Confederated Tribes
of the
Colville Reservation

Multi-Hazard Mitigation Plan

December 2018

Nespelem, Washington 99155

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Chapter 1: Introduction: Why establish a Hazard Mitigation Plan?

From July 2012 to May 2018, five disasters occurred upon the Colville Reservation (hereafter "reservation") for which Presidential Declarations of Disaster (PDD) were issued. One of these, the 2015 fires, included the loss of approximately 30 homes as well as the burning of almost 20% of the entire land mass of the reservation. In both 2014 and 2015, fires across Washington State set new records for size. The 2015 fires on the reservation, by themselves, nearly equaled that new statewide record set in 2014.

These were not the only hazards or disasters to which Tribal members, residents, and the natural and cultural resources of the reservation were exposed. Significant events occurring during this time period included:

The July 2012 wind storm, which destroyed homes and other property, put millions of board feet of timber on the ground and left part of the reservation without any power for more than a week (PDD issued);

The loss of the Tribal headquarters building and all of its records, which burned down in July 2013;

Another windstorm in July 2014, which damaged many structures and again left part of the reservation without power for more than two days;

The Carlton Complex and Devil's Elbow Fires in July 2014 (PDD issued);

A gasoline tanker transportation accident in May 2015, which spilled more than 3,000 gallons of fuel within approximately two dozen feet of the Sanpoil River; and

An extreme flood event in the Sanpoil Valley. It began in February 2017 but did not recede until May 2017 (partial PDD issued).

In 2018, the third-highest flood level ever recorded (and the highest water flow in forty-six years) occurred on the Okanogan River, requiring significant effort by the Tribe to protect lives and property. The river stayed above flood stage for twenty-three days (PDD issued).

Many lesser incidents have occurred. A small dam failed in April 1999, damaging State Route (SR) 155—the major highway for the western portion of the reservation. Landslides coming

after the filling of Lake Roosevelt behind Grand Coulee Dam, and caused by that dam, caused significant landslides beginning in 1942; some of those slides caused inland or "lake" tsunamis. During the 2017 floods, rain runoff caused Owhi Lake to rise within inches of the level where an uncontrollable release could have started erosion closely downstream from the dam abutment.

Recorded history reports other events in the more distant past. The 1700 Cascadia subduction zone earthquake was felt east of the Cascade mountain range, as evidenced by oral history from within the Yakima Valley. A Cascade Range volcanic eruption in the summer of 1800 caused ashfall across what is now the Colville Reservation, followed by famine (Hunn, 1990). The 1872 Lake Chelan earthquake caused massive ground changes on the current reservation, as chronicled by a Jesuit missionary on the reservation at the time. It also caused a landslide which blocked the Columbia River near Entiat. The only recorded fatality from that earthquake occurred near the mouth of the Spokane River, during the aftershock period (Nisbet, 2015).

Multiple tribes in the Columbia River Basin have legends about great floods. These may be a reference to the series of floods that took place more than ten thousand years ago, when ice age lakes such as Lake Missoula and Lake Spokane drained in a series of floods as ice dams broke and reformed. Those are the floods that produced the "channeled scablands" that are such a distinctive geologic feature of Eastern Washington.

When both recent and historical events are considered, it should be clear that hazards to the members, residents, and natural and cultural resources of the reservation need to be both identified and mitigated.

Some hazards may be highly mitigatable: avoiding constructing structures in high-risk flood plains, on soils known to be unstable and subject to liquefaction during earthquakes, or in an area where modern septic systems should not be installed (to protect surface waters from contamination) will limit future losses from disasters as well as protect tribal resources.

Other hazards may only be partly mitigatable: wildland fire protection, for example, will always be a balancing act in a wildland environment such as the reservation. Even so, there are actions that can be taken to mitigate the losses from wildland fire; setting fire-safe standards for new construction is one example.

Conflicting or overlapping regulatory jurisdictions sometimes cause issues, making mitigation more difficult. In the following example, lack of septic system compliance resulted in sewage runoff into the Sanpoil River.

The photos below involve fee land where an entire slope (a trailer park once stood at the top) has eroded away. In this location, the river is influenced by the level of Lake Roosevelt and its banks are subject to the well-known landslide risk from changing lake levels. The flat above the cliff once sloped down to the river; when the river changed course, it began eroding the slope away, resulting in the cliff face seen in the photos.

Ferry County is primarily responsible for septic compliance on fee lands within the county. During the winter 2017 flooding, the exposed septic tank shown in the 2015 photo below eroded away completely, along with the shed at the back of the structure, and collapsed downslope. Even after the 2017 flooding, this structure continued to be occupied without a working septic system. The Tribe has limited ability to stop unlawful sewage disposal on fee land that will eventually make its way into the river. The county, acting upon a request from the Tribe, began working on this issue in 2018.

Home on the Sanpoil River, south end of Keller Community, February 7, 2015

Some hazards may be mitigatable but require funding beyond the financial means of the Tribe. This brings up another reason to prepare a Hazard Mitigation Plan (HMP): once an HMP is in place and approved by FEMA, the Tribe is eligible to apply for pre-disaster mitigation grants to minimize risks. These can be for such purposes as armoring bridge abutments to prevent flood-related damage; relocating structures out of flood plains; installing emergency generators in structures used as emergency shelters; and improving the Tribe's capacity to prepare for, and respond to, disasters. When such grants are received, the Tribal match is 25% of the full cost of the project.

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Chapter 2: Planning Process

A. Introduction

A useful concept for hazard planning is that some risks or threats are "low frequency but high impact" while others are "high frequency but low impact." A low frequency but high impact occurrence would be a severe earthquake. The last severe earthquake to strike the reservation was in 1872; as evidenced by the survey and results presented later in this section, few residents are concerned about the risk of earthquake. Discussed within the earthquake section is information about how destructive the 1872 earthquake was and what the consequences might be if it occurs again.

Another low frequency but high impact occurrence would be a significant volcanic eruption with ashfall. The survey results indicate that few residents are concerned about volcanic eruption. Yet following the last major eruption circa 1800, so much ash fell on the reservation that the population starved from lack of food. While starvation may no longer be an issue in an era with a robust supply chain delivering to grocery stores, an eruption could severely impact the availability of traditional foods and affect Tribal life.

Floods are a relatively common event that could be either high frequency/low impact or the reverse. The Okanogan River reaches flood stage many years, but rarely reaches major flood stage. An "ordinary" flood (when the river reaches flood stage but causes little or no damage) is a high-frequency but low-impact occurrence. More severe flooding, as in 2018 where that river reached and remained at the "major" flood stage for twelve days, is a low-frequency/high-impact event.

Power failures are another example of an occurrence that could fit in either category. A major concern of those living on the reservation, as shown by survey results, is that of long-term power failure. Short-term failures are common: a windstorm causes power lines to touch and short out; a wildland fire burns down a few poles and wires; or winter storms cause an ice- or snow-loaded tree limb to fall across power lines. These are relatively high-frequency/low-impact issues. Power is often restored within a few hours to overnight.

B. Plan Development

The Tribe applied for FEMA's Pre-disaster Mitigation Competitve Grant PROGRAM, or PDMG, in early 2014 to produce a Hazard Mitigation Plan (HMP). A grant was awarded to the Tribe in May 2015. Due to repeated disasters, including the catastrophic fires of 2015 and their long aftermath, significant work on the Hazard Mitigation Plan did not begin until the fall of 2016. The project was initially managed out of the Tribe's Emergency Management Services/Fire/Rescue Department. Project leadership was provided from the Office of Public Safety.

The formal hazard mitigation planning effort began on November 9, 2016, with a kick-off and scoping meeting held at the Tribal government center beginning at 1 p.m. on that date.

The kick-off meeting was advertised in the October 28th edition of the local newspaper, *The Tribal Tribune*, and announced through e-mails and internal announcements to Tribal employees and to other interested parties including the BIA and IHS. Announcements and invitations were e-mailed to the leaders of every school district on the reservation, city and town government officials, cooperating agencies including local sheriff's offices and county emergency managers, the local Washington State Police office, local fire districts and departments, public and private utility providers, cooperators such as the conservation district and WSU extension, and to major private sector employers.

Because of the nature of Tribal sovereignty and Tribal governments, a Tribal hazard mitigation planning project has fundamental differences from those conducted by counties. In order to be eligible for pre-disaster mitigation grants from FEMA, a city or town must be covered under a FEMA-approved HMP. Within Okanogan County, every city or town—including all five of those entirely, or partially, located within the reservation boundary—is already a signatory to the county's HMP. None of them needed to participate in the Tribe's planning effort in order to be covered under an HMP. None of them chose to participate with the Tribe's HMP.

For the Okanogan County HMP, all of the fire districts and city fire departments participated in the HMP process for the county and were listed as cooperators. They are a part of the county's HMP. Every such department within the reservation was invited to participate in the Tribe's HMP. None chose to participate. For the one fire district for which an e-mail address could not be located, telephone calls were made to the fire chief to ensure that department had the opportunity to participate.

Another difference is that county and city governments have access to comprehensive data about property values within their jurisdictions. Tribes generally do not assess the value of homes and other improved property within reservations. Because Tribe does not levy property taxes, it does not have the same need to know the value of lands and improvements. Even if a Tribe did assess property, a comparison to other jurisdictions would be meaningless. Off reservation, property ownership can be transferred freely. Within the reservation, the value of Tribal trust land (which is not freely transferable) cannot be compared in a meaningful way with land values and buildings outside of the reservation.

Arizona State University maintains a planning data set known as SHELDUS, which aggregates past disaster history along with insurance claims and property damage reports. The database includes crop insurance claims caused by drought, hail, or fire. It maintains that data by county and charges fees to provide it. Because it does not separate Tribal lands data from county-wide data, it was not useful for this planning effort.

The private sector economy within the reservation is also significantly different from that in the outside world. The Tribe has a business arm, the independent Colville Tribal Federal Corporation (CTFC), which operates businesses that would be privately owned within other jurisdictions. A few of these businesses are located on trust lands outside of the reservation boundaries. CTFC business interests include gas stations with convenience stores, three casinos, a security company, and grocery stores. The Tribe itself provides services such as residential trash pickup, and operates two medical clinics, that elsewhere could be run as private businesses.

The three largest non-government employers within the reservation were believed to be, in no particular order, the CTFC and its subsidiaries, the Omak Wood Products Mill, and Gebbers Farms. All were invited to participate. A representative from the mill did attend the public meeting in Omak to provide input; that mill has since shut down. The other two business entities did not participate.

Within the Tribal government, participation from some programs was either required or strongly encouraged by the respective division directors. This included tribal law enforcement, Tribal Occupational Safety and Health (TOSHA), and the Environmental Trust Department (ENV).

The agenda on November 9th consisted of a short power-point presentation, containing an explanation of the expected planning effort, followed by a short question and answer period. Next was the audience participation portion, where attendees were asked to make their way around sixteen separate stations in the room. Attendees were asked to identify their three

highest-priority issues, among those that were grouped under broad headings, to help generate a "heat map" to establish priorities. Eighteen persons signed in to that meeting, fourteen of them took HMP surveys, and ten surveys were returned by the end of the session.

Following the November 9th meeting, a public meeting was held in each of the four districts on the reservation: Nespelem on November 15th, Inchelium on November 17th, Omak on November 21st, and Keller on November 29th, 2016. Despite the October 28th newspaper publication, public announcements and reminders sent before each meeting, the turnout for these follow-up meetings was low. Five persons (out of six present) signed in at the Omak meeting—four of whom returned HMP surveys. Only two persons came to the Nespelem meeting (no surveys returned) and the Inchelium meeting (two surveys returned). Although additional flyers were posted in the community to encourage attendance, no one came to the Keller meeting.

Meetings were held with the Okanogan County Planning Director (on March 30, 2017) and with Ferry County Planning Director (on April 4, 2017). These meetings were held at their offices in Okanogan and Republic, respectively. The purpose was to give their departments an opportunity to provide input into Tribal planning, and to encourage them to participate in reviewing the draft of the Tribal HMP when it became available.

C. Survey Results

The survey was not intended to be a scientific, statistically valid sampling of member and resident knowledge of hazards relevant to mitigation planning. The major flaw of the survey is that of potential bias, because persons completing the survey were self-selected. The participants, because they either stopped at an informational booth, attended a public meeting, or downloaded the form from the Tribal web page or an email, tended to be those with an interest in the subject. Regardless of potential participant bias, some worthwhile information came from this survey.

That information included the following about this group's experiences on the reservation:

53% do not have fire insurance
71% do not have flood insurance

31% have experienced a drought on the reservation
37% have experienced an earthquake on the reservation
47% have experienced a power failure lasting more than 24 hours

76% have experienced a wildland fire
81% have experienced severe weather

73% are “not at all prepared” or “somewhat prepared” for a disaster
26% are “adequately prepared” or better

68% have received first aid training
61% have taken some preparatory steps, such as installing smoke detectors

In order to rank the participant’s perception of the most serious hazards, the numbers of those who declared themselves “concerned,” “very concerned,” or “extremely concerned” about specific hazards are shown in the left column. The right column shows the number for just “very concerned” and “extremely concerned.”

Wildland Fire	95	80
Severe Weather	89	59
Power Failure	71	45
Household Fire	71	45
Drought	62	41
Climate Change	59	41
Hazardous Materials	60	33

Survey participants expressed the least concern, ranked from the lowest level of interest upward, with volcanic eruptions and earthquakes. Landslides, floods, and dam or levee failure were all next with essentially similar scores.

The heat map exercise was reasonably consistent with the results of the survey. The four highest-ranking threats to the reservation and its people were identified in order from most to least severe as:

Severe Storm
Power Failure lasting longer than 24 hours
Climate Change and Wildland Fire (tie)

Although these were the most serious concerns ranked by the heat map exercise, all except Severe Storm (at top) were essentially interchangeable in priority. A single vote could have changed their order.

The next tier of concern, with tied scores, included Animal and Plant disease, Hazardous Materials, and Active Shooter incidents. The lowest-ranked concerns, in no particular order, were Dam/Levee Failure, Volcanic Eruption, and Winter Storm.

The tabulated results of the survey, a summary of individual comments received, and a copy of the "heat map" results with all comments are found in Chapter 6, "Supporting Documentation."

D. Capability Assessment and Assets

The Tribe has shown that it is capable of responding to and recovering from major disasters. A partial listing of the Tribe's physical response assets follows. Following the list of physical assets is a listing of other Tribal capabilities in terms of policy, planning, and existing guidance.

Public Safety assets:

- A Tribal Police Department with more than thirty officers, with a full-time 24-hour/7 day per week dispatch that has an emergency generator.
- A command post vehicle with radios and work space, which can be used as an alternate dispatch center.
- A Tribal EMS/Fire/Rescue department, with full time staffed fire stations in Nespelem and Inchelium; an unstaffed but equipped fire station at Keller; and additional fire engines at homes in Wildland-Urban Interface (WUI) zones including the Kartar Valley and Disautel. Assets include two almost-new structural fire engines, two water tenders with initial attack capability, an almost-new ladder truck, and two almost-new rapid response brush-type fire apparatus.
- Two ambulances at each of the full-time fire stations.
- A full-time Tribal jail.
- A Natural Resources Enforcement department, with sworn law enforcement officers who patrol on as well as off reservation in places where the Tribe has land and land use rights.
- An identified location for a Tribal EOC, with computers and supplies to set up and open within a few hours of need.
- An emergency management cache with generators, water pumps and hoses, traffic control supplies, spill adsorbents, emergency lighting, and other emergency response equipment.
- A Tribal Geographic Information Systems (GIS) program, with the ability to generate maps for specific incidents and a significant data base including recent reservation-wide LIDAR data

Community assets:

- A community center in each district, suitable for use as an emergency shelter.
- A longhouse in each district, suitable for use as an emergency shelter.
- A senior meal site in each district, suitable for mass feeding and for a shelter.
- At least one school in each district, which could be used as an emergency shelter.
- Washington State University Extension Office, and staff, located on reservation for collaborative outreach education and training.
- Two Tribally-operated medical clinics, one each in Keller and Inchelium, both of which have emergency generators.
- A Tribally-operated Convalescent Center, which has an emergency generator.
- Two IHS clinics, neither of which has an emergency generator.
- Grocery stores in Nespelem, Keller, and Inchelium, each with fuel pumps as well.

Heavy equipment:

- A Tribal Department of Transportation, which works in cooperation with the BIA roads department, with access to dump trucks, snow plows, and other heavy equipment.
- A Public Works department with access to a dump truck, backhoe, excavators, and other heavy equipment.
- A Fish and Wildlife Department that owns trucks and trailers, backhoes, forklifts, and other equipment useful for disaster response.

Transportation assets:

- The Tribal Department of Transportation operates small commuter buses across the reservation
- The Tribal Head Start program has small buses for its students, and buses may be available in emergencies from local schools as well.
- There are local schools with buses in Omak, Paschal Sherman/Mission campus area, Nespelem, Keller, Coulee Dam, and Inchelium.

BIA and other outside agency assets:

- Wildland fire fighters from Mt. Tolman Fire Center during fire season.
- Fire fighters from county fire districts that have response areas within the reservation.

- Fire support, both for structural and wildland fires, under a mutual aid agreement between the Tribe and every fire district or department in Okanogan County. Written mutual aid agreements are pending with Grand Coulee-area departments in Grant and Douglas counties and with Ferry County departments.

The Tribe, as a sovereign government, possesses the following law, regulatory, or policy assets:

- A Constitution, adopted in 1938;
- A Tribal code known as the Law and Order Code, revised most recently in 2004; and
- Has either established or adopted policies to protect Tribal members and other residents, to protect natural resources, and to protect the cultural legacy and continued cultural existence of the twelve constituent Tribes and Bands that make up the Confederated Tribes of Colville Reservation.

Relevant policies include the following, which the Tribe—either on its own or in conjunction with the BIA where that agency takes the lead role—has created or adopted:

- A Wildfire Prevention Plan
- A Fire Management Plan
- A Forest Management Plan
- An Agricultural Management Plan
- A Range Management Plan
- A Community Economic Development Strategy (CEDS)
- An Integrated Resource Management Plan
- Dam emergency action plans for Owhi and Twin Lakes Dams
- A Threat and Hazard Identification and Risk Assessment (THIRA), which includes an assessment of emergency management training needs tied to the FEMA resource typing system
- A Comprehensive Emergency Management Plan (CEMP), with annexes that constitute an Emergency Operations Plan (EOP) for specific disasters such as floods, winter storms, etc.

There are specific Tribal codes that either directly address, or involve, hazard mitigation issues. They include:

- Participation in the National Flood Insurance Program (NFIP), with a registration date of October 13, 2006. The Tribal code pertaining to the NFIP is found in Title 4, Chapter 20.

- A Land Use and Development Code, Title 4 Chapter 3, which establishes reservation-wide zoning and prohibits land uses that are not in conformity with the code.
- A Building Code, Title 6 Chapter 3, which establishes a permit system for construction or remodeling, and requires certificates of occupancy for structures. The Building Code, at Chapter 3(a), also adopts as its standards:
    - The 2015 International Building Code
    - The 2015 International Fire Code
    - The 2015 International Mechanical Code
    - The 2015 edition of the National Fire Protection Association's (NFPA) National Electrical Code
    - The 2015 International Plumbing Code
    - The 2015 International Residential Code
- A Water Utilities Code, Title 6 Chapter 10.
- A Tribal Health Authority Act, Title 11 Chapter 1, pertaining to operating medical clinics and facilities for both Tribal members and the non-member public.

The Tribe's permit staff for building permits consists of one person: the Land Use and Shoreline Administrator within the Tribal Planning Department. This individual receives and processes building permits. Because only a single person performs this duty, the review process consists of sending a copy of the permit application package to individuals within various Tribal programs to review the applications for compliance issues.

Permit review includes review by multiple offices and individuals, including:

- Environmental Trust staff, including but not limited to water quality and supply impacts, floodplain encroachment, air quality, and septic system requirements.
- Mt. Tolman fire staff for wildland-urban interface (WUI) issues.
- Fish and Wildlife staff for impacts to fish, wildlife, and plants.
- Forestry, Public Works, Solid Waste, IT, History and Archeology, and other programs that may have a role in reviewing the impacts of new construction or new land uses.
- Emergency Management, for hazard mitigation issues including WUI, floodplain, liquefaction, and similar natural hazard issues.

The Tribe employs two building inspectors (Public Works), a fire marshal (EMS, Fire & Rescue (CTEFR), and safety officers (TOSHA) for construction oversight and review.

As required of any emergency response entity receiving Federal funds, the Tribe is NIMS-compliant. Appropriate management officials attend Incident Command System training to the Intermediate (ICS-300) or Advanced (ICS-400) levels. From 2014 onwards, at least one of each ICS class has been offered each year within the local commuting area by Tribal staff.

E. Hazard Identification Process

The first stage of the hazard, vulnerability, and risk assessment (or "threat" assessment) began on December 6, 2011. All Tribal government departments and cooperators, including the Bureau of Indian Affairs (BIA) and the Indian Health Service (IHS), were invited to a scoping meeting held at the Children and Family Services conference room, Colville Agency campus, Nespelem. Comments and guidance were solicited as the first stage of emergency planning began: gathering information for the Hazard and Vulnerability Assessment (HIVA, at that time the standard for a threat assessment) and for a Comprehensive Emergency Management Plan (CEMP).

Following that meeting, the HIVA/CEMP author conducted interviews with individual program managers and many of their subordinates. These included the managers overseeing: Tribal Information Technology (IT); the BIA fire management program; the police department; the corrections department; Tribal Occupational Safety and Health (TOSHA); Tribal Health; public works, particularly about sewage and water infrastructure; community centers; Natural Resources Enforcement, which is responsible for search and rescue; and the EMS/Fire/Rescue program. The HIVA was completed in March 2012. Within weeks, it was superseded for emergency planning purposes by a new FEMA standard, the Threat and Hazard Identification and Risk Assessment (THIRA). A THIRA was later completed, submitted to FEMA in December 2014, and accepted.

The HIVA was written with another use in mind: that it could be used as the basis for a future Hazard Mitigation Plan (HMP). In many instances when hazards and vulnerabilities were discussed, mitigation strategies were included. Although it was not specifically designed as an HMP, it was a precursor to this project and was intended for use in the eventual creation of the HMP.

Outreach to update that hazard and risk assessment began again at the 2016 annual Tribal membership meeting, which was held at the Nespelem Community Center on October 8, 2016. A table staffed by the public safety program was in place throughout the meeting that day, and copies of the "Hazard Mitigation Survey" were first distributed there. Forty-six members spoke with public safety staff about the HMP, and eighteen of them returned the first surveys; only

sixteen attendees signed the participation log. Fliers were distributed announcing the next public meetings requesting members to come to one or more of those meetings. Several hundred people attended the annual membership meeting.

Tribal notices were sent out in order to obtain more survey responses. An additional sixty-eight surveys were received, either by fax, e-mail, or interoffice mail by April 2017. In all, one hundred and three surveys were returned.

The survey results were used, in part, to determine which threats and hazards needed to be addressed in this plan. This plan addresses fourteen separate hazards; the 2013 Okanogan County plan, in comparison, addresses five.

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Chapter 3: Community Profile

Physical and Political Geography:

The Tribe is governed by an elected Colville Business Council, under a Tribal Constitution approved in 1938. There are fourteen members, one of whom is chosen as the Chairman. Politically, the reservation is divided into four districts; council members are elected by district.

The Colville Reservation ("reservation") is bounded on the south and east by the Columbia River; on the west, by the Okanogan River; and on the north, by an arbitrary line drawn at the northern boundary of Township 34 of the public lands survey system. Geographically, most of the reservation is part of the Okanogan Highlands; the remainder is part of the Okanogan Valley. The Inchelium and Keller districts are located within Ferry County; the Nespelem and Omak districts are within Okanogan County.

Elevation levels range from a low of approximately 780 feet in the southwest corner of the reservation, to over 6700 feet at the summit of Moses Mountain; the average is above 3,000 feet. Elevation generally increases from south to north and from west to east. The predominant terrain features were carved by glacial erosion. The Sanpoil River drains much of the eastern interior of the reservation south to the Columbia River; the Nespelem River basin, and many additional creeks, drain into the Columbia River; and additional creeks drain into the Okanogan River.

The populated area along the eastern edge of the reservation is separated by two mountain ranges from the Tribal and BIA administration at the Colville Agency. During winter the roads across those two ranges can sometimes be traversed only with difficulty.

The reservation is bisected by the boundary between Ferry County (on the east) and Okanogan County (on the west). There are two incorporated towns entirely within the reservation: Elmer City and Nespelem. There are three incorporated cities or towns located partially within the reservation: Coulee Dam, Okanogan, and Omak. There are three additional "Census Designated Places" (CDPs) used for gathering census data: Disautel, Inchelium, and Keller.

Within the reservation boundary, in addition to privately-owned fee lands, the Army Corps of Engineers (ACOE), Bureau of Indian Affairs (BIA), and Bureau of Reclamation (BOR) own land. For the construction of both dams, trust lands were taken by the federal government up to a specified elevation level; in the case of Grand Coulee Dam and Lake Roosevelt, all trust lands up

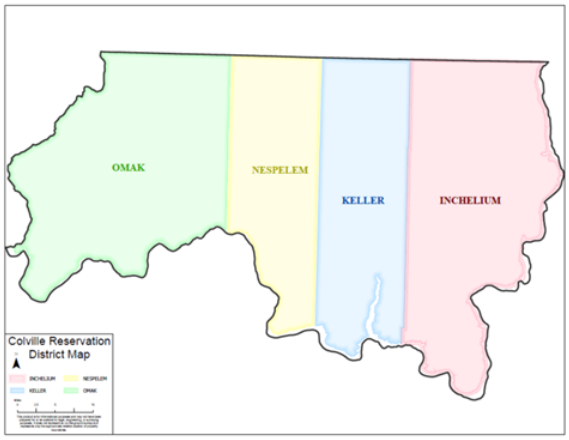
to the 1310-foot elevation line became BOR land. Some private land parcels that extended both above and below that elevation line, however, were bought out in their entirety.

Under the terms of the 1990 Lake Roosevelt Management Agreement, the Tribe manages the BOR lands within the "reservation zone" defined in that agreement. This includes most BOR-owned lands within the reservation boundary upstream from the immediate area of the dam. "Management" rights, however, do not authorize the Tribes to exercise general law enforcement authority on those lands except when violations are committed by Tribal members.

Because of the risk of landslide due to slope undermining by the newly impounded waters behind Chief Joseph Dam—which also happened after the filling of Grand Coulee Dam—the ACOE appropriated easements across trust lands within the reservation. Although the ACOE did not acquire fee simple ownership of those lands, the easements it required limit the uses to which affected lands can be put.

History:
Much of the reservation boundary, as it exists today, was established in 1872 by an executive order issued by President Grant. At that time the reservation covered approximately 2.9 million acres. Members of twelve different tribal groups were either already present within, or later moved onto, the reservation.

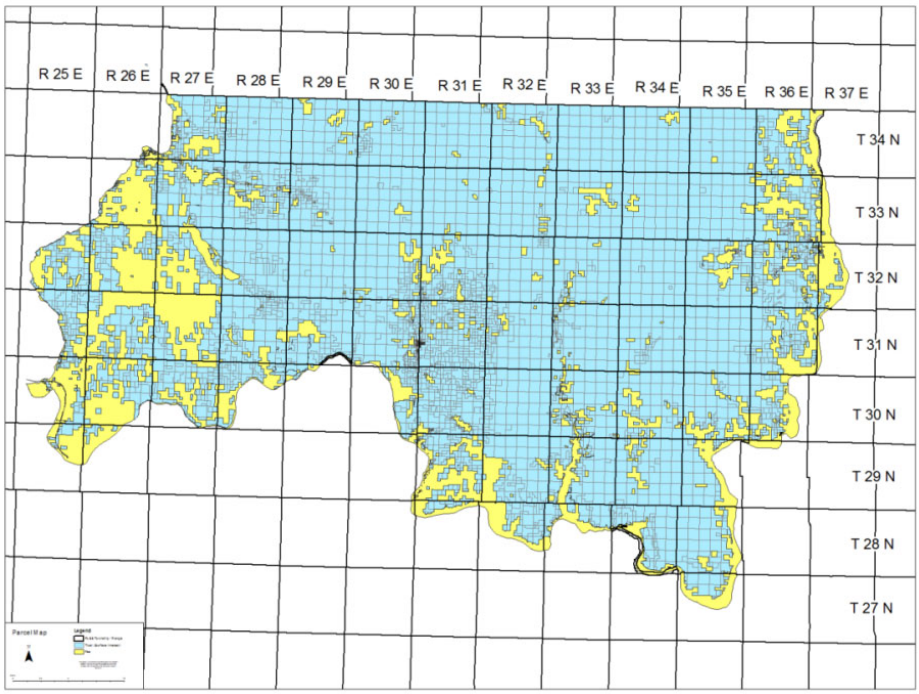
In 1892, by act of Congress the reservation was cut approximately in half; the current reservation is the southern portion of the original reservation. The "North Half" was opened to homesteading, mining, and to other public lands uses. The Tribe retained hunting, fishing, and gathering rights on the federal lands within the north half. Some lands in the north half had already been allotted to individuals and remained in tribal trust status. The Tribe has been purchasing lands in the North Half when funds and land availability allow and is returning these purchased lands to trust status. One of the larger pieces of land returned to tribal ownership includes the Chopaka Crossing, a former railroad border crossing located directly upon the U.S.-Canada border.



Source: CCT GIS, October 11 2018

Beginning in 1916, the south half of the reservation was opened to "settlement" under

the public land laws. Lands within the reservation not already allotted to Tribal members were open to mining claims and patents, homesteading, and even to cash purchases. Large areas of



Source: Tribal GIS program, March 2018. Non-trust lands are yellow, trust lands shown in blue.

the reservation, particularly in the southwest, passed out of trust status and into private non-member ownership. The map below shows the approximate extent of trust (blue) versus private and government ownership (yellow). Government ownership on the reservation includes federal lands owned by the Bureau of Reclamation and the Army Corps of Engineers; state lands managed by Washington State Parks, as well as highway maintenance sites; and county or other local government lands, including fairgrounds and lands used for road maintenance.

The reservation was withdrawn from entry under the public lands laws in 1934; there were no more mining, homestead, or cash purchase entries within the reservation after that year. The last of the legacy mining claims established during the public lands era on the reservation lapsed in 1993. However, even after 1934 fee lands, allotted trust lands and tribally owned lands within the reservation were taken by the federal government for the construction and operation of Grand Coulee and Chief Joseph Dams.

As with the north half areas, when land is available and funding permits, the Tribe purchases land within the reservation boundary and returns it to trust status. In addition to lands within the reservation boundary and the North Half, there are other parcels of trust lands located in

several counties. These include such lands as the Mill Bay Casino in Chelan County, a former USFS site in Okanogan County, and others.

The Tribe has continued to lose access to lands in the North Half due to federal government actions. For example, during the 25-year period from 1983 to 2008, the Bureau of Land Management transferred 3,868 acres of north half lands within Ferry County out of federal ownership. This action effectively eliminated Tribal hunting, fishing, and gathering rights on those lands.

Demographics:

As of 2018 there are approximately 9,500 enrolled members of the Confederated Tribes of the Colville Reservation. Many enrolled members reside just outside of the reservation boundaries in communities such as Coulee Dam, Grand Coulee, Wilbur, Okanogan, and Omak. The total enrolled membership does not include a substantial population of descendants who, although not members, have both a familial and cultural affiliation to the Tribe and receive some services from both the Tribe and IHS. It also does not include non-members who are married to members.

The 2010 decennial census collected data on persons residing within the external boundaries of the Colville reservation, as well as those residing upon affiliated Tribal trust lands outside the reservation boundary. This census data showed 7,687 residents; approximately 2,360 were non-Tribal. School-age persons (17 and under) were counted at 2,102; persons aged 65 and older were counted at 1,032.

Rural populations generally, and Tribal populations specifically, have been consistently undercounted during past national census data collections. One U.S. Census Bureau report addressing Oklahoma issues identified undercounting by as much as 27% of the Tribal population (Moore, 1992). An Eastern Washington University presentation stated that the Native American undercount during the 1990 census was 12%, varying by reservation (Winchell, 2015). Based upon the 1992 study, there may be as many as 9,600 people residing within the Colville Reservation.

The Tribal experience during the 2015 fires showed there were residents who lost homes that had not even been mapped under the 911 addressing system. It wasn't known by the Tribe, or by Okanogan County, that the homes had even existed until after they had burned down and the residents displaced.

Further, in any widespread natural or other disaster, members and descendants from adjacent communities may also need assistance. Although the Tribe is not responsible for disaster relief services outside the reservation (except when they involve off-reservation trust lands), as a practical matter those Tribal members may work within the reservation. If their homes outside the reservation are damaged, they may temporarily reside with relatives within the reservation whose homes are intact.

There are a substantial number of people visiting the reservation for recreation every summer. Within the reservation there are: resorts at Twin Lakes; people with summer homes; campgrounds; and boating users and beach campers along the Tribe's Columbia River shoreline. The National Park Service figures for Lake Roosevelt indicated that, on average, more than 7,000 people visited the park each day during June through August of 2016. Even if only one out of ten visited the reservation, that would still increase the population of the reservation by an average of more than 700 persons per day.

Finally, there are three state highways (SR17, SR21 and SR155) and one U.S. Highway (US 97) traversing the reservation. All of them serve as trucking corridors; US 97 in particular is used for international trade with Canada. Each highway has significant daily traffic across the reservation. The Inchelium-Gifford Ferry connects the reservation with SR25, which runs north-south along the eastern shoreline of Lake Roosevelt. The Inchelium Highway, which runs north from Inchelium towards the off-reservation river crossing at Kettle Falls, is a county road but serves the same function locally as a state highway.

For these reasons, the census data does not adequately reflect the population that may need to be served in the event of a natural or other disaster. For planning purposes, the population within the reservation on any given day is considered to exceed 10,000 people.

Economy—Government Sector:

The largest single employment sector within the reservation is government, in particular the Tribal government and BIA. The five different school districts within the reservation also constitute a significant employment source. Both Grand Coulee and Chief Joseph Dams are partially located within the reservation, and their employees should also be considered as part of the government employment sector.

The Colville Tribal Federal Corporation runs the casinos, community stores, most fuel stations and convenience stores on the reservation, as well as subsidiaries performing work both on and off reservation. This includes fuel stations and convenience stores located in both Ferry and

Grant counties, and a casino in Chelan County, all of which are outside the reservation boundary. At the Tribal membership meeting held in October 2018, it was announced that approximately 1,500 persons worked for the Tribal government or its business operations.

Economy—Agricultural Sector:

Agriculture, in the form of orchards and forage crops as well as livestock production, is a significant contributor to the local economy. At one time the Nespelem area was extensively farmed, but the former irrigation works (including diversion dams and weirs) have been largely abandoned. Large orchards exist along the Columbia and Okanogan rivers in the southwest portion of the reservation; as of 2012, they covered 12,040 acres within the reservation. These attract a seasonal labor force for harvests and have resulted in the construction of temporary housing for seasonal workers. State and county authorities allow such temporary housing to be constructed without requiring sprinkler systems or other fire protection measures (such as hydrants or fire standpipes).

Based upon current data, it is difficult to tell the scope and extent of private sector employment within the reservation. Gebbers Farms is a major employer but has not responded to a request for information about the scope of their activities on the reservation. Because they have orchards and other agricultural interests both on and off reservation, sometimes within a few miles of each other, it may be difficult to separate their data between the two.

In addition to orchards, other documented crop production includes corn (920 acres); other forage crops (11,296 acres); and wheat (13,367 acres) [Census of Agriculture, 2012].

There is one privately-operated aquaculture operation: raising farmed salmon within multiple netted pens in the Columbia River (Rufus Woods Lake).

According to BIA statistics from 2011, between 7,000 and 8,000 cattle are grazed on range units within the reservation each year. (A cow-calf unit is considered one head of cattle for grazing purposes, so the actual number of animals is higher.) No sheep were under permit on the reservation, and 200 horses were permitted. One horse grazed under permit is considered to consume the same forage as 1.5 cow-calf units.

Every five years, the U.S. Department of Agriculture conducts a “Census of Agriculture.” The most recent one was conducted in 2012, and the results were released in 2014. That census showed an “inventory” of 13,444 cattle and calves, as well as 520 horses. This showed an increase of over 2,000 cattle, but a decrease of 1,653 horses, from the 2007 census. The cattle

and horse figures do not match those provided by BIA for 2011. The discrepancy in cattle numbers with those of the BIA is likely due to the BIA keeping records by cow-calf "unit" rather than by animal. For horses, it is likely that many horses are maintained on private lands rather than range units.

