# Confederated Tribes of Warm Springs Reservation
# Natural Hazard Mitigation Plan

Image Source: Warm Springs Forest Products Industries

**July 2016**

**Volume I: Basic Plan**

**Prepared for:**

**CTWS Emergency Management**

**Prepared by:**

University of Oregon
Community Service Center
Oregon Partnership for Disaster Resilience

UNIVERSITY OF OREGON

CSC
Community Service Center

OREGON PARTNERSHIP FOR DISASTER RESILIENCE

This Natural Hazard Mitigation Plan was prepared by:

CSC
Community Service Center

OREGON PARTNERSHIP FOR DISASTER RESILIENCE

With support from:

UNIVERSITY OF OREGON

PPPM
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# SPECIAL THANKS & ACKNOWLEDGEMENTS

The Confederated Tribes of Warm Springs Reservation (CTWS) developed this Indian Tribal Natural Hazards Mitigation Plan (NHMP) with funding provided by the Federal Emergency Management Agency's Pre-Disaster Mitigation Competitive Grant Program. FEMA awarded the grant to support the update of the natural hazards mitigation plan. The CTWS planning process utilized a four-phased planning process, plan templates and plan development support provided by the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center. This project would not have been possible without technical and in-kind staff support provided by the CTWS.

Special thanks to Dan Martinez, CTWS Emergency Manger, for his leadership in convening the committee and to Neil MorningOwl for his support in developing this NHMP.

## CTWS NHMP Update Peer Group

| | |
|---|---|
| Convener, Dan Martinez | Emergency Manager |
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| Don Courtney | General Manager, Public Utilities |
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| Fay Hurtado | Human Services Administration |
| Bill Lang | Facility Manager, Public Utilities |
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| Neal MorningOwl | Student, Emergency Management |
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## Community Service Center Team

- Josh Bruce, OPDR Director
- Michael Howard, Assistant Program Director
- Julie Foster, Grant's Administrator

## Additional Thanks:

To the Oregon Department of Land Conservation and Development staff in the hazards, and Risk Map programs for flood data, mapping, and process support.

## About the Community Service Center

The Community Service Center (CSC), a research center affiliated with the Department of Planning, Public Policy, and Management at the University of Oregon, is an interdisciplinary organization that assists Oregon communities by providing planning and technical assistance to help solve local issues and improve the quality of life for Oregon residents. The role of the CSC is to link the skills, expertise, and innovation of higher education with the transportation, economic development, and environmental needs of communities and regions in the State of Oregon, thereby providing service to Oregon and learning opportunities to the students involved.

## About the Oregon Partnership for Disaster Resilience

The Oregon Partnership for Disaster Resilience (OPDR) is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster-resilient and sustainable state. Developed and coordinated by the Community Service Center at the University of Oregon, the OPDR employs a service-learning model to increase community capacity and enhance disaster safety and resilience statewide.

## Plan Template Disclaimer

This Natural Hazards Mitigation Plan is based in part on a plan template developed by the Oregon Partnership for Disaster Resilience. The template is structured to address the requirements contained in 44 CFR 201.6 (and modified to meet requirements of 44 CFR 201.7); where language is applicable to communities throughout Oregon, OPDR encourages the use of standardized language. OPDR hereby authorizes the use of all content and language provided to the Confederated Tribes of Warm Springs Reservation in the plan template.

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# PLAN SUMMARY

The Confederated Tribes of Warm Springs Reservation (CTWS) developed this Tribal Natural Hazards Mitigation Plan (NHMP or Plan) in an effort to prepare for the long-term effects resulting from natural hazards. It is impossible to predict exactly when these hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to create a resilient community that will benefit from long-term recovery planning efforts.

*44 CFR 201.7 – The Indian Tribal Mitigation Plan is the representation of the Indian tribal government's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to*

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk." Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as non-English speaking residents or the elderly. Natural hazard mitigation is the responsibility of the "Whole Community" - individuals, private businesses and industries, state and local governments, and the federal government.

## Why Develop this Mitigation Plan?

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved Natural Hazard Mitigation Plan (NHMP) in order to receive federal funds for mitigation projects. Tribal and federal approval of this Plan ensures that the Confederated Tribes of Warm Springs Reservation will remain eligible for pre- and post-disaster mitigation project grants.

*44 CFR 201.7(a)(1) – Indian tribal governments applying to FEMA as a grantee must have an approved Tribal Mitigation Plan meeting the requirements of this section as a condition of receiving non-emergency Stafford Act assistance and FEMA mitigation grants.*

**What is Mitigation?**

"Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event."

- U.S. Federal Emergency Management Agency

# Who Participated in Developing the Plan?

The CTWS NHMP is the result of a collaborative effort between the Tribal government, citizens, public agencies, non-profit organizations, the private sector, and regional organizations. The Peer Group guided the Plan development process. Members of the Peer Group are identified in the acknowledgements section of this NHMP.

The CTWS Emergency Manager convened the planning process and will take the lead in implementing, maintaining, and updating the plan. The Confederated Tribes of Warm Springs Reservation is dedicated to directly involving the public in the continual review and update of the natural hazards mitigation plan. Although members of the Peer Group represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan throughout the implementation and maintenance period.

*44 CFR 201.7(c)(1) – Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

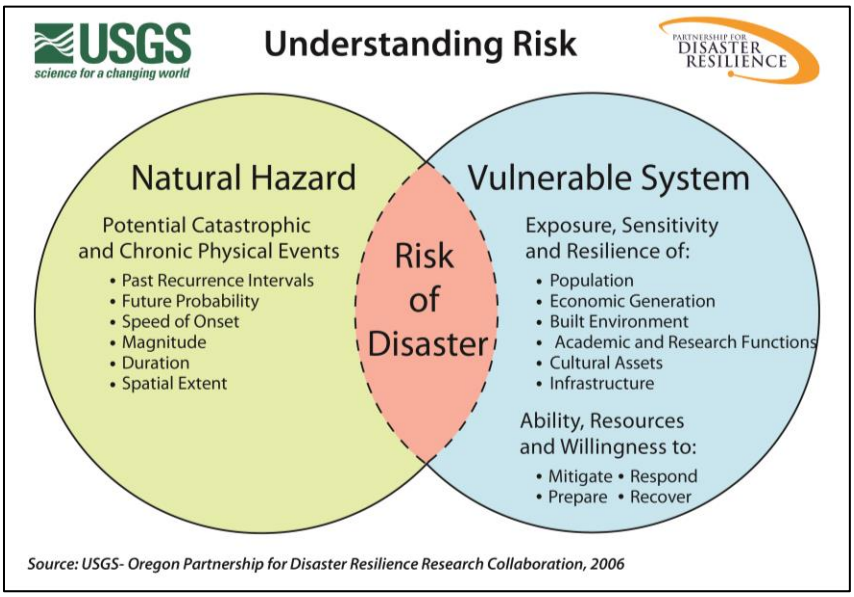
The Confederated Tribes of Warm Springs Reservation will ensure continued public involvement by posting the NHMP on their website. The Plan will also be archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive.

# How Does this Mitigation Plan Reduce Risk?

*44 CFR 201.7(c)(2) – A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards.. . .*

The NHMP is intended to assist the Confederated Tribes of Warm Springs Reservation reduce the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the reservation lands. A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

**Figure PS-1 Understanding Risk**




Source: Oregon Partnership for Disaster Resilience.

By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capacity, the CTWS is better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

# What is CTWS' Overall Risk to Natural Hazards?

The CTWS Peer Group reviewed and updated their risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. Table PS-1 below summarizes hazard probability and vulnerability as determined by the county Peer Group (for more information see Section 2, Risk Assessment).

**Table PS-1 Risk Assessment Summary**

| Hazard | Probability | Vulnerability | Total Threat Score | Hazard Rank |
|---|---|---|---|---|
| Wildfire | High | High | 240 | #1 |
| Winter Storm | High | High | 230 | #2 |
| Flood - Riverine | High | High | 224 | #3 |
| Drought | High | Moderate | 205 | #4 |
| Windstorm | High | Moderate | 177 | #5 |
| Cascadia Earthquake | Moderate | High | 171 | #6 |
| Volcano | Low | Moderate | 158 | #7 |
| Crustal Earthquake | Low | Moderate | 104 | #8 |
| Landslide | Low | Low | 82 | #9 |

Source: The CTWS NHMP Peer Group, 2015

At the end of this section hazard briefs provide summary information for priority hazards.

# What is the Plan's Mission?

The mission of the Confederated Tribes of Warm Springs Reservation NHMP is:

*To promote sound public policy designed to protect tribal members, critical facilities, infrastructure, private property, and the environment from natural hazards.*

*44 CFR 201.7(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

# What are the Plan Goals?

The Plan goals describe the overall direction that the participating jurisdiction's agencies, organizations, and citizens can take toward mitigating risk from natural hazards. Below is a list of the plan goals:

**Goal 1:** Protect life and injury resulting from natural hazards.

**Goal 2:** Minimize the impact of natural hazards while protecting, restoring, and sustaining environmental processes.

**Goal 3:** Minimize Tribal and private property damages and the disruption of essential infrastructure and services from natural hazards.

**Goal 4:** Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.

**Goal 5:** Increase the resilience of the Confederated Tribes of Warm Springs Reservation and their economy.

**Goal 6:** Minimize damage to historic and cultural resources.

**Goal 7:** Reduce development within mapped hazardous areas where the risks to people and property cannot be mitigated.

**Goal 8:** Increase communication, collaboration, and coordination among agencies at all levels of government and the private sector to mitigate natural hazards.

**Goal 9:** Integrate NHMP with the Peoples Plan and implementing measures.

(Note: although numbered the goals are not prioritized.)

# How are the Action Items Organized?

Data collection, research and the public participation process resulted in the development of mitigation action items. The Action Items identify the CTWS mitigation strategy and draw linkages between the plan goals and community vulnerabilities. The action items are included within Section 3, Mitigation Strategy.

*44 CFR 201.7(c)(3)(ii) – A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, . . .*

# Comprehensive Action Plan

The following table summarizes specific **priority** NHMP actions. Refer to the Mitigation Strategy section for a complete list of actions.

### Table PS-2: High Priority NHMP Actions

| Action | Priority Mitigation Actions |
|---|---|
| MH #1 | Integrate natural hazard mitigation efforts into the People's Plan, building codes, and development regulations. |
| MH #2 | Enhance and deliver education programs aimed at increasing awareness and mitigating the risk posed by hazards. At least twice each year a) provide information about the NHMP, b) describe progress toward implementation, and c) collect feedback on the NHMP from audiences. Accomplish these tasks by supporting Community Emergency Response Team programs/ training events that also include a mitigation component. |
| MH #3 | Develop a plan and seek funding for backup electric and telecommunications systems for critical facilities. |
| MH #4 | Develop a community evacuation plan to address multiple hazards. Develop routes, consistent advanced warning notification system, and community awareness plan. |
| MH #5 | Over the next five years, a) develop a prioritized list of critical public facilities, consistent with the Critical Infrastructure and Key Resources developed by the Federal Emergency Management Agency (FEMA), such as underground wastewater and stormwater collection and conveyance systems, radio communication systems, fire stations, schools and other buildings to be inspected for hazard vulnerability, b) develop a prioritization of facilities to be evaluated for hazard risk, c) seek funding for evaluations, d) develop a prioritized list of facilities/ services to be retrofitted, relocated, or replaced, e) secure funding for 2-3 retrofit projects per year. |
| MH #6 | Over the next five years, a) identify critical transportation corridors (including primary emergency, evacuation, and access routes) and electric distribution routes b) develop a list of key backbone transmission and distribution routes that serve critical customers and enable efficient restoration to the broader distribution system c) develop a long-term plan to underground, relocate, or "harden" key electric distribution lines along critical corridors (including feasibility assessment and prioritization) d) seek funds and opportunities to relocate power poles and power lines, or harden existing facilities, where feasible and appropriate, to reduce interruption to the transportation system and to reduce risk of outages from severe winter storms, windstorms, or earthquakes. |
| MH #7 | Utilize the final multi-hazard risk report and assessment currently being developed by FEMA through the Risk MAP program to update the CTWS Hazard Analysis. |
| FL #1 | Update the stormwater management plan to include regulations to control runoff; both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides. |
| FL #2 | Identify and analyze repetitively flooded structures and infrastructure. Explore mitigation opportunities for repetitively flooded properties and, if necessary, carry out acquisition, relocation, elevation, and flood- proofing measures to protect these properties. |
| FL #3 | Update the Flood Insurance Study, Flood Insurance Rate Maps, and revisit development codes to determine if floodplain standards are still adequate. |
| LS #1 | Create comprehensive geological mapping to areas prone to landslides and rockslides. |
| LS #2 | Use available data to determine areas and buildings at risk to landslides and propose Peoples Plan and land use policies accordingly. |
| LS #3 | Develop a vegetation management plan. Proper vegetation can supply slope- stabilizing root strength, and facilitate in intercepting precipitation. |
| LS #4 | Identify problem areas and implement stream stabilization measures to reduce the effects of erosion. |
| WF #1 | Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques. |
| WF #2 | Continue to conduct education/ outreach for creating defensible space around properties in wildland fire hazard areas. |
| WF #3 | Identify and inventory emergency water supplies; utilize GPS to map locations and available supply. At the beginning of fire season share this information with Fire Management. |
| WF #4 | Reduce fuels and develop community fuel breaks in high risk, high priority wildland urban interface areas. |
| WF #5 | Utilize national urban interface programs, including the Firewise Communities program, which emphasizes community responsibility for planning in the design of a safe community as well as effective emergency response and individual responsibility for safer homes. |

Source: The CTWS NHMP Peer Group, 2015

# How will the plan be implemented?

The implementation and maintenance section details the formal process that will ensure that the CTWS NHMP remains an active and relevant document (Section 4). The CTWS Emergency Manager is the designated NHMP Peer Group convener (Plan Convener) and is responsible for overseeing the review and implementation processes. The Plan maintenance process includes a schedule for monitoring and evaluating the Plan semi-annually and producing a plan revision every five years. This section also describes how the communities will integrate public participation throughout the plan maintenance process.

# Plan Adoption

*44 CFR 201.7(c)(5) – Documentation that the plan has been formally adopted by the governing body of the jurisdiction . . .*

*44 CFR 201.7(d) – Plan review [process] . . .*

This NHMP meets the requirements of Section 409 of the Stafford Act and Section 322 of the DMA 2000. In addition, as required by 44 CFR 13.11(c) and 44 CFR 13.11(d) the CTWS will comply with all applicable Federal statutes and regulations during the periods for which it receives grant funding, as well as amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes. A copy of the resolution, adopted by the Tribal Council, assures FEMA that the Confederated Tribes will comply with both of the CFR requirements.

Once the Plan is locally reviewed and deemed complete the Plan Convener submits it to the Federal Emergency Management Agency (FEMA – Region X) for review. This review will address the federal criteria outlined in 44 CFR Part 201.7. Once the Plan is pre-approved by FEMA, the CTWS Tribal Council will formally adopt the Plan. The Plan Convener will be responsible for ensuring local adoption of the NHMP and provide the support necessary to ensure plan implementation. Once the resolution is adopted and documentation is provided to FEMA, the Plan is formally acknowledged by FEMA and the CTWS will re-establish eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance Program funds.

The accomplishment of the NHMP goals and actions depends upon regular Peer Group participation and adequate support from Tribal Government. Thorough familiarity with this Plan will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.

The Confederated Tribes of Warm Springs Reservation adopted the plan on **August 8, 2016**

FEMA Region X approved The Confederated Tribes of Warm Springs Reservation NHMP on **September 29, 2016**. With approval of this Plan, the CTWS is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through **September 28, 2021**.

