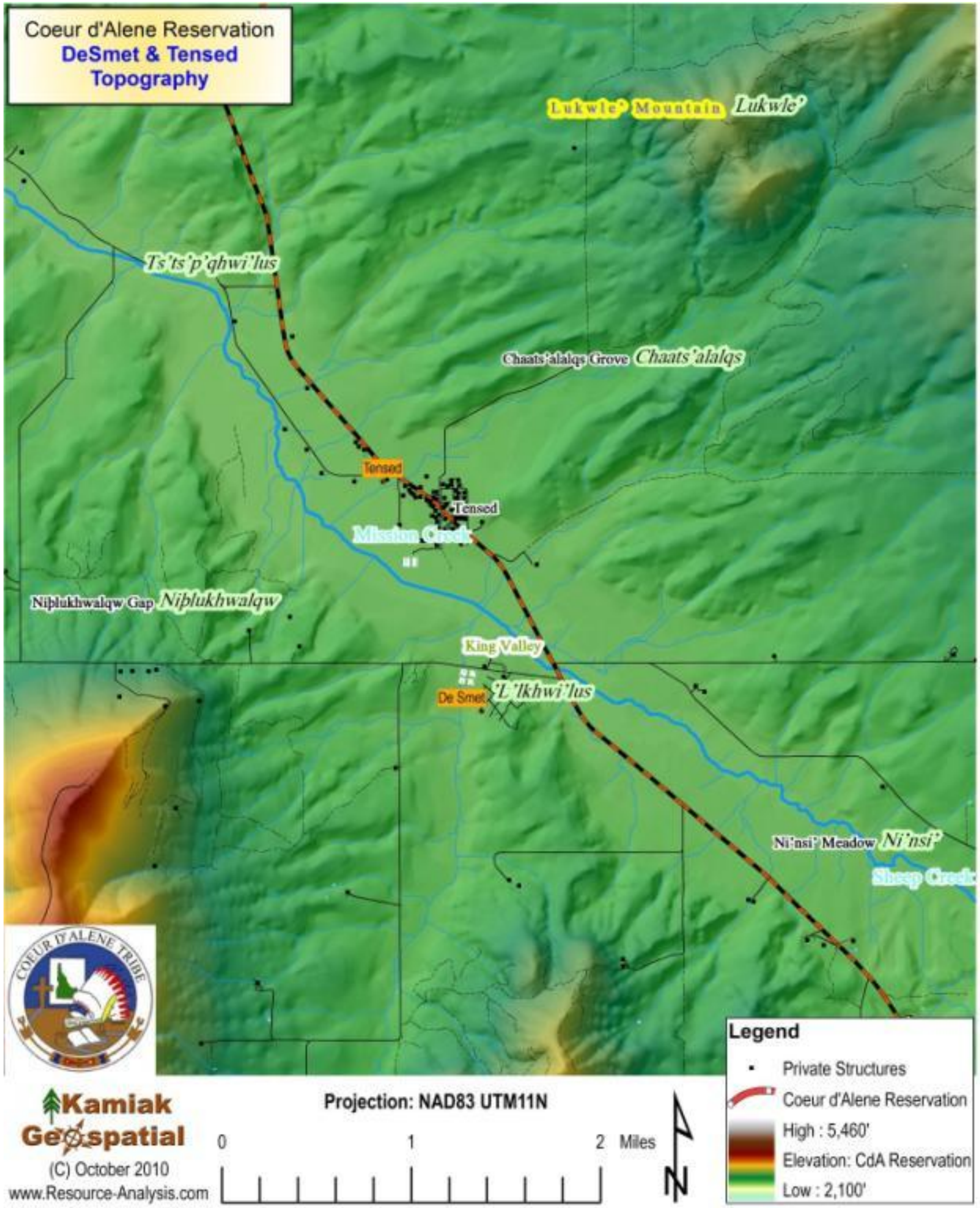


Figure LXX. Population Density Assessment in DeSmet & Tensed.

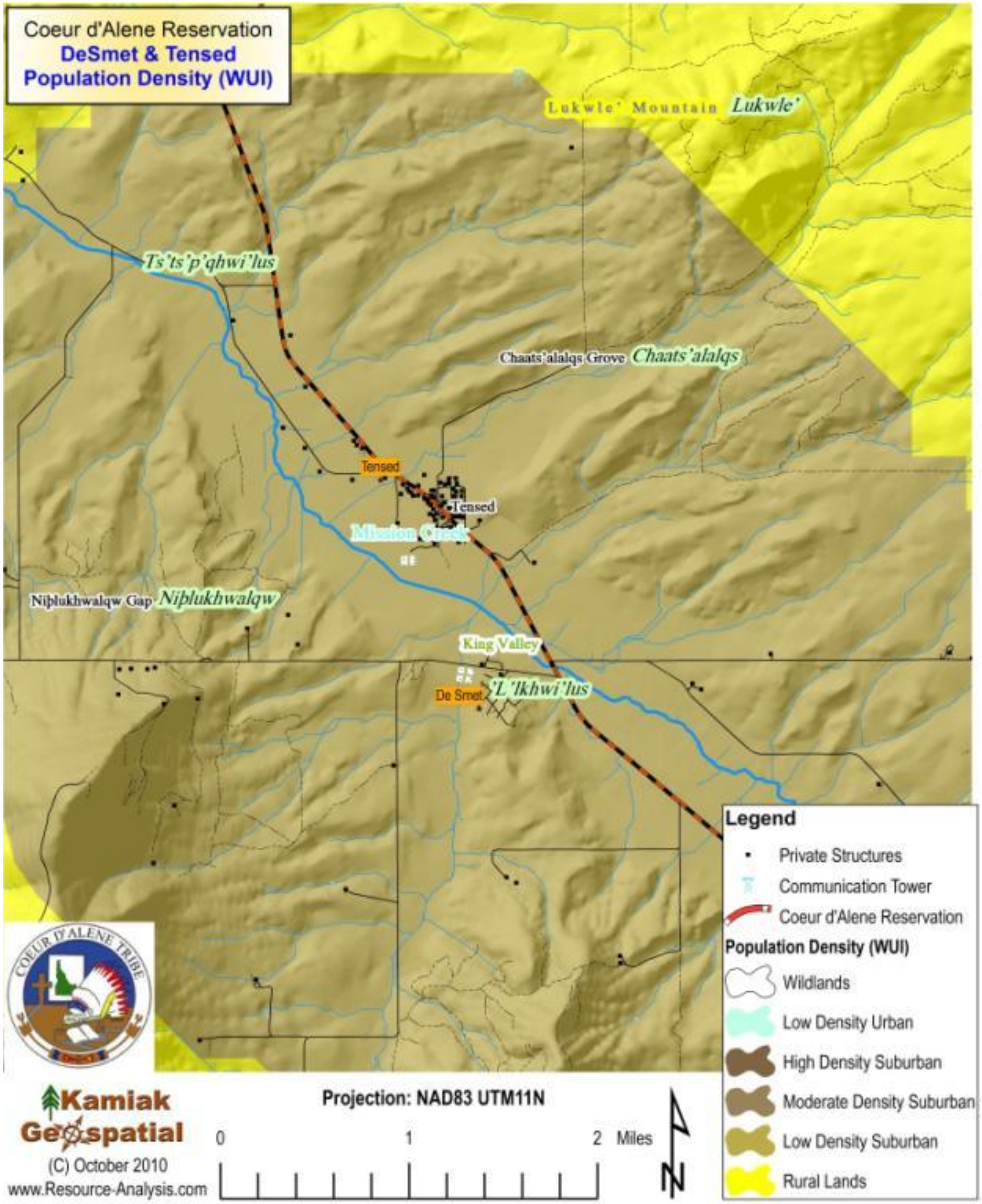


Figure LXXI. Floodplain Mapping of DeSmet & Tensed.

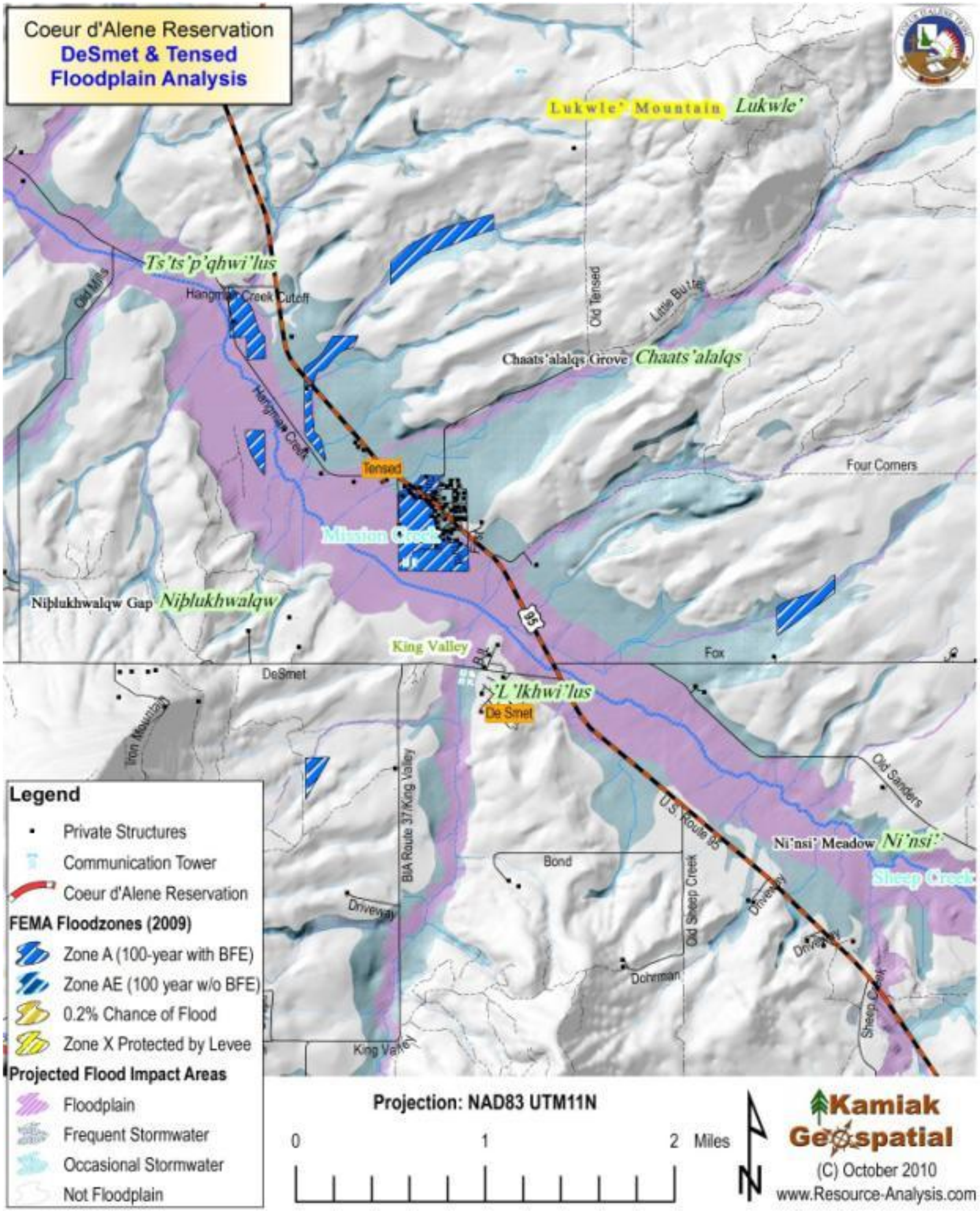


Figure LXXII. Seismic Stability & Fault Lines in DeSmet & Tensed.

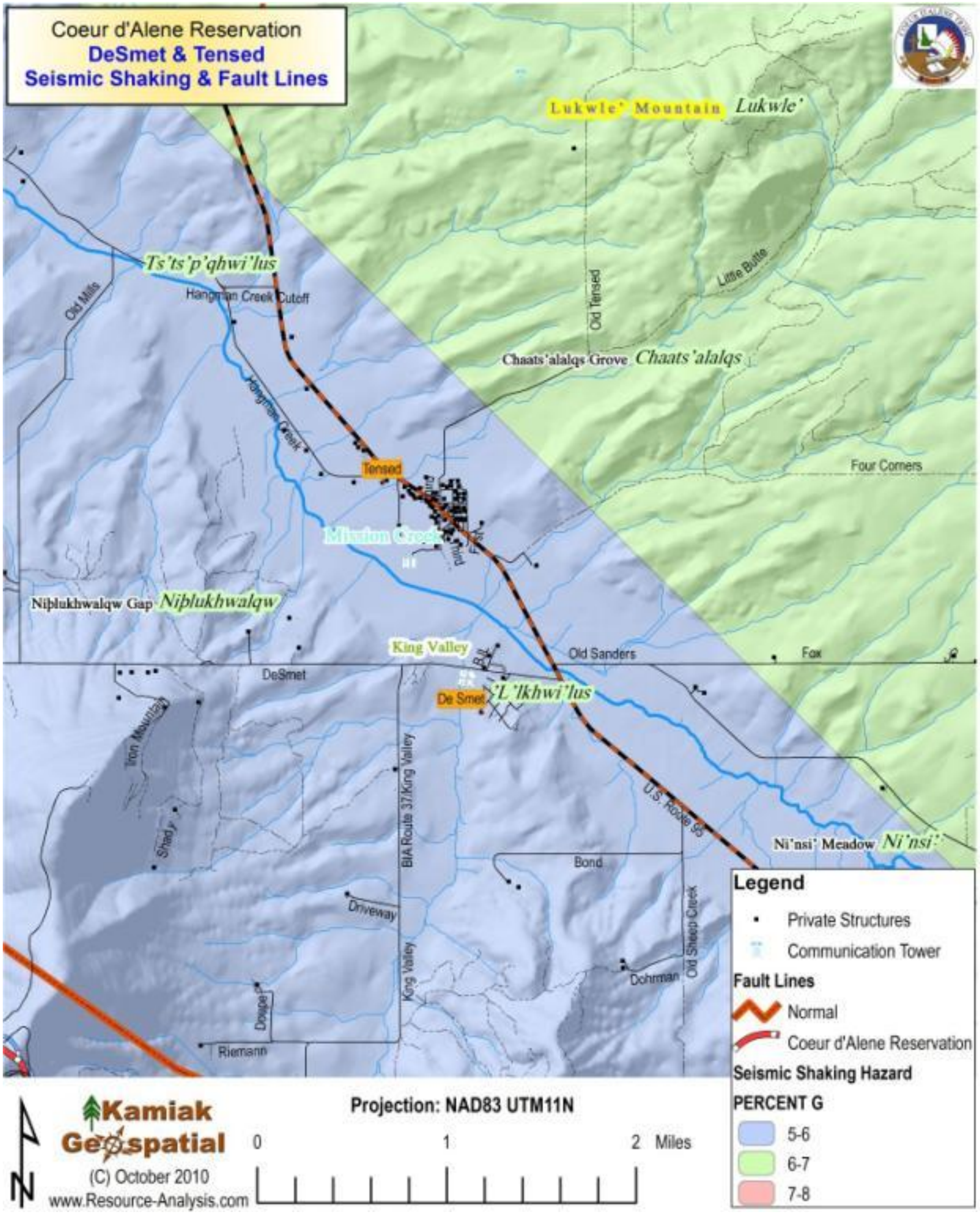


Figure LXXIII. Landslide Prone Landscapes in DeSmet & Tensed.

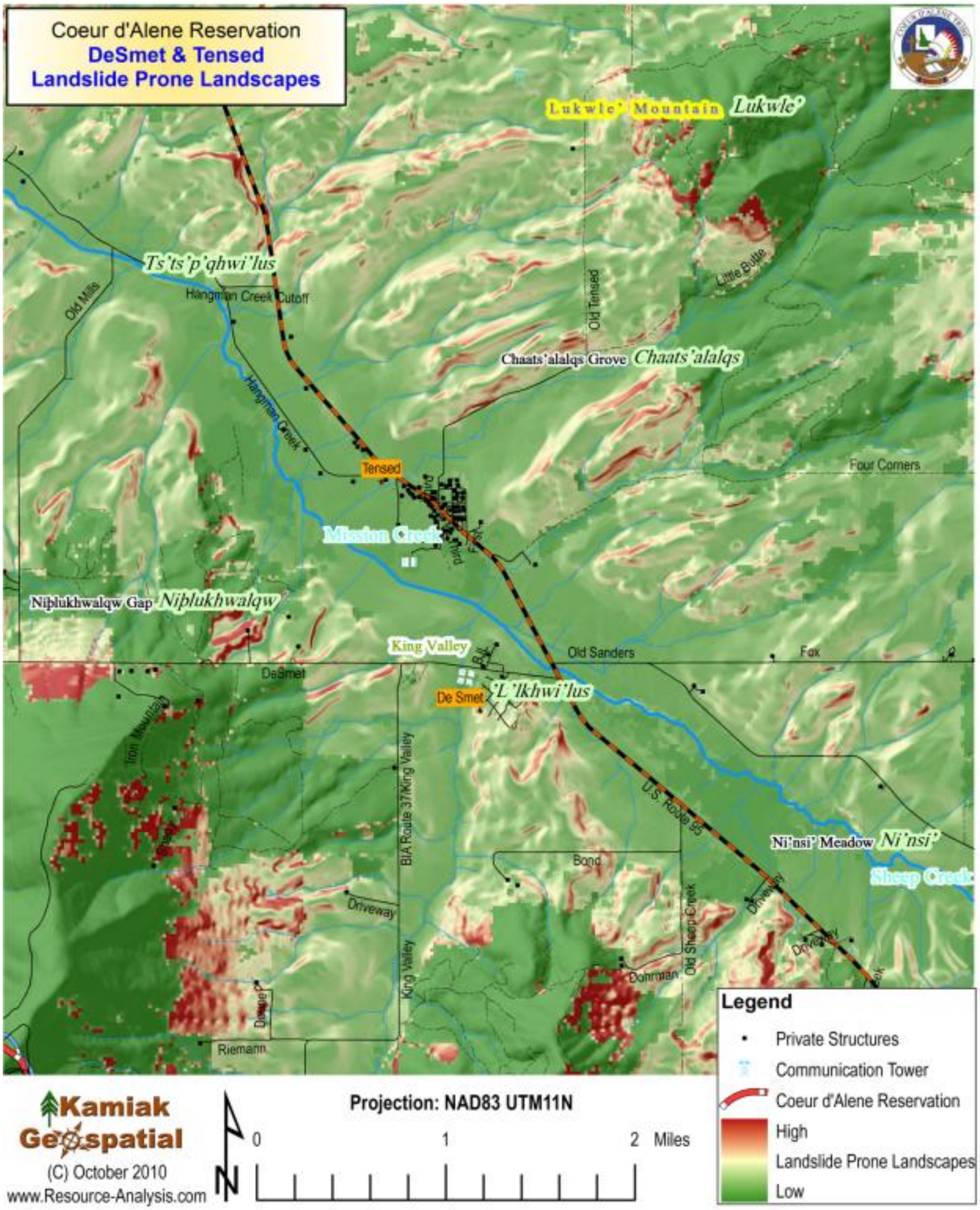


Figure LXXIV. Expansive Soils and Expansive Clays – Residential without Basement Assessment in DeSmet & Tensed.

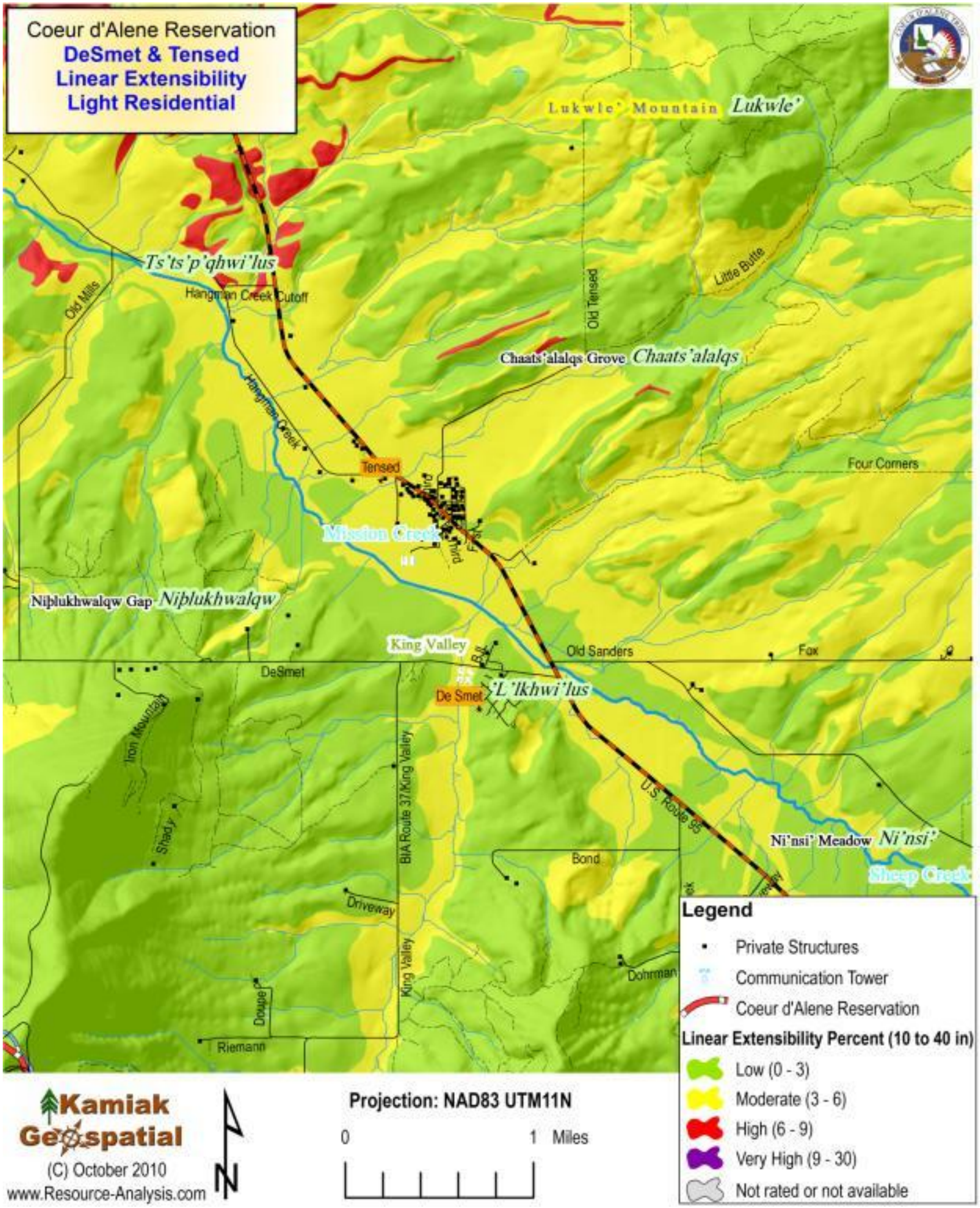


Figure LXXV. Expansive Soils and Expansive Clays – Light Commercial Assessment in DeSmet & Tensed.

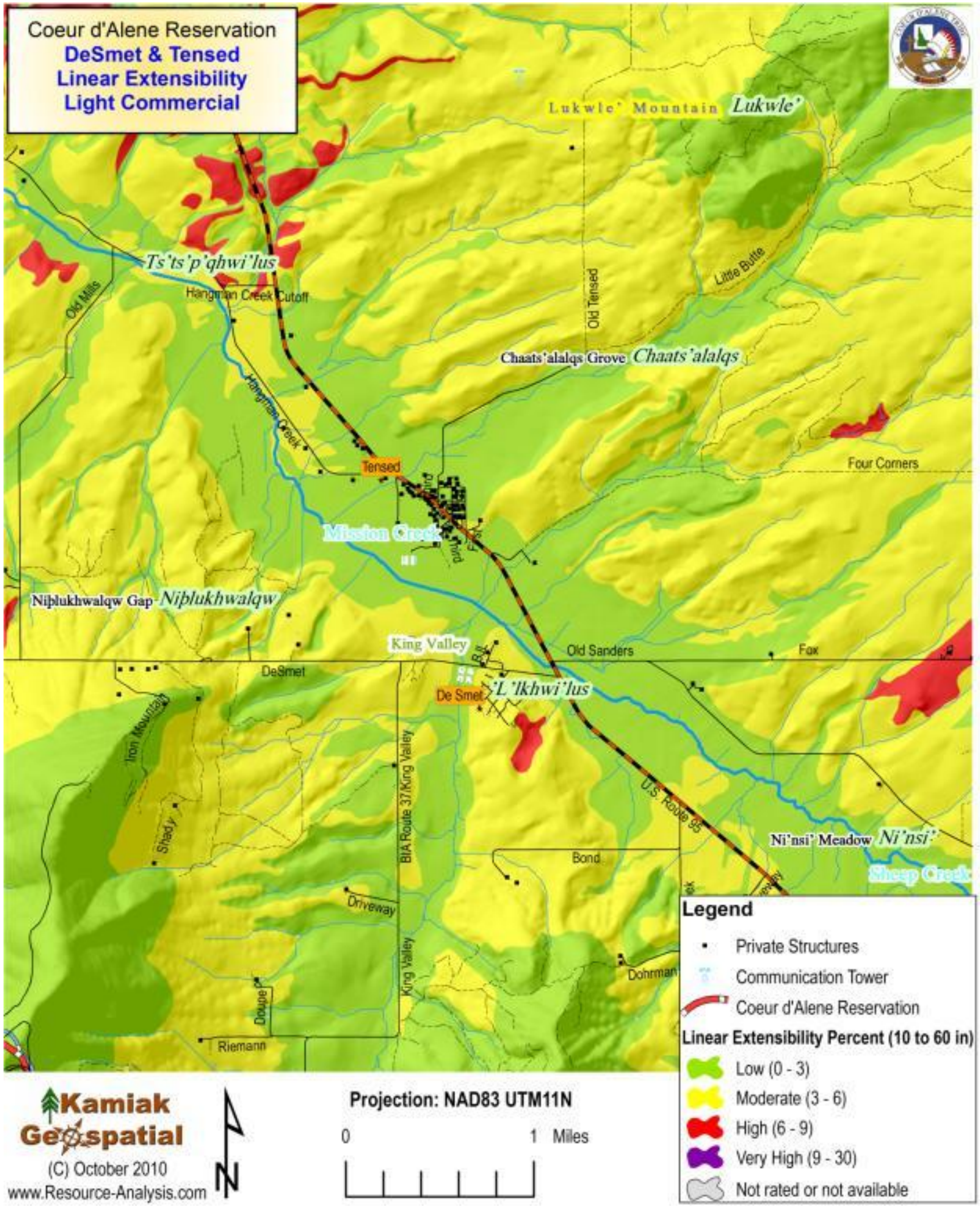
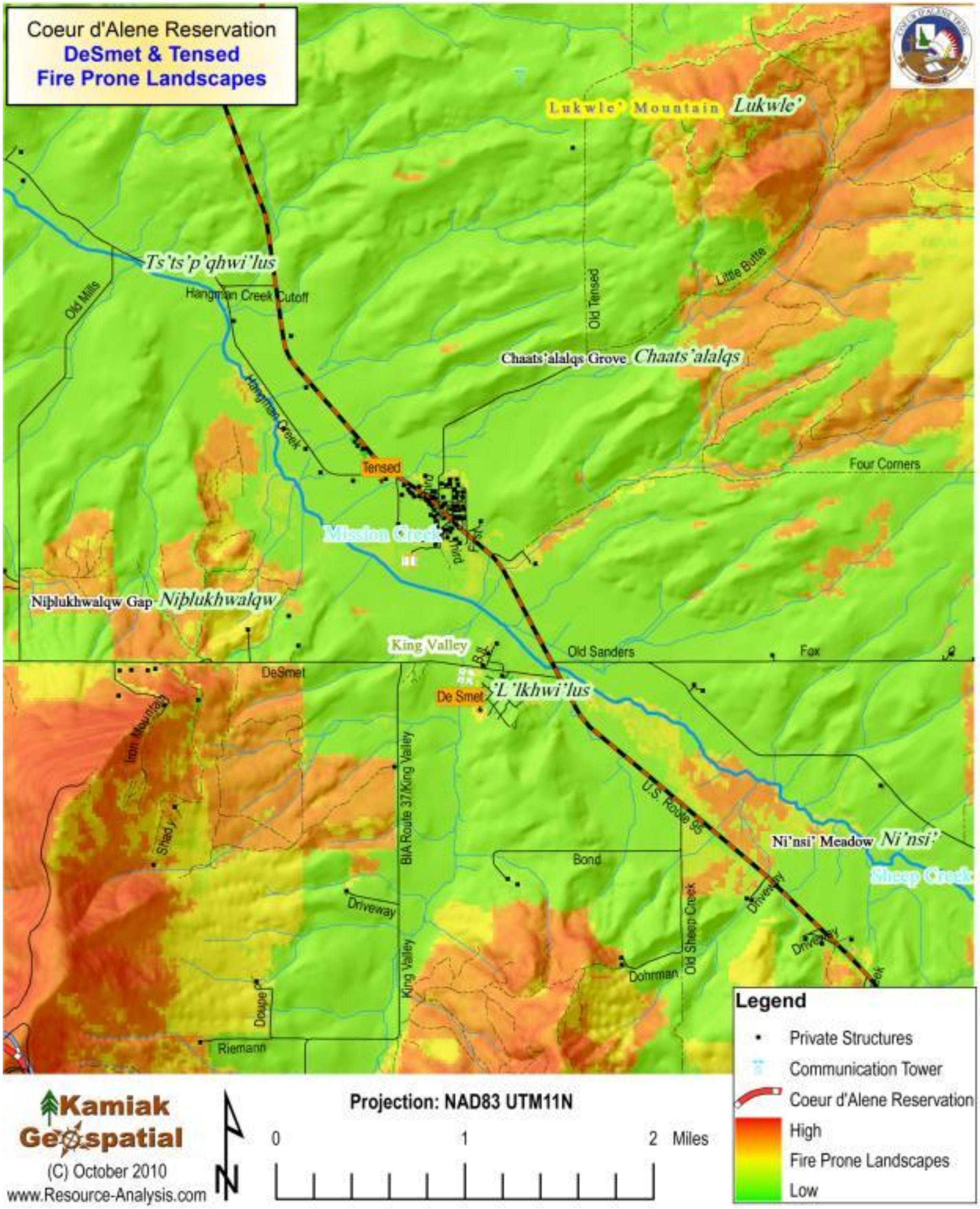


Figure LXXVI. Fire Prone Landscapes in DeSmet & Tensed.



5.4.2. City of Plummer and Surrounding Areas

The area of Plummer is the home to the Coeur d'Alene Tribal Headquarters and many Tribal resources (Figure LXXIX). US95 links this community to the areas both north and south of Plummer, while State Highway 5 connects Plummer and St. Maries. Several surface streets are accessible from here.

Plummer is located approximately 30 miles south of Coeur d'Alene and 18 miles west of St. Maries along Highway 95. Plummer Creek enters the city from the south and then cuts through the city from the southern edge to the northeastern corner. This drainage system drains agricultural fields and nearby timberland. The city is home to several residential structures, businesses, schools, and the Coeur d'Alene Tribal Headquarters. Plummer lies within fairly flat agricultural land. The lowlands surrounding Plummer consist mostly of agricultural fields, while the uplands consist mostly of moderate-to-steep forestland.

As of the census of 2000, there were 990 people, 336 households, and 257 families residing in the city. This population has remained fairly stable and by 2008 the population is estimated at 997 people (Census 2009). The population density is approximately 875 people per square mile. In 2008 there were 380 housing units at an average density of 336 per square mile (Census 2009). Plummer is the largest city located entirely within the Coeur d'Alene Reservation.

The area surrounding of Plummer includes about 494 privately owned structures, and 96 non-privately owned structures. Combined, these structures represent a total value of approximately $79.9 million (Table 3). This summary combines all of the structures located closest to this community, not just the structures within the city limits of Plummer; it includes structures located miles away, that are not 'closer' to any other community.

As already defined in Section 5.3 (Macro Hazards), the risk exposure to high winds is uniformly significant in Plummer, as well as the other populated places of the Coeur d'Alene Reservation. There are few softwood trees surrounding homes, but ornamental hardwoods have been planted throughout this community (Figure LXXVII), and there are a few homes with compromised roofing materials that would benefit from reinforcement as a protection against the wind and falling debris of surrounding trees. The prevalence of URM chimneys is common in this area.

Figure LXXVII. Softwoods, hardwoods, and power lines dominate the above-the-ground atmosphere around homes in Plummer.

5.4.2.1. Flood Risks

The City of Plummer was assessed by FEMA for the creation of FIRM analyses published in 2004 and 2009. These maps were estimated for the City of Plummer while excluding the outlying areas of Benewah County and the Coeur d'Alene Reservation. The placement of the floodplain within the city is concentrated along the narrow path of Plummer Creek, traversing property owned by the City of Plummer and the Plummer Forest Products mill within the area of the log storage yard. There is one private structure located within the FIRM floodway.

The City of Plummer sent an official letter to FEMA on April 20, 2009, identifying no discrepancies in the draft FIRM maps issued in September 2008 by FEMA, and later informed FEMA that the City had reconsidered its participation in the NFIP. This letter was accepted by FEMA, and the city was removed from NFIP participation. Since that date, residents of the city have not been eligible to purchase NFIP flood insurance within the City of Plummer.

Flood risks in Plummer are attributed to a limited floodplain of Plummer Creek (Figure LXXXII, Table 26, Table 27). The floodplains determined and approved by FEMA were updated in September 2009 and used for this analysis.

Floodplain mapping for all of Plummer Creek has been completed and is presented here (Figure LXXXII, Table 26, Table 27). These floodplains indicate that several structures are located along the Plummer Creek headwaters and its tributaries, and only a few are located within the zone considered most at risk to flooding. Most of the structures of value within this area are located close to, and within the City of Plummer.

Storm-water accumulation within the area of Plummer is isolated generally to areas where rainfall accumulates within small depressions and adjacent to the banks of Plummer Creek and its tributaries. Rain-on-snow events are notorious for causing stormwater accumulations around structures in the late winter months (February-March). Generally, these areas can be mitigated for water-accumulation damages by developing drainage ditches that link the water-accumulation areas into larger drainage systems. This mitigation measure has been identified as a plausible means of mitigating the frequent stormwater drainage problems surrounding the Coeur d'Alene Tribe's Wellness Center in Plummer.

Caution should always be applied to reducing these surface stormwater accumulations by draining the water directly into the river. These surface-water accumulations can become contaminated by oils, detergents, salts, and other water soluble contaminants that would harm fisheries in the river and degrade water quality. A filtration system should be applied to any such activity. The risks of this occurrence in the area is low because of the residential nature of the communities. However, there are commercial enterprises here including the gas stations (x3), store, and commercial enterprises.

The City of Plummer has maintained a wastewater treatment facility that has been within and adjacent to the Plummer Creek floodplain. As of the time of preparing this report, the City of Plummer wastewater treatment facility is being retired (Figure LXXVIII) in favor of a new site located higher in elevation and near to the old site.

Figure LXXVIII. Plummer Wastewater Treatment Facility within the Plummer creek watershed being retired in favor of a new site located above the floodplain.

Efforts to retire this facility and return the site to normally functioning floodplain conditions has been initiated. The lagoons are going to be dewatered, the solids removed and disposed of properly, and the site will be fully remediated by the city of Plummer as stipulated in the lease agreement between the Tribe and the city. This is expected to occur during the summer of 2011.

5.4.2.2. Seismic Shaking and Fault Lines

The seismic shaking risk within and around the community of Plummer is moderate (6% to 7% G rating) (Figure LXXXIII and Table 29). A series of normal faults transect the region oriented mainly east-west with some level of fault-line density. As this density increases, the tendency of tectonic stresses to distribute themselves within these areas increases. The exposure to earthquakes in the areas surrounding homes and businesses within Plummer are documented in Section 5.3.4, Seismic Shaking Hazards.

The unreinforced masonry buildings of Plummer are primarily among the school district buildings located along E Street. The exact status of these structures as reinforced or unreinforced has not been determined; however, they were all built in an era that places them at concern for these risks. The mitigating factor for these structures is their profile as single- and two-level buildings. As the number of levels increases, the seismic shaking hazards increase. There are additional masonry construction buildings in Plummer that were built within the past 15 years. These structures appear to have been built to incorporate building codes for seismic shaking standards.

Chimney construction in the city consists of both brick and metal pipe construction. The brick-chimney constructions on many homes erected in the 1960s and prior, show signs of mortar crumble and cracking. Some homes placed the chimney external to the outer wall of the structure, while others have the chimney located internal to the structure, cresting near the apex of the roof.

The external wall chimneys have the greatest amount of exposed surfaces and extended height and represent a greater hazard during a seismic event such as an earthquake. These are the structures that can experience chimney breakage and damage to the resources adjacent to the structure.

5.4.2.3. Landslide

Landslide risk assessments in Plummer are responsive to the topographic relief of the area. Within Plummer and the surrounding areas, the risks are rated across the entire spectrum from low to moderate, to high (Figure LXXXIV). This area, as with many areas within the western side of the Coeur d'Alene Reservation, defines the dividing line between rich farming lowlands and Figure LXXXVII forested uplands. Where forestry practices remove the stable vegetation, the sites can respond with localized landslides, slumping, and erosion. The top soils in this area are derived from loess parent materials and can respond to rapid erosion, when vegetation is removed and the slopes are steep.

Landslides within these communities have been rare, and isolated to small events. Inspections along State Highway 5 between Plummer and Heyburn State Park reveal a late winter / early spring occurrence of freeze/thaw events. The underlying columnar basalt can be wedged apart releasing rock to land on the surface below, generally noticed on the road surfaces.

5.4.2.4. Expansive Soils

Expansive soils and expansive clays within the area of Plummer, for light residential (without basements) are a mix of low-to-moderate risks, with most of the prime building locations (outside the floodplain) showing low risks to expansive soils (Figure LXXXV). Within the City of Plummer developments are located on sites rated as low risk for expansive soils.

The profile for light commercial structures (and Residential with a basement) are rated as moderate risk in Plummer (Figure LXXXVI). This divergence in ratings is due to the depths of consideration for the light residential (without a basement) allowing for only soil layers between 10 and 40 inches in depth, while the light commercial and residential with a basement considers the soil characteristics between 10 and 60 inches in depth. The variations in the zone between 40 and 60 inches of depth has led to these increased risk ratings.

In this entire area, expansive soil pre-construction building techniques should be considered for all new structures to integrate recommendations. Even low risk soils in the Upper Columbia Plateau can respond with adverse results if the soil moisture is not moderated at near-constant levels.

5.4.2.5. Wildfire

Plummer region is located within an area showing a mix of agricultural and forestland characteristics. Although a few wildfire ignitions have been responded to in the past decade in areas surrounding Plummer, none of the fires exceeded one acre before being extinguished.

Most of the structures located in the area surrounding the City of Plummer are at low-to-moderate risk to wildfire (Figure LXXXVII, Table 42, Table 43). This community is located between two peaks where forestland vegetation is present, and aesthetic conditions favor a dominant forestland condition. This being stated, past wildfire mitigation efforts have done an excellent benefit leading to moderate concerns for unchecked wildfire spread. The Coeur d'Alene Tribe wildfire resources are all located in this area, and equipment with highly trained professionals are available to respond to events with short notice.

Local wildfire mitigation efforts in the area have been very successful in limiting the risk exposure to wildfire. Although wildfire fuels are evident adjacent to homes and businesses, there are few conditions posing a wildfire risk to require immediate attention. As with other areas on the Coeur d'Alene Reservation, some of the homes have received WUI fuels mitigation work in the past, while others have not. Even some of those homes that have received fuels mitigation attention in the past are facing the need to 'update' the treatments and maintain an acceptable level of ‘protection’. Continued attention to maintaining a low level of risk to wildland fire surrounding homes should be maintained.

One mitigating factor for the City of Plummer is the break in continuous wildfire fuels. This break comes in the form of changing land uses (agriculture to forestry to home sites, and commercial property). High risk is seen when the wildfire risk profile is extensive and continuous across a large area. Within the Plummer area, the risk is not continuous nor is it extreme.

Figure LXXIX. Aerial Imagery of Plummer, 2009.

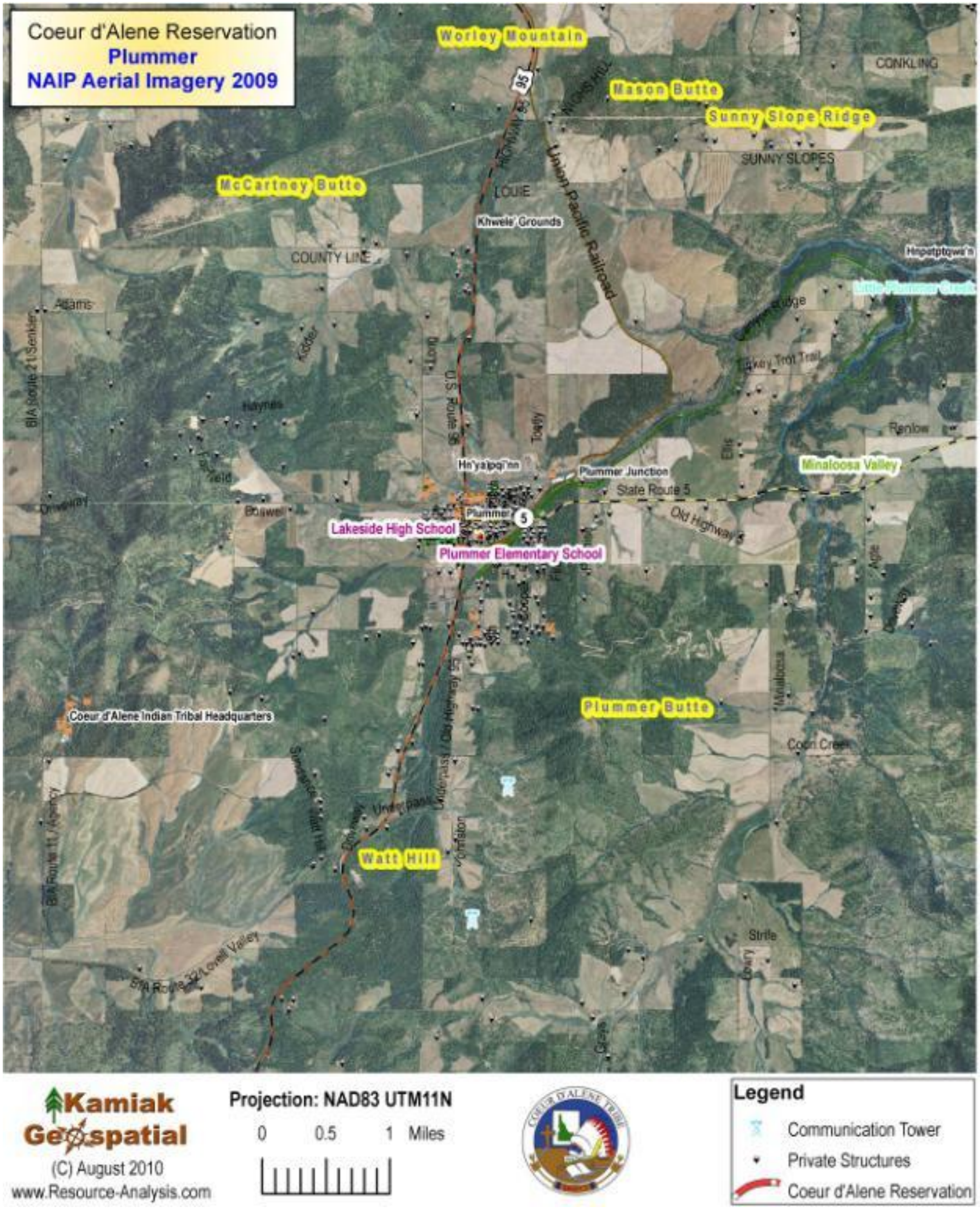


Figure LXXX. Topographic Relief of Plummer.

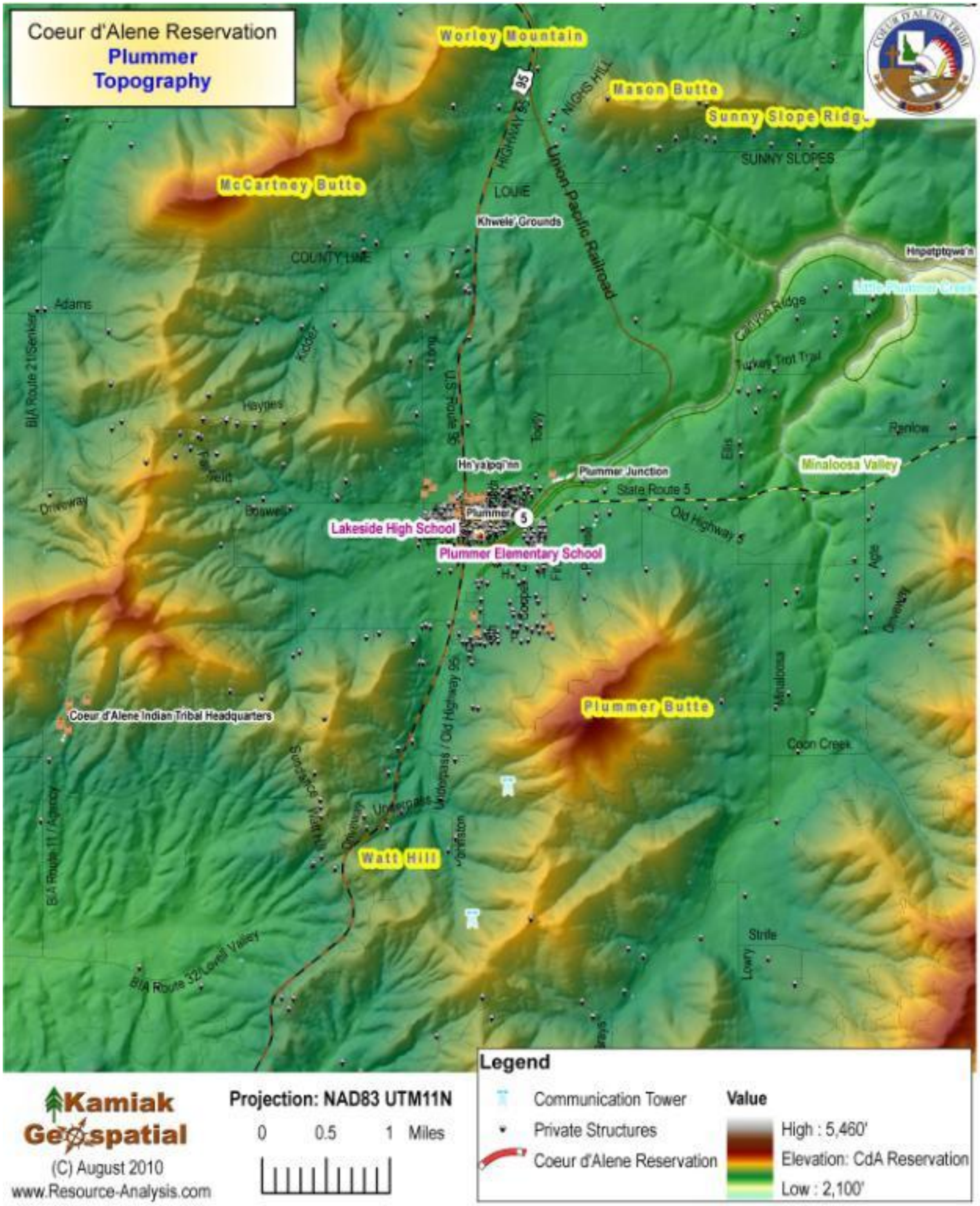


Figure LXXXI. Population Density Assessment in Plummer.