Although only 200 horses are grazed under permit, livestock counts in 2010-2011 showed as many as 600 horses on range units. Historically there were a small number of wild horses on the reservation—a 2012 Tribal management plan placed their number at 200 and set that as the goal for wild horse management—but the additional 200 animals were suspected to be "estray" horses turned loose by their owners. These wild and estray horses consumed the same forage as 600 cow-calf units, amounting to between 7% and 8% of the total amount authorized under permit at that time. The forage they consume is not available for either wildlife or cattle grazing and affects both the Tribe's economy and culturally important access to wildlife.

Since 2011, resource damage from wild and feral horses has become more acute. As of March 2018, the Tribe's natural resource manager estimated that there were approximately 2,000 of these horses on the reservation. A roundup in 2015 resulted in the capture of 423 horses, although Tribal land managers wanted to remove 1,000. The current estimate of 2,000 horses across the reservation translates into the consumption of enough forage to support 3,000 cattle.

Both the livestock industry and crop production on the reservation is susceptible to drought, wildland fire, and disease. Livestock grazing was heavily impacted by the 2015 fires. In addition to the loss of cattle in the fires, leased Tribal range lands had to be rested to allow recovery following the fires. This reduced the grazing land available for three years post fire.

Economy—Timber Sector:

Historically timber production has been a major economic resource within the reservation, but the last sawmill operating within the reservation shut down in 2017 after little more than three years of operation. Both tribally owned timber mills (the Omak Wood Products Mill and the former Colville Indian Precision Pine plant, also near Omak) shut down in the wake of the Great Recession that began in 2008. The Omak mill later reopened, but shut its doors again in 2017. There is significant timber production from within the reservation, but logs are now transported to outside mills for processing.

The 2015 fires devastated the timber industry, burning an estimated 22% of the marketable timber within the reservation. This amounted to approximately 800 million board feet of timber burned, about ten years' worth of full production. Although there was a short-term increase in

the amount of logging, as salvage logging took place to bring damaged but still usable trees to market, that timber was salable only at reduced prices.

A significant source of income to sustain the Tribal government and its membership consists of revenues from timber production. The timber losses from the 2015 fires, especially when combined with the destruction of marketable timber during the 2012 windstorm, reduced long-term timber resources. This left the Tribe facing a dilemma; increasing the timber cut to sustain revenue would result in reduced harvests in future years. Reducing the timber cut immediately, to support longer-term sustainability, would cause an abrupt decrease in Tribal revenue in the short term.

In any case, the outlook for long-term sustained yield timber production will likely decrease over the economic projections made prior to 2014.

Chapter 4: Hazards, Threats, and Mitigation Strategies

A. Introduction

Tribal members are survivors despite:

- the invasion of traditional territories by "settlers" moving in and taking Tribal lands;
- the federal government's attempts to terminate Tribes and their governments as sovereign entities and to assimilate Tribal members; and
- the deliberate suppression of Tribal languages and culture.

The Confederated Tribes of the Colville Reservation have endured and prevailed. The Tribes have resisted threats to Tribal sovereignty, regained primary control over law enforcement on the reservation, and established an economy in which the members manage their own natural resources.

A Tribal Hazard Mitigation Plan, while it may address many of the same issues as an HMP prepared for other jurisdictions, differs in at least one major respect from them. Tribal governments approach some issues from a different angle, because preserving not just the natural environment but traditional uses and cultural resources are critically important goals. As just one example, a non-Tribal government might pursue salvage archeology if a planned road building project would disrupt an archeological site, rather than alter road building plans. A Tribal government might re-route the road despite the extra cost, or even cancel road construction altogether, rather than damage or destroy a significant cultural resource.

Virtually every Tribal government decision takes into account the effects on hunting, fishing, gathering, protection of and access to traditional sites, and other traditional uses of land within the reservation. This type of deliberate approach may be less common with other governments. It may also result not just in a slower pace of governance, but in decisions different from those a non-Tribal government would make.

A requirement of a hazard mitigation plan is that the identified natural disaster hazards and threats must be evaluated and rated. Detailed information about each hazard or threat can be found in its respective section; at the end of each section will be listed possible mitigation strategies. These are not strategies that the Tribe is required to implement; these are ideas for what can be done when funding is available and Tribal leaders approve a project.

The summary hazard rating follows below. The rating criteria for each aspect of these ratings—Location/Distribution, Maximum Probable Extent, Probability of Future Events, and Overall Risk Significance Ranking—can be found in Chapter 5, section D.

Hazard	Location/ Distribution (Reservation Wide)	Maximum Probable Extent (Magnitude/Strength)	Probability of Future Events	Overall Risk Significance Ranking
Communications Failure	**Significant**	**Severe**	**Likely**	**Medium**
Climate Change	**Significant**	**Moderate**	**Likely**	**Medium**
Dam Failure:				
Chief Joseph	**Significant**	**Extreme**	**Unlikely**	**Low**
Grand Coulee	**Significant**	**Extreme**	**Unlikely**	**Low**
Owhi Lake	**Negligible (<10%)**	**Low**	**Occasional**	**Low**
Twin Lakes	**Negligible (<10%)**	**Weak**	**Occasional**	**Low**
Upriver Dams	**Significant**	**Moderate to Extreme**	**Unlikely**	**Low**
Disease, Animal	**Extensive**	**Low**	**Occasional**	**Low**
Drought	**Extensive**	**Moderate**	**Likely**	**Medium**
Earthquake	**Extensive**	**Extreme**	**Unlikely**	**Low**
Extreme Heat	**Significant**	**Low**	**Likely**	**Low**
Flood	**Limited (<25%)**	**Moderate**	**Likely**	**Medium**
Landslide	**Limited (<25%)**	**Moderate**	**Likely**	**Medium**
Severe Winter Weather	**Significant**	**Moderate**	**Likely**	**Medium**
Severe Storm:				
Wind	**Significant**	**Severe**	**Likely**	**High**
Rain	**Significant**	**Severe**	**Likely**	**High**
Tornado	**Negligible**	**Severe**	**Unlikely**	**Low**
Utility Failure (Power Grid and subsequent)	**Significant**	**Moderate**	**Likely**	**Medium**
Volcanic Eruption	**Significant**	**Moderate**	**Unlikely**	**Low**
Wildfire	**Extensive**	**Extreme**	**Highly Likely**	**High**

The chart above ranks the identified hazards and threats as High Risk, Medium Risk, or Low Risk. It is consistent with the survey and heat map results presented in Chapter 2, section B, preceding.

Persons participating in the public outreach consistently rated wildland fire as the most serious risk, followed by severe storms; the third priority was essentially tied between long-term power failure and climate change, with other issues narrowly lower.

For that reason, when pursuing mitigation actions, the priorities for mitigation will be:

1. Wildland fire
2. Severe storms
3. Electrical power resiliency during disasters
4. Climate change and drought

To an extent, mitigation action under these priorities may be changed or offset by the availability of grant funding. Out of its internal resources, the Tribe has limited ability to begin major mitigation programs. As detailed under the following section, General Mitigation Strategy for All Risks and Hazards, the Tribe has embraced a low-key but continuing approach to mitigation. One reason for that approach is because many small-scale mitigation actions can be funded, a little at a time, out of existing budgets. As just one example, when a culvert needs to be replaced it costs relatively little to increase culvert diameter to increase the flow capacity it can handle. Incremental mitigation actions may be slow, but the Tribe is already working to mitigate threats and improve Tribal resiliency as part of normal day-to-day work.

When grants are available, they may be for a lower priority issue (such as drought, rated as a "medium" risk) but such a grant may be the only mitigation action that could be funded during that year. The Tribal council has in the past been able to reallocate existing program funds to cover the 25% Tribal share of a grant, such as required for a Hazard Mitigation Grant, when a grant opportunity appears.

B. General Mitigation Strategy for All Risks and Hazards

Mitigation is not new to the Tribe. The Tribe has followed mitigation strategies when possible, even before this Hazard Mitigation Plan began. When the Tribe acquired equipment to set up an Emergency Operations Center (EOC), it was mitigating future risks by increasing the Tribe's ability to respond to disasters. The Tribe has long pursued increasing the resiliency of its Information Technology infrastructure. When damaged roads are repaired, culvert or drain sizes are evaluated and increased if necessary. All of these issues are examples of mitigation in action.

The Tribe's general mitigation strategy is to plan and prepare for disasters and issues that could occur, whether for a major earthquake, the slower disaster of a drought, or the potential generations-long hazard of climate change affecting natural resources central to Tribal life. Where possible, this includes making physical changes to infrastructure or creating infrastructure to protect against future damage. There are three general ways in which the Tribe carries out this overall strategy.

The first mitigation strategy is that of basic emergency planning. Some disasters are appropriately planned for and managed through the Tribes' existing Comprehensive Emergency Management Plan (CEMP). Natural disasters including earthquakes, volcanic eruptions, and flood, and technological disasters such as major power failures, are addressed within individual Emergency Operations Plans (EOPs). The Tribe's EOPs are found as the functional annexes that are a part of the CEMP.

In some cases there may not be an individual EOP; catastrophic wildland fire is an example of a regularly recurring hazard for which there is no separate EOP. The primary reason for that is because the responsibility to prevent and fight wildland fire currently rests in the hands of a federal agency (BIA) rather than with the Tribal, state, or county governments and agencies.

The Bureau of Indian Affairs, within the Colville Reservation:

- sets the wildland fire strategy through its fire staff;
- suppresses wildland fires;
- controls forestry issues such as the development of dog-hair thickets and other successional changes that create unhealthy forests and increase the risk of catastrophic fires;
- decides when and where to conduct prescribed burns;
- manages the fire prevention program; and
- manages timber practices and logging, including fire risks caused by industrial logging operations.

Although the Tribe may not have its own wildland fire EOP, it has plans to address the consequences of major fires. These plans include evacuation and sheltering plans to meet the needs of members and residents threatened by wildland fire.

The second way is through long-term planning independent of the CEMP and EOPs. The Tribe is currently working its way through developing a climate change strategy, in cooperation with the University of Washington. This Tribal partner, and others, has assisted the Tribe with the

scoping and the development of a climate change report. Although the climate change report identifies some of the threats posed to the Tribe and its members by climate change, by its nature this HMP only surveys this long-term threat. Until the larger effects of climate change are more clearly understood, this HMP cannot include a comprehensive mitigation strategy. Those strategies will emerge as the problem continues to be studied and will be included into future revisions of this HMP.

The Tribe is integrating hazard mitigation into other planning efforts. The Tribe is nearing completion of a new draft Community Economic Development Strategy (CEDS), which will replace the previous version. Any work towards creating a more robust local economy will increase the resilience of the Tribe and its members in the face of disaster, enabling a faster recovery. After meeting with the CEDS planning team leader, the Tribe's current THIRA and 2012 HIVA were provided to the CEDS team for partial incorporation into the CEDS. The intent is to identify areas where economic development grants can also serve mitigation strategies.

The Tribe is currently preparing an update to its long-term transportation plan, which is being prepared by a contractor. This plan is intended to guide Tribal transportation maintenance and improvements for the next twenty years. Tribal hazard mitigation information has been provided to the contractor and one in-person meeting has been held to ensure that hazard mitigation issues are addressed during the preparation of the long-term plan.

The Tribe has a zoning process, established under the Land Use and Development chapter of the Tribal Law and Order Code. The zoning map approved by the Colville Business Council determines whether a given use can be permitted within a zone.

The Tribal building permit process now includes a hazard mitigation review, a process that was initiated because of this HMP. Every permit application is sent to Emergency Management to ensure that hazard mitigation is considered. Hazard mitigation review of new construction permit applications now includes a review of liquefaction maps and known flood risks.

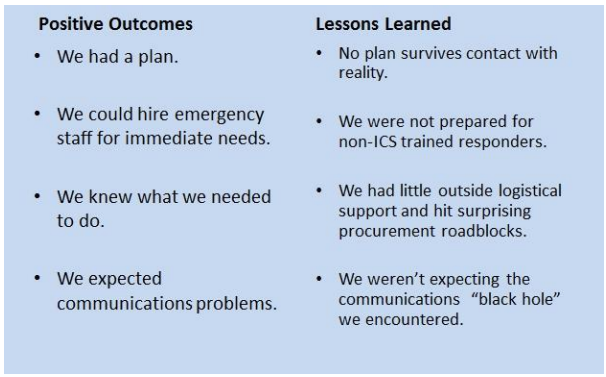
As Tribal plans come up for renewal, hazard mitigation will be incorporated into them wherever possible. Examples of such plans including the various Tribal transportation plans, BIA's Fire Prevention Plan, Tribal Integrated Resource Management Plan, etc. Long-term transportation plans, in particular, are an opportunity to identify infrastructure problems such as inadequate road culverts, landslide mitigation to protect roads, and other measures to prevent stormwater runoff damage. Identifying the scope of the problem is a first step towards resolution.

The third general strategy is to identify lessons learned from incidents and disasters and to apply them to future activities. Some examples of this approach follow.

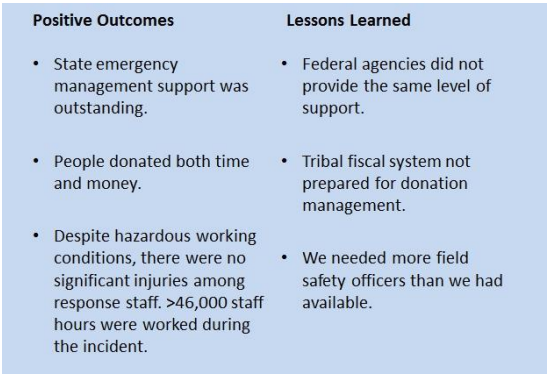
During the period from December 2008 to August 2018, six presidential declarations of disaster were issued because of disasters occurring within the Colville Reservation. For the first one in 2008, the Tribe was reimbursed for only a fraction of its losses. This is because the reservation, divided as it is between two counties, was dependent upon those counties to apply for disaster assistance. When Okanogan County did not pursue a disaster declaration, the Tribal damage within the Okanogan County portion of the reservation could not be addressed under the Stafford Act.

As a result of that experience, the Tribe aggressively pursued disaster declarations in all subsequent disasters. For three of the next four declarations, the Colville Confederated Tribes were specifically listed as an affected jurisdiction in addition to listing the counties. In the fourth instance (2017 floods), the Tribe's FEMA-reimbursable losses were included within the county-wide total to help the county reach the disaster declaration threshold. In the fifth instance (2018 floods), the Tribe received a disaster declaration directly from the president without being part of a state declaration.

Significant effort has been dedicated to learning from disasters to better prepare for the future. For example, the two images below are from a slide presentation prepared for an after-action review of the 2012 storm response:



Positive Outcomes	Lessons Learned
• We had a plan.	• No plan survives contact with reality.
• We could hire emergency staff for immediate needs.	• We were not prepared for non-ICS trained responders.
• We knew what we needed to do.	• We had little outside logistical support and hit surprising procurement roadblocks.
• We expected communications problems.	• We weren't expecting the communications "black hole" we encountered.



Positive Outcomes	Lessons Learned
• State emergency management support was outstanding.	• Federal agencies did not provide the same level of support.
• People donated both time and money.	• Tribal fiscal system not prepared for donation management.
• Despite hazardous working conditions, there were no significant injuries among response staff. >46,000 staff hours were worked during the incident.	• We needed more field safety officers than we had available.

Learning from experience and incorporating those lessons learned into policy and procedure, resulted in a re-write of the Tribe's 2012 Comprehensive Emergency Management Plan and the approval of a new plan in 2014. The next rewrite, scheduled to occur in FY2019, will incorporate lessons learned from the 2014 and 2015 fires as well as the 2016, 2017 and 2018 floods.

Funding mitigation work may be the biggest challenge of any mitigation strategy. It is particularly true for this Tribe, which currently has an unfunded negative balance of approximately $1.6 million dollars in its emergency management account. This negative balance is a consequence of repeated natural disasters (five of which, over a six year period, resulted in presidential disaster declarations) as well as significant ineligible disasters including the loss of the Tribal headquarters building to fire in 2013.

The Public Safety Division (PSD) employs a full-time grants coordinator. Her duties include providing guidance to PSD entities that are applying for grants, including mitigation grants.

DHS and FEMA are not the only potential sources of funding; there are other grant sources where the funding can help achieve mitigation goals. Examples include Federal transportation grants, which can be used to improve roads and make them more resilient against floods and landslides. The climate change steering committee identified sources of grants or funding for riparian habitat restoration; ecologically restored riparian habitats minimize erosion, which mitigates stream-caused erosion of road shoulders as well as slows stream velocity. Slowing stream velocity helps preserve culvert ends and bridge abutments from undermining.

The activation of this HMP includes the formation of a Steering Committee:

- to promote and monitor the inclusion of mitigation activities into all facets of Tribal planning, no matter which Tribal department is involved;
- to identify sources of grant or other funding;
- to apply for, or assist other Tribal programs to apply for, grant or other funding that will help achieve Tribal mitigation goals; and
- to encourage and monitor the incorporation of mitigation into everyday Tribal government activities.

The formation and operation of the Steering Committee is addressed in Chapter 5, section C, of this plan.

The systemic approach laid out in this introductory section is an integral part of the Tribe's overall hazard mitigation process and applies to all hazards. Additional mitigation strategies for specific hazards are discussed in the following sections.

C. Technological and Other Hazards

"Technological and Other Hazards" are not always addressed as part of Hazard Mitigation Plans. Unlike the hazard mitigation plans produced by some other jurisdictions, this plan does not address terrorist or civil disorder threats. It does address one potential threat or hazard that is unique to Tribes: the possibility that unfavorable government actions at the national level may cause difficulty for the Tribe and its members. Protecting Tribal members and Tribal sovereignty are high priorities.

The primary cause of many of the technological hazards identified here is likely to be a natural hazard. Earthquakes could cause dam failures. Wildland fire, earthquake, windstorms, severe winter storms, and floods could all trigger technological hazards. These hazards are listed here to discuss them in a single location within this plan, rather than repeatedly describing them under each possible category of natural disaster. When natural disaster hazards are discussed, each section may mention "second order" effects. An example would be a wildland fire (a "first order effect") destroying power lines and knocking out the power supply (creating a "second order" effect). Second order effects are sometimes referred to as "cascading" failures.

1. Loss of Public Utility Services

In this section we are concerned not just with electrical power but with communications, potable water, and sewage disposal. All of these are dependent upon uninterrupted electrical power. While loss of utility services can occur in isolation—a well pump breaks, an electrical transformer catches fire, etc.—major failures are likely to be a second order effect from another disaster.

There are no pipelines crossing the reservation; all fuel deliveries are made by tanker trucks or by rail. The Cascade and Columbia River Railroad, a short line operating on what was once a Burlington Northern right of way along the western edge of the reservation, transports bulk propane and bulk diesel fuel by rail car to local distributors. It also delivers bulk agricultural chemicals to an agricultural supply business within the reservation, near the Okanogan River between Omak and Okanogan. Those chemicals include agents listed as regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Electrical Power

Electrical power on the reservation comes from four different providers:

- Okanogan County Public Utility District (PUD) #1, along the western reservation including eastward along SR155 from Omak to the Paschal Sherman/Mission area;
- Nespelem Valley Electric Cooperative, which provides power along the SR155 corridor to the Paschal Sherman/Mission area as well;
- Ferry County PUD, primarily in the Sanpoil Valley but also to several small areas on the reservation where power lines come from the north; and
- Avista Energy, for the eastern reservation including Inchelium and Twin Lakes.

Power distribution lines throughout the reservation are above-ground, and many of them run through forested areas. Winter storms can cause ice buildup that cause power lines to break under the strain, or they can be knocked down by ice-encased falling trees or tree limbs. Wind storms can cause power lines to touch and arc; lines to break and fall; or blow over trees or their limbs onto power lines—any of which can cut electrical power. Other accidents can cause power outages; the Tribal Police Department discovered that their dispatch emergency generator was not fully functional when a crop duster aircraft struck a power line in June 2012, interrupting power to Nespelem. That issue was quickly resolved.

The power supply to the Inchelium and Twin Lakes area is at the edge of the Avista Energy distribution network; during widespread power outages due to storms, such as the 2008-2009 severe winter storm and the 2012 and 2014 summer windstorms, power restoration to the edges of their network took longer to accomplish than in their core service areas.

Even when the area involved is not at the far edge of a distribution network, restoration may take time due to the vulnerability of the power infrastructure. During the 2012 windstorm, the entire Sanpoil Valley and all areas fed from it went dark. More than 45 miles of power lines were down, with breaks in multiple locations. Ferry County PUD, which services the area from a Keller substation (fed from Grand Coulee Dam), had to replace poles and restring line throughout the entire valley. It took more than two weeks to restore power to everywhere it had been lost.

Wildland fire is a common cause of power failure. The 2015 fires cut power to huge swaths of land both within and outside of the reservation. It took days to replace burned power poles and to restring lines along the new poles. The SR155 corridor to the Disautel area required more than a week to return power just to those areas immediately along the highway and longer until power was restored to areas further from the highway.

Within the reservation, community centers are the first choice for evacuation shelters; longhouses and schools are also available for that purpose. However, none of the longhouses or community centers has an emergency generator, and only the Paschal Sherman Indian School (PSIS) has a generator. PSIS is not usable as a shelter except during summer, as it is a boarding school during the school year. Outside of that single school, there are no other public buildings immediately suitable for a shelter when power is out. The only kitchens that can be used for emergency feeding if power fails reservation-wide are the ones at the PSIS and at the Tribal Correctional Facility, which does have an emergency generator.

An issue is that in some parts of the reservation, there are few facilities suitable for use as either an evacuation shelter or for incident command posts for wildland fire incident management teams. This results in competing needs for two different purposes and few alternatives.

A reservation-wide power failure is one of the higher-impact disasters that could affect the Tribe. As mentioned above, power failures are often a second order effect from another cause. But electrical power supplies can fail entirely on their own, without a triggering wind or ice storm. A region-wide heat wave causing heavy stress on electrical supplies, coupled with a transmission system incident causing a cascading series of failures within the regional distribution network, could cause a major regional power outage.

Many other low-probability but high-impact disasters could cause region-wide power failures affecting Tribal members. A major Cascadia Subduction Zone earthquake is forecast to shut down power distribution networks as far east as Montana and require up to a week to restore power in eastern Washington. A volcanic eruption could cause power outages due to heavy ash fall. A major solar storm, such as the 1989 event that left the entire province of Quebec without power for nine hours, could shut down a regional power grid. While longer-term power failures are usually considered low-frequency/high-impact occurrences in any single location, they have been common world-wide. The North American power grid is susceptible to major power grid failures.

The Tribe is not adequately prepared to deal with the consequences of a wide-spread winter power failure, requiring protective sheltering of a significant population from the cold. It is also not adequately prepared to deal with long-term power failures in terms of providing potable water, or solving fuel distribution issues, to members and residents.

Water and Sewage

All public utilities on the reservation are highly dependent upon uninterrupted electrical power; none have a backup generator or are pre-wired to accept an emergency generator.

The reservation is served by a number of small water systems. These include local tribally or Colville Indian Housing Authority (CIHA) owned and operated systems for the Nespelem Agency area, Mt. Tolman Fire Center, Keller community, and HUD housing communities; municipal systems in Coulee Dam-Elmer City, Okanogan, Omak, and Nespelem; a privately-operated water system for homes in the Twin Lakes area; and a privately-operated local water and sewage district for the Inchelium area. Every water system on the reservation is dependent upon electrical power to operate wells. When power fails, the water system fails when water pumped into storage tanks is used up. Estimates of the time before water tanks empty, under normal demand, range from one day (Nespelem) to three days (Keller). Outside the areas covered by these systems, residents rely on electrically-powered well pumps for individual residential water supplies.

Waste water treatment systems operating within the reservation include:

- Coulee Dam-Elmer City, operated by the Town of Coulee Dam;
- Nespelem and Agency campus areas, operated by the Tribe;
- City of Omak;
- City of Okanogan; and
- A privately-operated water and sewage district in the Inchelium area.

Everywhere else on the reservation on-site septic systems are in use, including some of the larger operations (such as the Twin Lakes Resort, the Paschal Sherman Indian School and the Mission campus).

None of the water or sewage systems on the reservation have emergency power capability. If power fails, the systems will shut down until either line power is restored or an emergency generator is located and installed. Such a power outage may greatly hinder firefighting efforts. When the power went out in 2015, the Paschal Sherman Indian School stopped fire apparatus from refilling their water tanks to preserve water supplies in the storage tanks for defending the school from nearby fires.

In the case of a sewage system, a power failure can have significant environmental impacts. The system built in the 1970's for the Nespelem and Agency Campus areas includes five sewage lift stations; none of them has an emergency generator. If a power outage occurs, the sewage lift

stations in the Nespelem and Agency campus areas cannot pump sewage uphill to the sewage lagoons for treatment.

A power outage for as little as one hour, during peak daytime use of the system, may cause sewage to begin backing up. One of the lift stations is automatically set to drain into former sewage ponds. If a septic pump truck is available, the full-time use of that truck to pump from other lift stations and transport to the sewage lagoon has been able to keep up with the sewage flow. If no pump truck is available, it may be necessary to open valves to dump raw sewage into the Nespelem River drainage to avoid sewage flow into residential areas.

In the case of water systems, it is not just electrical power failure that could have significant adverse effects. During the 2015 fires the fire hydrants for the Town of Nespelem failed due to age-related water main damage. Tribal firefighters in 2015 were faced with the task of defending a town, without working fire hydrants, in the face of forecasted 40 MPH winds driving the North Star Fire into the town.

Communications

Even where there are buried telephone lines, many people do not have land-line telephones. There is no longer a network of pay phones within the reservation, even in places such as the Sanpoil Valley where they would constitute the only reliable emergency communications infrastructure for the public. Parts of the telephone network on the reservation are still installed on above-ground poles vulnerable to windstorms, winter storms, and wildland fire in the same manner as electrical lines. Much of the telephone network off-reservation is also above ground, and failures outside of the reservation impact the reservation's phone network as well. In 2014 during the Carlton Complex series of wildland fires, the Okanogan County 911 system failed due to widely separated system damage at two different locations.

Cellular telephone coverage is inconsistent. Two providers--AT&T and Verizon--have towers on the reservation. Their reliable coverage is limited to the Okanogan Valley along the river, some of the Nespelem area, and some of the Inchelium area. Everywhere else, including along the SR 155 corridor, cellular telephone coverage can best be described as sporadic. Text messages often go through when cellular phone calls do not.

An often-neglected impact of communications failures is the impact upon commerce. During the 2014 and 2015 fires when above-ground communication lines burned, they took with them the ability to use credit cards and to withdraw cash from automated teller machines. Gas stations and grocery stores have to be connected via internet or telephone lines in order to

verify that credit cards/debit cards are valid. Many affected people were unable to buy either fuel or food with their credit/debit cards and could not obtain cash from ATMs.

A credit union just outside the reservation in Brewster, WA had electricity but without communications. Sign displays "ATM OUT OF SERVICE". July 2014, Carlton Complex fires

Much of the Columbia River Road and SR 155 corridors (Coulee Dam and Nespelem to Omak), the Peter Dan/Manila Creek Road and the Cache Creek Road (Sanpoil Valley to points west), the entire Sanpoil Valley including much of Keller, and much or even most of the Silver Creek and Bridge Creek roads (Sanpoil Valley to Inchelium and points east) are without cellular phone coverage. As previously noted, there is no longer a pay phone infrastructure which can be used to report fires, accidents, or other emergencies.

Moses Mt. repeater site, August 2015, during Tunk Block Fire

Cellular telephone systems, while they may have battery or generator backup, cannot run indefinitely without line electrical power. The 2015 fires, particularly where the Moses Mountain communications site was involved, showed that.

When power lines to that site were destroyed by fire, the emergency generators powering the AT&T cell tower and powering the Tribal microwave backbone needed to be refueled regularly. Refueling small-capacity fuel tanks in an active fire area, where at least once the refueling team had to evacuate for their safety and leave a disabled vehicle behind, is uncertain at best. Had these refueling missions failed, the only working cell tower for a large area of the reservation

(and for Okanogan County) as well as the Tribal government's internet connection would have been lost.

In many jurisdictions, emergency responders can use their agency radios to communicate in the absence of telephones. That isn't always true on the reservation. Much of the northern Sanpoil Valley, for example, is a radio dead zone. During a 2014 petroleum tanker accident in the northern Sanpoil Valley, fire and police responders had to leave the scene to be able to reach a radio repeater to send and receive radio messages. This delayed the response and may have increased the extent of the pollution from spilled fuel. As of this writing (four years after the accident), the cleanup to remove gasoline from ground water is still ongoing.

The problem with radio communications has multiple facets. The switch from wideband to narrowband required new radios and repeater equipment; at the same time, radio communications nationally have been moving from analog to digital radio. The "reach" of broadcasts from digital radio equipment (the area in which voice transmissions can be understood) is generally better than with analog transmissions. However, digital signals reflected from multiple terrain features can appear to a receiving radio to be corrupted and indecipherable. This appears to be a significant issue in the mountainous environment of the Colville Reservation.

There are currently thirteen mountaintop radio repeater sites on the reservation, used by Tribal government entities as well as by the BIA. An analysis of radio signal propagation on the reservation determined that when the Tribe does convert to digital public safety radios, it will need to substantially increase the number of communication sites. Contributing to this problem is the reservation's location near the border with Canada. Part of the reservation is north of the Federal Communication Commission's (FCC) "A Line" within which broadcast power is more tightly restricted to avoid interference with Canadian users.

Although each of these problems can be solved with the application of enough funding, the switch to narrowband radio was an unfunded mandate imposed upon the Tribal government. Even now, more than five years after the FCC's mandatory deadline, portions of the public safety infrastructure are still wideband. Significant infrastructure investment is needed to bring the reservation into the modern communications era using digital public safety radios. It is already difficult to purchase replacement radios for use on the still-wideband portions of the Tribe's public safety radio network.

Tribal broadband internet access is threatened by the fact that it must connect to off-site transmission systems of varying quality. For example, one crucial stream crossing

off-reservation consists of a single bundle of fiber optic cable that, as of summer 2018, was still exposed to the elements and to casual vandalism. Elsewhere, as with telephone lines, fiber is strung on wooden power poles that can be damaged by ice storms, wind storms, or wildland fire. Although the Tribe can—and is—putting its own fiber underground, it still has to connect to off-reservation systems.

To summarize, the Tribe has little influence upon vital public utilities. It is dependent upon electrical power generated by sources beyond the Tribe's control; it is dependent upon off-reservation links for its communications infrastructure with the outside world (internet, telephone, and cellular phone); and it is dependent upon outside sources of supply for fuel.

Possible Mitigation Strategies: Loss of Public Utility Services

The Tribe neither generates nor distributes electricity on its own. With service fragmented between two public utility districts, one rural electric cooperative and one for-profit power company, the Tribe is not currently able to address electrical infrastructure issues. The Tribe has considered the option of creating a Tribal electrical utility, but that effort is still at the discussion stage.

What the Tribe can do now is seek funding for emergency generators for critical Tribal facilities. A successful example of this comes from the Nez Perce Tribe in Idaho, which obtained DHS grant funding to install emergency generators at community centers. That grant provided the Tribe with structures that, after generators were installed, could be used as evacuation shelters regardless of whether the shelters were for warming during ice storms or cooling shelters during a life-threatening heat wave.

As of the writing of this document, the Confederated Tribes of the Colville Reservation do not have a single community center or longhouse in any district with an emergency generator. That may eventually change; long-term infrastructure planning calls for construction of a "Nespelem Longhouse" (Tillman, 2018). Plans for the structure include installing an emergency generator capable of carrying the building's entire electrical load. In this instance, identifying the lack of emergency generation capacity for evacuation shelters during past threat and hazard assessments may result in an eventual mitigation action.

Where generators are not needed at all times, facilities could be pre-wired with cut-over and isolation switches to allow a generator to be connected in time of need. A portable generator could then be brought in to carry all or part of the load of that facility. A large trailer-mounted generator could, for example, be moved from well field to well field around the reservation

during a major power failure. This would only work if each of the well fields, and water purification facilities, is pre-wired to accept a portable generator. Once water tanks at a location are at least partially refilled, the generator could be moved to additional well fields until power is restored.

The two community sewage systems (one Tribal, one private water and sewer district) could also benefit from emergency generators. The Nespelem/Colville Agency system should not have to risk the discharge of sewage directly to the environment during a prolonged power failure.

The Tribe will pursue grants to install emergency generators. The cost to acquire and install three additional Tribal districts with emergency generation (since Nespelem District will have a longhouse with a generator) of pre-wiring facilities to accept a portable generator and of acquiring a trailer-mounted large generator is sufficiently high that grant funding may be the only way to accomplish this within a reasonable time. The privately held water and sewer system has received at least one Indian Health Service grant in the past to improve service to Tribal customers served by the utility.

A different mitigation problem is posed by fuel supply to the reservation. As noted before, no fuel station on or near the reservation has an emergency generator. The Tribal government does not maintain a fueling station capable of refueling emergency equipment, such as ambulances, law enforcement patrol vehicles, or fire apparatus. Unless the Tribe builds its own fuel supply for Tribal government vehicles, it remains dependent upon commercial stations.

Three states, concerned by the lack of emergency power at fuel stations, have now passed laws to resolve the problem. Depending upon the state, they require certain newly constructed or even existing stations to either have an emergency generator at all times, or to be able to connect one within twenty four hours of a power failure or a declared emergency. The most recent state to do so, New York, instituted that requirement as a direct result of Superstorm Sandy in 2013.

A possible solution would be to use the Tribe's regulatory and permitting authority to influence change over the long term. Additional commercial fuel stations may be built in the future; current fuel stations will eventually need to be remodeled or renovated. A council resolution imposing an emergency power requirement as a condition of receiving a building permit could eventually resolve this problem. There could include an exemption for stations of three or fewer pumps to avoid shutting down the smallest fuel stations (such as the ones at Twin Lakes).

If this is too much of a burden, a lesser standard could be imposed requiring that newly constructed or remodeled stations must install a generator connection and isolation switch, so that a generator can be plugged in to operate the fuel pumps.

Another way to approach this would be to require emergency generator capability for certain classes of structures: health care facilities, commercial fueling stations, and certain other public occupancies such as community centers. This would eventually result in emergency generator capacity for the IHS clinics, both of which must currently shut down most operations when there is a power failure.

Many homes on the reservation are heated with pellet stoves, which require electric power to operate. The cost of a small generator may be prohibitive for some Tribal members, even though essential to keep their homes warm and lighted during winter power outages.

A possible solution would be for the Tribe to make bulk small generator purchases with extension cords, at a discounted price, for Tribal members. The Tribe already provides this service to members for other expensive items. Although individual members should pay for the items, the Tribe's purchasing power would obtain discounts to enable more people to buy generators. This will help them be more resilient during disasters.

AT&T is currently seeking customers for its FirstNet program. FirstNet is a nationwide cellphone based network that gives first responders priority access to the available cellular bandwidth, so first responder calls will be given a higher priority than all other callers. AT&T may install additional towers on the reservation in the Inchelium area and along SR155. It is not currently considering that action for the area on the reservation with the least cellular coverage, the Sanpoil Valley.

Here is the summary of possible mitigation actions for this hazard:

Issue	Possible Mitigation Actions
1. No shelters with emergency power in any district	A. Pursue funding (grants etc.) to install generators B. Pre-wire shelters to accept portable generators to run the facilities

2. All community water supplies dependent upon electrical power	A. Pursue funding (grants, etc.) to pre-wire well fields/purifiers to accept generators
3. Power failure at Nespelem will cause sewage discharge into Nespelem River basin	A. Pursue funding (grants etc.) to purchase and install a generator for each of five sewage lift stations
4. No gas station on reservation or nearby can pump fuel during power outage	A. Persuade Tribal enterprise to install emergency generators at all four gas stations on/near reservation B. Seek funding to install emergency generator at community gas station in Inchelium (consider Quampt' Quampt' funding) C. Use Tribal government permitting authority to require gas stations to provide emergency power for pumps D. Obtain a fuel truck, possibly from surplus, that can be filled off-reservation and used to refuel generators and emergency vehicles during emergencies
5. Tribal members with pellet stoves will not have heat during winter power outages	A. Use bulk purchasing power of Tribe to buy small generators and extension cords for discounted resale to members
6. Inadequate cellular phone service on reservation	A. Consider switching Tribal government phones to a provider that will build additional cell tower(s) B. Explore possibility of installing emergency phones to connect to 911 operator or to Tribal police along existing land-line telephone routes

	C. Influence FirstNet Authority to install cellular towers along the SR 21 corridor and other underserved areas
7. Inadequate public safety radio coverage on reservation	A. Seek funding to heighten existing antenna towers to improve coverage B. Seek grants to allow additional radio repeater sites to be constructed C. Seek additional FCC frequency allocations to improve radio coverage, and seek grants to install the additional repeaters needed

2. Cyber Threats

Many governments adapted over a period of years to a workplace in which desktop computers went from a curiosity to a necessity, and in which the need for connectivity grew continuously. This was an environment in which the need for standardized equipment and policy crept up on many jurisdictions, and networks grew in an unplanned manner. Wiring and connection points were added to existing structures designed and built in a pre-cyber age; servers, electrical power upgrades, and other needs were shoe-horned in wherever they would fit.