**RESOLUTION NO. 12,205**

**WHEREAS,** The Confederated Tribes of Warm Springs Reservation recognizes the threat that natural hazards pose to people, property and infrastructure within the community; and,

**WHEREAS,** Undertaking hazard mitigation actions will reduce the potential for harm to people, property and infrastructure from future hazard occurrences; and,

**WHEREAS,** An adopted Natural Hazards Mitigation Plan (NHMP) is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post- disaster mitigation grant programs; and,

**WHEREAS,** The NHMP is comprised of two main elements: Basic Plan and Mitigation Resources, collectively referred to herein as the *Confederated Tribes of Warm Springs Reservation Natural Hazards Mitigation Plan*; and,

**WHEREAS,** The Confederated Tribes of Warm Springs Reservation fully participated in the FEMA prescribed mitigation planning process to prepare this NHMP; and,

**WHEREAS,** The FEMA Region X officials reviewed the *Confederated Tribes of Warm Springs Reservation Natural Hazards Mitigation Plan* and pre-approved it (dated, July 21, 2016) contingent upon this official adoption; and,

**WHEREAS,** The NHMP is in an on-going cycle of development and revision to improve its effectiveness; and,

**WHEREAS,** The Tribal Council adopts the NHMP and directs the tribal government to develop, approve and implement the mitigation strategies and any administrative changes to the NHMP; now, therefore,

**BE IT RESOLVED,** By the ($27^{th}$) Tribal Council of the Confederated Tribes of the Warm Springs Reservation of Oregon, hereby adopts the *Confederated Tribes of Warm Springs Reservation Natural Hazard Mitigation Plan* as an official plan with assurance that the Confederated Tribes of Warm Springs Reservation will continue to comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding in compliance with 44 CFR 13.11 and will amend this plan if necessary to reflect changes in state or federal statutes and regulations as required in 44 CFR 13.11 (d); and,

**BE IT FURTHER RESOLVED,** That the Confederated Tribes of Warm Springs Reservation will submit this Adoption Resolution to FEMA Region X officials to enable final approval of the *Confederated Tribes of Warm Springs Reservation hazard Mitigation Plan.*

**CERTIFICATION**

The undersigned as Secretary-Treasurer/CEO of the Confederated Tribes of the Warm Springs Reservation of Oregon, hereby certifies that the Tribal Council is composed of 11 members, of whom 6 constituting a quorum were present at a meeting thereof, duly and regularly called, noticed, and convened, and held this 8th day of August, 2016; and that the foregoing resolution was passed by affirmative vote of 4 members, 1 member abstaining, and the Chairman not voting, and that the said resolution has not been rescinded or amended in any way.

Glendon N. Smith
Secretary-Treasurer/CEO

Noted: AUG 1 7 2016

for Dale L. Sebastian
Superintendent

cc: Secretary-Treasures/CEO
Superintendent
Administrative Service Center

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

FEMA

SEP 29 2016

The Honorable Eugene Greene
Chairman, Confederated Tribes of Warm Springs Reservation
P.O. Box C
Warm Springs, Oregon 97761

Dear Chairman Greene:

Congratulations, on September 29, 2016, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA), Region 10, approved the ***Confederated Tribes of Warm Springs Reservation Natural Hazards Mitigation Plan*** as a Tribal Mitigation Plan, in accordance with Code of Federal Regulation Title 44 Part 201.

This approval provides the Confederated Tribes of Warm Springs Reservation eligibility to apply directly to FEMA for non-emergency Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) programs, i.e., Pre-Disaster Mitigation grants, Public Assistance (Categories C-G), Fire Management Assistance, and Hazard Mitigation Grant Program (HMGP) projects through September 28, 2021. 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 the date of this letter, Tribes must review, revise as appropriate, and re-submit plans for approval.

FEMA's approval of your updated plan as a Tribal Mitigation Plan provides the Confederated Tribes of Warm Springs Reservation's continued availability of eligibility to apply for various Stafford Act programs. FEMA individually evaluates all application requests for funding according to the specific eligibility requirements of the applicable program. Moreover, a mitigation action identified in the approved plan may, or may not, meet the eligibility requirements for HMGP funding.

For your assistance, FEMA has designated staff to aid Tribes with specific program requirements and/or eligibility questions. Please contact Braden Allen, Hazard Mitigation Assistance Programs Specialist at 425-487-4749 and/or Regional Tribal Liaison, Erin Ward at 425-487-4567.

We look forward to continuing a productive relationship between FEMA, Region 10, and the Confederated Tribes of Warm Springs Reservation. For further assistance, please contact our Regional Mitigation Planning Program Manager, Brett Holt, at 425-487-4553, or Mitigation Division Director, Mark Carey, at 425-487-4687 with any plan specific questions.

Sincerely,

Kenneth D. Murphy
Regional Administrator

cc: Angie Lane, Oregon Office of Emergency Management

BH:vl

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# Volume I:
# Basic Plan

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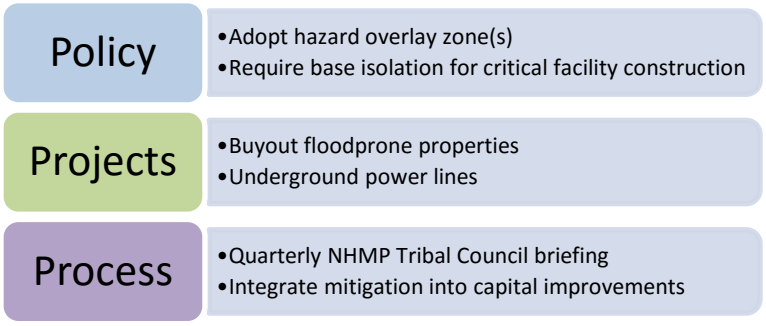
# SECTION I: INTRODUCTION

Section I: Introduction provides a general introduction to natural hazard mitigation planning for the Confederated Tribes of Warm Springs Reservation (CTWS). In addition, it addresses the planning process requirements contained in 44 CFR 201.7(b) thereby meeting the planning process documentation requirement contained in 44 CFR 201.7(c)(1). The section concludes with a general description of how the plan is organized.

## What is Natural Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk."[1] Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies (see Figure 1.1) include policy changes, such as updated land development ordinances; projects, such as seismic retrofits to critical facilities; and process tasks such as quarterly reporting to the Tribal Council on mitigation activities.

**Figure 1-1 Mitigation Strategy Categories**




Source: Oregon Partnership for Disaster Resilience

Natural hazard mitigation is the responsibility of the "Whole Community" - individuals, private businesses and industries, state and local governments, and the federal government. At the local level engaging in mitigation activities provides jurisdictions with a number of benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

[1] FEMA, *What is Mitigation?* http://www.fema.gov/what-mitigation

# Why Develop a Mitigation Plan?

The CTWS developed this Tribal Natural Hazards Mitigation Plan (NHMP or Plan) in an effort to reduce future loss of life and damage to property resulting from natural hazards. It is impossible to predict exactly when natural hazard events will occur, or the extent to which they will affect community assets. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. Tribal and federal approval of this plan ensures that the CTWS will remain eligible for pre- and post-disaster mitigation project grants.

# What Federal Requirements Does This Plan Address?

DMA2K is the latest federal legislation addressing mitigation planning. It reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning for tribal governments. Tribal governments must have approved mitigation plans in place in order to qualify to receive post-disaster HMGP funds. Mitigation plans must demonstrate that tribal governments' proposed mitigation measures are based on a sound planning process that accounts for the risk to the individual and tribal capabilities.

Chapter 44 Code of Federal Regulations (CFR), section 201.7, also requires a tribal government to have an approved mitigation plan in order to receive HMGP project grants.[2] Pursuant of Chapter 44 CFR, the Natural Hazard Mitigation Plan planning processes shall include opportunity for the public to comment on the plan during review, and the updated Natural Hazard Mitigation Plan shall include documentation of the public planning process used to develop the plan.[3] The Natural Hazard Mitigation Plan update must also contain a risk assessment, mitigation strategy, and a plan maintenance process that has been formally adopted by the tribal governing body.[4]

# How was the Plan Developed and Updated?

The CTWS Natural Hazards Mitigation Plan Peer Group developed this NHMP. The CTWS formally convened on three occasions to discuss and revise the plan (see Appendix A for details). Peer Group members contributed data, reviewed and updated the community profile, risk assessment, action items, and implementation and maintenance sections of the plan.

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[2] Code of Federal Regulations, Chapter 44. Section 201.7, subsection (a), 2015

[3] ibid, subsection (b). 2015

[4] ibid, subsection (c). 2015

An open public involvement process is essential to the development of an effective plan. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process should include opportunity for the public, appropriate U.S. Federal agencies, neighboring jurisdictions, local and regional agencies, as well as, private and non-profit entities to comment on the Plan during review.[5] OPDR provided a publicly accessible project website for the general public to provide feedback on the draft NHMP via a web form. In addition, CTWS provided a press release on their websites to encourage the public to offer feedback on the Plan update.

## 2006 NHMP

The original plan was generated by URS and completed in 2006. The following section describes the process that was used for the creation of the first plan.

FEMA tasked URS with providing technical assistance in support of the development of a HMP for the Confederated Tribes of Warm Springs, thus ensuring its eligibility for future HMGP funding for the March 2006 Presidential Disaster Declaration for the Reservation.

For the first step in the planning process URS met with FEMA to discuss the project work plan and hazard mitigation planning in Region X. Next, URS and FEMA met with members of the Confederated Tribes of Warm Springs in Warm Springs, Oregon. During the meeting, URS familiarized the Confederated Tribes with DMA 2000 requirements, the overall planning process, and the estimated work schedule. URS also led the group through a hazard identification and screening exercise. During this process, the tribal members identified six potential hazards. In addition, the tribal members identified Steering Committee participants and a primary point of contact for the Confederated Tribes.

Once the Steering Committee was formed, the following five-step planning process took place from April to June 2006.

**Organize resources:** Members of the Steering Committee identified resources, including the Confederated Tribes of Warm Springs staff, agencies, and local community members, who could provide technical expertise and historical information needed in the development of the HMP.

**Assess risks:** The Steering Committee identified the hazards specific to the Reservation, and URS developed the risk assessment for the six identified hazards. The Steering Committee reviewed the hazard maps and draft risk assessment, prior to and during the development of the mitigation strategy.

**Assess capabilities**: URS and the Steering Committee reviewed current administrative and technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards.

**Develop a mitigation strategy:** After reviewing the risks posed by each hazard, the Steering Committee selected a comprehensive range of potential mitigation goals and actions.

[5] Code of Federal Regulations, Chapter 44. Section 201.7, subsection (b). 2015

Subsequently, the Steering Committee prioritized and ranked the actions to be implemented.

**Monitor progress:** The Steering Committee developed an implementation process to ensure the success of an ongoing program to minimize hazard impacts to the Reservation.

# How is the Plan Organized?

Each volume of the Plan provides specific information and resources to assist readers in understanding the hazard-specific issues facing residents, businesses, and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to reduce or eliminate long-term risk to people and their property from hazards and their effects. This plan structure enables stakeholders to use the section(s) of interest to them.

## Volume I: Basic Plan

### Plan Summary

The plan summary provides an overview of the FEMA requirements plans process and highlights the key elements of the risk assessment, mitigation strategy, and implementation and maintenance strategy. In addition, the plan summary presents short briefing papers for top and middle tier hazards identified in the plan.

### Section 1: Introduction

The Introduction briefly describes the CTWS mitigation planning efforts and the methodology used to develop the Plan.

### Section 2: Risk Assessment and Hazard Identification

Section 2 provides the factual basis for the mitigation strategies contained in Section 3. (Additional information is included within Appendix B, which contains an overall description of the CTWS. This section describes the risk assessment process and summarizes the best available local hazard data. A hazard summary is provided for each of the hazards addressed in the Plan. The summary includes hazard history, location, extent, vulnerability, impacts, and probability (see also the hazard briefs provided in the plan summary).

The Risk Assessment allows readers to gain an understanding of CTWS' sensitivities – those community assets and characteristics that may be impacted by natural hazards, as well as their resilience – the ability to manage risk and adapt to hazard event impacts. Additionally, this section provides information on the CTWS' participation in the National Flood Insurance Program (NFIP). This NHMP addresses: Drought, Earthquake (crustal and Cascadia Subduction Zone), Flood, Landslide, Volcano, Wildfire, Windstorm, and Winter Storm.

### Section 3: Mitigation Strategy

This section documents the Plan vision, mission, goals, and actions (mitigation strategy) and also describes the components that guide implementation of the identified actions. Actions are based on community sensitivity and resilience factors and the hazard vulnerability assessments in Section 2.

### Section 4: Plan Implementation and Maintenance

This section provides information on the implementation and maintenance of the Plan. It describes the process for prioritizing projects, and includes a suggested list of tasks for updating the Plan to be completed at the semi-annual and five-year review meetings.

## Volume II: Appendices

The resource appendices are designed to provide the users of the CTWS NHMP with additional information to assist them in understanding the contents of the mitigation plan, and provide them with potential resources to assist with plan implementation.

### Appendix A: Planning and Public Process

This appendix includes documentation of all the public processes utilized to develop the Plan. It includes invitation lists, agendas, sign-in sheets, and summaries of Peer Group meetings as well as any other public involvement methods.

### Appendix B: Community Profile

The community profile describes the CTWS from a number of perspectives in order to help define and understand their sensitivity and resilience to natural hazards. The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the Reservation when the Plan was updated. Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

### Appendix C: Economic Analysis of Natural Hazard Mitigation Projects

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities. The Oregon Partnership for Disaster Resilience developed this appendix. It has been reviewed and accepted by FEMA as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

### Appendix D: Grant Programs and Resources

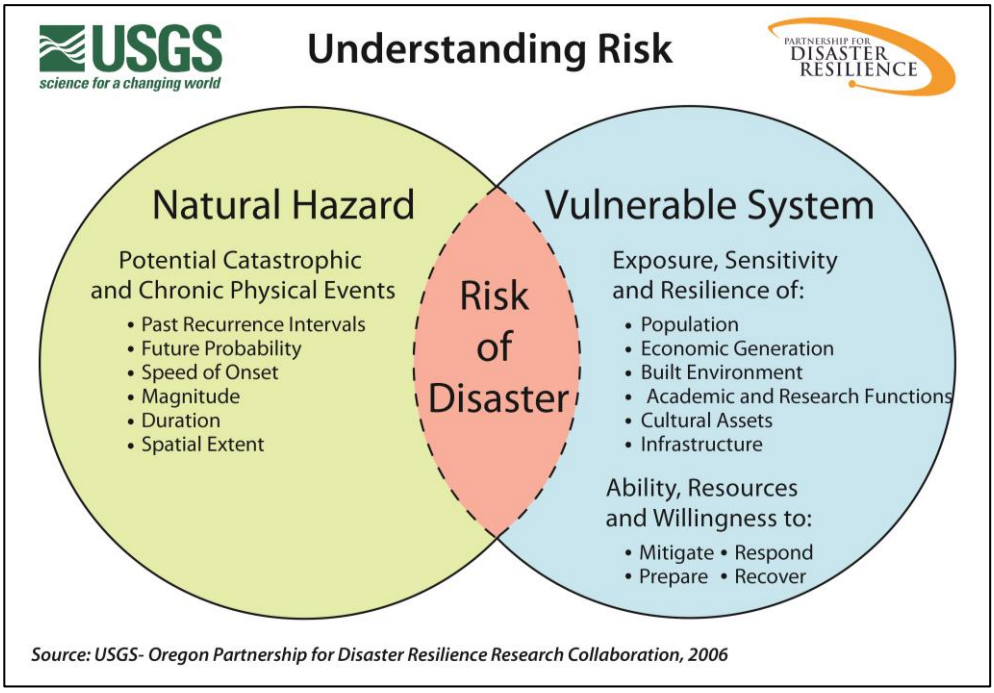
This appendix lists BIA, Federal, state and other resources and programs.

# SECTION 2:
# RISK ASSESSMENT

This section of the NHMP addresses 44 CFR 201.7(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards.

The information presented below, along with the community characteristics presented in the Community Profile Appendix, will be used as the local level rationale for the risk reduction actions identified in Section 3 – Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

**Figure 2-1 Understanding Risk**




Source: Oregon Partnership for Disaster Resilience.