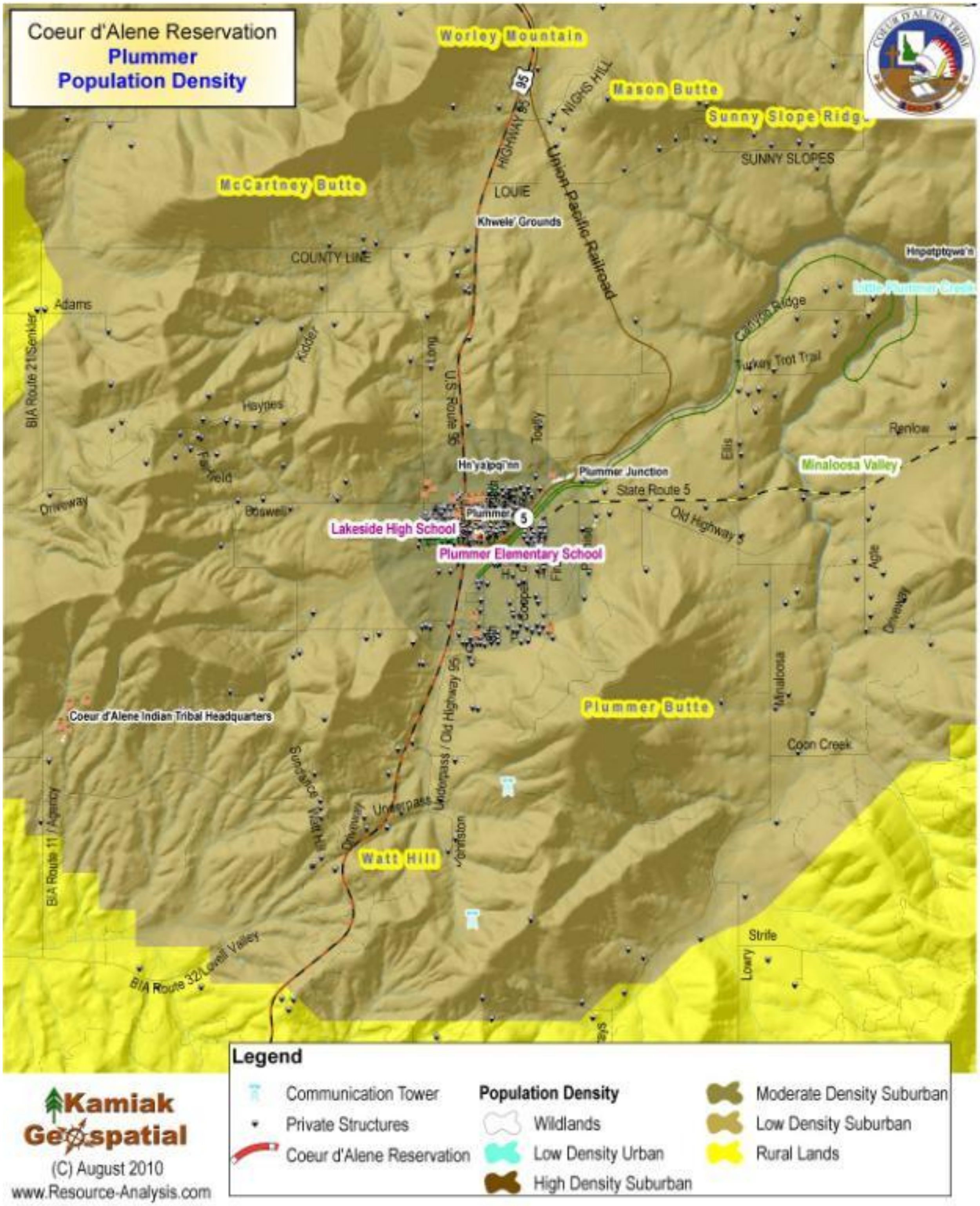


Figure LXXXII. Floodplain Mapping of Plummer.

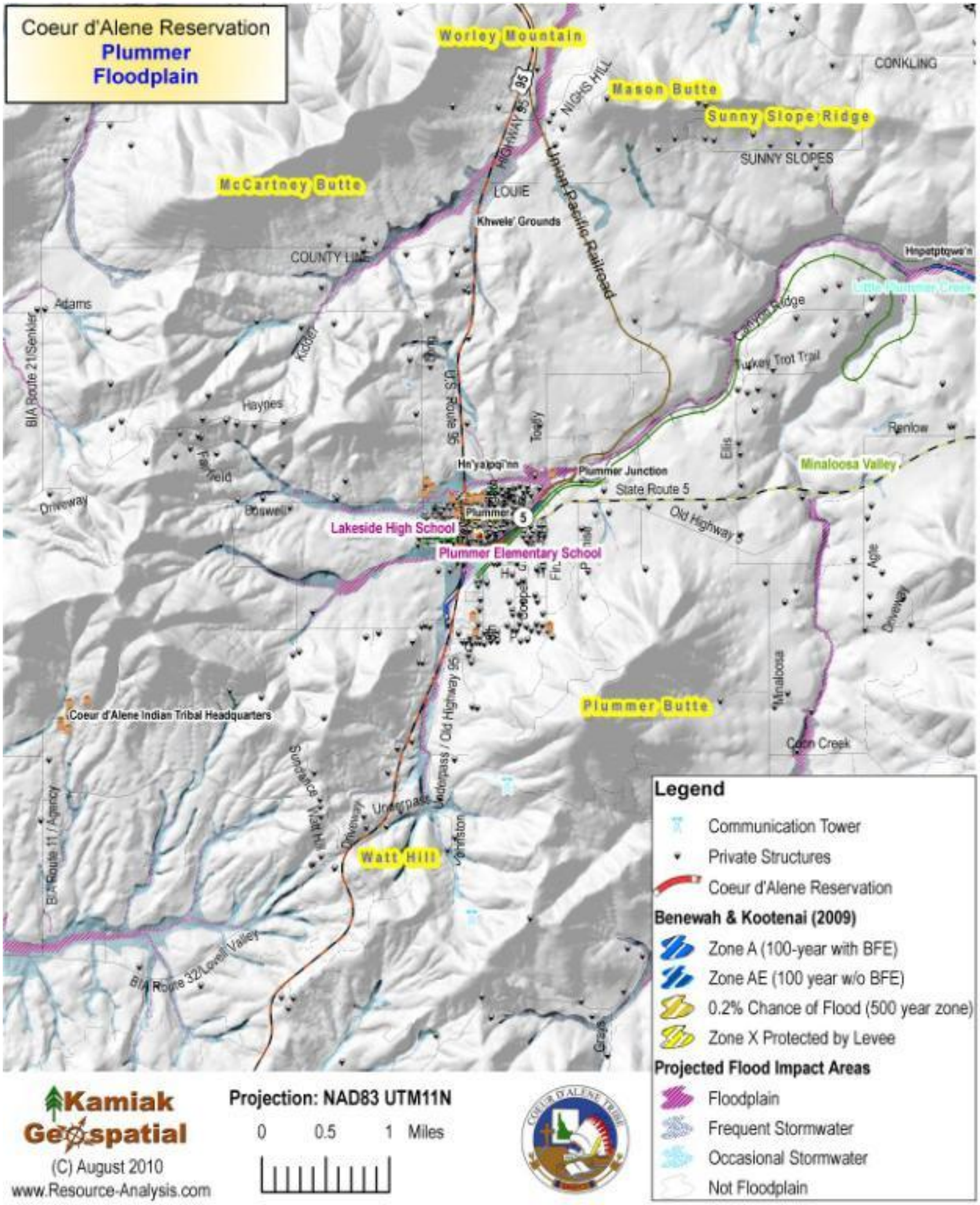


Figure LXXXIII. Seismic Stability & Fault Lines in Plummer.

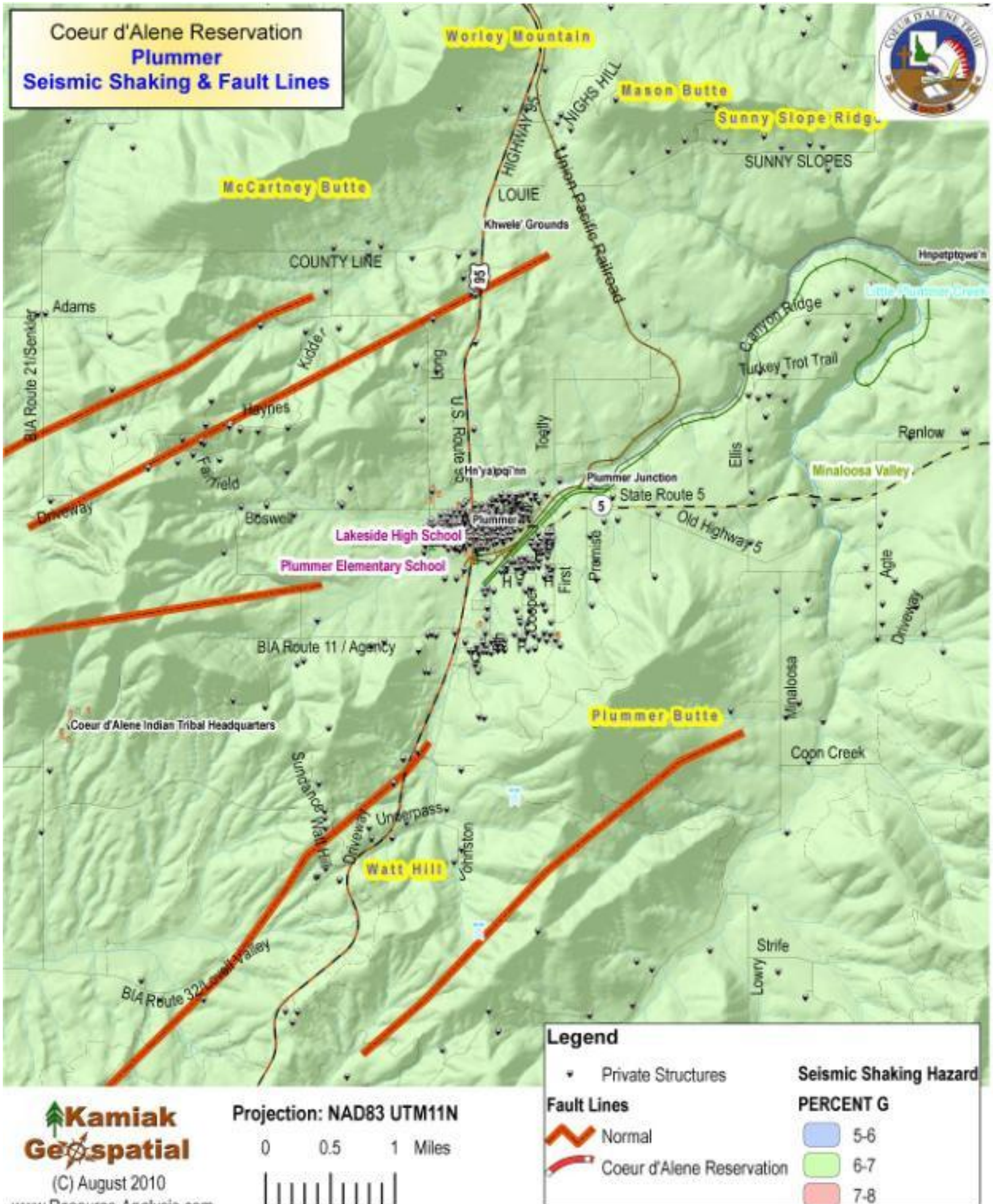


Figure LXXXIV. Landslide Prone Landscapes in Plummer.

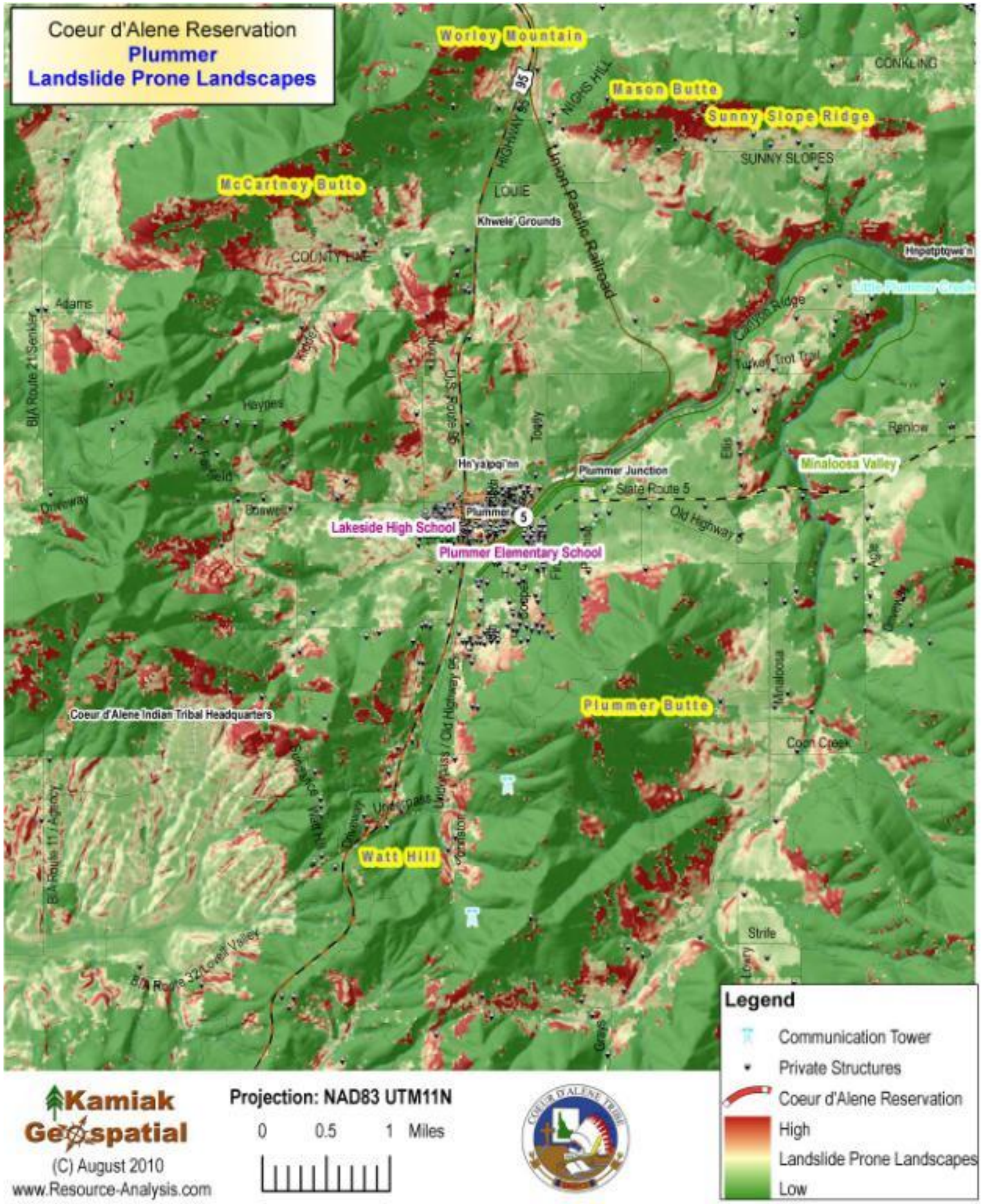


Figure LXXXV. Expansive Soils and Expansive Clays – Residential without Basement Assessment in Plummer.

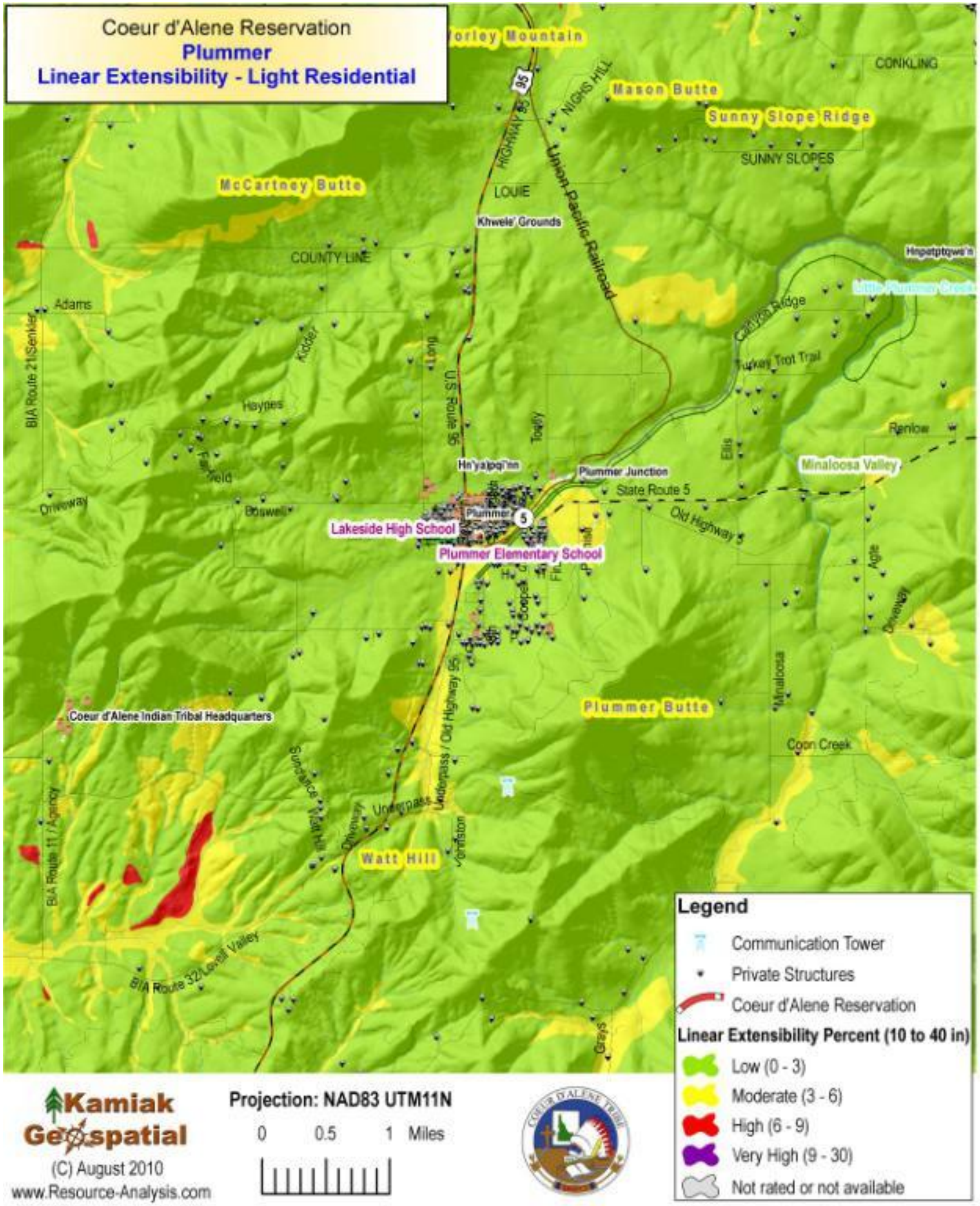


Figure LXXXVI. Expansive Soils and Expansive Clays – Light Commercial Assessment in Plummer.

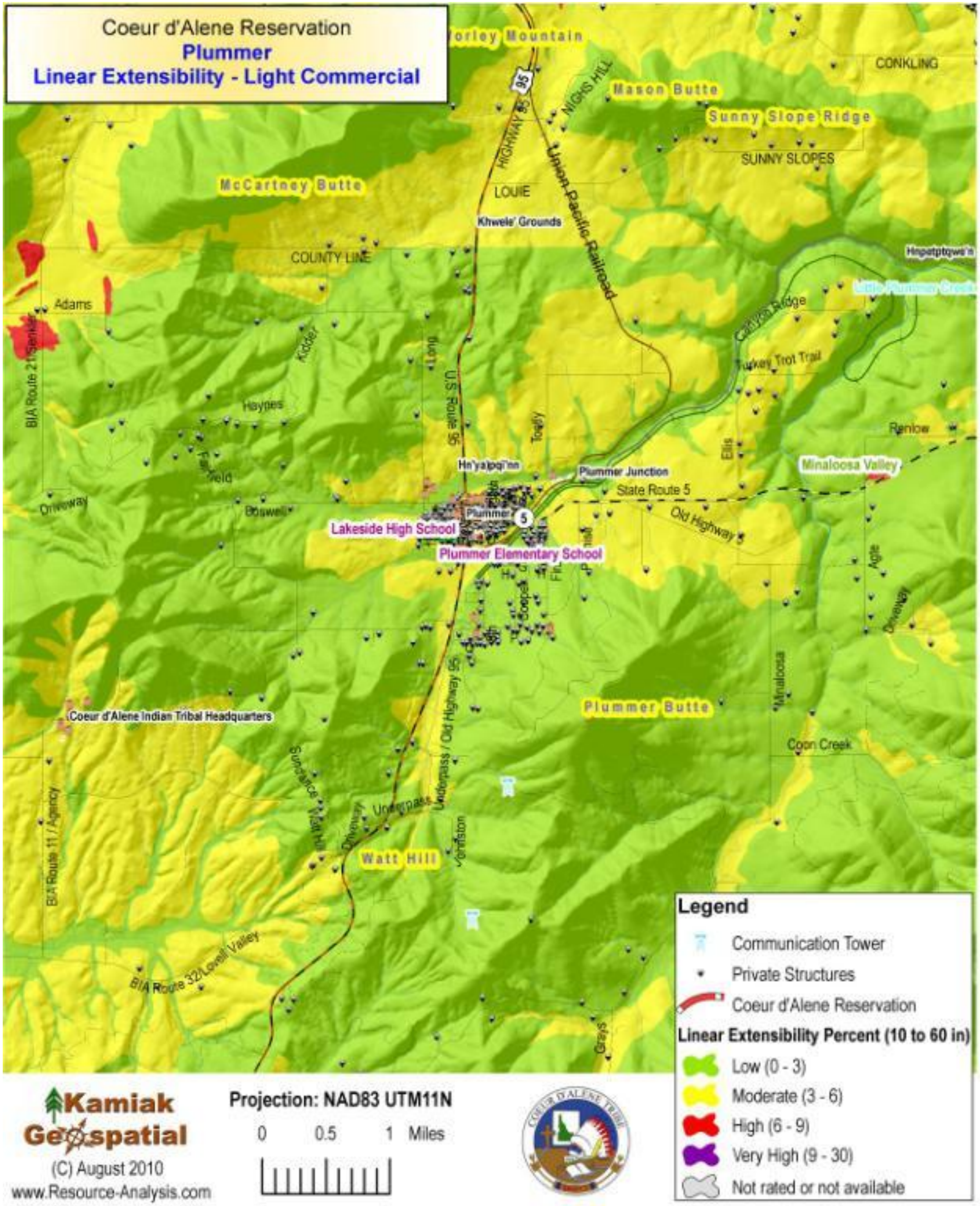
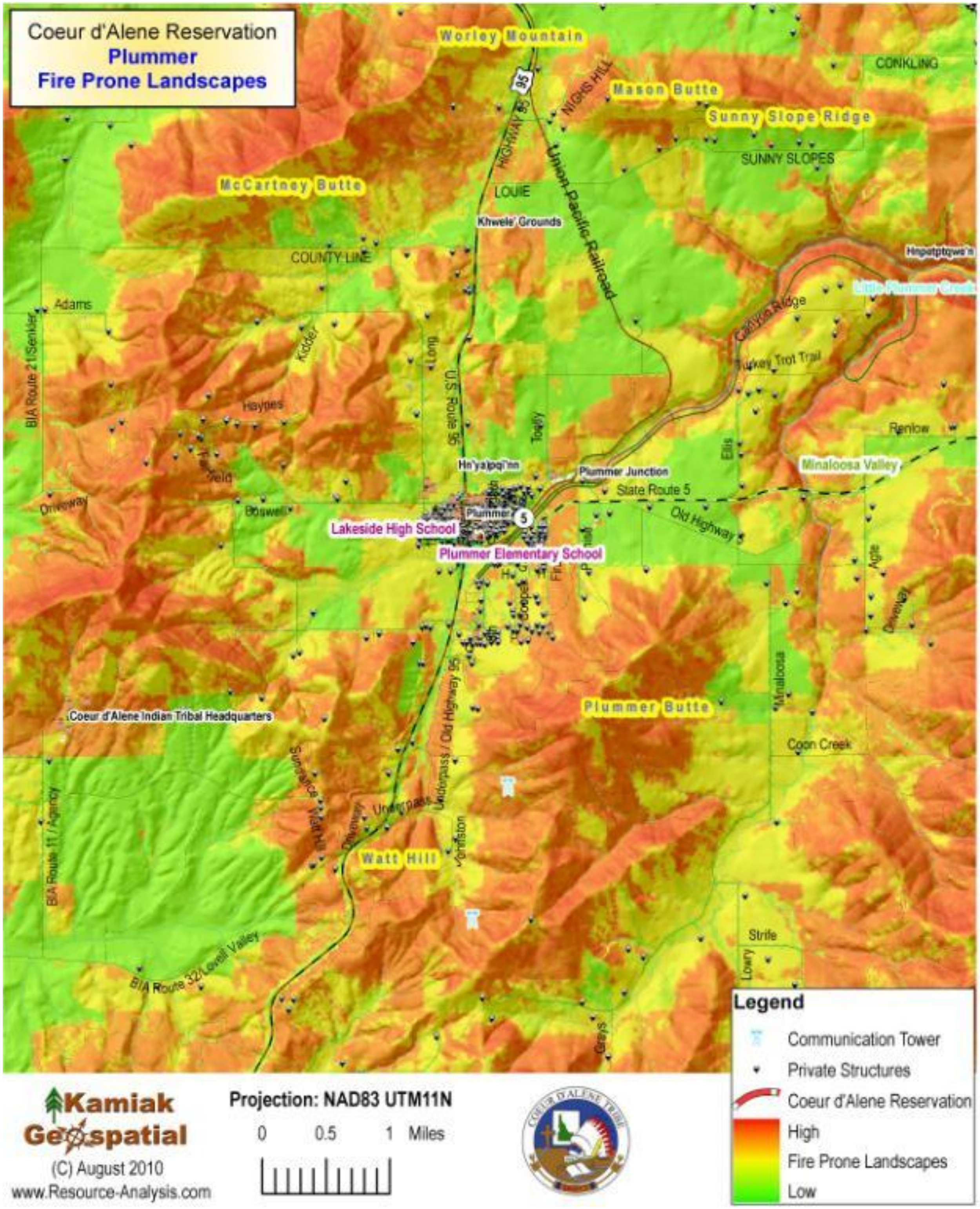


Figure LXXXVII. Fire Prone Landscapes in Plummer.



5.4.3. St. Maries

St. Maries professes to be the "Home of the Shadowy St. Joe River". The steep canyon walls surrounding the community and the major rivers of the area give rise to this notable reference.

The Saint Maries River and the Saint Joe River each meet and run through St. Maries. The town was developed to take advantage of the lower cost logging transportation with the two rivers and rail networks located close by. The local economy has traditionally been driven by the timber industry, complemented by some mining operations and a solid base of farming. The remarkable beauty of the region combined with the exceptional quality of life has spawned a considerable retirement community in the area in recent years.

The City of St. Maries is located partially within the external boundaries of the Coeur d'Alene Reservation, and partially off Reservation.

As already defined in Section 5.3 (Macro Hazards), the risk exposure to high winds is uniformly significant in St. Maries, as it is in the other populated places of the Coeur d'Alene Reservation. Along the St. Joe River straight line winds blow along the Coeur d'Alene Lake and are funneled up the St. Joe River Valley (easterly). High winds of straight-line force are commonly seen and drop trees and rip roofs (Figure LXXXVIII).

There are several trees surrounding homes, and there are many homes with compromised roofing materials that would benefit from reinforcement against the wind and falling debris from surrounding trees. Although the structures within the city limits are generally moderate to risk from high winds, the homes outside the city and within the external boundaries of the Coeur d'Alene Reservation face higher levels of risk due to tree proximity to these homes.

Figure LXXXVIII. Example of windstorm damages to a structure near Rocky Point, on State Highway 5, west of St. Maries.

5.4.3.1. Flood Risks

Flood risks in the area of St. Maries are mainly attributed to the St. Joe River (Figure XCII, Table 26, Table 27). The floodplains determined and approved by FEMA were updated in September 2009 and used for this analysis.

The St. Joe River and the St. Maries River join at the western edge of the City of St. Maries, beyond the current boundaries of the Coeur d'Alene River. Both of these river systems belong to high Shreve Stream Order river drainages carrying a riverine flood profile of the slow kind.

Rain-on-snow events and weather inversions in the upper reaches of both rivers can lead to above-capacity flow rates in the lower St. Joe River.

FIRM maps (2009) of the area show a combination of risk profiles from regulatory floods in the 1% probability of occurrence (100-year flood zone) category to areas with a 0.2% probability of occurrence (500-year flood zone). The northern extent of the City of St. Maries includes an area that would normally be in a regulatory flood zone (100-year flood zone); however, the construction and maintenance of levees along the St. Joe River provide a level of protection such that these areas of the city have been removed from the regulatory flood zone and are mapped as “protected by a levee” (Figure XCII).

Storm water accumulations are mostly restricted to areas adjacent to the levee systems and the rivers. Apparatuses associated with the levee systems move both flood waters and storm waters into the river channels.

Although the flood control systems along the St. Joe River are well developed, the potential for flood waters to breach the confines of the river channels and the dikes is present. This has been witnessed when extreme events such as ice jams and rapid snow melt occur on the upper reaches of either the St. Joe or the St. Maries Rivers. The elevation relief between St. Maries and the full-pool elevation of Coeur d’Alene Lake is only 6.5 feet. The St. Joe River follows a nearly 14 mile stretch that drops only 6.5 feet, meandering through an expansive floodplain, farmlands, Benewah Lake, and Chatcolet Lake on its way to Coeur d’Alene Lake.

5.4.3.2. Seismic Shaking and Fault Lines

The region surrounding the City of St. Maries is potentially impacted by a series of fault lines fracturing the region in a west-to-east line of fissures located mainly north of the St. Joe River (Figure XCIII and Table 29). These faults are mainly of the normal fault type. The Lewis & Clark Fault Line extends through this region. It is an aeromagnetic and gravitational anomaly, with surveys suggesting its extension into the interior of the continent. Seismically, it is considered significant although it exhibits characteristics of a normal fault zone structure. None of the fault lines in this area are of the thrust-fault type. The region is within an expansive zone of moderate risk to seismic shaking hazards with a 6% to 7% G rating.

Earthquakes are felt in this area when they occur within a zone of 200 miles or more. The Hoyt Mountain earthquakes referenced earlier in this document were felt and reported within St. Maries. The risks for the residents of this area concentrate on the unreinforced masonry construction of a few buildings and the widely distributed brick masonry chimneys attached to wood frame construction homes.

The unreinforced masonry buildings of St. Maries primarily include the brick and masonry buildings constructed between 1890 and 1970. Attention to the wide-spread presence of these buildings within the St. Maries community has received focused attention by the city officials and the Benewah County Emergency Manager (Schlosser 2010).

Observations of these URM buildings reveal signs of cracking mortar, disintegrating bricks, and failing structural stability. The exacerbating factor for these structures is their profile as multi-level masonry construction buildings. As the number of levels in a masonry building increases, the seismic shaking hazards increase.

Chimney construction in the area has used both brick and metal pipe construction. The brick-chimney constructions on many homes erected in the 1960s and prior, show signs of mortar crumble and cracking. Some homes placed the chimney external to the outer wall of the structure, while others have the chimney located internal to the structure, cresting near the apex of the roof.

The external wall chimneys have the greatest amount of exposed surfaces and extended height and represent a greater hazard during a seismic event such as an earthquake. These are the structures that can experience chimney breakage and damage to the resources adjacent to the structure.

There are a number of low-cost remedies for these masonry chimney exposure instances, and those have been detailed in this document. In case the chimney's materials have deteriorated a complete replacement must be considered. A visual assessment of the structures and inspection of masonry chimneys in the area is warranted, leading to repair to avoid this risk. Funding for this effort and a public awareness of the issue should be undertaken.

5.4.3.3. Landslide

The slopes in some areas of this region are steep, and the soils of this area are largely formed from unconsolidated river sediments placed on top of Columbia River columnar basalts and exposed continental batholithic materials. Landslides are possible unless the risk is mitigated (Figure XCIV).

The landslide profile for this area is influenced primarily by the presence of steep slopes in combination with mobile surface soils, as found along the sides of the St. Joe River, and to the south of State Highway 5. Roads in this latter area are few, but several private structures are located here. Some of these private homeowners utilize retaining walls and other methods to hold the soils in place. Vegetation on these sites includes a combination of hardwood and softwood tree species, shrubs, and home-site landscaping.

The north side of State Route 3 shows areas of high risk to landslides. In these areas, the slopes are generally stable, but they can respond abruptly to site disturbances such as flooding, road construction, vegetation modifications, and building placement. Many homes have been placed here and small-scale landslides have occurred as a result.

5.4.3.4. Expansive Soils

Expansive soils and expansive clays within the area of the lower St. Joe River, for light residential (without basements) are a mix of low-to-moderate risks, with some inclusions of high-risk areas (Figure XCV). Within the City of St. Maries, developments are located on sites rated as moderate for expansive soils. Large expanses of the St. Joe River floodplain are rated as moderate-to-high risks to expansive soils for residential without basements. Beyond the St. Joe River basin, looking north, areas of the low risk are interrupted by areas of high risk. One such area is crossed by State Highway 3 near the Kootenai High School. Several of these inclusions are seen.

The profile for light commercial structures (and Residential with a basement) are rated similar to the light residential analysis within the St. Joe River Valley floodplain (Figure XCVI). However, when observing the areas north of the river bottom, the risk increases from low to moderate across much of this region, with the areas of high risk remaining fairly constant.

In this entire area, expansive soil pre-construction building techniques should be considered for all new structures to integrate recommendations. Even low-risk soils in the Upper Columbia Plateau can respond with adverse results if the soil moisture is not moderated at near-constant levels.

5.4.3.5. Wildfire

The lower St. Joe River Valley is surrounded by elevated scores of Fire Prone Landscapes assessment (Figure XCVII, Table 42, Table 43). The forestlands that are so attractive also present some level of risk from wildfire spread. Past wildfires have threatened this region. The

1910 wildfire extended to the northern shores of the St. Joe River, but did not reach to the southern shore.

Numerous wildfire ignitions have been recorded in these areas during the past 20 years, but all have been controlled while still below 2 acres. Recognition of wildfire risks by the residents of the region has been evidenced by the implementation of wildfire fuels mitigation efforts over the past 10 years. Many residential areas display mature conifers, shrubs, and grasslands. Left unmitigated, these areas could pose an increased risk to wildfire losses.

Figure LXXXIX. Aerial Imagery of St. Maries, 2009.

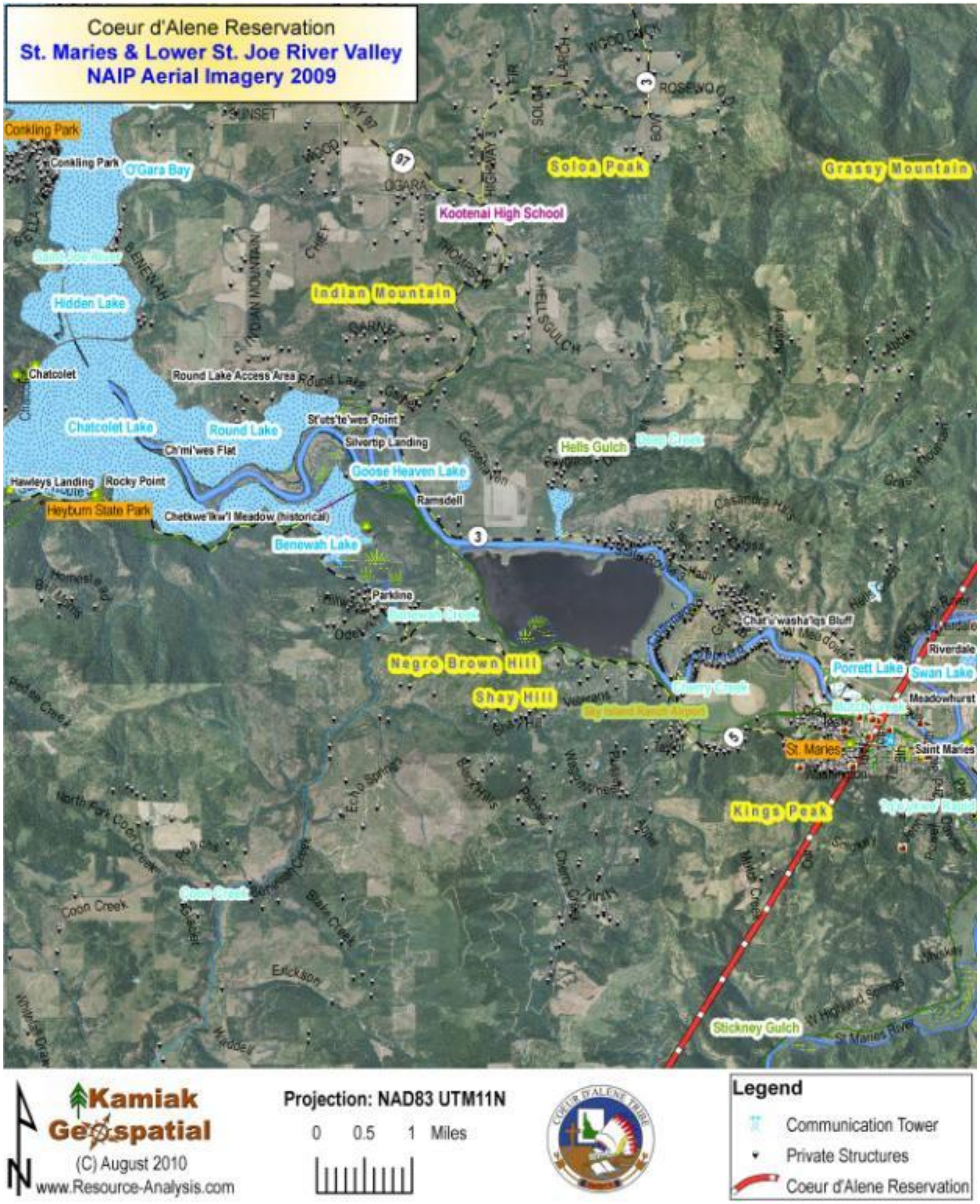


Figure XC. Topographic Relief of St. Maries.

Figure XCI. Population Density Assessment in St. Maries.

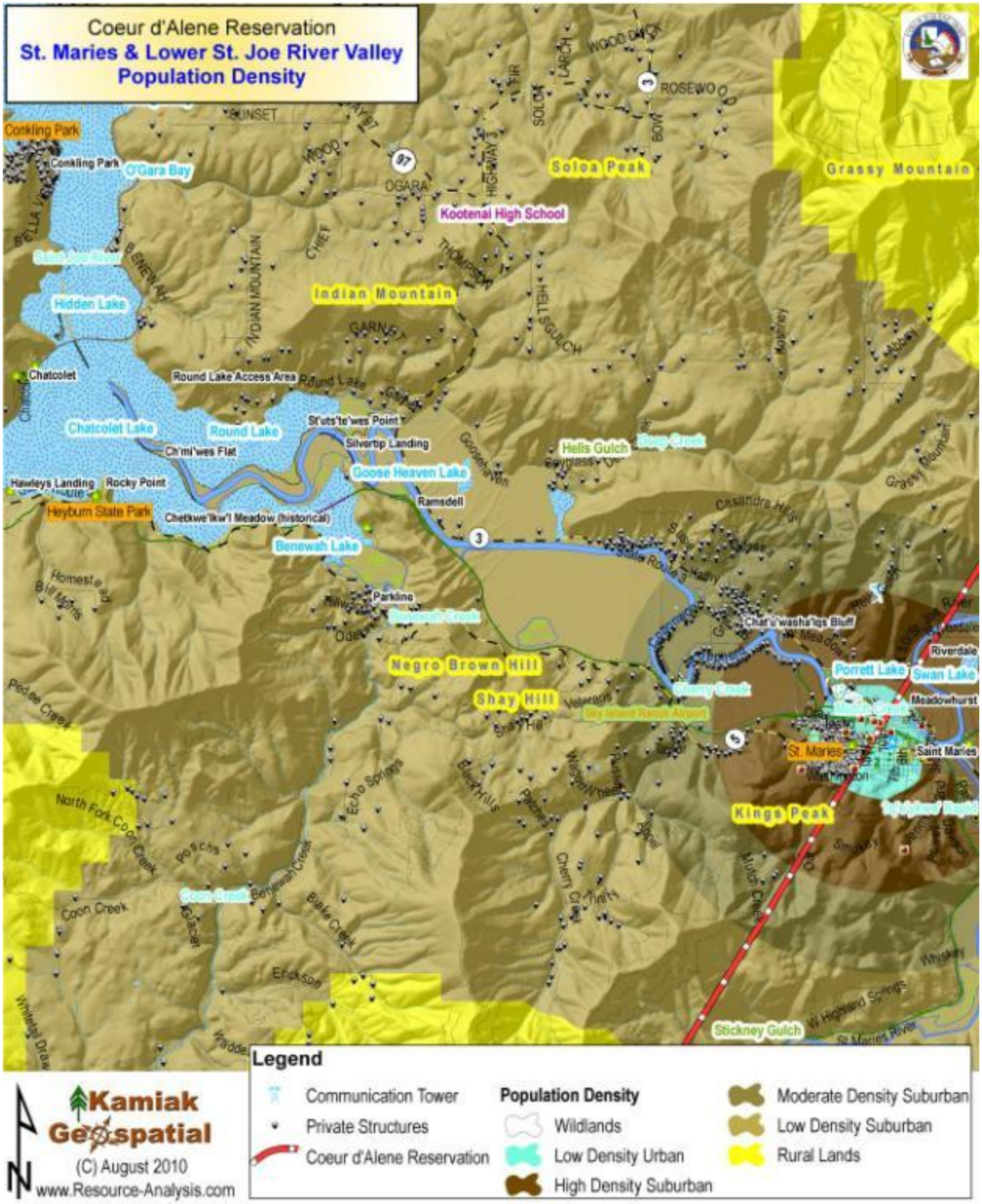


Figure XCII. Floodplain Mapping of St. Maries.

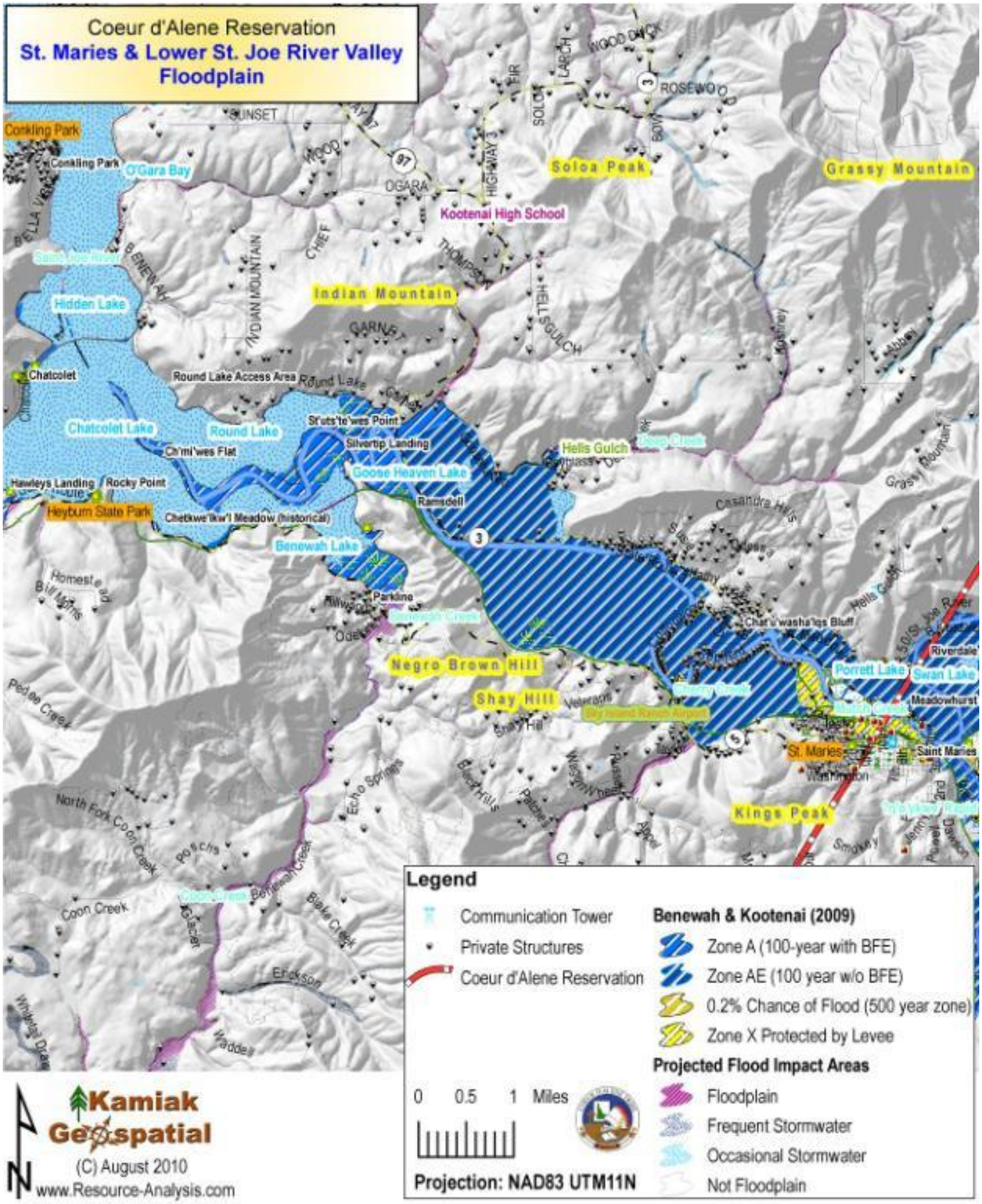


Figure XCIII. Seismic Stability & Fault Lines in St. Maries.

Figure XCIV. Landslide Prone Landscapes in St. Maries.

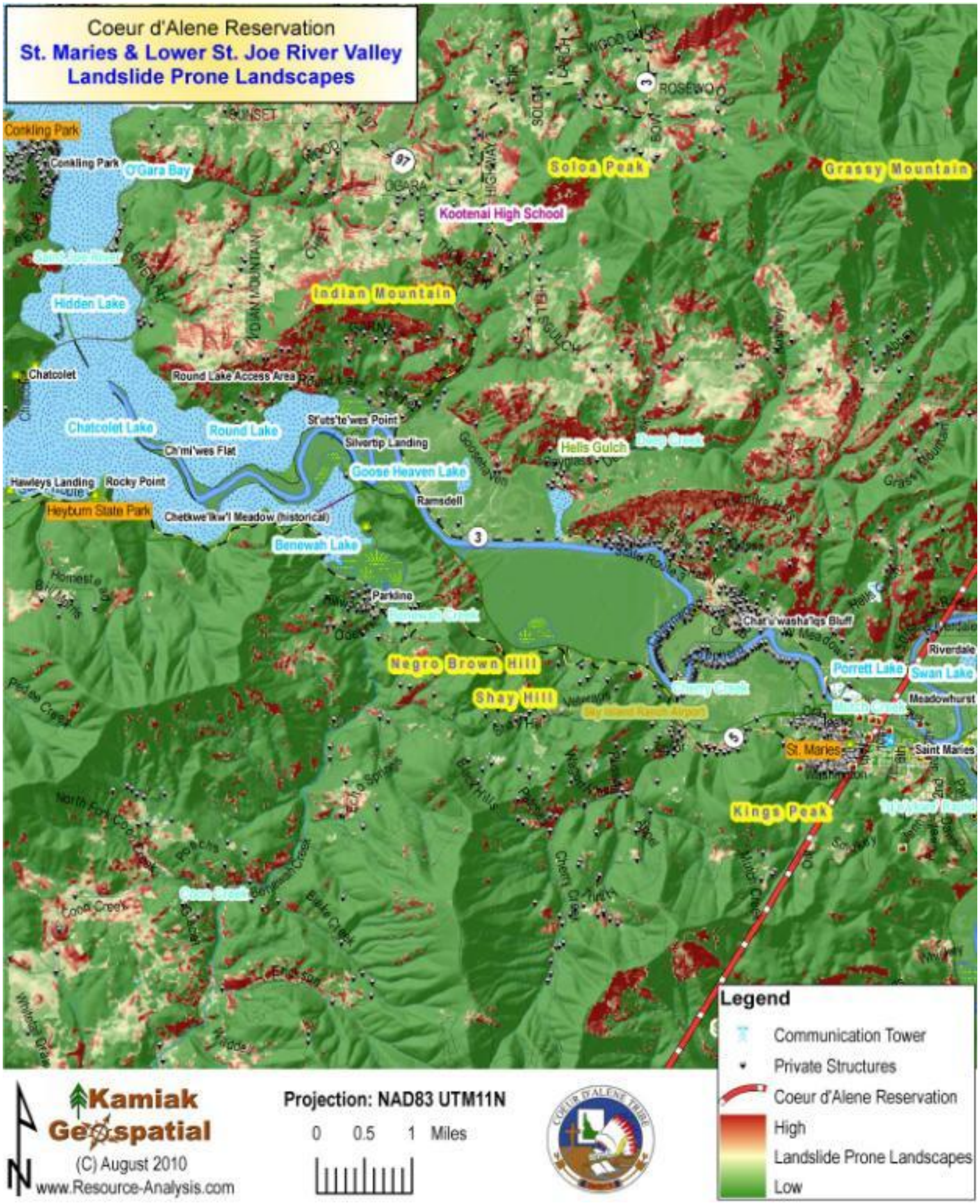


Figure XCV. Expansive Soils and Expansive Clays – Residential without Basement Assessment in St. Maries.