This was also true of the Tribal infrastructure. When the first Hazard Identification and Vulnerability Assessment (HIVA) for the Tribe was completed in March 2012, Information Technology (IT) staff was consulted about network vulnerability. It was recognized that there was a risk of catastrophic data loss, due to the lack of off-site data backup. However, it was apparently not recognized that the Tribal headquarters building represented a single point of failure for most of the Tribal network.

The Tribal headquarters building was destroyed by fire in July 2013. Every Nespelem and Keller connection in the Tribal network led to that structure. When the headquarters burned down, with a significant loss of records, it took the local Tribal network with it. Satellite offices in Inchelium and Omak remained connected to the internet.

The Tribal government has since redesigned and rebuilt its headquarters, redesigned and upgraded its network infrastructure, and is replacing older technology still in use. As with any

other large organization, the Tribe faces a variety of cyber threats from both internal and external sources. Some of the "threats" are simply older technology.

The Tribal network is vulnerable to physical damage simply because it connects, off-reservation, to fiber optic cables that are above ground and susceptible to wildland fire, ice storm damage, or casual vandalism. Microwave backhauls are still in use, although now they remain in service for redundancy rather than as primary connections. Microwave connections remain vulnerable to wind disturbance and to ice accumulation, which can move them out of alignment and render them useless. Antenna sites are also vulnerable to wildland fires.

Adaptation to cyber threats has progressed, similar to the fashion in which the physical network grew and changed. Although the first documented denial of service technique was demonstrated in 1974 and the first worm was invented in 1988, the dangers of malware and network intrusions were for years more a concern of large government agencies, the military, and large corporations. Local governments were much slower to respond to a changing threat environment. In an era before threats that could destroy or encrypt your data became common, local governments were often not considered to be common targets of malicious cyber activity. Now, when compromised user logins and passwords, personal identifying data such as social security numbers, dates of birth, and other information can be gathered and sold on the dark web, Tribal data is a target of cyber criminals.

Insider threats, primarily from a lack of security awareness on the part of employees, contribute to occasional cyber incidents due to phishing. Phishing emails sent to Tribal accounts are a daily occurrence, and occasionally they make it past screening software and into individual e-mail accounts. Users, including new employees, have not been systematically trained in the basics of cyber security. Aside from the initial employee orientation, there is little or no "maintenance level" training of employees on cyber security issues. According to the desktop support branch of the Tribal IT department, there were approximately ten infected Tribal computers during 2017. However, there are occasional surges; in February 2018, for example, four Tribal computers suffered malware infections. It is suspected that the primary source of that infection was a "spam attack," as during that same month IT staff noted a significant increase in spam that included phishing attempts.

Occasionally there are incidents where Tribal data could have been compromised. For example, in 2015 a Tribal desktop computer at a community center was found to be communicating constantly with an IP address that resolved to Shenzhen, China. That infected computer was believed to have been part of a botnet. That infected computer was connected to the internet rather than to the Tribal network.

There have been no recent incidents such as occurred in Licking County, Ohio, in February 2017. In that jurisdiction, the county network was infected with ransomware; the cybercriminals demanded more than $30,000 to unlock the files, and government data became inaccessible. A similar attack disrupted health care at sixteen hospitals in the United Kingdom in May 2017.

The Tribe has not always been this successful at handling cyber threats. In 2008, a number of Tribal computers were victims to worms of the "Conficker" family; the actual number of infected machines is no longer available, but current IT employees recall that there were multiple computers infected.

Attempts to intrude into the Tribal network occur regularly but are blocked by the Tribe's adaptive security appliance. As of March 2018, the IP addresses from which many of the pings come commonly resolve to China or Russia.

The Tribe does not have computer-based industrial control systems; what Supervisory Control and Data Acquisition (SCADA) systems it has are automated rather than networked. They are manually configured and monitored, with non-networked alarms. Appropriate but ordinary physical security measures are all that are needed to secure such systems; they are not a weak point within the Tribe's cybersecurity measures.

The two small dams managed by the Tribe are controlled with manual valves. The Tribal water purification and distribution systems, although automatic to a degree, are not controlled or managed by networked industrial control systems; they are managed with manual checks, adjustments, and alarms. Standard physical security measures rather than elaborate cyber security defenses are all that is needed.

The Tribal IT program supports a number of other organizations which, although not part of Tribal government, access the internet through the Tribal system. These include the Colville Indian Housing Authority, Tribal Credit (a separate banking and loan institution), the Tribal corporation (Colville Tribal Federal Corporation), Washington State University Extension, and the Lake Roosevelt Health Clinics. Tribal IT maintains a separation between Tribal information networks and the internet access provided to these entities.

Possible Mitigation Strategies: Cyber Threats

An infrastructure threat is simple failure of network infrastructure to work due to age, environmental factors (such as poor ventilation causing excessive heat buildup, excessive dust,

etc.) that affect the service life of servers and other equipment, lack of redundancy to minimize single points of failure, and so on. To gain a better perspective of how far the Tribe has come, a brief review of the situation less than seven years ago is warranted.

In January 2012, during the preparation of the Tribal HIVA and CEMP, the director of the Tribe's IT division was Jim Ronyak. In an interview, he discussed Tribal plans to improve network reliability and data security. They included:

- Install fiber-optic cable to replace a microwave connection to the internet at Coulee Dam, as that connection was already reaching its maximum capacity.

- Install a redundant fiber-optic cable to Omak to prevent cable or other damage cutting the Tribal network off from the outside world.

- Improve the Tribes' ability to back up data within the government to preserve digital records.

- Archive data off site to avoid catastrophic data loss.

- Replace Tribal telephone equipment, "most" of which was fourteen years old.

As of the preparation of this plan in October 2018, some of those goals have been achieved. There is now fiber between the Tribal offices at the Agency Campus (Nespelem) to the internet connection point at Coulee Dam. A contract has been let to lay a redundant fiber line to Omak, to improve network reliability in the event of accident or disaster. Fiber has been laid to the Mt. Tolman Fire Center. The Tribal telephone network has been upgraded, with newer equipment. At the Agency campus where the bulk of the Tribal government is located, network architecture has improved dramatically with the construction of the new government center. Network storage is now available so that some data on individual desktop computers can be backed up to another location.

In terms of cyber security, major improvements have also occurred. Within the past two years, network security staff began receiving weekly bulletins from the Washington State Fusion Center. These weekly bulletins identify cyber threats such as compromised web sites and other sources of malware, phishing attempts, redirects, IP addresses from which network attacks are made, etc. This information is used to update the Tribes' adaptive security appliances to protect against such attacks. And within the past year, Tribal network security staff began receiving the

U.S. Computer Emergency Readiness Team bulletins. These bulletins identify new security threats to cyber systems.

A security upgrade, about to be rolled out, is a switch to personal identity verification (PIV) cards and two-factor authentication for network access. This is scheduled for FY2019 for the entire Public Safety Division as a test case. This requires card reader slots for external keyboard-equipped desktop computer users and either built-in or USB-connected card readers for laptop computers. This will improve network security by automatically locking the computer when the PIV card is removed (preventing unattended but open computers), raising awareness of security (which should help limit "shoulder surfing"), and similar potential compromises.

Improvement is still desirable in a number of areas, all of which are known to the IT unit. They include:

- Minimize the potential for user error. Currently, new employees receive brief information at their employee orientation about Tribal policies, including IT issues. As the entire orientation is complete in barely two hours, this does not include sufficient instruction about good security and data practices.

- Engineer an enterprise-wide solution for automatic data backup from all computer users.

- Work to improve data security practices involving large files, to minimize the need for portable storage devices such as "thumb drives."

- Issue encrypted thumb drives to keep data secure, in the event a portable drive is lost and recovered by someone else.

- Establish a program where external security contractors attempt to breach the Tribal network, in order to identify unsecured access points or ports, find vulnerable Tribal web sites that could be defaced, etc.

To minimize user error, at least one comprehensive training session could be required of each new or returning employee. This could cover simple security violations (such as writing a password down and leaving it next to the computer) as well as a classroom session on how to recognize phishing attempts or falsified "from" addresses on received emails. Real examples could be used to make the session more relevant.

Following the initial training, an annual refresher could be required. A possibly inexpensive source for this is DOI Learn, the Department of the Interior's online training portal. Since the Tribe operates many 638 contracts, it is required to meet the same security standards as a federal agency in carrying out those contracted duties for that Department. A yearly refresher is required to meet Interior standards, and non-Interior agencies can be allowed access to DOI Learn where that yearly update class is provided. This would improve the Tribes' cyber security posture.

The Tribe does not have an enterprise-level backup of data otherwise stored on individual desktop work stations, whether they are desktop computers or laptops in docking stations. Network storage is available, but it is incumbent upon each individual computer user to request access to a network share drive and remember to back his/her data up. This is not a recipe for robust data backup of everyday work products. Enterprise-wide data programs, such as the Tribal accounting records, are automatically backed up.

Installing a central backup storage, requiring computers to be left turned on and locked at the close of the work day, and automatic daily backups of all new or changed data would improve this situation. It may require time to obtain the necessary funding to increase storage and install software, but that is a goal that should be worked towards. Until this occurs, and until all Tribal data is not only backed up but is also protected by an additional off-site backup, the Tribe remains vulnerable to another data loss disaster such as occurred during the 2013 headquarters building fire.

Tribal data remains vulnerable to compromise due to the loss of portable storage. An easy fix would be to purchase encrypted thumb drives that allow data to be moved, secure against data compromise even if the drive is lost and recovered by someone else. Another partial solution is to set up an internal share point or FTP server where large files, too large to be sent via email, can be posted for download by another office or employee. If a large training video, for example, needs to be shared with another Tribal office or employee the only current way to do so is to copy the file to portable storage. It can then be physically transported to another location. If the Tribal network made it easier to share large files, there would be less need for portable storage.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Actions

1. User security practices still allow phishing and other attacks	A. Increase level of cyber security training B. Explore access opportunities to "DOI Learn" and if successful, require every Tribal employee to take yearly cyber security refresher on line
2. Data stored on individual desktop computers is not backed up	A. Establish an enterprise-wide system that automatically backs up data from individual computers to server(s)
3. Data on portable "thumb drives" is not secure if drive is lost	A. Consider purchasing "iron key" or similar encrypted drives to protect data
4. It is difficult to transport large files across the Tribal network	A. Set up network share site(s) as an internal equivalent of an FTP site, to share data across programs
5. It is possible to share passwords and user IDs on current network	A. Switch to two-factor authentication enterprise-wide to increase security; require a password and PIV card B. Ensure PIV cards are removed when users step away from computers by setting PIV cards as the door access token

3. Dam Failure

There are four dams of primary concern within the reservation:

Chief Joseph Dam (CJD), operated by the Army Corps of Engineers (ACOE)
Grand Coulee Dam (GCD), operated by the Bureau of Reclamation (BOR)
Owhi Dam, operated by the Tribe
Twin Lakes Dam, operated by the Tribe

Chief Joseph Dam, operated by the ACOE, impounds Rufus Woods Lake. The reservoir extends to the base of Grand Coulee Dam approximately 52 miles upstream. The northern portion of the dam structure is within the exterior boundary of the Colville Reservation.

CJD is a "run of the river" dam, which means that it has little or no capacity to store excess water flow. If Grand Coulee Dam releases additional water, the operators of CJD must also increase their water releases to match the incoming flow. A catastrophic breach of Grand Coulee Dam would likely, at a minimum, overtop CJD. A possible outcome would be the failure of CJD as well and the combined release of the stored capacity of both dams.

Grand Coulee Dam is operated by the Bureau of Reclamation (BOR); more than half of the dam structure is located within the external boundaries of the reservation. It impounds Lake Roosevelt, which continues north of the reservation.

There are fourteen water storage dams and fourteen run-of-the-river dams in the Columbia River watershed upstream from GCD. The primary concern of an upstream dam breach affecting GCD would be the failure of Mica Dam in British Columbia. It is the second largest earth fill dam in the world, and its water storage capacity dwarfs that of GCD. A breach of Mica Dam at full pool, with cascading subsequent breaches of two additional Canadian dams downstream, would cause an inundation event involving almost four times the active water storage capacity behind GCD. The inundation wave would not reach Northport, Washington, until approximately 22 hours after Mica Dam failure, allowing significant time to evacuate those at risk.

Both Owhi and Twin Lakes dams were constructed early in the 20th century, raising the levels of existing lakes. The failure of either dam should not result in the complete release of all water in the respective lakes. Dam inundation maps have been prepared in case of failure of either dam. Copies of those maps, and of the entire emergency plans for the two smaller dams, are at Tribal Police dispatch and readily available in case of emergency.

Owhi and Twin Lakes Dams are not staffed at all times, but they are monitored by Early Warning System (EWS) monitors. Although there are EWS monitors on both dams that relay data to the National Monitoring Center, it is conceivable that signs of impending dam failure or rupture would not be noticed until a breach and water release occurs. Notification of an event at these two dams is made to both the Environmental Trust Department (ENV), which is responsible for monitoring these dams, and to the Colville Tribal Police Department dispatch.

During the 2017 spring runoff, water flowed over the spillway at Owhi Lake for weeks. If water levels had risen as little as six more inches, water could have eroded away ground near one end of the dam. That dam is currently scheduled for significant maintenance work during 2019 or 2020 to lessen future risk.

It is rare for dams to fail catastrophically (rupture with immediate water release), and even more rare for them to fail catastrophically without any outward warning signs such as cracks or visible leaks. Major dams, such as Grand Coulee and Chief Joseph, are staffed around the clock and signs of impending failure should be detected. That allows warning to emergency managers and to populations downstream. This also provides the dam operator with time to make emergency water releases to lower the pressure on the dam and slow the rate of dam failure.

It is possible that low-lying lands immediately downstream could be flooded by an emergency water release. A concern below GCD is the area from Coulee Dam to downstream of Elmer City, where there are homes close to the water. The GCD emergency plan does not include any inundation maps for the entire stretch of reservoir/river leading to CJD. It does contain timetables for the arrival of an inundation wave at various points downstream.

In late 2017 GCD released copies of its emergency plan, with limited inundation maps, to local jurisdictions. The inundation maps do not include any areas immediately downstream from the dam. The BOR considers that it has met its emergency notification requirements when it notifies local jurisdictions of a breach or imminent breach of the dam. The ACOE also considers that it has met its emergency notification requirements when it notifies local jurisdictions of the dam emergency. Neither BOR nor the ACOE operates a siren or other warning system to notify those immediately at risk downstream in the event of a breach.

No dams existed during the last Cascadia Subduction Zone (CSZ) earthquake on January 26, 1700. The recurrence level for CSZ events is uncertain; one study surveyed the literature and concluded a CSZ event was unlikely to recur in less than approximately 200 years after such an earthquake. It accepted that the recurrence level could be as little as 520 ± 330 years (Onur, 2004). By that standard, the Columbia River dams on the reservation as well as those upstream could be affected by such an earthquake. It is unclear whether all of the dams that could affect reservation lands were constructed to withstand that level of earthquake, including dams in British Columbia.

CJD has shared copies of its emergency plan since 2014. GCD allowed its plan to be reviewed at the BOR offices in 2012, but did not provide a copy to the Tribe. The Tribe did not receive a copy until the GCD plan was updated in 2017. It contains no actionable planning information about upstream dams.

<u>Possible Mitigation Strategies: Dam Failure</u>

Concrete gravity dams such as CJD or GCD rarely fail in a catastrophic collapse. There is nothing the Tribe can do to prevent failure and flooding from either dam, whether it takes the form of an emergency water release or a catastrophic collapse. What the Tribe can do is mitigate the consequences of dam failure by warning those at risk. The BOR's own plan states that following a catastrophic dam failure, lives would be immediately at risk from inundation. An inundation wave would reach Elmer City only six minutes after a dam breach.

The Tribe has already partially mitigated this issue. The ACOE plan for CJD, prior to 2013, did not even include notification to the Tribe of a dam emergency. The Tribe is now third on the external notification list, after a 911 call and after the National Weather Service (NWS) is notified. (The NWS operates the Emergency Alert System, or EAS, for storms and evacuations.)

The most recent BOR plan for GCD listed the Tribe as eighth on the notification list, behind two Sheriff's Departments covering areas upstream from the dam where no one would be at immediate risk. BOR has since committed to changing the priorities on their call list.

Early notification by the warning system sensors at Owhi Dam and Twin Lakes Dam may detect potential dam failures in time to evacuate persons downstream and to close roads that could be flooded. The Tribe's only mitigation option may be to warn people downstream of the danger and to close roads.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Actions
1. Lack of ability to quickly notify those immediately at risk from an emergency water release from Grand Coulee or Chief Joseph Dam	A. Acquire and operate a Tribal emergency notification or "reverse 911" system B. Consider an alternate notification method for emergency evacuation warnings, such as radio tone-triggered sirens covering several miles downstream from each dam
2. Prepare Tribal and other responders for a dam emergency	A. Conduct Tribal tabletop exercises addressing dam failure, notification, and evacuation scenarios for both major dams

	B. Continue to participate in the tabletop exercises for Twin Lakes and Owhi Lake dams organized by BIA dam safety staff

4. Hazardous Materials

During the initial public outreach to determine the major concerns of members and residents, hazardous materials incidents were identified as a significant Tribal concern.

Hazardous materials (hazmat) incidents on the reservation are primarily associated with transportation accidents. Commercial trucks operate across the reservation, and some of them are placarded to show that they carry hazardous substances. The most significant hazmat incident involving transportation occurred in May 2015, when a gasoline tanker overturned in the northern Sanpoil Valley on SR 21 and spilled at least 3,000 gallons of gasoline next to the Sanpoil River. A smaller amount of diesel was spilled. Other known hazmat incidents involved spilled fuel from motor vehicle accidents.

The Tribe does not manage hazmat incidents on state highways; under state law, the Washington State Patrol does. What the Tribe does is provide first response, place barriers if safely possible to contain any spills, and call for hazmat cleanup specialists. Once the first response is over, the Tribe's role is to monitor the cleanup to make sure it is properly completed. ENV is responsible for monitoring cleanups. Within that department is one position funded by the Environmental Protection Agency (EPA) to be a response manager.

Internet and Federal Railroad Administration records searches (the searchable database covers 1975 to 2018) found no recorded train derailments on the reservation. The Cascade and Columbia River Railroad does carry diesel fuel, propane, and bulk agricultural supplies through the reservation.

There is a local emergency planning committee, or LEPC, in both Okanogan and Ferry counties. LEPCs were established under the Emergency Planning and Community Right-to-Know Act (EPCRA). Some Tier 2 (hazardous material storage) reporting is made directly to the Tribe; other reports are sent to local fire districts and to the LEPC. The Tribe participates in meetings with both LEPCs.

The Tribe's concerns with transportation accidents are not limited to those occurring on the reservation. The Tribe has fishing, hunting, and gathering rights off-reservation that can be affected by transportation accidents. A railroad tank car, truck tanker, or pipeline accident causing a spill into the Columbia River or any of its tributaries could severely damage the natural resources upon which the Tribe depends. An example comes from the 2016 Mosier train derailment, where sixteen oil-filled tank cars derailed in the Columbia River gorge. Oil

contaminated Mosier's sewage treatment plant and drained into the Columbia River. The Yakama Tribe played a role in the response and post-incident monitoring.

The Tribe is routinely notified by the Washington Department of Ecology of spills affecting traditional areas, such as oil releases into the Columbia River and its tributaries downstream from the reservation. Tribal staff may be called to respond to such incidents off-reservation to protect cultural sites threatened by petroleum products, or to monitor cleanup efforts.

In addition to petroleum product or chemical spills, a relatively common occurrence is sewage contamination of surface waters in both the Columbia and Okanogan River basins. The municipal sewage system in Trail, British Columbia, regularly fails during high snowmelt and/or rain runoff events. A simple internet search reveals major sewage discharges into the Columbia River at Trail in 2012 (once each from overflow and from a broken sewer line), 2016, and 2017.

There have been multiple other spills in Republic, Nespelem, and Omak primarily due to physical plant failures. In addition, multiple locations downstream from the reservation have drained sewage directly into the Columbia River for similar reasons as occurred in Trail. Such downriver spills threaten the health of the river and of the fisheries upon which so much of Tribal life and culture depends.

Although salmon habitat is an obvious Tribal concern from hazmat incidents, salmon are not the only culturally significant species that can suffer habitat destruction in such an accident. The Tribe has actively litigated to stop pollution and obtain damages from those responsible for damaging waterways important to Tribal life. The Teck Cominco litigation over pollution of the Columbia River and its fisheries, now in its fourteenth year, demonstrates the Tribe's commitment to protect waterways and fisheries. That litigation focuses on industrial waste from mining operations that was dumped into the Columbia River from a refinery at Trail, British Columbia, for more than a century.

Possible Mitigation Strategies: Hazardous Materials

The Tribe has small quantities of sorbents, barrier materials, and disposal drums for small-scale petroleum spills. It is not equipped for any cleanup activities beyond that. The Tribal EMS/Fire/Rescue Department is trained and equipped to respond to, but not to clean up, hazardous materials incidents. ENV is notified to respond to hazardous materials incidents on the reservation.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Actions
1. Tribal responders have limited training on hazardous materials incidents	A. Conduct table-top exercises to practice hazardous materials incident response B. Conduct training sessions in how to safely use and dispose of the sorbents that are in stock
2. Hazardous materials are stored in commercial facilities in the Okanogan River floodplain	A. Identify hazards by reviewing LEPC reports B. When flooding is possible, contact Tier 2 reporters to ensure materials have been moved to safe locations C. Use permitting process to limit future facilities in floodplains or other locations at risk, such as on liquefaction-prone soils
3. Off-reservation petroleum product, hazardous materials, and sewage spills threaten anadromous fish critical to Tribal life and may damage cultural sites off-reservation	A. Work with cooperating agencies to receive notification of all spills anywhere Tribal cultural affiliation exists B. Ensure that public advisories are issued to protect members and residents from exposure to contaminated water or fish C. Ensure that water quality monitoring takes place to identify a return to normal quality levels

5. Governmental and Regulatory Issues

Tribal governments in general and the Confederated Tribes of the Colville Reservation in particular have survived a long history of interference with, or outright attempts to destroy, the Tribal way of life. A short list includes:

- The taking of the North Half of the reservation by Congress, initially without any provision for compensation, in 1892 (see 27 Stat 62);

- The opening of the reservation to "settlement" in 1916, without compensation to the Tribe;
- The taking of Tribal land for Grand Coulee Dam in 1934, initially without provision to pay for the seized Tribal lands;
- The "Termination Era," when the official policy of the United States was to terminate tribal governments, reservations, and the Tribal way of life;
- The decisions to build dams on the Columbia River without fish ladders, destroying a critical food source for Tribal members without compensation;
- And many more.

Another example with long-term consequences involves mining. Until 1934 mining claims could be filed within the reservation. There was little oversight during mineral exploration and production, and there was little or no reclamation after mining operations ended. Elsewhere in the western United States, the Department of the Interior makes funding available for the reclamation of abandoned mine lands. However, the abandoned mine land reclamation program excludes Indian reservations, even though the mining laws and Department of Interior practices created this problem. To this day the reservation is dotted with abandoned mines, some of which pose a fall or collapse hazard.

Unfortunately, these examples—many of which occurred within living memory—have consequences for the Tribes today. Further, actions similar in spirit or effect to those listed above still occur. Some samples of these types of issue are addressed in this section, following.

Federal Funding

Many Tribal programs are dependent upon Federal funding. This is not limited to programs funded under the Indian Self Determination and Education Assistance Act, Public Law 94-638, known as "638" programs. Other Tribal functions are at least partly funded by grant funds received either directly from the Federal government, or by Federal grant funds passed through from Washington State entities (such as public health grant funding).

Such funds are subject to the budget priorities set by the president and Congress and can be taken away at any time. For a cautionary example, one needs to look only at the financial crisis that developed in Puerto Rico when federal tax laws (designed to encourage manufacturing there) changed. Manufacturers that had relocated to Puerto Rico began leaving when the tax advantages expired. Jobs vanished, and the local economy in 2006 started a long decline as a direct result of decisions made in Washington D.C.

The Tribe is similarly vulnerable to decisions that affect the timber, livestock, and gaming industries, or to decisions to underfund 638 programs vital to the day-to-day health and safety of Tribal members.

Federal Extinguishment of Tribal Rights

Since 1991, thousands of acres of land owned by BLM within the North Half of the Colville Reservation have been transferred into private ownership. ("North Half" refers to that area of the 1872 reservation forcibly taken from the Tribes by Congressional act in 1892 and moved into the public domain for "settlement," consisting of approximately 1.5 million acres.) According to BLM data, between 1991 and 2008 more than 3,800 acres of public lands in Ferry County alone—all of which were within the North Half and clearly subject to Tribal usage rights—were transferred into non-Federal ownership.

These transfers were based upon a BLM resource management plan that dated to the 1980's. BLM is currently engaged in a resource management planning effort that will set land disposal, exchange, and management priorities for the foreseeable future. Despite seeking to join that land management planning effort as a "cooperator," the BLM regional office in Portland declined to approve a Memorandum of Understanding between the Tribe and BLM.

Obsolete Federal Lands Actions

A review of the Bureau of Land Management (BLM) Master Title Plats for lands within the Colville Reservation show a number of power site reservations. These include lands within sections 10, 14, 15, and 24 of Township 29 North, Range 25 East. The plats identify the source of this withdrawal as "SO Pwr S Res 764" (a "Secretarial Order" for a power site reservation, numbered 764) dated January 15, 1945. It appears that some of these withdrawn lands may have been used in the construction of Chief Joseph Dam, but other still-withdrawn lands do not appear to have been used for any power-related purposes.

A similar concern involves a listed Executive Order dated January 3, 1917, shown on the plats, purportedly establishes a power site reservation (numbered 564) encumbering trust lands within sections 3, 4, 8, 9, 17, 18, and 19 of Township 29 North, Range 26 East.

The Realty staff at the BLM office responsible for maintaining records for the area does not have a copy of this order, so it is impossible to determine why this land use reservation exists. A review of the list of executive orders issued January 3, 1917, reveals that six executive orders were issued that day. None of them appears to have established this power site reservation.

It is difficult to understand why encumbrances on Tribal lands are still shown on the official master title plats when there is apparently no authority to support those encumbrances. In the alternative, if an authority for either withdrawal can be identified, it is still difficult to understand the need for the continuing validity of unused withdrawals more than a century old.

These are only two of the obsolete, or impossible to verify, withdrawals or similar lands actions shown on master title plats both within and outside of the Colville Reservation. There are a number of such reservations shown on the master title plats within the North Half, and elsewhere, for potential power projects which may no longer be economically viable, will never be needed, or both. Off reservation and outside of the north half, such withdrawals are still a Tribal concern because they may impact federal- and state-managed lands within the traditional areas of the Tribe. Those withdrawals or land use reservations could, if the original projects are ever pursued, interfere with or end traditional uses of those lands by Tribal members.

Possible Mitigation Strategies: Governmental and Regulatory Issues

The Tribe retains lobbyists to protect Tribal interests in both the state capital and the nation's capital. These representatives have arranged for the Tribe's voice to be heard in Congressional hearings, at the state capital, and before government agencies. Examples of their successes include the state law, passed in 2017, that authorized the use of dental therapists. These providers can provide dental services to Tribal members on reservations that, in the past, could only be provided by dentists. Reservations are significantly undeserved when it comes to dental care, according to the federal Health Resources and Service Administration, and this change in state law was made to increase the availability of dental care on reservations.

Lobbying is more than contacting legislators and executive branch officials, and it is more than just a public relations strategy. Lobbyists monitor the changing regulatory as well as legislative environment, and provide early notification to the Tribe about proposed changes in policy and regulation.

In addition to specific Colville Tribes' lobbying efforts, the Tribe is also supported on both the state and national levels through such organizations as the Affiliated Tribes of Northwest Indians (ATNI), National Congress of American Indians (NCAI), Northwest Tribal Emergency Management Council (NWTEMC), and others. These groups are valuable because they also monitor changes in both federal and state law and regulation.

Changes in law, regulation, policy, and more importantly, proposed changes that may affect tribes are then identified early. It is easier for a Tribe to be heard and to be effective in influencing those changes, when Tribal contact with the proponents is made and comments provided at the earliest possible moment.

The Tribal Law and Order Act of 2010 (Pub. L. 11-211) is an example of successfully lobbying at the highest national levels; that effort was triggered after a 2007 NCAI resolution brought attention to the issue. That law worked toward fixing significant shortcomings involving Tribal jurisdiction over serious crimes on reservations.

The need for active lobbying isn't limited to changes in law. An example of a Tribal success in the policy realm comes from FEMA's first attempt at drafting standards for Tribal disaster declarations in the wake of the Sandy Recovery Improvement Act of 2013. That Act authorized, for the first time, a Tribe to request its own presidential disaster declaration without going through the governor of a state.

FEMA drafted its first attempt at rules for Tribal declarations, and a review by the Colville Business Council considered them unnecessarily restrictive. The Tribe submitted comments directly to FEMA, and the Council met with FEMA representatives in person to share the Tribal perspective on the FEMA draft. The Tribe also circulated its draft comments to other Tribes, to encourage them to raise the same issues as well. FEMA listened to the comments from multiple Tribal sources, revised its draft, and ended up with a policy that was far more workable for Tribes than the first attempt.

To continue to propose and/or mitigate changes in policy, regulation, and law that may affect Tribes and their membership, the Tribe will continue its policy of engagement with regulatory agencies and legislators. The Tribe will continue to submit formal comments on proposed policy and regulatory changes, to protect Tribal sovereignty and the interests of members.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Actions
1. Changes in law and policy at both State and Federal level may adversely affect Tribes	A. Continue monitoring proposed regulations and proposed changes in law for adverse effects. B. Submit detailed comments on proposed regulatory changes to

	minimize adverse effects and promote positive changes.
2. Tribal issues may not be considered at State and Federal levels	A. Continue to employ lobbyists to advocate for Tribal issues
3. A single Tribe may not have the ability to influence policy- and law-makers	A. Explore opportunities for inter-tribal collaboration to increase influence at the State and Federal level, including but not limited to ATNI and NCAI
4. Federal and State land management agencies, with control over lands in traditional territories, may affect Tribal hunting, fishing, and gathering rights or fail to protect cultural sites	B. Continue rapid response to consultation notices; attend resource management plan meetings by those agencies to monitor for changes that could affect Tribal rights
5. Obsolete Federal lands actions may affect Tribal control over lands within the reservation and traditional territories	C. Pursue cancellation of obsolete land withdrawals that affect Tribal lands, whether trust land or in traditional territories

D. Natural Hazards

6. Disease

Historically, disease all but destroyed the peoples that now constitute the Confederated Tribes of the Colville Reservation. Smallpox crossed the North American continent and infected tribes in Eastern Washington even before the first Europeans arrived; the first smallpox epidemic occurred between 1770 and 1780 (Cebula, 2003). When the Lewis and Clark expedition reached the Columbia River in 1805, they noted old men with smallpox scars. Additional smallpox epidemics occurred in 1800, 1825, and 1830. By 1802, smallpox alone had caused a loss of an estimated 45% of the original population. The post-1802 smallpox epidemics, a scarlet fever epidemic in 1844, a measles epidemic in 1847, and the spread of malaria to what is now Washington State killed 75% of that remaining population by the mid-nineteenth century (Hunn, 1990; Ackerman, 1990).

The human population on the reservation is today as susceptible to—and as protected from—disease as any other human population. Not often considered, however, is that the reservation's economy can be severely impacted by plant and animal disease. In addition to the economic impact, some animal diseases have the potential to jump to the human population.

Finally, some animal diseases—such as Chronic Wasting Disease (CWD)—have the potential to permanently alter or outright destroy traditional cultural practices of Tribal members and their descendants.

Human Disease:

The Colville Service Unit of the Indian Health Service (IHS) operates two clinics within the reservation: the main IHS facility at Nespelem and a satellite clinic in Omak. It is currently planning to replace the Omak facility.

The Tribe operates two clinics: the main Lake Roosevelt Community Health Center in Inchelium, and a smaller clinic in Keller. These clinics are partially funded by the Indian Health Service under a public law 93-638 contract to support Tribal members. The two Lake Roosevelt clinics also serve non-members through their individual health insurance or as private pay patients.

All of these clinics comply with mandatory reporting guidelines for communicable diseases. In addition, IHS holds annual vaccination clinics to make seasonal influenza immunization available to all Tribal members.

As with other rural and economically depressed Tribal nations across the country, the Tribe faces issues with high rates of suicide, alcohol abuse, drug abuse, and a shortage of both addiction treatment facilities and mental health support. To address this shortage, the Tribe is currently planning the construction of a residential addiction treatment facility to be built in the Keller area.

Because the threat from human disease is considered to be very low, no further mitigation efforts are needed. Human disease will not be addressed further in this plan.

Plant Disease:

The primary commercial crops on the reservation are orchard fruit, wheat, corn (produced primarily for livestock use), and hay.

Commercial orchard fruits are produced by large agri-business operations, with multiple orchards on and off reservation. Fruit is produced on both fee lands and on lands leased from the Tribe. No problems with plant disease affecting orchard production within the reservation have come to the Tribe's attention. Only one disease, powdery mildew affecting cherry production, has caused significant infestations in the past thirty years in Eastern Washington.

In 1996, a single small field of durum wheat outside of Moses Lake was found to be infected with karnal bunt, a wheat disease that destroys the economic value of harvested wheat. An exotic wheat disease first identified near Karnal, India in the 1930's, at the time of its discovery near Moses Lake, an outbreak was taking place in Arizona, California, and Texas. Other nations refuse to purchase wheat from areas where karnal bunt is known to exist, affecting the overall marketability of wheat in regions where the disease exists. Moses Lake is less than eighty miles by road south of the reservation, and the infestation posed a threat to Eastern Washington's agricultural economy. Eastern Washington is a major wheat producing region.

The Moses Lake infestation was successfully eradicated. There was a subsequent multi-state outbreak in 2001, but it did not extend to this state. As of the spring of 2018, Karnal bunt disease in the United States was confined to Arizona.

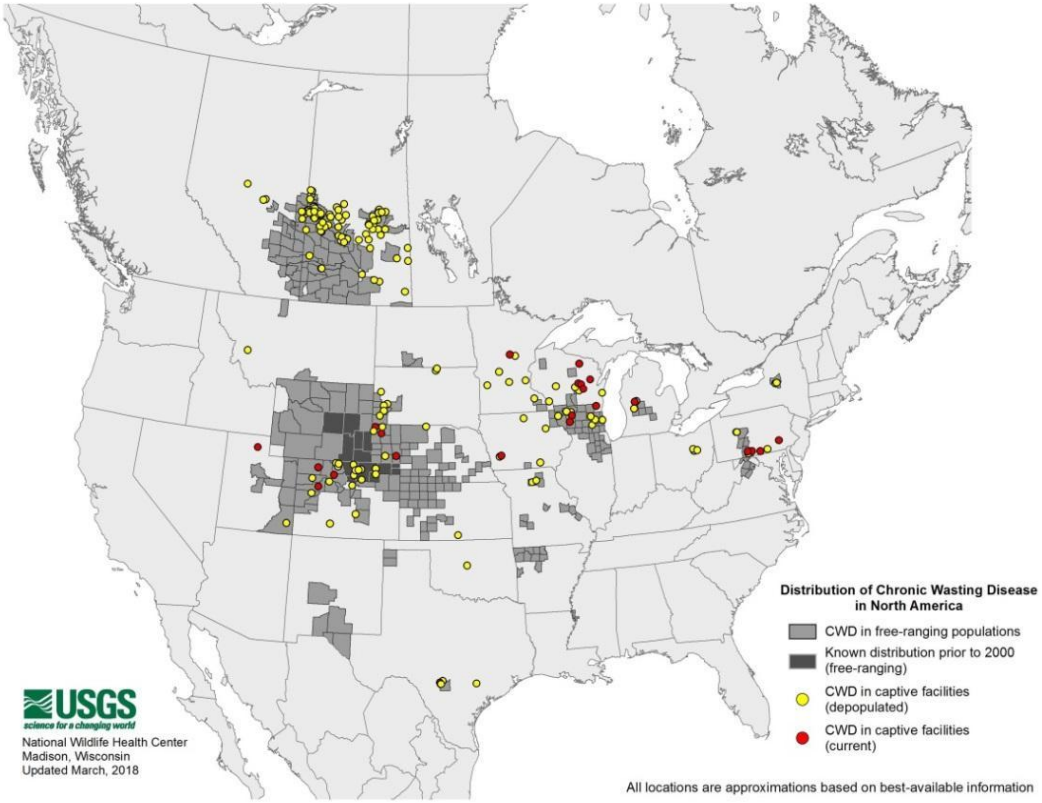
There are no other known significant threats to crop production on the reservation other than drought and climate change. Climate change may, in the future, affect the vulnerability of Tribal forests to plant disease. Some forest disease agents are already naturally present in the area; they include Fomes annosus, laminated root rot, and white pine blister rust.