## What is a Risk Assessment?

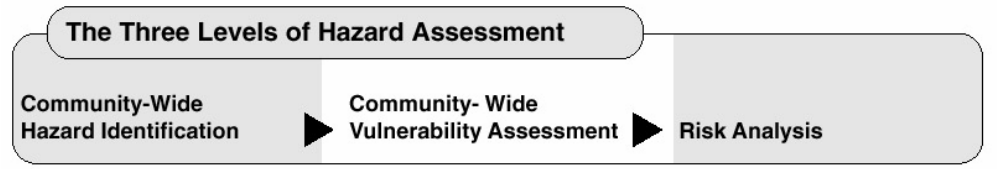
A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis.

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.

- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The following figure illustrates the three-phase risk assessment process:

**Figure 2-2 Three Phases of a Risk Assessment**




Source: Planning for Natural Hazards: Oregon Technical Resource Guide, 1998

This three-phase approach to developing a risk assessment should be conducted sequentially because each phase builds upon data from prior phases. However, gathering data for a risk assessment need not occur sequentially.

## Hazard Identification

The CTWS identifies eight natural hazards that could have a local impact. For specific information pertaining to individual hazards, including location information. Table 2-1 shows the hazards identified in the CTWS, the table also shows regional hazards as identified in the State of Oregon NHMP for the Mid-Columbia Gorge (Region 5) and Central Oregon (Region 6), which include description of regional hazards and infrastructure that may affect the CTWS. The Dust Storm hazard is the only hazard identified in the regional Oregon profiles that is not considered a threat by the CTWS NHMP Peer Group; as such it was not included. It should be noted that the Oregon NHMP does not include detailed information on the impact of hazards upon CTWS.

**Table 2-1 Hazard Identification**

| Confederated Tribes of Warm Springs Reservation | Oregon NHMP: Region 5 (Mid-Columbia) and Region 6 (Central Oregon) |
|---|---|
| Drought | Drought |
| - | Dust Storm |
| Earthquake (Cascadia/ Crustal) | Earthquake (Cascadia/ Crustal) |
| Flood (Riverine) | Flood (Riverine) |
| Landslide | Landslide |
| Volcano | Volcano |
| Wildfire | Wildfire |
| Windstorm | Windstorm |
| Winter Storm | Winter Storm |

Source: CTWS NHMP Peer Group (2015) and Oregon NHMP (2015)

The previous version of this plan profiled the Flood, Landslide, Wildland Fire, and Winter Storms (including Avalanche), with this version of the NHMP the CTWS Peer Group opted to also profile the Drought, Earthquake, Volcano, and Windstorm hazards. In addition, the previous plan profiled the non-natural hazards of Dam Failures and Hazardous Materials

Events, in this version these hazards are described in applicable natural hazards sections (flood, earthquake, winter storm, etc.).

In the next section of this NHMP hazard profiles are presented alphabetically; the order of presentation does not signify the level of importance or risk.

# Drought

**Significant Changes Since Previous Plan:**

The Drought Hazard was not assessed in the 2006 Plan, therefore, this section provides new content.

## Characteristics

Drought can be defined in several ways. The American Heritage Dictionary defines drought as "a long period with no rain, especially during a planting season." Another definition of drought is a deficiency in surface and sub-surface water supplies. In socioeconomic terms, drought is present when a physical water shortage begins to affect people, individually and collectively, and the area's economy.

A drought is a period of drier than normal conditions. Drought occurs in virtually every climatic zone, but its characteristics vary significantly from one region to another. Drought is a temporary condition; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate. The extent of drought events depends upon the degree of moisture deficiency, and the duration and size of the affected area. Typically, droughts occur as regional events.

There are four types of drought: meteorological, agricultural, hydrological and socioeconomic. Meteorological drought is based on the degree of dryness. Agricultural drought focuses the amount of soil moisture versus the needs of the crops. Hydrological drought is associated with shortfalls of surface and subsurface water supply. Socioeconomic drought refers to physical water shortages and its human effect, and occurs when the need for water exceeds the supply resulting in a shortfall.

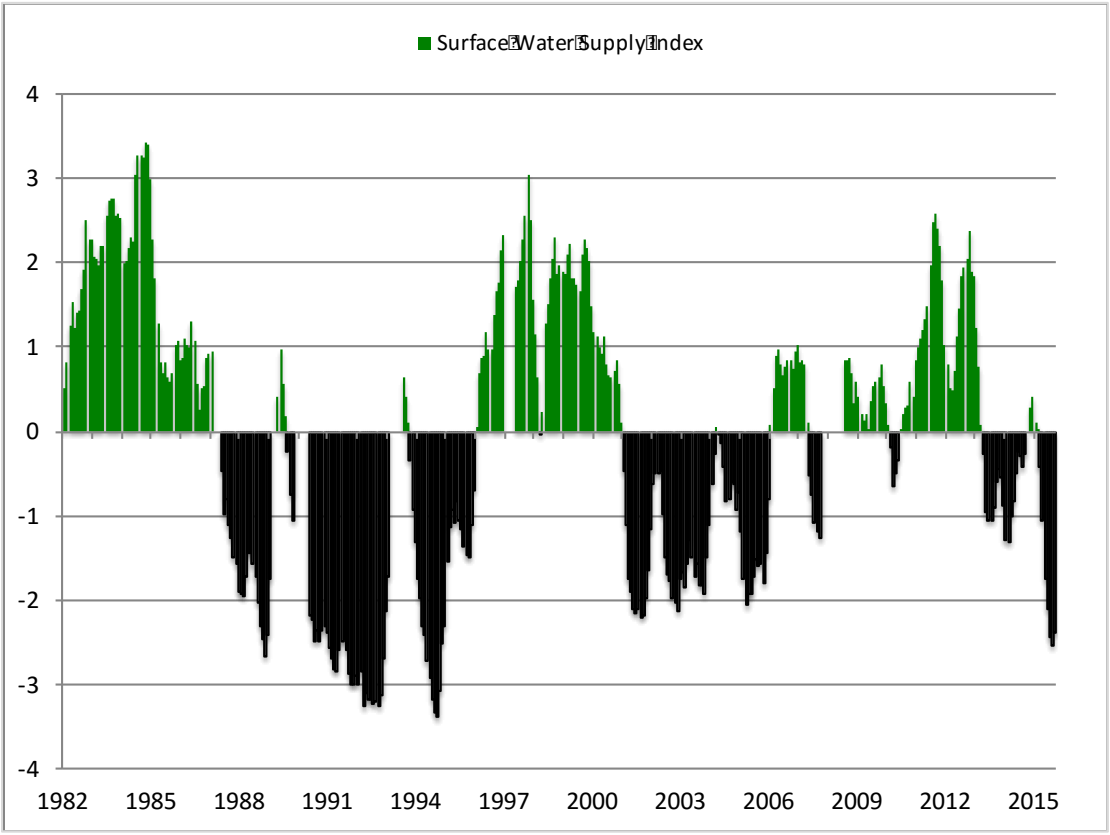
## Location and Extent

Droughts occur in every climate zone, and can vary from region to region. Drought occurs in all parts of CTWS, and may have profound effects on the economy, particularly the agricultural and hydro-power sectors. Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity.

The Surface Water Supply Index (SWSI) from the Natural Resources Conservation Service is an index of current water conditions throughout the state. The index utilizes parameters derived from snow, precipitation, reservoir and stream flow data. The data is gathered each month from key stations in each basin. The lowest SWSI value, -4.1, indicates extreme drought conditions. The highest SWSI value, +4.1, indicates extreme wet conditions. The mid-point is 0.0, which indicates a normal water supply. The table below shows the monthly

history of SWSI values from 1982 to 2015 for the Upper Deschutes Basin which includes the CTWS. Research shows that the periods of drought have fluctuated; a severe drought period occurred from about 1987 to 1996 (with short periods of non-drought), between 2001 and 2006 a period of moderate drought occurred. Since about 2006, conditions in the Upper Deschutes Basin have been near normal or wet, except for a few shorter periods of mild drought conditions (including from mid-2013 to 2015).

**Figure 2-3 SWSI Values for the Upper Deschutes Basin (1982-2015)**




Source: Department of Agriculture-Natural Resources Conservation Service, "Surface Water Supply Index, Upper Deschutes Basin" www.or.nrcs.usda.gov. Accessed November 2015.

## History

Records, dating back to the late 1800s, clearly associate drought with a departure from expected rainfall. Concern for mountain snowpack, which feeds the streams and rivers, came later. Droughts were particularly noteworthy during the following years:

**Table 2-2 History of Droughts**

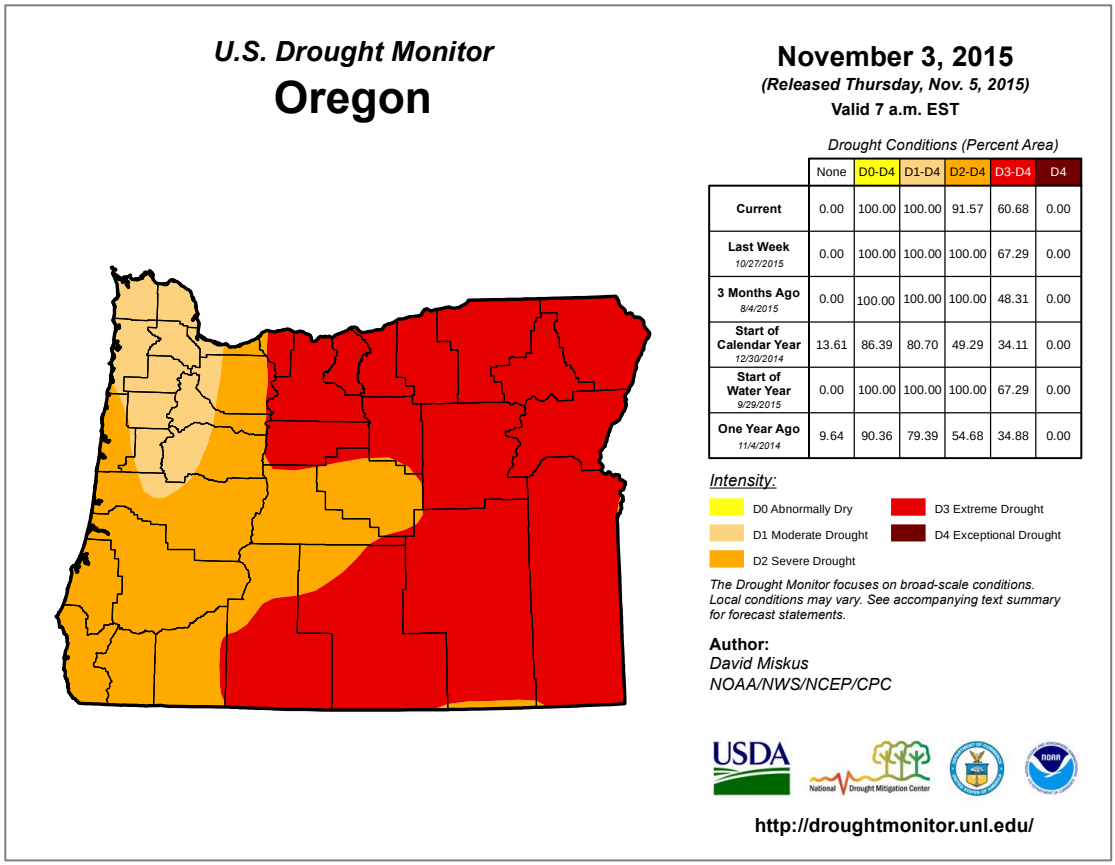
| Date | Location | Characteristics |
|---|---|---|
| 1904-1905 | Statewide | A state-wide drought period of about 18 months |
| 1917-1931 | Statewide | A very dry period puncuated by brief wet spells in 1920-21 and 1927 |
| 1928-1941 | Statewide | A significant drought affected all of Oregon from 1928 to 1941. The prolonged statewide drought created significant problems for the agricultural industry. Punctuated by a three-year intense drought period from 1938-1941. |
| 1959-1964 | Eastern Oregon | Streamflows were low throughout eastern Oregon. |
| 1985-1994 | Statewide | A dry period lasting from 1985 to 1994 caused significant problems statewide. The peak year was 1992, when the state declared a drought emergency. |
| 2000-2001 | Southern, Eastern Oregon | Low snowpack in mountains worsens conditions. |
| 2001-2002 | Southern, Eastern Oregon | Extreme drought conditions in the eastern Oregon region. |
| 2005 | Region 5, 6, and 7 | February 2005 was the driest February on record since 1977, surpassing 2001's conditions. Above normal temperatures contributed to decreased water availability for the summer. Stream and river levels dropped significantly and watermasters regulated live flow use by irrigators. Drought conditions also led to the use of stored water, when it was available . |
| 2015 | Statewide | Extreme drought conditions in the region; 25 Oregon counties declared drought including Marion, Jefferson, and Wasco which surround CTWS. |

Sources: Oregon State Natural Hazard Mitigation Plan 2015; George and Ray Hatton, The Oregon Weather Book (1999), and Oregon Secretary of State's Office, Archives Division.

The figure below shows the CTWS current drought conditions monitor according to the National Drought Mitigation Center at the University of Nebraska, Lincoln. The measurement shown displays the percent area of drought severity conditions. It indicates that CTWS is currently registering D3 extreme drought. The possible impacts of a serve drought are: major crop or pasture losses, widespread water shortages or restrictions.[1]

[1] USDM "U.S. Drought Monitor Classification Scheme"

**Figure 2-4 U.S. Drought Monitor**




Source: National Drought Mitigation Center, University of Nebraska, Lincoln. Droughtmonitor.unl.edu, Accessed November 9, 2015.

## El Niño

El Niño Southern Oscillation (ENSO) weather patterns can increase the frequency and severity of drought. During El Niño periods, alterations in atmospheric pressure in equatorial regions yield an increase in the surface temperature off the west coast of North America. This gradual warming sets off a chain reaction affecting major air and water currents throughout the Pacific Ocean. In the North Pacific, the Jet Stream is pushed north, carrying moisture laden air up and away from its normal landfall along the Pacific Northwest coast. In Oregon, this shift results in reduced precipitation and warmer temperatures, normally experienced several months after the initial onset of the El Niño. These periods tend to last nine to twelve months, after which surface temperatures begin to trend back towards the long-term average. El Niño periods tend to develop between March and June, and peak from December to April. ENSO generally follows a two to seven-year cycle, with El Niño or La Niña periods occurring every three to five years. However, the cycle is highly irregular, and no set pattern exists. The last major El Niño was during 1997-1998, current conditions indicate that 2015 may be a large El Niño weather pattern.

## Future Climate Variability

One of the main aspects of the probability of future occurrences is its reliance on historic climate trends in order to predict future climate trends. The region east of the Cascades is experiencing more frequent and severe droughts than is historically the norm, and many climate predictions see this trend continuing into the future. Temperatures in the Pacific Northwest region increased in the 20th Century by about 1.5 degrees Fahrenheit and are projected to increasingly rise by an average of 0.2 degrees to 1.0 degrees Fahrenheit per decade. Average temperature change by 2040 is projected to be 3.2 degrees Fahrenheit, and by 2080, 5.3 degrees Fahrenheit. Temperature increases will occur throughout all seasons, with the greatest variation occurring during summer months.[2]

## Probability Assessment

Droughts are not uncommon in the State of Oregon, nor are they just an "east of the mountains" phenomenon. They occur in all parts of the state, in both summer and winter. Oregon's drought history reveals many short-term and a few long-term events. The average recurrence interval for severe droughts in Oregon is somewhere between 8 and 12 years. Based on the available data and research the CTWS Peer Group assessed the **probability of experiencing a drought as "high,"** meaning one incident is likely within the next 10 – 35 year period.