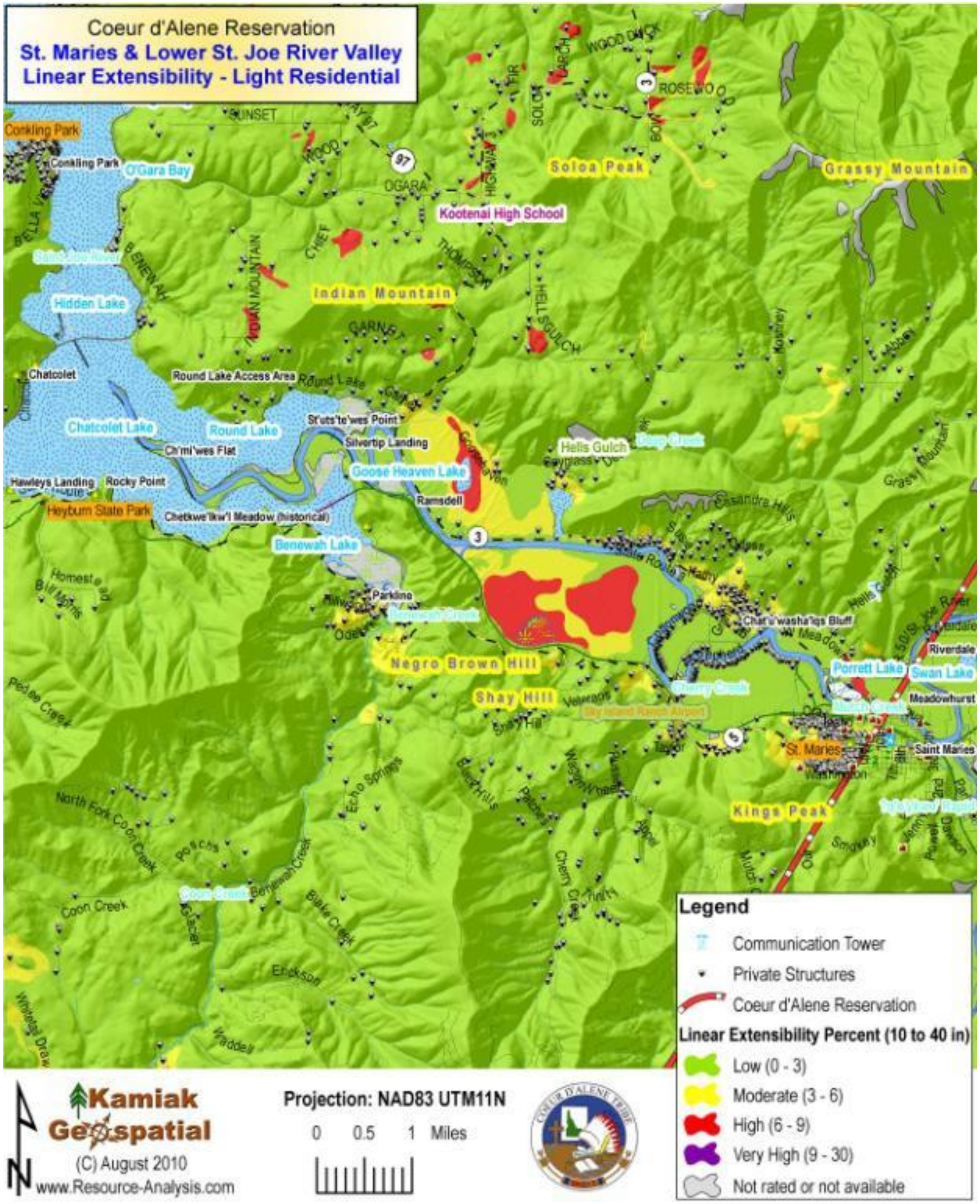


Figure XCVI. Expansive Soils and Expansive Clays – Light Commercial Assessment in St. Maries.

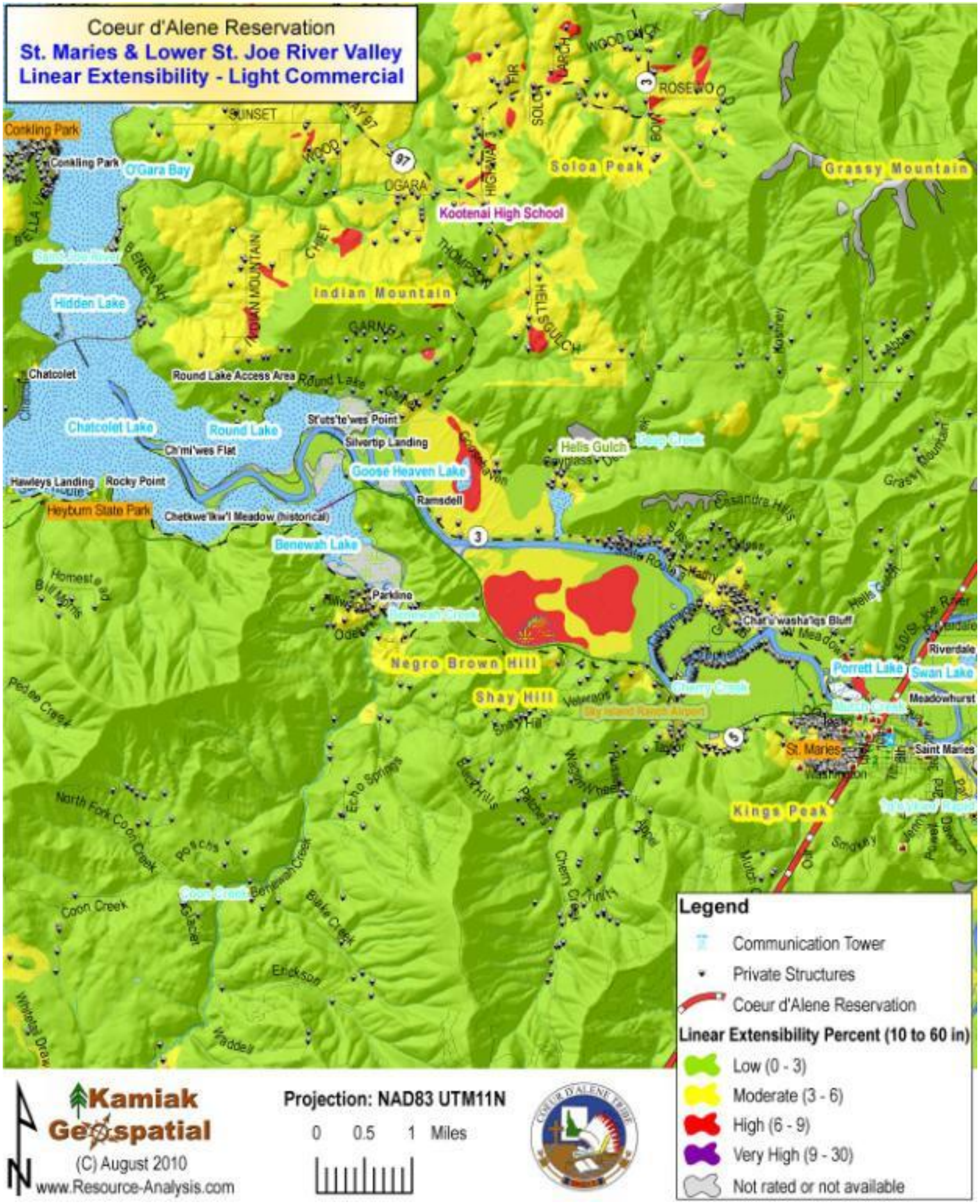
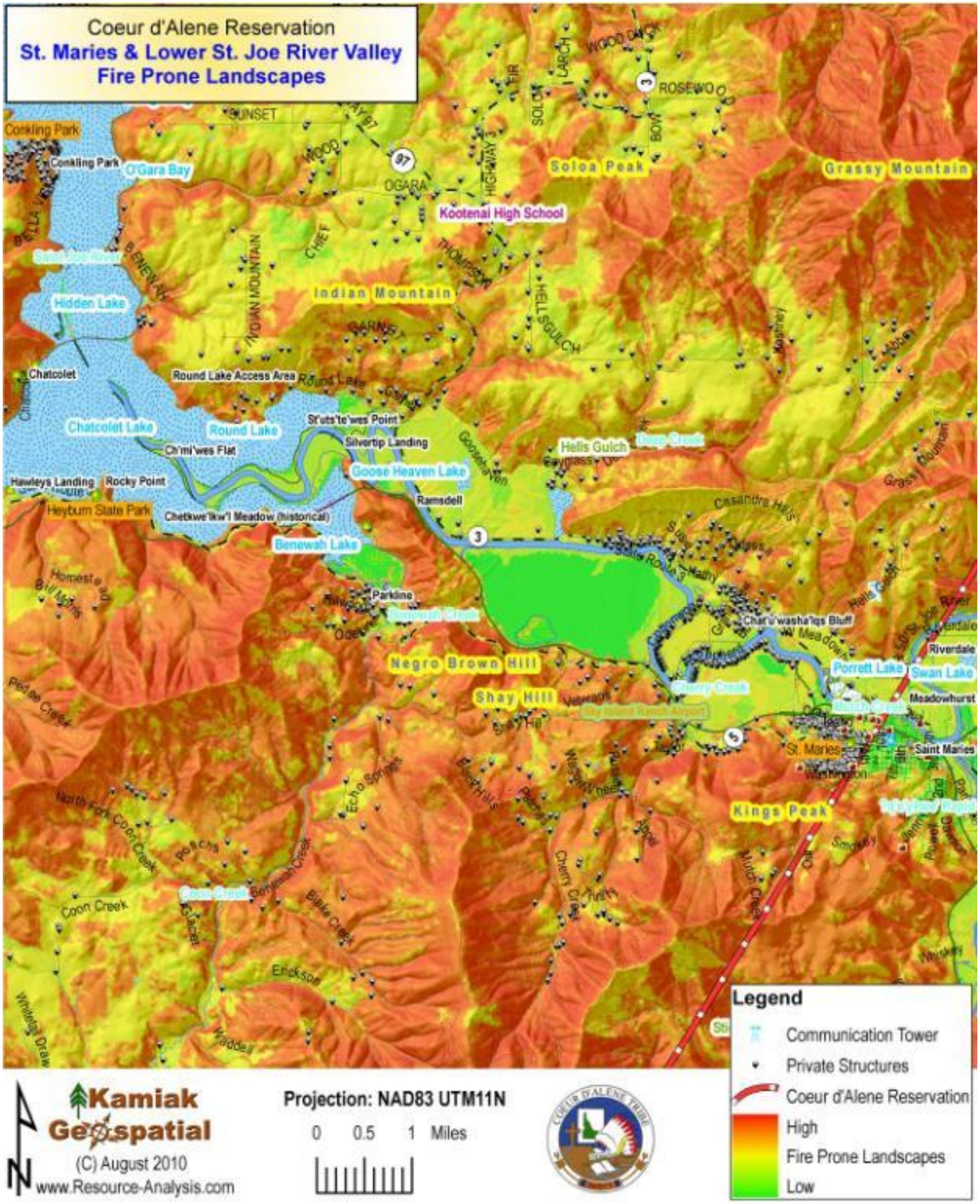


Figure XCVII. Fire Prone Landscapes in St. Maries.



5.4.4. Worley

The City of Worley is the most northerly incorporated city within the Coeur d'Alene Reservation (Figure XCVIII). The Coeur d'Alene Tribe manages multiple structures for Tribal housing use within this city and adjacent to it. Located to the north of Worley Butte and McCartney Butte, the location is picturesque. The Circling Raven Golf Club is located northwest of Worley adjacent to Rock Creek and is accessed by US95. This main infrastructure route, in addition to Highway 58, provides access to visitors of the Tribal Casino for day trips and extended stays.

5.4.4.1. Flood Risks

Flood risks along Rock Creek and within Worley have been mapped as part of this planning effort (Figure CI, Table 26, Table 27). FEMA has not determined the location of the floodplains in this area. The total value of privately owned structures is approximately $995,000, and approximately $757,000 of non-privately owned structures in this area within the floodplain. While these values seem significant, they are only a portion of the total value of structures attributed to Worley as their 'closest community'. Very few of the structures shown in Figure CI are located within the floodplain illustrated here.

The City of Worley, like Tensed, DeSmet, and Plummer, has a wastewater treatment facility located within the floodplain and adjacent to the city. The Coeur d'Alene Tribe has recently been working with the city to locate a new facility location, outside the floodplain, in order to retire the existing facility.

The Circling Raven Golf Club located downstream of the City of Worley represents an excellent land use adjacent to the Rock Creek Floodplain.

5.4.4.2. Seismic Shaking and Fault Lines

The seismic shaking risk within and around Worley is moderate, 6-7%G (Figure CII and Table 29). Only one fault line is near the community, and it is located south of Worley Butte, part of the matrix of fault lines located around Plummer.

The exposure to earthquakes in the areas surrounding homes and businesses near Worley are documented in Section 5.3.4, Seismic Shaking Hazards.

5.4.4.3. Landslides

Landslide risk assessments surrounding Worley and surrounding areas are responsive to the topographic relief of the area. In the immediate vicinity to Worley, the risks are rated as very low (in response to the relatively flat terrain), while isolated places show higher risk attributes in response to steep slopes (Figure CIII). This area possesses a dividing line between rich farming lowlands and forested uplands. Where forestry practices remove the stable vegetation, the sites can respond with localized landslides, slumping, and erosion. The soils in this area are derived from loess parent materials and can respond to rapid erosion when vegetation is removed and the slopes are steep.

Landslides within this area have been rare, and isolated to small events.

5.4.4.4. Expansive Soils

Expansive soils and expansive clays within the area of Worley, for light residential (without basements) feature a mix of low-to-moderate risks (Figure CIV). Within the City of Worley, and in adjacent areas, developments are located on sites rated as moderate for expansive soils.

The profile for light commercial structures (and Residential with a basement) is rated as almost uniformly a moderate risk (Figure CV). Several areas rate the sites as high in risk for both analyses of expansive soils, most of these are located north of Rock Creek. The home depicted in Figure LII (pg 213) was photographed in Worley, and was erected on a moderate risk site. This home is a residential category with a basement, but the draining of the gutters through their downspout onto the ground at the corner of the foundation led to the shrinking and swelling of the soils, and the cracking of the foundation.

In this entire area, expansive soil pre-construction building techniques should be considered for all new structures to integrate recommendations. Even low risk soils in the Upper Columbia Plateau can respond with adverse results if the soil moisture is not moderated at near-constant levels.

5.4.4.5. Wildfire

Structures located within Worley and within the fields surrounding it, are located within a mix of low risk to wildland fire, to moderate and high risks (Figure CVI, Table 42, Table 43). The homes located within the agricultural lands are at low risk for most of the year and the resistance to wildfire control is minimal. The homes located within and adjacent to the City of Worley, especially to the south of it, are all within a contiguous zone of elevated forestlands and wildfire fuels. Although fuel mitigation efforts have been implemented in this zone, many are in need of continued treatments and others need initial treatment.

Forest management in the area of Worley Mountain and McCarthy Butte have maintained relatively healthy forests with ample surface infrastructure to use during wildfire response. Continued attention by the Coeur d'Alene Tribe Fire Management staff is given to this area with respect to the homes located adjacent to the buttes.

Figure XCVIII. Aerial Imagery of Worley, 2009.

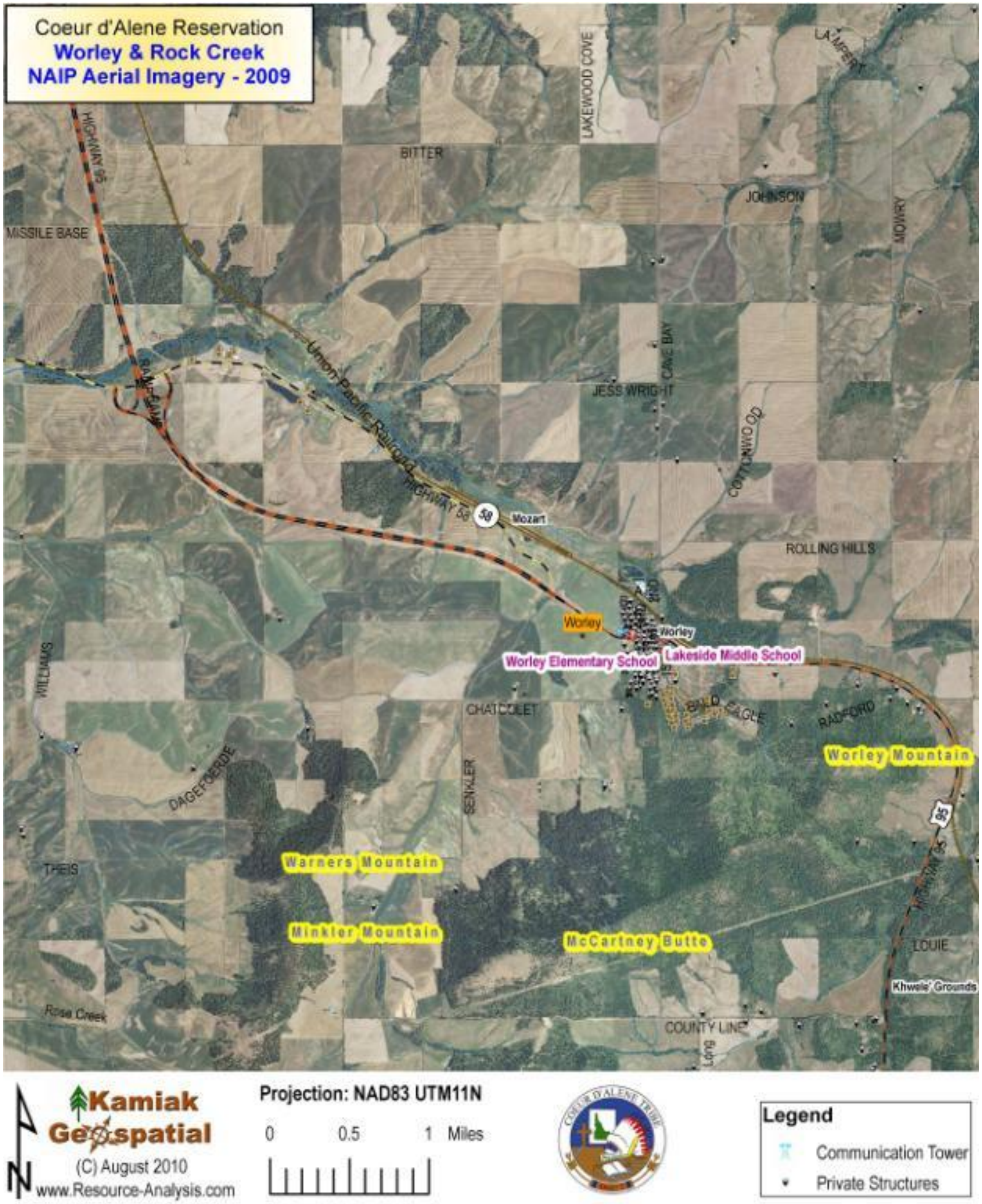


Figure XCIX. Topographic Relief of Worley.

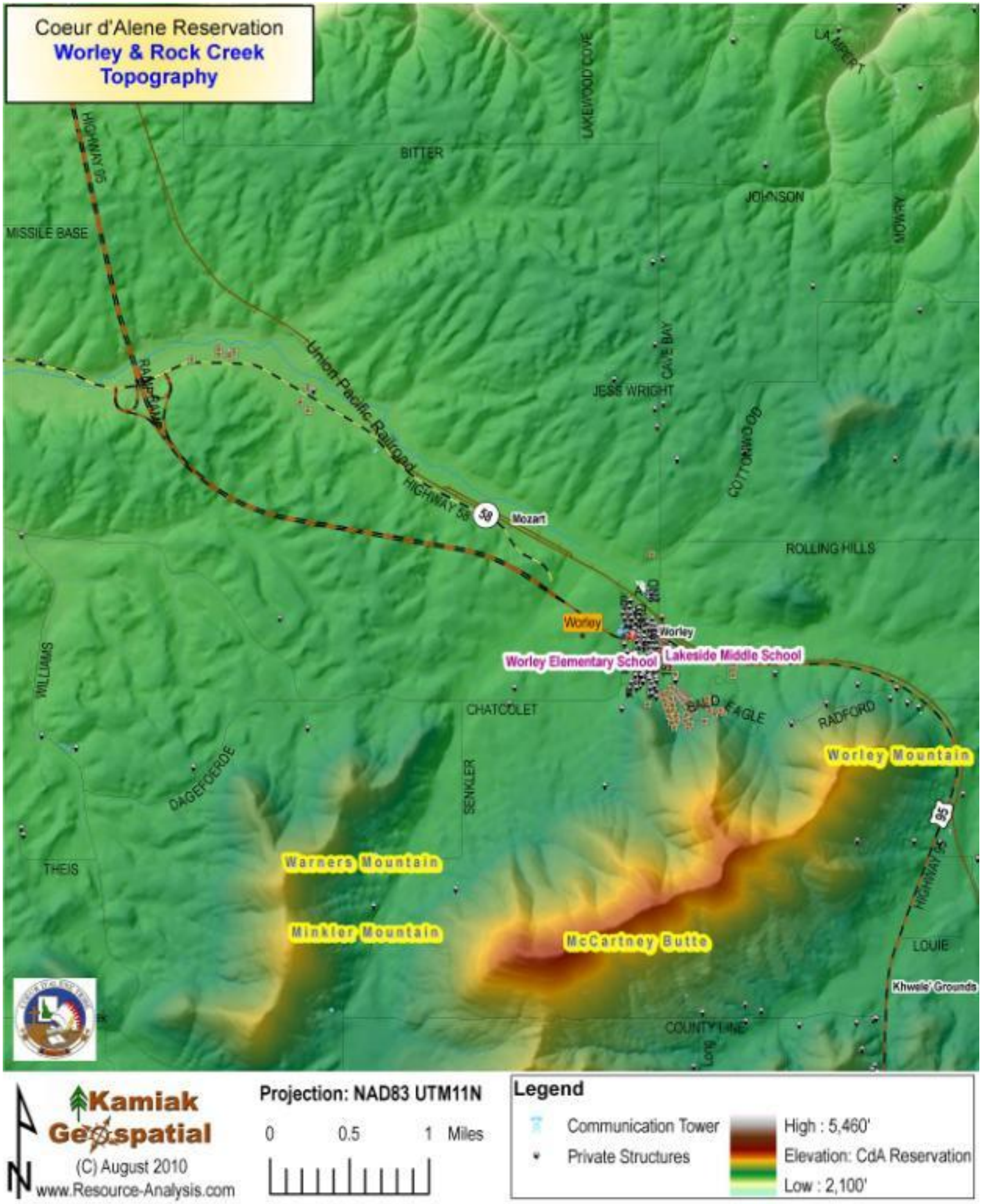


Figure C. Population Density Assessment in Worley.

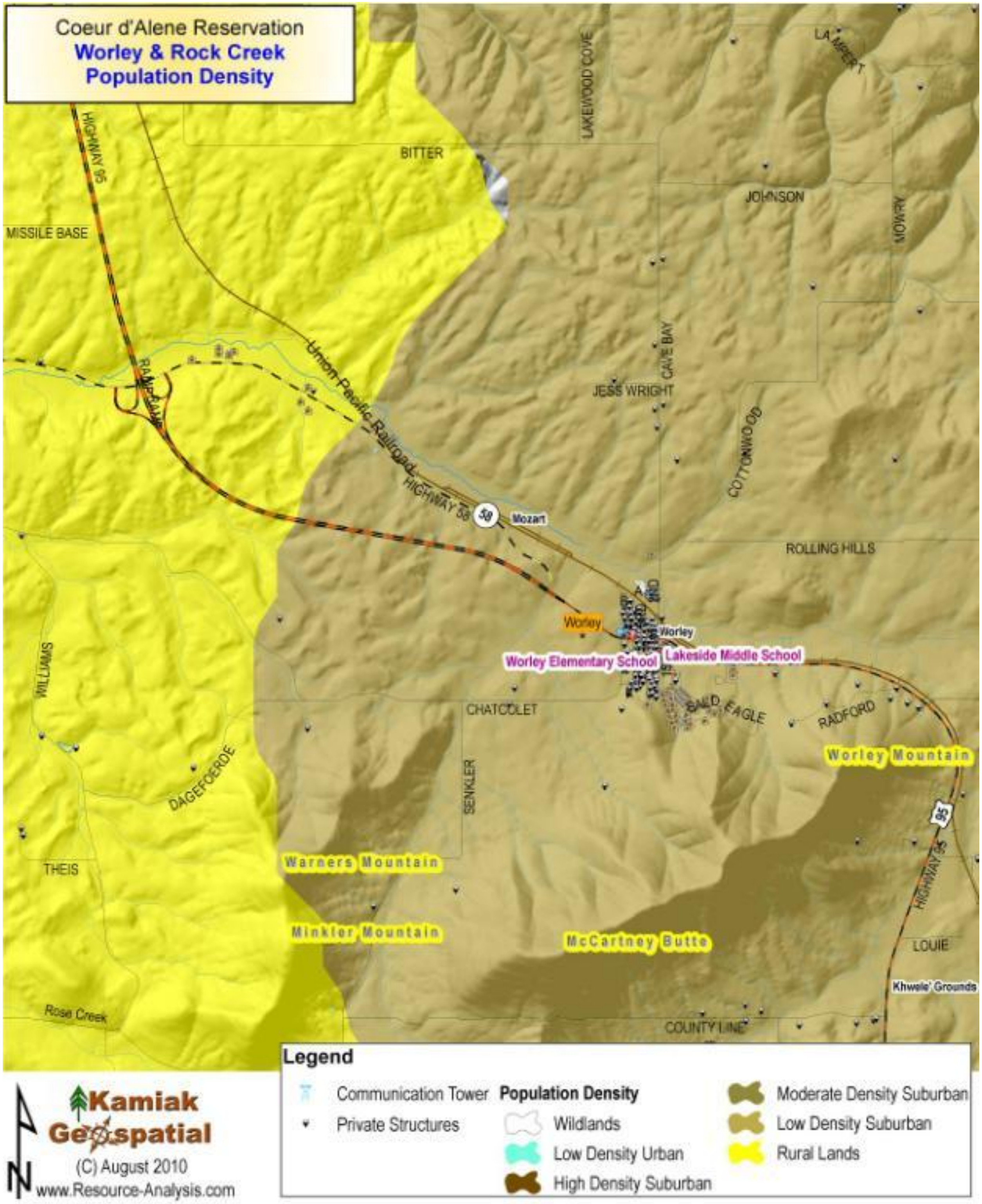


Figure CI. Floodplain Mapping of Worley.

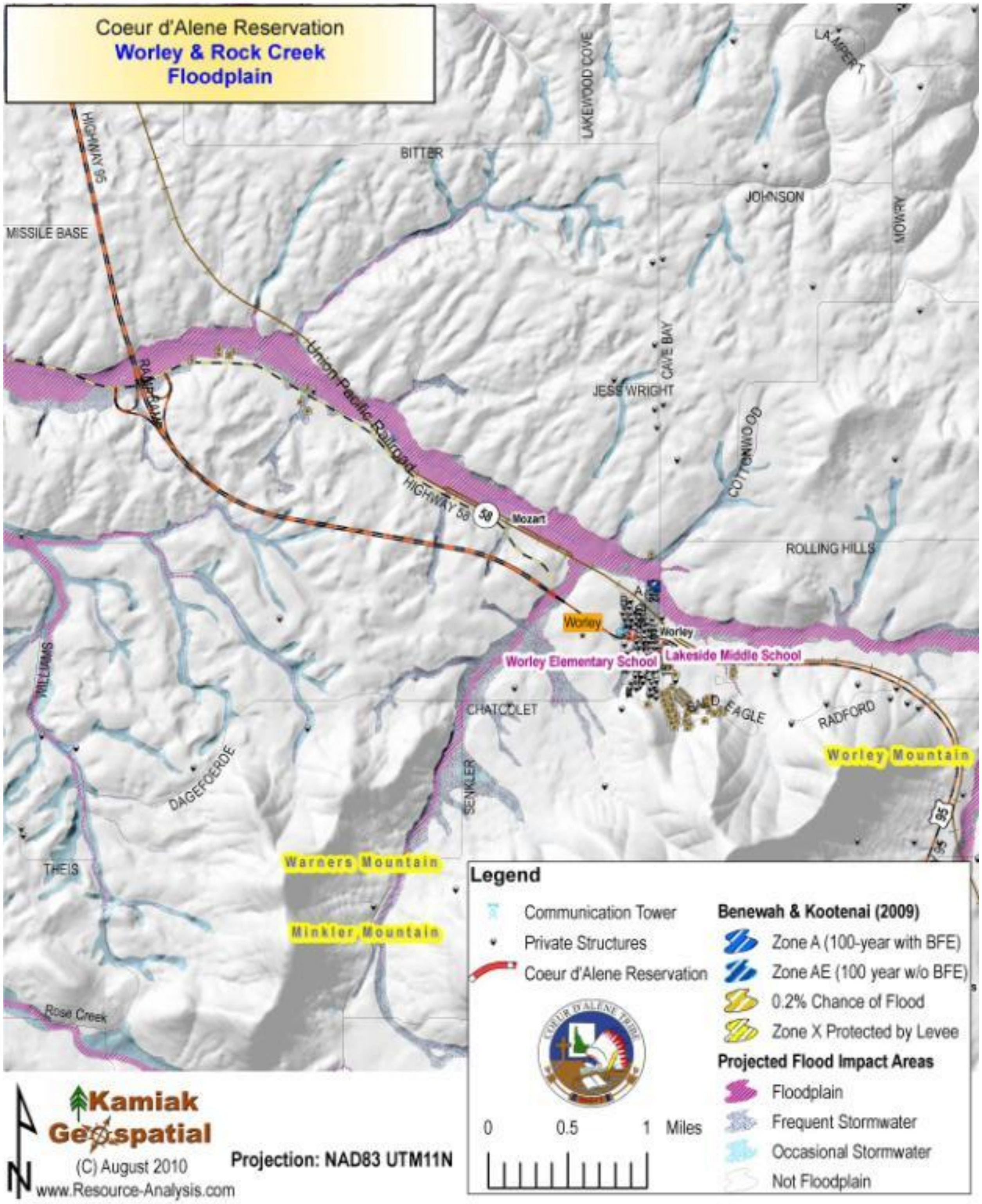


Figure CII. Seismic Stability & Fault Lines in Worley.

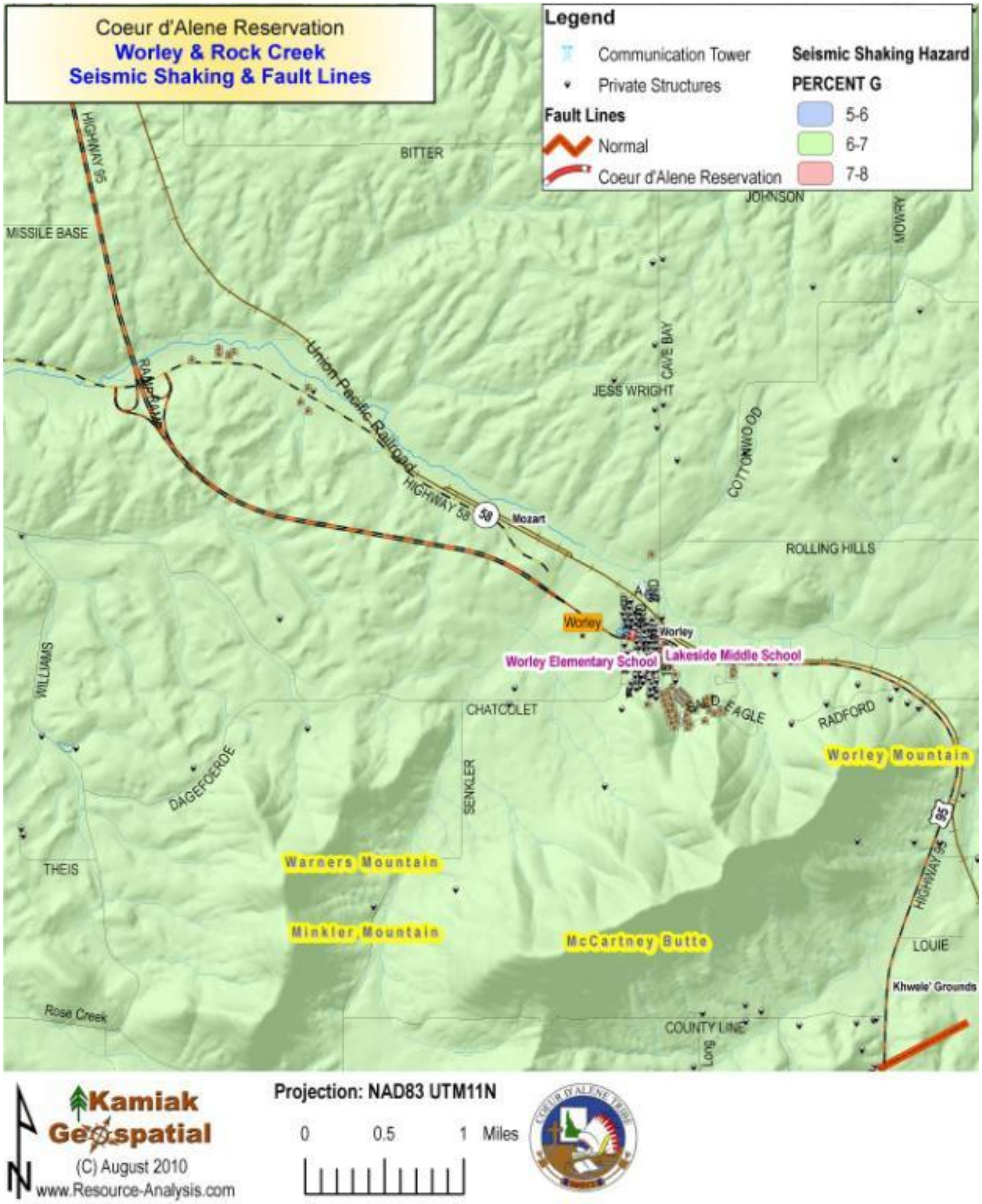


Figure CIII. Landslide Prone Landscapes in Worley.

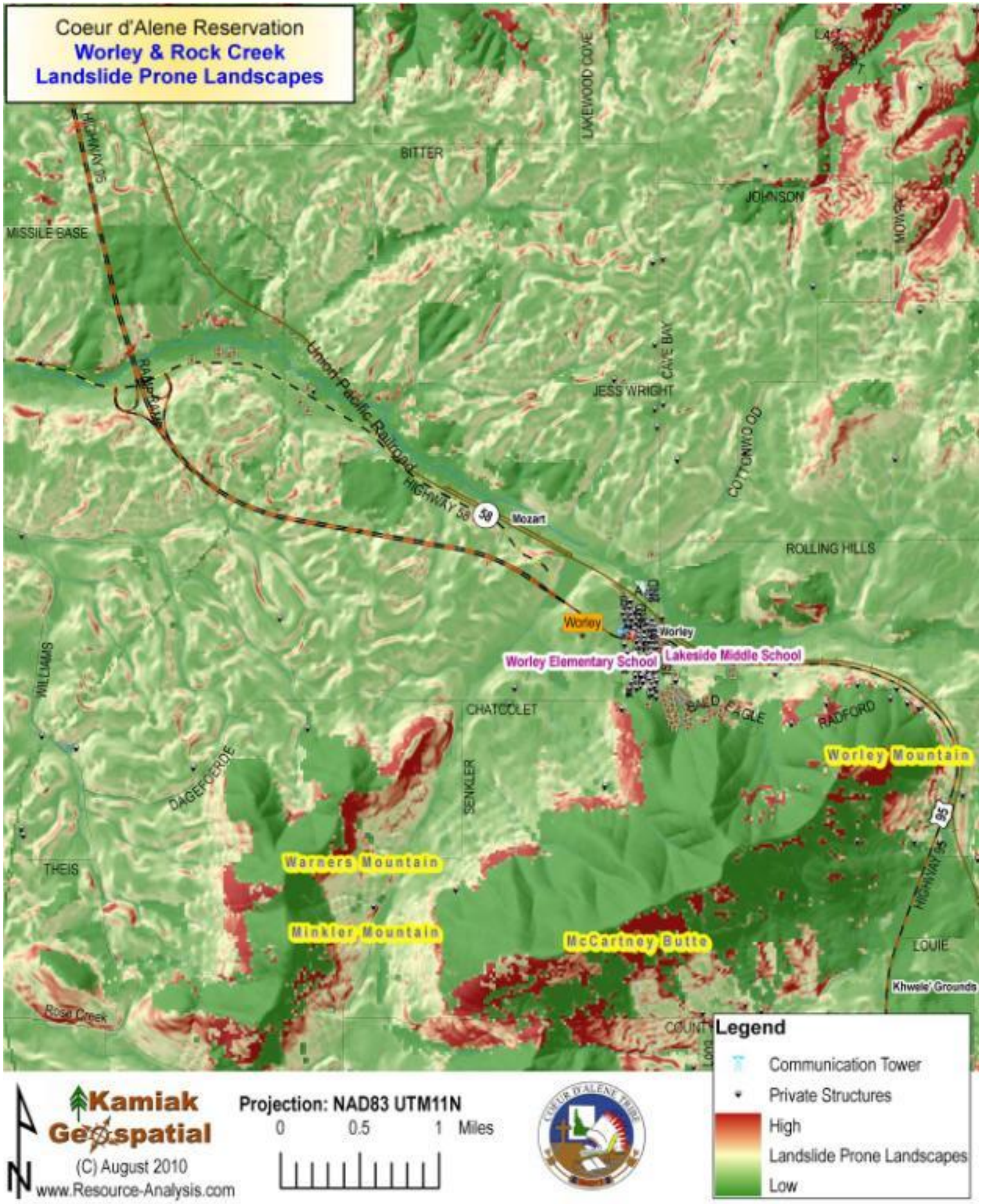


Figure CIV. Expansive Soils and Expansive Clays – Residential without Basement Assessment in Worley.

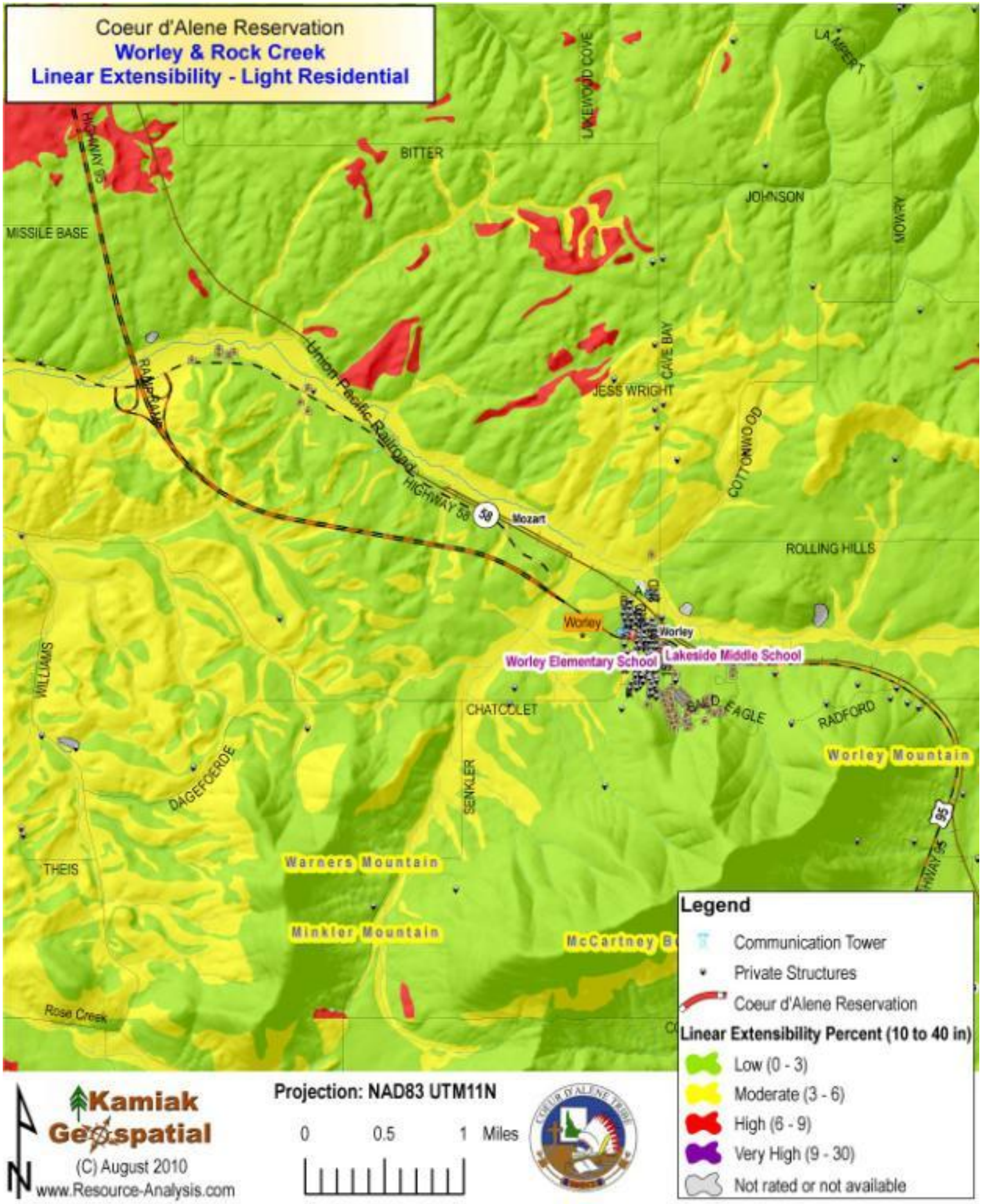


Figure CV. Expansive Soils and Expansive Clays – Light Commercial Assessment in Worley.

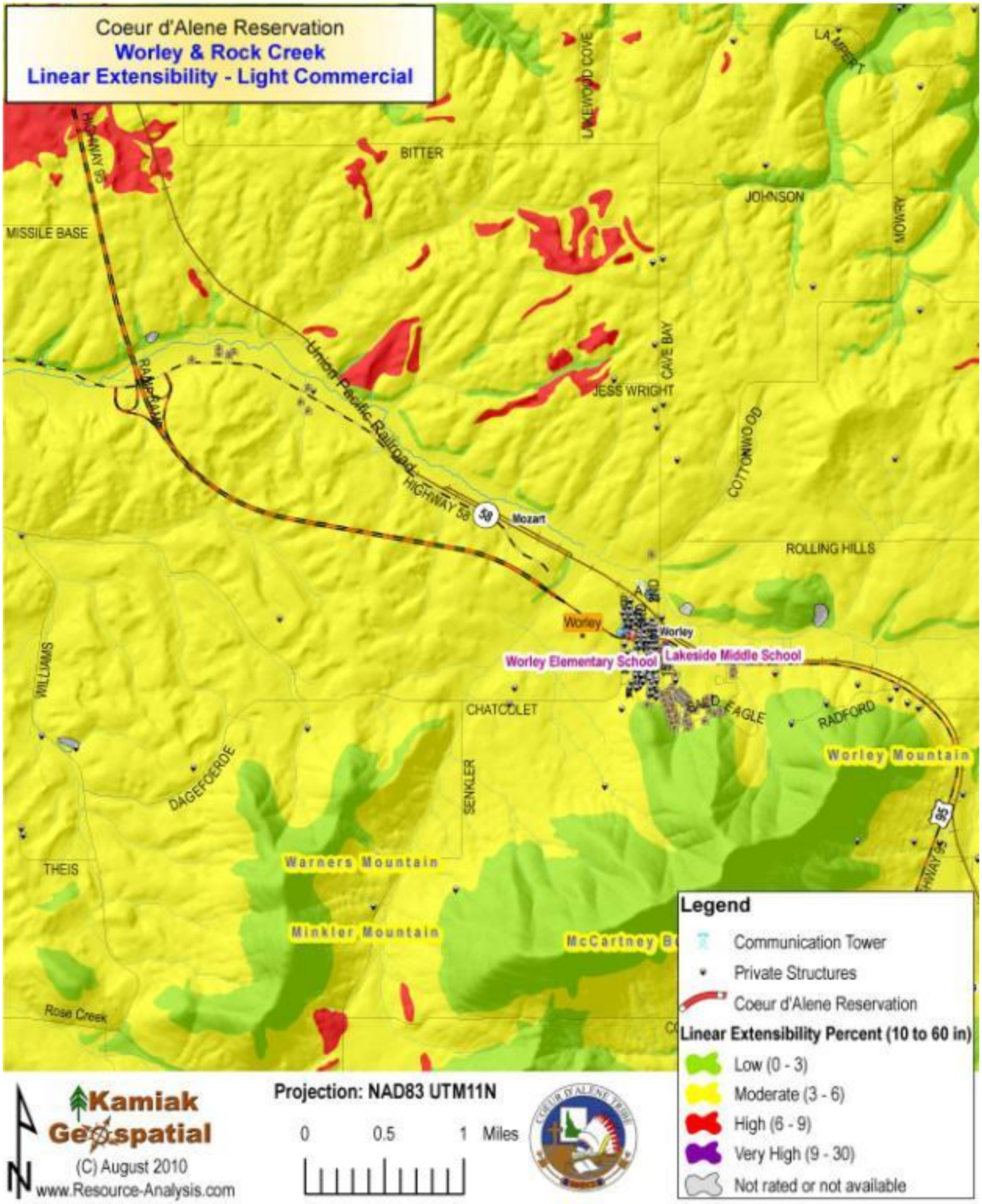
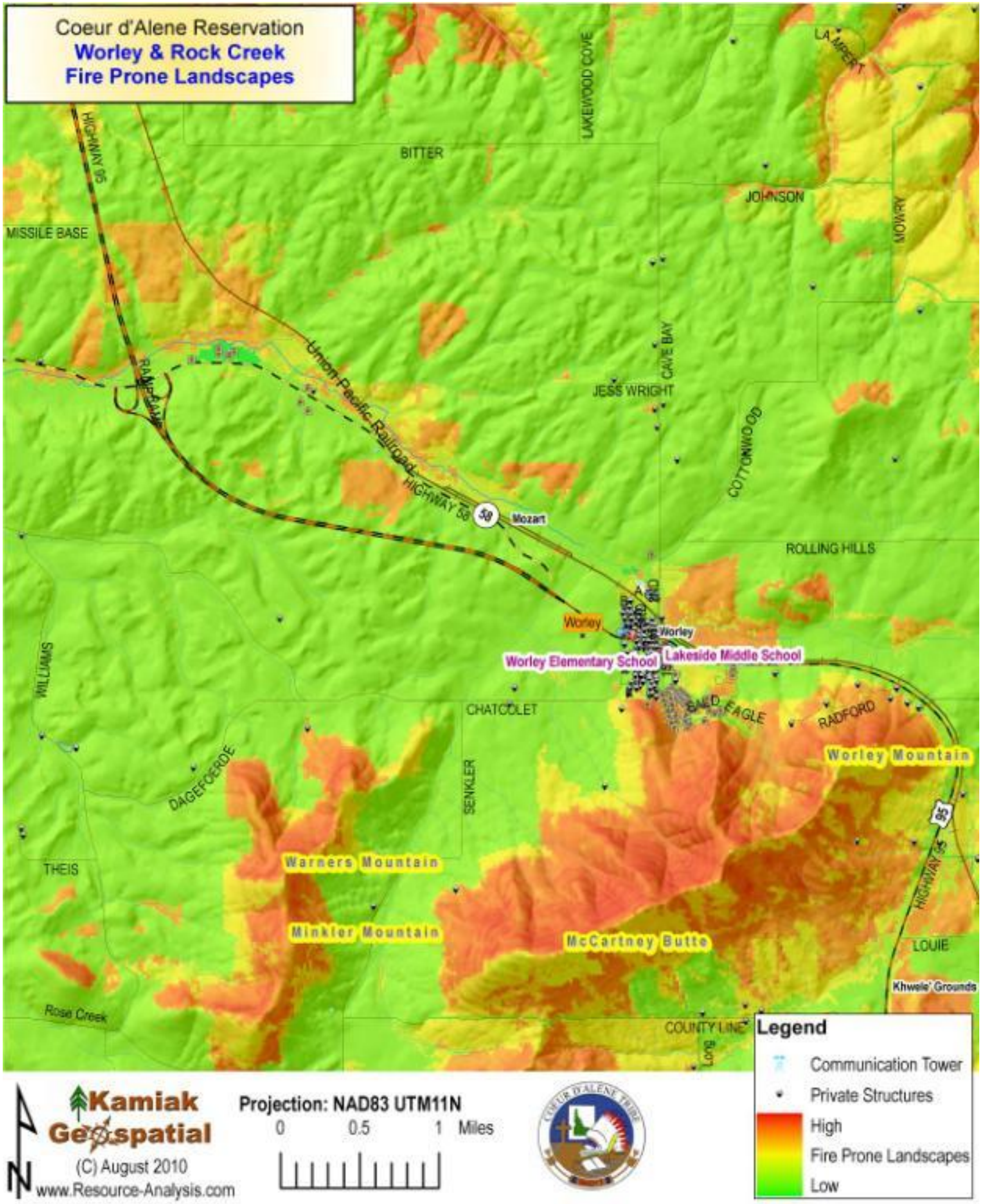


Figure CVI. Fire Prone Landscapes in Worley.



5.4.5. Benewah Valley

The Benewah Valley has received increased development during the past 10 years as new homes are built in this area (Figure CVII). Two main access points to this valley are provided: one from near St. Maries (between Parkline and St. Maries) to the north, and the other from the west and US95 north of Tensed.

In comparison to the population density analysis conducted for this for this area in 2004, the similar analysis conducted for the current planning effort (Figure CIX) concluded that the population density at the northern end of the valley has increased substantially transitioning from a rural population density category to a low density suburban density.