Because the threat of plant disease is considered to be very low, no further mitigation efforts are needed. Plant disease will not be addressed further in this plan.

Animal Disease:

Chronic Wasting Disease (CWD), mentioned above in the introduction, has the potential to severely damage or destroy traditional Tribal hunting practices. It is a spongiform encephalopathy that infects cervids (deer, elk, and moose) and is in some ways similar to the so-called "mad cow" disease (bovine spongiform encephalopathy, or BSE). BSE can be transmitted to humans, who undergo mental deterioration and eventually death. CWD has not been shown to infect humans, but hunters are routinely advised not to eat any animals that could have been suffering from CWD. The Washington State Department of Fish and Wildlife has been testing for CWD since 1995 and has never had a positive test result.

CWD has been detected in a captive cervid population in Western Montana and in wild animals in both Montana and Utah. It has never been detected in the wild in Washington or an adjacent state. If it does spread to Washington, the effect on Tribal hunters and traditional practices could be devastating. Subsistence hunting, as well as ceremonial hunts, could be greatly impacted if harvested cervids could not be safely consumed.



Source: https://www.nwhc.usgs.gov/images/cwd/cwd_map.jpg , retrieved 2 April 2018

The Tribe has previously addressed CWD in its game management plans, including the 2012 Interim Management Plan prepared by the Tribe's Fish and Wildlife division. Since CWD is already in the wild in the Rocky Mountain States, the arrival of CWD on the reservation may be inevitable.

BSE was not known to occur in the United States until 2003 when the first case was discovered in Mabton, near Yakima, within Washington State. The infected cow came from Canada, where the first known North American case occurred in 1993. An unrelated case occurred in Texas in 2005, involving a cow that had spent its entire life in that state. Occasional cases have occurred since then in both the U.S. and Canada.

Another danger from BSE is financial. Cattle production is an important economic activity on the reservation, and that sector of the economy could be devastated by the detection of a single case of BSE and a perception that reservation cattle were unsafe. During the BSE outbreak in the United Kingdom ending in the 1990's, 180,000 animals were euthanized to control the epidemic.

BSE is not the only disease that could destroy the livestock sector of the Tribe's economy. Foot and Mouth Disease (FMD) occurred in the U.S. in the past; there were nine documented outbreaks between 1870 and 1929. An outbreak occurred in Saskatchewan, Canada, beginning in late 1951; it was traced to an immigrant who had brought it, apparently on his clothing, from a farm in West Germany. When FMD broke out in the United Kingdom in 2001, more than 3.5 million animals were euthanized to stop the disease's spread. The only effective tool to stop either disease is mass slaughter of infected animals and of all potentially susceptible or exposed animals nearby.

Domestic sheep and goats pose a threat to the reservation's wild population of bighorn sheep, particularly due to mycoplasma pneumonia. This organism can be present in domestic sheep and goats while causing no more than mild illness. However, it causes devastating illnesses and death in the bighorn sheep population.

Equine Herpes Virus (EHV) and West Nile Virus (WNV) are two diseases that can affect both domestic and wild horses (including estray animals) on the reservation. EHV can cause abortions in pregnant mares, and the rare neurological form of the disease can have up to a 30% mortality rate. Preventive vaccines are available and should be a routine part of equine care.

WNV can affect both humans and horses; it is spread by mosquito bite. There is no human vaccine for West Nile, but equine vaccines are available. Infected humans suffer serious illness in less than 1% of all WVN infections, and fatalities are rare. Infected horses, however, have a mortality rate of approximately one in three cases. Preventive vaccines should be a routine part of equine care; mosquito control measures can be very effective in reducing mosquitos and therefore reducing infections.

The final disease to be discussed in this section is Avian Influenza (AI). In December 2014, AI was detected in northwestern Washington after first surfacing in British Columbia the previous month. On January 27, 2015, Highly Pathogenic Avian Influenza (HPAI) was confirmed in a privately owned 5,000-bird flock of poultry (primarily ducks) just north of Riverside,

Washington, in the Okanogan Valley not far from the reservation. HPAI in a small flock near Oroville, further north in the Okanogan Valley, was confirmed on February 3, 2015.

The Washington State Department of Agriculture responded to this event, and followed the standard response plan of euthanizing infected and exposed animals while establishing a quarantine zone. The only significant issue with the State's response was that it announced a quarantine that extended onto the reservation, without contacting or consulting with the Tribal government before doing so.

The Tribe and WSU Extension cooperated with the State in public education, established monitoring for infected birds, and worked together to keep the disease from spreading. The Tribe already has a program to examine found raptor carcasses for lead poisoning. During the AI outbreak, Tribal Fish and Wildlife tested found carcasses for AI as well.

Possible Mitigation Strategies: Disease

The primary disease-related concern for Tribal members, as evidenced by the survey and the heat map exercise, was that of animal disease. The threat of human diseases is considered very low, and an emergency plan is in place in the event of a human pandemic. The threat of plant disease is also considered to be very low. Mitigation planning is needed only for animal disease.

As discussed in the "Hazards and Threats" section of this document, the primary threats to the Tribe come from Avian Influenza, from the potential spread of Chronic Wasting Disease to the reservation, and from contagious animal disease affecting either domestic livestock or wild animals.

Here is the summary of possible mitigation actions for this hazard:

Animal Disease	Possible Mitigation Actions
1. CWD may spread to reservation	A. Conduct outreach efforts to educate hunters in how to recognize CWD, report possible occurrences, and not to eat potentially infective tissue B. Tribal NRE officers and/or Fish and Wildlife staff respond immediately to any suspected occurrences to verify

2. Mycoplasma infection may spread to wild bighorn sheep from domestic sheep and goats	A. Do not issue any grazing permits for sheep or goats on the reservation B. Where sheep or goats are grazed on private lands, keep them from interacting with bighorns through fencing etc.
3. Other diseases of cattle may spread to reservation	A. Continue existing herd surveillance for BSE or other infestations
4. AI or HPAI may spread to reservation	A. Monitor news media and State agriculture department releases for outbreaks near reservation B. Increase monitoring, work with State on quarantine restrictions, if outbreak occurs on or near to reservation C. When outbreaks are in area, test any dead raptor carcasses found to determine if AI/HPAI contributed. Consider testing other species if carcasses found

7. Drought

Climate researchers sometimes differentiate between agricultural drought, meteorological drought, hydrological drought, snow drought, and ecological drought; others may add socio-economic drought as a category as well. These all address the impacts of a drought (Abatzoglou 2018).

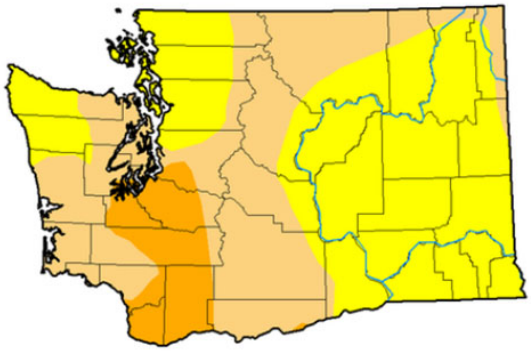
"Drought," in the context of this plan, refers to a period of abnormally low rainfall. It may or may not include a lack of water for other purposes. A drought can occur when reservoirs remain near normal levels, when surface water is still available for irrigation, and where springs have not run dry. Depending upon the time of year a drought begins, it may not significantly affect some rainfall-dependent crops (such as winter wheat).

This simple definition is chosen because it is adequate to describe the Tribe's concerns relating to drought. (Climate change is addressed in a section of its own.) For the purposes of this plan,

drought is of concern because of its impact upon wildland fires, fisheries, other culturally important plant and animal species, and agriculture.

The connections between drought and the above concerns are very clear. Forests that are drier than normal may catch fire more easily and burn more completely; instead of low-intensity creeping fires that clear out undergrowth, they may instead be raging infernos that destroy large quantities of marketable timber, destroy habitat for the plants and animals upon which Tribal culture relies, and cause other long-term damage (such as winter silt and mud runoff from burned lands into streams, destroying future fish runs). If there isn't enough rainfall at the right time, crops won't grow. And if the rivers and streams are low, anadromous fish cannot reproduce. The fallout from that comes in the form of future salmon, steelhead, and lamprey runs that are too small to sustain the fishery.

During the 2015 drought year, when large wildland fires later devastated the reservation, there was also a massive fish loss due to low water levels with high water temperatures. The sockeye salmon run on the Okanogan River was the lowest in years. According to NOAA's 2016 Sockeye Salmon Fish Passage Report, only 2% of the Okanogan sockeye salmon that passed Bonneville Dam survived to Lake Osoyoos to spawn. During the previous five years, survival rates ranged from 25% to 50% over the same distance.



Drought Conditions (Percent Area)

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current 9/25/2018	0.00%	100.00%	48.33%	9.80%	0.00%	0.00%
Last Week 9/18/2018	0.00%	100.00%	60.16%	17.31%	0.00%	0.00%
Three Months Ago 6/26/2018	42.81%	57.19%	11.98%	0.00%	0.00%	0.00%
Start of Calendar Year 1/02/2018	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
One Year Ago 9/26/2017	4.97%	95.03%	63.66%	0.00%	0.00%	0.00%

Source: https://www.drought.gov/drought/states/washington *downloaded October 3, 2018*

Drought doesn't occur only when streams are low, reservoirs emptying, with wildland fires either burning or imminent. The illustration above, from the official web site www.drought.gov shows drought conditions for the reservation as of September 25, 2018.

Most of the reservation was shown as being in the lowest category of drought, "abnormally dry." The remainder, the northwest portion of the reservation, is shown in the next higher category of "moderate drought."

During any year, an area may suffer from abnormally low rainfall. The data above shows that as of the start of calendar year 2018, no portion of Washington State was in drought. As the year progressed and became abnormally dry, the reservation slipped into drought along with the rest of the state.

The primary known effect of drought in 2018 was simply that the area received less moisture. There were no catastrophic wildland fires on the reservation, no reservoirs ran dry, and groundwater levels did not sink to the point where wells no longer provided water. Long term drought, or a severe short-term drought, can contribute to all of those problems.

In 2015, the catastrophic wildland fires took place during a drought summer. Washington's mountain snowpack that year was so low that in May of 2015 the governor declared a statewide "drought emergency." Total precipitation in the form of snow and rain over the winter of 2014-2015 was near normal. What was different was that much of the precipitation fell in the form of rain earlier in the year than normal, due to warmer than normal temperatures. That rain helped melt the snowpack early. The loss of snow meant that mid- and higher-elevation lands dried out sooner than normal. This caused drier and warmer fuels early in the season, increasing fire risk and increasing the energy release component of fires. These were direct precursors to a catastrophic fire season.

A significant effect of drought may be the loss of habitat, especially during long-term drought. Drought can impact deer, elk, and moose numbers due to environmental stress from lack of food. In addition, drought is a stressor that can increase animal diseases.

During the 2015 drought, "bluetongue" (a viral disease of deer) killed large numbers of deer throughout Eastern Washington. News reports stated that 68 whitetail deer carcasses, killed by bluetongue disease, were collected within the town of Colville in Stevens County that summer. During another drought year, 1996, 81 deer carcasses were picked up within the same town. Those deer all died of a similar disease, Epizootic Hemorrhagic Disease (EHD).

Other drought years correlated with EHD outbreaks were 1988 and 2004. Drought is not the only stressor that can cause an increase in deaths from these two diseases, but it is a significant one. Because of the importance of hunting to Tribal culture and life, a deer die-off during a drought would be a significant impact to the Tribe.

<u>Possible Mitigation Strategies: Drought</u>

While the Tribal government has no way to influence how much precipitation falls, and may not control instream water flows from off-reservation, it has options for dealing with drought.

The reservation has no communities dependent upon surface water for domestic use; all community water supplies come from wells. Unless there is a years-long severe drought that causes water tables to drop below the reach of existing wells, Tribal members and residents will not go without water. Individual well-dependent homes may have wells run dry in a lesser drought and may have to seek Tribal, IHS, or other assistance. Unlike communities that draw their drinking water from rivers, the Tribe is somewhat insulated from the loss of domestic water supplies during drought. The Tribe will still need to preserve those water resources for emergency livestock/wildlife needs and for wildfire protection.

The primary hazards from a drought revolve around damage to fisheries from low instream flows combined with high water temperatures, loss of wildlife due to loss of water, damage to the livestock industry and other agriculture, and the increased risk of devastating fires due to dry vegetation. In addition, drought—or forest die-off caused or exacerbated by drought—may interfere with the availability of traditionally used plants, including huckleberries, roots, and other food and medicinal plants.

Here is a summary of possible mitigation actions for this hazard:

Drought	Possible Mitigation Actions
1. Monitor permitted grazing when drought sets in, to stay within the grazing prescription (percent utilization of shrubs, forbs and grasses)	A. Reduce grazing season to preserve ground cover and prevent erosion that would increase future runoff B. Reduce permitted grazing numbers (AUMs) to reduce additional impact of grazing upon drought-related poor plant growth, to preserve ground cover
2. Minimize wildlife losses	A. Improve water sources for wildlife with temporary stock ponds, guzzlers, or water delivery
3. Ensure instream flows necessary for migrating anadromous fish	A. Initiate government-to-government consultation to protect fish stocks and reproduction with sufficient in-stream flows and fisheries monitoring

	B. Consider restrictions upon fishing to preserve limited stocks for future C. Consider active intervention to move anadromous fish upriver if low water blocks spawning or traps fish
4. Preserve domestic water supplies	A. Initiate a water conservation program when needed, including household use, lawn watering/car wash restrictions, leak reductions B. Inspect for any leaking water mains or fire hydrants and make necessary repairs
5. Reduce water use permanently	A. Conduct outreach education through WSU Extension, Conservation District, and others on drought tolerant plants and landscaping B. Conduct outreach education on water-saving agricultural and landscaping irrigation practices
6. Increase fire protection activity to prevent wildland fires	A. Strictly enforce burning restrictions B. Prohibit fireworks C. Raise industrial fire protection level (IFPL) on all lands D. During extreme fire danger, close Tribal lands to all motorized vehicles or to all entry and use
7. Search for additional water supplies	A. Explore short-term purchase or lease of unused/underused water rights from fee land owners B. If Tribe has leased any water rights, explore whether the Tribe should temporarily reduce that draw during drought emergencies

8. Obtain State or Federal assistance	A. Consider declaring a drought emergency, including in concert with other jurisdictions

8. Earthquake

In November 2011, the U.S. Department of Homeland Security (DHS) issued a report entitled "Analytical Baseline Study for the Cascadia Earthquake and Tsunami." It was prepared by DHS' Homeland Infrastructure Threat and Risk Analysis Center (HITRAC) and is commonly referred to as the "HITRAC" study. This study attempted to identify the effects of a catastrophic earthquake along the offshore Cascadia fault, a magnitude 9.0 on the 10 point Richter scale, on Washington State west of the Cascade mountain range.

The last known earthquake of that strength or higher occurred in late January 1700, and the tsunami it generated struck Japan. The date of the earthquake became known by working backwards from the known date on which the tsunami reached Japan.

Although 1700 predated written history in what is now Washington, it did not predate oral history. It isn't clear how far to the east the earthquake was felt, nor the strength of the earthquake in what is now Eastern Washington. There is a story indicating that it was felt strongly as far east as the Yakima Valley. In 1889 G.B. Kuykendall collected that story from a Yakama native that described the earth shaking. It shares other common elements with stories from coastal tribes, stories that have been tied to the 1700 Cascadia earthquake (Ludwin, 2002). This is the only identified story from east of the Cascade Mountains that could reasonably be associated with the 1700 Cascadia earthquake.

A well-known landslide was the Bonneville-Cascade landslide that temporarily dammed the Columbia River, creating a lake more than 100 miles long; it is the subject of at least one Colville Tribal legend (Budwha, 2002, citing Clark's 1953 collection of legends). This landslide was initially dated by research in 1978 as occurring around the year 1100. However, more recent studies indicate that the massive slide occurred much later. Samples from submerged trees at separate sites in the temporary lake behind that landslide have now been dated. Tree-ring evidence indicates they were killed by submergence after the 1699 growing season. Lichen growth studies also date the landslide as occurring between 1670 and 1760. That raises the possibility that this landslide is an eastern Washington example of damage caused by the 1700 Cascadia earthquake (Hill, 2002).

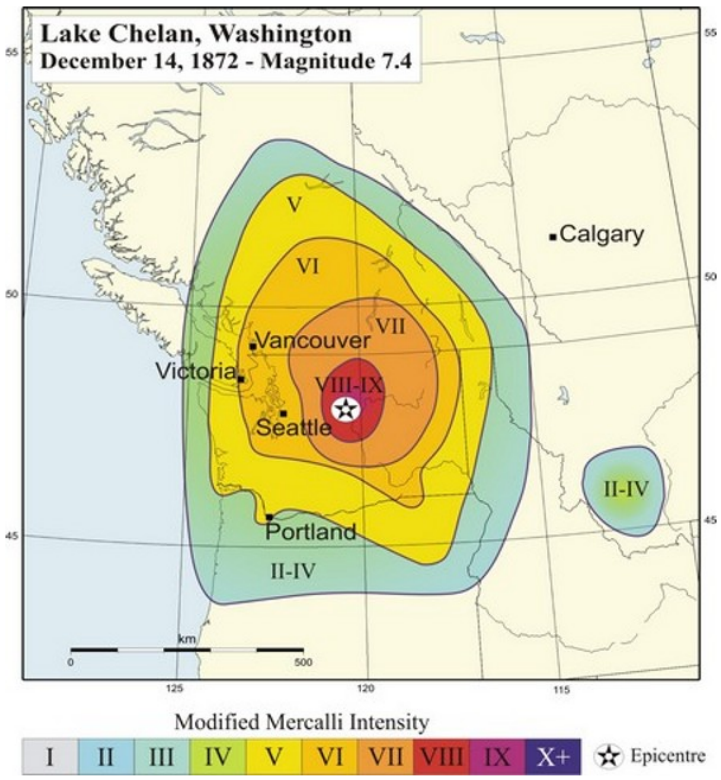
One major earthquake affecting the Colville Reservation is thoroughly documented in the historical record. That is the series of earthquakes and aftershocks that began on December 14, 1872, and lasted into 1874. Known variously as either the North Cascades or Lake Chelan earthquake, recent research has attempted to better determine the magnitude and the epicenter.

The earthquake was felt from Salem, Oregon, in the south to as far north as central British Columbia. In the west, people ran out of buildings in Seattle and Victoria when they felt the earthquake. Items fell off shelves as far away as Colville, in Stevens County (Nisbet, 2015).

Source: Natural Resources Canada website, downloaded Feb. 7, 2012 from:

http://www.earthquakescanada.nrcan.gc.ca/historic-historique/events/18721215-en.php

Closer to the epicenter, the earthquake damaged a trading post built near the mouth of the Wenatchee River and threw settlers to the ground. The third aftershock caused a landslide approximately four miles north of the mouth of the Entiat River, which completely dammed the Columbia River. Miners who crossed the Columbia River on the dam were stranded on the wrong side when the river broke through the landslide (Hackenmiller, 1995). As much as five feet of subsidence occurred at the mouth of the Wenatchee River (Nisbet, 2015).



The Columbia River rose at least fifty feet overnight after the landslide, flooding fields and a trading post. Significant subsidence and major landslides occurred as far east as Whitestone Rock on the Columbia River as well as at the mouth of the Spokane River. The only documented fatality occurred when a Spokane woman, upset by the earthquakes, ran away from her community near the mouth of the Spokane River and was later found dead (Nisbet, 2015).

Liquefaction occurred in many areas, from the Wenatchee to the Spokane River shorelines and surrounding areas. A Spokane tribal member, many years later, said that the ground "boiled like a big pan of boiling gravy" during one of the earthquakes (Nisbet, 2015).

There were no seismographs in Washington at the time of the earthquake, so it was impossible to determine the epicenter. Various studies have moved it to near Canada and all the way south to Lake Chelan. One of the reasons for placing the epicenter at or near Lake Chelan is because that is where aftershocks continued to be felt for more than two years, after they were no longer felt in a wider area.

Other changes occurred there, including the eruption of a fifty-foot geyser near the outlet to Lake Chelan. The geyser gradually declined over the winter and eventually became a spring that

continues to flow today. Several other smaller geysers, two to three feet in height, were seen (Nisbet, 2015). Since there are Colville Tribal land holdings in this area, including a Tribal casino, another earthquake in this area could significantly affect the Tribe today.

According to Nisbet, various studies have assigned not only different locations for the epicenter of this earthquake but have also assigned different strengths on the Richter scale. A 1976 study placed it in Canada at a 7.0 to 7.3 magnitude; another set it at 7.4 but at Ross Lake; still another placed it at Lake Chelan but at a magnitude 6.8 (Nisbet, 2016).

There is another way to evaluate an earthquake's strength, and that is by applying observations against the twelve-level Modified Mercalli Intensity Scale. The Mercalli scale is more focused on the damage an earthquake did, or can do, rather than just the strength of the movement. The type of rock or soil through which the earthquake is conducted, and the frequency of the various earthquake waves, can make a major difference in the amount of damage that occurs.

A Jesuit missionary, Father Urban Grassi, was on the Colville Reservation shortly after the earthquake and was a regular visitor. In 1874 he wrote this about the Sanpoil Tribe:

> This Tribe more than any other on the Columbia for the past two years has been visited by God with earthquakes that in some places has sunk the ground, in others has piled it up greatly, and in others has broken the sides of the mountains. (Nisbet, 2015)

When contemporary accounts are compared to the Mercalli scale, the 1872 Chelan earthquake is considered to be intensity VIII to IX. Here is a chart to place that in context:

VII	Severe	Difficult to stand or walk. Damage to poorly built masonry buildings. Some cracks in better masonry buildings.
VIII	Destructive	Extensive damage to unreinforced masonry buildings. Fall of some masonry walls. Wood-frame houses moved on foundations if not bolted
IX	Violent	General panic. Damage to masonry buildings ranges from collapse to serious. Wood-frame structures rack, and, if not bolted, shifted off foundations. Underground pipes broken.
X	Very Violent	Poorly built structures destroyed with their foundations. Even some well-built wooden structures and bridges heavily damaged and needing replacement.

Source: Oregon Office of Emergency Management slide presentation, partial screen image of slide 15, captured October 1 2018 from http://wleog.org/wp-content/uploads/2014/06/2015-hour-and-a-half-Cascadia-Infrastructure.pdf

In 1873 following the earthquake, there was famine on the reservation because people were not able to gather foods as they normally did (Ackerman, 1996).

Earthquakes can cause soil liquefaction as well as landslides. Although detailed liquefaction zone and landslide maps are not available for the reservation, the State has generally mapped liquefaction zones and identified historical landslides statewide. Until this planning project began those maps were not being used for planning and permitting by the Tribe.

Earthquake is a concern for emergency planning because the danger of it, on the reservation, has been seen as very remote. Statewide public planning efforts are focused on preparation for the eventual Cascadia Subduction Zone earthquake that may cause tsunamis, destroy much of the infrastructure of the Puget Sound area, and kill thousands. But as shown above, not only would such an earthquake affect Eastern Washington, the reservation has its own history with severe earthquake.

The 1964 Alaskan earthquake, measured at 9.2 on the Richter scale, was felt in Washington; on-the-ground effects were measured if not felt as far away as Texas and Louisiana (Geiger, 2014). Tsunami waves that struck Washington's Pacific coast are well-documented. What is less well-known is that rockfall apparently caused by the earthquake occurred on State Route 21 along the Sanpoil River in Ferry County (Fagerlie, 2018).

An unknown but presumably large percentage of the structures on the reservation were built before the Tribe instituted a robust permitting and building code enforcement process. The Tribe has formally adopted both the International Building Code and the International Residential Code. Older structures, however, have not been evaluated against either standard. The 1872 earthquake and its effects are not well-known on the reservation. It is not clear that older structures were built to withstand that significant an earthquake.

An earthquake issue associated with major hydroelectric dams is that of "induced seismicity." This is thought to be caused by the weight of water in a reservoir forcing water into the underlying rock, lubricating existing faults that friction had kept stable. Especially during the first years of a reservoir's existence, this lubrication may cause earthquakes. Such earthquakes often lessen in both strength and frequency with time. There are no reported instances of this type of earthquake associated with either Grand Coulee or Chief Joseph dams.

Potential Mitigation Strategies: Earthquake

Here is a summary of possible mitigation actions for this hazard:

Issue	Possible Mitigation Actions
1. There is little awareness of earthquake (EQ) potential/danger on reservation	A. Begin annual participation in the Great Washington Shakeout B. Plan to participate in 2022 statewide EQ exercise C. Obtain EQ outreach materials for booths at events, visits to schools, and begin "Two Weeks Ready" education program
2. Improve Tribal resilience	A. Professionally assess which major structures may survive a significant EQ, build response/recovery plans around them B. Send appropriate staff to ATC-20 course to learn to assess EQ damaged structures C. When permits are issued to remodel structures, conduct an assessment to identify recommendations to identify seismic safety issues such as unbraced cripple wall foundations
3. Improve EQ emergency response capability	A. Locate funding to re-establish CERT program, and equip CERT rescuers B. Conduct collapsed structure rescue training C. Identify local source of cribbing and wedges for collapsed structure rescue
4. Identify potential liquefaction zones	A. Locate funding to conduct a liquefaction survey of the reservation
5. Limit potential for future EQ damage	A. Consider mapped fault lines, EQ-caused landslides and liquefaction potential when issuing new building permits

	B. Deny permits or require site mitigation in high-risk areas prior to permitting

9. Flood

Flooding is often spoken about in terms of "100 year floods," "500 year floods," and so on. A 100-year flood is one that has a 1% chance of occurring during any single year. A 500-year flood would have one-fifth of a 1% chance of occurring during any single year. A 50-year flood, on the other hand, would have a 2% chance of occurring during any year. It is possible to have a major flood, even at the 100-year occurrence level, for two or more years in a row.

FEMA maintains flood risk maps for the entire nation; if FEMA has mapped an area for flood risk, the map is available online. The State of Washington also assembles flood risk maps, from the FEMA data; those maps are also available online. As of October 2018, neither source shows any flood risk maps for any portion of the reservation outside of the Okanogan River corridor. The Tribe does have non-FEMA flood risk maps for the Sanpoil River valley. They were originally prepared by the NRCS during its flood study in the 1990's and later updated by Ferry County.

In 2015, FEMA issued a "Discovery Report" concerning their re-evaluation of flood risk mapping for the Okanogan River basin. FEMA has been requested by the Tribe to map other watersheds at risk on the reservation, and Tribal data has been shared with the FEMA contractors. When that work is completed, the results will be incorporated within the next revision of this plan.

Sheet flow in the Sanpoil Valley below Devil's Elbow Fire burn scar, February 2015

In February 2017, a warm and intense rainfall on snow triggered flash flooding on the reservation. The most significant damage occurred at the Mt. Tolman Fire Center (MTFC), where both the Tribal building housing the BIA wildland fire program and an adjacent building, housing the Natural Resource Enforcement program, were flooded. This was at least the third time that the MTFC has flooded.

Flooding is not limited to the main channels of rivers and streams. A severe rainstorm, especially upon fire-scarred lands not yet covered with new vegetation, can cause damaging "sheet flow" runoff where soils and debris are moved

by flowing sheets of water. This has occurred repeatedly around the reservation; the Sanpoil Valley during the winter of 2014-2015, and the Haley Creek Road area during 2015-2016 are two recent examples. In both instances, there was significant road damage.

The reservation has been impacted by flooding on four different rivers:

- the Columbia River, along the eastern and southern boundaries of the reservation;
- the Nespelem River basin, including the Nespelem and Little Nespelem Rivers;
- the Sanpoil River, running down the center of the reservation and joining the Columbia River/Lake Roosevelt south of Keller; and
- the Okanogan River, which forms the western boundary of the reservation.

In addition to these rivers, there are several creeks that have flooded in the past and damaged structures as well as roads. Storms in the winter of 2015-2016, after the major fires of 2015 denuded the landscape of vegetation and increased storm runoff, contributed to flooding along the normally intermittent Wannacut Creek.

Morningstar Ministries, Wannacut Creek, February 2016

That flooding surrounded one modular structure used by a church group; hasty defense work was needed to protect a nearby residence from flooding. Other creeks of concern for flooding include Stranger Creek, Hall Creek, and Omak Creek.

Omak Creek has caused significant flooding. In the winter of 2015-2016 it flooded because of rapid run-off from lands damaged by catastrophic fires the preceding summer, and in early 2017 because of heavy rains. According to ENV, approximately twenty acres of level ground suitable for farming were destroyed when Omak Creek flooded in 2017, and for the first time since 1936, temporarily changed course to run into Omak Lake. The deep ravine caused by that course change cut off access to another twenty acres of level ground.

In the past, stream gage data was collected on three creeks: Hall Creek from 1913 to 1929, and again 1972-1974; Stranger Creek from 1914 to 1929; and Omak Creek from 1972 to 1974 and again from 1976-1979. Twin Lakes Dam releases into Stranger Creek are monitored for dam safety (for ruptures and leaks), but the actual stream flow is not. The only creek being monitored today is Omak Creek. In 2013 the Tribe installed a continuous monitor that provides real-time water flow and height data to the USGS.

Columbia River

The Columbia River drainage upstream from the reservation is now regulated by at least twenty-eight dams, and is monitored for both in-stream flow and stream height. Snowfall and rainfall in the basins that feed the upper river are measured in many places; this data allows, during an average snowfall year, reasonably accurate forecasting of river levels for the spring runoff.

The entire shoreline of the reservation along what was once the free-flowing Columbia River is now a reservoir shoreline. Major flooding along the Columbia River occurred in 1894, 1948, and 1996. The 1894 flood inundated parts of Portland, Oregon, and is the first flood that is clearly recorded in contemporary written records. Subsequent floods, such as the 1948 and 1996 events, have been partially controlled by Grand Coulee and other dams. The 1948 and 1996 Columbia River floods had little impact on Tribal lands.

Nespelem River

Of the three remaining rivers on the reservation, there is a lack of historical data and stream flow monitoring for the Nespelem River. River gage data for the Nespelem River was collected from 1911 to 1929, but those gages no longer exist; the last data gage on the Nespelem River, which operated at a mill pond for only two years, was discontinued in 1974. There is no network of snow or rainfall monitors to provide data for runoff or flow forecasts. Although the Nespelem River Basin is small, draining approximately 122 square miles, it has apparently flooded in the past. Topographic maps indicate that much of the Nespelem and Colville Agency area is relatively flat; as they both exist along rivers and the Agency area is near the junction of the Nespelem and Little Nespelem Rivers, a reasonable assumption is that it has flooded in the past.

There is one privately-owned small dam creating a stock pond, used for ranch purposes, on the lower Nespelem River. It is small, and if breached would drain almost immediately into the Columbia River. It is not a hazard mitigation concern.

There are two other small dams in the Belvedere to Nespelem area. One was recently in use as a stock pond and for irrigation; if it failed, released water could reach SR155 in the Belvedere area. The property it is on was purchased by the Tribe in 2017. The other, upstream from Nespelem, is derelict and no longer maintained. Because of their tiny size, neither of those dams is a hazard mitigation concern.

Tribal members have recounted past flooding of some structures at the Colville Agency area and in the Town of Nespelem, caused by heavy rain and flash flooding. There are no FEMA flood risk maps for the Nespelem River Basin.

Sanpoil River

The Sanpoil River drains a basin of approximately 902 square miles. River gaging data is not comprehensive; it exists for 1911 to 1918, 1952-1955, and 1972-1974. There is also some gaging data for upstream portions of the river, such as from the discontinued gage at Thirteen Mile. There are not enough snow and rainfall monitors in the basin to allow the NWS to issue river forecasts. A flood level has not been set for this gage; experience by Tribal Emergency Management staff during the 2015 through 2018 spring runoffs is that the risk of flood damage to infrastructure becomes significant when the river level is higher than six feet as measured at the Keller gage.

Because there was so little data available about Sanpoil River flooding, in 1994 the Tribe, Ferry County, the local conservation district, and the State agreed to cooperate with a Natural Resources Conservation Service (NRCS) study of the river. The goal of that project was to map flood risk zones, and establish potential flood flows up to the 500-year recurrence level.

Table 2: Sanpoil Discharge by Cross Section
Sanpoil Floodplain Management Study

Cross Section Number	Flood Recurrence Interval - years						
	2	5	10	25	50	100	500
	Peak Discharge - cubic feet per second						
9.2 - 11.4B	1,456	2,509	3,080	3,984	4,950	6,068	11,637
13.9 - 30.0B	1,281	2,534	3,118	3,970	4,855	5,905	11,429
31.1 - 43.4	1,072	2,431	2,914	3,562	4,258	5,326	10,945
43.5 - 51.2	420	1,144	1,255	1,575	2,121	2,662	5,847
51.3 - 57.5	316	919	982	1,260	1,708	2,178	5,164
57.55 - 59.6	172	514	547	741	1,065	1,425	3,669
59.8C - 62.5B	77	235	242	373	662	910	2,121
Mouth O'Brien Ck.	84	280	309	522	900	1,218	2,717
Mouth Granite Ck.	143	419	432	533	899	1,263	3,165
Mouth Scatter Ck.	42	127	127	127	127	135	280
Mouth West Fork	552	1,257	1,435	1,661	1,826	2,239	5,124

Source: Table 2, Appendix B, NRCS Sanpoil River Study

The partial graph shown at left displays what water flows would amount to for each flood recurrence level along the river. The top "cross section number" corresponds to the Keller Tribal community; the next cross section refers to the Sanpoil Valley north of Keller to the Devil's Elbow area, north of the SR21 junction with the Bridge Creek Road.

During the 2017 flooding, which began with warm rain falling on snow in February, the estimated river flow peaked on the morning of April 9th at Keller at 5,620 cubic feet per second (CFS). This places the peak of the 2017 flood at between the 50 and 100 year recurrence interval.

This level may not be an accurate representation of the actual flood. The Tribe's ENV subsequently evaluated the flow levels and damage from the flood. The flood damaged the

gaging station at Keller twice during the flood; the USGS official peak flood figures had to be estimated due to that damage. ENV's evaluation, which was reviewed and verbally concurred with by USGS, was that the flooding was on the order of a 200-year recurrence level.

The 2017 flood caused significant damage to roads, threatened other homes to the point where protective sandbagging was necessary, and destroyed one home. A log jam formed behind the 21 Mile Bridge, a BIA bridge across the Sanpoil River, in the early morning hours of April 9th. At some point water moving around the log jam eroded away the bridge abutments, stranding two residents, and water was suddenly released to flow downstream. The river gage at Keller, after an abrupt three foot drop in water level, rapidly increased. The rapid increase apparently

Sanpoil River near Keller, April 9, 2017

Twenty-One Mile Bridge, SR 21, April 10, 2017

reflected the surge of released water reaching Keller. At about the same time, water began rapidly eroding away the river bank upon which the Saltz Road home rested. The home slid into the river that evening.

State Highway 21 Bridge at 25 mile, April 10 2017

The highway bridge on SR 21, where Gold Creek reaches the Sanpoil River, was destroyed. The highway was closed for two weeks until a temporary one-lane bridge was installed. This impacted school children who could no longer reach their schools by road, as well as normal traffic to jobs, shopping, and medical care.