## Vulnerabilities

All parts of CTWS are susceptible to drought, however, the following areas and issues are of particular concern:

- Drinking water system
- Power and water enterprises
- Residential wells in rural areas, particularly Sidwalter and Seekseequa
- Fire response capabilities
- Fish and wildlife, huckleberries, roots

Potential impacts to community water supplies are the greatest threat. Long-term drought periods of more than a year can impact forest conditions and set the stage for potentially destructive wildfires. The CTWS Peer Group rated the Reservation as having **a "moderate" vulnerability to drought hazards**, meaning between 1-10% of the region's population or assets would be affected by a major emergency or disaster.

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

## Mitigation Actions

Priority: MH #1, MH #2

Potential: MH #10

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[2] Climate Impacts Group, "Climate Change," http://cses.washington.edu

# Earthquake

**Significant Changes Since Previous Plan:**

The Earthquake Hazard was not assessed in the 2006 Plan, therefore, this section provides new content.

## Characteristics

The Pacific Northwest in general is susceptible to earthquakes from four sources: 1) the offshore Cascadia Subduction Zone; 2) deep intraplate events within the subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate, and 4) earthquakes associated with volcanic activity.

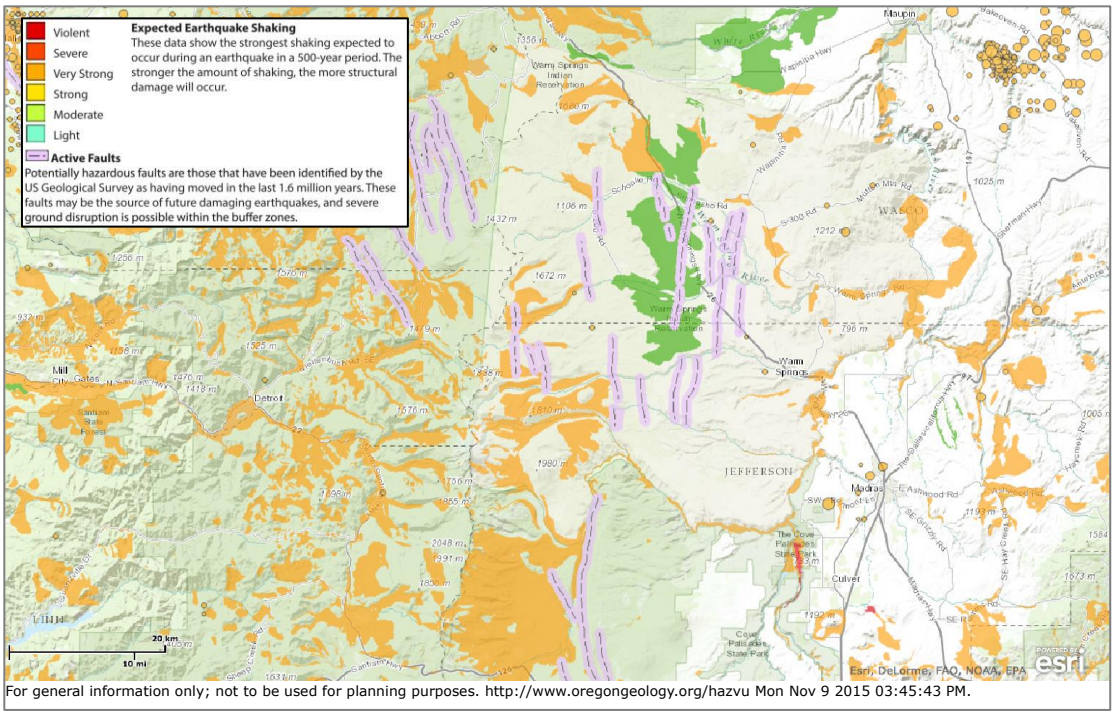
All types of earthquakes in the region have some tie to the subducting, or diving, of the dense, oceanic Juan de Fuca Plate under the lighter, continental North American Plate. There is also a link between the subducting plate and the formation of volcanoes some distance inland from the offshore subduction zone.

## Location and Extent

There have been several significant recent earthquakes in the region; however all have been located in Klamath and Lake Counties in southern Oregon. The region has also been shaken historically by crustal and intraplate earthquakes and prehistorically by subduction zone earthquakes centered outside Central Oregon. All considered, there is good reason to believe that the most devastating future earthquakes would probably originate along shallow crustal faults in the region, or along the offshore Cascadia Subduction Zone.

As the following figure shows, the region routinely has small earthquake events. The earthquakes shown in the figure below are relatively insignificant events below M 2.0 (primarily SE of Maupin to the northeast of the reservation). The larger events may have been slightly felt but little to no structural/property damage resulted. There is no historic record of significant crustal earthquakes centered in the CTWS in the past 150 years.

**Figure 2-5 Earthquake Epicenters (1971-2008) and Soft Soils**




Source: Oregon HazVu: Statewide Geohazards Viewer (HazVu), accessed November 8, 2015

The Oregon Department of Geology and Mineral Industries (DOGAMI), in partnership with other state and federal agencies, has undertaken a rigorous program in Oregon to identify seismic hazards, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. DOGAMI has published a number of seismic hazard maps that are available for communities to use. The maps show liquefaction, ground motion amplification, landslide susceptibility, and relative earthquake hazards. OPDR used the DOGAMI Statewide Geohazards Viewer to present visual maps of recent earthquake activity and liquefaction (Figure 2-5); ground shaking is expected to be higher in the areas marked by soft soils in the map above. The severity of an earthquake is dependent upon a number of factors including: 1) the distance from the earthquake's source (or epicenter); 2) the ability of the soil and rock to conduct the earthquake's seismic energy; 3) the degree (i.e., angle) of slope materials; 4) the composition of slope materials; 5) the magnitude of the earthquake; and 6) the type of earthquake.

## History

A summary of significant earthquake events in the CTWS/ Central Oregon region is found in the table below.

**Table 2-3 Selected Earthquakes, M 5.0+ (1971-2015)**

| Date | Location | Magnitude | Comments |
|---|---|---|---|
| Approximate years: 1400 BCE, 1050, BCE 600 BCE 400, 750, 900 | Offshore, Cascadia subduction zone | Probably 8.0-9.0 | Based on studies of earthquakes and tsunamis in Willapa Bay, WA. These are the midpoints of the age ranges for these six events. |
| January 1700 | Offshore, Cascadia Subduction zone | Approximately 9.0 | Generated a tsunami that struck Oregon, Washington and Japan; destroyed Native American villages along the coast. |
| April 1906 | North of Lakeview, OR | 5.0 | Three felt aftershocks. |
| April 1920 | Crater Lake | 5.0 | |
| January 1923 | Lakeview, OR | 6.0 | |
| March 1958 | Southeast of Adel, OR | 4.5 | Damage unknown |
| 1968 | Adel | 4.7-5.1 | Damage to homes. 20 earthquakes of M4 or greater were recorded between 5/28/68 & 6/24/68. |
| September 20, 1993 | Klamath County | 5.9 and 6.0 | Two deaths, $10 million damage, including county courthouse; rockfalls induced by ground motion. |

Source: Ivan Wong and others, "A Look Back at Oregon's Earthquake History, 1841-1994," in Oregon Geology, (1995), 125-139; Niewendrop and others, "Map of Selected Earthquakes fore Oregon, 1841 through 2002," DOGAMI, (2003).

## Probability Assessment

The Cascadia Subduction Zone (CSZ) generates an earthquake on average every 500-600 years. However, as with any natural processes the average time between events can be misleading. Some of the earthquakes may have been 150 years apart while some closer to 1,000 years apart.[3] Establishing a probability for crustal earthquakes is difficult given the small number of historic events in the region. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable.

Based on the available data and research the CTWS Peer Group determined that the **probability of experiencing a crustal earthquake is "low",** meaning one incident is likely within the next 75 – 100 year period; the Peer Group also determined that the **probability of experiencing a Cascadia earthquake is "moderate"**, meaning one incident is likely within the next 35 – 75 year period.

## Vulnerabilities

Accurate data is being developed for the earthquake hazard as part of the FEMA led Risk MAP project currently underway. At t his time it is assumed that significant Infrastructure (road, bridge, utility), residential, and commercial building damages are expected with a crustal or Casacadia earthquake event.

[3] Y. Wang & J.L. Clark, Special Paper 29, Earthquake Damage in Oregon: Preliminary Estimates of Future Earthquake Losses. 1999. DOGAMI.

The CTWS Peer Group rated the Reservation as having a **"moderate" vulnerability to the crustal earthquake hazard**, meaning between 1-10% of the region's population or assets would be affected by a major emergency or disaster; the Peer Group rated the Reservation as having a **"high" vulnerability to the Cascadia earthquake hazard,** meaning more than 10% of the region's population or assets would be affected by a major emergency or disaster.

As part of the update of this NHMP the Peer Group will utilize the final multi-hazard risk report and hazard assessment currently being developed through FEMA's Risk MAP program to update the CTWS Hazard Analysis for this hazard (Multi-hazard #13).

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

### Mitigation Actions

Priority: MH #1, MH #2, MH #3, MH #4, MH #5, MH #6, MH #7

Potential: EQ #1, MH #9, #10, #12

## Flood

**Significant Changes Since Previous Plan:**

The Flood Hazard section includes updated national flood insurance program (NFIP), and history information. The CTWS flood maps are out of date; an update of this section should occur following when new data is available. In addition, the format of the section and minor content changes have occurred.

### Characteristics

Flooding is the accumulation of water where usually none occurs or the overflow of excess water from a stream, river, lake, reservoir, or coastal body of water onto adjacent floodplains. Floodplains are lowlands adjacent to water bodies that are subject to recurring floods. Floods are natural events that are considered hazards only when people and property are affected.

Nationwide, floods result in more deaths than any other natural hazard. Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also

accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.
- Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.
- Release of sewage and hazardous or toxic materials as wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed.

Floods also result in economic losses through closure of businesses and government facilities, disrupt communications, disrupt the provision of utilities such as water and sewer service, result in excessive expenditures for emergency response, and generally disrupt the normal function of a community.

On the Reservation, the most common type of flooding event is riverine flooding, also known as overbank flooding. Riverine floodplains range from narrow, confined channels in the steep valleys of mountainous and hilly regions, to wide, flat areas in plains. The amount of water in the floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, and land use characteristics. Flooding in steep, mountainous areas is usually confined, strikes with less warning time, and has a short duration. Larger rivers typically have longer, more predictable flooding sequences and broad floodplains.

In addition to riverine flooding, the Reservation is susceptible to flash flooding. Flash flood is a term widely used by experts and the general population, but no single definition or clear means of distinguishing flash floods from other riverine floods exists. Flash floods are generally understood to involve a rapid rise in water level, high velocity, and large amounts of debris, which can lead to significant damage that includes the tearing out of trees, undermining of buildings and bridges, and scouring of new channels. The intensity of flash flooding is a function of the intensity and duration of rainfall, steepness of the watershed, stream gradients, watershed vegetation, natural and artificial flood storage areas, and configuration of the streambed and floodplain. Dam failure may also lead to flash flooding (see Related Hazards section below for more information). Urban areas are increasingly subject to flash flooding due to the removal of vegetation, installation of impermeable surfaces over ground cover, and construction of drainage systems. Wildfires that strip hillsides of vegetation and alter soil characteristics may also create conditions that lead to flash floods and debris flows. Debris flows are particularly dangerous due to the fact that they generally strike without warning and are accompanied by extreme velocity and momentum.

Finally, localized flooding may occur outside of recognized drainage channels or floodplains due to a combination of locally heavy precipitation, increased surface runoff, and inadequate facilities for drainage and stormwater conveyance. Such events frequently occur in flat areas and in urbanized areas with large impermeable surfaces. Local drainage may result in “nuisance flooding,” in which streets or parking lots are temporarily closed, and minor property damage.

Because the effects are not widespread and damage is typically minimal, they are not studied in detail as part of this NHMP.

## Location and Extent

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as streamflow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

Factors contributing to the frequency and severity of riverine flooding include the following:

- Rainfall intensity and duration
- Antecedent moisture conditions
- Watershed conditions, including steepness of terrain, soil types, amount and type of vegetation, and density of development
- The existence of attenuating features in the watershed, including natural features such as swamps, glacial dams, and lakes and human-built features such as dams
- The existence of flood control features, such as levees and flood control channels
- Velocity of flow
- Large landslides from canyon walls
- Availability of sediment for transport, and the erodability of the bed and banks of the watercourse

These factors are evaluated using a hydrologic analysis to determine the probability that a discharge of a certain size will occur; and a hydraulic analysis to determine the characteristics and depth of the flood that results from that discharge.

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a probability of occurrence of 1 percent in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the NFIP. The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements. FEMA prepared FIRMs for the Reservation in April 2002.

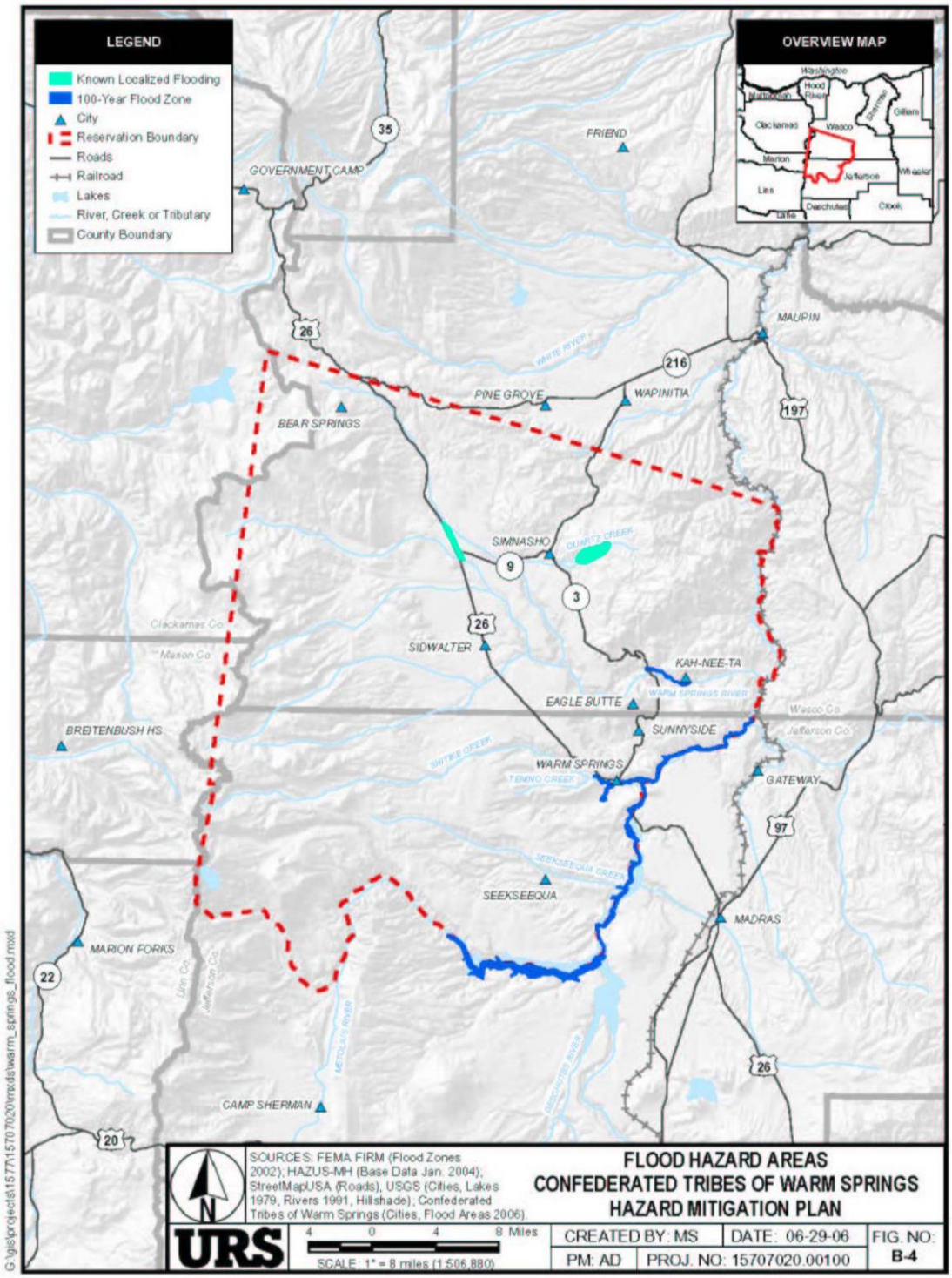
The Flood Insurance Study (FIS, FEMA 2005) for the Reservation shows the identified SFHAs for the following flooding sources in the Reservation boundaries:

- Warm Springs River, which is the largest tributary of the Deschutes River on the Reservation, has a drainage area of 530 square miles and a 100-year peak discharge of 8,000 cubic feet per second (cfs).
- Shitike Creek has a drainage area of 105 square miles, including Tenino Creek, and a 100- year peak discharge of 2,000 cfs.
- Tenino Creek has a drainage area of 21 square miles, and a 100-year peak discharge of 650 cfs.