As already defined in Section 5.3 (Macro Hazards), the risk exposure to high winds and seismic shaking hazards is uniformly high in the Benewah Valley, as well as the other populated places of the Coeur d'Alene Reservation. Native tree species surrounding homes are common; there are many homes with compromised roofing materials that would benefit from reinforcement against the wind and falling debris from surrounding trees. The prevalence of URM chimneys (**Error! Reference source not found.**) is well noted in this area.

5.4.5.1. Flood Risks

Flood risks in the Benewah Valley are attributed to Benewah Creek (Figure CX, Table 26, Table 27). FEMA has not developed floodplain assessments of this valley. These floodplains indicate that very few structures along the Benewah Creek valley are located within the zone considered most at risk to flooding.

Stormwater accumulation within the Benewah Creek valley is very limited owing to the steep terrain and forested soils. All of the homes in this area use domestic septic systems; there are no public septic systems in this valley.

5.4.5.2. Seismic Shaking and Fault Lines

The seismic shaking risk within the Benewah Valley is moderate (Figure CXI and Table 29). The distribution of fault lines is concentrated to the southern edge of this valley, with more to the north of the valley along the St. Joe drainage. Although most structures in this area use wood heat and support URM chimneys, there are no URM buildings.

5.4.5.3. Landslides

Landslide risk assessments in the Benewah Valley are responsive to the topographic relief of the area (Figure CXII). This area is completely dominated by forestland vegetation with surface access provided by dirt and gravel roads. Site disturbances leading to landslides have been minimal and confined to isolated small events.

5.4.5.4. Expansive Soils

Expansive soils and expansive clays within the area of the Benewah Valley, for light residential (without basements - Figure CXIII), and for light commercial structures (and Residential with a basement - Figure CXIV), are both characterized by low risks. The dominance of basaltic-derived soils in this valley leads to the reduced risks for this assessment.

5.4.5.5. Wildfire

Most of the structures located within the Benewah Valley area at moderate risk to wildfire (Figure CXV, Table 42, Table 43). However, the surrounding terrain is covered by moderate-to-high risk wildfire fuels.

Homes scattered within this valley face elevated wildfire risks due to the continuous nature of the wildfire fuels coupled with poor access into and out of this valley. A local commentary about access to this valley refers to “a trip that would normally take 30 minutes (based on distance), takes 4 hours to complete in the Benewah Valley!” This problematic infrastructure challenges homeowners when evacuating the area with the firefighters trying to enter the site in an emergency. To further complicate the situation, the access is a lane-and-a-half gravel road with “as many potholes as it has raindrops”.

Some of the homes have received WUI fuels mitigation work, while others have not. Even some of those homes that have received fuels mitigation attention in the past are facing the need to ‘update’ the treatments and maintain an acceptable level of ‘protection’.

Figure CVII. Aerial Imagery of Benewah Valley, 2009.

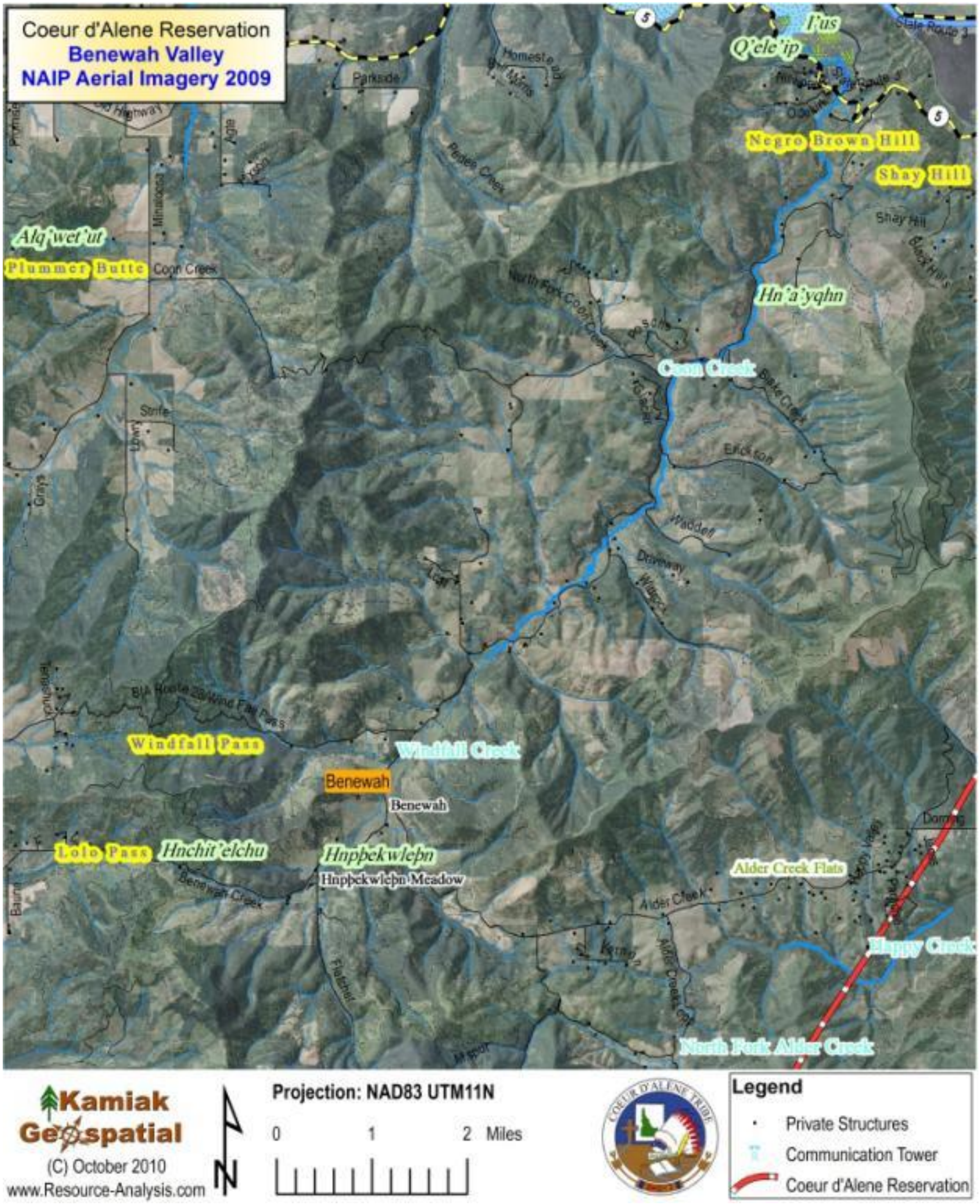


Figure CVIII. Topographic Relief of Benewah Valley.

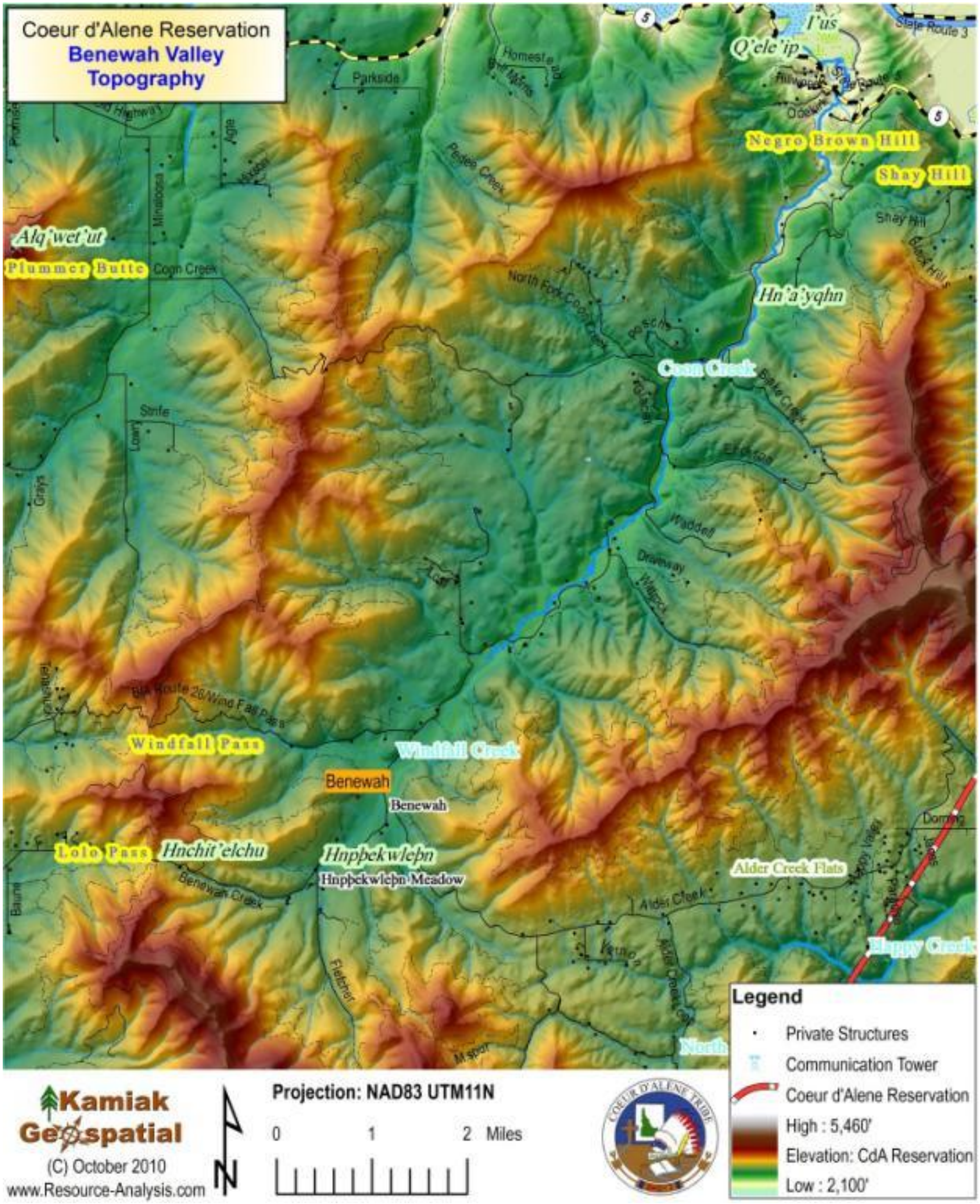


Figure CIX. Population Density Assessment in Benewah Valley.

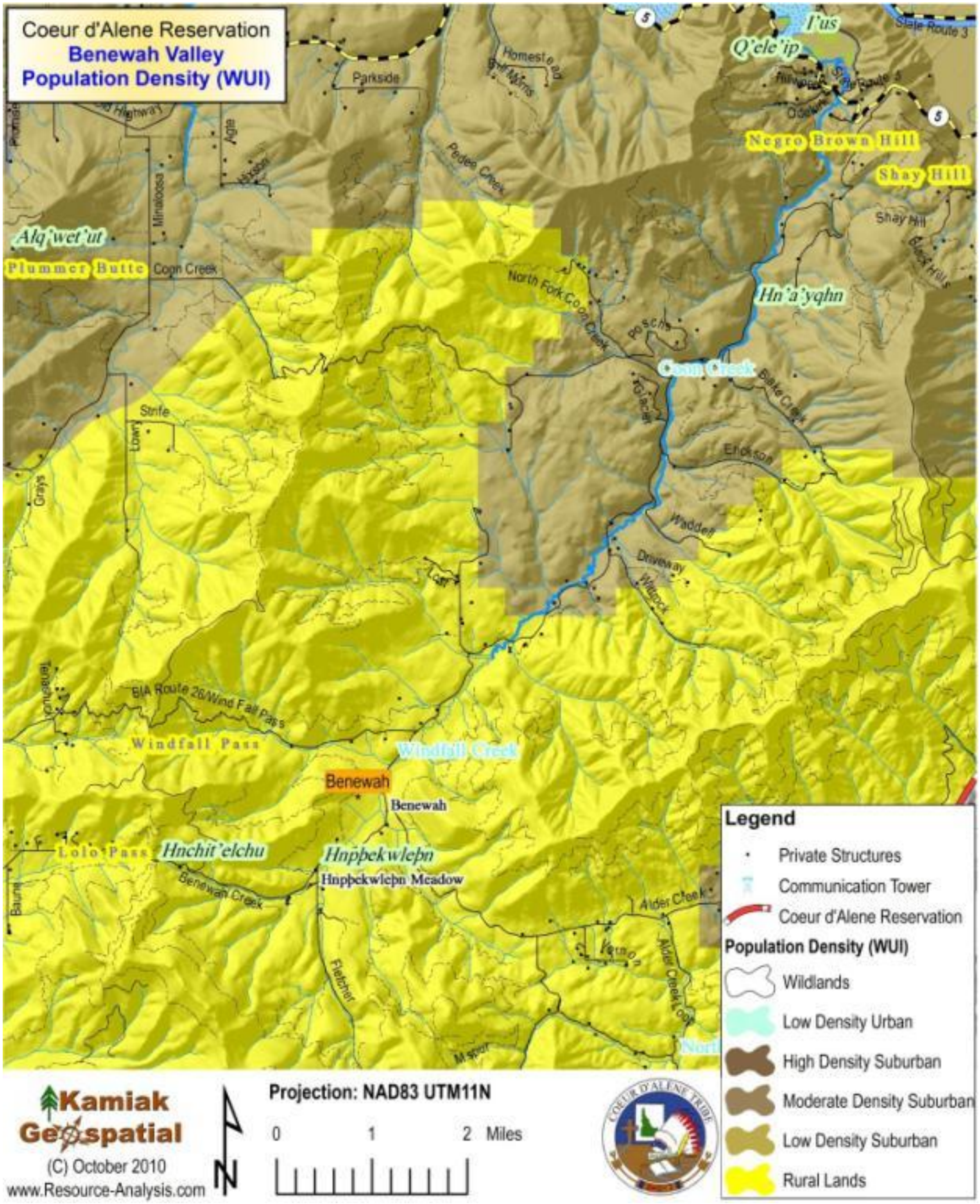


Figure CX. Floodplain Mapping of Benewah Valley.

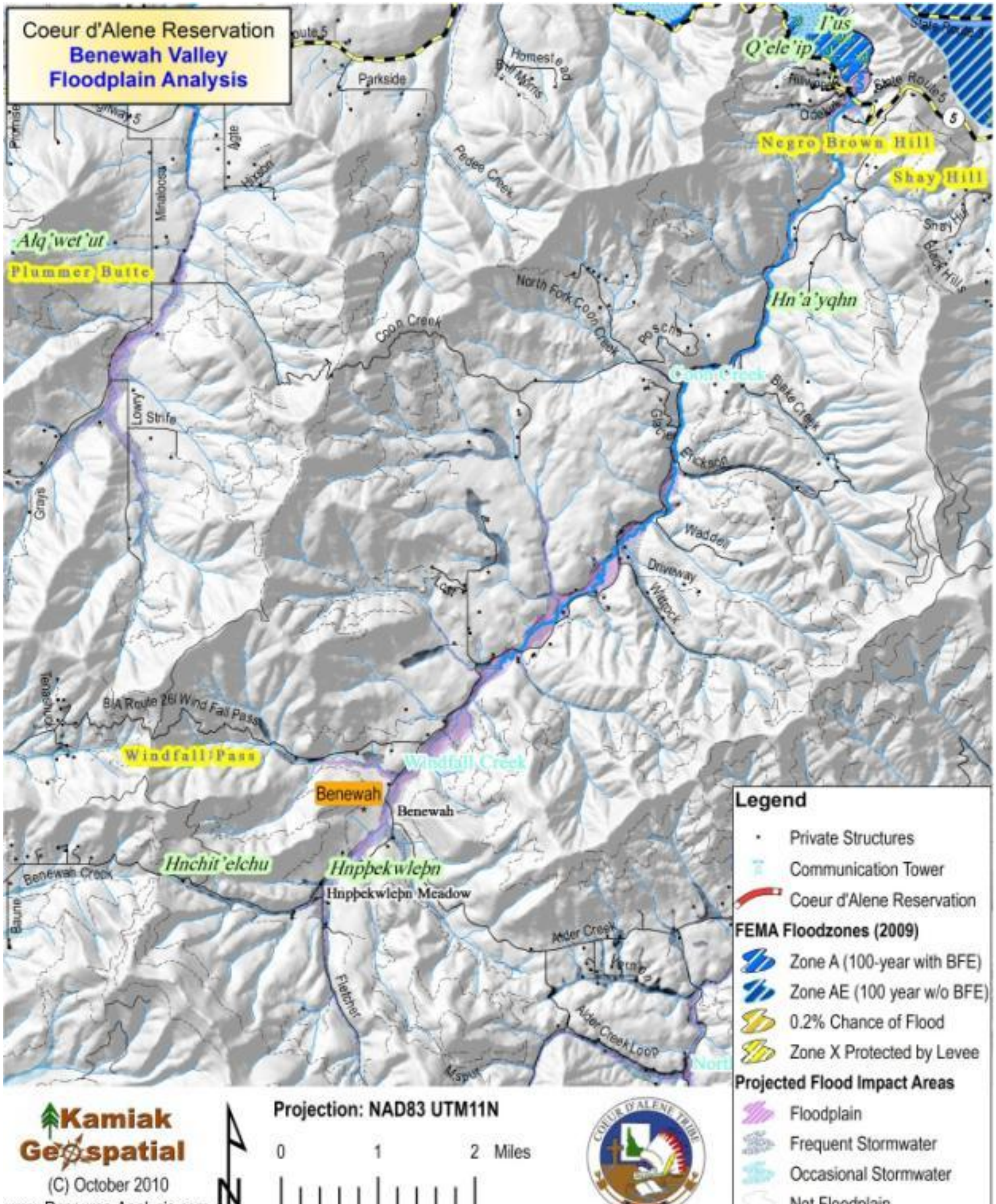


Figure CXI. Seismic Stability & Fault Lines in Benewah Valley.

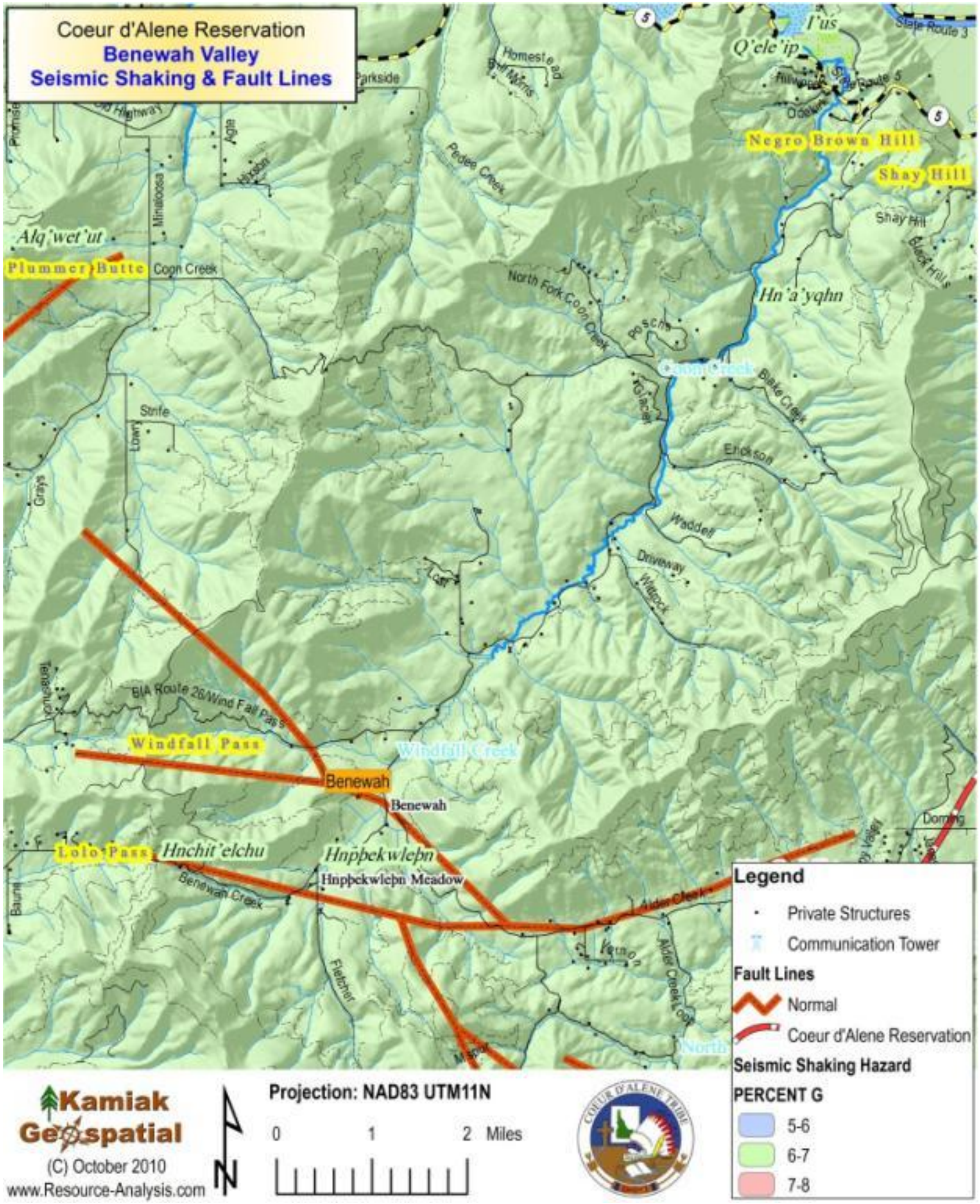


Figure CXII. Landslide Prone Landscapes in Benewah Valley.

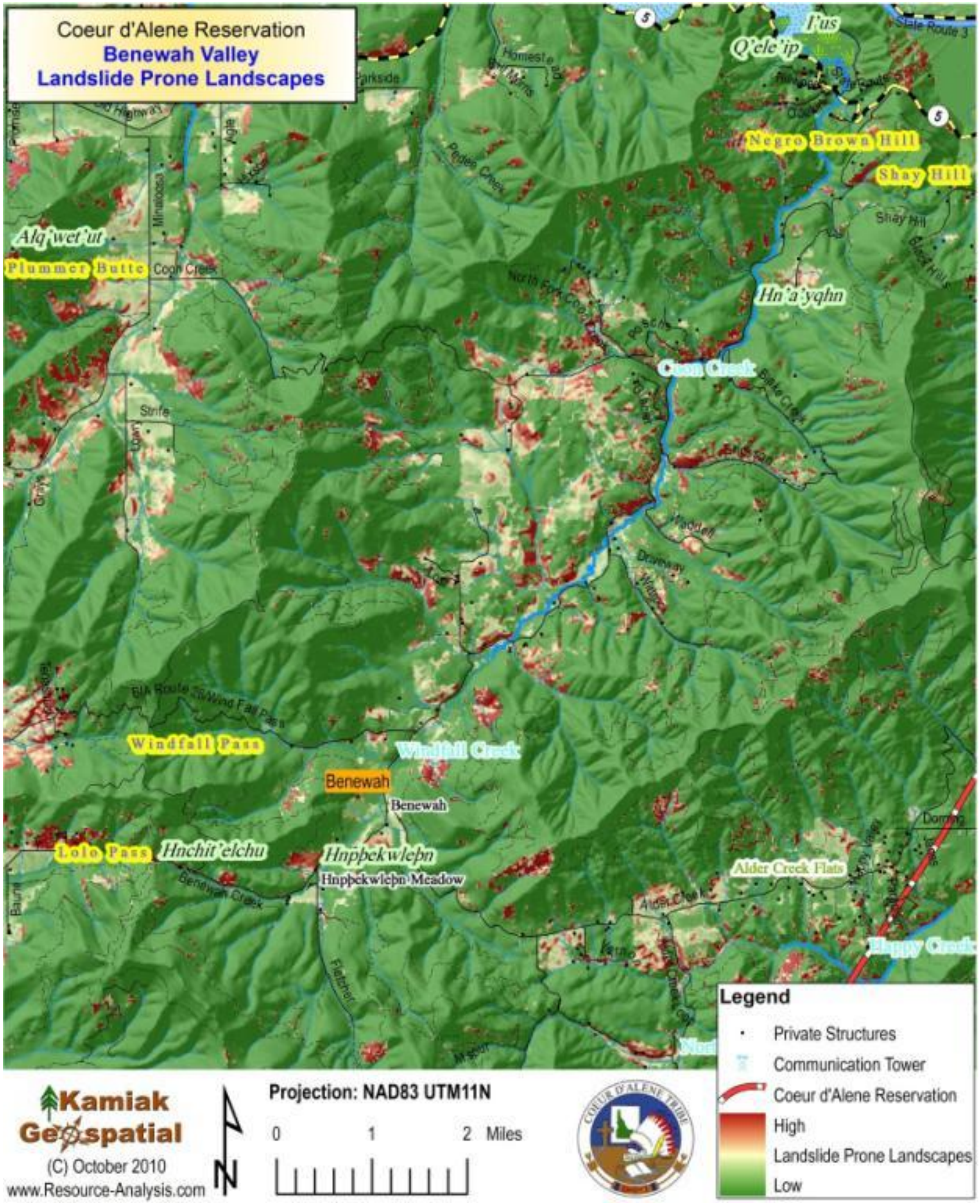


Figure CXIII. Expansive Soils and Expansive Clays – Residential without Basement Assessment in Benewah Valley.

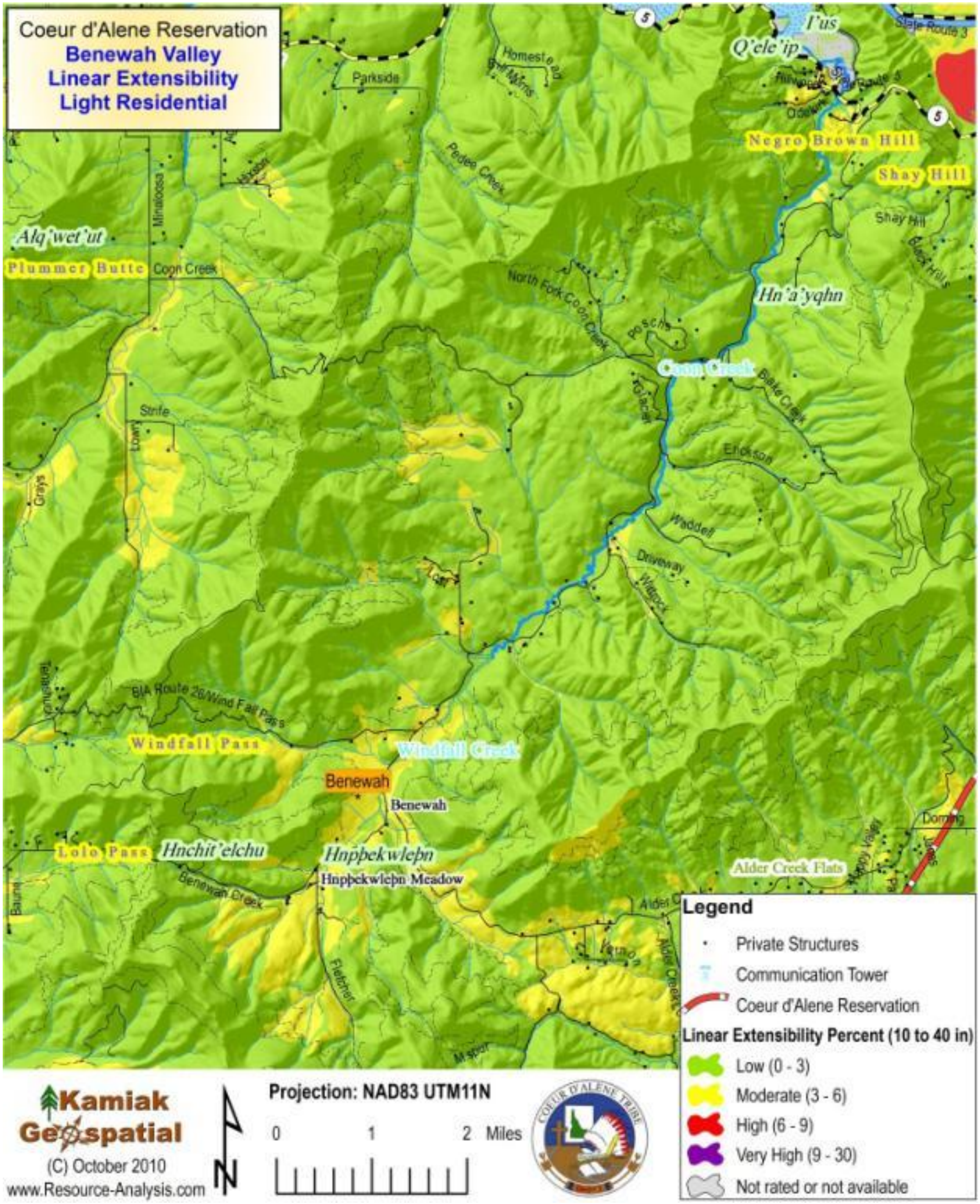


Figure CXIV. Expansive Soils and Expansive Clays – Light Commercial Assessment in Benewah Valley.

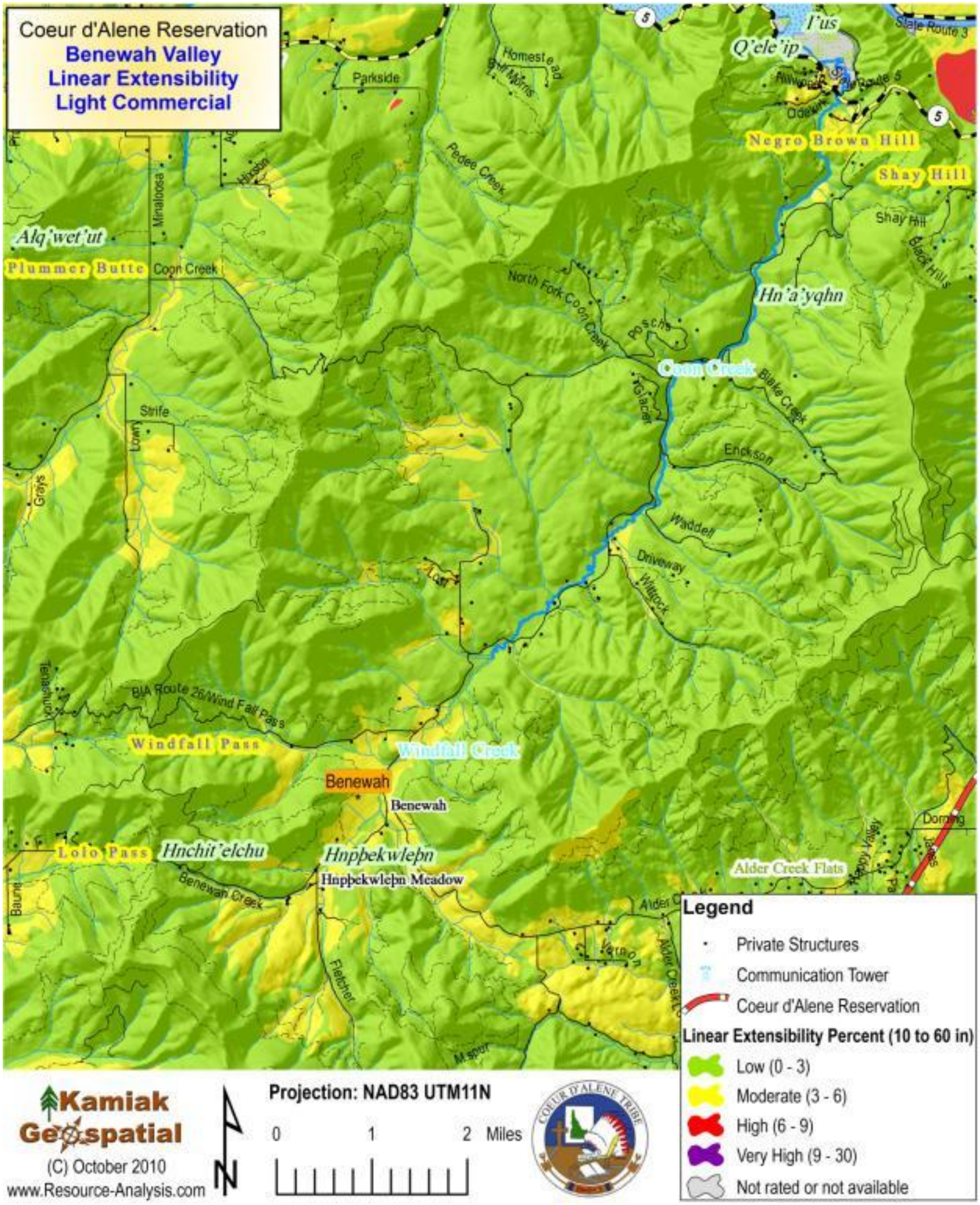
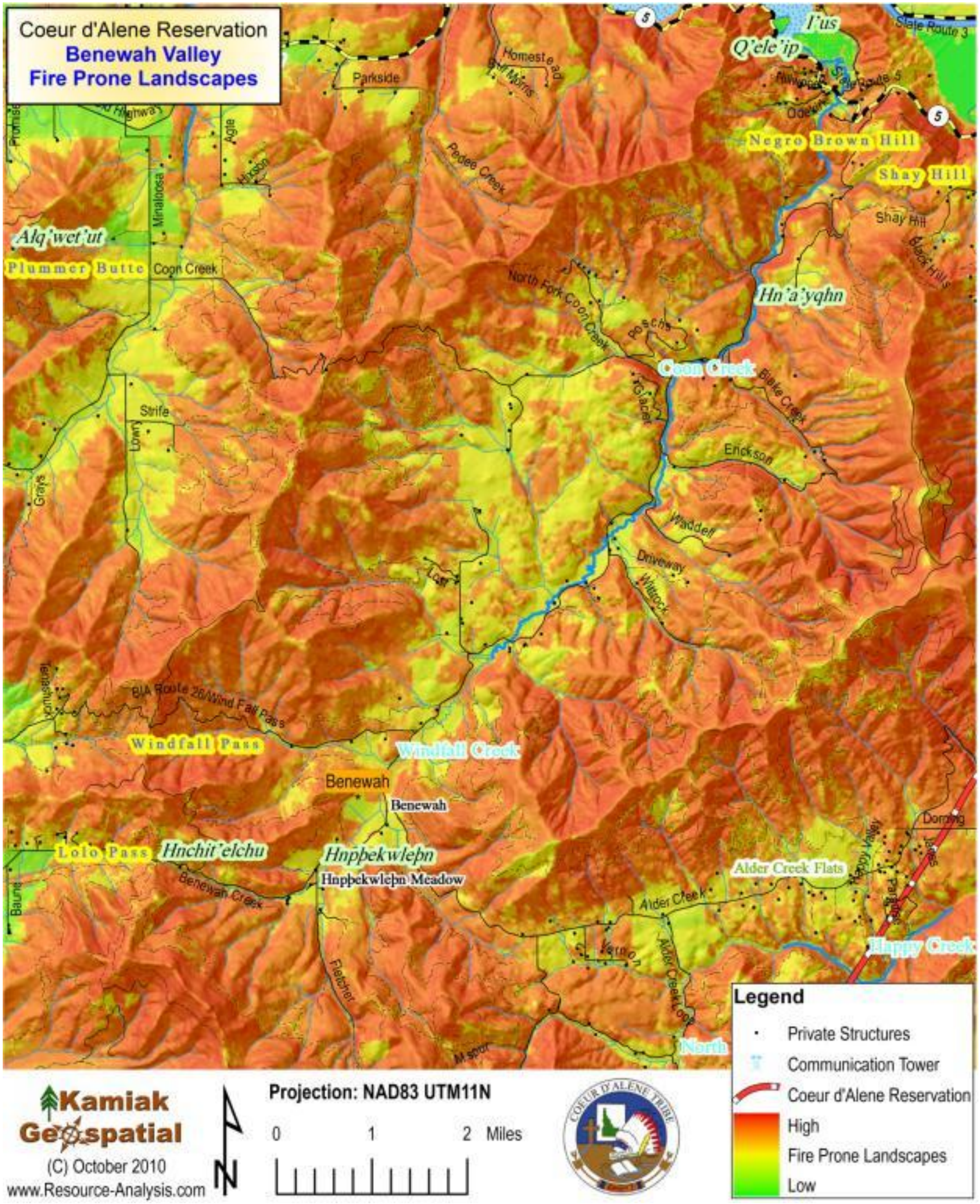


Figure CXV. Fire Prone Landscapes in Benewah Valley.



5.4.6. Communities along Coeur d'Alene Lake

Over the past few decades, many homes have been built along the bluffs overlooking Coeur d'Alene Lake (Figure CXVI), especially along the western shoreline at Conkling Park, Fullers Bay, and Chatcolet. Heyburn State Park, managed by the State of Idaho Department of Parks and Recreation, is located to the southwestern edge of Coeur d'Alene Lake near the pour point of Plummer Creek to Chatcolet Lake.

As already defined in Section 5.3 (Macro Hazards), the risk exposure to high winds and seismic shaking hazards is uniformly significant in this region. There are several trees surrounding homes, but because of the relatively young age of the structures, homes with compromised roofing materials are few. The prevalence of URM chimneys is common in this area.

5.4.6.1. Flood Risks

There are no floodplain risks to structures in this area (Figure CXIX).

5.4.6.2. Seismic Shaking and Fault Lines

The seismic shaking risk within and around the communities in the Coeur d'Alene Lake region is moderate (Figure CXX and Table 29). There are no fault lines in this region, although several have been documented to the southeast in the lower St. Joe River watershed.

5.4.6.3. Landslide

Landslides are moderated within the slopes of the lake where columnar basalt forms the substrate to the soils of the shorelines (Figure CXXI). The upper reaches of the bluffs surrounding the lake show variable conditions that could lead to isolated landslides and these are often triggered by site developments, road building, or vegetation modifications. State Route 97 (east side of the lake near Harrison) has experienced several small-scale site failures from these events.

The area known as 'Round Lake Access Area', located on the western sides of Indian Mountain (Figure CXXI) shows characteristics of surface exposure to landslides. When impacted by site disturbances, this area can expose structures to damage and roads to failure. These sites should be well considered prior to site modifications.

5.4.6.4. Expansive Soils

Expansive soils and expansive clays within this region, for light residential (without basements), exhibit dominantly low risks (Figure CXXII). The profile for light commercial structures (and Residential with a basement) is rated slightly higher with moderate risks for most sites (Figure CXXIII). As with the assessment for landslide prone landscapes, the exposure to structures for expansive soils is moderated substantially on the steep slopes of the lake where columnar basalt serves as the underlying (and exposed) parent material.

In this entire area, expansive soil pre-construction building techniques should be considered for all new structures to integrate recommendations. Even low risk soils in the Upper Columbia Plateau can respond with adverse results if the soil moisture is not moderated at near-constant levels.

5.4.6.5. Wildfire

While the steep slopes of Coeur d'Alene Lake reduced the potential for landslides and expansive soils, the reverse is true for wildland fire risks (Figure CXXIV, Table 42, Table 43). These communities are located within extensive spreads of forestland vegetation where fuels have accumulated, access is limited, and escape routes often involve using watercraft for escape. Several homes within this area have participated in conducting both home and access fuels mitigation efforts. Others are striving to maintain these improvements. The combination of 'high-value homes', with limited access, sometimes high concentrations of homes in small enclaves, and extensive areas of wildland fuels risks has led to bigger concerns for wildfire risk abatement for many wildfire resource managers.

Figure CXVI. Aerial Imagery of Communities along Coeur d'Alene Lake, 2009.

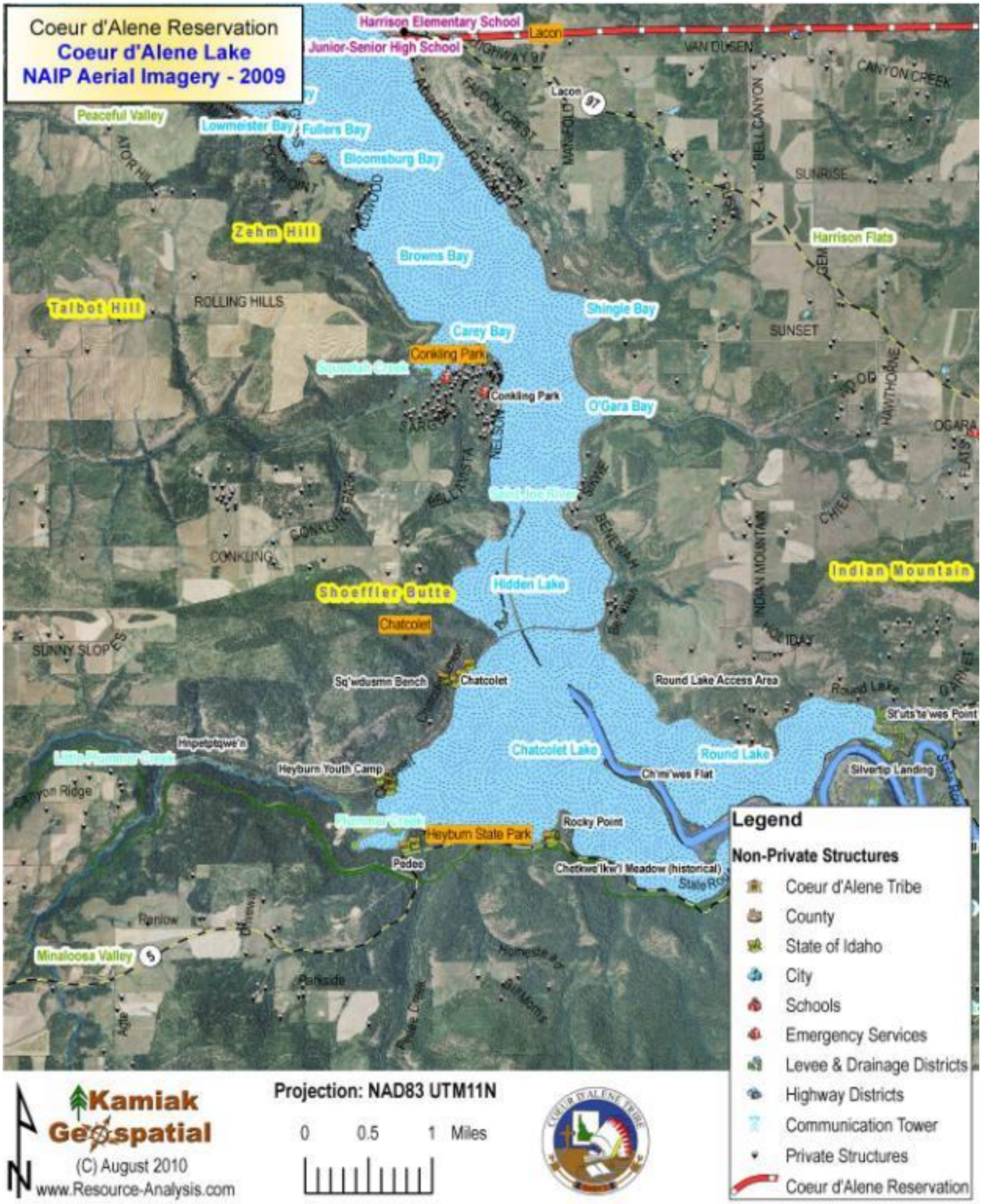


Figure CXVII. Topographic Relief of Communities along Coeur d'Alene Lake.

Figure CXVIII. Population Density Assessment in Communities along Coeur d'Alene Lake.

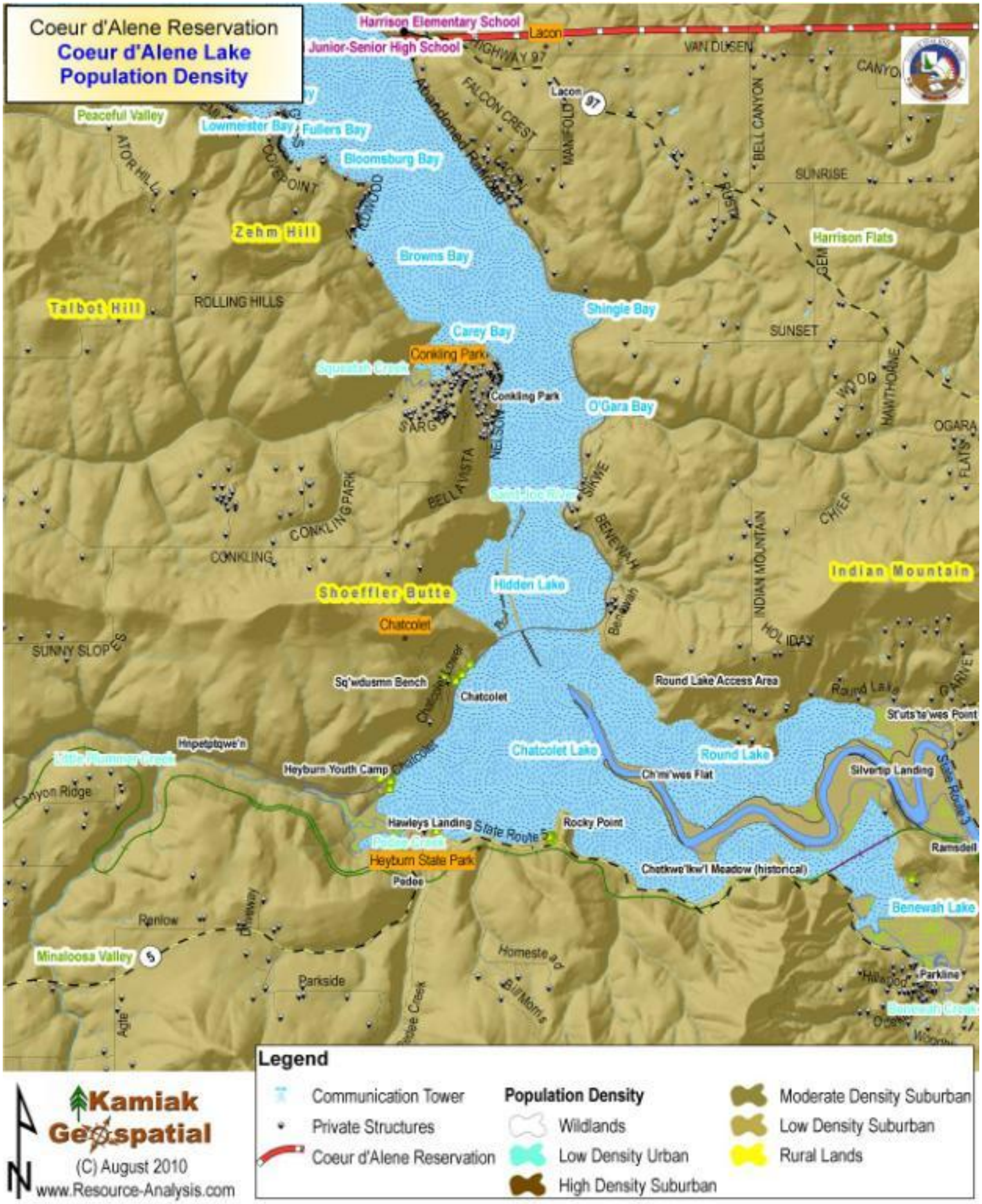


Figure CXIX. Floodplain Mapping of Communities along Coeur d'Alene Lake.

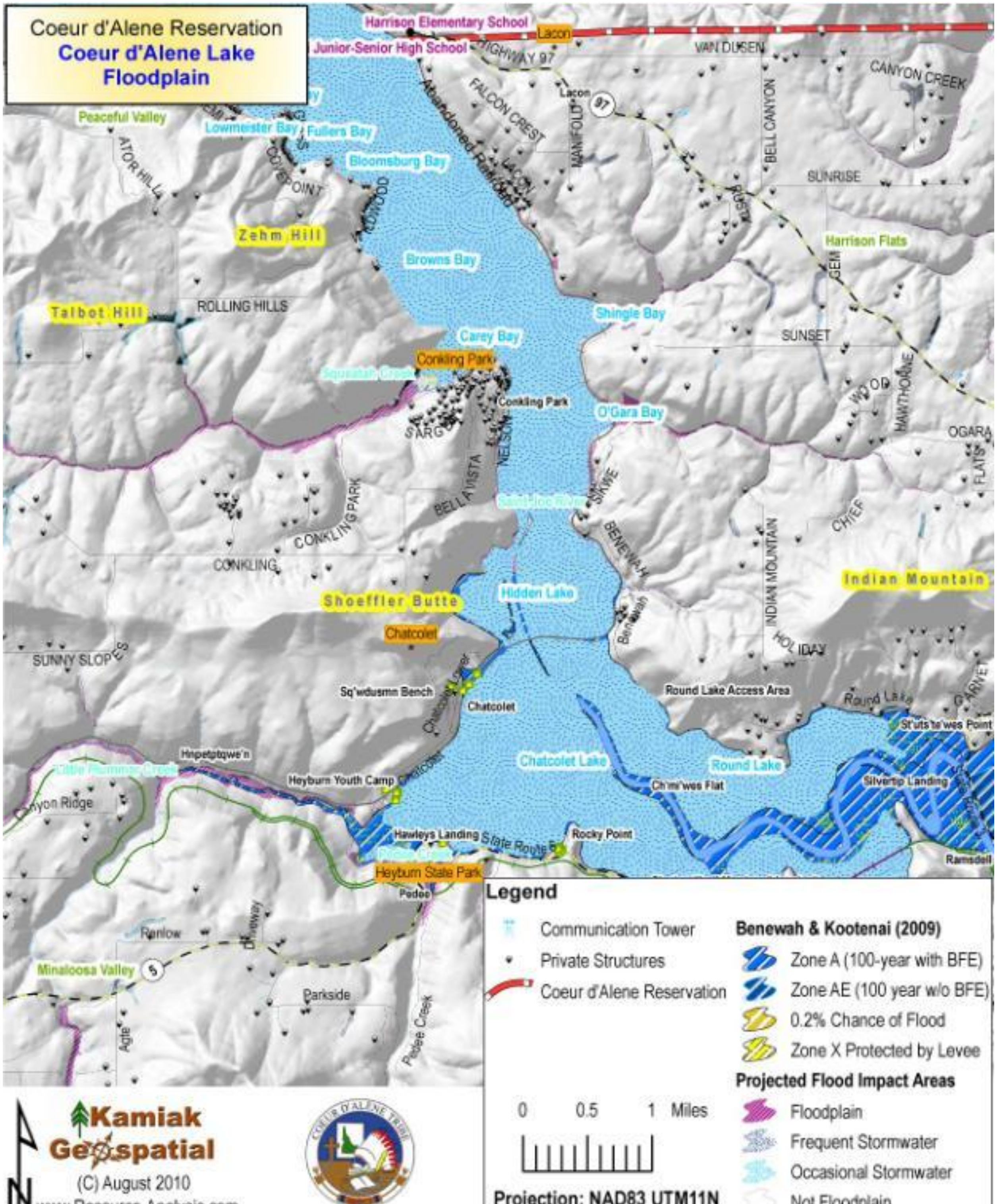


Figure CXX. Seismic Stability & Fault Lines in Communities along Coeur d'Alene Lake.