Only one state highway bridge was destroyed during the 2017 Sanpoil River flooding, but a second could easily have been lost. The photo above was taken after the

flood crest; grounded logs were in the river less than one hundred yards upstream. If a log jam had formed behind this highway bridge, it could have washed out its abutments as well.

Okanogan River

The earliest stream flow records for the Okanogan River date back to 1911-1925 at Okanogan. The oldest continuous records for the river date began in 1929, where the river is measured at a gage in Tonasket. That gage is approximately sixteen river miles north of the reservation boundary.

The Okanogan River experienced major floods in 1894, 1948, 1972, 1974, and 2018. The 1894 flood involved the entire Columbia River in Washington, and (in conjunction with Willamette River) flooded Portland. It is impossible to determine now how high the Okanogan River flowed during the peak flood in May and June, 1894. However, flash flooding due to heavy rain on Salmon Creek on May 27, 1894, damaged the county seat in Conconully and killed one person.

The 1948 flood caused flooding throughout the Okanogan Valley, knocking out power and other services. A Tribal member recently related that her 1948 Okanogan High School graduation was held on the athletic field, lit by the headlights of parked cars because power was out. The local newspaper reported that a lake one half mile wide extended from the east side of the Omak

River Bridge into the reservation; workers crossed the lake by boat to get to work. While numbers are not readily available now, that newspaper reported more than one hundred houses were evacuated, two homes were “washed away”, and “Many others were washed off foundations.” The reported damage was $6.9 million in 1948 dollars, the equivalent of more than $70 million today.

The 1972 flood, the highest on record, caused a reported $6.8 million in damage. This is equivalent to more than $40 million in today’s dollars. Damage was somewhat limited by levees that were constructed in 1949, but that did not save the Tribal community in East Omak. Tribal members who are elders today recount the frantic sandbagging efforts they took part in as high school students. The newspaper record states that:

> “The river invaded East Omak through the Stampede Arena, where a desperate attempt to throw a dike across the grounds failed Wednesday night. By then, homes in East Omak and Okanogan were being flooded and evacuated.” *Omak Chronicle, June 8, 1948*

Following the 1972 and 1974 floods, the Army Corps of Engineers constructed new levees to protect communities along the river.

Unlike the Sanpoil and Nespelem Rivers, the NWS has established flood stages for the Okanogan River. The NWS has enough years of data to be able to estimate runoff. Beginning in March 2018, river forecasts indicated the likelihood of at least moderate flooding during the spring runoff. The NWS forecasts were handicapped by the lack of good data from within the Similkameen River drainage, in Canada. The Similkameen is one of the major contributors to the flow of the upper Okanogan River.

Tribal employees and volunteers filling sandbags May 7 2018

The Tribe responded early to the 2018 flood and committed significant staffing, equipment, and funds to limit damage and protect the population. The county assisted by providing and delivering sand. The Tribe, through a combination of volunteer and employee efforts, filled approximately 51,000 sandbags.

Approximately 40,000 sandbags were either placed by the Tribal emergency response, or were supplied to individuals to protect their own property.

The Okanogan River stayed above flood stage from May 5th through May 28th, 2018. It stayed above "moderate" flood stage for fifteen days, and above the "major" flood stage for twelve. One Tribal home was destroyed in East Omak; at least five other Tribal homes were damaged. The Colville Indian Housing Authority provided housing for four displaced Tribal families.

Flood damage in East Omak was made worse by damage to the city-maintained storm drain in East Omak, necessitating a Tribal pumping operation. Ground water rising above the ground surface due to high river levels (a river surface higher than the surrounding terrain), and seepage through the levee, caused water accumulation in East Omak that could no outlet. The Tribe operated pumps that at their peak were pumping more than two million gallons per day out of East Omak and into the river.

The 2018 flood left substantial quantities of debris on trust lands along the river.

Trust lands south of Omak, May 2018

Flooded Tribal office at Brooks Tract, May 11 2018

The developed areas along the Okanogan River have been mapped for the purposes of the National Flood Insurance Program. The map for the Brooks Tract area, where one Tribal structure flooded and one across the street did not, establishes that the flood level was lower than the 100-year recurrence level. For comparison purposes, the record flood in 1972 was considered to be an 80-year flood; that is, a level of flood that would recur an average of once every eighty years (Northwest Management, 2013).

Possible Mitigation Strategies: Flood

The Tribe's experience during recent floods reinforced the need for a multi-faceted mitigation strategy for flooding. Lessons learned during the 2018 floods included the need for advance training, stockpiling of supplies, and pre-flood mitigation.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Strategies
1. Reservation is not fully mapped under the National Flood Insurance Program	A. Request FEMA to expedite risk mapping of areas identified as at risk for flooding but not mapped, including Nespelem River, Hall Creek, etc.
2. Use permitting process to mitigate future flood damage	A. Deny permits that place well pumps and pump sheds within flood zones; require relocation of such structures when replacement needed

	B. Deny, or require mitigation for, permits to build structures in flood plains so that construction is consistent with NFIP requirements C. Require propane tanks that supply structures to be secured against flood
3. Tribe did not have dewatering pumps, nor a secure place to cache them where needed	A. Tribe has now acquired pumps and hose; needs to identify secure storage
4. Tribe is not prepared to rapidly evaluate flooded structures	A. Send appropriate staff to ATC-45 course to lean to evaluate storm and flood damaged properties for safety B. Locate funding to prepare field kits for structure damage assessments
5. Roads repeatedly wash out during high runoff events	A. Identify and map repetitive road damage sites B. Conduct engineering assessment of repetitive loss sites C. Seek grant or other funds to mitigate design issues that contribute to road failure, including replacement of low bridges on SR21 and costs of potential road relocation
6. Flood fighting supplies not readily available	A. Seek grant or other funding for the costs of stockpiling flood fighting supplies: Hesco barriers, sheet plastic, sandbag filling tools, etc.
7. Emergency response staff not ready for flood fighting operations	A. Conduct training; bring FEMA flood fighting course to reservation

10. Landslide

Geographically the Colville Reservation is part of the Okanogan Highlands. The reservation is mountainous; crossing the central reservation from Inchelium to Omak requires traveling

through three mountain passes. Roads passing through mountainous terrain are often subject to rockfall and small landslides.

Although rockfall during winter and during rainstorms is common, larger landslides have significantly affected transportation across the reservation. The photo at right depicts a major slope failure above one of only two east-west routes across the reservation. The road was closed for months when a creeping landslide slid across the road, causing a lengthy detour.

Upper slope failure, Mile Marker 1, Peter Dan Road, March 2017

The road network on the reservation has been impacted by multiple landslides, ranging from the sudden collapse of a section of the Columbia River Road in March 2016, to the subsidence landslide that closed the Inchelium Highway in April 2017. The Inchelium highway landslide, in particular, isolated the community because the primary alternate route was also closed due to a bridge washout.

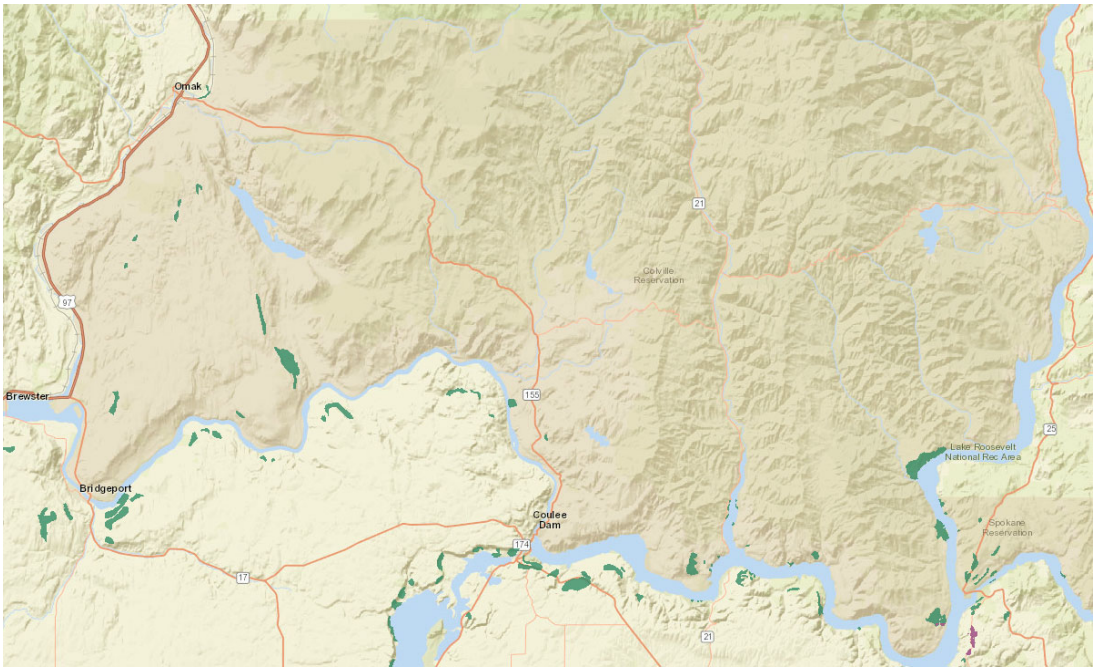
Inchelium Highway subsidence landslide, April 18 2017

The State of Washington has generally mapped historical landslides throughout the state, and is working on a mapping project statewide to identify high-risk areas where landslides may pose a danger to homes and infrastructure. Only low-resolution landslide maps, not suited for permit and construction decision-making for individual parcels, are available for the reservation.

Major landslides have occurred in the traditional territories of the Tribe, although those areas are not currently within the reservation. The 1872 Lake Chelan earthquake completely dammed the Columbia River north of the Entiat River, and was one such landslide.

Homes can be at direct risk from landslide. A February 1953 mudslide in Hopkins Canyon, near the Columbia River Road, destroyed one house (Jones, 1961).

One of the unexpected results of the filling of Lake Roosevelt behind Grand Coulee Dam was the number, size, and extent in years of lakeshore landslides. The Jones study published in 1961 documented more than 300 landslides along Lake Roosevelt between 1942 and 1955.



Green coloring indicates identified landslide areas. Retrieved/excerpted February 14, 2017, from: https://fortress.wa.gov/dnr/protectiongis/geology/?Theme=natural_hazards

These included a landslide in April 1952 that caused a 65-foot high wave against the opposite shore, three miles south of the Kettle Falls Bridge; and a series of landslides in 1953 that resulted in at least one wave that was also 65 feet high (Burnett, 2009).

Although many landslides were generated from the Reed Terrace, approximately twenty river miles north of Inchelium, there have also been many within the reservation. A series of landslides on the west bank of the Sanpoil Arm of the lake, south of Keller, during the early 1950's required multiple repairs to the then-SR4 (Jones, 1961).

The Sanpoil Arm is still affected by landslides. In Chapter 1 of this document are photos of an eroded property south of Keller. According to the ENV, the water level below that property is influenced by Lake Roosevelt water levels. In addition to the erosion in those photos, approximately two acres of Tribe-owned land slid into Lake Roosevelt during 2017. This creeping, unrecognized, and unreimbursed loss of the Tribal land base due to the Bureau of Reclamation's operation of Grand Coulee Dam is an infringement upon both Tribal property rights and Tribal sovereignty.

A wave caused by a landslide into water is sometimes called an “inland tsunami” but is also known as a “seiche”. One of the more damaging seiches on Lake Roosevelt occurred in February 1951, when such a wave pushed logs through walls ten feet above the lake level at the Harter Lumber Company Mill in Kettle Falls (HIVA, 2012).

A National Park Service report explains this phenomenon:

> The landslides are controlled in-part by the size and rate of annual reduction in the reservoir elevation. Risk of landslides is a moderate concern for 30-50 ft drawdowns, and a major concern for drawdowns of more than 50 ft. Rates of drawdown in excess of 1.5-2 ft/day are also believed to accentuate occurrence of landslides. Bureau of Reclamation management of reservoir levels has attempted to avoid these conditions for the past 20 years. (Riedel, 1997, page 5)
>
> Erosion problems persist primarily because of the annual drawdown of Lake Roosevelt. Erosion of shorelines occurs primarily as large landslides located at hundreds of sites along the reservoir. Several studies have shown that the larger the annual drawdown of Lake Roosevelt, the greater the number of landslides. (Riedel, 1997, page 67)

There has been no comprehensive study of landslide-prone terrain within the reservation, other than along the Columbia River/lake shorelines.

Landslides along the Lake Roosevelt shorelines still occur. The most recent damaging landslides occurred on the Spokane Arm of the lake in January 2009, producing a 30-foot wave that caused significant damage to private docks and moored boats; and again in August 2009, causing damage at an NPS campground.

<u>Possible Mitigation Strategies: Landslide</u>

During the preparation of this plan, the possibility of doing a reservation-wide landslide risk assessment was considered. The State of Washington, after the Oso Landslide in 2014, set standards for a statewide landslide risk inventory. The amount of funding available to the Tribe, to perform an assessment to the same standard as the State, was insufficient.

A lesson learned from the 2015-2016 post-fire flooding is that the BIA’s Burned Area Emergency Rehabilitation (BAER) response is focused on trust lands, and does not adequately assess issues

on fee lands within the reservation. Runoff and soil stability issues from fee lands may affect adjacent or downstream trust lands, and some fee lands are occupied by Tribal members.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Actions
1. A landslide risk assessment has not been completed	A. Seek $300,000 in grant funding for comprehensive landslide risk mapping of the entire reservation
2. BAER evaluations do not assess all lands at risk, even if may affect Tribal lands	A. After large fires, request assistance from Conservation District or other sources to assess fee lands; ensure that issues from fee lands will not affect trust lands B. If fee lands pose a landslide risk to adjacent trust lands post-fire, seek emergency stabilization funding to minimize damage to trust lands
3. Major landslides are an uncommon event; staff may be unfamiliar with landslide rescue issues	A. Begin an in-service training program on disaster preparedness and response for first responders and potential incident commanders. Include landslide response and considerations in the training.
4. Building permits not currently assessed for landslide risk	A. Until risk mapping is available, evaluate every permit and plan from the standpoint of landslide risk.
5. Repetitive landslides block roads and endanger travelers	A. Map locations where landslides and rockfall reach roads, including state highways and county roads B. Identify high-risk sites that need mitigation. Work with road/highway owner to locate funding to improve road safety

6. Tribal land is being lost to Lake Roosevelt.	A. Seek compensation from BOR for loss of Tribal land; and seek changes in the Army Corps of Engineers system management decisions that cause fluctuations in lake levels that contribute to landslides

11. Severe Weather

During the first public input portion of this planning effort, members and residents participating typically ranked "severe weather" or "severe storm" as either their highest concern, or the second highest concern after wildland fires. The "heat map" exercise included a separate category of "winter storm"; no one participating rated a winter storm as among their three highest concerns. This may be because winter storms are a yearly occurrence, while severe rain and wind storms are less common.

Tribal experiences with severe storms during the last decade include:

> July 2012: Damage from straight line winds was severe in the Sanpoil Valley to Inchelium area, but associated rainfall caused damage from flash flooding in the Okanogan County portion of the reservation. The Tribal IT building on the Agency campus was flooded; road damage occurred north of SR 155 and a Malott. Trees crushed homes in Keller, cabins at Twin Lakes, and cut power throughout much of the eastern reservation.

Keller, July 21 2012

Blowdown along SR 21, near Keller, July 21 2012

July 2014: Severe winds caused trees to crush homes and cabins at Twin Lakes, and cut power to the Inchelium and Twin Lakes areas for parts of three days.

February 2015: Heavy rains falling on burn scars, and quickly running off, damage roads in the Sanpoil Valley.

August 2015: Severe winds caused the Tunk Block fire to blow up, moving south more than twelve miles in one day and burning approximately thirty homes.

Winter 2015-2016: Heavy rains running off burn scars cause flooding in the Haley Creek area, causing major road damage.

February 2017: Heavy rain falling on snow caused flash flooding in the Sanpoil Valley. Flooding heavily damaged the Mt. Tolman Fire Center headquarters building, a Tribally-owned structure from which the BIA fire protection program is run. Other Tribal structures were also damaged.

October 2018: A sudden windstorm caused an electrical fire in Elmer City, burning seven mobile homes at the Grandview Trailer Park. Four of the homes were occupied.

During this period there were many lesser wind and rain storms that temporarily blocked roads with trees, caused debris to flow onto roads, and interfered with travel. But in the last decade, there has only been one severe winter storm period that required an emergency response: the heavy snowfall and ice storms of 2008-2009. That storm resulted in a disaster declaration for the Ferry County portion of the reservation.

Possible Mitigation Strategies: Severe Storms

Issue	Possible Mitigation Actions
1. There is no quick way to get warnings to members and residents	A. Obtain an emergency notification system (“reverse 911”) for the Tribe to allow rapid notifications of weather hazards B. Tie into national IPAWS system for wireless emergency alert access

2. New structures may be susceptible to damage from high winds; older structures may need retrofitting	A. During permitting, provide information on hazard mitigation such as chimney bracing, securing shingles or metal roofs to avoid wind lifting, etc. B. Distribute information about non-structure mitigation measures for homeowners, such as tree hazards C. Conduct outreach at district, membership, or other meetings to educate residents about mitigation ideas and current construction standards
3. Above-ground power lines may fall during winds, causing fires	A. Require new power lines to be underground. B. Explore with electric utilities the possibility of shutting down power during extreme winds, to avoid power line-caused fires
4. Flash flooding impacts same locations causing repetitive losses	A. Identify repetitive loss properties B. Review sites for engineering solutions to runoff problems: diking, diversion, or engineered run-off paths C. Explore other mitigation options such as structure relocation
5. Tribe not prepared to shelter evacuees if power is out	A. Obtain emergency generators for community centers, for sheltering; for sewage lift stations; and for well fields B. Obtain portable beds and other shelter supplies for evacuees
6. Tribe not prepared to rapidly assess damaged structures	A. Send appropriate staff to ATC-45 course to lean to evaluate storm damaged properties for safety B. Locate funding to prepare field kits for structure damage assessments

7. Tribe may not have rescue-trained workforce immediately available	A. Obtain funding to restart Community Emergency Response Team (CERT) program B. Develop plan to use CERT volunteers and keep them involved in the emergency response program
8. Essential emergency supplies not readily available	A. Assemble emergency management cache for Inchelium from existing stocks B. Obtain grant funding for additional rescue equipment needed, such as chain saws, cribbing, safety helmets and vests

12. Volcanic Eruption

Any of the Washington Cascade Range volcanoes, and conceivably Oregon volcanoes as well, could pose a threat to the Colville Reservation. It is not clear which volcano is most likely to erupt. Because they are the closest volcanoes, a Tribal planning assumption is that Glacier Peak and Mt. Baker are the greatest potential threats. However, two eruptions of Mount St. Helens within recorded history have affected the Tribe.

Distance and topography protect the reservation from lahars or other debris flows, lava flows, or blast damage from an eruption. The primary danger will likely come from volcanic ash fall. The 1980 eruption of Mt. St. Helens resulted in limited ashfall on the reservation; however, measurable ashfall from that event occurred as far away as Oklahoma. In the distant past a Glacier Peak eruption dropped 12 inches of ash at what is now the city of Chelan, and 1¼ inches of ash in southwestern Montana.

A lesser-known disaster was the Mt. St. Helens eruption of 1800, which resulted in significant ashfall on what is now the Colville Reservation. Stories collected later referred to that year as the one in which “dry snow” fell, which greatly interfered with Tribal life. Several inches of ash fell, driving away game animals in the Sanpoil Tribe’s area, and the ashfall was so thick that there was little difference between night and day (Cebula, 2003). Another researcher described Tribal members as “too distraught to collect foods” that year (Ackerman, 1996, page 40). The result was famine the following winter.

Prior to any eruption there will likely be a change in geologic activity at the volcano, signaling the possibility of an eruption. Small-scale steam or ash venting, earthquakes, and similar occurrences usually precede significant eruptions. Before the catastrophic Mt. St. Helens event, there were almost two months of such warnings. Such notice gives emergency managers time to order contingency supplies, update plans, and provide preparatory advice to managers and to the public.

When warning signs of a possible eruption are noted, public information is a key part of the Tribal response. Tribal members and residents must be informed of the potential risks, be advised how they can protect themselves and their property, and be strongly encouraged to keep supplies of food, water, and home heating fuel on hand as well as keep personal medications available.

Ashfall may quickly follow an eruption; the initial ash plume from Mt. St. Helens travelled at approximately 60 miles per hour. If Glacier Peak erupts, and the wind direction is unfavorable, ash could begin falling on the reservation slightly more than one hour later. Although there will likely be many indicators that a volcano is becoming more active, there may be little or no warning of an actual eruption and the start of ash fall.

Eruption clouds and ash fall commonly degrade or interrupt telephone and radio communications. This includes physical damage to equipment, frequent lightning (electrical discharges), and either scattering or absorption of radio signals by the heated and electrically charged ash particles. All Tribal operations and residents should expect communications problems with land-line telephones, cellular phones, and direct radio transmissions as well as radio repeaters.

Volcanic ash is small enough to be inhaled by people and livestock, is extremely abrasive, can damage vehicles and other machinery, is not only corrosive but conducts electricity when wet, and can damage or overload and collapse roofs. It has a very different impact than ash and smoke from wildland fires. Volcanic ash can also significantly change the acidity of surface waters.

Ashfall impacts range from short term emergency situations which may last for several days (highway closures, air quality requiring people to stay indoors, power failures due to ash contamination and electrical arcing, etc.), to very long term problems (decreased agricultural productivity, significant livestock mortality from both ash and fluorosis). A significant and expensive issue is the removal and disposal of ash from roads, housing areas including

residential roofs, Tribal buildings and facilities, and parking areas near those facilities as well as streets.

Ash composition can vary widely with distance from the eruption. After Mt. St. Helens erupted, the Yakima area was able to use street sweepers to remove ash from roads. The ash that fell on Spokane, approximately 120 miles further from the eruption than Yakima was significantly lighter and finer with almost a talcum powder consistency. Spokane ash removal managers had to invent a method involving large quantities of damp sawdust as a collector, before they were able to remove volcanic ash with machinery.

There is significant risk of damage to Tribal infrastructure, including building HVAC systems (heating, ventilating, and air conditioning) and Tribal vehicles. Sewage systems, water supply systems, and buildings (or at least their HVAC systems) may need to be shut down to prevent damage. Opening system bypasses and draining untreated sewage into waterways may be necessary to save sewage disposal infrastructure. Tribal members with respiratory and/or cardiac issues may require significant medical support or even evacuation from the area.

Possible Mitigation Strategies: Volcanic Eruption

A volcanic eruption is often seen as non-mitigatable; once the population at risk has been evacuated, there is nothing more that can be done. For jurisdictions very close to volcanos and at risk of lahar flows or other direct affects, that may be true. Since the reservation is not within range of lahars, nor of direct eruption effects, the threat to the reservation is primarily from volcanic ash fall.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Actions
1. Advance planning is needed	A. Update the Tribe's volcanic eruption EOP to include recent research findings and best practices B. Plan for sheltering in place for the population C. Prepare an extensive communication plan that can be implemented without delay

2. Scarce supplies may be needed on short notice	A. As funding permits, stockpile other necessary supplies with multiple-use disaster functions; e.g., sheet plastic for flooding can be used for ashfall protection for buildings; N95 respirators for wildfire smoke will work for volcanic ash
3. Volcanic eruption is an unlikely event, and staff may be unfamiliar with volcano eruption issues and hazards	A. Begin an in-service training program on disaster preparedness and response for first responders and potential incident commanders. Include volcanic eruption discussion in this series.

13. Wildland Fire

Wildland fires play a major role in shaping western lands. Wildfires have benefits for cleaning out dead fuels, helping to restore a more natural environment and encouraging renewal of food sources for both wildlife and domestic grazing animals. A benefit not always considered is that this cycle sustains the growth of traditionally-gathered plants, which provide both food and cultural continuity to Tribal members. The other side of this coin is that wildfires threaten the lives of fire fighters, community members, their communities, and the entire infrastructure that the Tribe has developed, as well as the work the Tribe has done to preserve access to culturally significant plant species.

The Colville Reservation is not an isolated fire world. Private, U.S. Forest Service (USFS), Bureau of Reclamation (BOR), and State-owned lands adjoin the reservation. Fires cross boundaries without respect to land ownership or land management. Background information, following, will provide some perspective on wildland fire issues.

The Bureau of Indian Affairs is responsible for wildland fire suppression on trust lands within the reservation. It operates the Mt. Tolman Fire Center (MTFC) to carry out that responsibility. It generally operates as a fire suppression agency from March to November each year.

In addition:

- The Town of Coulee Dam operates a municipal fire department.

- Okanogan County Fire District 2 is based in Elmer City.
- Okanogan County Fire District 3 covers Malott, Okanogan, and Omak and lands on the reservation side of the river; it operates as three municipal fire departments, one for each community, under the umbrella of the fire district.
- Okanogan County Fire District 5 covers the Monse area and reservation side of the Okanogan River until District 8 begins.
- Okanogan County Fire District 8 covers the southwest portion of the reservation, with its high proportion of privately owned (fee) lands.
- Okanogan County-Ferry County Fire District 13 covers the northern portion of the Sanpoil Valley along SR 21, and some isolated parcels of fee lands
- The Colville Tribal EMS/Fire/Rescue Department (CTFD) operates two 24-hour/7-day per week staffed fire stations, one each in Inchelium and Nespelem.

The Town of Nespelem formerly operated a volunteer fire department. That department disbanded when the town reached an agreement for the CTFD to operate from the town's fire station, and turned over the town's fire equipment for Tribal operation. CTFD is primarily an ambulance and structural fire protection service. It does respond to wildland fires threatening homes, and suppresses wildland fires when MTFC is not in operation. The CTFD is not heavily staffed; each fire station operates with only two full-time fire fighters on duty.

The CTFD faces limitations that impair its ability to operate. Among them is that the Tribe cannot operate a volunteer fire department program to augment full-time staff. Elsewhere in the State, one of the ways to induce volunteer fire fighters to sign up is the fact that they not only can earn a small pension, but that they are covered for the purpose of on-the-job injury. Volunteers properly enrolled under state law are eligible to earn a pension and to receive workman's compensation if they are injured while working as a volunteer, under the Volunteer Firefighters and Reserve Officers Relief and Pension Act. The CTFD is barred from participating in that state-wide system because it is neither a municipality nor a fire district, under the language of the Act.

A mainstay of fire protection against rapidly moving wildfires, throughout Washington, is the Fire Mobilization ("Fire Mobe") program. A local jurisdiction, when it is overwhelmed and mutual aid resources are limited, can call on the State to declare a Fire Mobe. Once that is done, regional fire district and fire department resources are dispatched to assist. They typically arrive within

Source: Tribal Tribune, August 15, 2015. Plume from North Star Fire, two days after ignition.

a few hours, help protect structures, and suppress the fire.

According to the chief of the Washington State Patrol (the approving official for fire mobilizations) and the state fire marshal (the recommending official for fire mobilizations), the CTFD cannot request state mobilization because it is neither a fire district nor a municipal fire department. Neither State official is willing to accept that the Tribe's agreement with Nespelem, to provide fire protection to the town after the Town merged its firefighting resources with those of the Tribe, is equivalent.

Tunk Block Fire, August 21, 2018

Two disastrous fire seasons affected the state during the last decade: the 2014 Carlton Complex fires, and the 2015 fire season. The 2014 fire season set new records for the most acres burned, and was the worst fire year in state history. The 2015 fire season far exceeded 2014 in acreage burned.

There have been many large and significant fires on the reservation, but the most significant fires in living memory were the 2015 North Star and Tunk Block fires. During those fires in 2015, more than 240,000 acres on the reservation burned. That nearly equaled the statewide record set during the 2014 fire season. The acreage burned on the reservation in 2015 was only a fraction of the statewide fire acreage that year.

Several issues have affected the reservation's ability to handle and recover from major fires. They include:

- The need to protect structures from closely approaching fire, a task MTFC firefighters are not allowed to carry out. The CTFD, which does defend structures, at times has insufficient staff to both protect homes and answer ambulance calls.
- Members and residents may not be able to find, or to afford, fire insurance. Many homes are far from fire hydrants, and some insurers will not sell fire insurance to homeowners when there are no fire stations or fire hydrants nearby.

MTFC has been responsible for fire prevention activities involving wildland fire. The emphasis of that program has varied depending upon the resources made available to it each fiscal year. After the 2015 fires burned more than 240,000 acres and 30 homes on the reservation, MTFC restarted the Firewise program in 2016. Firewise emphasizes risk reduction, including home changes (such as landscaping) and clearing out fuels in the area. Since the 2016 fire season, fire prevention activities have returned to a lower activity level.

WSU Extension, and the local conservation districts, participated in the 2016 Firewise restart and the first community fire protection project. Since that time, MTFC fire prevention has been less active. Firewise emphasizes risk reduction, including home changes (such as landscaping) and clearing out fuels in the area.

There are three components that drive wildland fires: weather, topography, and fuels. The first two components are not under local control; nothing can change their impact on wildland fires. Something can be done about fuels. A discussion of each of these three components follows, for better understanding of fire prevention options.

Weather

Weather is the most significant component as it makes fuels more available for wildland fires. It is the strength of winds, relative humidity, temperature, and moisture that determine the intensity of wildland fires. During the past several years the Western United States has experienced large, devastating wildland fires.

This is believed to be due to rising temperatures and an increased length of the fire season. Above normal temperatures dry out green fuels, which makes them burn more readily to generate larger and more destructive wildland fires.

Topography

Topography drives wildland fire by heat transfer and by preheating and curing fuels as fires burns upslope. Topography can also slow the spread of wildfires because wildfires burn slower traveling down slope. Other influences that affect wildland fire spread include “aspect,” which refers to a slope facing in a certain direction. In general south and west aspects tend to receive more direct sun which in turn dries out fuels. This makes them more ready to receive fire, increasing fire spread. The fuel types on the south and west aspects tend to be lighter and flashier fuels, which contributes to rapid fire spread.

On north and east aspects the general conditions tend to be a little wetter, and the fuels a little heavier and less ready for combustion; these slopes will burn more slowly. In some cases the fuels on these aspects, being much larger in diameter, will hold higher fuel moistures and will only dry out enough to support wildland fire much later in the season if at all.

Fuels

Fuels come in all forms and fashions from herbaceous grasses, brush, trees, leaves, and needles to building materials. It is their properties and vertical arrangement that affects how and when these fuels will burn.

Fuel loading includes the size and shape of the fuels. Moistures of live and dead fuels determine how much of the woody fuels are available for combustion. Generally the lighter and flashier fuel types will have a higher rate of spread. In the Western United States the main carriers for all wildland fires are the herbaceous grass fuel types.

In order to have single tree torching, group torching, or crowning wildfires there needs to be ladder fuels that will carry fire into the forest canopy. Without this vertical arrangement there would be only a ground fire. The time of day when the wildfire burns through an area also determines how much of the fuels are available due to relative humidity, temperature, and recovered fuel moistures.

Fire Occurrence

Wildland fire occurrence data from the Mount Tolman Fire Center (MTFC) was used for this Hazard Mitigation Plan. The wildfire data covers from 2001 through 2017. On average the reservation has recently had sixty human-caused and forty natural-caused wildfires each year.

Table 1 demonstrates that the number of both human-caused and natural fires have been trending down for the past three fire seasons.

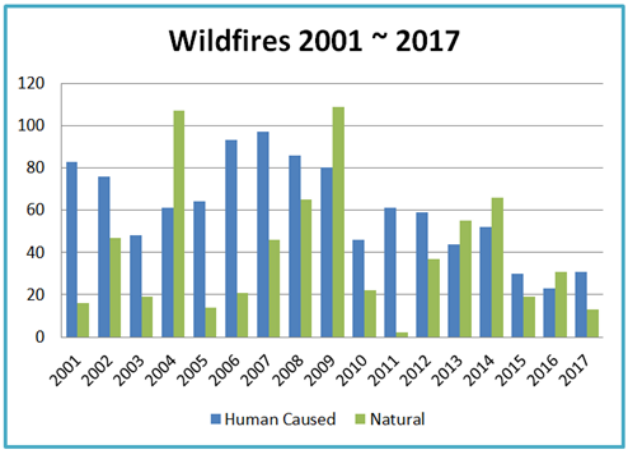


Table 1: Wildfires 2001~2017

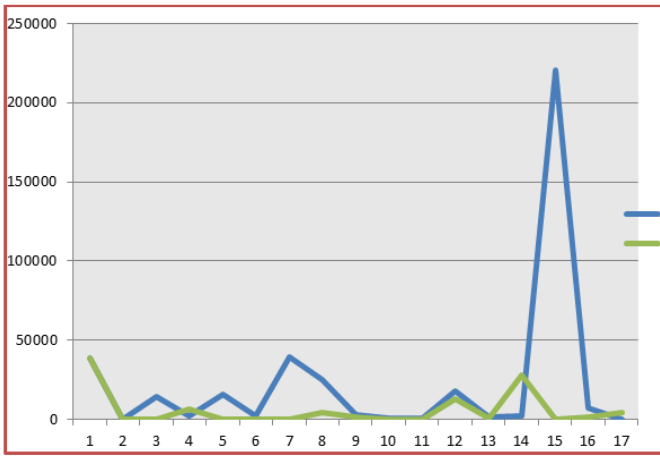


Table 2: Acres burned, human v. natural causes

However, Table 2 displays acres burned by both human-caused and natural-caused fires. This table shows that there were more acres burned, even though there have been fewer ignitions. More acres burned per incident could be from summers becoming warmer and dryer, as well as from longer fire seasons.

Fuels Assessment

The reservation has been classified by fuel type into four different Fire Management Zones (FMZs). FMZ 1 is the light grass and brush model. It is at lower elevations, running the length of the west side and along most of the south boundary of the reservation. FMZ 2 is the lower elevation timber, brush and grass mixture. FMZ 3 is mixed conifer and brush at the mid-elevations of the reservation. FMZ 4 is high elevation timber, and has a mixture of all the coniferous tree species.

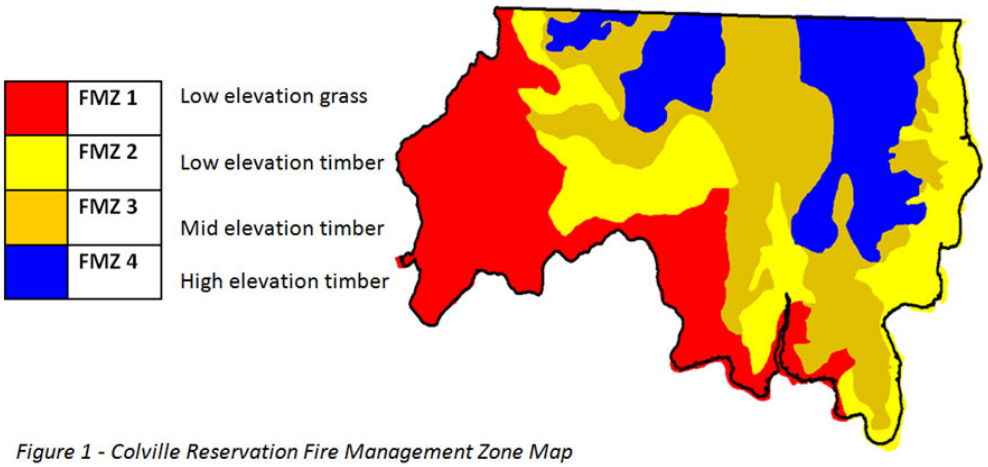


Figure 1 - Colville Reservation Fire Management Zone Map

FMZ 1

This is low elevation with mostly grass, sagebrush, and bitter bush with an occasional tree or small clumps of trees. There are several communities within FMZ 1, posing a risk of community losses. Because of the light flashy fuels in zone 1, these communities are at risk from wildland fires.

Treatments in FMZ 1 could include mowing, mechanical brush removal, hand-piling and pile burning. Another possibility is putting in strategic fuel breaks around communities. These fuel breaks would need annual maintenance due to the fast-growing grass fuel types within this zone.

FMZ 2

This zone is also low elevation; the fuels include grass, brush, and timber. This is the transition zone between zone 1 grass and brush fuels types, and zone 3 which includes grass and brush but is primarily coniferous forest. There are several communities within FMZ 2 and it would be beneficial to establish strategic fuel breaks around the communities.

Potential treatment options include mowing, mechanical thinning or brush removal, pruning brush and trees, and hand piling with either broadcast or pile burning.

FMZ 3

This is the mid-level zone which is mostly timber; much of the Tribe's timber harvesting comes from this zone. The understory is a mix of grass, brush and second and third growth timber species. The overstory consists of ponderosa pine, douglas fir, western larch, and lodgepole pine.