Using information provided by the FIS and the Confederated Tribes of Warm Springs, Figure 2-6 shows potential flood-prone areas in the Reservation. Warm Springs River, Shitike Creek, and Tenino Creek generally occur during the rainy season during the months of November through February. Severe flooding is usually a result of a combination of rain on snow with

saturated or frozen soil. Therefore, based on previous occurrences, the likelihood of a major flood occurring within the Reservation is every 10 years. Localized flooding, such as along Highway 26 and Quartz Creek, can occur annually.

**Figure 2-6 Flood Hazard Areas**




Source: CTWS HMP (2006); URS

## History

Several large floods have occurred on the Warm Springs River, Shitike Creek, and Tenino Creek within the Reservation, including:

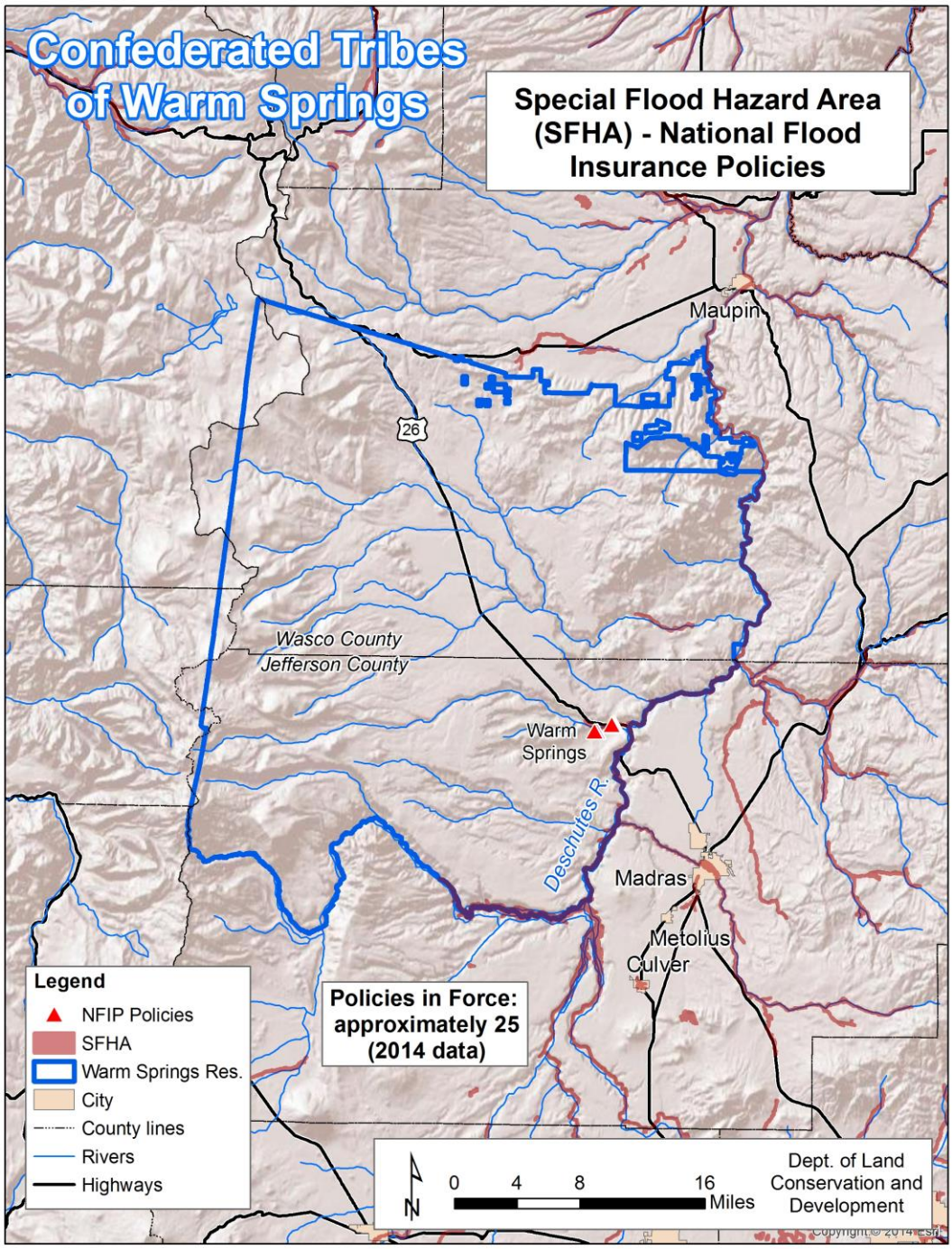
- In the winter of 1964, a 100-year flood event damaged the Kah-Nee-Ta Resort and 24 homes in Warm Springs and washed out portions of Highway 26. Damage on the Reservation was estimated at $903,000.
- In January 1974, flood levels along the Shitike Creek reach a recurrence interval of 60 years. No structural damage was reported.
- In February 1996, during a 4-day period, recording breaking rain in conjunction with warm temperatures and deep snowpack led to severe flooding along the Warm Springs Creek, Shitike Creek, and Tenino Creek. River flood stages were comparable in magnitude to the December 1964 flood, which was the largest in Oregon since flood control reservoirs were built in the 1940s and 1950s. The Reservation received a Federal disaster declaration in February 1996 due to these storms and flooding events (DR-1099).
- On March 20, 2006, the President declared a major disaster under the authority of the Stafford Act for severe storms, flooding, landslides, and mudslides from December 18, 2005, through and including January 21, 2006, in several areas of Oregon, including the Reservation (DR-1632).
- 2012, flood on Badger and Beaver Creeks, Warm Springs River

## National Flood Insurance Program (NFIP)

The CTWS Flood Insurance Rate Maps (FIRMs) were modernized in April 2012 and cover stretches of the Warm Springs River, Shitike Creek, and Tenino Creek. As of November 2015, there are 26 National Flood Insurance Program (NFIP) policies in force and zero (0) paid claims. The CTWS is not a member of the Community Rating System (CRS). The figure below displays the policies and shows that all policies are in the City of Warm Springs.

The Community Repetitive Loss record for CTWS identifies zero repetitive loss buildings, zero severe repetitive loss buildings, and zero total repetitive loss claims.

**Figure 2-7 Repetitive Loss and Severe Repetitive Loss Properties**




Source: Department of Land Conservation and Development, November 2015.

## Related Hazards – Floods due to Dam Failure

A dam failure is the structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. The sudden release of water has the potential to cause human casualties, economic loss, and environmental damage. This type of disaster is dangerous because it can occur rapidly, providing little warning and evacuation time for people living downstream. The flows resulting from dam failure generally are much larger than the capacity of downstream channels and can, therefore, lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment- laden water, flooding over the channel banks, and impact of debris carried by the flow.

### History

Pelton Reregulating Dam, Pelton Dam, and Round Butte Dam, which are located to the south of the Reservation, and Happy Valley Reservoir, which is located on the Reservation, have never failed or been subject to significant damage.

### Location, Extent, and Probability of Future Events

As shown in Figure 2-8, three dams are located outside of the Reservation, about 6 miles west of the city of Madras. These three dams (Round Butte Dam, Pelton Reregulating Dam, and Pelton Dam) are jointly owned by the Confederated Tribes of Warm Springs and Portland General Electric, and are known as the Pelton Round Butte Hydroelectric Project. Round Butte Dam is the largest dam, with a height of 440 feet and a 135,000 acre-feet storage capacity (holding 40 percent of the water stored in the Deschutes basin). This 1964 rockfill dam has been classified as a high hazard dam by the Oregon Water Resources Department. Pelton Dam is the second largest dam of this hydroelectric project, standing 204 feet tall. This 1957 concrete-arch dam has a storage capacity of 37,300 acre-feet and is considered a high hazard dam. Finally, Pelton Reregulating Dam is the smallest of these three dams, with a height of 78 feet and a storage capacity of 3,270 acre-feet. This 1957 concrete and rockfill dam is also classified as a high hazard dam.

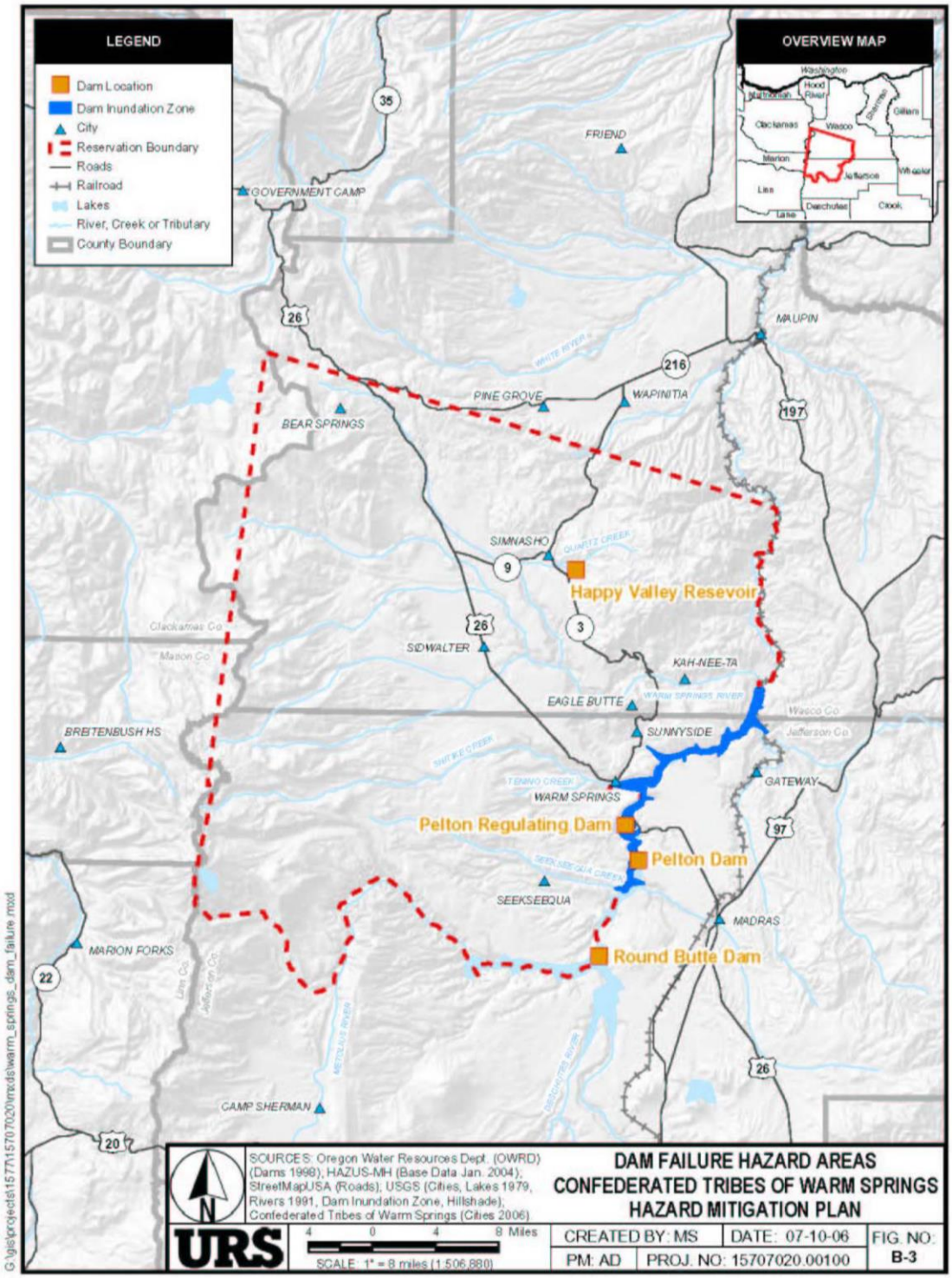
Happy Valley Reservoir is the only dam located on the Reservation. This dam is 45 feet tall and has a storage capacity of 4,750 feet. Oregon Water Resources Department has classified this dam as a high hazard dam.

The United States Geological Survey has prepared dam inundation maps for the failure of Round Butte and the Pelton dams due to lahar flows. As shown in Appendix B, Figure B-3, dam failure models show that floods generated by the breaching of Round Butte Dam would overtop and cause the Pelton dams to fail. As a result of these failures, large flood waves on the lower Deschutes River and its tributaries would inundate Warm Springs.

The depth and duration of these floods are dependant upon the amount of water in the reservoirs. In addition, it is nearly impossible to estimate the probability of dam failure. The annual probability of Pelton Round Butte Hydroelectric Project failure due to the Mount Jefferson eruption is 1 in 15,000 years.

A dam failure inundation map for Happy Valley Reservoir is not available. However, should this dam fail, it would send flood waves down Badger Creek and Pine Hollow Creek.

**Figure 2-8 Dam Failure Hazard Areas**




Source: CTWS HMP (2006); URS

## Probability Assessment

The Federal Emergency Management Agency (FEMA) has mapped the 10, 50, 100, and 500-year floodplains in the Reservation. This corresponds to a 10%, 2%, 1% and 0.2% chance of a certain magnitude flood in any given year. The 100-year flood is the benchmark upon which the National Flood Insurance Program (NFIP) is based.

Based on the available data and research the CTWS Peer Group determined that the **probability of experiencing a flood is "high"**, meaning one incident is likely within the next 10 to 35-year period.

## Vulnerabilities

USGS scientists and US Army Corps of Engineers studies indicate the Reservation is at a low level of risk for catastrophic flooding. The town of Warm Springs and the Indian Head Casino are the most vulnerable identified areas. Although at risk the casino is protected by a levee system that may be vulnerable to undercutting, as part of the FEMA led Risk MAP project a needs evaluation of this system could be performed.

According to the 2006 exposure analysis, utilizing FIRMs prepared for the Confederated Tribes of Warm Springs and US Census blocks, approximately 20 percent of the total area of Warm Springs and Ka-Nee-Ta are at risk to the 100-year flood. Therefore, within this hazard area are approximately 500 tribal members, 133 residential structures (worth $9.4 million), and 15 critical facilities (worth $44.6 million).

### Dams Failure Hazard Areas

According to the United States Geological Survey (USGS), the breaching of Round Butte Dam would overtop and cause the Pelton dams to fail. As a result of these failures, large flood waves on the lower Deschutes River and its tributaries would inundate Warm Springs. According to the 2006 exposure analysis, exposed within these inundation areas are 2,272 tribal members, 600 residential structures (worth $42.2 million) and 24 critical facilities (worth $61.5 million), which includes the Pelton dams.

The CTWS Peer Group rated the Reservation as having a **"high" vulnerability to the flood hazard**, meaning more than 10% of the region's population or assets would be affected by a major emergency or disaster.

As part of the update of this NHMP the Peer Group will utilize the final multi-hazard risk report and hazard assessment currently being developed through FEMA's Risk MAP program to update the CTWS Hazard Analysis for this hazard (Multi-hazard #13).

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

## Mitigation Actions

Priority: FL #1, FL #2, FL #3, MH #1, MH #2, MH #3, MH #4, MH #5, MH #7

Potential: FL #4, FL #5, FL #6, MH #9, #10, #11, #12.