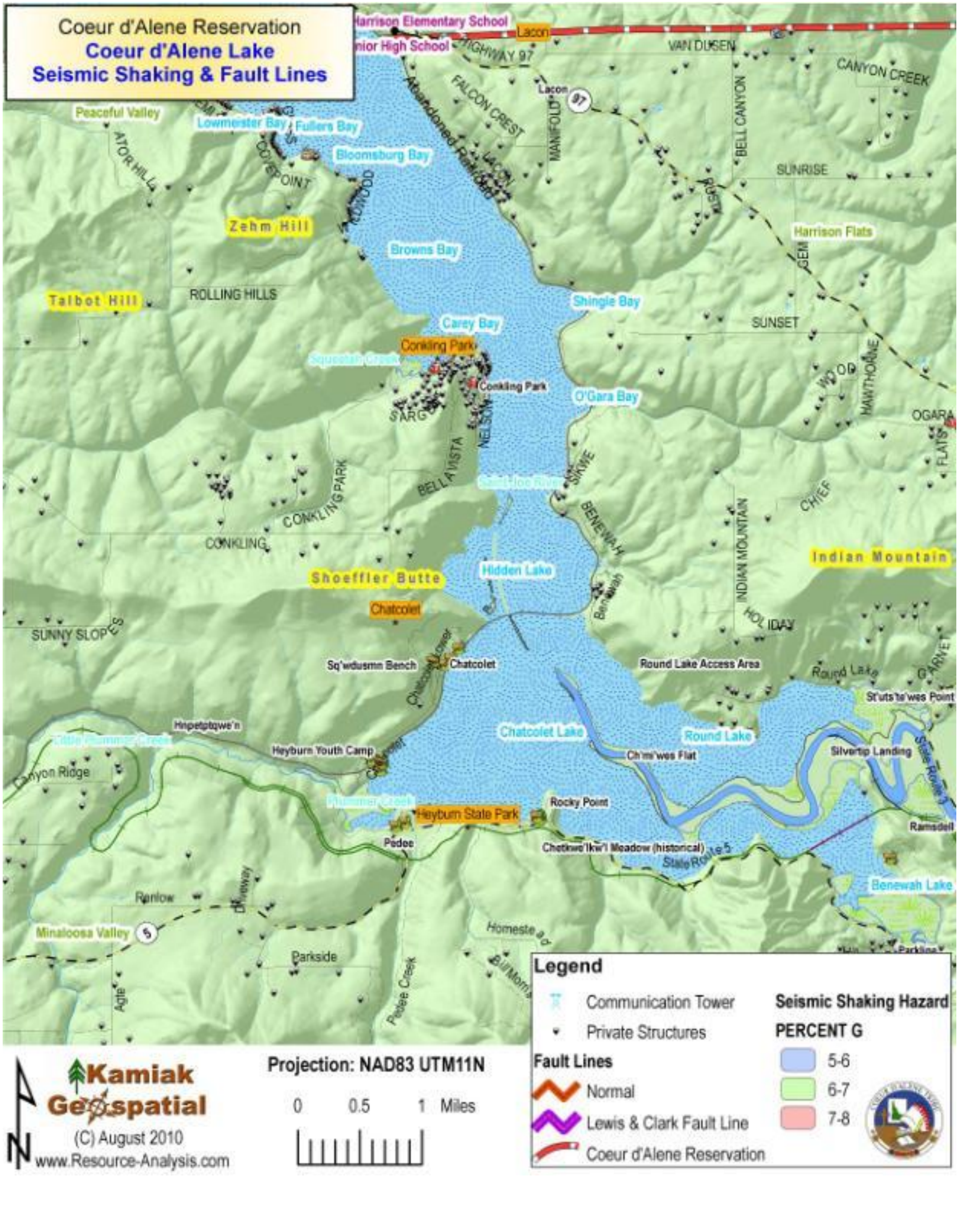


Figure CXXI. Landslide Prone Landscapes in Communities along Coeur d'Alene Lake.

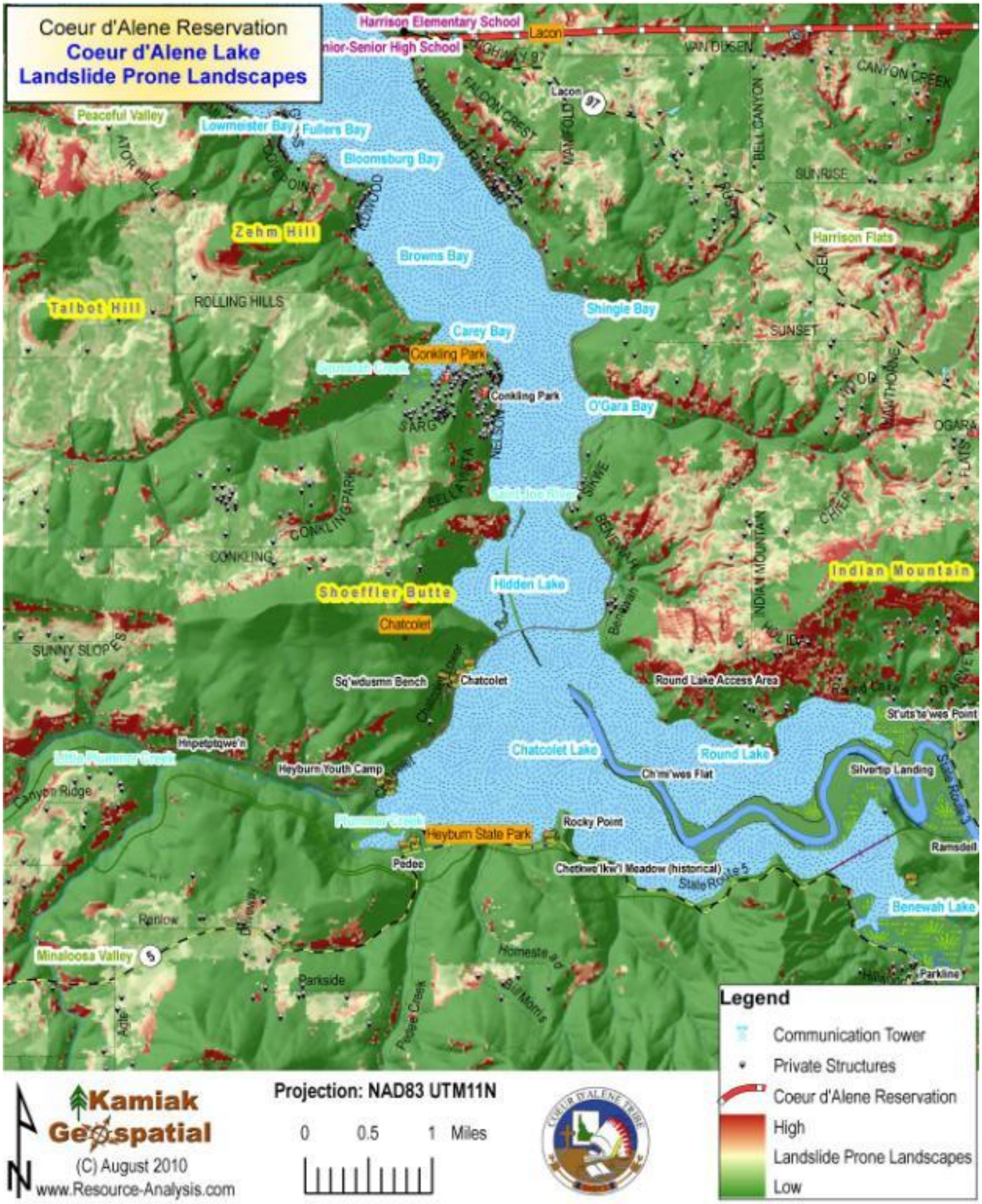
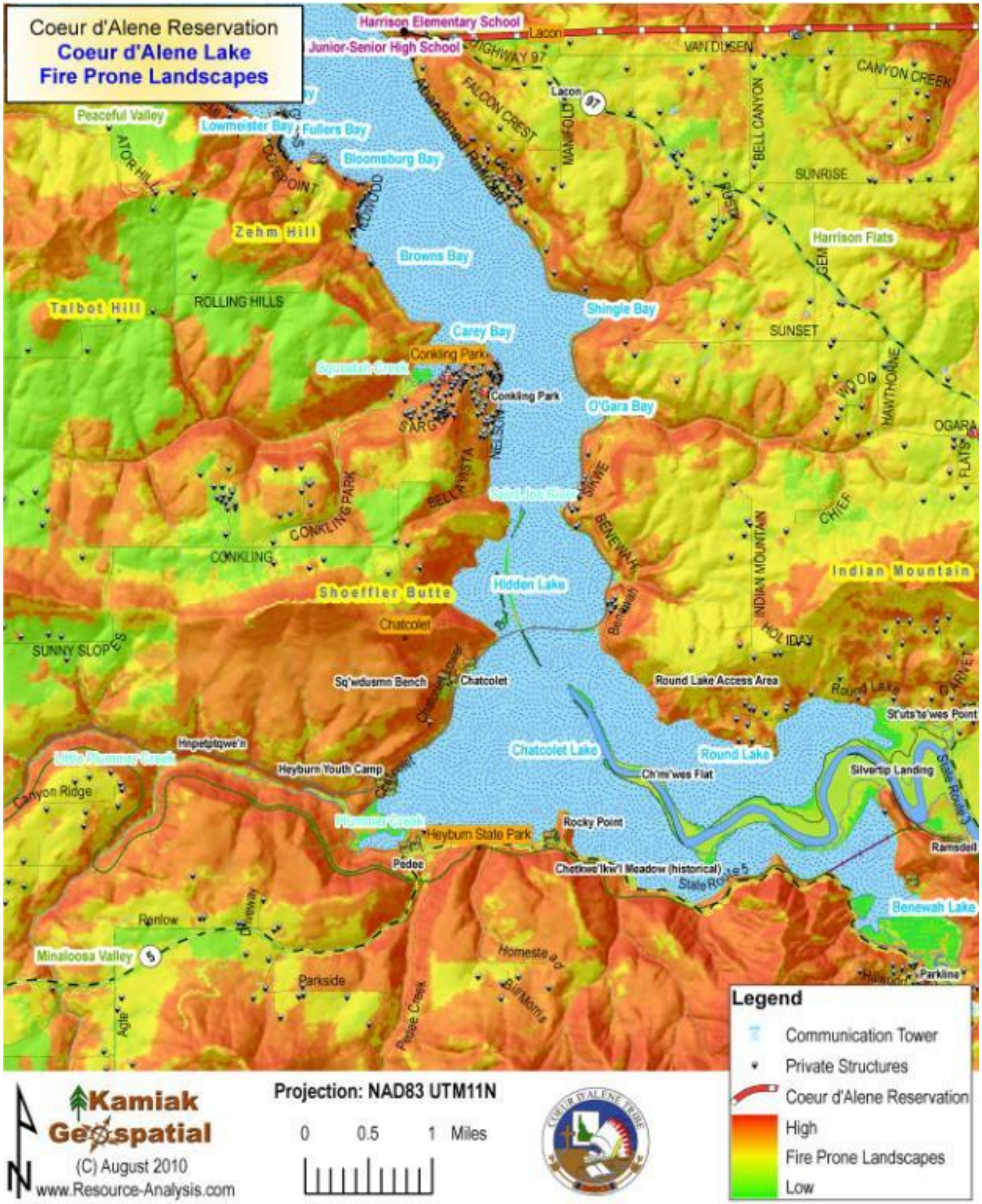


Figure CXXII. Expansive Soils and Expansive Clays – Residential without Basement Assessment in Communities along Coeur d'Alene Lake.

Figure CXXIII. Expansive Soils and Expansive Clays – Light Commercial Assessment in Communities along Coeur d'Alene Lake.

Figure CXXIV. Fire Prone Landscapes in Communities along Coeur d'Alene Lake.



5.4.7. Rockford Bay and Windy Bay Communities

The movement of people to the shorelines of Coeur d'Alene Lake over the past few decades has led to an increase of developments in the area of Rockford Bay and Windy Bay along the bluffs overlooking Coeur d'Alene Lake (Figure CXXV). These areas are located closest to the City of Coeur d'Alene, a major population center of the region, near to another population center in Spokane, Washington. Some people commute from their homes to Coeur d'Alene each day while others use these homes as partial year vacation homes, or lakeside cabins.

As already defined in Section 5.3 (Macro Hazards), the risk exposure to high winds and seismic shaking hazards is uniformly significant in this region. There are several trees surrounding homes, but because of the relatively young age of the structures, homes with compromised roofing materials are few. The prevalence of URM chimneys is common in this area.

5.4.7.1. Flood Risks

There are no floodplain risks to structures in this area (Figure CXXVIII).

5.4.7.2. Seismic Shaking and Fault Lines

The seismic shaking risk within and around the communities near Rockford Bay and Windy Bay in the Coeur d'Alene Lake region is moderate (Figure CXXIX and Table 29). There are only two fault lines in this region, although several have been documented to the southeast in the lower St. Joe River watershed.

5.4.7.3. Landslide

Landslides are moderated within the slopes of the lake where columnar basalt forms the substrate to the soils of the shorelines (Figure CXXX). The upper reaches of the bluffs surrounding the lake show variable conditions that could lead to isolated landslides; these are often triggered by site developments, road building, or vegetation modifications.

5.4.7.4. Expansive Soils

Expansive soils and expansive clays within this area, for light residential (without basements), exhibit mainly low risks (Figure CXXXI). The profile for light commercial structures (and Residential with a basement) are rated slightly higher with moderate risks for most sites (Figure CXXXII). As with the assessment for landslide prone landscapes, the exposure to structures for expansive soils is moderated substantially on the steep slopes of the lake where columnar basalt serves as the underlying (and exposed) parent material.

In this entire area, expansive soil pre-construction building techniques should be considered for new structures. Even low risk soils in the Upper Columbia Plateau can respond with adverse results if the soil moisture is not moderated at near-constant levels.

5.4.7.5. Wildfire

While the steep slopes of Coeur d'Alene Lake reduced the potential for landslides and expansive soils in this area, the reverse is true for wildland fire risks (Figure CXXXIII, Table 42, Table 43). These communities are located in expansive spreads of forestland vegetation where fuels have accumulated, access is limited, and escape routes often involve using watercraft for escape. Several homes within this area have participated in conducting both home and access fuels mitigation efforts. Others are striving to maintain these improvements. The combination of 'high-value homes', with limited access, sometimes high concentrations of homes in small enclaves, and extensive areas of wildland fuels risks has led to bigger concerns for wildfire risk abatement for many wildfire resource managers.

The Coeur d'Alene District of the BLM has proposed two significant projects associated with lands managed by the BLM adjacent to Coeur d'Alene Lake at Windy Bay. These projects are reactive to the identification of the WUI on the Coeur d'Alene Reservation and the assessment of wildfire fuels present on the site. These two priority projects include:

1. Windy Bay Rough Fescue Project: Fuel's reduction/species propagation for the rough fescue. The Windy Bay area is home to a rare BLM endemic species, the rough fescue, that is thought to be dependent upon fire to propagate. The BLM plans to inventory the species and then conduct fuel reduction and reduce conifer encroachment into this rare species' habitat. This may include prescribed fire and/or mechanical treatments.
2. Fuel's reduction along the BLM Windy Bay Recreation Site: Currently, the BLM recreational site is very remote with a small two track road as the only access. If a wildfire were to start from either a natural or man caused ignition, the response time to the area would be very slow. The proposed project includes increased access and turn around sites within the BLM managed lands for firefighter ingress and egress.

Figure CXXV. Aerial Imagery of Rockford Bay and Windy Bay, 2009.

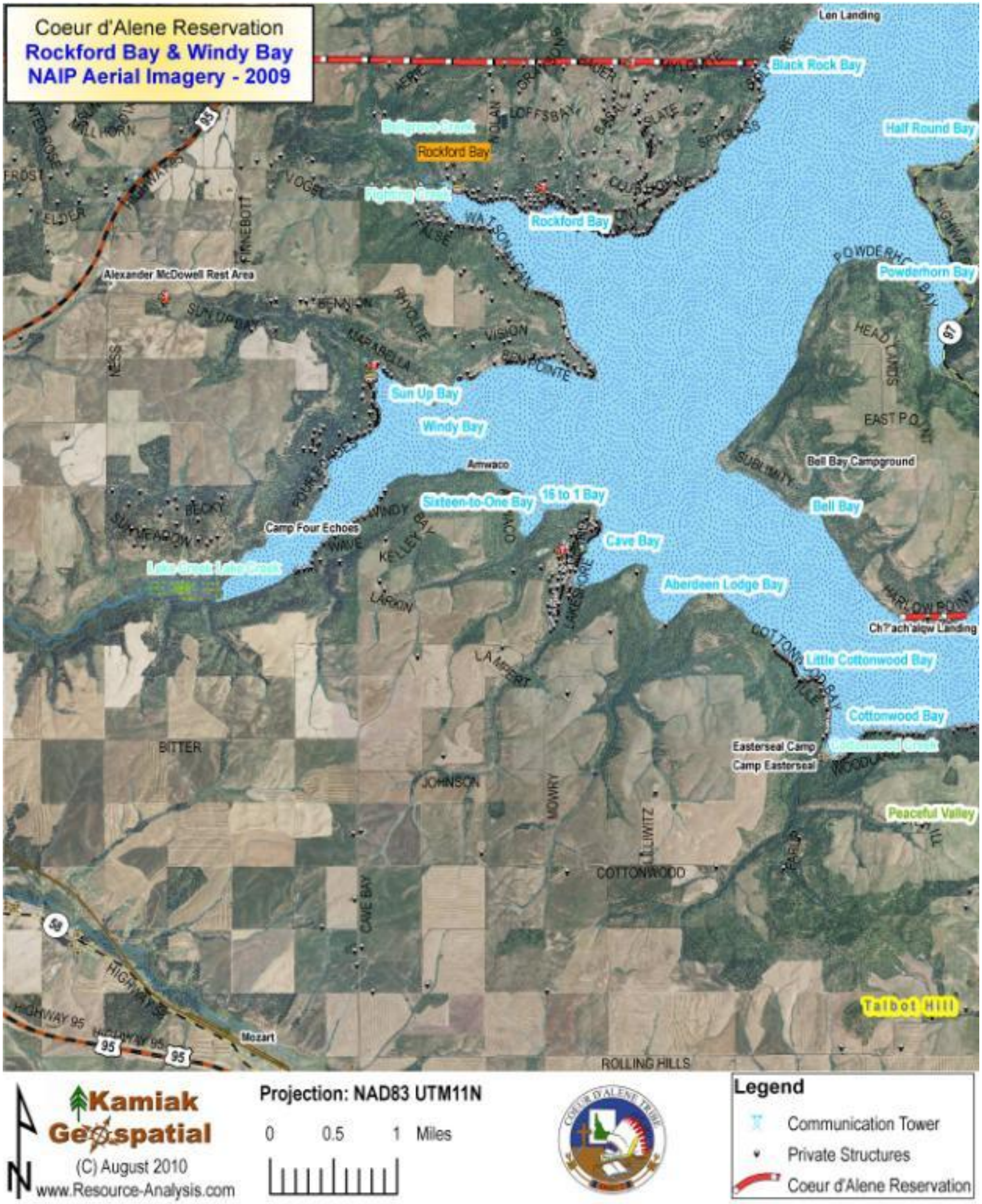


Figure CXXVI. Topographic Relief of Rockford Bay and Windy Bay.

Figure CXXVII. Population Density Assessment in Rockford Bay and Windy Bay.

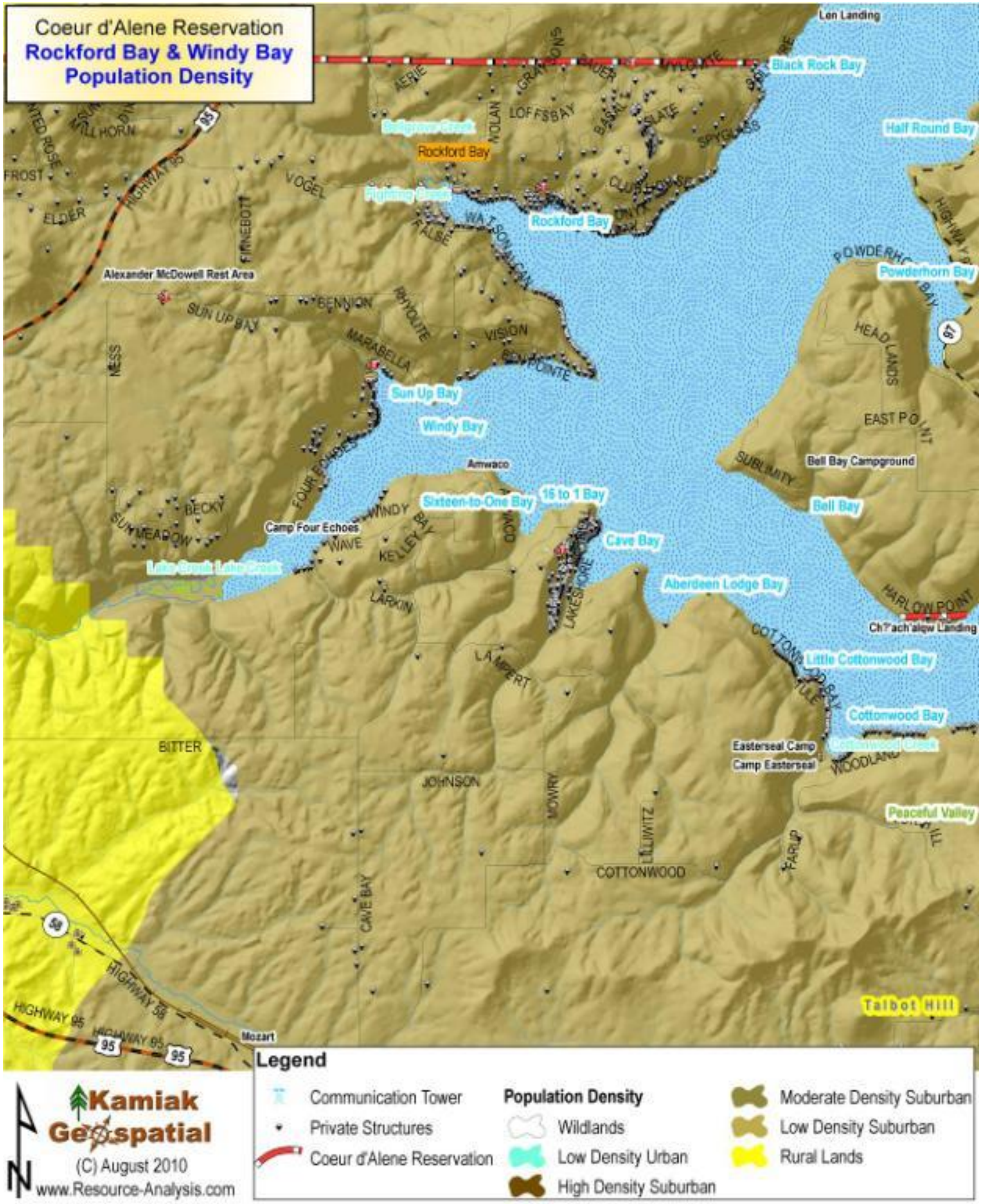


Figure CXXVIII. Floodplain Mapping of Rockford Bay and Windy Bay.

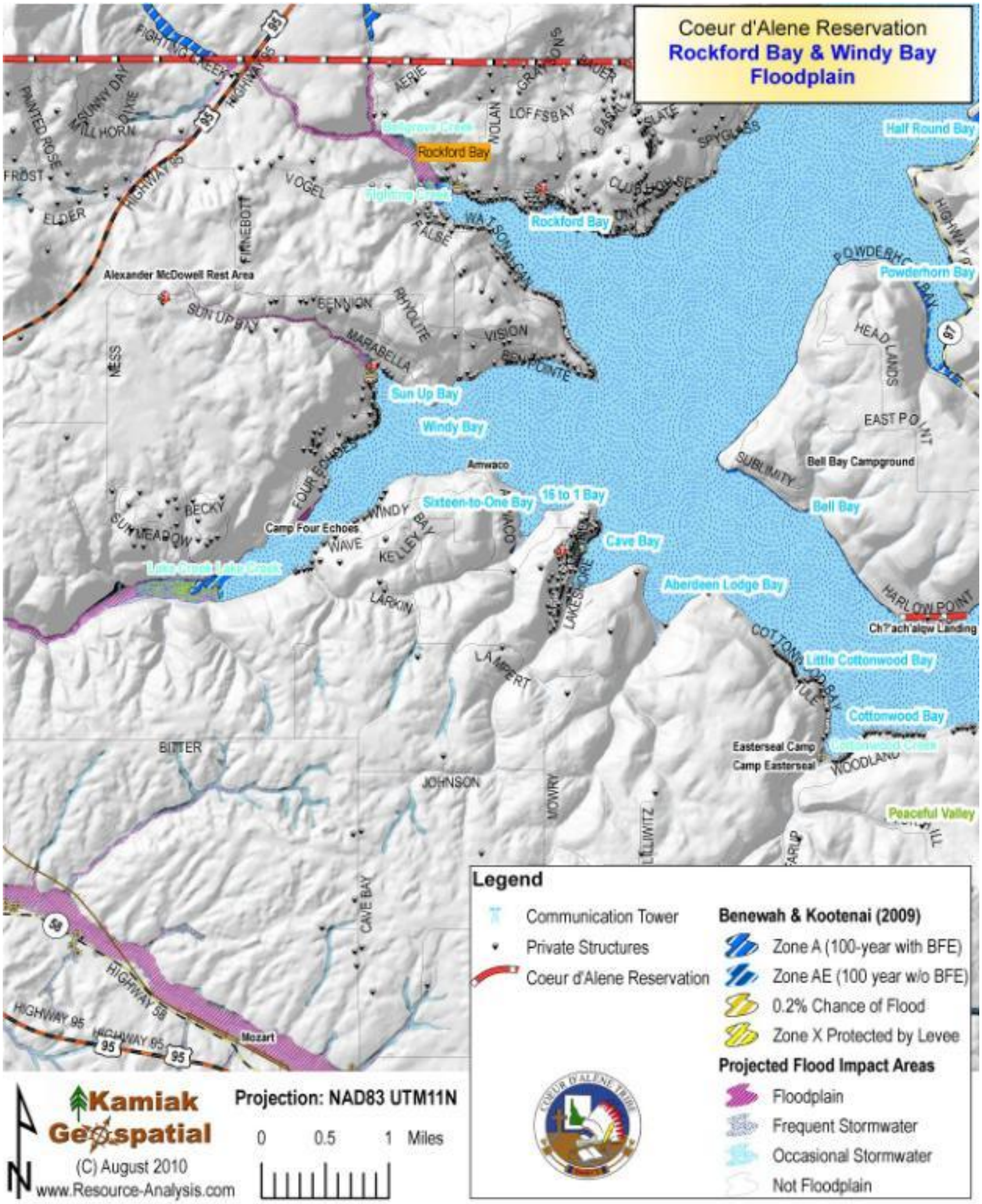


Figure CXXIX. Seismic Stability & Fault Lines in Rockford Bay and Windy Bay.

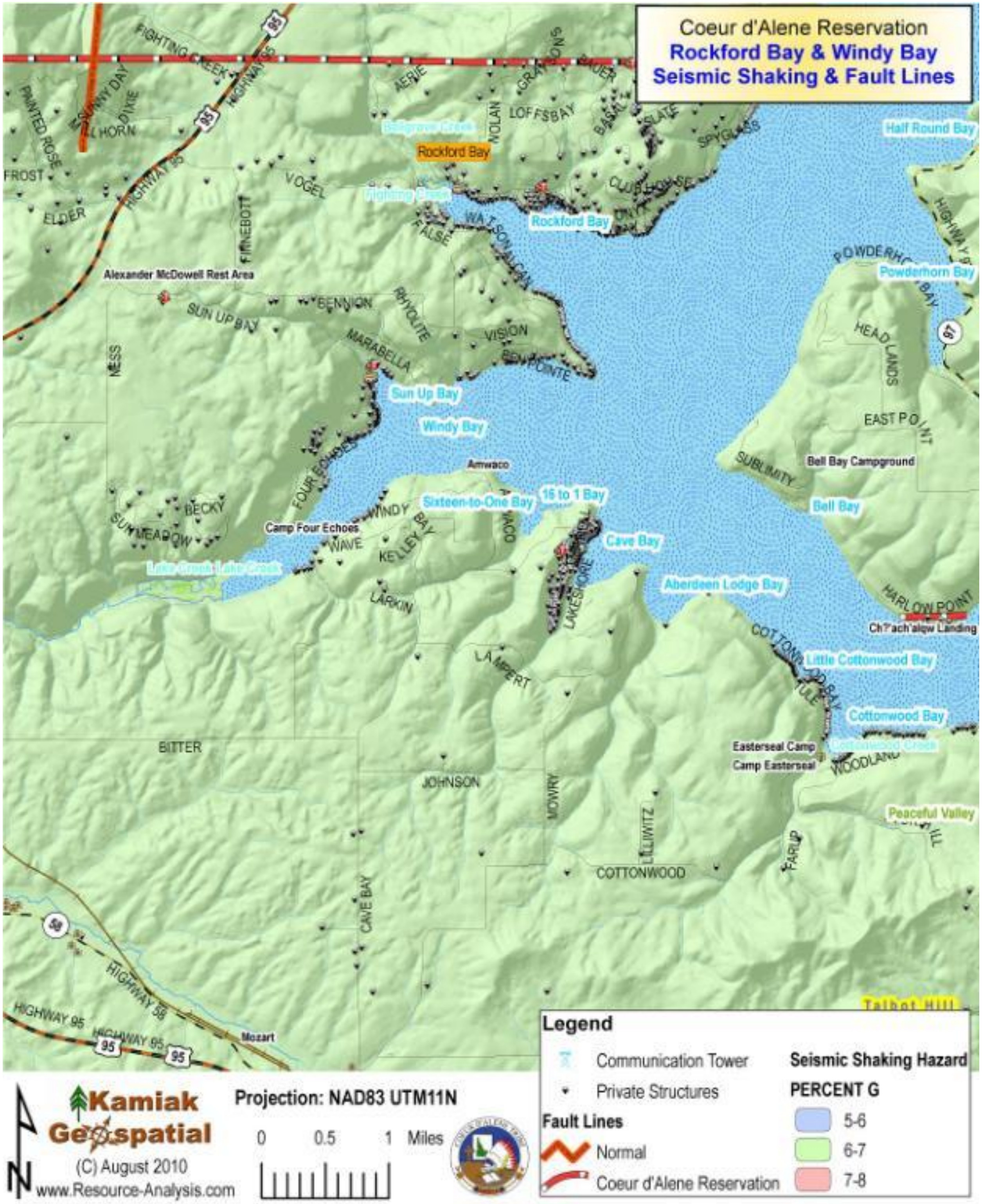


Figure CXXX. Landslide Prone Landscapes in Rockford Bay and Windy Bay.

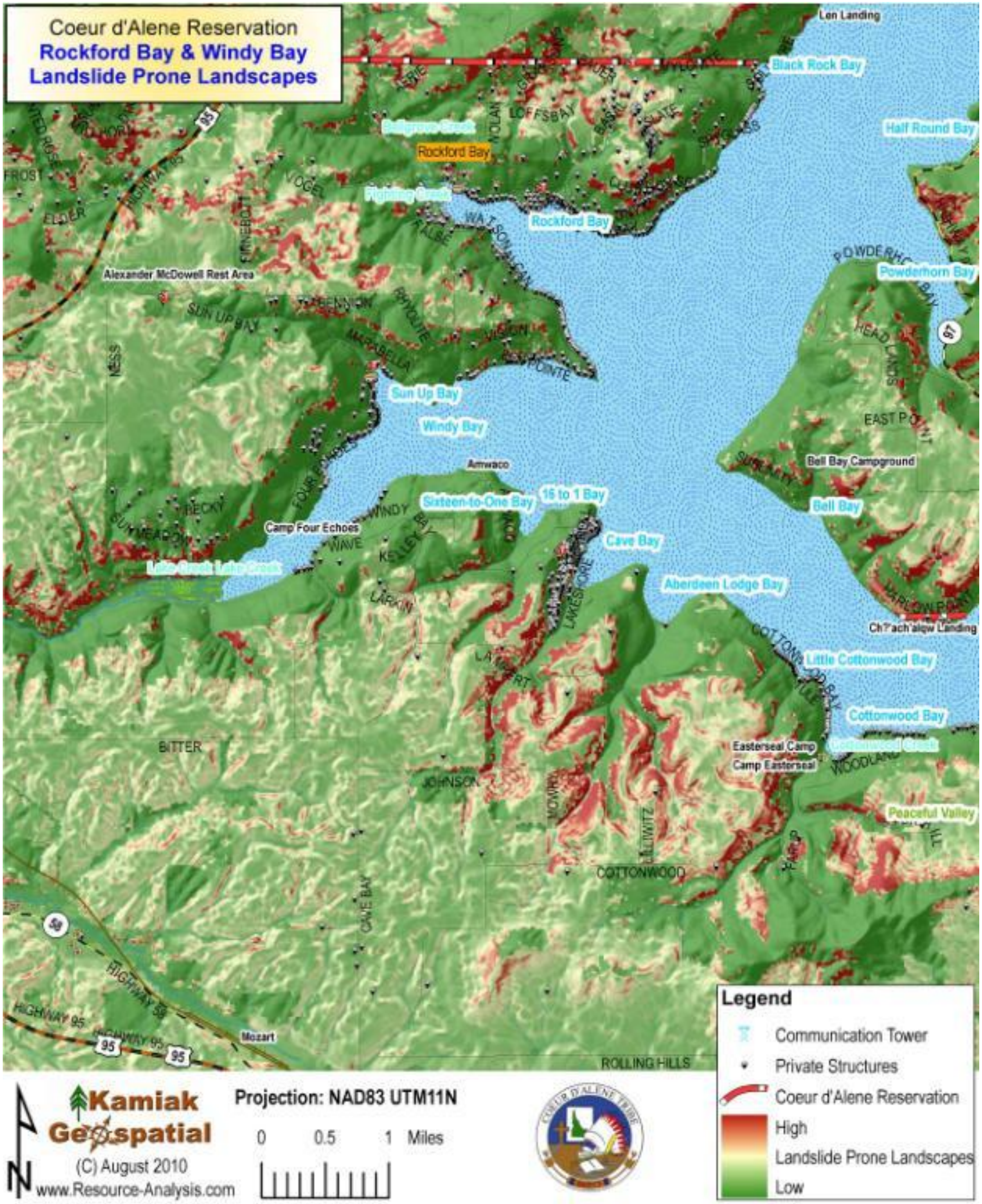


Figure CXXXI. Expansive Soils and Expansive Clays – Residential without Basement Assessment in Rockford Bay and Windy Bay.

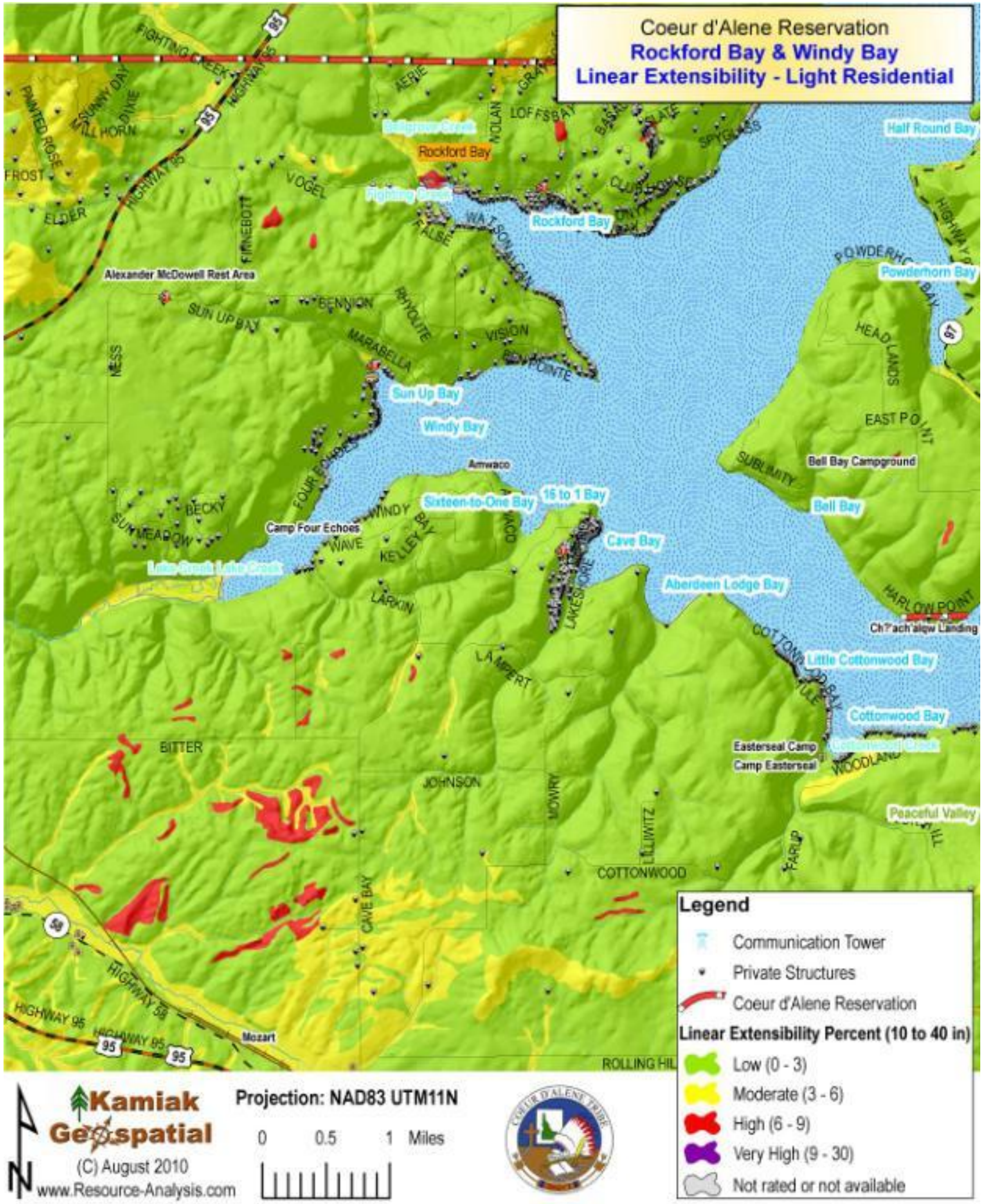


Figure CXXXII. Expansive Soils and Expansive Clays – Light Commercial Assessment in Rockford Bay and Windy Bay.

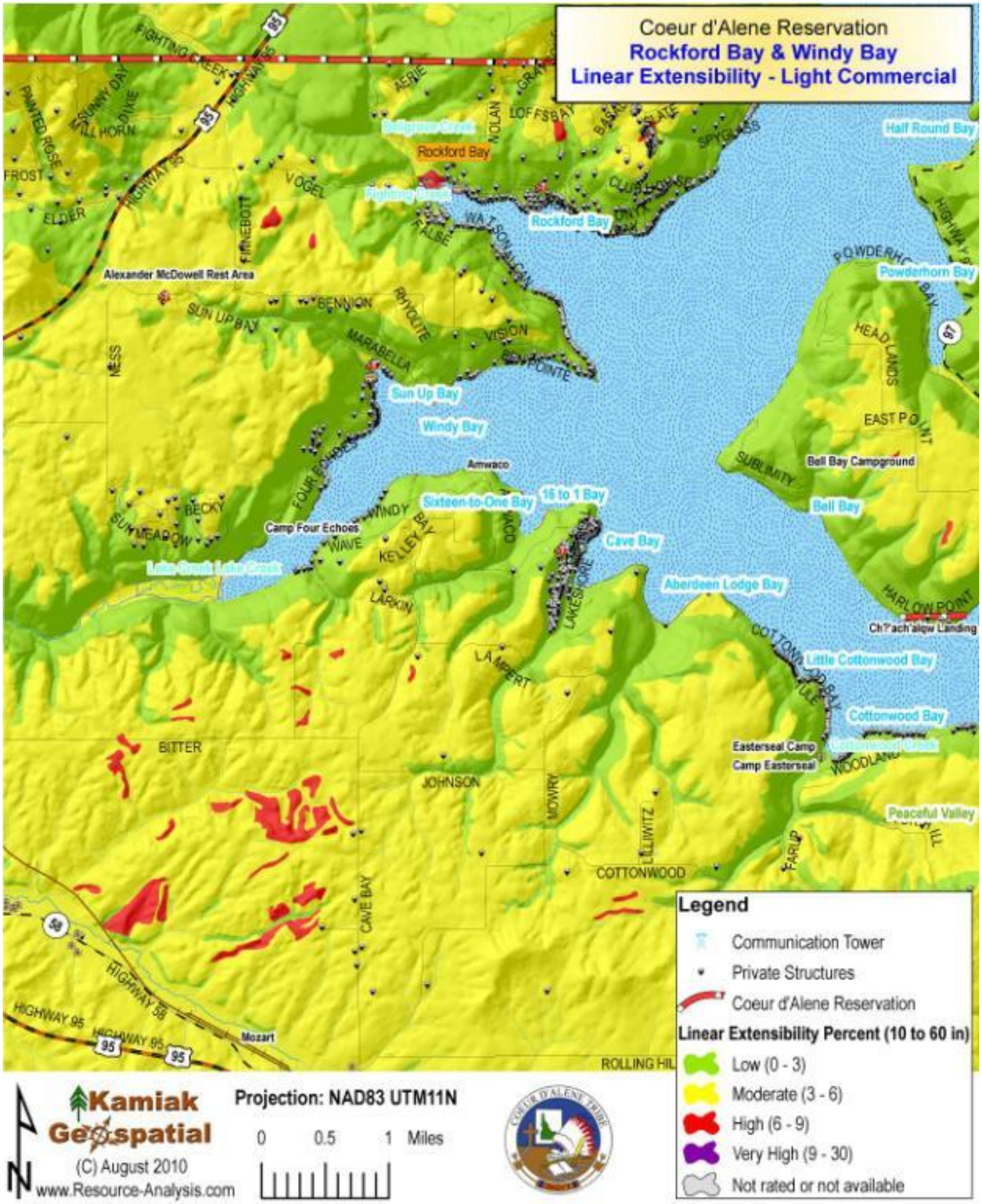
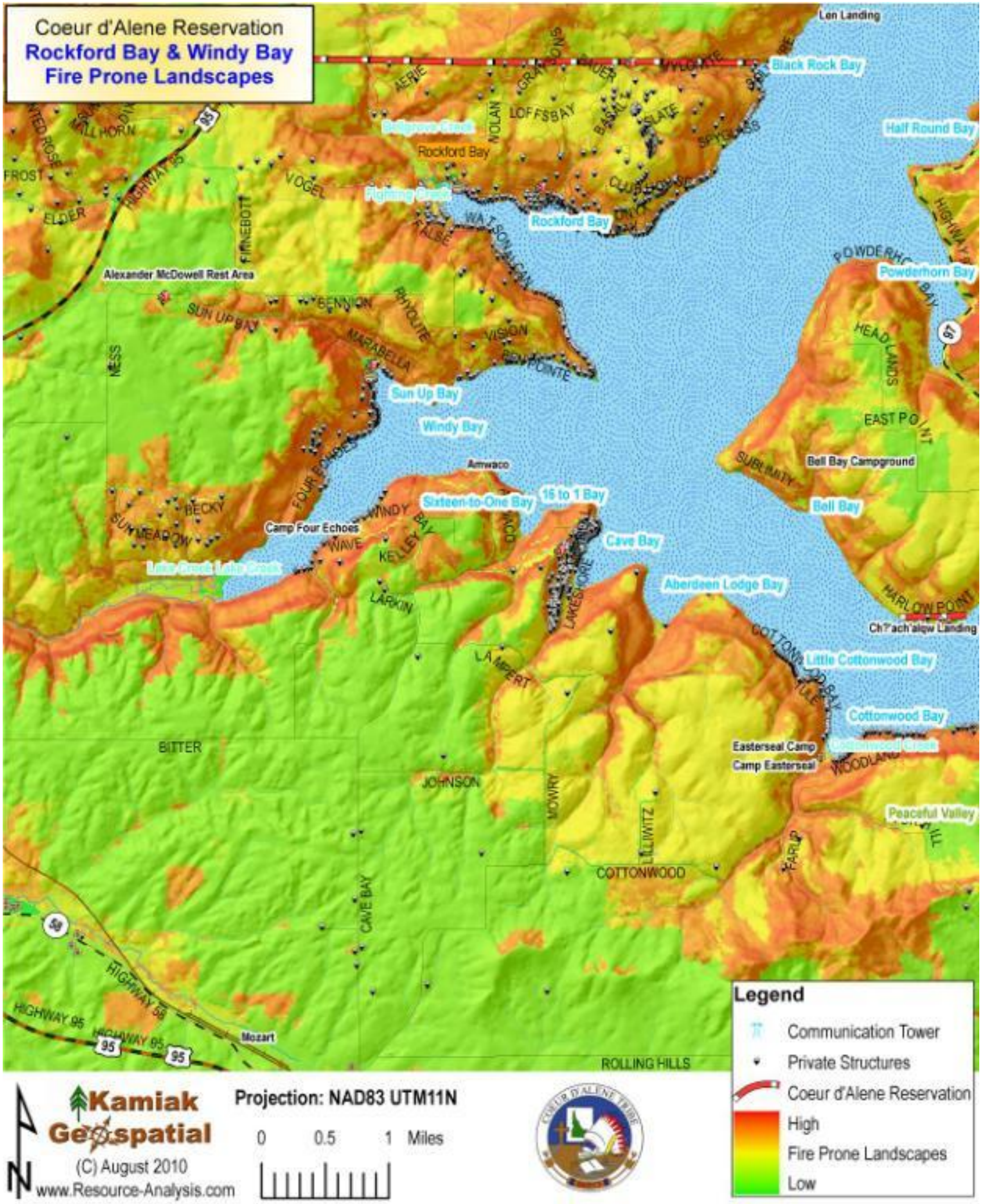


Figure CXXXIII. Fire Prone Landscapes near both Rockford Bay and Windy Bay.



5.5. Natural Systems Mitigation Efforts

Although much of this section has focused on potential mitigation measures with respect to the location of homes, communities, and infrastructure at risk to natural hazards, this portion of the document will discuss one particular watershed within the Coeur d'Alene Reservation, Hangman Creek. Three communities; DeSmet, Tensed, and Sanders are located within this watershed. The DeSmet Tribal School is located in DeSmet (Figure CXXXIV). In addition to the homes and businesses located in this watershed, US95, SR274, SR60, and several less used roads, traverse this area.

Figure CXXXIV. Coeur d'Alene Tribal School located in DeSmet.

Lovell Valley and Moctelme Creek both drain the watersheds to the north of Hangman Creek, and join near the western edge of the Coeur d'Alene Reservation near Willard, Washington. Both SR274 and SR60 are located within the floodplains of these drainages. After joining, the streams flow into Hangman Creek just 2 miles west of the exterior boundaries of the Coeur d'Alene Reservation (Figure CXXXV).