Treatment options include but are not limited to mechanical thinning and piling, hand thinning and piling, and either pile or broadcast burning.

FMZ 4

This is the high elevation timber zone; the overstory has a mixture of ponderosa pine, douglas fir, lodgepole pine, western larch; it also includes white fir, subalpine fir, and spruce. The other

fuels consist of downed and dead woody materials, brush, and grass. In FMZ 4 there are also two wilderness set-aside areas.

Treatment options for this zone include but are not limited to mechanical thinning, hand thinning, machine piling, hand piling, and pile or broadcast burning. Fuels treatments can have a longer duration of impact if there is scarification. This creates openings to mineral soil as site preparation for seeding and plantings for regeneration to the desired species distribution.

Wildland Urban Interface

Wildland Urban Interface (WUI) exists in FMZs 1 through 3. Because WUI is found in all three FMZs the WUI areas are not treated as additional, separate Fire Management Zones. Instead, the WUI component is addressed within each FMZ.

The U.S. Forest Service (USFS) defines WUI as at least one home per forty acres. Population shifts and growth are expanding homes and communities into the wildlands. WUI growth nationally is partially driven by population shifts towards the western United States. The effects of the shifts and population density also heighten the wildfire risk caused by humans; an NPS report states that “as many as 90 percent of all wildfires in the United States are caused by humans” (NPS web resource, 2017).

A significant way to reduce risks is to develop WUI fire codes. These codes could include building all new homes with more fire resistant materials for walls and roofs; require remodelers of older building to upgrade to the new building codes and use fire resistant materials; and make design changes to protect against embers lodging where they could ignite structures. Development of landscaping guides and a plant list of native, fire-resistant plants for landscaping designs would also help to protect WUI communities.

Fuels treatment in WUI areas could include mechanical thinning, hand thinning, pruning, mechanical piling or hand piling, and pile burning.

Communities at Risk

According to the current BIA Wildland Fire Prevention Plan (WFPP) there are 16 communities within the Colville Reservation. In the development of the WFPP each community was evaluated for risks from wildland fires. In the table below you can see how each community was rated.

High	Moderate	Low
#13 Roger's Bar	#7 Colville Agency	#9 Elmer City
#10 Keller*	#15 Twin Lakes*	#8 Belvedere
#14 Kewa	#3 Okanogan*	
#12 Inchelium*	#11 West Fork	
#5 Disautel*	#16 Coulee Dam	
#6 Nespelem*	#2 Omak*	
	#1Malott*	
	#4 Ft. Okanogan	

"*" Denotes communities listed on the 2001 Federal Register of Communities at Risk.

Table 1: ***Composite Community Assessment Ranking***

The above table reflects fire risks that have already been evaluated; it prioritizes the communities where resources could best be assigned for fuel reduction projects. Ground assessment work, and working with the fuels reduction group at MTFC, could get WUI fire safety projects moving with only seasonal delays.

Possible Mitigation Strategies: Wildland Fire

There is a need to bring the "Home Ignition Zone" training to the reservation. When combined with the Firewise program, it could help save homes from future fires. Much of the work needed to reduce the risk of losing homes or outbuildings can be completed in a weekend using ordinary hand tools. This needs to become an annual event before each fire season begins.

Morning air quality in Nespelem, late August 2015, during North Star Fire

Another issue is that of wildland fire smoke. The Tribe's air quality specialist is working on a "Smoke Ready Reservation" program, working with Tribal partners to reduce air pollution in the area. Working with partners allows a coordinated airshed-level approach to reducing particulates and improving air quality year round, not just during the annual fire season.

A summary of possible mitigation actions includes:

Issue	Possible Mitigation Actions
1. Inconsistent emphasis on fire prevention programs	A. Seek grant or other funding to place a full time fire prevention specialist within the CTFD. B. Seek consistent support for fire education and prevention from the BIA fire management organization C. Seek partners such as WSU extension and the Conservation District to bring Firewise and the Home Ignition Zone training to members and residents D. Conduct outreach at public events to raise awareness of wildland fire hazards and ways to protect property
2. Increase staffing level for CTFD	A. Complete conversion of former volunteers into paid-on-call employees B. Seek funding to increase firefighter shift size from two to three firefighters, to better protect lives and properties
3. Improve building permitting process to limit homes at risk in WUI	A. Consider requiring fire prevention staff to review and sign off on all permits for construction or major remodeling in WUI B. Require distribution of Firewise and/or Home Ignition Zone safety training materials during permit issuance
4. Improve interagency coordination and response to fires	A. Complete mutual aid agreements with surrounding jurisdictions

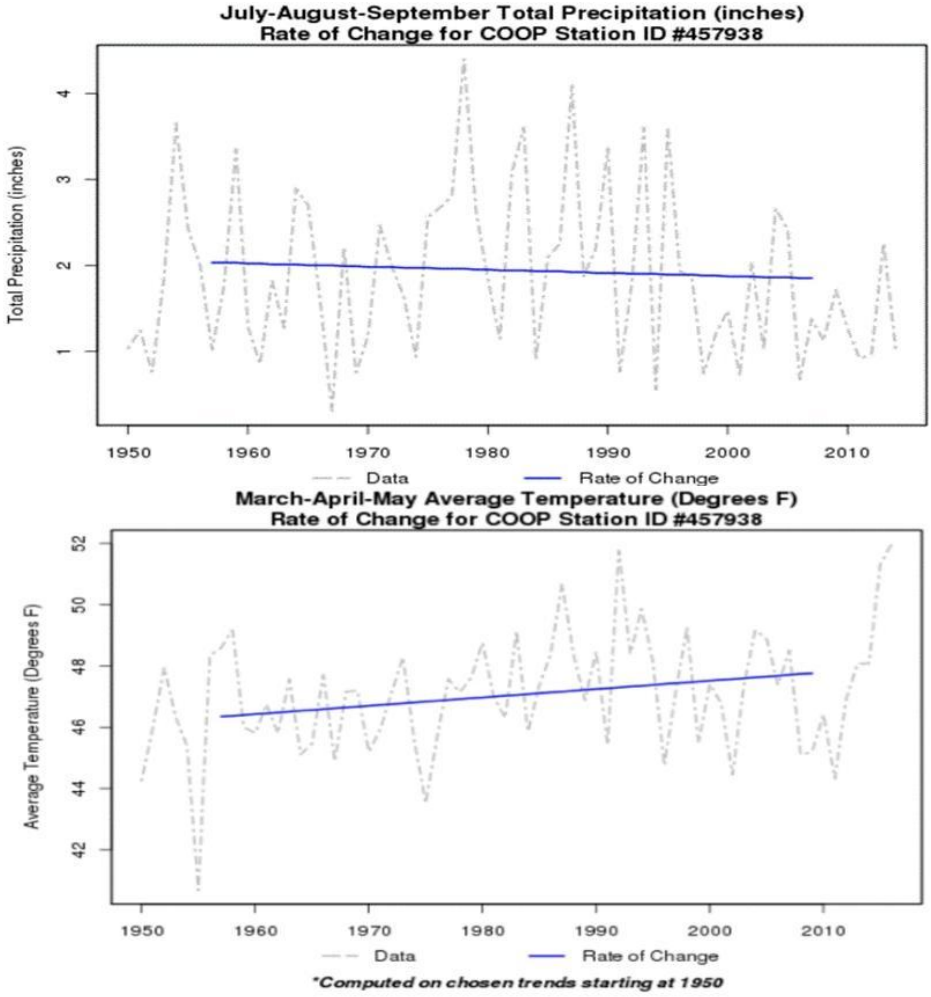
	B. Participate in the Okanogan County and Ferry County Community Wildfire Protection Plans the next time they are revised C. Conduct annual review of defensible space around every community
5. Make homes and structures more fire resistant	A. Consider changes to Tribal code requiring that new construction meet specified standards for fire resistance such as the improved attic vents, prohibiting new "shake" roofs, etc. B. Consider requiring setbacks from wood piles, sheds, and other sources that could ignite homes C. Develop list of approved Firewise building materials that will be required for new construction (including outbuildings) and for significant remodeling projects
6. Improve fire protection infrastructure	A. Replace or move flood-prone Keller fire station B. Identify garage storage at the Mission campus to store one fire apparatus filled with water, year around C. Explore funding sources and abilities to develop water sources in under-served areas, to allow fire engines to refill

14. Climate Change

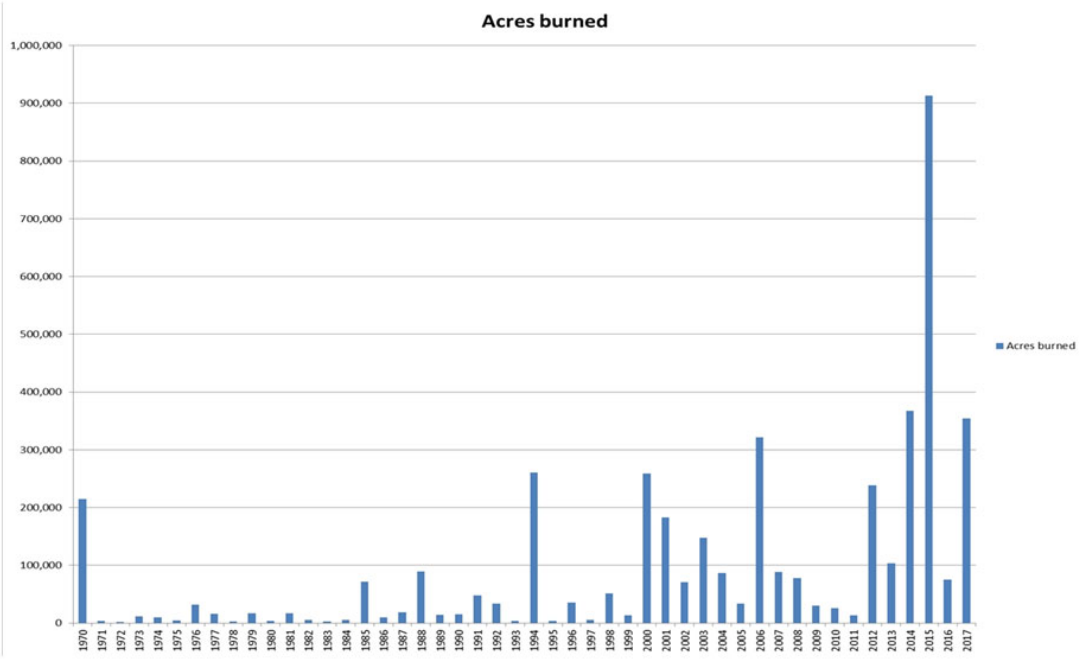
Climate change, and its potential to disrupt ecosystems and Tribal lives, is a looming threat that is currently impossible to quantify. The graphs below explain the type of change occurring now.

These graphs were copied from the NOAA-NWS "Fire Season Outlook" presentation delivered June 13th, 2018, at the annual Tribal fire season briefing. All that the graphs show is that over a

sixty year period, temperatures in Eastern Washington increased slightly during the spring and precipitation decreased slightly during the summer.



The graph below, from the same source as those above, shows the results of those two changes in terms of increased fire activity. Even without the anomalous 2015 year, the trend is clear that there is a long-term increase in the number of acres burned each year while temperatures were increasing and summer precipitation was decreasing.



The presentation concluded that there is no reason to believe that this long-term trend will stop.

Lower-elevation snowpack is now receding sooner during the season that it has in the past. Although this contributes to earlier snowmelt runoff, a corollary is that low-elevation forests are drier and ready to receive and sustain wildland fire earlier in the calendar year than in the past.

These are not the only documented changes. Between the mid-20th century and 2006, the snowpack in the Cascades range decreased by 15% to 35%. Over the time period from 1948 to 2002, 66% of snowmelt-dominated stream runoff shifted at least three days earlier into the season (Case, 2017). This results in warmer and shallower waters that may interfere with anadromous fish runs, such as the summer-run sockeye salmon.

During the 2015 drought year, there was in fact a much-increased mortality for the summer sockeye salmon run in July. An estimated 98% of all Okanogan River sockeye salmon died before they could spawn that summer (Case, 2017). In addition, there was a large die-off of sturgeon broodstock, presumably from the high heat and low dissolved oxygen levels that affected other species.

In 2013, the University of Washington Climate Impacts Group (CIG) released a “State of Knowledge Report” entitled “Climate Change Impacts and Adaptation in Washington State.”

Although projections can—and have been—made about future temperatures and rainfall changes, they are not yet fact. They are cause for concern, because:

- Changing climate could cause changes in plant succession, in both disturbed areas and in natural environments.
- Culturally significant species of plants, both food and medicinal, could decrease their range and be less common.
- Insect pests may proliferate with higher mortality for trees, changing the mix of forest species. These could include pine and other tree-killing beetles, spruce budworm, Douglas fir needle midge, etc.
- Plant diseases could spread due to warmer winter temperatures. These could include blister rusts, root rot, and the spread of parasitic plants such as dwarf mistletoe.
- If there is more winter precipitation and runoff, it may increase sedimentation. This could affect fish spawning, require culvert replacement with large culverts, cause damage to roads as well as to private improvements, damage buried utility lines, and more.
- Drought and dry soils may increase erosion, which will end up in streams and culverts. Soils may also be lost through dust storms.
- Lower water levels in streams and rivers, and higher water temperatures, may increase fish mortality during spawning runs. They may also increase the mortality of non-migrating fish.
- If the graphed trends above continue, there will be more wildland fires. There may be additional expense to keep cheatgrass and other noxious weeds from taking over newly damaged and opened lands before trees and other native species can be replanted.

The CIG also reported that the growing season in the Pacific Northwest has become longer.

One of the most significant issues relating to climate change is documenting that something has changed. Anecdotal information, and stories, may be useful to help identify what needs to be examined, but they are not the same as hard data documenting that a change is underway or has occurred. The various CIG reports clearly indicate that climate change is occurring, but they neither identify nor quantify all of the consequential changes that occur along with climate change.

The Tribe is heavily dependent upon revenue from Tribal forests. The CIG identifies that increasing wildfires, insect outbreaks, and tree diseases will result in increased “forest mortality” and a long-term change in “forest landscapes” (Snover, 2013, page ES-6). Climate

change with Tribal forests may affect not just Tribal government revenues, but private sector employment in the logging and timber industry as well. The socio-economic impacts of such a change could be significant.

Unanswered questions, that need answers in order to be able to craft a coherent climate change adaptation strategy, include:

- What will invasive species and noxious weeds do to the fire regime? Will they contribute to more fires that will limit or destroy the availability of traditional cultural, medicinal, or food plants?
- To what extent will plant succession change with climate change?
- Will medicinal or cultural plants remain available, or will hotter and dryer summers reduce their numbers and range?
- Has there been a change in the distribution or availability of traditional food plants, such as roots and berries?
- Will vegetation (biomass) be lost due to dryer and hotter summers? Will that expose cultural or archeological sites to disturbance or vandalism?
- Will habitat for rare, threatened, and endangered species be disrupted and become no longer suitable for those species?

Possible Mitigation Strategies: Climate Change

Here is a summary of possible mitigation actions for this hazard:

Issue	Possible Mitigation Actions
1. Conduct research to identify changes in plant distribution/availability of culturally significant plants	A. Collect and assess Traditional Ecological Knowledge (TEK) from Tribal elders and records, identifying locations of sites that can be identified and assessed for change over time B. Use TEK to determine whether, and to what extent, gathering seasons may have changed over time C. Establish a seed bank for traditional foods and medicinal plants D. Seek funding to research methods for mass cultivation of culturally significant

	plants in nurseries, for additional seed or to plant as seedlings E. Seek funding to determine which plant species most need assistance to retain a viable population distribution on the reservation
2. Spawning fish are and will be exposed to higher temperatures and shallower water, causing higher mortality.	A. Explore possibilities of extra water releases from tributary dams (such as Conconully Dam) or other dams to keep water temperatures below 20 degrees C during spawning runs B. Explore possibilities of creating cold water refugia for migrating salmon along their migration route, to improve spawning success rates C. Search for other methods to improve spawning success of anadromous fish
3. Climate change may disrupt traditional hunting and gathering practices, by: ---changing seasonal food gathering times, leaving members out of step with the traditional yearly calendar --relocation or loss of traditional gather sites as plant species redistribute to more suitable microclimates --migration of animal species to higher altitudes due to heat, or to wetter locations, or off reservation, disrupting hunting practices	A. Set up a monitoring program for cervids and other harvested species to monitor whether they change current seasonal migration patterns B. Conduct plant transit studies to confirm whether, or where, the distribution of plant species is changing C. Conduct research on whether significant plant species can be replanted in former areas, or in new microclimates
4. Climate change may affect fire regimes and, due to rainfall and river changes, slope stability	A. Seek funding for research to determine if Tribal zoning should change, to restrict usages that might be at enhanced risk due to changing vegetation conditions or river flows

5. Increase resilience of transportation infrastructure as climate change precipitation increase may damage roads	A. Find funding to improve culvert and other drainage capacities to deal with increased runoff B. Seek funding for road stabilization in areas where increased runoff may cause damage, or to relocate roads instead of repairing them repeatedly as runoff increases

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Chapter 5: Supporting Documentation

A. Plan Adoption

1. Colville Business Council Resolution to adopt HMP
2. FEMA Acceptance Letter

B. Planning Documentation

1. Planning Committee and Stakeholder Documentation
2. Public Meetings: Announcements, Invitations and Attendance Sheets
3. Timeline of Planning Committee HMP Activities (Summary)
4. Slide Presentation at Public Meetings
5. Survey Results
6. "Heat Map" Exercise Results

C. Plan Updates and Maintenance

D. Hazard Summary Worksheet with Rating Criteria

E. Links to Risk Maps

F. Glossary

G. Literature Cited and Selected Sources

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A. Plan Adoption

1. The Colville Business Council resolution to adopt the Hazard Mitigation Plan is included on the following pages, which do not have HMP page numbers assigned.

By adoption of this plan, the Tribe agrees that it will comply with all applicable Federal statutes and regulations with respect to the periods for which it receives grant funding. This includes the uniform grant guidance found in Title 2 CFR Parts 200 and 3002. The Tribe agrees that it will amend this plan as necessary to reflect changes in Tribal or Federal laws and statutes, as required by Title 44 CFR § 201.7(c)(6).

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2. FEMA Acceptance

The FEMA Region X letter accepting the Tribe's Hazard Mitigation Plan is included on the following page(s), which do not have HMP page numbers assigned. A reproduction of the commitment letter from FEMA Region X, to approve the plan upon adoption by the Tribe, is below.

U.S. Department of Homeland Security
FEMA Region 10
130 228th Street, SW
Bothell, Washington 98021

FEMA

November 16, 2018

The Honorable Chairman Rodney Cawston
Colville Business Council
The Confederated Tribes of the Colville Reservation
P.O. Box 150
Nespelem, Washington 99155

Dear Chairman Cawston:

The Federal Emergency Management Agency (FEMA) Region 10 completed a pre-adoption review of the draft *Confederated Tribes of the Colville Reservation Tribal Mitigation Plan*. The attached Mitigation Plan Review Tool documents the Region's review and compliance with all required elements of 44 Code of Federal Regulation Part 201.7. This letter serves as Region 10's commitment to approve the plan upon receiving documentation of its adoption by the tribe.

Formal adoption documentation must be submitted to FEMA Region 10 within one calendar year of the date of this letter, or the entire plan must be updated and resubmitted for review.

Please contact Tamra Biasco, Risk Analysis Branch Chief, at (425) 487-4645 or tamra.biasco@fema.dhs.gov with any questions.

Sincerely,

Tamra Biasco
Risk Analysis Branch Chief

Enclosure

cc: Tim Cook, Washington Emergency Management Division

AS:rg

RECEIVED
11-27-18

www.fema.gov

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

FEMA

DEC 13 2018

The Honorable Chairman Rodney Cawston
Colville Business Council
The Confederated Tribes of the Colville Reservation
PO Box 150
Nespelem, Washington 99155

Dear Chairman Cawston:

Congratulations, on December 13, 2018, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) Region 10 approved the *Confederated Tribes of the Colville Reservation All Hazards Mitigation Plan* as a Tribal Mitigation Plan, in accordance with Code of Federal Regulations Title 44 Part 201.

An approval provides the Confederated Tribes of the Colville Reservation eligibility to apply directly with FEMA for Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) programs, i.e., Pre-Disaster Mitigation project grants, Public Assistance (Categories C-G), Fire Management Assistance and Hazard Mitigation Grant Program (HMGP) projects through December 12, 2023. Recipients are required to develop and maintain hazard mitigation plans compliant with FEMA standards as a condition for receiving funds. To continue eligibility, within five years from date of this letter, tribes must review, revise as appropriate and re-submit plans for approval. For further assistance on hazard mitigation planning, please contact our Risk Analysis Branch Chief, Tamra Biasco, at (425) 457-6959.

FEMA's approval of your plan as a Tribal Mitigation Plan provides the Confederated Tribes of the Colville Reservation eligibility to apply for various Stafford Act programs. FEMA evaluates applications for funding according to the specific requirements of the applicable program. A mitigation action identified in the plan may, or may not, meet a program's eligibility requirements. For assistance with hazard mitigation grant funding, please contact Hazard Mitigation Assistance Branch Chief, Kristen Meyer, at (425) 487-4749.

We look forward to continuing a productive relationship between FEMA Region 10 and the Confederated Tribes of the Colville Reservation. Our Regional Tribal Liaison, Erin Ward, at (425) 487-4567, is available to facilitate this relationship and delivery of our programs. You are also welcome to contact me directly, at (425) 487-4604.

Sincerely,

Michael F. O'Hare
Regional Administrator

Enclosures

cc: Tim Cook, Washington Emergency Management Division

RECEIVED
12.19.18
DRellatant

www.fema.gov

B. Plan Development

1. Planning Committee and Stakeholder Documentation

The Tribe was notified informally, in early 2015, that it was a selectee for the Pre-Disaster Mitigation Grant (PDMG) that it had applied for in 2014. The purpose of the grant application was to obtain funding for the preparation of the Tribe's first Hazard Mitigation Plan.

Formal notification of the grant award was received on May 12, 2015. The planning committee began with the three employees involved in applying for the Pre-Disaster Mitigation Grant that partially funded the HMP project: Randy August, Emergency Planner; Chris McCuen, Emergency Manager and Commander of EMS/Fire/Rescue; and Kwis Logan, Public Safety Grants Manager. Randy August was assigned as the lead for HMP preparation, a position he held for the duration of the project.

Del Ostenberg, at that time the supervisor for Tribal OSHA, was the next addition to the planning team. Personnel changes and workloads left a core planning group consisting of then-Public Safety Director Larry Robinette, TOSHA supervisor (later Emergency Manager) Del Ostenberg, then-Chief of Police Mike Henry, and Emergency Planner Randy August preparing for the public outreach section effort scheduled for the Fall of 2016.

The planning committee defined the "public" for whose primary benefit the HMP was being prepared as the enrolled members of the Confederated Tribes of the Colville Reservation; and the "public" includes all others who reside within, work within, or traverse the Colville Reservation.

The worksheet on the following two pages was adapted from the FEMA Multi-Hazard Mitigation Planning Guide, specifically from the Planning Process Worksheets found in Appendix A.

Mitigation Planning Team Worksheet

- **Planning Team** – The core group responsible for making decisions, guiding the planning process, and agreeing upon the final contents of the plan
- **Stakeholders** – Individuals or groups that affect or can be affected by a mitigation action or policy

Note: A forward slash between names indicates a transition from one team member or stakeholder to a successor

Partner Organization	Planning Team	Stakeholder	Notes
Local Agencies			
Emergency Management, Public Safety Division	X		Randy August, Emerg. Planner
EMS/Fire/Rescue Department, Emergency Manager	X		Chris McCuen/Del Ostenberg
Colville Tribal Police Chief	X		Mike Henry/Dustin Best
Public Safety Director	X		Larry Robinette/Debra Wulff
Public Safety Grants Manager	X		Kwis Logan
Tribal Fish & Wildlife-Climate Change Steering Committee	X		Mike Sanders, Coordinator
Tribal Health Emergency Preparedness Coordinator	X		Bill Joseph/Amber Seymour
Tribal Occupational Safety and Health Supervisor	X		Del Ostenberg /Brian Quill
Building Code Enforcement			n/a [part of Tribal public works]
Colville Indian Housing Authority		X	Doug Marconi, Director
Environmental Trust Department, Director		X	Gary Passmore/Amelia Marchand
Floodplain Administrator/Response Program Mgr.		X	Todd Thorn
Water Resources Analyst		X	Elizabeth Wright
Geographic Information Systems Specialist		X	Alex Besemann
Historian		X	E. Richard Hart
Natural Resource Enforcement Chief		X	Henry Hix
Planning/Community Development (CEDS) , Planner		X	Ernest Rasmussen
Planning, Land Use and Shoreline Administrator		X	Pete Palmer
Public Works Director		X	Randy Marcellay
Public Works—Tribal Water and Sewage Supervisor		X	Ron Toulou
Department of Transportation -Director		X	John Clark
Okanogan County Planning Department Director		X	Perry Huston
Ferry County Planning Department Director		X	Leah Vanderstoep/M. Kalinowski
Okanogan County Emergency Manager		X	Maurice Goodall
Ferry County Emergency Manager		X	Amy Rooker
Local Emergency Planning Committee		X	Ferry and Okanogan EM's, above
All Cities/Towns within Reservation		X	All invited; Nespelem commented

Partner Organization	Planning Team	Stakeholder	Notes
Special Districts and Authorities			
Fire Districts—Five were invited		X	Invited, none participated
Colville Reservation Conservation District		X	Jackie Richter
Okanogan County Conservation District		X	Invited, participated
School District(s)—All seven were invited schx		X	Five did not respond; see below
Lake Roosevelt School		X	Paul Turner, Superintendent
Paschal Sherman Indian School		X	Tami Hickle, Superintendent
Transit Authority—Tribal DOT, see above			n/a
Utility Districts—Inchelium Water and Sewer District		X	Invited, did not participate
WSU Extension, Colville Reservation and Republic		X	Invited, both offices participated;
WSU Extension, continued:			Dan Fagerlie & Linda McLean
Non-Governmental Organizations			
American Red Cross		X	Provided preparedness grant
Utility Companies—All four on the reservation were invited		X	None participated
Large Employers: Omak Wood Products (OWP)		X	Yancy Epperson for OWP
Gebbers Farms		X	Invited, did not participate
Colville Tribal Federal Corporation		X	Invited, did not participate
State Agencies			
Washington State Emergency Management Division		X	Invited, remote participant
Washington State Patrol		X	Invited, did not participate
Federal Agencies			
Bonneville Power Administration		X	Invited, did not participate
Bureau of Indian Affairs		X	Debra Wulff
Bureau of Reclamation		X	Invited, did not participate
Indian Health Service, Colville Service Unit		X	Colleen Cawston
National Weather Service		X	Katherine Rowden
U.S. Army Corps of Engineers		X	Invited, did not participate

Reviewers:

The following individuals either volunteered to participate in this project during the scoping session held November 9, 2018, or later served as reviewers for part or all of the HMP.

Signed up to participate, November 9, 2016:

- Dan Fagerlie, WSU Extension-Ferry County, for wildland fire, disease, and climate change issues;
- Don Hurst, then-Response Program Manager, ENV, for hazardous materials/water quality issues;
- Amelia Marchand, Water Regulatory Specialist, ENV, for climate change issues;
- Pete Palmer, Land and Shoreline Use Administrator, Planning Department, for epidemic/pandemic issues; and
- Michelle Smith, Fish and Wildlife, for unspecified issues.

Reviewers in addition to those listed above:

Russell Boyd, IT
Sev Carden, IT
Damon Day, IT
Glennis DeCloedt, IT
E. Richard Hart, Historian
Henry Kuehne, Forestry
Patricia Laramie-Brooks, Training and Organizational Development
Scott Lilly, IT
Jim Nanamkin, Emergency Management
Val Palmer, IT
Sheri Sears, Fish and Wildlife
Jane Smith, Court Administrator
Elizabeth Wright, Environmental Trust

2. Public Meetings, Announcements, Invitations, and Attendance Sheets

The first public meeting concerning the HMP was held at the Nespelem Community Center on October 8, 2016. A booth was set up at the Tribe's annual General Membership Meeting. The number of flyers distributed was not recorded. Forty-six people received HMP surveys, and eighteen were returned that day; sixteen people signed in at the informational booth.

The flyer distributed that day, and the sign-in sheet, follow.

The Confederated Tribes of the Colville Reservation

EMS, Fire, and Rescue
P.O. Box 150, Nespelem, WA 99155
Office: (509) 634-2440

Hazard Mitigation Planning

The Colville Tribes have received a FEMA grant to prepare a Hazard Mitigation Plan for the Reservation. This planning effort has three goals:

Identify natural and technology-based hazards/threats to the health and safety, cultural heritage, and property of members and residents;

Identify ways to minimize those risks; and

Make the Confederated Tribes eligible for pre-disaster mitigation grants, which are only available once a Hazard Mitigation Plan (HMP) has been completed and accepted by FEMA.

The planning effort will kick off with a meeting at the Lucy Covington Government Center on Wednesday, November 9th, beginning at 1 p.m. in the events center. All are welcome to participate in the initial scoping meeting. For those who cannot come to this kick-off meeting, individual sessions will be scheduled within each district during November to make sure that everyone has a chance to be heard.

A survey form will be available at the meetings to help the planning effort. It can be handed in at any of the meetings or sessions, or can be faxed or e-mailed to the coordinator.

The draft HMP is expected to be ready for public comment by April 2017. After comments are received and revisions made, the plan will be forwarded to FEMA by August 2017.

For further information, please contact the coordinator for this project, Randy August, at randy.august2@colvilletribes.com or by phone at (509)634-2134.

The managers responsible for this project can be reached at the e-mail addresses below:

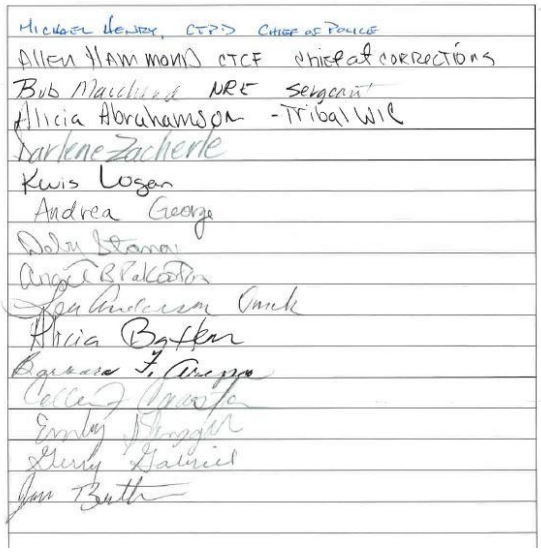
Larry Robinette
Public Safety Director
larry.robinette@colvilletribes.com

Del Ostenberg
Commander, Emergency Management Services/Fire/Rescue
del.ostenberg@colvilletribes.com

Participation Log
Colville Tribal Hazard Mitigation Plan--Informational Session

Date: 10/8/16

Location: NESPELEM C.C. / MEMBERSHIP MTNG (ANNUAL)



The next public outreach was the HMP Kickoff and Scoping Meeting, held on November 9, 2016, at the Tribal administration building. This meeting was announced through an article published in the Tribe's newspaper, the Tribal Tribune; through a Tribal e-mail broadcast, with a reminder sent again the morning of the meeting; and through emails to specific invitees.

TRIBAL TRIBUNE
VOLUME 42, ISSUE 44 • FRIDAY, OCTOBER 28, 2016

Join us for Hazard Mitigation Planning in each district

Attached is an announcement for the kickoff meeting--November 9th at 1 p.m. at the government center-- for the drafting of the Reservation-wide Hazard Mitigation Plan. Anyone with an interest in emergency planning is welcome to attend and to provide input.

A Hazard Mitigation Plan is an attempt to identify, and mitigate, disasters or other threats to the members, residents, and their way of life on the Reservation. Participants at each meeting will be asked to complete a survey and to help set priorities for the plan.

For those who cannot be there on this date, but would like to help shape the Tribal plan, public meetings will be held in each district. The dates, times, and locations are:

· Nespelem District: Tuesday, November 15th, from 6 to 8 p.m., in the conference room at the Tribal Courts building at 22 Schoolhouse Loop Road. Please enter from the side parking lot.

· Inchelium District: Thursday, November 17th, from 6 to 8 p.m. at the Senior Meal Site. (This location is not yet confirmed and may be subject to change.)

· Omak District: Monday, November 21st, from 6 to 8 p.m. at the Senior Meal Site.

·Keller District: Tuesday, November 29th, from 6 to 8 p.m. at the Keller Community Center.

If you have any questions about these meetings, please contact me by email or through one of the telephone numbers below.

Respectfully,
Randy August, Emergency Planning
Colville Tribal EMS, Fire, and Rescue
Desk: 509-634-2134

Randy August (PSD)

From: Broadcast
Sent: Thursday, October 20, 2016 8:25 AM
To: FromAdmin
Subject: Hazard Mitigation Planning
Attachments: HMP Announcement.pdf

From: Randy August (EMS)
Subject: Please Broadcast: Hazard Mitigation Planning

Attached is an announcement for the kickoff meeting--November 9th at 1 p.m. at the government center-- for the drafting of the Reservation-wide Hazard Mitigation Plan. Anyone with an interest in emergency planning is welcome to attend and to provide input.

A Hazard Mitigation Plan is an attempt to identify, and mitigate, disasters or other threats to the members, residents, and their way of life on the Reservation. Participants at each meeting will be asked to complete a survey and to help set priorities for the plan.

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- Inchelium District: Thursday, November 17th, from 6 to 8 p.m. at the Senior Meal Site. (This location is not yet confirmed and may be subject to change.)
- Omak District: Monday, November 21st, from 6 to 8 p.m. at the Senior Meal Site.
- Keller District: Tuesday, November 29th, from 6 to 8 p.m. at the Keller Community Center.

If you have any questions about these meetings, please contact me by email or through one of the telephone numbers below.

Respectfully,

Randy August, Emergency Planning
Colville Tribal EMS, Fire, and Rescue

Desk: 509-634-2134
Cell: 509-634-6420

Randy August (PSD)

From:	Randy August (EMS)
Sent:	Friday, October 21, 2016 2:06 PM
To:	'townofnespelem@centurylink.net'; 'dcarriere@usbr.gov'; 'cwsmith@usbr.gov'; 'danb@okpud.org'; 'johng@okpud.org'; 'tribalaffairs@bpa.gov'; 'pturner@gcdsd.org'; 'mherndon@gcdsd.org'; 'llakin@gcdsd.org'; 'yancy.epperson@[redacted] 'johnm@colvillecasinos.com'; 'brettb@ctecorp.org'
Cc:	Larry Robinette; Del Ostenberg (EMS)
Subject:	Invitation to Participate: Colville Tribal Hazard Mitigation Planning
Attachments:	HMP Announcement.pdf

You are invited to participate in a kick-off and scoping meeting for the preparation of a Hazard Mitigation Plan (HMP) for the Colville Indian Reservation. The announcement for that meeting is attached.

Local officials from all levels of government, whether town, city, county, fire or other district, as well as State and Federal agencies with a presence on the Reservation are welcome to participate and provide input. Local utility providers, schools, employers, and non-government organizations are also welcome.

The Tribal HMP is not intended to replace or conflict with the existing Okanogan County or the pending Ferry County plans. The four incorporated towns and cities within the Reservation are already covered by the Okanogan County HMP. This is an opportunity for those jurisdictions, along with every other interested party, to raise concerns not addressed under those plans or which may need to be addressed in more detail in the Tribal plan. We are particularly interested in addressing the hazard mitigation needs of all schools within the Reservation.

If you are able to attend, your involvement would be greatly appreciated. If you are not able to attend this meeting, but would still like to participate in person, an additional public meeting is being held in each Tribal district. They are scheduled for:

- Nespelem District: Tuesday, November 15th, from 6 to 8 p.m., in the conference room at the Tribal Courts building at 22 Schoolhouse Loop Road. Please enter from the side parking lot.
- Inchelium District: Thursday, November 17th, from 6 to 8 p.m. at the Senior Meal Site. (This location is not yet confirmed and may be subject to change.)
- Omak District: Monday, November 21st, from 6 to 8 p.m. at the Senior Meal Site next door to the Omak Community Center.
- Keller District: Tuesday, November 29th, from 6 to 8 p.m. at the Keller Community Center.

Please contact me by e-mail or by telephone if you would like more information about the purpose and scope of the Tribal Hazard Mitigation Plan.