# Landslide

**Significant Changes Since Previous Plan:**

The occurrence history for this hazard has been updated as well as the probability rating. If and when new data (Lidar) is available an update of this section should occur. In addition, the format of the section and minor content changes have occurred.

## Characteristics

Landslide is a general term for the dislodgment and fall of a mass of soil or rocks along a sloped surface or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rockfalls, rockslides, debris avalanches, debris slides, and slump-earth flows. Landslides may result from a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also occur due to indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions.

Additionally, landslides often occur together with other natural hazards, thereby exacerbating conditions, as described below:

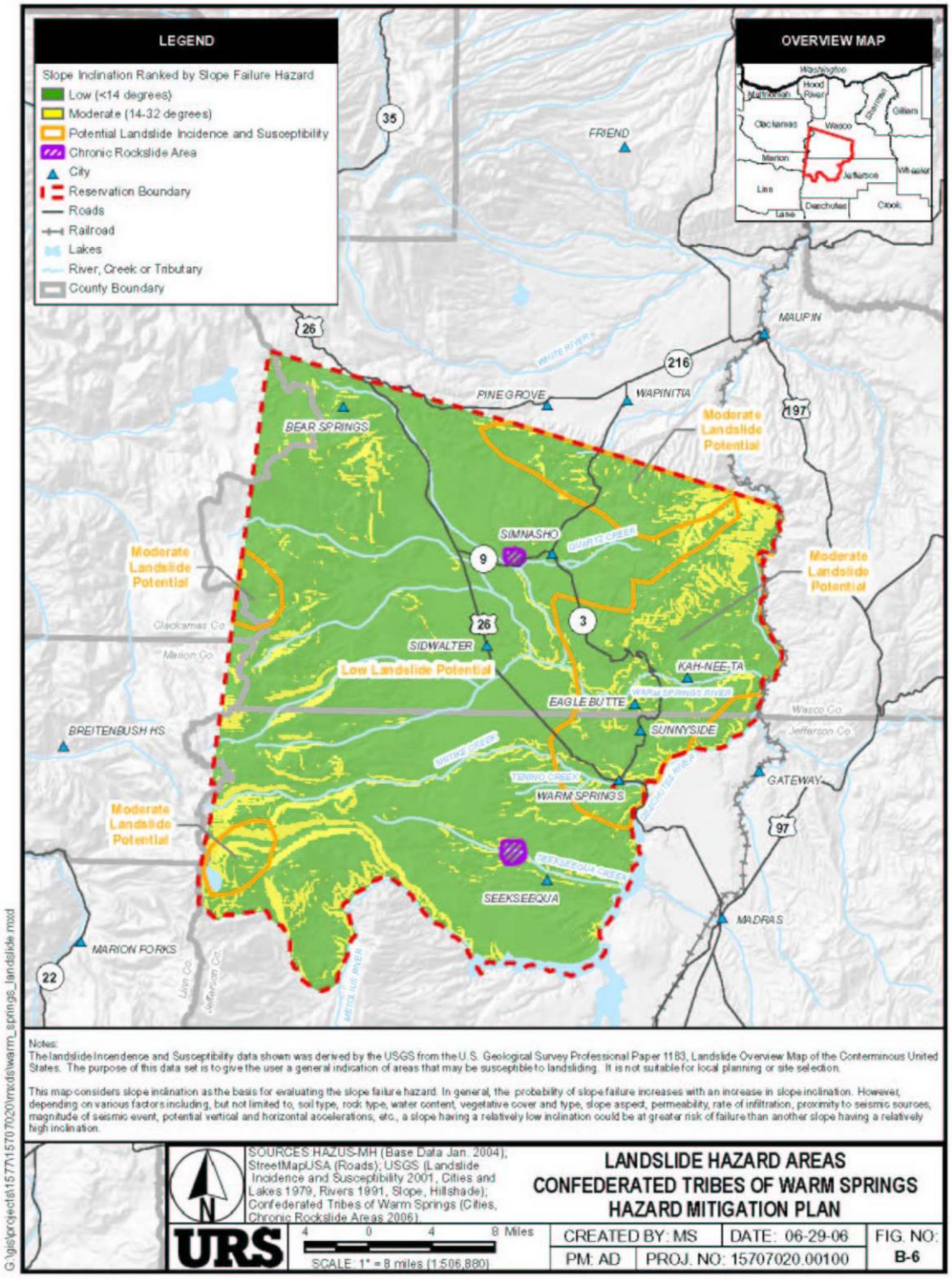
- Shaking due to earthquakes can trigger events ranging from rockfalls and topples to massive slides.
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides.
- Landslides into a reservoir can indirectly compromise dam safety, and a landslide can even affect the dam itself.
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential.

## Location and Extent

As shown in Figures 2-9 and 2-10, landslides are possible throughout the Reservation, but are especially prevalent on steep slopes. The western portions of the Reservation border the Cascade Mountain Range and are characterized by steep slopes, indicating that these areas are vulnerable to landslide events. In addition, bluffs and mesas in the northeastern and eastern portions of the Reservation are susceptible to landsliding.

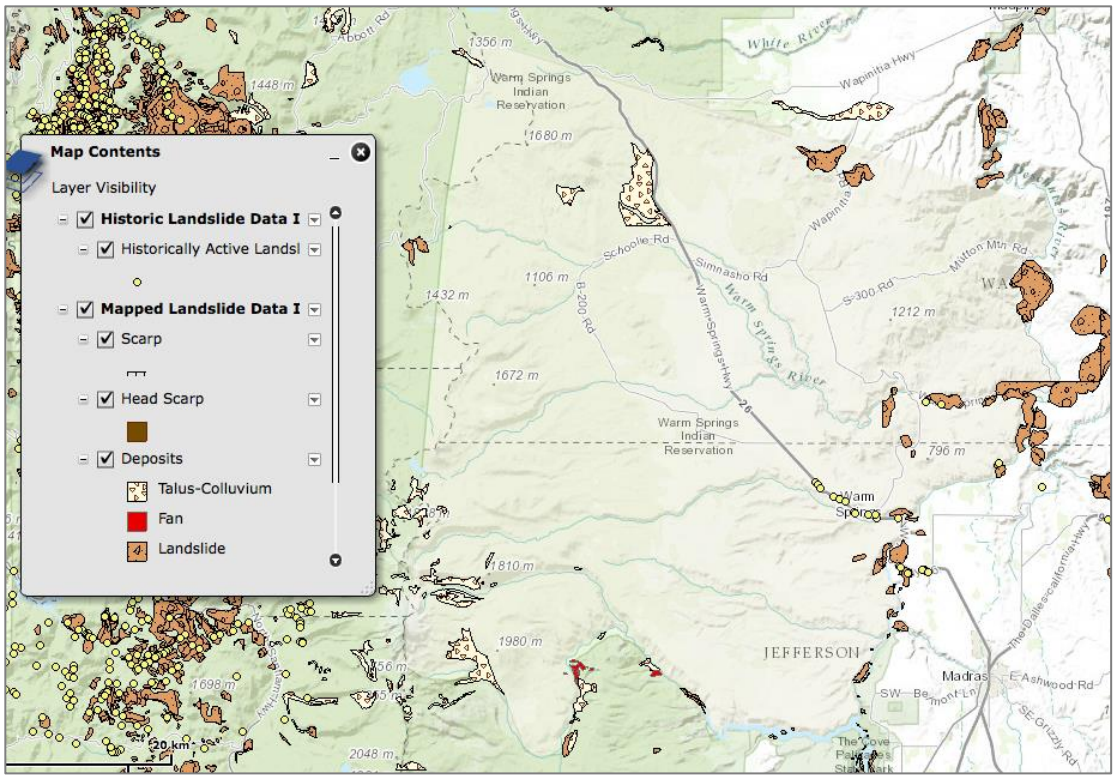
The probability of a landslide is dependent upon many factors including, but not limited to, the steepness of the slope, the type and stability of slope materials, amount of vegetative cover, human influence, and water. Based on previous events, the Reservation is susceptible to large landsliding events every 10 years.

**Figure 2-9 Landslide Hazard Areas**




Source: CTWS HMP (2006); URS

**Figure 2-10 Landslide Hazard Areas**




Source: DOGAMI Statewide Landslide Information Layer for Oregon (SLIDO)

## History

While landslides on the Reservation are triggered by the aforementioned events, they mostly occur during periods of significant precipitation. Two landslides induced by heavy precipitation and flooding have occurred in recent history.

- The Reservation also received a Federal disaster declaration in February 1996 due to severe storms and flooding (DR-1099). These events produced landslides on the Reservation, and also produced approximately 700 landslides and debris flows throughout the state of Oregon.
- A Federal disaster was declared in Oregon for 18 counties and the Reservation on March 20, 2006 (DR-1632). The disaster declaration was the result of severe storms, flooding, landslides, and mudslides, which occurred in the 18 counties and the Reservation from December 18, 2005, to January 21, 2006.
- Chronic landsliding and rocksliding are known to occur near Seekseequa and Simnasho.
- 2015 a landslide occurred temporarily affecting Route 8 and Highway 9.

## Probability Assessment

The probability of rapidly moving landslides occurring depends on a number of factors; these include steepness of slope, slope materials, local geology, vegetative cover, human activity, and water. There is a strong correlation between intensive winter rainstorms and

the occurrence of rapidly moving landslides (debris flows). Given the correlation between precipitation / snow melt and rapidly moving landslides, it would be feasible to construct a probability curve. Many slower moving slides present in developed areas have been identified and mapped; however, the probability and timing of their movement is difficult to quantify. The installation of slope indicators or the use of more advanced measuring techniques could provide information on these slower moving slides.

Based on the available data and research the CTWS Peer Group determined that the **probability of experiencing a landslide is "low,"** meaning one incident is likely within the next 75 – 100 year period.

## Vulnerabilities

Chronic landsliding occurs near Seekseequa and Simnasho and throughout the Western portion of Reservation and bluffs and mesas to east and northeast.

According to the 2006 exposure analysis, using a USGS digital data and slope inclinations of 0-13 percent (low) and 14-32 percent (medium), landslides are possible throughout the Reservation, but are especially prevalent on steep slopes of the western portions of the Reservation as well as the bluffs and mesas to the east and northeast. Therefore, the community of Sidwalter is at low risk to landslides, with 200 tribal members, 67 residential structures (worth $4.7 million), and 3 critical facilities (worth $13.6 million) residing in this area. The communities of Warm Springs, Bear Springs, Kah-Nee-Ta, Simnasho, and Seekseequa are at a higher risk to landslides, with 2,697 tribal members, 741 residential structures (worth $52.2 million) and 36 critical facilities (worth $123.8 million) located within this moderate landslide area. It is important to note that the dataset used only

offers the general indication of areas that may be susceptible to landsliding and is not suitable for local planning or site selection.

The CTWS Peer Group rated the Reservation as having a **"low" vulnerability to landslide hazards**; meaning less than 1% of the region's population or assets would be affected by a major emergency or disaster.

As part of the update of this NHMP the Peer Group will utilize the final multi-hazard risk report and hazard assessment currently being developed through FEMA's Risk MAP program to update the CTWS Hazard Analysis for this hazard (Multi-hazard #13).

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

## Mitigation Actions

Priority: LS #1, LS #2, LS #3, LS #4, MH #1, MH #2, MH #4, MH #5, MH #7

Potential: LS #5, MH #9, MH #10, MH #11, MH #12

# Volcano

**Significant Changes Since Previous Plan:**

The Volcano Hazard was not assessed in the 2006 Plan, therefore, this section provides new content.

## Characteristics

The Pacific Northwest, lie within the "ring of fire," an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth's tectonic plates. The Earth's outermost shell, the lithosphere, is broken into a series of slabs known as tectonic plates. These plates are rigid, but they float on a hotter, softer layer in the Earth's mantle. As the plates move about on the layer beneath them, they spread apart, collide, or slide past each other. Volcanoes occur most frequently at the boundaries of these plates and volcanic eruptions occur when molten material, or magma, rises to the surface.

The primary threat to lives and property from active volcanoes is from violent eruptions that unleash tremendous blast forces, generate mud and debris flows, or produce flying debris and ash clouds. The immediate danger area in a volcanic eruption generally lies within a 20-mile radius of the blast site. The following section outlines the specific hazards posed by volcanoes.

Volcanoes are commonly, but not always, conical hills or mountains built around a vent that connects with reservoirs of molten rock below the surface of the earth. Volcanoes are built up by an accumulation of their own eruptive products: lava or ash flows and airborne ash and rocks. When pressure from gases or molten rock becomes strong enough to cause an upsurge, eruptions occur. Gases and rocks are pushed through the vent and spill over, or fill the air with lava fragments. Figure II-10 diagrams the basic features of a volcano.

There are four general types of volcanoes found within a short distance of the CTWS:

- Lava domes are domes that are formed when lava erupts and accumulates near the vent.
- Cinder cones are cone-shaped and formed by accumulation of cinders, ash, and other fragmented materials originating from an eruption.
- Shield volcanoes are broad, gently sloping volcanic cones of flat domical shape, usually several tens or hundreds of square miles in extent, built chiefly of overlapping and interfingering basaltic lava flows.
- Composite or stratovolcanoes are typically steep-sided, symmetrical cones of large dimensions built of alternating layers of lava flows, volcanic ash, cinders, and blocks. Most composite volcanoes have a crater at the summit containing a central vent or clustered group of vents.

Along with the different kinds of volcanoes, there are different types of eruptions. Eruption type is a major determinant of the physical results it creates and the hazards it poses. The

main types of volcano hazards include: Tephra, lave flows, pyroclastic flows, lahars and debris flows, volcanic landslides, and earthquakes.

## Location and Extent

Although there have been no recent volcanic events in the Reservation, it is important to note the area is active and susceptible to eruptive events since the region is a part of the active Cascade Volcanic Range.

The western portion of the Reservation is on the east slope of the Cascade Range. Volcanic activity in the Cascades will continue, but questions regarding how, to what extent, and when, remain. Many volcano-associated hazards affect local areas within 5 to 10 miles (e.g., explosions, lava flows, pyroclastic flows and debris avalanches). However, lahars, or volcanic mudflows can travel considerable distances downstream valleys and wind-borne tephra (ash) can blanket areas many miles from the source.

CTWS is therefore at risk from volcanic events and should consider the impact of volcano-related activity on communities, dams that create reservoirs, tourist destinations (e.g., Kah-nee-ta), agriculture, highways and railroads. The Reservation should also consider probable impacts on the local economy should a volcano-related hazard occur.

Geologic hazard maps have been created for most of the volcanoes in the Cascade Range by the USGS Volcano Program at the Cascade Volcano Observatory in Vancouver, WA and are available at http://vulcan.wr.usgs.gov/Publications/hazards_reports.html.