Hangman Creek drains the watershed within the extreme south of the current Coeur d'Alene Reservation. The watershed is extensive but exhibits a relatively flat floodplain from the departure of the exterior boundary of the Coeur d'Alene Reservation to Sanders; a distance of about 75,000 feet (14.2 miles) with a total elevation change of only 154 feet (average slope of approximately 0.2%). The floodplains within this valley are as wide as 3,500 feet near DeSmet and Tensed (Figure CXXXVI).

Figure CXXXV. Lovell Valley & Moctelme Creek Watershed Floodplains.

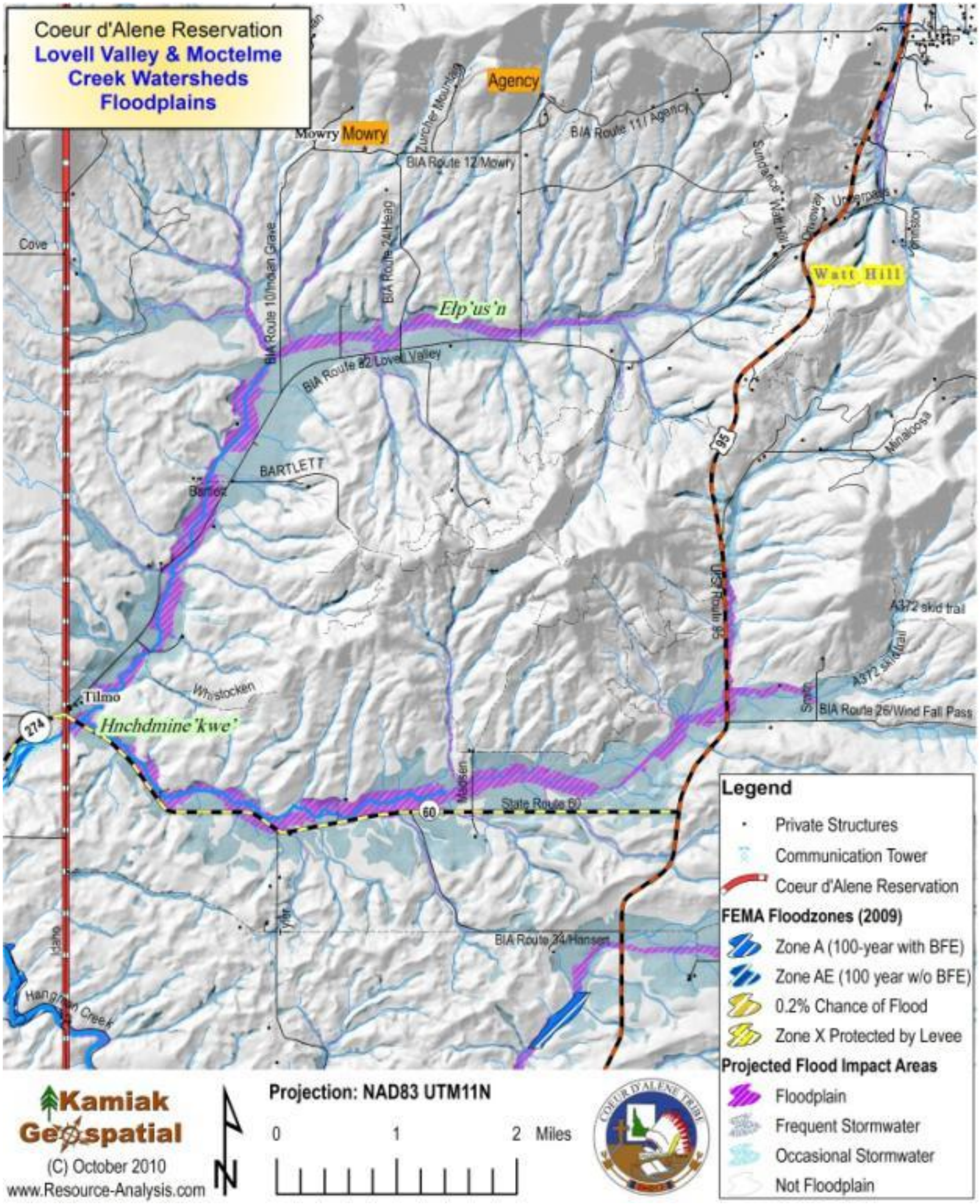
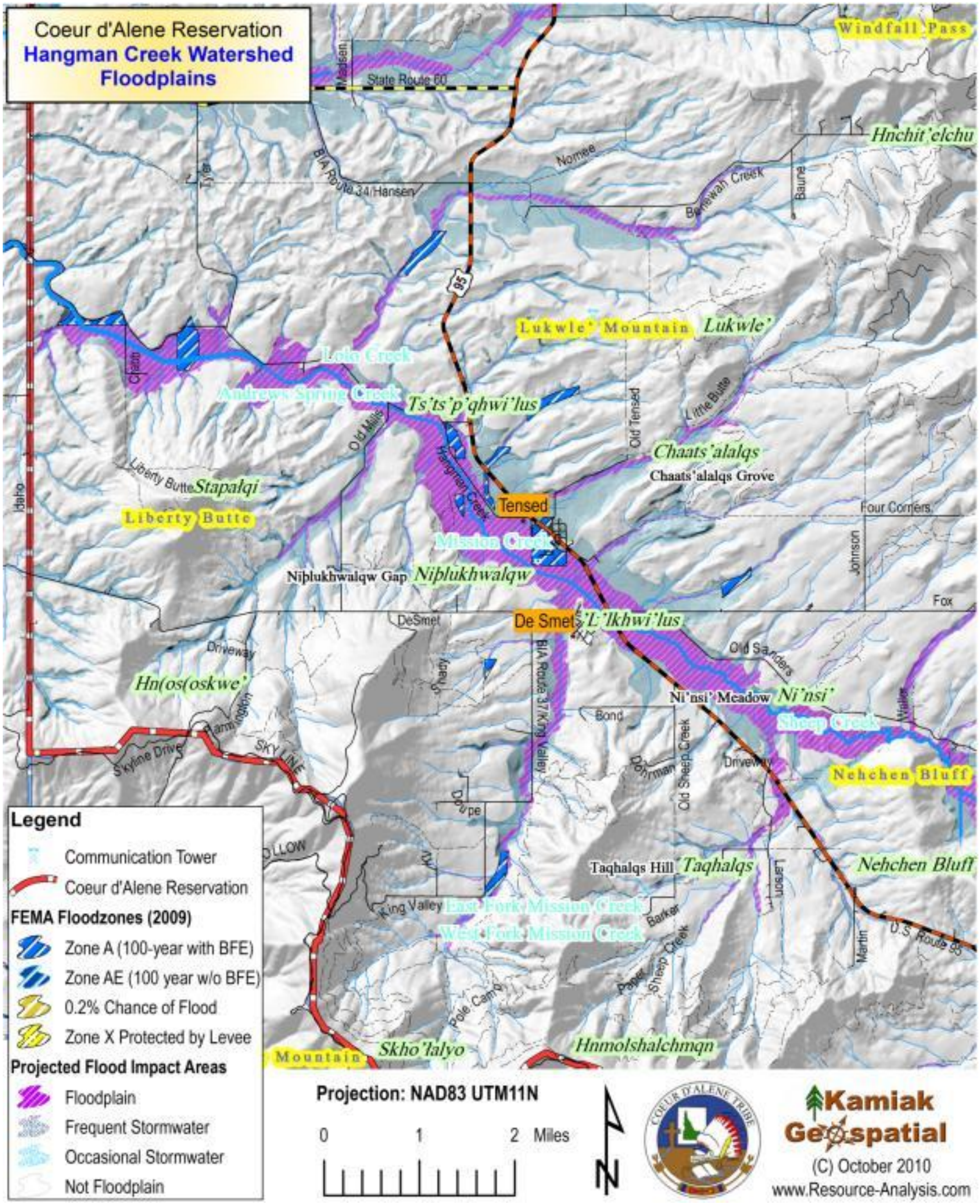


Figure CXXXVI. Hangman Creek Watershed Floodplains.



Both of these watersheds are formed by the expansive loess soils known for their agricultural productivity. These productive soils overtop the basalt foundation of the region. Water infiltration is high in the early months of the autumn, but become saturated as the winter rains progress and turn into winter snows and spring rains. This condition of soil saturation and spring rains coupled with snowmelt has led to several flood events within these valleys. Within recent history, floods cresting on May 22, 2004 (Figure CXXXVIII), and then on January 6, 2009 (Figure CXXXVII) compromised local access and flooded homes and infrastructure of Hangman Creek.

Figure CXXXVII. Images of the January 6, 2009, flood within the Hangman Creek watershed.

Figure CXXXVII. Images of the January 6, 2009, flood within the Hangman Creek watershed.

Photos by Bruce Kinkead, provided by Gerald I. Green, both of Coeur d'Alene Tribe (2009).

Figure CXXXVIII. Images of the May 22, 2004, flood within the Hangman Creek watershed.

Photos by Bruce Kinkead, provided by Gerald I. Green, both of Coeur d'Alene Tribe (2004).

The challenges of floodplain management in the face of local infrastructure, can be seen along most of the crossings of Hangman Creek and other tributaries, by US95 and several local access roads (Figure CXXXIX). Many of these road crossings of Hangman Creek and its tributaries have been created so that the stream is restricted from normal meandering and the floodplain is restricted in its ability to move water efficiently during high water events.

The diminishment of the floodplain has led to increased flooding potential upstream of each bridge crossing followed by increased incised stream meanders downstream of the crossing. The reader can view many of the scenes in Figure CXXXIX and compare them to the views of flood events in 2004 (Figure CXXXVIII) and 2009 (Figure CXXXVII) to see the impacts on the areas between low flow and high water flooding.

Figure CXXXIX. Bridge Crossings of Hangman Creek and the restriction of the floodplain.

[Above] US95 crossing of Hangman Creek on June 5, 2010, a time of relatively low water flows. Note the height of debris hanging in the vegetation, deposited by previous high water marks, and the relative height of the bottom of the bridge crossing provided by US95.

Figure CXXXIX. Bridge Crossings of Hangman Creek and the restriction of the floodplain.

[Above] US95 crossing of Tensed Creek on June 5, 2010, a time of relatively low water flows. Note the absence of freeboard between the water level and the bottom of the road crossing. Both are upstream views.

[Above] US95 crossing on June 5, 2010, a time of relatively low water flows. The constriction of the stream for the road crossing causes water to accumulate at the surface upstream of the crossing.

[Above] Local access road crossing Hangman Creek on June 6, 2010, a time of relatively low water flows. The bridge crossing has restricted the width of Hangman Creek and eliminated a major portion of the normally functioning floodplain at this point. The supporting structure of the bridge has been failing and is depositing debris into the river channel.

Figure CXXXIX. Bridge Crossings of Hangman Creek and the restriction of the floodplain.

[Above] Scenes of Hangman Creek looking upstream (left) and downstream (right) of the bridge featured above. The restriction of the floodplain at the road crossing has decreased the slope of the upstream portion of the stream, leading to a release of stream-carried sediment. Downstream of the crossing, water velocity increases (with less sediment) causing a cutting into the channel and entrenchment of the waterway.

Additional challenges for the Hangman Creek watershed, and its tributaries, can be found in the historical vegetative management of the watershed. Both upland forest management and riparian agricultural management practices have led to a reduced functioning of the floodplain (Figure CXL). The Coeur d'Alene Tribe has taken purposeful actions to restore the functioning of the wetlands and floodplains of Hangman Creek.

One example of this effort, has been the acquisition of lands within the Hangman Creek watershed, used for agricultural purposes, that was lined with subsurface tiles to prevent wetland water accumulations. The farmer was able to cultivate crops by draining the wetlands. The Coeur d'Alene Tribe has removed the tiles and encouraged native vegetation to restore the site as a wetland and floodplain (Figure CXL - top row, left side)

Figure CXL. Riparian Zone Management along Hangman Creek and Lovell Valley.

Figure CXL. Riparian Zone Management along Hangman Creek and Lovell Valley.

Other efforts by the Coeur d'Alene Tribe include the recognition of the benefits of beaver within the watersheds of the Coeur d'Alene Reservation. Gerald I. Green, Coeur d'Alene Tribal Wildlife Mitigation Specialist, provided data for this planning effort to identify 83 locations where beaver dam and den activity have been identified within Hangman Creek (Figure CXLI). All of the beaver dam activity is located within the floodplain identified for this planning effort.

The Coeur d'Alene Tribe favors the success of beaver along this watershed, and other watersheds, as an indicator of a normally functioning riparian ecosystem. Efforts to restore wetlands and the normally functioning floodplain have shown success. Ongoing efforts will serve the goals of the program.

A critical evaluation of the road/stream crossings within Hangman Creek watershed, and all watersheds, should be conducted to determine the remediation actions necessary to restore the entire riparian ecosystem of Hangman Creek. While it may be desirable to replace bridges and culverts that restrict water flow in all cases where a limitation is observed, the ability to fund these efforts will prove to be insurmountable in the next decade. On the other hand, it is feasible to design greater capacity crossings of the streams as road rebuilding endeavors are implemented. In other cases, some roads may be closed and traffic rerouted through access lines that do not cross the streams.

Figure CXLI. Beaver Dams and Dens within the Hangman Creek Watershed.

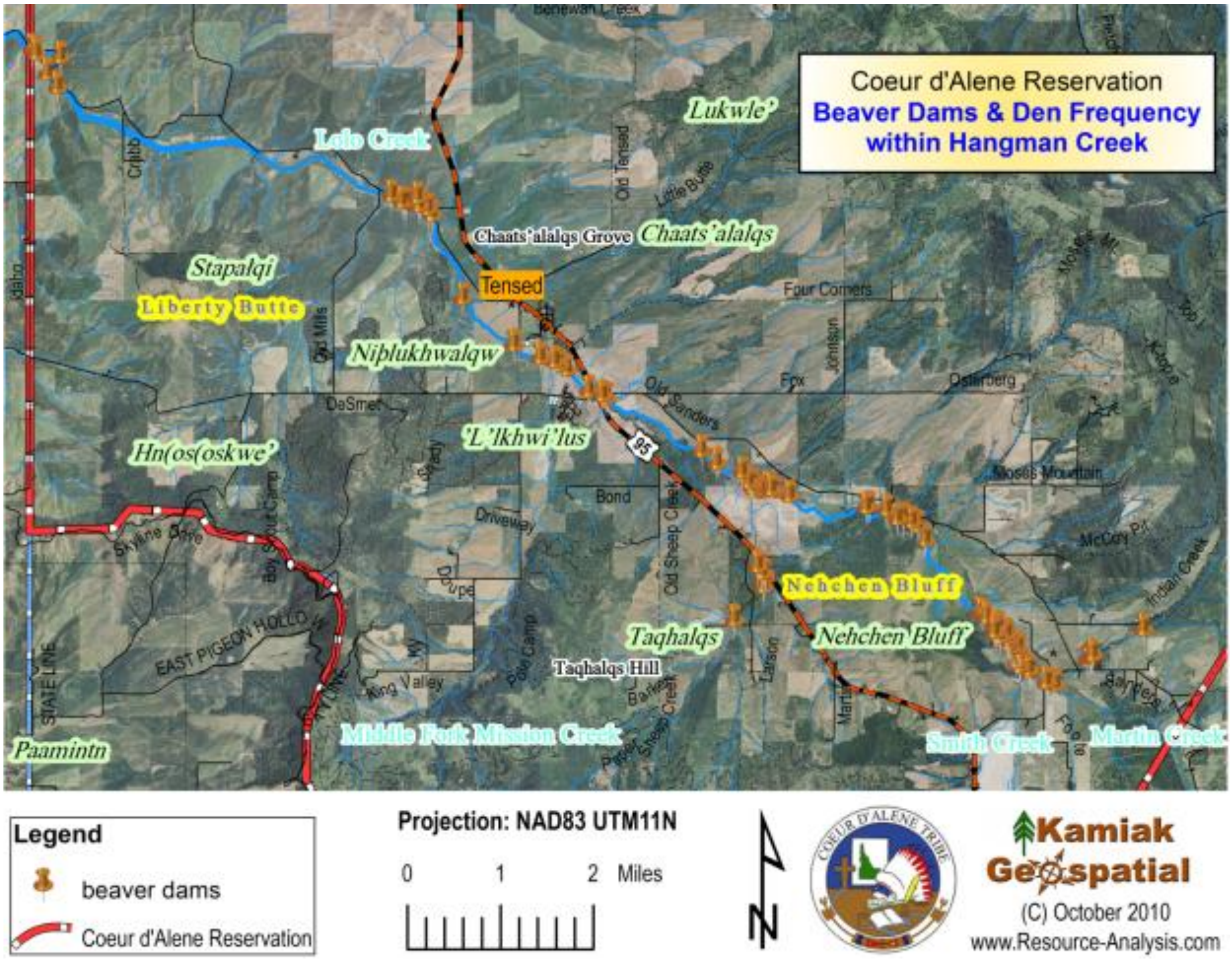


Figure CXLII. Fire Station in Worley.

Chapter 6. Resources, Capabilities, and Needs Assessment

6.1. Coeur d'Alene Tribe Legal and Regulatory Resources Available for Hazard Mitigation Efforts

The Resources, Capabilities, and Needs Summary was a survey given to all managers of Tribal Divisions, emergency services, agencies, and others involved in the administration of hazard mitigation, preparedness, and protection on the Coeur d'Alene Reservation. It was also intended to collect information to ascertain the current status of protection responsibilities, current resources available to respond to hazard prevention, mitigation, and response, and to collect current information about resources needed by each respondent's organization to better meet the needs of the citizenry of the Coeur d'Alene Reservation.

A total of five surveys have been received and are presented here. The technological and human resource needs identified by the respondents serves to identify needed enhancements to the Coeur d'Alene Tribe's preparedness for natural disaster preparedness.

6.1.1. Wildlife Program

Table 46. Resources, Capabilities, and Needs: Wildlife Program.

Department Name	Natural Resources
Name & Position of Person Preparing this Summary	Cameron Heusser, Wildlife Program Manager
Department Head	Alfred Nomee
Address & Telephone	850 A St, PO Box 408, Plummer, ID 83851, 208-686-5521
Service Area	Coeur d'Alene Indian Reservation
Describe your services and organization goals in overview (100 words or less)	The Wildlife Program is responsible for ensuring the protection and preservation of wildlife resources throughout the aboriginal lands of the Coeur d'Alene Tribe. The program strategy is rooted in the protection and enhancement of wildlife habitats as a means of maximizing the potential of traditional lands to support the needs of various wildlife species as well as Tribal members.

Table 46. Resources, Capabilities, and Needs: Wildlife Program.

Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	Trucks • 2010 Chevy Silverado 3500 4WD • 2010 Ford F-250 4WD • 2009 Ford F-350 4WD • 2007 Dodge Ram 1500 4WD • 2006 Chevy Silverado 2500 4WD ATV's • 1998 Kodiak 400 • Two (2) 2004 Honda Rubicon 500 • 2006 Honda Rancher 350 • 2006 Honda Rancher 350 • 2010 Polaris Ranger Side by Side • 2008 Rokon Scout Snowmobiles • Two (2) 1998 Polaris Indy 550 • 2010 Arctic Cat M-6 • 2010 SkiDoo Skandic 550 Trailers • 4x6 Utility Trailer • Two (2) Place tilt deck snowmobile trailer • Two (2) Place snowmobile trailer w/ramp • 2007 H&H Utility Trailer Other • John Deere 5320 Tractor • Honda Generator
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	No response entered
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	• 8 desktop computers • 3 laptops • 1 irridium satellite phone • 6 cell phones • 4 midland two-way handheld radios
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	No response entered
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	1 Program Manager 1 Administrative Assistant 4 Biologists 3 Technicians
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	No response entered

6.1.2. Environmental Programs Office

Table 47. Resources, Capabilities, and Needs: Natural Resource Department – Environmental Programs Office.

	Department Name	Natural Resource Department – Environmental Programs Office
	Name & Position of Person Preparing this Summary	Tiffany Allgood, EAP Coordinator
	Department Head	Alfred Nomee
	Address & Telephone	P.O. Box 408, 850 A Street, Plummer, ID 83851 (208) 686-8802
	Service Area	The Coeur d'Alene Reservation and aboriginal territory
	Describe your services and organization goals in overview (100 words or less)	The mission of the Environmental Programs Office (EPO) is to conduct multi-disciplinary work in support of the NR Department's mission statement. The EPO strives to protect and improve environmental and human health for the benefit of present and future generations of the Coeur d'Alene people. Services include: Food handling courses, environmental health and safety inspections, commenting on proposed projects, plans, etc. that may affect the environment, long-term natural resources, environmental planning (solid waste, drinking water, Integrated Resource Management Planning, etc.), fundraising, special projects, and other services.
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	1 GSA vehicle (leased) – 4 wheel drive small truck 1 emergency radio (once frequency gets programmed)
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	None in terms of the current role of the Environmental Programs Office.
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	4 computers and 1 emergency radio.
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	Unknown.
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	1 EAP Coordinator 1 Environmental Health Specialist 1 Environmental Planner (vacant) 1 Office Manager/Administrative Asst.
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	Unknown.

6.1.3. Fisheries

Table 48. Resources, Capabilities, and Needs: Natural Resources - Fisheries.

Department Name		Natural Resources - Fisheries
Name & Position of Person Preparing this Summary		Jeff Jordan, Fisheries Biologist Angelo Vitale, Fisheries Program Manager
Department Head		Alfred Nomee
Address & Telephone		401 Annie Antelope rd, 208-686-8702
Service Area		Coeur d'Alene Reservation
Describe your services and organization goals in overview (100 words or less)		Fisheries related, restoration, monitoring, evaluation, regulatory recommendation, recreational
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	• Four (4) 1-Ton Trucks • 303 SC Mini Excavator, 72" Cleanout Bucket, 48" Common Rock Digger • Kumatsu 51PX Dozer • 6x6 1972 American General Dump Truck • Paystar 5000 International Dump Truck • 6 Inch Trash Pump, 12' Suction Line, 20' Output Line • Two (2) trailers w/14,000 Pound Capacity Dual Axel • Bobcat T320 w/Attachments • 10 Foot Dingy • 14 Foot Dingy • Koboda B330 Tractor w/Attachments • Two (2) Portable Gas Generators
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	Two (2) Lowboy Trailers
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Cell Phones
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	Specialized Training and Equipment, Satellite Phones
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	Varies on the response condition(s) Personnel not specialty trained for emergency citations or not current on certifications and/or certification(s) basic short course concept. Have limited personnel trained to operate heavy equipment.
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	Training and staff depending on the circumstance.

6.1.4. Land Services

Table 49. Resources, Capabilities, and Needs: Natural Resources – Land Services.

Department Name	Natural Resources-Land Services
Name & Position of Person Preparing this Summary	John M. Abraham, Manager Land Services
Department Head	Alfred Nomee

Table 49. Resources, Capabilities, and Needs: Natural Resources – Land Services.

Address & Telephone		PO Box 408, Plummer, Idaho 83851
Service Area		Coeur d'Alene Reservation
Describe your services and organization goals in overview (100 words or less)		To provide trust management service to Coeur d'Alene Tribe
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	Telephone, Computer, Video Camera, Radio
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	No response entered
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Telephone, Computer, Video Camera, Radio
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	No response entered
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	Smoke Management Staff
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	No response entered

6.1.5. Forestry

Table 50. Resources, Capabilities, and Needs: Natural Resources – Forestry.

Department Name		Natural Resources-Forestry
Name & Position of Person Preparing this Summary		Kurt Mettler, Forest Manager
Department Head		Alfred Nomee
Address & Telephone		PO Box 408, Plummer, Idaho 83851
Service Area		Coeur d'Alene Reservation
Describe your services and organization goals in overview (100 words or less)		Management of the trust forests within the reservation boundary.
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	Fire engines, ATV's, pumps, equipment trailers, radios, transport vehicles, snow plow pickup truck.
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	Water tender, funding for equipment operators.
Technologi cal Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Radios, tents, MRE's, Incident Command System (ICS) training, computers/GIS, Emergency Blankets, cots.

Table 50. Resources, Capabilities, and Needs: Natural Resources – Forestry.

	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	Narrow band repeater, program specific radio frequency.
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	8/2010 –Twelve fire qualified individuals, various ICS qualified individuals.
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	6 additional equipment operators/fireguards (plus funding).

6.1.6. Forestry Fuels Program

Table 51. Resources, Capabilities, and Needs: Forestry Fuels Program.

Department Name		Natural Resources-Forestry Fuels Program
Name & Position of Person Preparing this Summary		Chuck Simpson, Fuels Specialist
Department Head		Alfred Nomee
Address & Telephone		850 A. Street, Plummer, ID 83851
Service Area		Coeur d'Alene Reservation
Describe your services and organization goals in overview (100 words or less)		The Forestry Fuels Program works to reduce the risk of fire damage to property and the natural habitat, by eliminating brush and other natural materials which fuel wildfires.
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	• 1 Dodge Pickup 2500 Single Cab GSA Vehicle • 1 Chevy Pickup 2500 Crew Cab GSA Vehicle • 1 Chevy Pickup 1500 Crew Cab GSA Vehicle • 2010 Polaris Ranger • Yamaha Grizzly 4 Wheeler • 66 Gallon Fuel Tank & Pump • Briggs & Straton Air Compressor • 2, 50 Feet Air Hoses • Ford F550 • 3 Stihl 350 Brush Cutters • 2 Stihl 85 Brush Cutters • Titan Generator • PJ Tow Trailer • Ford F250
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	No Response
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	• 2 Garmin 60cx GPS Units • Trimble 2008 GEO XT GPS Device
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	No Response

Table 51. Resources, Capabilities, and Needs: Forestry Fuels Program.

Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	No Response
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	No Response

6.1.7. Fire Management

Table 52. Resources, Capabilities, and Needs: Fire Management.

Department Name	Natural Resources-Fire Management Program
Name & Position of Person Preparing this Summary	Daniel Vassar, Training Specialist/Safety Officer
Department Head	Alfred Nomee
Address & Telephone	187 Agency Loop Road or P.O Box 408 Plummer Idaho 83851, Plummer Idaho 83851 208-686-7004
Service Area	Coeur d'Alene Reservation
Describe your services and organization goals in overview (100 words or less)	The Fire Management Program works cooperatively with local, state and federal agencies to protect tribal, allotted and fee lands against catastrophic wildfires. The Fire Management Program also prescribes burning to prepare planting sites, initiates underburning to increase forage and reduce fuel loading, and maintains a defensible space program to protect tribal homes from fire.
Major Equipment Resources: List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	• 2006 Ford F550 E5561 • 2003 Ford F550 E5562 • 1994 International 4700DT E5541 • 2000 International 4700DT E5551 • 1994 Ford F450 E5571 • 1995 Ford F700 Flat bed • 1984 Chevrolet military Truck (Snow plow) • 2006 Chevrolet Silverado Command truck • 1990 Ford F250 • Kubota (ATV) • 15 chain saws • 2 trailers • 2 welders • Wheel balancing machine • Tire changing machine • John Deere tractor (grapple, bucket, tiller, mower) • Water tender (In poor condition) • DR mower • 2 generators

Table 52. Resources, Capabilities, and Needs: Fire Management.

Department Name		Natural Resources-Fire Management Program
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	• Replace water Tender • Replace command truck • Replace trailer • Replace type 4 engine • Kubota (ATV) • Passenger Van (transporting personnel) • Update fire cashe (Fire pants, fire shirts, hard hats, ect.) • Land tamer (UTV)
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	• 1 Repeater in Tekoa Washington • 11 truck Radios • 19 hand held radios (Some radios do not work) • 2 cases of MRE's (Meals Ready to Eat) • 3 computers in office • 1 laptop
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	• Update older handheld radios (to digital) • Update older truck radios (to digital) • Replace 2 older computers • 1 laptop
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	1. Thomas Pakootas- Fire Management Officer (FMO) 2. Daniel Vassar- Training Specialist/Safety Officer 3. Donald Pakootas- Engine Boss 4. Michael Hendrickx-Engine Boss 5. Leonard Tomaskin- Firefighter Type 2
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	1. 8 Firefighter type 2 2. 1 dozer operator with CDL (class A) driver's license. 3. 1 Diesel Mechanic

6.1.8. Forestry Roads Program

Table 53. Resources, Capabilities, and Needs: Forestry Roads Program.

Department Name	Natural Resources-Forestry Roads Program
Name & Position of Person Preparing this Summary	George Torpey
Department Head	Alfred Nomee
Address & Telephone	850 A. Street, Plummer ID 83851 (208) 582-2517
Service Area	Coeur d'Alene Reservation
Describe your services and organization goals in overview (100 words or less)	The Forestry Roads Program is responsible for operations of the tribal rock pit in Plummer. Other responsibilities include maintaining tribal roads leading to tribal forest lands.

Table 53. Resources, Capabilities, and Needs: Forestry Roads Program.

Department Name		Natural Resources-Forestry Roads Program
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	• 2006 Trio Impactor Crusher • 1995 Caterpiller D5 Dozer • 1966 Caterpillar D7 Dozer • 1991 Komatsu PC 60 Excavator • 1995 Caterpillar 311 Excavator • 1975 Shop Built Tilt Deck Trailer • 1974 Huber Grader • 1968 Hyster Tire Roller • 1995 Ford Dump Truck • 1996 Ford Dump Truck • 1977 IHC Water Tender • 2003 American Air Burner • 1997 Protogrind 1200 Demolition Grinder • 1971 Caterpillar 950 Front Loader • 1994 Caterpillar 936 Loader • 2003 Freightliner Truck Tractor • 1986 Freightliner Truck Tractor • 1985 Chevrolet Truck Flatbed • 1989 Ford Fuel Truck • 1976 Fruehauf End Dump Trailer • Extec Turbu 5000 • 1985 Ace 1500 Fuel Storage Tank • 1986 Recycle Systems Chip Colorizer • Bri-Mar Dump Bed Insert
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	Heavy Equipment Transport – Lowboy Trailer
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Portable Radios
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	Back-Up Generator
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	3 Heavy Equipment Operators 1 Equipment Supervisor/Operator
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	1 Supply/Parts Officer 1 Dispatch/Billing & Receiving Officer

6.1.9. Pesticide Enforcement

Table 54. Resources, Capabilities, and Needs: Pesticide Enforcement.

Department Name	Natural Resources-Pesticide Enforcement
Name & Position of Person Preparing this Summary	Eric Gjevre

Table 54. Resources, Capabilities, and Needs: Pesticide Enforcement.

Department Head		Alfred Nomee
Address & Telephone		Agency Road Building 132 Plummer, ID 83851
Service Area		Coeur d'Alene Reservation
Describe your services and organization goals in overview (100 words or less)		Pesticide Enforcement of Coeur d'Alene Tribal Pesticide Code and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	4 DR 4 WD Pickup
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	No response entered
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Cell phone, aircard, related office/field equipment
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	No response entered
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	1 full time, 1 part time temporary
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	No response entered

6.1.10. Lake Management

Table 55. Resources, Capabilities, and Needs: Lake Management Department.

Department Name	Lake Management Department
Name & Position of Person Preparing this Summary	Sandra Raskell, Project Engineer
Department Head	Phil Cernera
Address & Telephone	PO Box 408 850 A Street Plummer, ID 83851 208-686-1800
Service Area	The Coeur d'Alene Reservation and aboriginal territory
Describe your services and organization goals in overview (100 words or less)	Department responsibilities include but are not limited to; management of lake and river encroachments, water quality protection, lake improvements, aquatic invasive species management, wetlands and riparian lands mitigation, shoreline erosion management, debris management, safe boating, implementation of the recently adopted Tribal /State Coeur d'Alene Lake Management Plan, recreation on Tribal waters (including operation and maintenance of the Trail of the Coeur d'Alenes), and hazardous waste management as it pertains to mining related contamination. The Department Director is designated as lead contact in the Avista / Spokane River Project dam relicensing effort.

Table 55. Resources, Capabilities, and Needs: Lake Management Department.

Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	4 GSA vehicle (leased) – 4 wheel drive vehicles (trucks/JEEPs) 1 Spill Response Kits
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	1 Additional GSA vehicle Replace and replenish spill kits as needed
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	5 computers
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	Central Radio System
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	1 Recreation Program Manager 1 Hazardous Waste Management Program Manager 1 Water Resources Program Manager 1 Lake and Rivers Program Manager 1 Project Engineer Other Lake Management Staff
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	Unknown

6.1.11. Tribal Housing Authority

Table 56. Resources, Capabilities, and Needs: Tribal Housing Authority.

Entity Name		Coeur d'Alene Tribal Housing Authority
Name & Position of Person Preparing this Summary		Louis H. Aripa, Sr., Accounts Payable
Executive Director		Rosanna Allen
Address & Telephone		PO Box 267, 1005 8th St, Plummer, Idaho 83851
Service Area		DeSmet, Tensed, Plummer, Worley
Describe your services and organization goals in overview (100 words or less)		Make sure our housing is safe to occupy after or during a disaster.
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	None available.
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	Generators, equipment trailers, and snow plows

Table 56. Resources, Capabilities, and Needs: Tribal Housing Authority.

Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	None available
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	Emergency communications, shelter/meals, etc. HazMat equipment
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	Three employees are currently on emergency call list, regarding housing & our office.
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	To be determined once this plan is established.

6.1.12. Public Works

Table 57. Resources, Capabilities, and Needs: Public Works.

Department Name		Public Works
Name & Position of Person Preparing this Summary		Jim Kackman, Director
Department Head		Jim Kackman
Address & Telephone		P.O. Box 408 208-686-2066 Plummer, ID 83851
Service Area		All areas within the Reservation Boundary
Describe your services and organization goals in overview (100 words or less)		Manage construction projects, land use planning, road maintenance, grants, transportation planning.
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	• 1975 InternationalDump Truck • 1975 Dodge Water Truck • 1996 Kenworth T800 Dump Truck • 2006 Sterling Dump Truck • 1991 Kenworth T800 Truck • 1990 Eager Beaver Low-Boy • 2005 Trailmax TD-20-T • 1996 Ford Truck (1 Ton - F450) • 2002 Sterling Elgin Sweeper • 2006 Dodge R35 (1 Ton - Ram) • 1969 Peerless Belly Dump Trailer • 1954 Osh Kosh Snow Blower • 1976 Dodge Pickup • 1985 Chev Blazer • 1980 John Deere 772 BH Grader • 2008 John Deere 544J Wheel Loader • 1985 Komatsu Excavator
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	Road grader

Table 57. Resources, Capabilities, and Needs: Public Works.

Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	We have a UHF radio frequency for departments to tune into as well as an emergency frequency for others to use as well. Our department can help with hazards in terms of bringing in heavy equipment to do certain work.
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	We could use a few more radios for other departments to access the emergency frequency in the event of an emergency.
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	We have 3 road maintenance employees, a project coordinator and the director who could assist with an emergency or hazard if needed.
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	None.

6.2. State and Federal Cooperator Summaries

State and Federal organizations operating within the Coeur d'Alene Reservation and with the Coeur d'Alene Tribe are summarized for reference purposes. These organizations have cooperated with the Coeur d'Alene Tribe in the development of this Tribal Hazards Mitigation Plan.

6.2.1. Bureau of Land Management

Table 58. Resources, Capabilities, and Needs, Bureau of Land Management.

Department/Organization Name	U.S. Dept. of Interior, Bureau of Land Management (BLM)
Name & Position of Person Preparing this Summary	Kurt Pavlat, Field Manager, Coeur d'Alene Field Office
Address & Telephone	3815 Schreiber Way, Coeur d'Alene, ID 83815 (208) 769-5038
Service Area	Boundary, Bonner, Kootenai, Benewah and Shoshone Counties
Describe your services and organization goals in overview (100 words or less)	Multiple use and sustained yield management of federal public lands and resources located in the five northern counties of Idaho. BLM resource specialists located in Coeur d'Alene specialize in forest management, hazardous fuels management, botany, cultural resource mgmt., wildlife/fisheries management, lands/realty, noxious/invasive species management, hydrology, geology/mine engineering, GIS, IT, environmental engineering, outdoor recreation management, environmental planning, law enforcement, cadastral survey, public affairs, financial management and abandoned mine land/HAZMAT management.

Table 58. Resources, Capabilities, and Needs, Bureau of Land Management.

Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	The BLM has a type 6 fire engine located in Coeur d'Alene. The BLM also has various pickup trucks/SUVs and one 1 ton stake truck available for transporting people and hauling equipment and supplies.
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	None
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Hand-held broad-band programmable radios, hand-held GPS units, fire shelters, satellite telephones and various GIS mapping software.
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	None
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	The BLM has four Foresters, two Fuels Management Specialists (one Fire Ecologist and one Fuels Technician), one Law Enforcement Officer (LEO), various ICS qualified personnel (fire), one hydrologist, one mining engineer, one budget analyst, one public affairs officer, one IT specialist, three administrative assistants and one environmental engineer located in Coeur d'Alene.
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	None

6.2.2. Heyburn State Park

Table 59. Resources, Capabilities, and Needs: Heyburn State Park.

Department/Organization Name	Heyburn State Park
Name & Position of Person Preparing this Summary	Ron Hise
Address & Telephone	1291 Chatcolet Rd
Service Area	Western Benewah County
Describe your services and organization goals in overview (100 words or less)	Heyburn State Park consists of 5,700 acres of land and 2,300 acres of water and is situated on the southern end of Coeur d'Alene Lake. Services and amenities include three campgrounds, five day use areas, two marinas, three boat launches, three rental cottages, 16 miles of non-motorized trails, and a visitor information center. The park is also home to 166 privately leased cottages and 20 historic structures. Our goal is to provide for quality recreational opportunities and resource stewardship.

Table 59. Resources, Capabilities, and Needs: Heyburn State Park.

Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	**Resources available:** 1 John Deere 450 bulldozer, 1 case backhoe/loader, 1 75 gallon slip in fire pumper, 1 150 gallon slip in fire pumper, 1 17' aluminum work boat w/90hp outboard, 1 one ton 4x4 with 8 ½' snow plow, 1 Yamaha ATV, 1 Kawasaki Mule UTV.
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	No response entered
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	**Human resources available:** 5.75 full time employees made up of one manager, one assistant manager, three park rangers, and one part time office staff. From June 1st – August 31st there are an additional 6-10 seasonal employees of various backgrounds and skill levels available.
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	No response entered

6.2.3. Idaho Department of Lands

Table 60. Resources, Capabilities, and Needs: Idaho Department of Lands.

Department/Organization Name		Idaho Department of Lands
Name & Position of Person Preparing this Summary		John Pollard – Fire Warden (no longer with IDL as of June 2010)
Address & Telephone		Idaho Dept. of Lands 1806 Main Ave. St. Maries, ID. 83861 208-245-4551
Service Area		Pts. Benewah, Kootenai and Shoshone Co. West St. Joe Fire Protection District
Describe your services and organization goals in overview (100 words or less)		Wildland Fire Suppression and Hazardous Fuels Management
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Engines – Wildland: Type 4, 4X2, 750 gal. (30F11) Type 6, 4X4, 300 gal. (30F10) Type 6, 4X4, 300 gal. (30F27) Water Tender – Type 3, 1,300 gal. (30F13) Dozer, Tractor & Lowboy – Type 3, Cat D4H, (30f16, 30F14 & 43F19) Pickups – 4X4, ½ & ¾ T – 20 Personnel: ICS Qualified Overhead - 10-15 Firefighters (FFT1 or FFT2) - 10-15

Table 60. Resources, Capabilities, and Needs: Idaho Department of Lands.

	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	P-25 compliant portable radios and associated repeaters Training in P-25 compliant radios Adequate number of portable radios Financial assistance in replacing aging equipment in a timely manner
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	No response entered
Human Resources	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	Additional permanent, qualified and trained wildland fire personnel

6.3. Municipality Capabilities and Needs

Municipalities located within the Coeur d'Alene Reservation participated with the Coeur d'Alene Tribe in the development of this planning effort and have completed Resource, Capabilities, and Needs assessments. Their analysis results are presented here with only minor editing.

6.3.1. City of Plummer

Table 61. Resources, Capabilities and Needs, City of Plummer

Name & Position of Person Preparing this Summary	Donna Spier (No longer with City of Plummer as of Dec. 2010) City Clerk & Risk Manager
Address & Telephone	PO Box B Plummer, ID 83851
Service Area	City of Plummer
Describe your services and organization goals in overview	Government services, library, parks, cemetery, roads, public safety (police, animal control), utilities within the city (water, sewer, garbage collection, street lights). Electric distribution in Plummer and surrounding areas.
List your currently available technological resources for use in responding to emergencies in your service area (e.g., list of fire protection apparatus, snow plows, search and rescue trucks, etc.)	Snow plows, graders, loader used for plowing, and a sander (generally we use all of our equipment to keep up with city streets. Assist other agencies as we can. Dump trucks, link truck, bobcat, backhoe, trash pump, jetter, water truck, roller, and other miscellaneous equipment and power tools. Vehicles include 2 police cars, police / animal control pickup, cell phones, 2 crews, 2 police officers, and city personnel.
List your currently available human resources for use in responding to emergencies in your service area (e.g., detail staff by position and number, plus volunteers)	We have a small staff • 3 city maintenance workers • 2 law enforcement • 3 administrative personnel • 2 library staff

Table 61. Resources, Capabilities and Needs, City of Plummer

List your organization's technological needs for responding to hazard emergencies, which are not currently in inventory, in your service area (e.g., fire trucks or water tenders, fire hydrant network, radio communications network, etc.)	• Need emergency generators for at least one water service (well) to provide for emergency fire protection and potable water for residents in the city.
List your organization's human resource needs for responding to hazard emergencies, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	In the case of an emergency we may need to hire outside help depending on the situation.

6.3.2. City of St. Maries

Table 62. Resources, Capabilities and Needs, City of St. Maries.

Name & Position of Person Preparing this Summary	John W. Adams, Council Member
Address & Telephone	602 College Ave., St. Maries, ID
Service Area	City of St. Maries
Describe your services and organization goals in overview	City participates on the County LEPC, WUI committee, and delivers: • water & sewer • law enforcement • garbage services • street lights • public safety • library • cemetery • planning • building • ambulance • maintenance of federally approved levee system
List your currently available technological resources for use in responding to emergencies in your service area (e.g., list of fire protection apparatus, snow plows, search and rescue trucks, etc.)	The city maintains: • 3 ambulances • 5 patrol cars • 2 backhoes • 3 dump trucks • 1 loader • 2 sanders • 2 water trucks • 1 street sweeper • 1 line rodder • 5 mowers • 1 grader • 1 generator • Misc. power tools and equipment • 8 handheld radios with repeater

Table 62. Resources, Capabilities and Needs, City of St. Maries.

List your currently available human resources for use in responding to emergencies in your service area (e.g., detail staff by position and number, plus volunteers)	• 6 police officers • 2 certified water operators • 2 certified wastewater operators • 8 maintenance workers • 12 volunteer EMTs • 2 grounds keepers • 1 cemetery sexton • 2 library staff • 4 administrative personnel
List your organization's technological needs for responding to hazard emergencies, which are not currently in inventory, in your service area (e.g., fire trucks or water tenders, fire hydrant network, radio communications network, etc.)	• Security system for City's main water source at Rochat Creek • Pumping system for secondary water source at St. Joe River • Storm sewer pumping system • City Hall backup generator

6.3.3. City of Tensed

Table 63. Resources, Capabilities and Needs, City of Tensed.

Name & Position of Person Preparing this Summary	Mayor Faith Harvey
Address & Telephone	PO Box 126, Tensed, ID
Service Area	City of Tensed
Describe your services and organization goals in overview	The City of Tensed is on Hwy 95 half way between Moscow and Coeur d'Alene. We have a floodplain we are addressing with FEMA, to establish a BFE for our town's development. Our current issues include working with Idaho DEQ on water supply for the City.
List your currently available technological resources for use in responding to emergencies in your service area (e.g., list of fire protection apparatus, snow plows, search and rescue trucks, etc.)	• Tensed Fire District • Tensed Ambulance • 1-ton snow plow
List your currently available human resources for use in responding to emergencies in your service area (e.g., detail staff by position and number, plus volunteers)	Fire and Ambulance 911 Services
List your organization's technological needs for responding to hazard emergencies, which are not currently in inventory, in your service area (e.g., fire trucks or water tenders, fire hydrant network, radio communications network, etc.)	• 10 fire hydrants to be located within the city • Radio communications needs • Improved access to the sewer lagoons and increased protection from flood waters

6.3.4. City of Worley

Table 64. Resources, Capabilities and Needs, City of Worley.

Department Name	City of Worley
Name & Position of Person Preparing this Summary	Brenda Morris, Clerk, Water/Wastewater Operator
Address & Telephone	P.O. Box 219, Worley, Idaho 83876
Service Area	Worley
Describe your services and organization goals in overview (100 words or less)	We provide utility services, such as water, sewer and garbage. We try to provide the best service possible to the customer at a reasonable price.

Table 64. Resources, Capabilities and Needs, City of Worley.

	Department Name	City of Worley
Major Equipment Resources	List your currently available major equipment resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. vehicles, generators, equipment trailers, fire protection apparatus, snow plows, search & rescue trucks, etc.)	Snow plow/dump truck Backhoe
	List your major equipment needs for responding to emergencies, or mitigating potential hazard conditions which are not currently in inventory.	Water truck Newer backhoe Generator Confined Space Equipment
Technological Resources	List your currently available technological resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. communications, emergency shelter/meals, etc.)	Emergency shelter at Senior Center.
	List your organization's technological needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently in inventory, in your service area.	Generator for Senior Center.
Human Resources	List your currently available human resources for use in responding to emergencies, or mitigating potential hazard conditions in your service area (e.g. detail staff by position and number, plus volunteers)	City staff - 3 City Council - 5
	List your organization's human resource needs for responding to hazard emergencies, or mitigating potential hazard conditions, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	More volunteers and training.

6.4. Emergency Services Capabilities and Needs

Resource, Capabilities, and Needs forms were completed by each of the fire protection organizations on the Coeur d'Alene Reservation and are presented in this section with only minor editing.

6.4.1. St. Maries Fire Protection District

Table 65. Resources, Capabilities, and Needs, St. Maries Fire Protection.

Name & Position of Person Preparing this Summary	Chief Larry Naccarato
Address & Telephone	308 West Jefferson Ave. 1-208-245-5253- Office
Service Area	Kootenai Harrison and Benewah County St. Maries a total of 80 Square miles. The technical rescue area is over 2,350 square miles.
Describe your services and organization goals in overview	Provide Structure protection Wildland fire protection, and vehicle fire protection. We also provide extrication, and technical rescue.
List your currently available technological resources for use in responding to emergencies in your service area (e.g., list of fire protection apparatus, snow plows, search and rescue trucks, etc.)	4-Type 1 Structure Eng. 2-Type 1 Water Tenders 1- Type 3 Rescue Truck 2-Type 6 Brush Trucks 1 Mobile Support Truck- With portable air system 2- Support vehicles 1- Trailer mounted 750 GPM pump 1- Command vehicle

Table 65. Resources, Capabilities, and Needs, St. Maries Fire Protection.

List your currently available human resources for use in responding to emergencies in your service area (e.g., detail staff by position and number, plus volunteers)	901- Fire Chief 902-A Chief Training Officer EMT-A 903- A Chief of Operations EMT-B 913 Sta. 1 Capt EMT-B 906- Sta. 2 Captain 908-Sta. 3 Capt. 911 Lt. Sta. 1 EMT_B 914,915 Lt. Sta 3 Sta 1, Volunteer FF 20 Sta 2, Volunteers FF 8 Sta 3, Volunteers FF 5
List your organization's technological needs for responding to hazard emergencies, which are not currently in inventory, in your service area (e.g., fire trucks or water tenders, fire hydrant network, radio communications network, etc.)	1- 1-Mountain top repeater- p-25 2- 3- fixed base stations with page capable/ Communications P-25 3- 40 Handheld radio units/ P-25 4- 1- Water tender 5- 3- F-550 Wildland units 6- 8000 of Structure hose, 11/2, 21/2, LDH 7- New ropes and hardware for technical rescue 8- Need Fire Fighters Personal Protective Equipment (Turnouts)
List your organization's human resource needs for responding to hazard emergencies, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	1. More Volunteers 2. Money for sending FF to Specialty training.

6.4.2. Tensed Ambulance Department

Table 66. Resources, Capabilities, and Needs, Tensed Ambulance.

Name & Position of Person Preparing this Summary	Paul E. Damon, President
Address & Telephone	PO Box 6, Tensed, ID
Service Area	Southwestern portions of Benewah County.
Describe your services and organization goals in overview	Our goal is to provide excellent emergency medical services at the EMT Basic level along with rapid ambulance transport for people of the greater Tensed community.
List your currently available technological resources for use in responding to emergencies in your service area (e.g., list of fire protection apparatus, snow plows, search and rescue trucks, etc.)	Tensed Ambulance has one 4x4 Ambulance equipped as per the State of Idaho for EMT Basic service.
List your currently available human resources for use in responding to emergencies in your service area (e.g., detail staff by position and number, plus volunteers)	We have 8 certified EMT Basics and 2 non-certified drivers for a total of 10 staff.
List your organization's technological needs for responding to hazard emergencies, which are not currently in inventory, in your service area (e.g., fire trucks or water tenders, fire hydrant network, radio communications network, etc.)	We currently need radios that are P25 capable. In the next five years we will need to update our ambulance.
List your organization's human resource needs for responding to hazard emergencies, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	We need additional EMTs and Basic Training.