Respectfully,

Randy August, Emergency Planning
Colville Tribal EMS, Fire, and Rescue

Desk: 509-634-2134

Note: a private e-mail address was partially redacted, above, to protect personal privacy. All other e-mails are for organizational addresses. This is the final of three mass e-mail invites sent on October 20 and 21, 2016.

Below is the sign-in sheet for the HMP Kickoff and Scoping Meeting on November 9, 2016.

Participation Log

Colville Tribal Hazard Mitigation Plan--Informational Session

Date: November 9, 2016

Location: Government Center

	Tribal Employee? Y/N
Michelle Smith	F&W (Y)
Brandon Sutton	MTEC Y
I. Cawston	MTEC - N
Del Ostenberg	EMS Fire & Rescue
Michael Henry	CTPD COP (Y)
Frank B. Andrews Jr.	CCT Planning
Don Hurst	ETD
Connie Davisson	Planning
Dan Fagerlie	CCT WSU Extension
Dorene Kuehne	TANF
Todd Thorn	ETD
Pete Palmer	Planning
Phillip Bearcub	Planning
Amelia Marchand	ETD
Paul Turner	OCRSO (NO)
Douglas Marconi Jr	ETD
Darren Cawston	PW
Shawn Christianson	FAC MGR

The next public meeting was the Nespelem District meeting on November 15, 2016, at the Tribal courts conference room. Only one member of the public appeared and signed in.

Participation Log
Colville Tribal Hazard Mitigation Plan--Informational Session

Date: 11/15/16

Location: NESPELEM – COURTS BUILDING

Deb Ostenberg
Brian Timentwa

The Inchelium District public meeting was held November 17, 2016, at the Senior Meal Site.

Participation Log
Colville Tribal Hazard Mitigation Plan--Informational Session

Date: 11/17/16

Location: INCHELIUM SENIOR MEAL SITE

Jesse Schumacher
Stephanie Schumacher

The Omak District public meeting was held November 21, 2016, at the Omak Senior Meal Site. This was the only district meeting at which there was any interest in the "heat map" exercise, and all five attendees who signed in participated. One attendee did not sign in or participate.

Participation Log
Colville Tribal Hazard Mitigation Plan--Informational Session

Date: 11/21/16

Location: OMAK SENIOR MEAL SITE

~~D.C. Pearson~~	OFP
Stewart Smith	OFP
Xavier Ostenberg	
Maddie Goodall	OK DEM
C. McCown	M&J CONS.

The final district meeting was at the Keller Community Center. Because the turnout for previous meetings was so low, extra effort was made to obtain participants; notices were posted at both the Keller Community Center and the Senior Meal Site. However, no one showed for the session.

Participation Log
Colville Tribal Hazard Mitigation Plan--Informational Session

Date: 11/29/16

Location: KELLER CC

On October 16, 2018, following the bi-weekly public safety division's manager's meeting, all participants were asked to stay late for a review of the just-completed first draft of the HMP. Participants included Susan Murray and Joseph Kaufman, from the FEMA field office at the reservation (for disaster 4384-DR-CTCR). The sign-in sheet has been lost, but there were approximately ten Tribal employees in attendance; the review and comment session lasted almost two hours.

On October 19, 2018, an informational booth was set up at the Tribe's annual General Membership meeting in Omak. A handout was distributed to those who visited the booth, providing information about the HMP and the public comment period. Seventy-two of the handouts were distributed, along with fifteen copies of the draft HMP. Only eighteen persons signed in to show that they had visited the booth.

10/19/18

HAZARD MITIGATION PLAN

Eric Ferguson
Reggie Atkins
Doreene E Lezard Omak
[illegible]
Julie Cleveland
Ken Cleveland
Linda Palmer
Brian Nanamkin
Isaac Quintasket
Diane V. Aiken
Darlene Ermining
Tesla Gorr
Devcy Epperson
Samaria Camel
Larissa Jack
Russell Boyd
Josh Nanamkin
Henry Kuehne

Below is the handout that was distributed at the October 19, 2018, meeting.

The Confederated Tribes of the Colville Reservation

OFFICE OF PUBLIC SAFETY
21 Colville Street
Nespelem, WA 99155-0150

HAZARD MITIGATION PLAN

Comments Welcome!

The draft Hazard Mitigation Plan is now out for review and comments. Please submit any comments you may have by the close of business on Friday, November 2nd.

The plan can be found on the Tribal website, on the Emergency Management page, at:

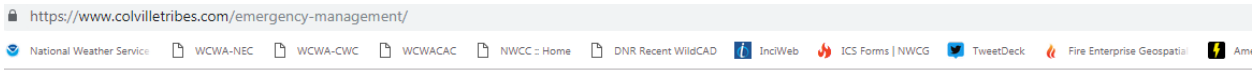
https://www.colvilletribes.com/emergency-management/

Why comment?

The plan addresses what the proposed strategy is for lessening the impact of disasters, whether from flood, fire, or from a once-in-a-century event. You may have a better idea, or you may spot something that we've missed.

Please send any comments you may have by e-mail to randy.august2@colvilletribes.com or by mail to him at the Public Safety office. Please submit any comments by Friday, November 2nd, 2018.

A link to the draft plan, with a request for comments, was published to the Tribal website on October 19, 2018. A screen capture of that web page follows.



Click here for the draft of the Tribe's Hazard Mitigation Plan. This is a plan required by FEMA before the Tribe is eligible for certain emergency management grants. It talks about ways to prepare for disasters, and ways the Tribe can soften the impact of any future disasters.

All of us in Emergency Management would like to receive any comments you are willing to submit on this plan. If we left something out, or got something wrong, please tell us so we can fix it.

It is more than 100 pages long. If you don't want to read it all, choose a section that interests you---wildland fire, earthquake, or something else—and send us comments about whatever section is most important to you.

Please submit any comments by the close of business on Friday, November 2, so we can review and incorporate them before this plan moves to the next stage.

On November 7, 2018, the planning team's lead and three other team members briefed the Law and Justice Committee of the Colville Business Council about the plan. Paper copies of the draft were provided to council members. The committee chairman, and the members present, concurred that when the plan was ready for Council approval it could be presented to them through the expedited "emergency" process rather than the standard procedure.

3. Timeline of Planning Committee HMP Activities (Summary)

This timeline was created from pre- and post-meeting or activity emails, and from notes maintained by the planning committee leader over the course of this project.

March 6 2015	Planning team lead exchanged multiple e-mails with Dan Fagerlie, WSU-Extension, to collect data for HMP
May 12 2015	E-mail notification of receipt of PDMG grant award
June 18 2015	Riskmap outreach, FEMA Region X, for preparation of updated flood risk maps
August 2015	Catastrophic wildfires afflict reservation, presidential disaster declaration issued; bulk of planning team lead's time tied up with disaster processes through July 2016
January 29 2016	Public Safety Director Larry Robinette joins HMP planning committee
February 3-4 2016	Emergency Planner attended FEMA G-318 course on HMP preparation
February 9-10 2016	BAER/EWP meetings, on post-fire flood damage mitigation
March 14 2016	Firewise meeting with MTFC, WSU Extension, Conservation District, EM, and other stakeholders; first meeting in a series ending with demonstration project in early summer 2016
March 21 2016	Planning team lead met with Chief of Police Mike Henry on HMP
May 4 2016	Emergency Preparedness Meeting/HMP discussion
May 16 2016	Emergency Preparedness meeting/HMP discussion
May 26 2016	Climate change steering committee meeting to coordinate that planning effort with HMP

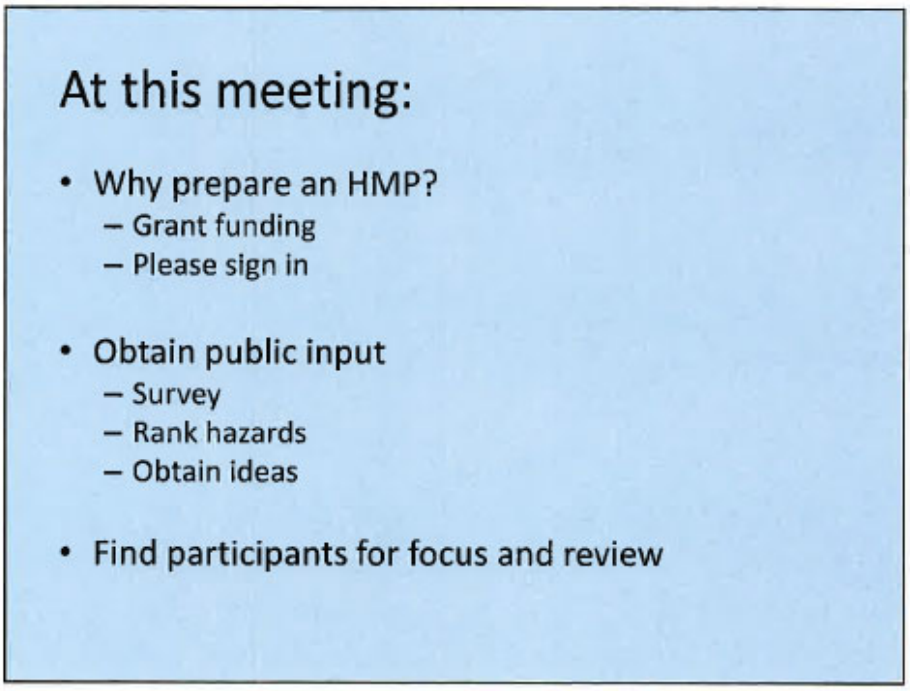
June 21 2016	First meeting held on communications resiliency. Six meetings documented over next 14 months, concerning land mobile radios and internet issues
August 25 2016	Climate change steering committee meeting; HMP discussion
September 1 2016	Climate change steering committee meeting; Public Safety Director Larry Robinette took part in webinar on upgrading HMPs to address climate change
October 8 2016	HMP flyers distributed at annual Tribal General Membership Meeting, Nespelem. The flyers invited members to come to the November 9 HMP kickoff meeting as well as to the four subsequent meetings, one of which was scheduled for each Tribal district. First distribution of HMP survey
October 18 2016	Outreach to Gebbers Farms, no response; outreach to CTFC, no response
October 19 2016	ENV meeting on septage and clean water issues for HMP
October 20 2016	Tribal Broadcast to all Employees, and to BIA, inviting participation at November 9 HMP scoping session and district meetings
October 20-21 2016	Sent invitation via email to all cooperators and interested parties including school districts, fire departments, law enforcement agencies, Mayors, utilities, and major employers
October 20 2016	ENV meeting on spills and risks to Tribal lands/resources, HMP discussed
October 25 2016	Climate Change Conference, Northern Quest, risks to Tribal lands
October 28 2016	Newspaper “Tribal Tribune” published announcement of HMP kickoff meeting and scoping session, and of the four subsequent public meetings
November 9 2016	HMP kickoff meeting and scoping session, held in the auditorium at the Tribal Government Center. Eighteen people participated. Meeting opened with a brief presentation explaining the HMP and how scoping would be conducted.

November 14 2016	Meeting with public safety director about HMP progress
November 15 2016	Public Meeting, Nespelem; one person attended.
November 17 2016	Public Meeting, Inchelium; two persons attended.
November 21, 2016	Public Meeting, Omak; five persons attended.
November 29, 2016	Public Meeting, Keller; no one attended.
February-May 2017	Worked towards RFP for landslide risk assessment and floodplain mapping
February 15 2017	Survey sent out via broadcast email to employees
February 14 2017	Meeting with Public Safety Director Deb Wulff, Grants Manager Kwis Logan, Accounting Manager Erica DeLeon, and Emergency Planner Randy August concerning grant management and progress on the HMP
March 30 2017	Meeting with Okanogan CO Planning on HMP issues
March 31 2017	HMP Webinar
April 4 2017	Meeting with Ferry CO Planning on HMP issues
April 3 2017	Okanogan County meeting with Pete Palmer (planning), Chief of Police Mike Henry, and Emergency Planner concerning 911 addressing on the reservation; hazard mitigation issue, especially as pertains to fire response and evacuation.
April 13 2017	Colville Business Council approves modification of grant SOW to allow contracting out a landslide risk assessment
April 25 2017	Emergency Planner and DOT Director John Clark meet about flood mitigation relating to transportation issues after public safety meeting.
June 1 2017	Landslide risk project not feasible; four bids scored, none acceptable or within available funding.

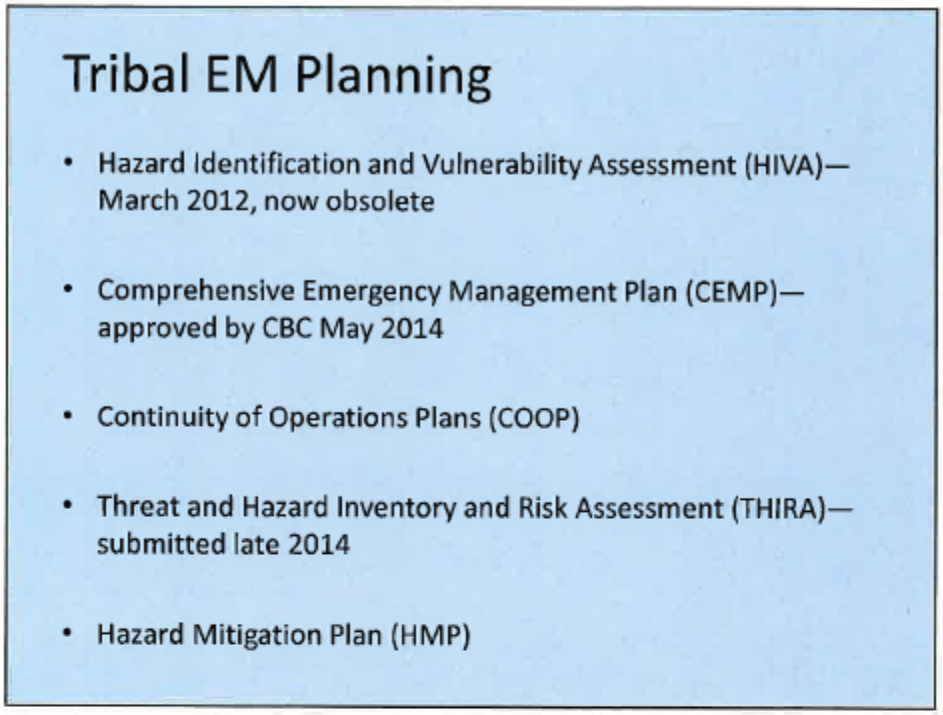
August 24 2017	Climate Change Steering Committee meeting, HMP discussed
November 2017	Planning Team lead on leave of absence until end of February 2018; completed 28 pages of HMP working part time while on leave
February 2018	Planning Team lead had multiple e-mail and phone contacts about flood risk mapping with FEMA Riskmap contractors and ENV
March 15 2018	Planning Team lead met with IT staff on cybersecurity issues for HMP
March 26 2018	Planning Team lead met with IT staff on cybersecurity issues for HMP
March-April 4 2018	Planning team lead had multiple contacts with public works staff about water and sewage treatment issues for HMP
April 3 2018	Meeting on street numbering and marking systems to mitigate emergency response issues: participants included Tribal Health, IT, EMS/Fire/Rescue, Emergency Management, Planning Department, CIHA
April 5 2018	Climate Change meeting, auditorium; HMP issues discussed
April 9 2018	Planning Team lead met with Ferry County Sheriff and Emergency Manager about HMP
September 10 2018	Planning Team lead met with Senior Planner for Community Economic Development Strategy, to integrate HMP issues into economic planning
October 16 2018	Draft HMP presented to Public Safety staff for review and comments. FEMA staff present. Attendees included Natural Resources Enforcement, Public Safety, Emergency Management, Prosecutor's and Public Defender's staff.
October 19 2018	Notice published in Tribal Tribune of two-week public comment period for draft HMP, with link to draft HMP posted on Tribal website. Table set up at Tribe's annual General Membership Meeting; 72 flyers distributed asking for comments, and 15 copies of the draft HMP were distributed. Eighteen persons signed in.

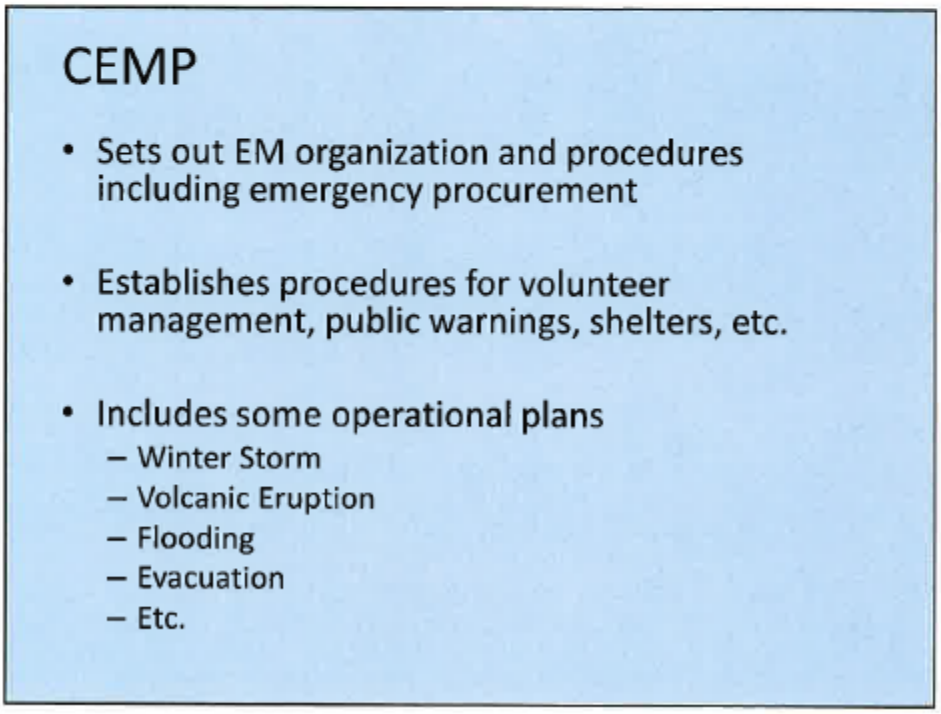
October 20 2018	E-mail broadcast to all Tribal employees announcing plan, providing link to plan on Tribal website, and requesting comments by November 2 2018.
October 22 2018	Draft HMP e-mailed to local county emergency managers, local county planning directors, to National Weather Service, and to Tribal historian, requesting review and comments
November 5 2018	Final day to receive comments on draft HMP
November 14 2018	Meeting with Tribal DOT concerning integrating hazard mitigation into draft Long Range Tribal Transportation Plan

4. Slide Presentation: October 2016 Kickoff/Scoping and District Meetings



HMP Public Meeting Presentation, page 1 of 6





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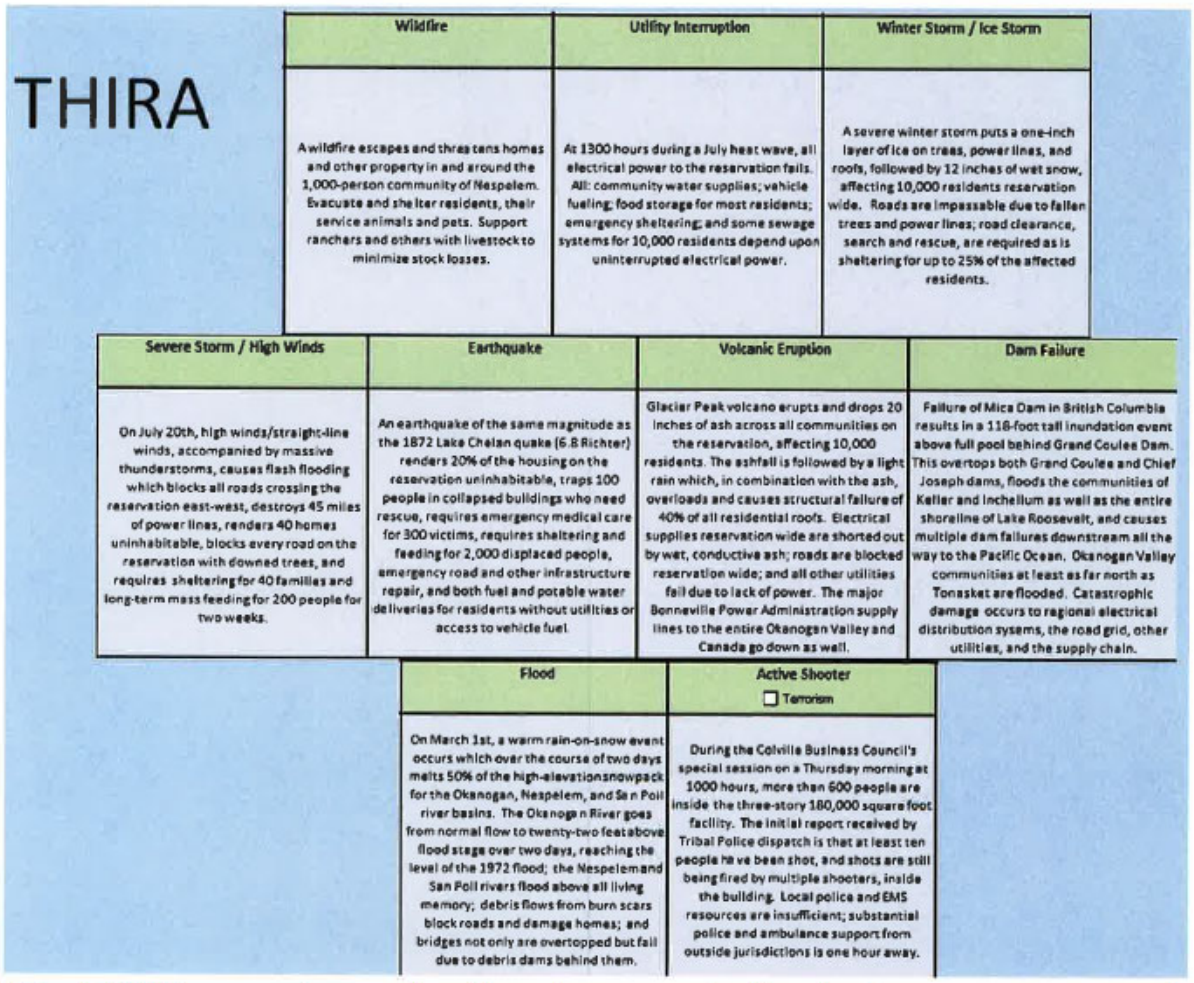
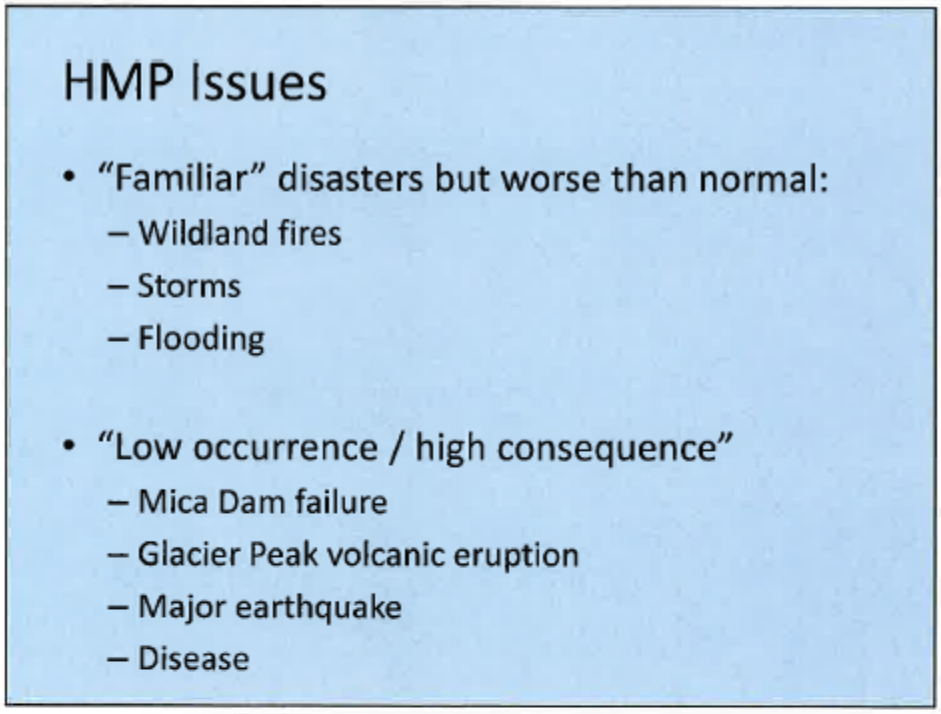
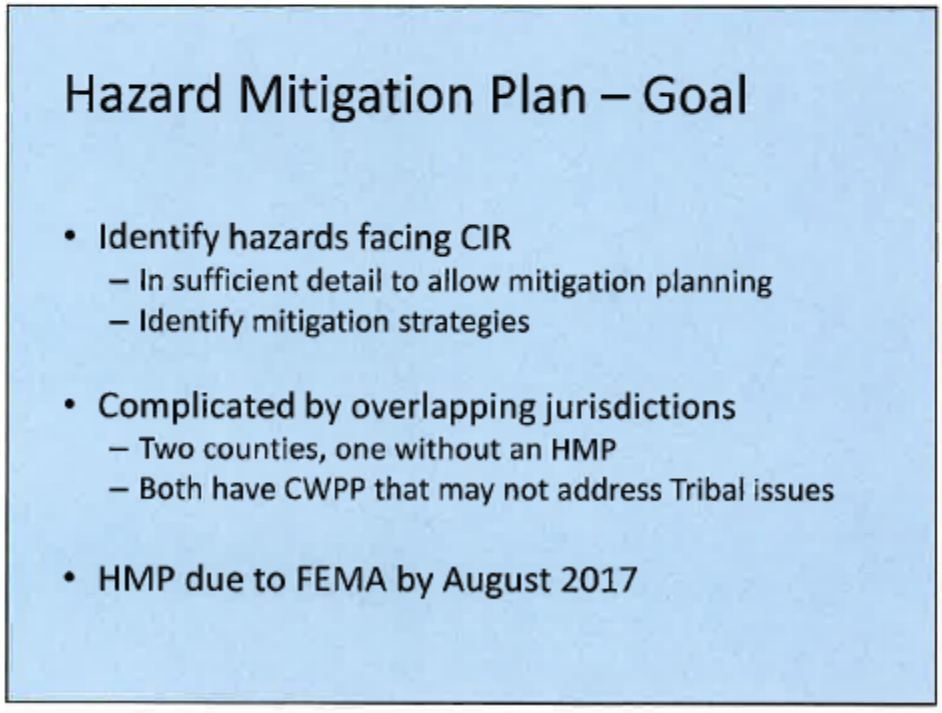


Note: A THIRA represents examples of "worst case scenarios" for planning purposes, a process that was explained at the actual meetings where these slides were used.

HMP Public Meeting Presentation, page 3 of 6





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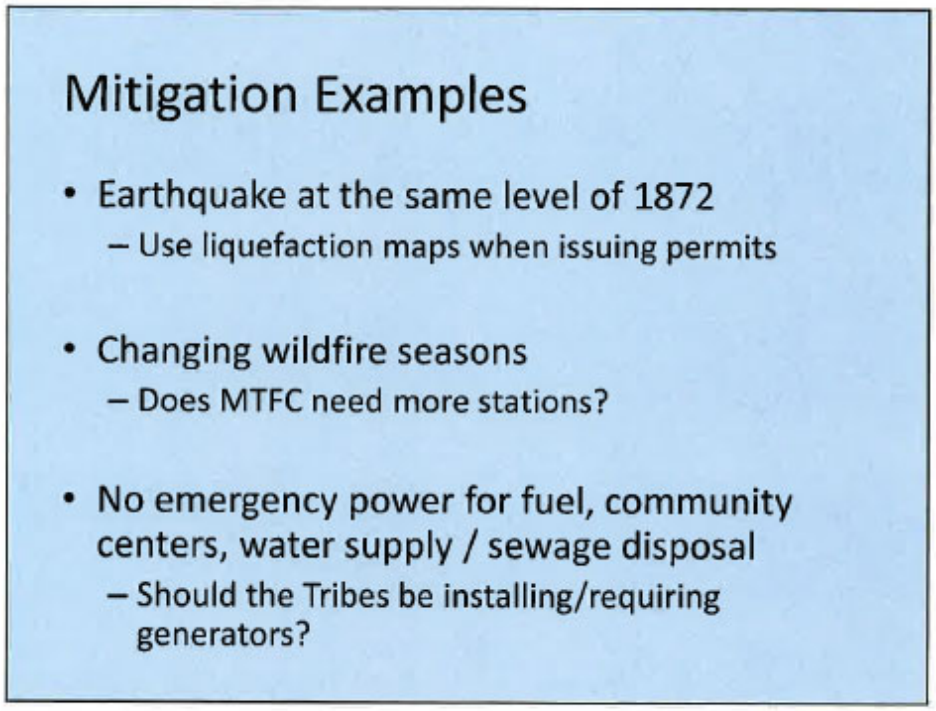

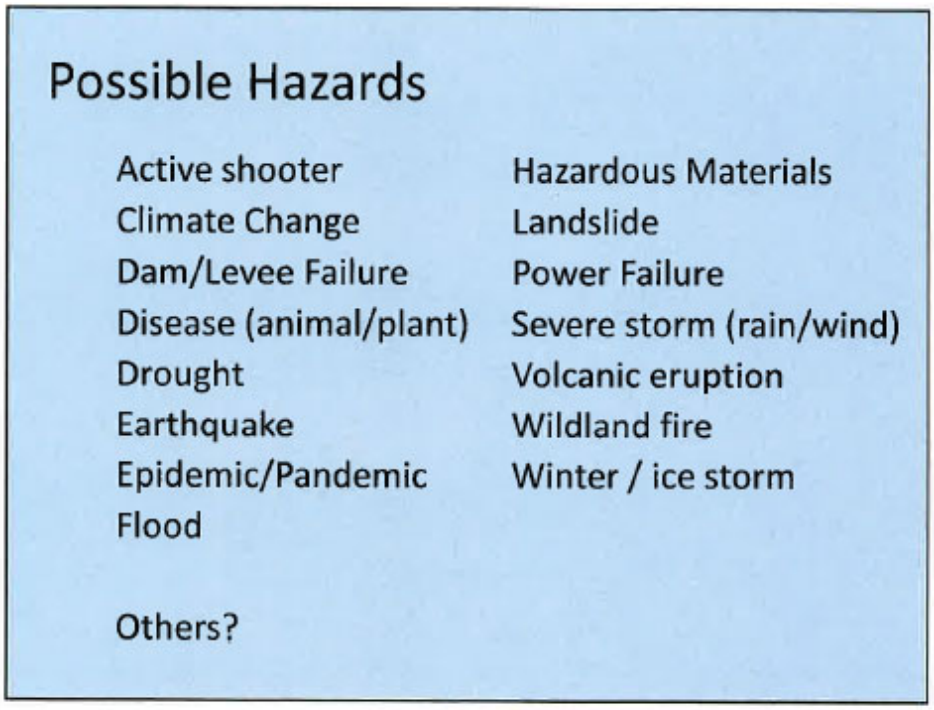

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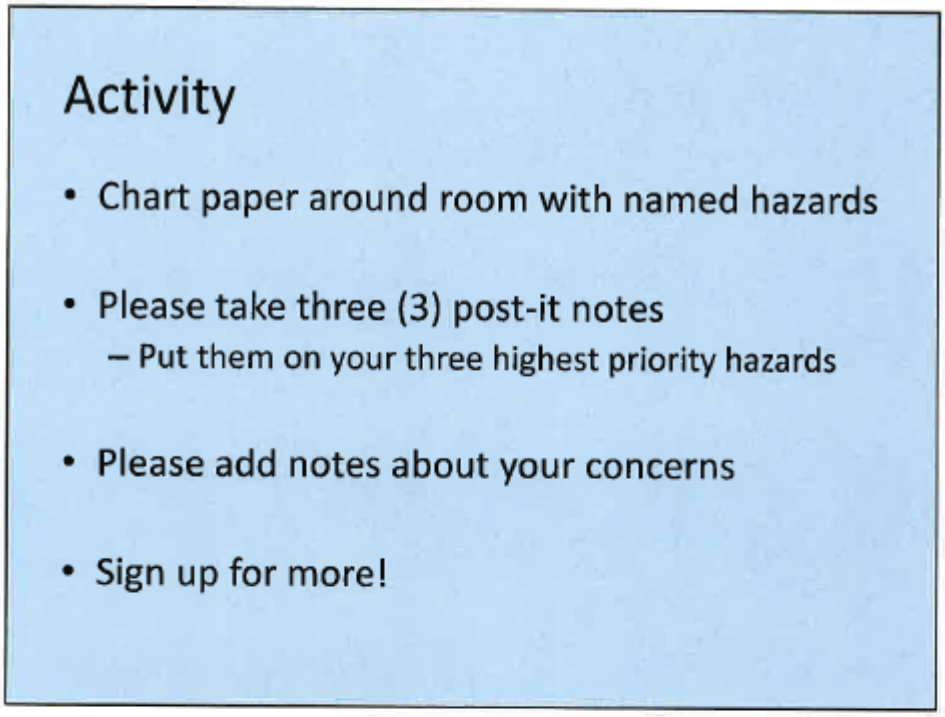

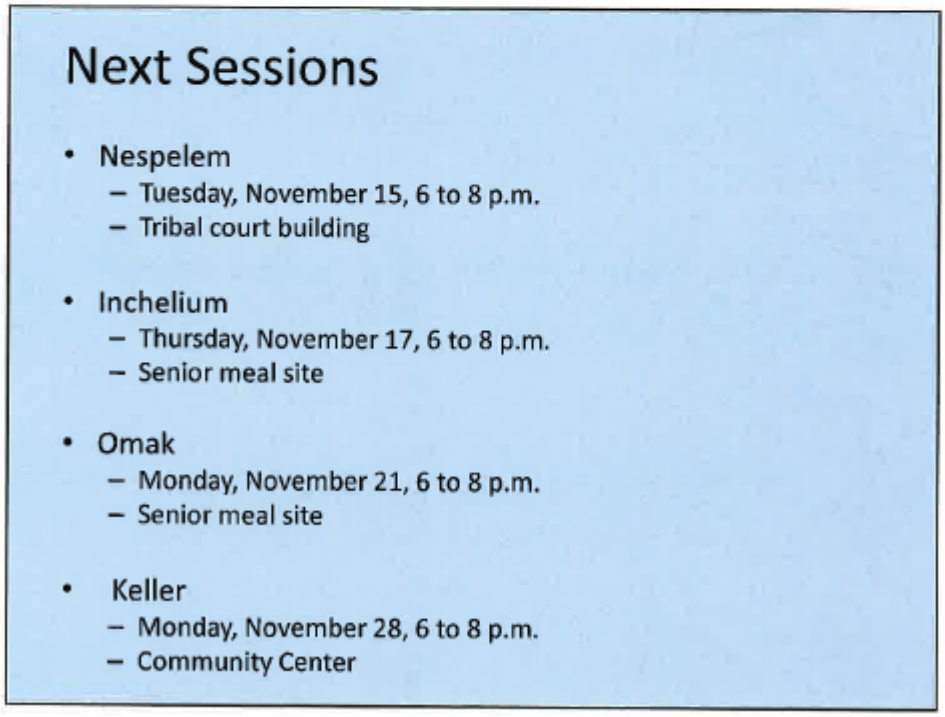

HMP Public Meeting Presentation, page 6 of 6

5. Survey Results

Surveys returned: 103

Tallied Survey
Colville Reservation Hazard Mitigation Planning

1. Where do you reside?

- ☐ Inchelium District 12
- ☐ Keller District 11
- ☐ Nespelem District 45
- ☐ Omak District 14
- ☐ Off-reservation 19

2. What is your membership status?

- ☐ Colville Tribal Member 76
- ☐ Colville Tribal Descendant 2
- ☐ Enrolled member from another Tribe 6
- ☐ Non-Member 19

3. Do you have fire insurance for your home (homeowner's or renters insurance)?

- ☐ Yes 55
- ☐ No 42
- ☐ Don't know 6

4. Do you have flood insurance for your home?

- ☐ Yes 13
- ☐ No 73
- ☐ Don't know 15

4a. If you answered "Yes" to question four, what river or stream is closest to where you live? Sanpoil R.-1 Nespelem R.-1 Okanogan R.-1 Chelan R. -1 Lake Roosevelt/Columbia R.-8 Stranger Creek - 1

5. Which of the following events have you or your household experienced in the last 20 years within the Colville Indian Reservation? (Check all that apply.) *(NOTE: Survey was prior to Sanpoil River flood of 2017 and Okanogan River flood of 2018)*

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- ☐ Dam or levee failure 4
- ☐ Drought 32
- ☐ Earthquake 38
- ☐ Flood 21
- ☐ Household fire 13
- ☐ Landslide 10
- ☐ Power failure lasting more than 24 hours 48
- ☐ Severe weather (windstorm, winter storm, etc.) 83
- ☐ Wildland fire 78
- ☐ None 4
- ☐ Other (please specify) Tornado: 2 HazMat: 1

6. How prepared is your household to deal with a natural hazard or other disaster?

- ☐ Not at all prepared 22
- ☐ Somewhat prepared 53
- ☐ Adequately prepared 13
- ☐ Well prepared 11
- ☐ Very well prepared 3

7. Which of the following has provided you with useful information to help you prepare for a natural hazard or disaster? (Check all that apply.)