**Figure 2-11 Volcanic Hazards in Central Oregon**

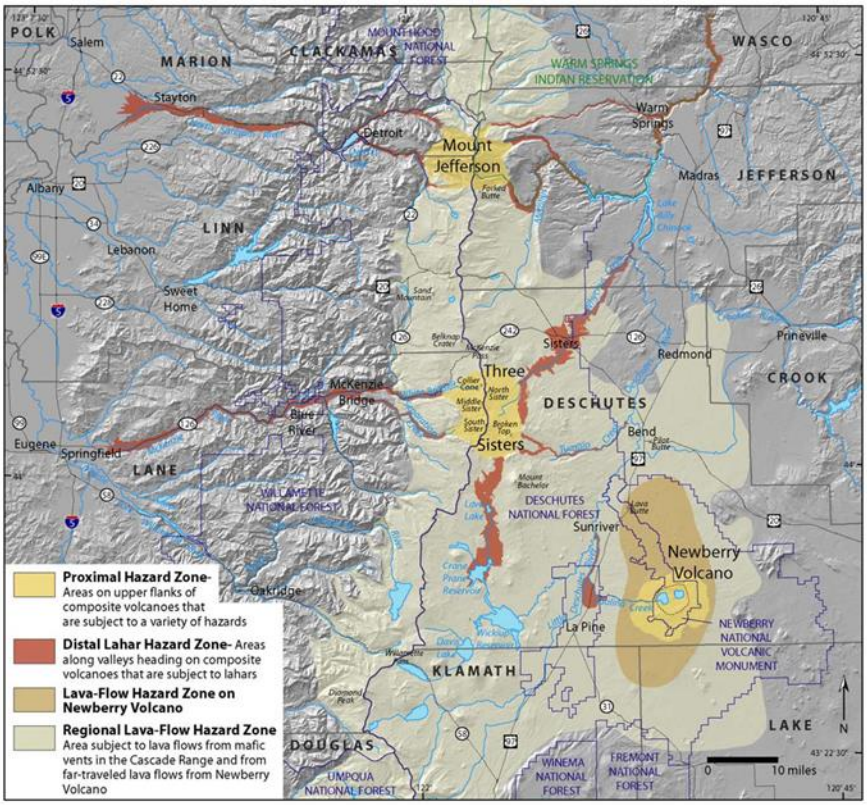


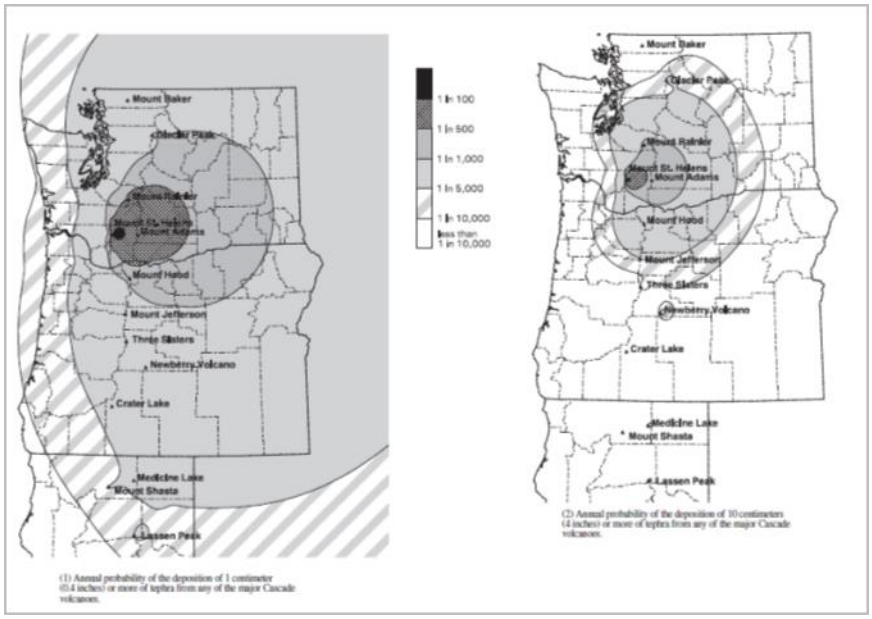

Figure 2. **Volcano hazards in central Oregon.** Hazard zones are modified from the USGS hazard assessments for Mount Jefferson, Three Sisters, and Newberry Volcano listed in references.

Source: Central Cascades Volcano Coordination Plan

Although the hazard map shows sharp boundaries for hazard zones, the degree of hazard does not change abruptly at these boundaries. Rather, the hazard decreases gradually as distance from the volcano increases, and decreases more rapidly as elevation above valley floors increases. Areas immediately beyond outer hazard zones should not be regarded as hazard free, because the boundaries can only be located approximately, especially in areas of low relief. Too many uncertainties exist about the source, size, and mobility of future events to locate the boundaries of zero-hazard zones precisely. Additionally, tephra (ash) hazard zones are not shown on the map, but tephra can impact large areas and the entire map region should be regarded as within the tephra hazard zone.

Scientists also use wind direction to predict areas that might be affected by volcanic ash; during an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction. The predominant wind pattern over the Cascades originates from the west, and previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes. Regional tephra fall shows the annual probability of ten centimeters or more of ash accumulation from Pacific Northwest volcanoes. Figure 2-11 depicts the potential and geographical extent of volcanic ash fall in excess of ten centimeters from a large eruption of Mt. St. Helens.

**Figure 2-12 Regional Tephra-fall Maps**




Source: USGS "Volcano Hazards in the Mount Jefferson Region, Oregon"

## History

No eruptions have occurred in the Reservation during the past 1,000 years, however the millennium before experienced numerous nearby eruptions, including several at Three Sisters, and one eruption at Newberry Volcano. The most devastating effects of these events were restricted to what is now wilderness or largely undeveloped areas, but ashfall from these eruptions probably deposited less than one-quarter inch to one-half inch of gritty ash in areas that are now populated.

Research of other stratovolcanoes suggest that Mount Jefferson should be considered dormant, not extinct. A major eruption could generate pyroclastic flows and lahars, and an explosive eruption could spew ash for hundreds of miles downwind. The volcano has steep slopes and debris flows would likely be contained within 10 miles of the surrounding valley.

## Probability Assessment

The annual probability of volcanic activity in or affecting CTWS can only be estimated with great uncertainty, but, depending on the type of eruption, ranges from roughly 1 in 1,000 to 1 in 10,000. However, as precursors of volcanic unrest begin the probability of eruption increases greatly. The precursors might include increased seismic activity, temperature and chemical changes in groundwater, ground deformation and release of volcanic gases.

Based on the available data and research the CTWS Peer Group determined that the **probability of experiencing a volcanic event is "low,"** meaning one incident is likely within the next 75 – 100 year period (or longer).

## Vulnerabilities

Potential vulnerability to ashfall, lahars from St Helens, Mt Jefferson, Three Sisters, and Newberry Crater.

The CTWS Peer Group rated the Reservation as having a **"moderate" vulnerability to volcanic hazards**; meaning between 1-10% of the region's population or assets would be affected by a major emergency or disaster.

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

## Mitigation Actions

Priority: MH #1, MH #2

Potential: MH #10, MH #11, MH #12

# Wildfire

**Significant Changes Since Previous Plan:**

The occurrence history for this hazard has been updated as well as the probability rating. The existing Wildfire Prevention Plan (2011) is scheduled to be updated in 2016; when the WPP is updated it should be incorporated into this plan. In addition, the format of the section and minor content changes have occurred.

## Characteristics

A wildland fire is a type of wildfire that spreads through consumption of vegetation. It often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. Wildland fires can be caused by human activities (such as arson or campfires) or by natural events such as lightning. Wildland fires often occur in forests or other areas with ample vegetation. In addition to wildland fires, wildfires can be classified as urban fires, interface or intermix fires, and prescribed fires.

The following three factors contribute significantly to wildland fire behavior and can be used to identify wildland fire hazard areas.

**Topography:** As slope increases, the rate of wildland fire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildland fire behavior. However, ridgetops may mark the end of wildland fire spread, since fire spreads more slowly or may even be unable to spread downhill.

**Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible

material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel's continuity, both horizontally and vertically, is also an important factor.

**Weather:** The most variable factor affecting wildland fire behavior is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildland fire activity. By contrast, cooling and higher humidity often signals reduced wildland fire occurrence and easier containment.

The frequency and severity of wildland fires is also dependent upon other hazards, such as lightning, drought, equipment use, railroads, recreation use, arson, and infestations. If not promptly controlled, wildland fires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildland fires may severely affect livestock and pets. Such events may require emergency watering/feeding, evacuation, and shelter.

The indirect effects of wildland fires can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards, as described above.

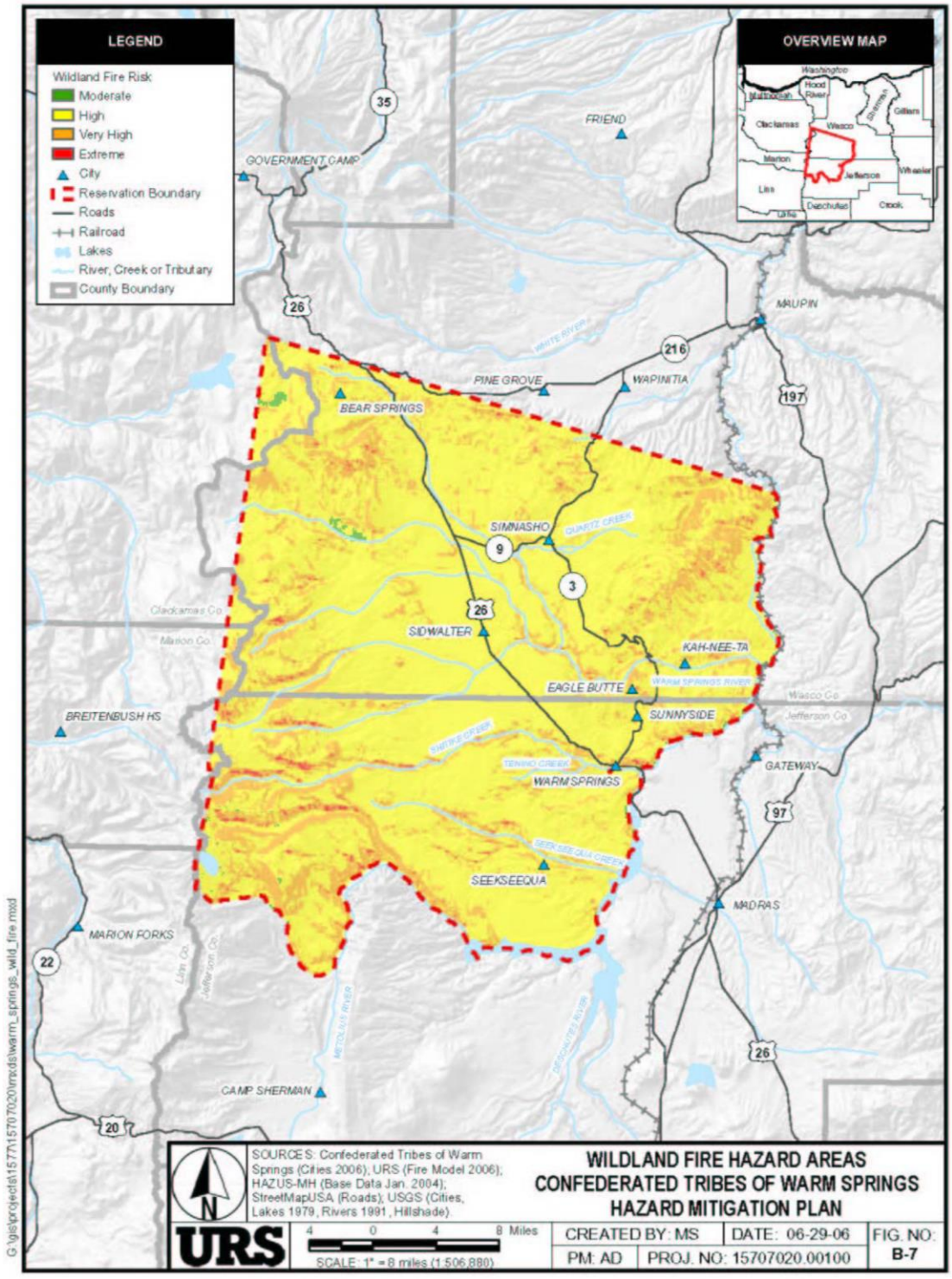
## Location and Extent

On the Reservation, wildland fires generally occur in the following areas:

- Warm Springs and the surrounding area, which is composed of sagebrush grass and intermittent juniper stands.
- Central and northeastern portion of the Reservation, which is primarily characterized by old growth Ponderosa pine, poles, and young saw timber. Incense cedar and perennial grasses are also present in this area as are sources of fuel.
- The western and southwestern portion of the Reservation, which is primarily characterized by mixed conifer vegetation and subalpine species including Douglas fir, Ponderosa pine, western larch, western hemlock, and perennial grasses amongst other species.

As shown in Figure 2-13, nearly the entire Reservation has a high-very high wildland fire risk. Fire susceptibility throughout the Reservation dramatically increases in late summer and early autumn as summer thunderstorms with lightning strikes increases and vegetation dries out, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. However, various other factors, including humidity, wind speed and direction, fuel load and fuel type, and topography can contribute to the intensity and spread of wildland. In addition, common causes of wildland fires include arson and negligence from industrial and recreational activities.

**Figure 2-13 Wildfire Hazard Areas**




Source: CTWS HMP (2006); URS

## History

Many significant wildland fires have occurred on the Reservation, since 1996 there have been 18 wildfires/ Complexes that have burned a total of 1.51 million acres (11 significant wildfires, that burned about 320,000 acres, have occurred since the previous version of this plan), including[4]:

- 67,207-acre County Line 2 Fire in August 2015, 11 homes and 23 outbuildings burned, loss of timber, fencing along HWY 26
- 6,644-acre Logging Unit Fires in July/ August 2014 (Skyline Fire, Haily Butte Fire, North Pinhead Fire, Logging Unit Fire, Camas Prairie Fire)
- 42,044-acre Shaniko Creek Fire in July/ August 2014, lightning ignited, 15 miles north of Warm Springs
- 3,803-acre Bear Butte 2 Fire in July/ August 2014
- 51,340-acre Sunnyside Turnoff Fire in July/ August 2013, gusty winds and high temperatures exacerbated the fire
- 12,265-acre Waterfalls 2 Fire in August/ September 2012, lightning ignited, 22 miles west of Warm Springs.
- 108,154-acre High Cascades Complex Fire in August/ September 2011, more info?
- 12,600-acre Glacier Peak Wildfire in July 2007, 2 miles SE of Warm Springs
- 11,137-acre Baker Canyon Fire in August/ September 2006, lightning ignited, 15 miles east of Warm Springs
- 4,129-acre Wolfe Point II fire in July 2006 , more info?
- 412-acre, Shitike Creek Fire, 2 miles WNW of Warm Springs, no structures lost.
- 1,271-acre Schoolie Rim Fire in July 2005, 4 miles WNW of Kah-nee-ta, no structures lost.
- 1,170-acre Rattlesnake Springs Fire in July 2005; 9 miles ESE of Warm Springs, lightning ignited, no structures lost.
- 4,150-acre Wolfe Point Fire in July 2005; human caused, centered near Kah-nee-ta, no structures lost.
- 13,539-acre Log Springs Fire in August 2004
- 23,573-acre Eyerly Fire in July 2002; $5,500,000 in damage, sparked by lightning, destroyed several structures, including 18 homes, 13 outbuildings, 3 travel trailers, and 2 cars. An additional, 1 home and 5 buildings were damaged.
- 1,000-acre Shimasho fire in July 1998
- 115,000-acre Shimasho fire in August 1996

## Probability Assessment

Based on previous occurrences, the likelihood of significant wildland fire (larger than 1,000 acres) occurring in and/or near the Reservation is every 2 years. As such, the CTWS Peer Group determined that the **probability of experiencing a wildfire event is "high,"** meaning at least one incident is likely within the next 10 – 35 year period (as the history of wildfires

[4] NOAA Storm Events Database, http://www.ncdc.noaa.gov/stormevents/, Accessed November 12, 2015; InciWeb, http://inciweb.nwcg.gov/, Accessed November 12, 2015; The Confederated Tribes of Warm Springs Hazard Mitigation Plan (2006)

indicates, it is likely that CTWS will experience a wildfire more frequently than once every 10 years).

## Vulnerabilities

According to the 2006 exposure analysis, wildland fire hazard areas were determined using a wildland fire fuel model that considered slope, aspect, and fuel hazard. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Within the areas of high wildland fire exposure is the community of Sidwalter. This community includes 200 tribal members, 67 residential structures (worth $4.7 million), and 2 critical facilities (worth $6.8 million). Within the areas of very high wildland fire exposure are the communities of Warm Springs, Bear Springs, Kah-Nee-Ta, Seekseequa, and Simnasho. At risk to very high wildland fire exposure are 2,472 tribal members, 667 residential structures (worth $47.0 million), and 39 critical facilities (worth $130.9 million).