6.4.3. Gateway Fire Protection District

Table 67. Resources, Capabilities, and Needs, Gateway Fire Protection District.

Name & Position of Person Preparing this Summary	Mike Meagher, Fire Chief
Address & Telephone	PO Box 328, Plummer ID
Service Area	Gateway Fire Protection District
Describe your services and organization goals in overview	Provide fire protection and suppression to approximately 129 square miles. Provide extraction and BLS response to approximately 275 square miles.
List your currently available technological resources for use in responding to emergencies in your service area (e.g., list of fire protection apparatus, snow plows, search and rescue trucks, etc.)	• 4500 gal water tender • 1250 gpm engine • 1000 gpm engine • Extraction / rescue / EMS truck • 1 ton brush truck 1986 • 1 ton brush truck 1987
List your currently available human resources for use in responding to emergencies in your service area (e.g., detail staff by position and number, plus volunteers)	• 1701 – Fire Chief / EMT B • 1703 – Captain / EMT B • 1704 – Captain / EMT B • 1705 – Lieutenant / EMT B • 1707 – Firefighter • 1708 – Engineer • 1709 – Firefighter / EMT A • 1710 – Firefighter • 1711 – Lieutenant / EMT B • 1712 – Firefighter / EMT B • 1713 – Firefighter / EMT B • 1714 – Firefighter • 1715 – Firefighter • 1716 – Firefighter / EMT B • 1717 – Engineer • 1718 - Firefighter
List your organization's technological needs for responding to hazard emergencies, which are not currently in inventory, in your service area (e.g., fire trucks or water tenders, fire hydrant network, radio communications network, etc.)	• Water Tenders • Radio Communications compliant with P25 System • Laptop computers for trucks • Fire Hose • Construct turnouts on access routes • Extraction equipment • Gas detectors
List your organization's human resource needs for responding to hazard emergencies, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	• More volunteers • Training locally for the volunteers in the organization.

6.4.4. Shoshone County Fire District #2

Table 68. Resources, Capabilities, and Needs, Shoshone County Fire District #2.

Name & Position of Person Preparing this Summary	Dale A. Costa, Fire Chief
Address & Telephone	14 W. Market Street, Kellogg, ID 83837 (208) 784-1188
Service Area	Starting at I-90 milepost 55.5 west to milepost 29.5. Down State highway 3 to milepost 103.4. We service both Western Shoshone and Eastern Kootenai County. We only go approximately 2-tenths of a mile up the Coeur d'Alene River from I-90. We take in all the gulches within our jurisdiction. Pinecreek we up 10 miles from the station to the Spokane/Idaho Mine. Approximately 2 miles above the Sunshine Mine. We do have 37 private fire protection contracts up the Coeur d'Alene River. Our district covers approximately 200 square miles.

Table 68. Resources, Capabilities, and Needs, Shoshone County Fire District #2.

Describe your services and organization goals in overview (100 words or less)	Shoshone County Fire District No. 2 responds to both structural and wildland fires within our jurisdiction. We provide basic first responder non-transport Emergency Medical Services, Heavy Rescue Extrication and some Backcountry Rescue Operations and are capable of responding to any Hazardous Materials Situation, to provide for rescue operations, and initial size up along with securing the scene until the arrival of the Region 1 Response Team. We also provide mobile decontamination services. In addition, we provide ice rescue services and have six certified drivers that are supported by the Fire District to work with the Shoshone County Dive Rescue Team. Shoshone County Fire District No. 2 is dedicated to providing a Well Trained, Highly Efficient, and Cost Effective Fire / Rescue Entity along with Public Services provided to all the citizens and visitors that are encountered.
List your currently available technological resources for use in responding to emergencies in your service area (e.g. list of fire protection apparatus, snow plows, search and rescue trucks, etc.)	Shoshone County Fire District No. 2 operates out of 4 stations with a 5th to be built this Summer. The 2 fire stations in Kellogg are owned by the City. Both the Kellogg and Doyle Road Stations have training rooms. Apparatuses We have six type on engines that meet or exceed NFPA Standards. One is equipped with an on board foam system and three have onboard generators with lights. 3 Equipped with 1500 GPM pumps with 1000 gallons of water. 1 Equipped with 1000 GPM pump with 750 gallons of water. 1 Equipped with 750 GPM pump with 750 gallons of water. 1 Equipped with 1500 GPM pump with 1000 gallons of water. 1 50-foot aerial platform, 1000 GPM pump with 300 gallons of water. 1 2500 Gallon Water Tender. 1 Heavy Rescue Extrication Vehicle with the Hurst "Jaws of Life". 1 2500 Gallon Water Tender. 1-250 gallon Water Donkey, not potable. 1 Hazardous material Response Trailer. 9 Level A Hazardous Material suites. 6 level A Training suites. Decontamination Equipment. Portable Propane Hot Water Heater. 4 CBRNE Certified Self Contained Breathing Apparatus. 1 – 6000 PSI Hypress Compressor with 4 bottle Cascade System. 2 – 2 bottle Cascade Systems. 6 Ice Rescue Suites. 2 Fold-A-Tanks, 1-2500 gallon and 1-1500 galloon. 2 Thermal Imaging Cameras, one with remote video feed. 2 District owned command Vehicles.
List your currently available human resources for use in responding to emergencies in your service area (e.g. detail staff by position and number, plus volunteers)	8 Career Fire Fighters with 2 Chief Officers and 6 Fire Fighters with 2 on duty 24-7. 30 Volunteer Fire Fighters
List your organization's technological needs for responding to hazard emergencies, which are not currently in inventory, in your service area (e.g., fire trucks or water tenders, fire hydrant network, radio communications network, etc.)	We need to update our portables and pagers. We provide one each for all personnel and 1 for each of our apparatus. Total need is 47 of each. All our equipment is old and we maintain them to the best of our ability. We are updating when possible We need to add three water tenders and three type 6 brush trucks, one for each of our stations We need a 100-foot ladder for Kellogg, which would require a new station for it to fit in.

Table 68. Resources, Capabilities, and Needs, Shoshone County Fire District #2.

List your organization's human resource needs for responding to hazard emergencies, which are not currently utilized, in your service area (e.g., additional number of paid staff, more volunteers, training for volunteers and staff, etc.)	We need to add 9 fire fighters to bring us back to our 1982 staffing with duty personnel 24-7. To meet NFPA standards we need 18 personnel to be in complacence with NFPA 2-in-2-out rule on a first in engine.

Figure CXLIII. Lovell Valley, a tributary of the Hangman Creek Watershed. Farming plowed lands “to the stream bank”, and narrow bridge crossings have increased stream incised meanders and limited floodplain functioning on many streams like this one on the Coeur d’Alene Reservation.

Chapter 7. Proposed Mitigation Measures

7.1. Summary of the Mitigation Measures Approach

This Tribal Hazards Mitigation Plan's implementation will reflect the unique challenges of the Coeur d'Alene Tribe, and each community within the Reservation. In response to these challenges, it is the desire of the Coeur d'Alene Tribe, associated agencies and organizations to continue the implementation of existing programs that have already provided a level of safety and preparedness in the protection of people, structures, infrastructure, the economy, and traditional way of life of the Coeur d'Alene Tribe and to improve those efforts in the long term.

A series of potential mitigation measures have been developed in this section of the Tribal Hazards Mitigation Plan. These activities are listed in Table 72 - Table 75. While each of these activities has been presented as a stand-alone project, in reality these projects must be implemented in a holistic approach to hazard mitigation in order to achieve increased protection.

In order to accomplish these programmatic goals, the Coeur d'Alene Tribe will continue to involve the neighboring jurisdictions mentioned in this plan. The implementation of this plan is applicable within the exterior boundaries of the Coeur d'Alene Reservation as defined by federal law.

Much of the funding for Coeur d'Alene Tribe's hazard mitigation projects identified in this effort will rely substantially on funding from outside sources. The Coeur d'Alene Tribe has limited resources to provide in-kind services of professional staff and administrative staff in the development and implementation of hazard mitigation projects. The acquisition of materials and equipment to implement many of the projects will rely on grant funding and cooperation with partners and neighboring jurisdictions.

7.2. Potential Funding Opportunities

General long-range fiscal planning is needed to carry out the activities recommended in this plan. Financial considerations include Tribal, federal, state, and private granting entities, directed local in-kind services, local funding, and local funding assistance from Tribal and State resources. Funding mechanisms can be combined to maximize project financing and project diversity.

7.2.1. Traditional Funding Agency Approach

Traditional funding agencies (e.g., Rural Development, Department of Commerce, and USACE) are focused on particular infrastructure issues that address regulatory compliance or public safety. Regulated systems typically funded are water and sewer because of the Clean Water Act, National Pollution Discharge Elimination System (NPDES), Safe Drinking Water Act (SDWA), and other federal laws. These two systems are common to all communities and are a focus of lawmakers and regulators. Finally, these systems are necessary for development, job creation, and other high priority uses for grant and loan money made available by the federal government.

7.2.2. Non-Traditional Funding Opportunities

Private funding from foundations and corporations is very competitive, and their processes are different from federal government funding. Because they are not accountable to voters, they fund according to their own specific set of priorities. The most common recipients of this type of funding are non-profit organizations. These non-profit organizations typically carry forward the goals of these non-traditional funding sources and can be an important implementation mechanism for rural communities such as are found on the Coeur d'Alene Reservation. This funding source will typically contribute $5,000 to $100,000 towards a project. This source should be viewed as a supplement to the major funding agencies or as a funding source for smaller projects.

7.2.2.1. Federal, State, and Local Funding Options

Tribal, federal, state, and local funding sources are available to Indian Communities and utility districts located on the Coeur d'Alene Reservation. In general, funding options can be broken down into several categories, including grant and loan programs. The following list provides potential sources of funding and contains outlines for availability and eligibility requirements for the various funding options.

7.2.2.1.1. Grant Programs

- Community Development Block Grant Program (Idaho Department of Commerce)
- Economic Development Administration (U.S. Department of Commerce)
- Rural Development Program, US Department of Agriculture (formerly Farmers Home Administration)
- Surface Transportation Program (STP) Local Rural, Idaho Transportation Department
- Surface Transportation Program (STP) Local Urban, Idaho Transportation Department
- Surface Transportation Program Enhancement, Idaho Transportation Department
- Indian Community Development Block Grant (ICDBG) Program
- Indian Health Service
- U.S. Environmental Protection Agency
- Department of Health and Human Services (DHHS)
- Housing and Urban Development (HUD)

7.2.2.1.2. Loan Programs

- Drinking Water State Revolving Fund Loan
- Wastewater Revolving Fund Loan

7.2.2.1.3. Local Resources

- Pay-As-You-Go
- Reserve Fund Financing
- General Obligation Bonds
- Revenue Bonds
- Local Improvement District
- Business Improvement District
- Impact Fees

7.2.2.2. Leveraging Funds

There are several methods to make grant dollars stretch so that the Coeur d'Alene Tribe can get the "biggest bang for the buck." The concept of leveraging means that you use more than one source of money to supplement a project.

7.2.2.2.1. Percentage and/or In-Kind Match

The Percentage and/or In-Kind Match method requires a set percentage (such as 25%) in local cash or in-kind resources from an entity to support a project. Without this amount of local financial contribution the grant application may not receive sufficient scoring points used to calculate grant awards, or may not be qualified to receive the intended grant award. Often reduced or waived in-kind matches are provided for qualified tribes when requested. Each grant should be evaluated on a unique situation basis.

7.2.2.2.2. Direct In-Kind Match

A second method, Direct In-Kind Match, means that the agency or community will make a non-cash contribution toward the project. Non-cash contributions can be in the form of goods, services, facilities, space, personnel, materials, and equipment calculated at fair market value. Often reduced or waived in-kind matches are provided for qualified tribes when requested. Each grant should be evaluated on a unique situation basis.

7.2.2.2.3. Dollar-for-Dollar Leverage Match

A third method, Dollar-for-Dollar Match, means that an entity, like the Coeur d'Alene Tribe, can leverage grant funds from one funding source with grant funds from a second funding source. For instance, the Coeur d'Alene Tribe may be able to leverage state grant funds with federal dollars. Verification is necessary before implementation to confirm that a grantor agency will allow this arrangement. Some grantor agencies use a so-called leveraging ratio to measure money an entity has from other sources that could be matched to the project grant. Generally, the more money an entity can bring in from other sources the better the chance of being funded.

7.2.3. Project Funding Opportunities Identified by FEMA

FEMA Region X has provided valuable references for potential funding of projects identified in this planning effort. These are summarized in Table 69 and are available to the Coeur d'Alene Tribe and associated cooperators.

Table 69. Federal Financial Resources for Hazard Mitigation.

Subtype	Administrator	Purpose	Amount/Availability
Hazard Mitigation Grant Program (HMGP)	Federal Emergency Management Agency (FEMA)	Support pre- and post-disaster mitigation plans and projects.	Available to communities after a Presidentially declared disaster has occurred within the state. Grant award based on specific projects as they are identified.
Pre-Disaster Mitigation (PDM) grant program	FEMA	Support pre-disaster mitigation plans and projects.	Available on an annual basis, nationally competitive grant. Grant award based on specific projects as they are identified (no more than $3M federal share for projects).
Flood Mitigation Assistance (FMA) grant program	FEMA	Mitigate repetitively flooded structures and infrastructure.	Available on an annual basis, distributed to communities within state by the state emergency management grants specialists. Grant award based on specific projects as they are identified.

Table 69. Federal Financial Resources for Hazard Mitigation.

Subtype	Administrator	Purpose	Amount/Availability
Assistance to Firefighters Grant (AFG) Program	FEMA/USFA (U.S. Fire Administration)	Provide equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Available to fire departments and nonaffiliated emergency medical services. Grant award based on specific projects as they are identified.
Homeland Security Preparedness Technical Assistance Program (HSPTAP)	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Technical assistance services developed and delivered to state and local homeland security personnel. Grant award based on specific projects as they are identified.
Community Block Grant Program Entitlement Communities Grants	U.S. Department of Housing and Urban Development	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Available to entitled jurisdictions (including Tribes in some situations). Grant award based on specific projects as they are identified.
Community Action for a Renewed Environment (CARE)	U.S. Environmental Protection Agency (EPA)	Through financial and technical assistance, offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., storm water) in its local environment. Through CARE, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Competitive grant program. Grant award based on specific projects as they are identified.
Clean Water State Revolving Fund (CWSRF)	EPA	The CWSRF is a loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	CWSRF programs provided more than $5 billion annually to fund water quality protection projects for wastewater treatment, non-point source pollution control, and watershed and estuary management.
Public Health Emergency Preparedness (PHEP) Cooperative Agreement.	Department of Health and Human Services' (HHS) Centers for Disease Control and Prevention	Funds are intended to upgrade Tribal, state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Competitive grant program. Grant award based on specific projects as they are identified.
FEMA Grant Programs	FEMA	Disaster mitigation and preparedness, post-disaster cleanup, and retro-fitting of at-risk structures, infrastructure, and Tribal preparedness planning and response.	Tribes must have a FEMA approved Tribal Hazard Mitigation Plan in place, and current, to apply for and receive most FEMA program funding for pre-disaster mitigation projects.

7.3. Tribal Mitigation Strategies

Mitigation strategies detailed within this Tribal Hazards Mitigation Plan have been developed through an integrated approach of (1) findings determined through this series of analyses, (2) recommendations from Planning Committee members, and (3) suggestions and ideas presented by the public during the Residential Survey, public meetings, and open discussions between the planning team members and the public.

Critical to the implementation of this Tribal Hazards Mitigation Plan will be the identification of, and implementation of, an integrated schedule of treatments within the Coeur d'Alene Reservation targeted at achieving an elimination of the lives lost and reduction in structures damaged or destroyed, infrastructure compromised, reduction to the economy of the Coeur d'Alene Reservation, and unique ecosystems damaged. Since there are many management agencies and hundreds of residents living on the Coeur d'Alene Reservation, it is reasonable to expect that differing schedules of adoption will be made and varying degrees of compliance will be observed across all properties.

The Coeur d'Alene Tribe, and the communities of the Coeur d'Alene Reservation, encourage the philosophy of instilling disaster resistance in normal day-to-day operations. By implementing plan activities through existing programs and resources, the cost of mitigation is often a small portion of the overall cost of a project's design or program.

The state and federal land management agencies operating in and near the Coeur d'Alene Reservation, specifically the Idaho Department of Lands, BIA, and BLM are participants in this planning process and have contributed to its development. Where available, their schedules of land treatments have been considered in light of the Coeur d'Alene Tribe management projections in this planning process, to better facilitate a correlation between their identified planning efforts and the efforts of government organizations.

The Coeur d'Alene Tribe's efforts to implement this integrated Hazard Mitigation Plan has included participants from Emergency Management from both Benewah and Kootenai Counties (updates to their plans both approved by FEMA and adopted by their County Commissioners in 2010). The Coeur d'Alene Tribe recognizes the risk assessments completed in those plans and their sets of potential mitigation measures. Some of those potential mitigation measures were scoped by the respective Counties to occur on the Coeur d'Alene Reservation. This Tribal Hazards Mitigation Plan has restated these County and City mitigation measures in this document where they were proposed on the Coeur d'Alene Reservation and are consistent with the goals of the Coeur d'Alene Tribe. The Coeur d'Alene Tribe recognizes the need of the Cities and Counties to work with the Coeur d'Alene Tribe in the management of potential mitigation measures.

All risk assessments were made based on the conditions existing during 2009 and 2010; thus, the recommendations in this section have been made in light of the understanding of those conditions. However, the components of risk and the preparedness of the Coeur d'Alene Tribe's resources are not static. It will be necessary to fine-tune this plan's recommendations annually to adjust for changes in the components of risk, population density changes, infrastructure modifications, and other factors.

7.3.1. Prioritization of Mitigation Activities

The Coeur d'Alene Tribe will complete the prioritization of the projects indicated in this plan. The Tribe will seek the assistance of and cooperation with other entities as appropriate.

The prioritization process includes a special emphasis on cost-benefit analysis review. The process will reflect that a key component in funding decisions is a determination that the project will provide an equivalent, or more, in benefits over the life of the project when compared with the costs. Projects will be administered by Coeur d'Alene Tribe to meet these goals.

If no federal funding is used in these situations, the prioritization process may be less formal. Often, the types of projects that the Coeur d'Alene Tribe can afford to do on its own are in relation to improved codes and standards, department planning and preparedness, and education. These types of projects may not meet the traditional project model, selection criteria, and benefit-cost model. The Coeur d'Alene Tribe will consider all pre-disaster mitigation proposals brought before the Tribal Council by department heads, and Tribal community representatives.

When federal or state funding is available for hazard mitigation, there are usually requirements that establish a rigorous benefit-cost analysis as a guiding criterion in establishing project priorities. The Coeur d'Alene Tribe will follow the basic federal grant program criteria that will drive the identification, selection, and funding of the most competitive and worthy mitigation projects. FEMA's three primary grant programs (the post-disaster Hazard Mitigation Grant Program, and the pre-disaster Flood Mitigation Assistance Program and Pre-Disaster Mitigation Grant Program) that offer federal mitigation funding to state, Tribal, and local governments, all include the benefit-cost and repetitive loss selection criteria.

The Coeur d'Alene Tribe is committed to compliance with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding from Federal agencies, in compliance with 44 CFR 13.11(c). The Coeur d'Alene Tribe will amend this plan whenever necessary to reflect changes in Tribal or Federal laws and statutes as required in 44 CFR 13.11(d).

The prioritization of projects will be considered annually and be facilitated by the Coeur d'Alene Tribe Public Works Department. Prioritization will be based on the selection of projects that create a balanced approach to pre-disaster mitigation by recognizing the hierarchy of treating (highest first):

- People and Structures
- Infrastructure
- Local and Regional Economy
- Traditional Way of Life
- Ecosystems

The resources at risk within each populated place on the Coeur d'Alene Reservation and the Communities detailed in this document will serve to establish a consistent and uniform basis for the "benefit" portion of the cost-benefit ratio analysis for all projects.

7.3.2. STAPLEE Matrix for Initial Ranking of Mitigation Measures

The STAPLEE matrix has been proposed as an approach to use when creating unbiased evaluations of potential mitigation measures. These seven criteria are determined subjectively and independently from each other. For these purposes each project has been rated on a scale of zero (low benefit) to ten (high benefit). The cumulative scores can range from zero to seventy. The score of seventy would be considered a highly desirable project while a very low scoring project would be considered a very undesirable project (Table 70).

Table 70. Evaluation Criteria (STAPLEE) for Mitigation Actions.

Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance, or Adverse effect on the population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Tribal, and/or federal authority, Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with Tribal and federal laws

All of these have been ranked on scale (subjective) from 0 to 10. The sum of the total will create the Mitigation Action's overall score, with the highest ranked scores achieving the highest ranked mitigation measures. If any one score of a project is equal to or below 3, the mitigation measure will be determined to be "unfeasible", removing it from further consideration.

7.3.3. Proposed Mitigation Measures

Potential mitigation measures are presented in Table 72 - Table 75. These measures include a Project Number. Project numbers contain a series of letters and numbers separated by dashes. For instance, Cd'AT-1006 is one example of a project identifier used in Table 71, representing a project to be administered by the Coeur d'Alene Tribe (Cd'AT), in the "1000" series (Policy Related Activities), and unique project number "006". The definition of these codes is listed in Table 71. All projects identified in this plan will be led by the governing body of the Coeur d'Alene Tribe or delegated to a neighboring jurisdiction such as Benewah County, Kootenai County, or one of the incorporated cities on the Coeur d'Alene Reservation. The location identifiers used here are to identify the major focus of specific projects, those identified only with "Cd'AT" (Coeur d'Alene Tribe) are projects having impact on multiple communities or the entire Coeur d'Alene Reservation and will be implemented by the Coeur d'Alene Tribe.

Table 71. Unique project codes for potential mitigation measures.

Jurisdiction Codes	Series Codes
Cd'AT: Coeur d'Alene Tribe	1000: Policy Related Activities
IDA: State of Idaho	2000: Activities to Reduce Loss Potential
BEN: Benewah County	3000: Resource and Capabilities Enhancements
KOT: Kootenai County	4000: Activities to Change the Characteristics of Risk
TEN: City of Tensed	
PLU: City of Plummer	
WOR: City of Worley	

Table 71. Unique project codes for potential mitigation measures.

Jurisdiction Codes	Series Codes
StM: City of St. Maries	
BLM: Bureau of Land Management	

The Series Codes (1000-4000) include projects generally listed by their potential to accomplish certain hazard mitigation goals. The first, Policy Related Activities (1000), are projects that specifically target the plans, policies, and programs conducted through existing Tribal programs. These efforts can preclude future developments from placing resources at risk to hazards currently identified (e.g., through Planning and Zoning). In this way, the Coeur d'Alene Tribe can focus on correcting current problems without allowing the same risk exposure conditions to be repeated in the future. The Coeur d'Alene Tribe can also ensure that currently ongoing beneficial practices, such as participation in astute forest management practices, are continued into the foreseeable future. The update to existing policies, plans, and programs of the Coeur d'Alene Tribe, will be the focus of the aforementioned Policy Related Activities (1000 Series projects). Formally, this process requires existing planning documents to be updated with analyses contained in this planning document, and then each specific mechanism should be presented to Tribal Council, discussed, and potentially adopted through formal resolution of adoption that integrates the guidance of hazard preparedness. It is critical to recognize that although specific policy related recommendations are formally presented in this Coeur d'Alene Reservation Tribal Hazards Mitigation Plan, the formulation, specific wording, and implementation time horizon are at the discretion of the members of the Coeur d'Alene Tribal Council. The members of this governing body are committed to the health, safety, welfare, and prosperity of the residents and visitors to the Coeur d'Alene Reservation, and implementation measures would reflect this commitment.

The second category, Activities to Reduce Loss Potential (2000 Series projects), includes activities targeted at changing a structure's risk or infrastructure component's risk profile. This may include elevating homes currently located within a flood zone above the height of flood waters, or replacing roofing on homes showing vulnerability to wind damage. These activities are targeted to change the risks of structures placed in harm's way. The implementation of these activities can only be accomplished through the efforts of the Coeur d'Alene Tribe.

The third category, Resource and Capability Enhancements (3000 Series projects), contains efforts to expand the ability of the Coeur d'Alene Tribe's Departments to respond to emergencies from natural hazards. For instance, one of the repeated themes in this risk assessment has been the need for increased communications between departmental administration, police, fire protection, regional, state, and federal agencies. These types of improvements generally apply equally to all hazard types and can impact the effectiveness of disaster response. Improving radio communications, power supply to run these communications, and increased cellular phone coverage may be applicable projects for the Coeur d'Alene Reservation in this category. The implementation of these activities can only be implemented through the integrated efforts of the Coeur d'Alene Tribe.

Finally, the fourth category, "Activities to Change the Characteristics of Risk" (4000 Series projects), represents activities targeted at modifying the characteristics of the hazard. In the case of flooding, a wetlands improvement project (re-establishing a floodplain's historical water storage capacity) is an example of a mitigation measure to change the risk component based on the vector of the hazard. Another example is improving storm water handling as it moves through a community to alleviate potential damages from flood-type impacts. Elevating a road access and improving culvert sizing or bridge overpass freeboard clearance and location are examples to change the characteristics of risk exposure.

Each table (Table 72 – Table 75) includes a project type, identification of the hazard most directly affected by the proposed activity. Some of the mitigation measures include multiple hazards, and others are applicable to “All Hazards”. The listing order for these potential mitigation measures is random. The STAPLEE score is determined for each project in based on the discussion items listed in Table 70 and are presented in Table 76 – Table 79.

7.3.4. Implementation Time Frame

Each project listed here has been assigned an anticipated implementation time frame. It is the goal to complete these projects within a schedule that allows for modification that deals with the ever changing landscape of limited resources and changing priorities. The intention of this proposed implementation schedule is to implement ‘immediate’ projects within the next 2 to 3 years, short-term projects within a period of 2 to 5 years, intermediate projects between 4 to 8 years, and long-term projects between 7 and 10 years after adoption of this Tribal Hazards Mitigation Plan.

Table 72. Potential Mitigation Activities for Policy Related Activities (1000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-1001	**Coeur d'Alene Tribe** to consider entry into the National Flood Insurance Program. Include training and certification of a Coeur d'Alene Tribe Planning Department staff member as a Nationally Certified Floodplain Administrator (fill the role of **Coeur d'Alene Tribe Floodplain Administrator**).	Flood	Coeur d'Alene Tribe	68	Immediate
Cd'AT-1002	**Coeur d'Alene Tribe** to work with neighboring agencies to provide **training in the usage of P-25 compliant communications equipment**.	All Hazards	Coeur d'Alene Tribe, BLM, BIA, Benewah County, Kootenai County, Idaho Dept. Lands	70	Immediate
Cd'AT-1003	Update the **Coeur d'Alene Reservation Wildland-Urban Interface Wildfire Mitigation Plan** and **Forest Management Plan**.	Wildfire, Landslides	Coeur d'Alene Tribe	69	Long-term
Cd'AT-1004	Obtain equipment and provide training to facilitate better **communications** between disaster response agencies on the Reservation.	All Hazards	Coeur d'Alene Tribe, BLM, BIA, Benewah County, Kootenai County, Idaho Dept. Lands	70	Intermediate
Cd'AT-1005	Implement an **Enhanced 911 Program** on the Coeur d'Alene Reservation and complete the saturation of 911 telephone service in the entire Reservation .	All Hazards	Coeur d'Alene Tribe	67	Long-term
Cd'AT-1006	**Coeur d'Alene Tribe Public Works Department to identify Coeur d'Alene Tribe Tribal Floodplain Administrator** who will complete requirements for training to certify through the Building Code Effectiveness Grading Schedule (BCEGS), which assesses the building codes in effect and how the communities enforce building codes, with special emphasis on mitigation of losses from natural hazards. The Tribal Floodplain Administrator will then work with the Tribal Council to implement these findings through current programs on the Coeur d'Alene Reservation.	All Hazards (especially Flood, Windstorm, and Earthquake damage)	Coeur d'Alene Tribe	70	Long-term
Cd'AT-1007	**Coeur d'Alene Tribe emergency Manager** will complete requirements for training to begin advancement of National Incident Management System (NIMS) training.	All Hazards	Coeur d'Alene Tribe	70	Long-term

Table 72. Potential Mitigation Activities for Policy Related Activities (1000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-1008	**Coeur d'Alene Tribe Floodplain Administrator** will complete requirements for training to complete training course E-273- Managing Floodplain Development, through the NFIP.	Flood	Coeur d'Alene Tribe	70	Long-term
Cd'AT-1009	Coeur d'Alene Tribe will begin implementing **flood administration activities** using the existing **FEMA FIRM projections** for floodplain location determination with the additional assessment of the Coeur d'Alene Tribe's projection (developed as part of this plan's development) of the floodplain where FEMA has not determined its location.	Flood	Coeur d'Alene Tribe	70	Long-term
Cd'AT-1010	Coeur d'Alene Tribe Floodplain Administrator will complete requirements for training to complete training and certification as a **Federally Certified Floodplain Administrator** by FEMA (contingent on Cd'AT-1001).	Flood	Coeur d'Alene Tribe	70	Long-term
Cd'AT-1011	Coeur d'Alene Tribe will take an active participant role in the identification and mapping of **Flood Insurance Rate Maps developed by FEMA**. This participation will be indicated by the development and sharing of pertinent locally collected information that influences the identification of the floodplain on Coeur d'Alene Reservation. This is dependent on the implementation of project Cd'AT-1001.	Flood	Coeur d'Alene Tribe	70	Ongoing
Cd'AT-1012	Create the development of a Coeur d'Alene Reservation **comprehensive disaster database** of all hazards in terms of the hazard event, location, beginning date, ending date, and impact of the event on people, structures, infrastructure, and the economy of the Reservation. Include the cost of rehabilitating the site to pre-disaster conditions, and any mitigation measures implemented to prevent future disaster losses, and location dependant information (for mapping).	All Hazards	Coeur d'Alene Tribe, BLM, BIA, Benewah County, Kootenai County, Idaho Dept. Lands	70	Short-term
Cd'AT-1013	Develop and deliver an information sharing **public relations program** for residents and businesses of the Coeur d'Alene Reservation to disseminate detailed information about hazards, and to highlight ongoing management of hazard mitigation programs, information on risks, and regional responses to implementing programs and policies to reduce losses from natural disasters.	All Hazards	Coeur d'Alene Tribe	70	Long-Term
Cd'AT-1014	Support the efforts of Reservation Communities to become registered in the **StormReady** Community Program.	Severe Weather	Coeur d'Alene Tribe	70	Short-term

Table 72. Potential Mitigation Activities for Policy Related Activities (1000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-1015	Form and staff a **Tribal Emergency Operation Center** (EOC) of the Coeur d'Alene Reservation.	All Hazards	Coeur d'Alene Tribe	70	Short-term
PLU-1016	Update existing **City of Plummer Comprehensive Plan** to incorporate hazard mitigation recommendations in this plan. Integrate specific hazard mitigation planning to include storm water, flooding and other hazards.	All Hazards	City of Plummer	66	Long-term
TEN-1017	Write a **City of Tensed Comprehensive Plan** to incorporate hazard mitigation recommendations in this plan. Integrate specific hazard mitigation planning to include flooding.	All Hazards	City of Tensed	67	Long-term
StM-1018	Update existing **City of St. Maries Comprehensive Plan** to incorporate hazard mitigation recommendations in this plan. Integrate specific hazard mitigation planning to include more concrete wording for dealing with flood prone areas in terms of development and impacts to the floodway.	All Hazards (especially Flood)	City of St. Maries	69	Long-term
WOR-1019	Update existing **City of Worley Comprehensive Plan** to incorporate hazard mitigation recommendations in this plan. Integrate specific hazard mitigation planning to include storm water, flooding, expansive soils, and other hazards.	All Hazards	City of Worley	68	Long-term
Cd'AT-1020	Develop **Minor Home Repair Program** and obtain grant funding support to award low-interest or deferred loans for emergency preparedness repairs to low income resident homeowners on the Coeur d'Alene Reservation.	All Hazards	Coeur d'Alene Tribe, area jurisdictions.	68	Mid-term
Cd'AT-1021	Develop a **flood response plan** to identify the activation of the EOC, emergency responses, human safety and health, and warning systems in advance of approaching flood hazards.	Flood	Coeur d'Alene Tribe	70	Immediate
Cd'AT-1022	Consider a **Floodplain Ordinance** for the Coeur d'Alene Reservation to restrict the building of structures and infrastructure within the Coeur d'Alene Reservation to include new construction and substantial value structure remodeling. This depends on Project No. 1001 being implemented.	Flood	Coeur d'Alene Tribe	70	Long Term
Cd'AT-1023	Initiate the service of incorporating **high wind warnings** to the operation of the EOC. Work with residents to identify and mitigate high wind hazard components of buildings and vegetation surrounding homes and power lines.	Severe Weather	Coeur d'Alene Tribe	70	Immediate

Table 72. Potential Mitigation Activities for Policy Related Activities (1000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-1024	Initiate **training in the Incident Command System** (ICS) for all employees that may be used during emergency situations.	All Hazards	Coeur d'Alene Tribe	70	Short-term
Cd'AT-1025	Coeur d'Alene Tribe to develop, adopt, and implement a **Cultural Awareness Program** related to the treatment and response to culturally sensitive sites and situations to be delivered to all Tribal department staff involved in potential response to hazard events and pre-disaster mitigation measures.	Flood	Coeur d'Alene Tribe	70	Immediate
Cd'AT-1026	Initiate the **update of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan** starting 3 years from the effective date of this plan to guarantee the resources for personnel, funding, and integration with other Coeur d'Alene Tribe objectives leading to an updated Tribal Hazards Mitigation Plan within 5 years.	All Hazards	Coeur d'Alene Tribe	70	Long-term
Cd'AT-1027	Integrate a **geotechnical site review** into the Planning and Zoning policies of the Coeur d'Alene Tribe for all new site subdivisions, new building sites within identified high risk areas, and remodeling activities of existing structures with a value equal to or greater than 50% of the total structure value before remodeling, to check for **expansive soils and expansive clays** and implement program to deal with the challenges faced.	Expansive Soils & Clays	Coeur d'Alene Tribe	70	Long-term
Cd'AT-1028	**Enact updates to Planning and Zoning** policies, discourage new structure developments that are not pre-mitigated for targeted hazards, but located in hazard prone areas as identified in this plan for each of the high risk areas. Use recommended structure protection strategies as appropriate.	All Hazards	Coeur d'Alene Tribe	70	Long-term
PLU-1029	Participate in and become officially registered in the **StormReady** Community Program.	Severe Weather	City of Plummer, NOAA	70	Short-term
StM-1030	Participate in and become officially registered in the **StormReady** Community Program.	Severe Weather	City of St. Maries, NOAA	70	Short-term
TEN-1031	Participate in and become officially registered in the **StormReady** Community Program.	Severe Weather	City of Tensed, NOAA	70	Short-term
WOR-1032	Continue participation and official registration in the **StormReady** Community Program.	Severe Weather	City of Worley, NOAA	70	Short-term

Table 72. Potential Mitigation Activities for Policy Related Activities (1000 series).					
Project Number	**Project Description**	**Type of Project**	**Responsible Organization**	**STAPLEE Score**	**Implementation Time Frame**
BEN-1033	Participate in, and become officially registered in the **StormReady** Community Program.	Severe Weather	Benewah County, NOAA	70	Short-term
KOT-1034	Continue participation and official registration in the **StormReady** Community Program.	Severe Weather	Kootenai County, NOAA	70	Short-term
Cd'AT-1035	Develop Coeur d'Alene Tribe **Planning and Zoning Policy** to encourage or require new developments in the Wildland-Urban Interface to make initial installation of **home defensibility space around new structures,** and then maintain them.	Wildfire	Coeur d'Alene Tribe	66	Short-term
Cd'AT-1036	Explore the logistical reality and funding opportunities to implement a new **fire protection district** in the **community of Benewah Valley** and seek resources to make this plan a reality, (coordinates with Item Cd'AT-3019).	All Hazards	Coeur d'Alene Tribe, Benewah County	70	Long-term
Cd'AT-1037	Continue participation in the **Panhandle Storm water & Erosion Education Program (SEEP)** sponsored by the Panhandle Area Council to distribute information and increase awareness and skills of construction professionals working on the **Coeur d'Alene Reservation**.	Flood, Landslides	Coeur d'Alene Tribe	70	Short-term
PLU-1038	Participate in the **Panhandle SEEP** sponsored by the Panhandle Area Council to distribute information and increase awareness and skills of construction professionals in the **City of Plummer**.	Flood, Landslides	City of Plummer, Coeur d'Alene Tribe, Benewah County	70	Short-term
StM-1039	Participate in the **Panhandle SEEP** sponsored by the Panhandle Area Council to distribute information and increase awareness and skills of construction professionals in the **City of St. Maries**.	Flood, Landslides	City of St. Maries, Coeur d'Alene Tribe, Benewah County	70	Short-term
TEN-1040	Participate in the **Panhandle SEEP** sponsored by the Panhandle Area Council to distribute information and increase awareness and skills of construction professionals in the **City of Tensed**.	Flood, Landslides	City of Tensed, Coeur d'Alene Tribe, Benewah County	70	Short-term
WOR-1041	Participate in the **Panhandle SEEP** sponsored by the Panhandle Area Council to distribute information and increase awareness and skills of construction professionals in the **City of Worley**.	Flood, Landslides	City of Worley, Coeur d'Alene Tribe, Kootenai County	70	Short-term

Table 72. Potential Mitigation Activities for Policy Related Activities (1000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
BEN-1042	Continue participation in the **Panhandle SEEP** sponsored by the Panhandle Area Council to distribute information and increase awareness and skills of construction professionals in the unincorporated areas of **Benewah County**.	Flood, Landslides	Benewah County	70	Short-term
KOT-1043	Continue participation in the **Panhandle SEEP** sponsored by the Panhandle Area Council to distribute information and increase awareness and skills of construction professionals in the unincorporated areas of **Kootenai County**.	Flood, Landslides	Kootenai County	70	Short-term
Cd'AT-1044	Create a **Tribal Position of Emergency Manager** to coordinate hazard mitigation projects for the Coeur d'Alene Tribe, to be involved with policy administration of planning and zoning activities, and to coordinate with other entities in matters concerning disaster mitigation on the Coeur d'Alene Reservation.	All Hazards	Coeur d'Alene Tribe	64	Long-term
Cd'AT-1045	Collect existing information and develop then deliver **educational programs** to educate homeowners on best management practices for building within floodplains and along levees.	Flood	Coeur d'Alene Tribe	70	Short-term
Cd'AT-1046	Coeur d'Alene Tribe to develop and share with other departments a **Wildfire Decision Support System** inclusive of responses within the Coeur d'Alene Reservation and along the Coeur d'Alene Trail.	Wildfire	Coeur d'Alene Tribe	70	Immediate
Cd'AT-1047	Coeur d'Alene Tribe to provide a mechanism for the inspection of buildings it constructs within the exterior boundaries of the Coeur d'Alene Reservation.	All Hazards	Coeur d'Alene Tribe	70	Immediate
Cd'AT-1048	**Determine status of unknown site conditions** upstream of DeSmet, along the Sanders Road, where **buried materials** appear at the surface as mounds potentially containing contaminants. Site may need cleanup to prevent future exposure from a disaster event.	All Hazards	Coeur d'Alene Tribe	65	Short-term
Cd'AT-1049	**Determine status of unsupervised City Dump sites** within the Coeur d'Alene Reservation, where **buried materials** appear that may potentially contain contaminants (human health risk). Site may need cleanup to prevent future exposure from a disaster event.	All Hazards	Coeur d'Alene Tribe	65	Short-term

Table 72. Potential Mitigation Activities for Policy Related Activities (1000 series).					
Project Number	**Project Description**	**Type of Project**	**Responsible Organization**	**STAPLEE Score**	**Implementation Time Frame**
Cd'AT-1050	Develop **public outreach and educational materials** specific to the Coeur d'Alene Reservation to provide information to all ages, as appropriate, **concerning natural disasters**, using examples of local conditions, mitigation measures, and success stories including cultural sensitivity to historical places. Include written materials, multi-media presentations, self-guided tours through "standing displays" erected at locations such as Tribal Long Houses and schools, and other media as deemed appropriate.	All Hazards	Coeur d'Alene Tribe	68	Intermediate

Table 73. Potential Mitigation Activities to Reduce Loss Potential (2000 series).					
Project Number	**Project Description**	**Type of Project**	**Responsible Organization**	**STAPLEE Score**	**Implementation Time Frame**
Cd'AT-2001	Develop **evacuation sites** and improve defensible space for evacuation along all Reservation roads.	All Hazards	Coeur d'Alene Tribe, Benewah County and Kootenai County Emergency Management Departments	67	Immediate
Cd'AT-2002	Seek project funding for needed **roofing improvements**, and implement the improvements, especially for low income families and Tribal housing, related to severe weather events such as high winds within the **Coeur d'Alene Reservation**.	Severe Weather	Coeur d'Alene Tribe	64	Mid-term
Cd'AT-2003	**Structural Landslide Protection** of private structures and public structures: identification of public assistance money, design and implementation of structural enhancements and access stabilization within the **Coeur d'Alene Reservation**.	Landslide	Coeur d'Alene Tribe	64	Short-term
Cd'AT-2004	**Expansive Soil and Expansive Clay Damage Protection** of private structures and public structures: identification of public assistance money, design and implementation of structural enhancements and access route stabilization within the **Coeur d'Alene Reservation**.	Expansive soils & Clays	Coeur d'Alene Tribe	64	Short-term

Table 73. Potential Mitigation Activities to Reduce Loss Potential (2000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-2005	**Wildfire Mitigation Protection** of private structures and public structures: identification of public assistance money, design and implementation of wildfire protection to homes and access within the **Coeur d'Alene Reservation**.	Wildfire	Coeur d'Alene Tribe	64	Short-term
Cd'AT-2006	**Flood and Storm Water Protection** of private structures and public structures: identification of public assistance money, design and implementation of structural enhancements and access stabilization against water damages within the **Coeur d'Alene Reservation**.	Flood and Storm Water	Coeur d'Alene Tribe	64	Short-term
Cd'AT-2007	Seek project funding, and identify exposed and **unreinforced masonry or brick chimney** structures, then design improvements and reinforce these structures to correct the risk to public safety within the **Coeur d'Alene Reservation**.	Earthquake	Coeur d'Alene Tribe	64	Short-term
Cd'AT-2008	Launch **public education program** and demonstrate techniques to **protect homes from wildfire risks** within the Coeur d'Alene Reservation. Demonstrate enhancement maintenance efforts for the long-term.	Wildfire	Coeur d'Alene Tribe	68	Long-term
Cd'AT-2009	Develop implementation plan to address **flooding to the Trail of the Coeur d'Alenes** on the east side of Coeur d'Alene Lake between Round Lake Access Area and Shingle Bay. Relocate rest area facilities (toilets) and take appropriate hazard mitigation actions.	Flood	Coeur d'Alene Tribe	68	Short-term
BEN-2010	Develop and implement **road/stream crossing failure corrections** west of Sanders at **Old Sanders Road crossing of Mineral Creek**.	Flood	Benewah County, Coeur d'Alene Tribe	64	Immediate

Table 74. Potential Mitigation Activities to Enhance Resources and Capabilities (3000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-3001	**Evaluate all stream/road crossings** on the Coeur d'Alene Reservation and create database of location, crossing type, flow characteristics, and needed changes to improve storm water and flood water conveyance. Implement recommendations to improve stream crossings.	Flood	Coeur d'Alene Tribe	67	Short-term

Table 74. Potential Mitigation Activities to Enhance Resources and Capabilities (3000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-3002	Improve **US95 stream crossing over Hangman Creek** where bridges and culverts lead to excessive water damming during high water flows and change the characteristics of the floodplain.	Flood	Coeur d'Alene Tribe, State of Idaho Transportation Department	70	Immediate
Cd'AT-3003	**Remove two bridge crossings in Hangman Creek** drainage between DeSmet and Tekoa that cause excessive water damming during high water flows thereby negatively changing the characteristics of the floodplain.	Flood	Benewah County, Coeur d'Alene Tribe	62	Immediate
Cd'AT-3004	Purchase and install **back-up generators** for evacuation site needs during emergencies.	All Hazards	Coeur d'Alene Tribe	68	Short-term
Cd'AT-3005	Enter into the **StormReady Program** and facilitate the placement of a NOAA weather radio tower on the Reservation. Work with NOAA to implement program.	All Hazards	Coeur d'Alene Tribe, NOAA	69	Immediate
Cd'AT-3006	Purchase radios, repeaters and associated equipment to make all radio communication departments on the Reservation **P-25 compliant**.	All Hazards	Coeur d'Alene Tribe, Idaho Dept. Lands, BLM, BIA, Benewah County, Kootenai County	69	Immediate
Cd'AT-3007	**Develop** an all-jurisdiction / all-agency **communication plan**.	All Hazards	Coeur d'Alene Tribe, BLM, BIA, Benewah County, Kootenai County, Idaho Dept. Lands.	70	Short-term
Cd'AT-3008	**Radio System Coverage Enhancement**. Enhance radio communications throughout Coeur d'Alene Reservation by locating **radio repeaters** in strategic locations to allow coverage in several remote areas accessed by emergency responders. Include narrow band repeater capabilities and program specific radio frequency (Natural Resources Department)	All Hazards	Coeur d'Alene Tribe, working with the BLM, BIA, Benewah County, Kootenai County, Idaho Dept. Lands	69	Mid-term
Cd'AT-3009	**Fire Department Training Opportunities:** develop custom training programs for firefighting on the Coeur d'Alene Reservation and implement training for all fire department staff and volunteers on the Coeur d'Alene Reservation.	All Hazards	Coeur d'Alene Tribe and all Fire Districts	70	Short-term
Cd'AT-3010	Coeur d'Alene Tribe to sponsor and host **training opportunities** for all cooperators on the Reservation in coordination with American Red Cross to conduct **volunteer and first-responder training**.	All Hazards	Coeur d'Alene Tribe	70	Short-term

Table 74. Potential Mitigation Activities to Enhance Resources and Capabilities (3000 series).					
Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-3011	**Update the Coeur d'Alene Tribe Law Enforcement Office Command Center** for improved communications, internet connectivity, and facilitate emergency responder multi-jurisdictional coordination.	All Hazards	Coeur d'Alene Tribe	68	Short-term
Cd'AT-3012	Purchase and deploy miscellaneous **equipment for police and fire** to outfit personnel while responding to natural disaster events on the Coeur d'Alene Reservation.	All Hazards	Coeur d'Alene Tribe Police	68	Short-term
Cd'AT-3013	**Training** for all emergency response staff in the **Incident Command System** – all levels; 100, 200, 300, 400	All Hazards	Coeur d'Alene Tribe – All Emergency Response Depts.	70	Immediate
Cd'AT-3014	Develop and implement plans for the establishment of an **Evacuation Center**, large generators, portable showers, portable toilets.	All Hazards	Coeur d'Alene Tribe	65	Short-term
Cd'AT-3015	Identify high quality **communication tower locations for cellular communications**, negotiate land leases (when needed) and work with commercial Cellular phone providers to install and activate services.	All Hazards	Coeur d'Alene Tribe	70	Short-term
Cd'AT-3016	Acquire **Radio Station** equipment, license its use, and begin using as a public service station for residents and visitors to the Coeur d'Alene Reservation that can be activated during emergency situations.	All Hazards	Coeur d'Alene Tribe	65	Mid-term
Cd'AT-3017	Install **gas pump on emergency generator** in case of power outage in Plummer for use by emergency vehicles.	All Hazards	Coeur d'Alene Tribe	63	Immediate
Cd'AT-3018	Develop a scenario to provide **fire protection to the communities in Benewah Valley**. Include fire apparatus, facilities, communications equipment, training and other support to the protection area. Consider new fire protection district or expansion of existing districts into this area (coordinates with Item Cd'AT-1038).	Wildfire	Coeur d'Alene Tribe, Benewah County, City of Tensed, City of St. Maries, City of Plummer	66	Intermediate
BEN-3019	Purchase a **water based hovercraft** for use in emergency rescue along the St. Joe River and in the lakes of the area where traditional watercraft cannot navigate and during periods of ice.	Flood	Benewah County, Coeur d'Alene Tribe (benefit to St. Maries Fire District rescue staff)	68	Short-term
StM-3020	Deploy **storm water pumping system** on the shores of the St. Joe River and surface drainage in the City and within the Coeur d'Alene Reservation.	Flood	City of St. Maries, Coeur d'Alene Tribe	68	Short-term
TEN-3021	Install 10 **fire hydrants** within the city, connect to central water supply system.	Wildfire	City of Tensed	69	Mid-term