- ☐ Emergency preparedness information from a government source 53
- ☐ Personal experience with one or more hazards/disasters 66
- ☐ Local news or news media 55
- ☐ Schools or other academic sources, including extension services 18
- ☐ Community Emergency Response Training (CERT) 26
- ☐ Facebook pages or posts 36
- ☐ Internet searches 28
- ☐ None 2
- ☐ Other (please specify) Red Cross course- 1 Neighbors/Friends: 2

8. What steps have you or your household taken to prepare for a hazard or disaster? (Check all that apply.)

- ☐ Received first aid training 70
- ☐ Taken Community Emergency Response Training (CERT) 22
- ☐ Made a fire escape plan 40

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□ Installed smoke detectors on each floor of your home	63
□ Keep a battery-powered radio	31
□ Keep a fire extinguisher	48
□ Prepared a disaster supply kit	19
□ Stored food and water	44
□ Stored flashlights and batteries	61
□ Stored medical supplies including medications	32
□ None	9
□ Other (please specify)	

_____

9. How concerned are you about the following hazards on the Reservation? Please check the appropriate box in the chart below to indicate your level of concern:

1—Not Concerned
2—Somewhat Concerned
3—Concerned
4—Very Concerned
5—Extremely Concerned

	1	2	3	4	5
Climate Change	12	24	18	15	26
Dam/Levee Failure	19	26	19	14	16
Drought	13	21	21	19	22
Earthquake	26	35	17	8	10
Flood	17	30	17	19	14
Hazardous Materials	16	22	27	18	15
Household Fire	8	18	26	17	28
Landslide	22	23	24	12	13
Power Failure	8	19	26	24	31
Severe Weather	5	8	30	26	33
Volcanic Eruption	50	24	7	5	9
Wildland Fire	4	2	15	24	56

10. Do you have access to the Internet from your home (includes access through a cellular telephone)?

- ☐ Yes 86
- ☐ No 15

11. Telephone service; check only one.

- ☐ I have wired (traditional land line) telephone service at my home, and I have reliable cellular phone service at my home. 23
- ☐ I have wired (traditional land line) telephone service at my home, but cellular phones are not a reliable way to reach me there. 26
- ☐ I have reliable cellular phone service at my home, but no land line telephone. 41
- ☐ I don't have either a land line telephone or reliable cellular phone service at my home. 9

12. Is there anything else you think should be addressed in the Hazard Mitigation Plan?

See attached list of summary comments

These can be faxed to (509)634-2438, sent by inter-office mail to Randy August at EMS, or scanned and e-mailed to randy.august2@colvilletribes.com . Please submit by March 15, 2017.

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Participant Comments
Colville Tribal HMP Survey
2016-2017

- Reliable cell service
- Affordable flood insurance – help getting home insurance
- Help & advise elders have better environment
- Elder evacuation routes
- Highly contagious pandemic disease plan
- Economic plan – major employer shutdown
- Reliability/vulnerability of transportation network
- All local volunteers/CERT members etc. receive training with household and farm animal evacuation. Drills and plans.
- Elders evacuation plan, rural, no phone, physical limitations, family, medications
- Making sure our elders, children, and people with special needs are made a priority during emergencies.
- Cell service unreliable-please knock on my door
- Training, training more training
- How to contact family
- Elders – alone/disabled/alone who don't drive – notification and accounted for
- Evacuation plans/routes, fuel stowed, generators
- Cultural and sacred site protection plan
- What to do and when/where to go for help
- Drugs cost?
- Broken down cars, debris, needles in trash around homes
- A plan for homeless who live on Reservation
- Help with generators
- Shelter in Place option
- Alternative shelter location, a list?
- Infectious disease control
- Hazardous travel conditions
- Earlier broadcast of administrative leave
- Animal evacuations
- Re-start CERT
- Reservation-wide awareness, prioritize most vulnerable
- Emergency escape plans with few options to get out, how do we avoid a bottleneck on limited roads
- Emergency plans for livestock and horses that are in direct path of disaster

- Educate with tips/tricks for filing for insurance after disaster
- Ensure rural addresses are on 911 list for easy location
- Identify fire hydrants and whether they work
- Store water in communities for emergencies/fires
- Identify "volunteers" to be on fire guard while other big fires are burning
- We need an emergency Firewise program to thin trees and abundant fuels close to homes and communities to reduce fire danger. This is preventative measure, not a response measure, but valid, we have to start somewhere and not only with the response. Thanks for asking!
- Educate people / outreach
- Local/familiar people on management teams especially info hotlines
- Water quality, solid waste, community water and sewer supplies
- What about hazardous materials spills on reservation highways?
- What do we do in case of emergencies, where to go, who to talk to or call? Will EOC be identified? Is there a hazardous preparedness program with the Tribe? What about continuity of operations for the Tribe?
- Does the Tribe have an insurance carrier for members to use? Can the Tribe identify an honest, reputable insurance company?
- Are emergency broadcasts done on radio still or by CB—it's an antique technology but in a poverty/poor community some elders may not have cell phone, landline, or internet
- With all the talks of Korea, Russia, nuclear war or possibilities with missile attach what are or would be a good safety procedure?
- People always forget about a plan for their pets
- A rendezvous location for family and/or friends to meet in case all communications are down
- Specific information for each district designating who/where to get information in case of emergency. Yesterday Ferry County had an alert. I just happened to be at home on Facebook or we would not have known about it due to no cell service in our area.
- Elders who live alone or are disabled; people who do not drive—how do we make sure they are properly notified and accounted for?
- Jurisdictional issues—multi-jurisdictional plans in place
- Floods and fires destroy our subsistence sources and Indian medicines
- Contaminated water—without clean water we will suffer
- Extreme heat
- Roads and bridges damaged by natural disasters
- In the majority in all districts most people live very rural, so I guess my question is how would you get the hazard mitigation plan out to all people who may not have the

transportation, telephone services, cellular phones, or internet to learn more abou the plan?

- How this info is shared with all members on the reservation. This survey for instance is only targeting a worker's population, there are members who don't have access to all broadcasts, or the internet, or who don't work for the tribe. To get good hard data for this planning, all member responses should be sought.
- Who to call and have posting at the post office/store, to broadcast channel for school closures, to post on community center billboard.
- Emergency route evacuation plan (Inchelium residents) that is posted in response plan.
- Emergency response team comprised of community member volunteers (fire and other natural disaster).
- List of equipment available within the community for fire/evacuation response, heavy equipment, trucks, trailers, land/space for evacuees (2 and 4 legged) – post listing central notification location
- Set up grounds around Inchelium (old rodeo grounds/corrals for evacuation stock, animals), softball field with running water and outside toilets.
- Not everyone has cell service, Facebook, etc. so a central location for info disbursement w/telephone number posted would be ideal.

6. "Heat Map" Exercise Results

Heat Map Results,
2016 HMP Public Outreach

HMP Heat Map

At the scoping session held at the Lucy Covington Government Center on November 9, 2016, sixteen sheets of large easel paper were placed on tables around the edge of the room. Each sheet addressed a hazard about which comments were sought, and many contained at least one question to help attendees frame their comments. In addition, each attendee was given three post-it notes. After the formal presentation ended, attendees were requested to place one of their post-it notes on each topic they selected, to "flag" it as one of their top three hazards for mitigation.

The easel sheets were arranged in alphabetical order by topic, except that the one entitled "Other Hazards" was last in sequence.

Bold type indicates the exact wording that was used on the heat map comment sheets. Comments may have been changed only in these ways: they may be punctuated differently than in the original; spelling may have been corrected; conjunctions have been added; and common abbreviations have been changed into the complete words, all to improve readability. A number in parenthesis following a comment indicates the total number of people who endorsed that comment, including the writer.

At the Omak public meetings, six persons participated in the heat map exercise. There were no participants in that exercise at the three other public meetings.

Summary Results

Numbers indicate the number of participants who believed each item was among the top three hazards or threats facing the Colville Indian Reservation.

Severe Storm	10
Power Failure>24 Hours	7
Climate Change	6
Wildland Fire	6
Disease: Animal and Plant	4
Hazardous Materials	4
Active Shooter	4
Drought	2
Earthquake	2
Flood	1
Landslide	1
Epidemic/Pandemic	1

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Other: Loss of Employment	1
Dam/Levee Failure	0
Volcanic Eruption	0
Winter Storm	0

Active Shooter **4 flags**

What locations?

- Government center/courts
- Inadequate response due to limited police force
- Training for employees on DHS: Run, Hide, or Fight
- At schools: training for staff/drill
- Mental/behavioral health services/training needs to be done for reservation professionals—to respond to incident—and specialists for children who are impacted
- Training is key for sure
- More training and any training (2)
- Evacuation plan—safety
- GCDSD *(Grand Coulee Dam School District)*—jurisdiction issues
- Continued training for public

Climate Change **6 flags**

Effects on hunting, fishing, gathering?
Effects on fire frequency and severity?

- Inadequate response due to the overwhelming fire incident *illegible*
- Increased invasive species threatening natural resources i.e. spotted fruit fly on huckleberry vines
- More severe disturbances—drought, heat, storms, changing flood regimes (2)
- Infrastructure vulnerability including roads
- Need to design and plan to different standard, that is, design for 100-yr flows may be inadequate in future
- More learning and studying so we recognize warnings—diseases plant and animal for consumption/use; water contamination
- Climate change threatens our youth more than any other population group; future planning in adaptation and mitigation must be made with our youth in mind.

Heat Map Results,
2016 HMP Public Outreach

Dam/Levee Failure **0 flags**

- All dams on the reservation (Twin Lakes, Owhi Lake)
- All levees on the reservation (on Okanogan River)
- Chief Joseph Dam
- Grand Coulee Dam
- All upper Columbia dams in British Columbia (Mica, Keenleyside, etc.) (3)
- Evacuate housing and routes identified
- Small town dams
- Incorporate Owhi and Twin Lakes Emergency Action Plans
- Similkameen River in Canada—several large tailings dams from mining/metal processing would deliver high metals into Okanogan River

Diseases **4 flags**

Animal

Wildlife, livestock, or both?

Any specific diseases?

Plant

Which diseases, crops, or plants?

- Funding for more testing on animals that show signs of maybe sick or illness
- Adequate notification process to limit exposure to local residents and first responders
- Wildlife, livestock, plant and human disease threat. How to contain and protect remaining population and deal with /partner with USDAAPHIS/CDC/etc.
- Avian flu, foot and mouth
- Drought and heat related to climate change may enable new disease, insect/pest incidence
- There is a serious lack of emergency medical services on the reservation, IHS needs to provide after-hours emergency room care or an urgent clinic
- Ambulance in Keller
- Loss of traditional foods due to changing temps (salmon, deer, plants)

Drought **2 flags**

- Climate change
- Water availability
- Need to validate water rights on reservation
- Keep water here!
- Save some water in storage

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Heat Map Results,
2016 HMP Public Outreach

- Build more water storage in all areas
- Water-well failures—utilizing Tribal water rights out of Lake Roosevelt to mitigate
- Beavers
- Local food supply and agricultural production
- Water availability for everything
- Dry water wells
- No adequate water supplies for domestic and irrigation
- Coordinate developments with Environmental Trust Division water administrator
- Work with Colville and Okanogan National Forests on drought planning
- Increased drought reduces food availability for human and animal consumption
- Fire suppression impacts to water quality, quantity, and access
- Logging and cattle impacts to water quality, quantity, and access

Earthquake **2 flags**

- Better notification to community---CCT FM radio
- Adequate notification and damage assessment
- Major to minor landslides could be triggered, compounding impact
- Unstable soil/landforms along Lake Roosevelt
- Road and power infrastructure
- Identify vulnerable areas
- Identify access/ingress/egress
- Identify resources

Epidemic / Pandemic **1 flag**

What disease(s) are you concerned about?

- Bird flu
- CWD and hoof and mouth for sure
- Any airborne diseases
- Drug use on the reservation
- New highly contagious pathogens
- Zika virus (56 cases in Spokane Co.?)
- Food-borne diseases
- Lack of access to healthy food choices has created an epidemic of diabetes and obesity. RIGHT NOW need to work w/Diabetes Prevention Program to address this human health impact
- Ambulance, fire truck equipment w/ personnel in all districts
- Access to emergency medical equipment

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Heat Map Results,
2016 HMP Public Outreach

Flood **1 flag**

What area concerns you?
Why there?

- Wannacut Creek
- Stranger Creek
- Little Nespelem River
- Run-off from North
- Sanpoil River (3)
- Okanogan River
- Gold Creek
- Run-off from North: all water flows down through the reservation in three different areas that would hit major townships and home sites, this is a concern
- Vulnerable home site location
- Road vulnerability throughout reservation—2,600 stream crossings
- Flood mapping needed based on LIDAR imagery
- Flooding after forest fires, example: Methow Valley
- Fluctuations on elevation of Columbia (Rufus Woods, Lake Roosevelt) will increase and be exacerbated
- Allotments in flood plains must not be developed

Hazardous Materials **4 flags**

Transportation accidents—
How can we mitigate?
Off-Reservation impacts to lands/waters—
How can we mitigate?

- Community notification poor—locally owned radio station
- Understand impacts, alternate routes
- Keep up the study on all
- Training on dealing with it for community (2)
- Chemical spills
- Training for staff—HAZWOP
- Waterways
- Knowing what, when, where hazardous materials are being transported across Colville Indian Reservation
- Have a checkpoint on all reservation roads that they are driving on at all times

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- Smaller spills—oil/hydraulic fluid associated with logging and heavy equipment transport
- Concerned about railroad hazards—what is being transported that could impact reservation lands and waters?
- Small-medium accidents: stock and maintain hazard trailer capable of limited response by Emergency Management Services

Landslide **1 flag**

What area concerns you?

- Keller Community
- All reservation areas
- High banks adjacent to Lake Roosevelt have failed many, many times and will again. May or may not be triggered by earthquake or dam failure—but will be made worse.
- Along Lake Roosevelt—drawdown
- Liquefaction in earthquakes
- Along Columbia and Sanpoil Rivers
- North where burned areas are
- All fire areas will need to be looked at
- Environmental Trust Department is developing an unstable slope GIS coverage – check in w/Todd or Bessie
- Considerable slide activity caused by failure of road embankments and unmaintained stream crossings

Power Failure > 24 Hours **7 flags**

- Every district needs a generator
- Identify priority for response resources/availability of these resources
- Place for people to go if they have no heat or power
- Adequate fuel supplies
- Places and resources to dispose of spoiled/rotten food
- More generators in all areas of the reservation and a main housing area for overnight or extended
- Training on residential preparation to survive
- Power and internet dealing with VOIP (communication)
- Loss of food stored and gasoline reduce ability of residents to survive extended power outages
- Solar panels and generators are needed at residences to build community grids resilient to powerline failure

Heat Map Results,
2016 HMP Public Outreach

Severe Storm **10 flags**

What hazards are you concerned with?
What mitigation can we do?

- Keller trees
- Adequate and correct communication to community (3)
- Ability to get to elders (2)
- Power for the people / power outages (2)
- Adequate assessment and response to protect the resources and human life on the reservation
- Shut-ins, no power or heat
- All of the above plus training
- More storm severity anticipated associated with climate change
- Transportation concerns (2)
- Medical/health concerns

Volcanic Eruption **0 flags**

- Emergency evacuation/notification (2)
- Adequate response—the ability to prioritize response to stabilize the local public infrastructure
- Pray when Yellowstone goes we all have warning and education in the field
- Hope wind going the other direction
- Teaching people how to improvise when ash comes—can't drive, can't use air conditioners

Winter Storm **0 flags**

- Wood and water on hand in bulk
- Elders/disabled: are they safe?
- Safety of transportation routes and maintenance of roads
- Adequate power and health services to manage the public need over a course of time
- More rain on snow runoff events anticipated due to climate change
- Survival if stranded in vehicles in isolated areas

Wildland Fire **6 flags**

What can we do to mitigate their impact?

- Effective fuels treatment/maintenance/monitoring
- Be more mindful of water quality during activities
- Better pre-planning to identify areas for helipads, roads, staging areas, etc.

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- Communications
- Elder and disabled people
- Effective coordinated response, minimize the various standards that govern the response to a local incident
- Stop salvage logging
- Rehab all roads, dozer lines, staging areas, drop points, safety zones, and stream crossing post-suppression
- Be mindful of all water withdrawals, protect water quality, quantity, and access
- Stop the spread of invasive species on suppression vehicles
- Keeping up to date with firefighting equipment. Participate jointly with counties that have air support
- Forest management practices

Other hazards? **1 flag**

Please list them, and why they should be addressed in the plan.

- Loss of employment
- Cattle and logging in and around water bodies—affecting condition and resilience of flood plain.
- Continued development in rural areas which stress emergency response time, impact water and reduce resiliency.
- Reduction in water quality, quantity, and access due to cattle range/leasing, wild horses and logging and road construction.
- Communication issues:
  - Cell phones not consistent
  - Phone system and internet are only technology *illegible* (VOIP)

C. Plan Updates and Maintenance

The HMP was prepared as a collaborative effort among the Planning Team. To maintain momentum and build upon this hazard mitigation planning effort, the Tribe will maintain a standing Steering Committee to monitor, evaluate and update the HMP. At a minimum, the Steering Committee will consist of the Emergency Management Services Coordinator (the initial Steering Committee Leader), the Emergency Manager, the Commander of EMS/Fire/Rescue, the TOSHA Supervisor, the Director of the Tribe's Environmental Trust Department, the Tribe's Floodplain Administrator, a representative from the planning department, and the Public Safety Director.

The responsibility for plan updates and maintenance rests within the Public Safety Department, and ultimately with the Public Safety Director. The Steering Committee leader will be assigned to a staff member selected from within the public safety department

In addition to the original members of the Steering Committee, other interested parties can be added to the Steering Committee or otherwise participate in this process. The Steering Committee leader will serve as the primary point of contact and will coordinate all local efforts to monitor, evaluate and revise the HMP. Following both the first and second year of adoption, the Steering Committee will conduct an annual review to monitor progress in implementing the HMP, particularly the mitigation actions identified in the plan. The annual review will provide the basis for possible changes in the HMP's mitigation actions, by refocusing on new or more threatening hazards, adjusting to changes to or increases in resource allocations, and engaging additional support for the HMP implementation.

The Steering Committee leader will initiate the annual review of the HMP by questionnaire, by holding an annual public meeting, through attendance and participation at the annual General Membership Meeting, or through meeting with the Colville Business Council to obtain information about their constituent concerns relating to hazard mitigation. The anniversary date of adoption of the plan will be the trigger date for this annual review.

The Steering Committee leader will collect the questionnaire or other data and summarize the results into an annual report. This report will be distributed to all Steering Committee members, CBC members and other interested agencies, departments and persons.

The members of the Steering Committee are also responsible for searching for internal funding to meet the Tribe's 25% share of any pre-disaster mitigation grants awarded to the Tribe by FEMA.

When funding has been established for one or more mitigation actions, each department identified in the mitigation action plan will be specifically responsible for monitoring mitigation project implementation and closeout. If more than one department is identified for a mitigation project, a single department will be chosen to monitor mitigation project implementation and closeout. The status of project implementation and closeout will be included with each annual review. In addition, each department conducting a mitigation action will be required to submit a closeout report at the conclusion of the project.

Progress review on achievement of goals and implementation of activities and projects of the Mitigation Strategy will also be accomplished during the annual review process. During each annual review, the department and/or agency currently administering a mitigation project will submit a progress report to the Steering Committee. The report will include the current status of the mitigation project, including any changes made to the project, and whether or not the project has helped to achieve the appropriate goals identified in the plan. Finally, the Steering Committee will review each progress report, as well as other relevant local, State and Federal mitigation activities, to determine if progress has been made toward achieving each goal identified in the Mitigation Strategy.

An HMP, once adopted by the Council and approved by FEMA, remains in effect for five years. Because the time frame to update an HMP is lengthy, in order to ensure that a valid HMP remains in effect, renewal activities will begin thirty months after adoption of the HMP and receipt of approval by FEMA.

At thirty months after adoption and approval of the HMP, the Steering Committee will:

- Thoroughly analyze and update the reservation's risk of natural and human-caused hazards. This will include a review of previous annual reports, including the mitigation activities progress reports.
- Conduct public outreach to obtain information about needed updates or changes.
- Provide a detailed review and revision of the Mitigation Strategy.
- Prepare a new Mitigation Action Plan with prioritized actions, responsible parties and resources.
- Prepare a new draft HMP and submit it to the Tribal Council for adoption.
- Submit an updated HMP to FEMA for approval.

It is anticipated that this process will take at least six months to one year. Adherence to this time frame will ensure that the Tribe never has an expired HMP.

D. Hazards Summary Worksheet with Rating Criteria

Content in italics indicates a change from the template as it appears in FEMA's templates.

Hazards Summary Worksheet

Use this worksheet to summarize hazard description information and identify which hazards are most significant to the planning area. The definitions provided on the following page can be modified to meet local needs and methods.

Hazard	Location/Distribution (Reservation Wide)	Maximum Probable Extent (Magnitude/Strength)	Probability of Future Events	Overall Risk Significance Ranking
Communications Failure	**Significant**	**Severe**	**Likely**	**Medium**
Climate Change	**Significant**	**Moderate**	**Likely**	**Medium**
Dam Failure:				
Chief Joseph	**Significant**	**Extreme**	**Unlikely**	**Low**
Grand Coulee	**Significant**	**Extreme**	**Unlikely**	**Low**
Owhi Lake	**Negligible (<10%)**	**Low**	**Occasional**	**Low**
Twin Lakes	**Negligible (<10%)**	**Low**	**Occasional**	**Low**
Upriver Dams	**Significant**	**Moderate to Extreme**	**Unlikely**	**Low**
Disease, Animal	**Extensive**	**Low**	**Occasional**	**Low**
Drought	**Extensive**	**Moderate**	**Likely**	**Medium**
Earthquake	**Extensive**	**Extreme**	**Unlikely**	**Low**
Extreme Heat	**Significant**	**Low**	**Likely**	**Low**
Flood	**Limited (<25%)**	**Moderate**	**Likely**	**Medium**
Landslide	**Limited (<25%)**	**Moderate**	**Likely**	**Medium**
Severe Winter Weather	**Significant**	**Moderate**	**Likely**	**Medium**
Severe Storm:				
Wind	**Significant**	**Severe**	**Likely**	**High**
Rain	**Significant**	**Severe**	**Likely**	**High**
Tornado	**Negligible**	**Severe**	**Unlikely**	**Low**
Utility Failure (Power Grid and subsequent)	**Significant**	**Moderate**	**Likely**	**Medium**
Volcanic Eruption	**Significant**	**Moderate**	**Unlikely**	**Low**
Wildfire	**Extensive**	**Extreme**	**Highly Likely**	**High**

Definitions for Classifications

Location (Geographic Area Affected). ***Note: the planning area is considered to be the entire land mass of the reservation, approximately 1.4 million acres bounded on the south and east by the Columbia River, on the west by the Okanogan River, and on the north by the boundary between Townships 34 and 35 of the Public Lands Survey System (PLSS).***

- Negligible: Less than 10 percent of planning area or isolated single-point occurrences
- Limited: 10 to 25 percent of the planning area or limited single-point occurrences
- Significant: 25 to 75 percent of planning area or frequent single-point occurrences
- Extensive: 75 to 100 percent of planning area or consistent single-point occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)

- Weak /*Low*: Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage

Note: "Weak" is listed as "Low" as that is a generally more descriptive term for those threats that are rated "Low" in extent. For example, "Extreme Heat" may require a significant emergency response for a few days for the vulnerable elements, within the overall reservation population, that are most susceptible to that hazard. For the vast majority of the population, extreme heat is an inconvenience rather than a threat to life. Two of the possible dam emergencies are also rated as "low" in extent because they are natural lakes for which the surface has been elevated by a dam. There is no practical risk that the entire lake will empty; those dams pose some risk for a small number of homes that could be partially flooded by dam failure, but in terms of the overall reservation the extent of the impact would be very low.

- Moderate: Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days
- Severe: Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months
- Extreme: Extreme classification on scientific scale, immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions

Hazard	Scale / Index	Weak	Moderate	Severe	Extreme
Drought	Palmer Drought Severity Index[1]	-1.99 to +1.99	-2.00 to -2.99	-3.00 to -3.99	-4.00 and below
Earthquake	Modified Mercalli Scale[2]	I to IV	V to VII	VII	IX to XII
	Richter Magnitude[3]	2, 3	4, 5	6	7, 8
Hurricane Wind	Saffir-Simpson Hurricane Wind Scale[4]	1	2	3	4, 5
Tornado	Fujita Tornado Damage Scale[5]	F0	F1, F2	F3	F4, F5

Probability of Future Events

- Unlikely: Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

[1] Cumulative meteorological drought and wet conditions: http://ncdc.noaa.gov/

[2] Earthquake intensity and effect on population and structures: http://earthquake.usgs.gov

[3] Earthquake magnitude as a logarithmic scale, measured by a seismograph: http://earthquake.usgs.gov

[4] Hurricane rating based on sustained wind speed: http://nhc.noaa.gov

[5] Tornado rating based on wind speed and associated damage: http://spc.noaa.gov

- Occasional: 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
- Likely: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years
- Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.

Overall Significance

- Low: Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.
- Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
- High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

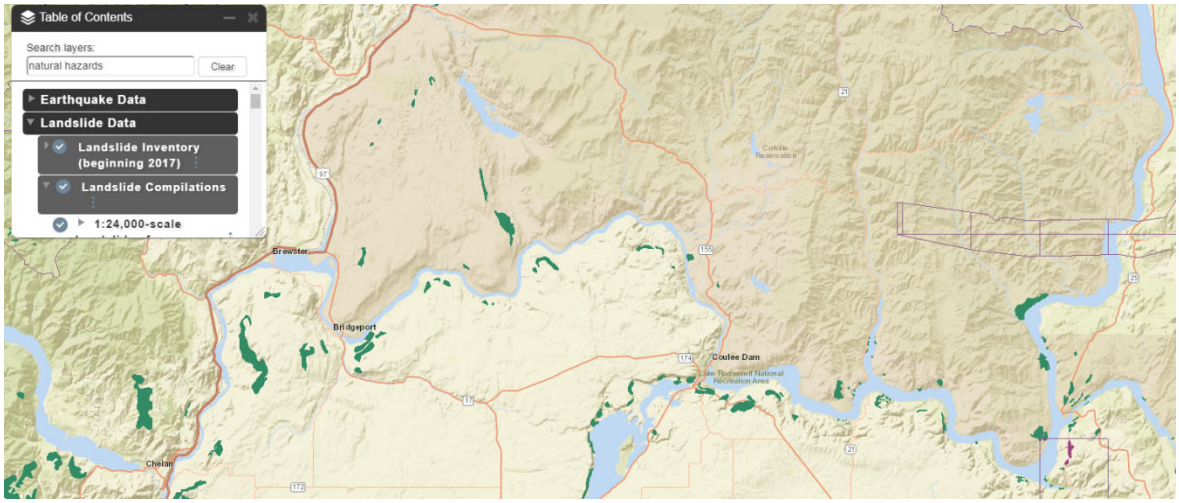
E. Links to Risk Maps

The Washington State Department of Natural Resources (DNR) has a web site for geological risk maps. These include maps of earthquake faults, historical landslides, and hazardous minerals.

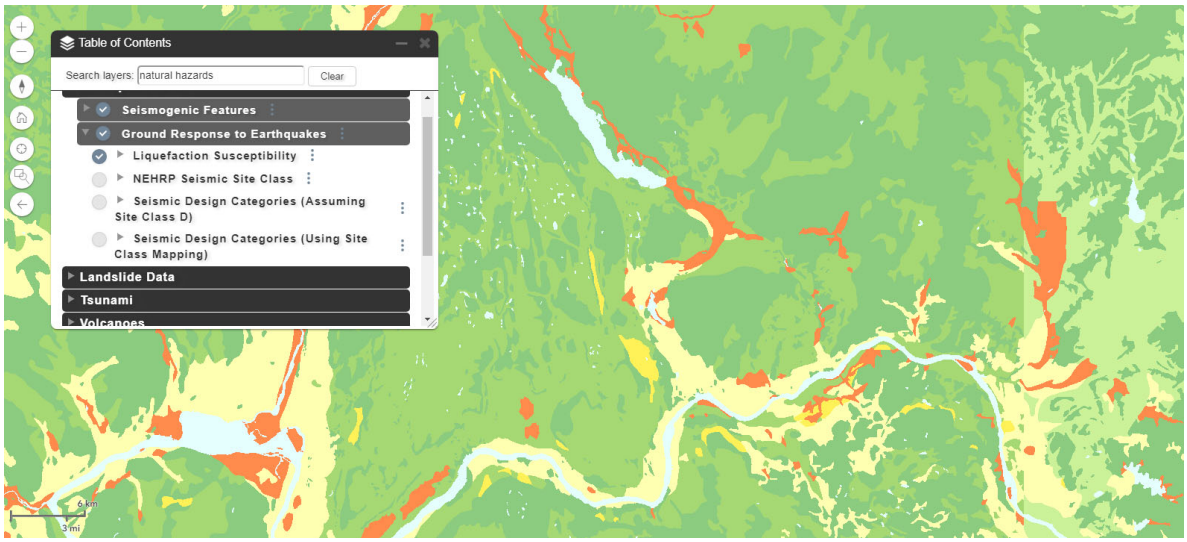
These maps can be found here:

https://geologyportal.dnr.wa.gov/#natural_hazards

A sample of the landslide mapping available for the reservation area is below, where green indicates historic landslides:



Liquefaction maps are found under the "earthquake data" section. Here is a sample map of the Nespelem to Omak Lake area, where dark brown indicates an area with a moderate to high susceptibility to earthquake-caused liquefaction.



Both FEMA and Washington State's Department of Ecology put out flood maps, available online. The ones from the State are easier to use than the FEMA maps. Here is a link to the State maps:

https://fortress.wa.gov/ecy/coastalatlas/tools/Flood.aspx

A sample flood map, for the Brooks Tract area in Omak, is below. This area partially flooded in 2018.

The red dot indicates the driveway entrance to a Tribal government structure that was flooded; the blue shaded area indicates the level of a 100-year flood.

The FEMA flood maps can be found here:

https://msc.fema.gov/portal/home

The FEMA flood hazard map layers can be found here:

https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd&extent=-118.71042102661185,48.074612867707465,-118.668878973388 12,48.0889480775504

F. Glossary

ACOE	Army Corps of Engineers, operator of Chief Joseph Dam
AI	Avian Influenza
AUM	Animal Unit Month, a measure of the amount of forage consumed by one cow-calf pair grazing for one month
BAER	Burned Area Emergency Response, a program to evaluate and mitigate wildland fire damaged lands
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BOR	Bureau of Reclamation, operator of Grand Coulee Dam
BPA	Bonneville Power Administration, operator of power lines and switchyards
BSE	Bovine Spongiform Encephalopathy, or “mad cow” disease
CBC	Colville Business Council, the legislative body of the CCT
CCT	abbreviation for Confederated Tribes of the Colville Reservation
CEMP	Comprehensive Emergency Management Plan, a document addressing how emergencies will be managed.
CFR	Code of Federal Regulations
CFS	Cubic feet per second, a measurement of water flow
CDP	Census Designated Place, a defined geographical area used for aggregating census data.
CEDS	Community Economic Development Strategy, a Tribal planning effort
CERT	Community Emergency Response Team
CIG	Climate Impacts Group, a research unit within the University of Washington
CIHA	Colville Indian Housing Authority
CJD	Chief Joseph Dam
COOP	Continuity of Operations Plan
CSZ	Cascadia Subduction Zone, a fault line off the Pacific coast of Washington State believed to pose the highest catastrophic earthquake risk the area
CTFC	Colville Tribal Federal Corporation, with multiple subsidiaries
CTFD	Colville Tribal Fire Department, formally known as the “Emergency Management Services, Fire, and Rescue” Department
CTPD	Colville Tribal Police Department
CWD	Chronic Wasting Disease, a prion spongiform encephalopathy that affects cervids; there is concern it may be communicable to humans
DHS	Department of Homeland Security

DOI	Department of the Interior
DNR	Washington State Department of Natural Resources
EAP	Emergency Action Plan, such as the Twin Lakes and Owhi Dams EAP
EAS	Emergency Alert System (replaced the Emergency Broadcast System or EBS)
ED	Executive Director; the highest-level executive in Tribal government
EHD	Epizootic Hemorrhagic Disease, which affects whitetail deer
EHV	Equine Herpes Virus
EM	Emergency Manager
EMD	Washington State Emergency Management Division
EMS	Emergency Medical Services, also used as an abbreviation for CTFD
ENV	Environmental Trust Department
EOC	Emergency Operations Center
EOP	Emergency Operations Plan; for the CCT, these are the incident-specific Annexes that are a part of the CEMP
EQ	earthquake
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency, a unit of DHS
FirstNet	A federally-sponsored initiative, operated by AT&T, to improve cellular and data access to first responders nationwide
FMD	Foot and Mouth Disease, an extremely serious animal disease
GCD	Grand Coulee Dam
HAZMAT	Hazardous Materials
HITRAC	A unit of the Department of Homeland Security, used here to refer to the Cascadia Subduction Zone earthquake study
HIVA	Hazard Identification and Vulnerability Assessment, sometimes referred to as a “threat assessment”; the first step in the emergency planning process, now replaced by a THIRA.
HMA	Hazard Mitigation Assistance, a FEMA grants program
HMP	Hazard Mitigation Plan, also known as the “Multi-Hazard Mitigation Plan”
HPAI	Highly Pathogenic Avian Influenza
HUD	Housing and Urban Development Department, referring to HUD-financed housing
HVAC	Heating, Ventilating, and Air Conditioning systems for buildings
ICS	Incident Command System
IFPL	Industrial Fire Protection Level, a system for rating fire hazards
IHS	Indian Health Service
IMT	Incident Management Team

IPAWS	Integrated Public Alert and Warning System
IT	Information Technology, which includes telephone and radio communications in addition to computers and networks
LIDAR	A survey method using lasers for extremely accurate measurements
MTFC	Mt. Tolman Fire Center, where the BIA wildland fire program is located
NCAI	National Congress of American Indians
NFIP	National Flood Insurance Program
NIMS	National Incident Management System, a component of which is ICS
NRCS	Natural Resource Conservation Service
NWS	National Weather Service
NWTEMC	Northwest Tribal Emergency Management Council
PDD	Presidential Declaration of Disaster, which authorizes FEMA to provide funding to recover from disasters
PDMG	Pre-Disaster Mitigation Grant, a grant to help prepare for future disasters
PSIS	Paschal Sherman Indian School, a Bureau of Indian Education boarding school on the reservation managed by the Colville Tribe
PUD	Public Utility District (Power Company)
RCW	Revised Code of Washington
SAR	Search and Rescue
SHELDUS	Spatial Hazard Events and Losses Database for the United States
SR	State Route, an abbreviation for a Washington State highway followed by the route number
TEK	Traditional Ecological Knowledge, a reference to cultural and environmental knowledge handed down by elders to younger Tribal members
THIRA	Threat and Hazard Identification and Risk Assessment; replaces HIVA
TOSHA	Tribal Occupational Safety and Health Administration
Tribe/Tribal	Refers to the Confederated Tribes of the Colville Reservation
Trust status	Lands in trust status have land titles that are held “in trust” by the United States government for the Tribe and/or individual Tribal members
USC	United States Code, the nationwide code of federal law
USGS	United States Geological Survey, a bureau of the DOI
WA EMD	Washington State Emergency Management Division
WNV	West Nile Virus, mosquito-borne equine disease that also infects humans
WSU Extension	Washington State University’s extension service on the reservation
WUI	Wildland-Urban Interface, a reference to homes and infrastructure built in a wildland fire-susceptible area

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