Table 74. Potential Mitigation Activities to Enhance Resources and Capabilities (3000 series).					
Project Number	**Project Description**	**Type of Project**	**Responsible Organization**	**STAPLEE Score**	**Implementation Time Frame**
TEN-3022	Update the City of Tensed's Emergency Services Providers for **improved communications**, internet connectivity, and facilitating emergency responder coordination.	All Hazards	City of Tensed	69	Mid-term
Cd'AT-3023	Acquire and deploy **narrow track vehicle** with water holding capacity, pump, and hose, that can also carry hand tools and a limited number (2) of staff to provide **initial wildfire attack** to wildfires along the **Trail of the Coeur d'Alenes**.	Wildfire	Coeur d'Alene Tribe	65	Immediate
Cd'AT-3024	Establish **improved access along the Alder Creek Road** from Alder Flats to St. Maries River Road. Include wildfire fuels reduction, road surfacing and widening, and grade moderation.	Wildfire	Coeur d'Alene Tribe, Benewah County	63	Short-term
Cd'AT-3025	Acquire "**Fire Boat**" for quick response uses by the Coeur d'Alene Tribe and Fire Departments on the Coeur d'Alene Reservation to respond to wildfire ignitions adjacent to Coeur d'Alene Lake, equipped with pumps, hose, and other response equipment.	Wildfire	Coeur d'Alene Tribe	63	Short-term
Cd'AT-3026	Acquire "**Emergency EMT/Rescue Boat**" for quick response uses by the Coeur d'Alene Tribe and Fire Departments on the Coeur d'Alene Reservation to respond to emergencies adjacent to Coeur d'Alene Lake, equipped needed response equipment.	Wildfire	Coeur d'Alene Tribe	62	Short-term
Cd'AT-3027	Identify preferred **emergency response routes** for use on the Coeur d'Alene Reservation that can be used by heavy emergency equipment to avoid weight limited bridges, grades, and narrow access points.	All Hazards	Coeur d'Alene Tribe	68	Short-term
Cd'AT-3028	Acquisition of transportation trailer and truck for dozer and excavator for the Natural Resources – Fisheries Department in support of disaster mitigation and emergency preparedness.	All	Coeur d'Alene Tribe	68	Short-term
Cd'AT-3029	Conduct staff training for emergency response management for operating equipment and radio communications.	All	Coeur d'Alene Tribe	70	Short-term
Cd'AT-3030	Acquisition of generators, equipment trailers, and snow plows for emergency response needs of the Tribal Housing Authority.	All	Coeur d'Alene Tribe	69	Short-term
Cd'AT-3031	Acquisition of shelters and meals for emergency response needs of the Tribal Housing Authority.	All	Coeur d'Alene Tribe	68	Short-term

Table 74. Potential Mitigation Activities to Enhance Resources and Capabilities (3000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-3032	Acquisition of road grader, and 1-ton service vehicle for the Tribal Public Works Department for emergency response needs.	All	Coeur d'Alene Tribe	67	Short-term
Cd'AT-3033	Acquisition of emergency communications devices for emergency response needs of the Tribal Housing Authority and Public Works Departments.	All	Coeur d'Alene Tribe	69	Short-term
Cd'AT-3034	Replacement spill kits for the Lake Management Department on a continuous basis.	All	Coeur d'Alene Tribe	70	Immediate
Cd'AT-3035	Acquisition of water tender and funding for equipment operators to provide protection against wildfire for the Natural Resources Department.	Wildfire	Coeur d'Alene Tribe	65	Immediate
Cd'AT-3036	Upgrade water distribution system in DeSmet to provide fire protection water storage, sufficient flow in adequate sized distribution mains, and adequately spaced fire hydrants to protect buildings in DeSmet.	All	Coeur d'Alene Tribe	68	Immediate
Cd'AT-3037	Acquire emergency backup generators and install them at wells (x3), wastewater treatment plants (x1), Tribal Headquarters (continuity of government, x1).	All	Coeur d'Alene Tribe	69	Immediate

Table 75. Potential Mitigation Activities to Change Characteristics of Risk (4000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-4001	**Restore the condition of Hangman Creek and Little Hangman Creek floodplain and wetlands** to "natural" condition by addressing farming practices (plowing to the river's bank, drainage tiles within the wetlands), forestry (clearcutting to the river's bank), road crossings (Andrews Spring Creek, 3300 Road) that narrow the stream channel causing flood water storage pooling upstream and channel cutting downstream, and housing in the valley. Establish normal function to the floodplain.	Flood	Coeur d'Alene Tribe	61	Long-term
Cd'AT-4002	**Build up the retaining pools around the DeSmet Waste Water Treatment pools** along the King Valley drainage leading to Hangman Creek, to elevate the protection against floodwaters entering facility's waters. Levee system needs to create a barrier at least 3 feet higher than current protection.	Flood	Coeur d'Alene Tribe	67	Immediate

Table 75. Potential Mitigation Activities to Change Characteristics of Risk (4000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
TEN-4003	**Build up the retaining pools around the Tensed Waste Water Treatment facility** along the Hangman Creek, to elevate the protection against floodwaters entering facility's waters. Retainment system needs to create a barrier at least 6 feet higher than current protection. Make a short-term fix to the system pending the implementation of mitigation measure TEN-4022, once that mitigation measure is implemented continue with TEN-4023.	Flood	City of Tensed, Coeur d'Alene Tribe, Benewah County	69	Immediate
Cd'AT-4004	**Create Storm Water drainage structures** within City of Plummer to route rain-on-snow events from causing damage to structures along the several drainage pathways in and adjacent to this city.	Flood	Coeur d'Alene Tribe, City of Plummer	70	Short-term
StM-4005	Repair **River Water Gauge** at St. Maries on the St. Joe River.	Flood	City of St. Maries, Benewah County, Coeur d'Alene Tribe	70	Immediate
StM-4006	Repair existing **City of St. Maries levee and Mutch Creek outlet** to improve water distribution.	Flood	City of St. Maries, Benewah County, Coeur d'Alene Tribe	67	Immediate
PLU-4007	**Storm water** drainage system design and implementation within **City of Plummer** to link storm water drainage into Plummer Creek.	Flood	City of Plummer, Benewah County, Coeur d'Alene Tribe	67	Mid-term
TEN-4008	**Storm water** drainage system design and implementation within **City of Tensed** to link storm water drainage into Hangman Creek.	Flood	City of Tensed, Benewah County, Coeur d'Alene Tribe	67	Mid-term
WOR-4009	**Storm water** drainage system design and implementation within **City of Worley** to link storm water drainage into Rock Creek.	Flood	City of Worley, Kootenai County, Coeur d'Alene Tribe	67	Mid-term
Cd'AT-4010	Inspect **Tribal Offices and other structures for snow-load capability** and retrofit (using budgets and grant funding) where appropriate and continue effort to create a snow removal plan.	Severe Weather	Coeur d'Alene Tribe, Benewah County, Kootenai County	67	Long-term
Cd'AT -4011	Establish a site location for a **NOAA Weather Radio Tower Repeater** in collaboration between **Benewah County, Kootenai County, and the National Weather Service** for participation in the **StormReady Program**.	All Hazards	Coeur d'Alene Tribe, with the National Weather Service	68	Immediate
Cd'AT-4012	Construct a **wildfire fuel break around the interoperable communications facilities** located on Plummer Butte.	Wildfire	Coeur d'Alene Tribe	68	Short-term
Cd'AT-4013	**Harden the propane tanks** at the interoperable radio towers located at Plummer Butte.	Wildfire	Coeur d'Alene Tribe	68	Short-term

Table 75. Potential Mitigation Activities to Change Characteristics of Risk (4000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-4014	Improve road conditions to install **fuel break corridors** to provide safe evacuation routes and provide safety for responding emergency personal (site distance and fuel load).	Wildfire	Coeur d'Alene Tribe, Idaho Department of Lands, and Bureau of Land Management	68	Short-term
IDA-4015	**Bridge debris flow and ice buildup handling** enhancement at US95 crossings of all streams to facilitate better water flow at these points.	Flood	Coeur d'Alene Tribe, Idaho Transportation Department	63	Mid-term
Cd'AT-4016	Improve **storm water runoff/drainage** around the Coeur d'Alene Tribe's Wellness Center (north of and adjacent to, the City of Plummer), to address rain-on-snow water accumulations that flood the parking area and the building. Re-route the water flow to the natural drainage in the area.	Flood	Coeur d'Alene Tribe, Benewah County, City of Plummer	69	Immediate
TEN-4017	Identify a suitable **route for the City of Tensed to access the sewer lagoons** in Tensed, acquire legal access, and build an all season road to the sewer treatment site.	Flood	City of Tensed, Benewah County, Coeur d'Alene Tribe	69	Immediate
IDA-4018	Implement **major revision of US95** from Worley to the southern exit to the Coeur d'Alene Reservation in order to improve stream crossings that are limiting for high water passage, ice jam flooding in winter, and access limitations. Elevate the free-board at all stream crossings to guarantee high water passage that does not constrict the drainages during high water events.	Flood	State of Idaho in consultation with the Coeur d'Alene Tribe, Kootenai County, and Benewah County	58	Long-term
TEN-4019	**Relocate the Tensed Waste Water Treatment facility** to a location outside the Hangman Creek floodplain, to elevate the potential of floodwaters entering facility's waters. Make the relocation a long-term fix to the system.	Flood	City of Tensed, Coeur d'Alene Tribe, Benewah County	60	Long-term
TEN-4020	**Retire the Tensed Waste Water Treatment facility** along Hangman Creek to remove the potential of contamination of the stream system while returning the site to an optimally functioning component of the floodplain.	Flood	City of Tensed, Coeur d'Alene Tribe, Benewah County	60	Immediate
Cd'AT-4021	**Increase runoff retention** through wetland restoration, removal of infrastructure from the floodplain. Apply this mitigation measure to numerous watersheds across the Coeur d'Alene Reservation.	Flood	Coeur d'Alene Tribe	61	Immediate
Cd'AT-4022	**Restoration of stream channels** and their riparian zones to slow flood water velocities, apply this mitigation measure to numerous watersheds across the Coeur d'Alene Reservation.	Flood	Coeur d'Alene Tribe	61	Immediate

Table 75. Potential Mitigation Activities to Change Characteristics of Risk (4000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-4023	Coordinate with City of Worley to assess status of **Worley Waste Water Treatment Facility** capacity and effectiveness.	Flood	Coeur d'Alene Tribe, City of Worley	60	Short-term
Cd'AT-4024	Develop a plan to restore the **natural levee system along the St. Joe River** that may include engineered log jams, debris catchment devices, and other features. Develop program and funding to reestablish the aquatic ecosystem, obtain Tribal Council Adoption of the measures, and then implement and maintain the project.	Flood	Coeur d'Alene Tribe	55	Long-term
ITD-4025	**Re-engineer the stream crossing** in the City of Plummer of **Plummer Creek crossing US Highway 95** to facilitate high water flows common during rain-on-snow events in January and February of "normal years".	Flood	Idaho Transportation Department, Coeur d'Alene Tribe, City of Plummer,	60	Short-term
Cd'AT-4026	**Develop floodplain encroachment plan at Camp Larson** to lessen the impacts of floodwaters in this camp considering armoring and facility modifications.	Flood	Coeur d'Alene Tribe	70	Short-term
Cd'AT-4027	**Develop and implement plan for debris catchment at Chatcolet Trestle** to address water carried debris that accumulates at the trestle during and after high flood events.	Flood	Coeur d'Alene Tribe	70	Short-term
Cd'AT-4028	Evaluate and develop corrective actions for **road/stream crossings (bridges and culverts) within the Little Hangman Creek watershed (Lovell Valley)** to reestablish hydrologic functioning for fisheries and water quality. At least 5 locations identified.	Flood	Coeur d'Alene Tribe	65	Intermediate
Cd'AT-4029	**Sheep Creek Restoration Project** implementation for restoring aquatic functioning in respect to riparian vegetation, wildlife, and floodplain operation.	Flood	Coeur d'Alene Tribe	65	Long-term
Cd'AT-4030	**Johnson Property Restoration Project** within the Benewah Valley implementation of project for restoring aquatic functioning in respect to riparian vegetation, wildlife, and floodplain operation.	Flood	Coeur d'Alene Tribe	65	Long-term
Cd'AT-4031	**Plummer Creek road crossing improvement** (culvert replacement and sizing) downstream of Plummer and northwest of Turkey Trot Trail.	Flood	Coeur d'Alene Tribe	65	Intermediate
Cd'AT-4032	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes south of and within **Lake Creek Drainage**, located south of Camp Four Echoes.	Wildfire	Coeur d'Alene Tribe	63	Short-term
Cd'AT-4033	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes within **Sixteen-to-One Bay** and on slopes adjacent to Coeur d'Alene Lake.	Wildfire	Coeur d'Alene Tribe	63	Short-term

Table 75. Potential Mitigation Activities to Change Characteristics of Risk (4000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-4034	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes within **Cottonwood Bay** and on slopes adjacent to Coeur d'Alene Lake.	Wildfire	Coeur d'Alene Tribe	63	Short-term
Cd'AT-4035	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes within **Conkling Park** and on slopes adjacent to Coeur d'Alene Lake.	Wildfire	Coeur d'Alene Tribe	63	Short-term
Cd'AT-4036	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes within the northern slopes of **Worley Mountain** bounded by US95 on the east and the City of Worley to the north..	Wildfire	Coeur d'Alene Tribe	62	Short-term
Cd'AT-4037	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on sites adjacent to the **Trail of the Coeur d'Alenes** between Plummer and Chatcolet Lake by reducing flashy fuels adjacent to the trail, eliminating noxious weeds adjacent to the trail, and other factors to reduce ignitibility.	Wildfire	Coeur d'Alene Tribe	66	Short-term
Cd'AT-4038	Continue to implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes surrounding the **Tribal Headquarters at Agency**, between Plummer and Mowry.	Wildfire	Coeur d'Alene Tribe	66	Short-term
Cd'AT-4039	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes located within Plummer Butte and extending northward to forested areas adjacent to Plummer.	Wildfire	Coeur d'Alene Tribe	66	Short-term
Cd'AT-4040	Implement Wildland-Urban Interface **wildfire fuel reduction activity of prescribed fire** on landscapes located along ridgeline separating Hangman Creek and Little Hangman Creek where forested vegetation is present.	Wildfire	Coeur d'Alene Tribe	65	Short-term
Cd'AT-4041	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes adjacent to **Lolo Pass** between Benewah Creek Road and the Benewah Valley.	Wildfire	Coeur d'Alene Tribe	64	Short-term
Cd'AT-4042	Implement Wildland-Urban Interface **wildfire fuel reduction activity** on landscapes adjacent to **Windfall Pass** between BIA Route 26/Windfall Pass Road and the Benewah Valley. Include activities to reduce wildfire fuels and make road improvements for emergency access.	Wildfire	Coeur d'Alene Tribe	64	Short-term
Cd'AT-4043	Implement Wildland-Urban Interface **wildfire fuel reduction activity of prescribed fire and fuels mastication** on landscapes located west of DeSmet, and west of BIA Route 37/King Valley, south of DeSmet Road on forested lands.	Wildfire	Coeur d'Alene Tribe	65	Short-term

Table 75. Potential Mitigation Activities to Change Characteristics of Risk (4000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
Cd'AT-4044	Implement Wildland-Urban Interface **wildfire fuel reduction activity of prescribed fire** on landscapes located north of DeSmet Road, within the area known as Ni'lukhwalqw Gap on forested lands.	Wildfire	Coeur d'Alene Tribe	64	Short-term
Cd'AT-4045	Implement Wildland-Urban Interface **wildfire fuel reduction activity of prescribed fire** on landscapes located **south of DeSmet Road, and east of Farmington Road** on forested lands.	Wildfire	Coeur d'Alene Tribe	65	Short-term
Cd'AT-4046	Implement Wildland-Urban Interface **wildfire fuel reduction activity of fuels mastication** on landscapes located within the **Pedee Creek watershed** on forested lands.	Wildfire	Coeur d'Alene Tribe	62	Short-term
Cd'AT-4047	Implement Wildland-Urban Interface **wildfire fuel reduction activities** on forested landscapes located **south of State Route 5 between Rocky Point and Parkline (Chetkwe'lkw'l Meadow).**	Wildfire	Coeur d'Alene Tribe	66	Short-term
Cd'AT-4048	Implement Wildland-Urban Interface **wildfire fuel reduction activity leading to a fuel break** on landscapes located within the Coon Creek Drainage near the Benewah Creek Road.	Wildfire	Coeur d'Alene Tribe	66	Short-term
Cd'AT-4049	Implement Wildland-Urban Interface **wildfire fuel reduction activities including fuel reduction, prescribed burning, and fuels mastication** on landscapes located within the **Hells Gulch Road** area extending westerly to Indian Mountain, easterly to Sharp Top (mountain), northerly to Grassy Mountain, and southerly to Deep Creek.	Wildfire	Coeur d'Alene Tribe	62	Short-term
Cd'AT-4050	**Evaluate and repair** stream/road crossing at BIA Route 11 / **Agency Road**, within the City of Plummer, crossing **Plummer Creek**, south of the Lumber Mill, to enhance crossing attributes for water conveyance.	Flood	Coeur d'Alene Tribe	67	Short-term
Cd'AT-4051	**Evaluate and repair** stream/road crossings near **Fairfield Road**, adjacent to the City of Plummer, crossing **Fairfield Creek**, to address the stream rerouting that caused 90º turns in the stream to avoid entering the City while endangering the structures located to the north of the City of Plummer.	Flood & storm water	Coeur d'Alene Tribe	66	Short-term
Cd'AT-4052	**Rehabilitate waste water treatment plant being retired by the City of Plummer** to restore the site to optimally functioning riparian zone within the Plummer Creek Watershed.	Flood	Coeur d'Alene Tribe, City of Plummer	64	Short-term

Table 75. Potential Mitigation Activities to Change Characteristics of Risk (4000 series).

Project Number	Project Description	Type of Project	Responsible Organization	STAPLEE Score	Implementation Time Frame
BLM-4053	Fuel's reduction along the BLM Windy Bay Recreation Site (described in Section 5.4.7.5)	Wildfire	Bureau of Land Management, Coeur d'Alene Tribe	67	Mid-term
BLM-4054	Windy Bay Rough Fescue Project (described in Section 5.4.7.5)	Wildfire	Bureau of Land Management, Coeur d'Alene Tribe	68	Mid-term

7.3.5. Proposed Mitigation Measures STAPLEE Scores

STAPLEE Scores have been subjectively determined for each project proposed in Table 72 – Table 75 and are presented numerically in Table 76 – Table 79.

Table 76. STAPLEE Scores for 1000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-1001	10	10	9	9	10	10	10	68
Cd'AT-1002	10	10	10	10	10	10	10	70
Cd'AT-1003	10	10	9	10	10	10	10	69
Cd'AT-1004	10	10	10	10	10	10	10	70
Cd'AT-1005	10	9	9	10	10	9	10	67
Cd'AT-1006	10	10	10	10	10	10	10	70
Cd'AT-1007	10	10	10	10	10	10	10	70
Cd'AT-1008	10	10	10	10	10	10	10	70
Cd'AT-1009	10	10	10	10	10	10	10	70
Cd'AT-1010	10	10	10	10	10	10	10	70
Cd'AT-1011	10	10	10	10	10	10	10	70
Cd'AT-1012	10	10	10	10	10	10	10	70
Cd'AT-1013	10	10	10	10	10	10	10	70
Cd'AT-1014	10	10	10	10	10	10	10	70
Cd'AT-1015	10	10	10	10	10	10	10	70
PLU-1016	9	9	9	9	10	10	10	66
TEN-1017	10	9	9	9	10	10	10	67
StM-1018	10	10	9	10	10	10	10	69
WOR-1019	10	10	9	10	10	9	10	68
Cd'AT-1020	10	10	9	10	9	10	10	68
Cd'AT-1021	10	10	10	10	10	10	10	70
Cd'AT-1022	10	10	10	10	10	10	10	70
Cd'AT-1023	10	10	10	10	10	10	10	70
Cd'AT-1024	10	10	10	10	10	10	10	70
Cd'AT-1025	10	10	10	10	10	10	10	70
Cd'AT-1026	10	10	10	10	10	10	10	70
Cd'AT-1027	10	10	10	10	10	10	10	70

Table 76. STAPLEE Scores for 1000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-1028	10	10	10	10	10	10	10	70
PLU-1029	10	10	10	10	10	10	10	70
StM-1030	10	10	10	10	10	10	10	70
TEN-1031	10	10	10	10	10	10	10	70
WOR-1032	10	10	10	10	10	10	10	70
BEN-1033	10	10	10	10	10	10	10	70
KOT-1034	10	10	10	10	10	10	10	70
Cd'AT-1035	9	10	9	9	9	10	10	66
Cd'AT-1036	10	10	10	10	10	10	10	70
Cd'AT-1037	10	10	10	10	10	10	10	70
PLU-1038	10	10	10	10	10	10	10	70
StM-1039	10	10	10	10	10	10	10	70
TEN-1040	10	10	10	10	10	10	10	70
WOR-1041	10	10	10	10	10	10	10	70
BEN-1042	10	10	10	10	10	10	10	70
KOT-1043	10	10	10	10	10	10	10	70
Cd'AT-1044	10	9	9	10	10	6	10	64
Cd'AT-1045	10	10	10	10	10	10	10	70
Cd'AT-1046	10	10	10	10	10	10	10	70
Cd'AT-1047	10	10	10	10	10	10	10	70
Cd'AT-1048	10	9	9	10	9	8	10	65
Cd'AT-1049	10	9	9	10	9	8	10	65
Cd'AT-1050	10	10	9	10	10	9	10	68

Table 77. STAPLEE Scores for 2000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-2001	10	9	9	10	9	10	10	67
Cd'AT-2002	10	9	9	9	10	8	9	64
Cd'AT-2003	10	9	9	9	10	8	9	64
Cd'AT-2004	10	9	9	9	10	8	9	64
Cd'AT-2005	10	9	9	9	10	8	9	64

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-2006	10	9	9	9	10	8	9	64
Cd'AT-2007	10	9	9	9	10	8	9	64
Cd'AT-2008	10	10	10	10	10	8	10	68
Cd'AT-2009	10	10	10	10	10	8	10	68
Cd'AT-2010	10	9	9	10	9	7	10	64

Table 77. STAPLEE Scores for 2000 Series Potential Mitigation Measures.

Table 78. STAPLEE Scores for 3000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-3001	10	9	9	10	10	9	10	67
Cd'AT-3002	10	10	10	10	10	10	10	70
Cd'AT-3003	7	10	8	10	10	7	10	62
Cd'AT-3004	10	10	9	10	10	9	10	68
Cd'AT-3005	10	10	10	10	10	9	10	69
Cd'AT-3006	10	10	10	10	10	9	10	69
Cd'AT-3007	10	10	10	10	10	10	10	70
Cd'AT-3008	10	10	10	10	10	9	10	69
Cd'AT-3009	10	10	10	10	10	10	10	70
Cd'AT-3010	10	10	10	10	10	10	10	70
Cd'AT-3011	10	9	10	10	10	9	10	68
Cd'AT-3012	10	10	9	10	10	9	10	68
Cd'AT-3013	10	10	10	10	10	10	10	70
Cd'AT-3014	10	10	8	10	10	7	10	65
Cd'AT-3015	10	10	10	10	10	10	10	70
Cd'AT-3016	10	9	9	10	9	8	10	65
Cd'AT-3017	10	8	8	9	10	8	10	63
Cd'AT-3018	8	10	8	10	10	10	10	66
BEN-3019	10	10	10	10	10	8	10	68
StM-3020	10	10	10	10	10	8	10	68
TEN-3021	10	10	10	10	10	9	10	69
TEN-3022	10	10	10	10	10	9	10	69
Cd'AT-3023	10	9	10	10	10	6	10	65
Cd'AT-3024	10	8	9	9	10	7	10	63

Table 78. STAPLEE Scores for 3000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-3025	10	8	9	10	10	6	10	63
Cd'AT-3026	10	8	9	10	10	5	10	62
Cd'AT-3027	10	8	10	10	10	10	10	68
Cd'AT-3028	10	10	10	10	10	8	10	68
Cd'AT-3029	10	10	10	10	10	10	10	70
Cd'AT-3030	10	10	10	10	10	9	10	69
Cd'AT-3031	10	10	10	10	10	8	10	68
Cd'AT-3032	10	10	10	10	10	7	10	67
Cd'AT-3033	10	10	10	10	10	9	10	69
Cd'AT-3034	10	10	10	10	10	10	10	70
Cd'AT-3035	10	10	9	10	10	6	10	65
Cd'AT-3036	10	10	9	10	10	9	10	68
Cd'AT-3037	10	10	10	10	10	9	10	69

Table 79. STAPLEE Scores for 4000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-4001	9	8	8	10	9	7	10	61
Cd'AT-4002	10	9	9	10	10	9	10	67
TEN-4003	10	10	10	10	10	9	10	69
Cd'AT-4004	10	10	10	10	10	10	10	70
StM-4005	10	10	10	10	10	10	10	70
StM-4006	10	9	9	10	10	9	10	67
PLU-4007	10	10	9	9	10	10	9	67
TEN-4008	10	10	10	9	10	9	9	67
WOR-4009	10	10	10	9	10	9	9	67
Cd'AT-4010	10	10	10	9	10	9	9	67
Cd'AT-4011	10	10	10	10	10	9	9	68
Cd'AT-4012	10	10	10	10	10	9	9	68
Cd'AT-4013	10	10	10	10	10	9	9	68
Cd'AT-4014	10	10	10	10	10	9	9	68
IDA-4015	10	7	8	8	10	10	10	63

Table 79. STAPLEE Scores for 4000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-4016	10	10	10	10	10	9	10	69
TEN-4017	10	10	10	10	9	10	10	69
IDA-4018	8	8	8	8	8	8	10	58
TEN-4019	8	8	9	10	10	5	10	60
TEN-4020	8	7	9	10	10	6	10	60
Cd'AT-4021	10	8	7	10	9	7	10	61
Cd'AT-4022	10	8	7	10	9	7	10	61
Cd'AT-4023	10	8	7	10	9	6	10	60
Cd'AT-4024	9	6	7	10	8	6	9	55
ITD-4025	10	8	7	10	9	6	10	60
Cd'AT-4026	10	10	10	10	10	10	10	70
Cd'AT-4027	10	10	10	10	10	10	10	70
Cd'AT-4028	10	8	9	10	10	8	10	65
Cd'AT-4029	10	9	10	10	10	6	10	65
Cd'AT-4030	10	9	10	10	10	6	10	65
Cd'AT-4031	10	9	10	10	10	6	10	65
Cd'AT-4032	10	8	8	10	10	7	10	63
Cd'AT-4033	10	8	8	10	10	7	10	63
Cd'AT-4034	10	8	8	10	10	7	10	63
Cd'AT-4035	10	8	8	10	10	7	10	63
Cd'AT-4036	10	8	8	10	10	6	10	62
Cd'AT-4037	10	10	10	10	10	6	10	66
Cd'AT-4038	10	10	10	10	10	6	10	66
Cd'AT-4039	10	10	10	10	10	6	10	66
Cd'AT-4040	10	9	10	10	10	6	10	65
Cd'AT-4041	10	9	9	10	10	6	10	64
Cd'AT-4042	10	9	9	10	10	6	10	64
Cd'AT-4043	10	10	9	10	10	6	10	65
Cd'AT-4044	10	9	9	10	10	6	10	64
Cd'AT-4045	10	10	9	10	10	6	10	65
Cd'AT-4046	10	8	8	10	10	6	10	62

Table 79. STAPLEE Scores for 4000 Series Potential Mitigation Measures.

Project	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Cd'AT-4047	10	10	10	10	10	6	10	66
Cd'AT-4048	10	10	10	10	10	6	10	66
Cd'AT-4049	10	8	8	10	10	6	10	62
Cd'AT-4050	10	9	10	10	10	8	10	67
Cd'AT-4051	10	9	9	10	10	8	10	66
Cd'AT-4052	10	8	9	10	10	7	10	64
BLM-4053	10	9	9	10	10	9	10	67
BLM-4054	10	10	9	10	10	9	10	68

7.3.6. Identification and Analysis of Mitigation Measures

A comprehensive analysis of risk exposure, proposed mitigation measures, human resources, and funding mechanisms (including direct resources, grants and cooperative agreements) can ensure the consideration of a range of actions for each hazard. Within projects identified from Table 72 through Table 75, a collection of 151 potential mitigation measures have been identified. While some of these potential mitigation measures can "stand alone" to accomplish the stated goals of this planning effort, other measures must be implemented in concert with multiple activities to witness measurable change.

An analysis of these potential mitigation measures has revealed that this planning effort ensures consideration of a range of actions for each hazard.

Table 80. Identification and Analysis of Mitigation Measures format suggested by FEMA (March 2010), optional.

	Hazards Identified Per Requirement 201.7(c)(2)(i)		A. Comprehensive Range of Actions and Projects	
Hazard Type	Not a Hazard	Yes	N	S
Avalanche	X		X	
Coastal Erosion	X		X	
Coastal Storm	X		X	
Dam Failure	X		X	
Drought		X		X
Earthquake		X		X
Expansive Soils		X		X
Extreme Heat		X		X
Flood		X		X
Hailstorm		X		X
Hurricane	X		X	
Land Subsidence	X		X	
Landslide		X		X
Severe Winter Storm		X		X
Tornado		X		X
Tsunami	X		X	

Table 80. Identification and Analysis of Mitigation Measures format suggested by FEMA (March 2010), optional.

Hazard Type	Hazards Identified Per Requirement 201.7(c)(2)(i)		A. Comprehensive Range of Actions and Projects	
	Not a Hazard	Yes	N	S
Volcano	X		X	
Wildfire		X		X
Windstorm		X		X

Legend:
201.7(c)(3)(ii) Identification and Analysis of Mitigation Actions
A. Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?

7.4. Monitoring and Maintenance Program

This Progress Report (below) is intended to be reviewed annually and completed by the Coeur d'Alene Tribe Public Works Department staff. Once completed, the progress report and the annual review questionnaire for each Tribal Department will be summarized in an annual report notebook. This notebook of status reports will form the basis for a summary presentation, open to the Coeur d'Alene Reservation public, discussing the status and pending action items related to hazard mitigation and preparedness on the Coeur d'Alene Reservation. If determined necessary by the Public Works Director, the annual progress report and update may be presented to the Tribal Council.

The Coeur d'Alene Tribe Emergency Manager will take the responsibility for meeting with each Tribal Department and cooperating Agency and organization at least annually to discuss ongoing projects, needs, and changes in status of hazard preparedness. These annual meetings will be summarized in written form, then presented and discussed along with the summary to the Tribal Council. These meetings will result in an action plan to deal with the status of preparedness and mitigation measures.

These annual summaries will form the basis for updating the plan, and presenting it to Tribal Council for approval, within a five year cycle. The Coeur d'Alene Tribe Emergency Manager, in cooperation with the Coeur d'Alene Tribe Public Works Department will be responsible for coordinating these efforts. Each project's manager will be responsible for completing these project evaluations as projects are implemented, with the assistance of the Coeur d'Alene Tribe Public Works Department and the Coeur d'Alene Tribe Emergency Manager.

The monitoring of the impacts of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan will be completed formally on an annual basis, but ongoing evaluations of project impacts will be a critical measure of success for improvements and amplifications of the positive benefits of the hazard mitigation ethic expressed in this plan. Monitoring of the positive impacts of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan should be completed at critical event junctures, no less than annually. These critical event junctures include 1) when projects are launched to implement mitigation measures, 2) after disaster events happen within the Coeur d'Alene Reservation or on adjacent lands to determine how specific mitigation measures did positively impact the negative influences of disaster events, or could have benefited the Coeur d'Alene Reservation if implemented, 3) when new developments are proposed for structures or infrastructure and pre-disaster mitigation planning can be implemented to reduce future development losses, and 4) as new scientific data becomes available to cast new understandings about natural disasters on the Coeur d'Alene Reservation leading to increased understanding of risk exposure.

This monitoring of the Coeur d'Alene Reservation Tribal Hazards Mitigation Plan will serve to manage disaster preparedness as an ongoing effort, not a static five-year blueprint that cannot be modified. It should be continually updated and improved so that when the five-year life of this document expires, and it is updated for another five-year cycle, the growth of the hazard mitigation plan can continue to benefit the residents and visitors to the Coeur d'Alene Reservation.

Tribal Hazards Mitigation Plan Progress Report (Annual & Periodic)			
Progress Report Period From (date):		**To (date):**	
Plan Title:	**Coeur d'Alene Reservation Tribal Hazards Mitigation Plan**		
Description of Plan:	**Hazard Preparedness & Disaster Mitigation**		
Implementing Agency:	**Coeur d'Alene Tribe**		
Contact Name:			
Contact E-mail and Number:			
Summary of Progress of Tribal Hazards Mitigation Plan for this Reporting Period			
1. Did any hazard / disaster events occur during this report period? If so, list events.			
2. Did anyone from the public comment on the plan during this reporting period? If so, list the comments.			
3. Were any mitigation projects identified in the Hazard Mitigation Plan implemented during this reporting period?			
4. What obstacles, problems, or delays did any current or ongoing mitigation projects encounter, if any? How were the problems resolved?			

PLAN MAINTENANCE

Annual Review Questionnaire				
Project Title	**Questions**	**Yes**	**No**	**Comments**
PLANNING PROCESS	Are there internal or external organizations and agencies that have been invaluable to the planning process or to mitigation action?			
	Are there procedures (e.g., meeting announcements, plan updates) that can be done differently or more efficiently?			
	Has the Planning Team undertaken any public outreach activities regarding the THMP or a mitigation project?			
HAZARD ANALYSIS	Has a natural and/or human-caused disaster occurred in this reporting period?			
	Are there natural and/or human-caused hazards that have not been addressed in this THMP and should be?			
	Are additional maps or new hazard studies available? If so, what are they and what have they revealed?			
VULNERABILITY ANALYSIS	Do any new critical facilities or infrastructure need to be added to the asset lists?			
	Have there been changes in development trends that could create additional risks?			
CAPABILITY ASSESSMENT	Are there different or additional resources (financial, technical, and human) now available for mitigation planning?			
MITIGATION STRATEGY	Should new mitigation actions be added to the Implementation Strategy/Plan?			
	Are the mitigation actions listed in a community's Implementation Strategy/Plan appropriate for available resources?			

PLAN MAINTENANCE

Individual Mitigation Project Progress Report			
Progress Report Period From (date):		**To (date):**	
Project Title and Project ID:			
Description of Project:			
Implementing Agency or Department:			
Contact Name:			
Contact E-mail and Number:			
Grant/Finance Administrator:			
Total Project Cost:			
Anticipated Cost Overrun/Under run:			
Date of Project Approval:			
Project Start Date:			
Anticipated Completion Date:			
Summary of Project Progress for this Reporting Period			
1. What was accomplished during this reporting period?			
2. What obstacles, problems, or delays did the project encounter, if any? How were the problems resolved?			

7.5. Continued Public Involvement Program

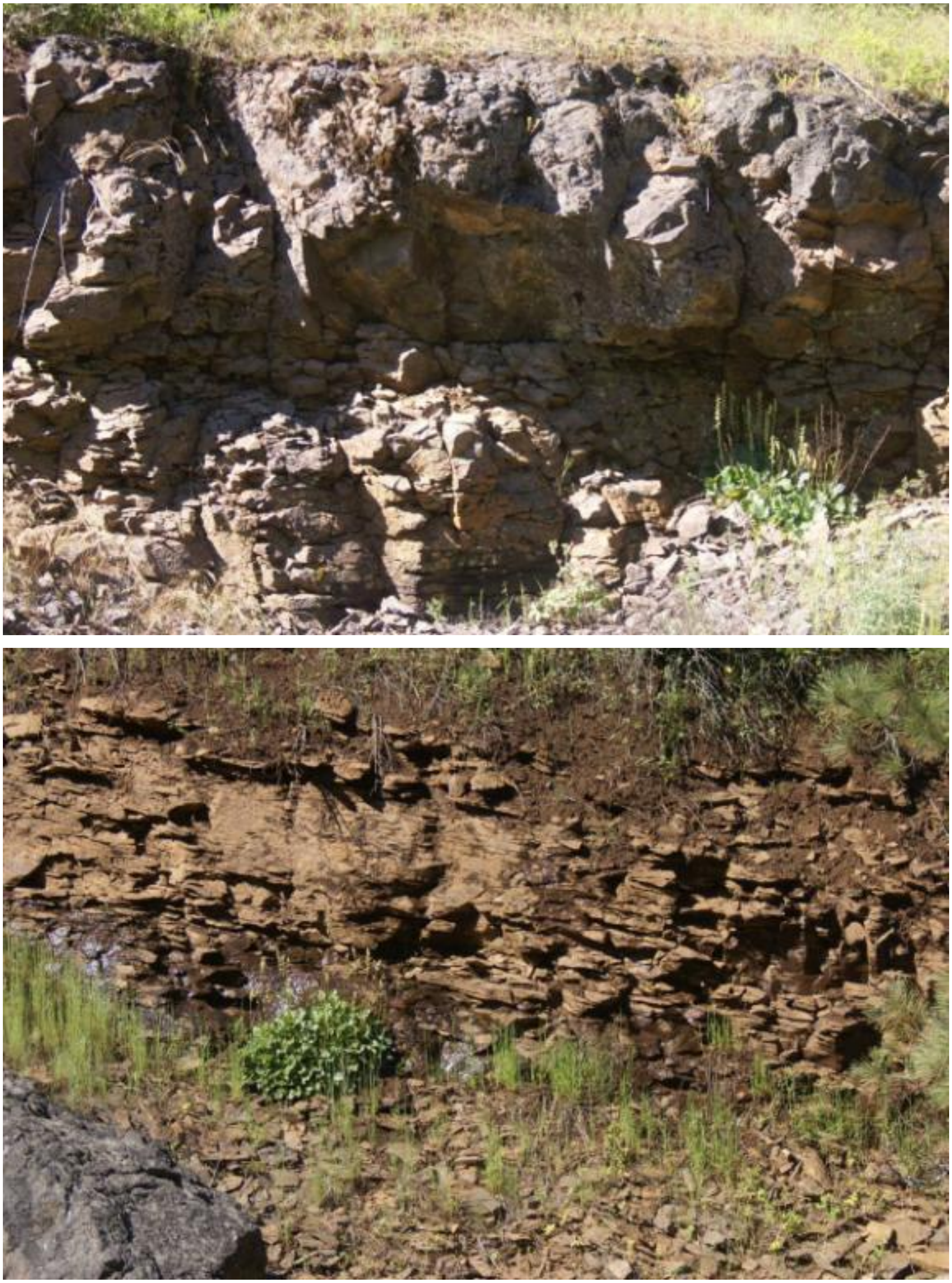
The Coeur d'Alene Tribe is dedicated to involving the public directly in review and updates of this Tribal Hazards Mitigation Plan. The Coeur d'Alene Tribe Emergency Manager is responsible for the annual review and update of the plan as advised in the "Recommendations" section of this document.

The Coeur d'Alene Reservation public will have the opportunity to provide feedback about the Tribal Hazards Mitigation Plan annually, coinciding approximately with the anniversary of the adoption of this plan. Copies of the Plan will be catalogued and kept at the Coeur d'Alene Tribe Public Works Department. The existence and location of these copies will be publicized, including electronic copies. Instructions on how to obtain copies of the plan will be made available on the Coeur d'Alene Tribe Internet website and annually in a Council Fires public notice article.

In addition, copies of the plan and any proposed changes will be posted on the Coeur d'Alene Tribe website, or other venue deemed appropriate by the Coeur d'Alene Tribal Public Works Department. This information will also contain an e-mail address and phone number where people can direct their comments, ideas, and concerns.

A public meeting will be held as part of each annual evaluation or when deemed necessary by the Coeur d'Alene Tribe Emergency Manager. The meetings will provide the public a forum for expressing concerns, opinions, or ideas about the implementation of the Tribal Hazards Mitigation Plan. The Coeur d'Alene Tribe Emergency Manager will be responsible for using Tribal resources to publicize the annual public meetings and maintain public involvement through the webpage and Council Fires articles.

Figure CXLIV. Amalgam of geologic structures near Windy Bay, both within 1 mile of each other, separated by half a million years in formation.



Chapter 8. Information Citations

8.1. Acronyms and Abbreviations Used

Table 81. List of Acronyms and Abbreviations used in this report.

ACLU	American Civil Liberties Union
AFG	Assistance to Firefighters Grant
ALDS	Automated Lightning Detection System
BCEGS	Building Code Effectiveness Grading Schedule
BIA	Bureau of Indian Affairs (USDI)
BLM	Bureau of Land Management (USDI)
CARE	Community Action for a Renewed Environment
CBRA	Coastal Barrier Resources Act
CD	Consent Decree
CEDS	Comprehensive Economic Development Strategy
CERCLA	Comprehensive Environmental, Response, Compensation and Liability Act
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
COOP	Continuity of Operations Plan
CWSRF	Clean Water State Revolving Fund
DBH	Diameter Breast Height
DEM	Digital Elevation Model
EAP	Environmental Action Plan
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
EPO	Environmental Programs Office
ERP	Emergency Response Plan
FEMA	Federal Emergency Management Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FMP	Forest Management Plan
FPEIS	Final Programmatic Environmental Impact Statement
FPL	Fire Prone Landscapes
FRCC	Fire Regime Condition Class
FRTEP	Federally Recognized Tribal Extension Program
FTP	File Transfer Protocol
GAO	General Allotment Act
GIS	Geographic Information Systems
GMPOG	General Management Principles and Operating Guidelines
HazMat	Hazardous Materials
HFR	Historic Fire Regime
IGS	Idaho geological Survey
HMGP	Hazard Mitigation Grant Program
HSPTAP	Homeland Security Preparedness Technical Assistance Program
HUD	Housing and Urban Development
IBC	International Building Code
IBHS	Idaho Bureau of Homeland Security
ICDBG	Indian Community Development Block Grant
ICS	Incident Command System

Table 81. List of Acronyms and Abbreviations used in this report.

IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
IDWR	Idaho Department of Water Resources
IRA	Indian Reorganization Act
IRMP	Integrated Resource Management Plan
IRR	Indian Reservation Road (System)
IT	Information Technology
LAFD	Los Angeles Fire Department
LANDFIRE	Landscape Fire and Resource Management Planning Tools Project
LEO	Law Enforcement Officer
LMP	Lake Management Plan
MAA	Mutual Aid Agreements
MFRI	Mean Fire Return Interval
MOU	Memorandums of Understanding
MRLC	Multi-Resolution Land Consortium
M&R	Maintenance and Repair
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFMAS	National Fire Management Analysis System
NIMS	National Incident Management System
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NRCS	USDA Natural Resources Conservation Service
NWS	National Weather Service
O&M	Operations & Maintenance
PDF	Portable Document Format (Adobe Acrobat Reader file)
PDM	Pre-Disaster Mitigation Program
PHEP	Public Health Emergency Preparedness
P.L.	Public Law
PRISM	meter-elevation Regressions on Independent Slopes Model
RAMP	Response Action Maintenance Plan
RFLP	Repetitive Flood Loss Properties
ROW	Right-of-Way
RSF	Replacement Severity Fire
SDWA	Safe Drinking Water Act
SEEP	Storm water & Erosion Education Program (in Idaho Panhandle)
SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
SOW	Statement of Work
Spokane EA	Spokane Regional Economic Area
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
STA	Surface Transportation Program
STATSGO	NRCS State Soils Geographic Database
TDHE	Tribally Designated Housing Entity
THMP	Tribal Hazards Mitigation Plan
THPO	Tribal Historic Preservation Officer
UBC	Uniform Building Code
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture

Table 81.	List of Acronyms and Abbreviations used in this report.
USDI	U.S. Department of Interior
USFS	USDA Forest Service
USGS	U.S. Geological Survey
WRCC	Western Regional Climate Center
WSSPC	Western States Seismic Policy Council
WUI	Wildland-Urban Interface

8.2. Glossary of Technical Terms Used

All definitions are cited from www.en.Wikipedia.org.

Cases

Atlatl: An atlatl or spear-thrower is a tool that uses leverage to achieve greater velocity in dart-throwing, and includes a bearing surface that allows the user to temporarily store energy during the throw. It consists of a shaft with a cup or a spur, which may be integrated into the weapon or made separately and attached, in which the butt of the projectile, properly called a dart, rests. It is held near the end farthest from the cup, and the dart is thrown by the action of the upper arm and wrist. An atlatl can readily achieve ranges of greater than 300 feet and speeds of over 60 MPH. 136

Botholith: A batholith (from Greek bathos, depth + lithos, rock) is a large emplacement of igneous intrusive (also called plutonic) rock that forms from cooled magma deep in the earth's crust. Batholiths are almost always made mostly of felsic or intermediate rock-types, such as granite, quartz monzonite, or diorite. It is the material that constitutes all continents. 222

Bridge Overpass Freeboard: the height from the top of high-water-flow to the bottom of the bridge or culvert the stream passes through. Generally, distances less than the depth of the water it conveys is considered limiting and may lead to incised stream charateristics. 391

Chalcedony: Chalcedony is a cryptocrystalline form of silica, composed of very fine intergrowths of the minerals quartz and moganite. These are both silica minerals, but they differ in that quartz has a trigonal crystal structure, whilst moganite is monoclinic. 136

Chert: Chert is a fine-grained silica-rich microcrystalline, cryptocrystalline or microfibrous sedimentary rock that may contain small fossils. It varies greatly in color (from white to black), but most often manifests as gray, brown, grayish brown and light green to rusty red; its color is an expression of trace elements present in the rock, and both red and green are most often related to traces of iron (in its oxidized and reduced forms respectively). 136

Columnar basalt: During the cooling of a thick lava flow, contractional joints or fractures form. If a flow cools relatively rapidly, significant contraction forces build up. While a flow can shrink in the vertical dimension without fracturing, it cannot easily accommodate shrinking in the horizontal direction unless cracks form; the extensive fracture network that develops results in the formation of columns. The topology of the lateral shapes of these columns can broadly be classed as a random cellular network. These structures are often erroneously described as being predominantly hexagonal. In reality, the mean number of sides of all the columns in such a structure is indeed six (by geometrical definition), but polygons with three to twelve or more sides can be observed. The size of the columns depends loosely on the rate of cooling; very rapid cooling may result in very small (<1 cm diameter) columns, while slow cooling is more likely to produce large columns. 281

Curies: The curie (symbol Ci) is a unit of radioactivity, defined as 1 Ci = 3.7×1010 decays per second. This is roughly the activity of 1 gram of the radium isotope a substance studied by the pioneers of radiology, Marie and Pierre Curie, for whom the unit was named;.....................222

Jökulhlaup: jökulhlaup (or glacier burst) is a glacial outburst flood. It is an Icelandic term that has been adopted by the English language. It originally referred to the well-known subglacial outburst floods from Vatnajökull, Iceland which are triggered by geothermal heating and occasionally by a volcanic subglacial eruption, but it is now used to describe any large and abrupt release of water from a subglacial or proglacial lake/reservoir. 135

Loess Deposits: Loess is an aeolian sediment formed by the accumulation of wind-blown silt and lesser and variable amounts of sand and clay that are loosely cemented by calcium carbonate. It is usually homogeneous and highly porous and is traversed by vertical capillaries that permit the sediment to fracture and form vertical bluffs. 188

Megafauna: In terrestrial zoology, megafauna (Ancient Greek megas "large" + New Latin fauna "animal") are "giant", "very large" or "large" animals. Their original and most common definition is 100 lb, often rounded in the metric system to 40 or 45 kg. This thus includes many species not popularly thought of as overly large, such as white-tailed deer and red kangaroo, as well as humans. 135

Mesoscale: Mesoscale meteorology is the study of weather systems smaller than synoptic scale systems but larger than microscale and storm-scale cumulus systems. Horizontal dimensions generally range from around two miles to several hundred miles. Examples of mesoscale weather systems are sea breezes, squall lines, and mesoscale convective complexes. Vertical velocity often equals or exceeds horizontal velocities in mesoscale meteorological systems due to nonhydrostatic processes such as buoyant acceleration of a rising thermal or acceleration through a narrow mountain pass. 137

Mortars and Pestles: A mortar and pestle is a tool used to crush, grind, and mix solid substances (trituration). The pestle is a heavy bat-shaped object, the end of which is used for crushing and grinding. The mortar is a bowl, typically made of hard wood, marble, clay, or stone. The substance to be ground is placed in the mortar and ground, crushed or mixed with the pestle...136

Stream Incised Meanders: If the slope of an established meandering stream is suddenly increased it will resume downward erosion – this happens when the base level of the stream is reduced, for example due to tectonic uplift of the region, a global fall in sea-level, collapse of a moraine-dammed lake downstream, damming by bridges and culverts, large-scale reduction of the water storage of a floodplain, or by capture of the stream by a steeper one. As the stream erodes downwards, its established meandering pattern will remain as a deep valley known as an incised meander or entrenched meander.....................................354, 383

Synoptic Scale: The synoptic scale in meteorology (also known as large scale or cyclonic scale) is a horizontal length scale of the order of 600 miles or more. This corresponds to a horizontal scale typical of mid-latitude depressions. Most high and low pressure areas seen on weather maps such as surface weather analyses are synoptic-scale systems, driven by the location of Rossby waves in their respective hemisphere. Low pressure areas and their related frontal zones occur on the leading edge of a trough within the Rossby wave pattern, while surface highs form on the back edge of the trough. Most precipitation areas occur near frontal zones. The word synoptic is derived from the Greek word sunoptikos meaning seen together. 137

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