The Warm Springs Wildfire Prevention Plan (WFPP, 2011) is scheduled to be updated in 2016. The update of the WFPP will include minor updates to the Risk Assessment, mitigation activities, and highest priority areas. When complete the updated WFPP shall be incorporated into this NHMP by reference. For more information on wildfire risk and fuels reduction projects see the Warm Springs WFPP.

The CTWS Peer Group rated the Reservation as having a **“high” vulnerability to wildfire hazards**; meaning more than 10% of the region’s population or assets would be affected by a major emergency or disaster.

## Future Climate Variability

One of the main aspects of the probability of future occurrences is its reliance on historic climate trends in order to predict future climate trends. The region east of the Cascade Mountain Range in Oregon is experiencing more frequent and severe wildfires than is historically the norm, and many climate predictions see this trend continuing into the future. Temperature increases will occur throughout all seasons, with the greatest variation occurring during summer months. Hotter temperatures mean more combustible vegetation. This information was considered while developing the probability of wildfire occurrence for the CTWS.

As part of the update of this NHMP the Peer Group will utilize the final multi-hazard risk report and hazard assessment currently being developed through FEMA's Risk MAP program to update the CTWS Hazard Analysis for this hazard (Multi-hazard #13).

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

## Mitigation Actions

Priority: WF #1, WF #2, WF #3, WF #4, WF #5, MH #1, MH #2, MH #3, MH #4, MH #5, MH #7

Potential: WF #6, MH #8, MH #9, MH #10, MH #11, MH #12

# Windstorm

**Significant Changes Since Previous Plan:**

The Windstorm Hazard was not assessed in the 2006 Plan, therefore, this section provides new content.

## Characteristics

Extreme winds occur throughout Oregon. The most persistent high winds take place along the Oregon Coast and in the Columbia River Gorge. High winds in the Columbia Gorge are well documented. The Gorge is the most significant east-west gap in the Cascade Mountains between California and Canada. Wind conditions in central Oregon are not as dramatic as those along the coast or in the Gorge yet can cause dust storms or be associated with severe winter conditions such as blizzards. A majority of the destructive surface winds striking Oregon are from the southwest. Some winds blow from the east but most often do not carry the same destructive force as those from the Pacific Ocean.

Though tornadoes are not common in Oregon, these events do occasionally occur and sometime produce significant property damage and even injury. Tornadoes are the most concentrated and violent storms produced by earth's atmosphere, and can produce winds in excess of 300 mph. They have been reported in most of the regions throughout the state since 1887. Most of them are caused by intense local thunderstorms common between April and October.

## Location and Extent

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect the entirety of the CTWS, they are especially dangerous in developed areas with significant tree stands and major infrastructure, especially above ground utility lines. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities, and create tons of storm related debris.

Windstorms in the CTWS usually occur in the winter from October to March, and their extent is determined by their track, intensity (the air pressure gradient they generate), and local terrain; summer thunderstorms may also bring high winds along with heavy rain and/ or hail. The National Weather Service uses weather forecast models to predict oncoming windstorms, while monitoring storms with weather stations in protected valley locations throughout Oregon.

The table below shows the wind speed probability intervals that structures 33 feet above the ground would expect to be exposed to within a 25, 50 and 100 year period. The table shows that structures in Region 6, which includes the CTWS, can expect to be exposed to 60 mph winds in a 25-year recurrence interval (4% annual probability).

**Table 2-4 Probability of Severe Wind Events by NHMP Region**

| | 25-Year Event (4% annual probability) | 50-Year Event (2% annual probability) | 100-Year Event (1% annual probability) |
|---|---|---|---|
| **Region 1:** Oregon Coast | 75 mph | 80 mph | 90 mph |
| **Region 2:** North Willamette Valley | 65 mph | 72 mph | 80 mph |
| **Region 3:** Mid/Southern Willamette Valley | 60 mph | 68 mph | 75 mph |
| **Region 4:** Southwest Oregon | 60 mph | 70 mph | 80 mph |
| **Region 5:** Mid-Columbia | 75 mph | 80 mph | 90 mph |
| **Region 6:** Central Oregon | 60 mph | 65 mph | 75 mph |
| **Region 7:** Northeast Oregon | 70 mph | 80 mph | 90 mph |
| **Region 8:** Southeast Oregon | 55 mph | 65 mph | 75 mph |

Source: Oregon State Natural Hazard Mitigation Plan, 2009

## History

Windstorms occur yearly; more destructive storms occur once or twice per decade. In the past 65 years,13 significant windstorms have been recorded on the Reservation. These storms occurred in November 1951, December 1951, December 1955, October 1962, March 1971, November 1981, March 1991, December 1991, December 1995, November 2005, October 2007, August 2009, and August 2013.[5] In addition, there have been 26 additional windstorm events (16 in the winter months, 10 in the summer months) that included wind speeds between 35 and 80 mph (many of these wind events are accompanied by heavy rains and/ or thunderstorms).

## Probability Assessment

Windstorms affect the CTWS annually. More destructive storms occur once or twice per decade. According to the Oregon NHMP Region 6 – Central Oregon, where CTWS is located, is likely to experience windstorms of 60 mph during a 25-year cycle. It should be noted that some of the report incidents are localized events that do not affect large areas of CTWS.

[5] Oregon State NHMP (2015); Jefferson County NHMP (2013); George and Ray Hatton, 1999, The Oregon Weather Book; NOAA Storm Events Database, http://www.ncdc.noaa.gov/stormevents/. Accessed November 12, 2015.

Based on the available data and research the CTWS Peer Group determined that the **probability of experiencing a windstorm event is "high,"** meaning one incident is likely within the next 10 – 35 year period.

### Vulnerabilities

Entire reservation is vulnerable, above ground utility infrastructure is particularly vulnerable, as is truck commerce, particularly on Hwy 26.

The CTWS Peer Group rated the Reservation as having a **"moderate" vulnerability to windstorm hazards**; meaning between 1-10% of the region's population or assets would be affected by a major emergency or disaster (particularly if utility lines are damaged).

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

### Mitigation Actions

Priority: MH #1, MH #2, MH #3, MH #6

Potential: MH #8, MH #10, MH #11, MH #12, MH #13

## Winter Storm

**Significant Changes Since Previous Plan:**

The occurrence history for this hazard has been updated as well as the probability rating. In addition, the format of the section and minor content changes have occurred.

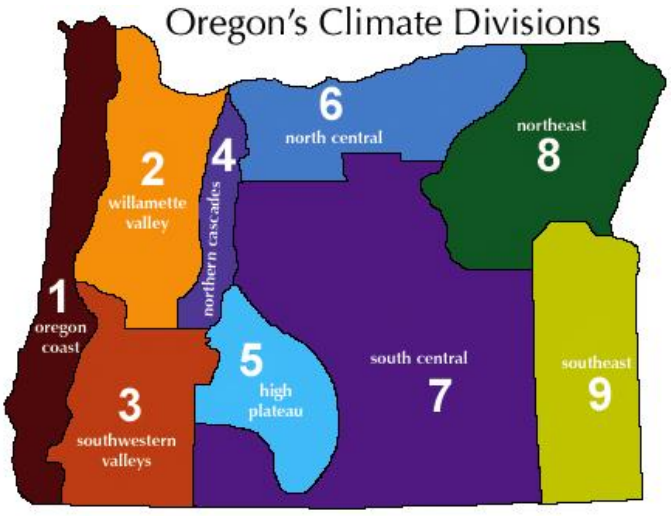
### Characteristics

In Oregon, winter storms begin with cyclonic weather systems in the North Pacific Ocean or the Aleutian Islands that can cause massive low-pressure storm systems to sweep into the continental United States. As the moist air masses push across the Cascade Mountains, the air masses cool and the water condenses as snow. Wind in combination with the snow can cause reduced visibilities and deep snowdrifts. In addition, heavy snow can cause avalanches in areas along steep terrain. In some instances, freezing rain occurs, when very cold inland arctic air becomes trapped under warm moist air.

The National Climatic Data Center has established climate zones in the United States for areas that have similar temperature and precipitation characteristics. Oregon's latitude, topography, and proximity to the Pacific Ocean give the state diversified climates. The southern portion of the CTWS is located within Zone 7: South Central Area, northern portions of the CTWS are located within Zone 6: North Central Area. The climate in Zone 7

generally consists of wet winters and dry summers.[6] These wet winters result in potentially destructive winter storms that produce heavy snow, ice, rain and freezing rain, and high winds. Severe storms affecting the CTWS with snow and ice typically originate in the Gulf of Alaska or in the central Pacific Ocean. Winter storms occur over eastern Oregon regularly during November through February when cold arctic air sinks south along the Columbia River basin, filling the region with cold air.

**Figure 2-14 Oregon Climate Divisions**




Source: Oregon Climate Service,

The principal types of winter storms that occur include:

- **Snowstorms:** require three ingredients: cold air, moisture, and air disturbance. The result is snow, small ice particles that fall from the sky. In Oregon, the further inland and north one moves, the more snowfall can be expected. Blizzards are included in this category.
- **Ice storms:** are a type of winter storm that forms when a layer of warm air is sandwiched by two layers of cold air. Frozen precipitation melts when it hits the warm layer, and refreezes when hitting the cold layer below the inversion. Ice storms can include sleet (when the rain refreezes before hitting the ground) or freezing rain (when the rain freezes once hitting the ground).
- **Extreme Cold:** Dangerously low temperatures accompany many winter storms. This is particularly dangerous because snow and ice storms can cause power outages, leaving many people without adequate heating.

## Location and Extent

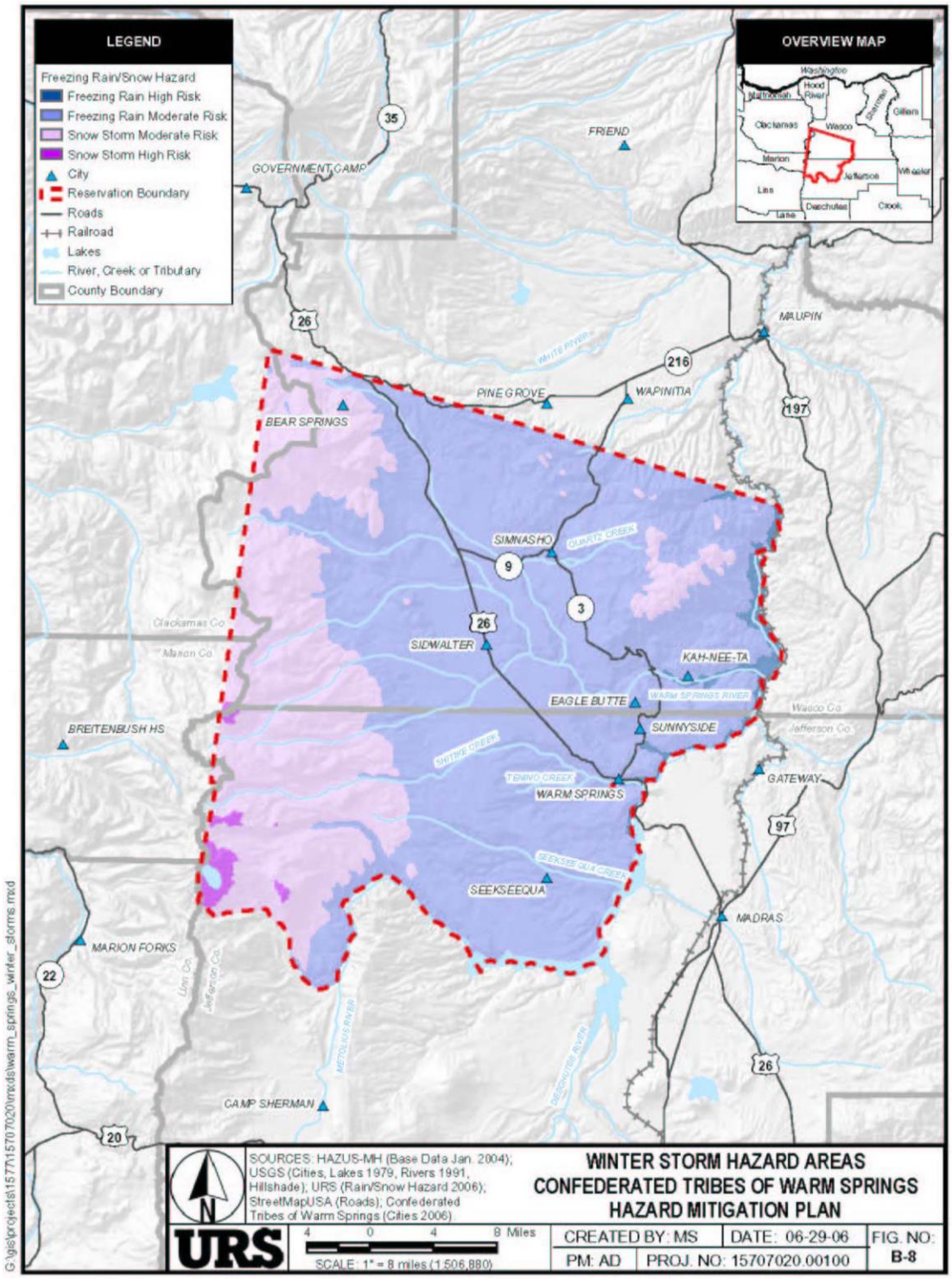
As shown in Figure 2-15, the valley locations within the central and eastern portions of the Reservation are at moderate and high risk to freezing rains. It is in these lower-elevation areas where temperatures may be near or above freezing during the day, but as storms pass

[6] Oregon Climate Service, "Climate of Jefferson County,"

and temperatures plummet, wet roadways often turn to ice. It is not uncommon for freezing rain storms to occur every 2 to 3 years on the Reservation.

The western side of the Reservation, at the foothills of the Cascades, is at risk to moderate and high snow storm hazards. As such, this mountainous area can accumulate over 140 inches of snow during the months of January and February. Generally, these severe winter storms occur every 5 to 10 years.

**Figure 2-15 Winter Storm Hazard Areas**




Source: CTWS HMP (2006); URS

## History

In the past 30 years, four heavy snow-associated winter storms have been recorded on the Reservation. Meteorologists define heavy snow as 6 inches or more falling in less than 12 hours, or snowfall of 8 inches or more in 24 hours. These storms occurred in January 1969, February 1989, and December 2003–January 2004, and February 2014.[7] In addition, recent severe ice storms on the Reservation occurred in January 1986, January 1991, January 1996, February 1996, and February 2005. Additional winter storms that involved snow and/ or ice occurred in December 2005, November 2006, November 2007, January 2008, December 2008, January 2010, November 2011 (followed by extreme cold), December 2010, February 2011, November 2011, January 2012 (also with high wind and followed by freezing rain/ ice), February 2012, March 2012, December 2012, November 2013 (followed by extreme cold), and November 2014.[8]

## Probability Assessment

The recurrence interval for a severe winter storm is about every 13 years; however, there can be many localized storms between these periods. Severe winter storms occur in eastern Oregon regularly from November through February. The CTWS experiences winter storms a couple times every year, to every other year.

Based on the available data and research the CTWS Peer Group determined that the **probability of experiencing a winter storm event is "high,"** meaning one incident is likely within the next 10 – 35 year period.

## Vulnerabilities

According to the 2006 exposure analysis, using information provided by the National Weather Service and USGS, the valley locations within the central and eastern portions of the Reservation, including the communities of Warm Springs, Kah-Nee-Ta, Sidwalter, Simnasho, and Seekseequa are at risk to freezing rains. Moderate freezing rain hazard areas include 400 tribal members, 133 residential structures (worth $9.4 million), and 13 critical facilities (worth $38.5 million) while high risk freezing rain hazard areas include 2,472 tribal members, 667 residential structures ($47.0 million), and 26 critical facilities (worth $99.0 million).

Only the western side of the Reservation, at the foothills of the Cascades, is at risk to moderate and high snow storm hazards. As such, 25 tribal members, 8 residential facilities ($5.6 million) and 1 critical facility (worth $170,000) are located in moderate snow storm hazard area.

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[7] Oregon State NHMP (2015); Jefferson County NHMP (2013); George and Ray Hatton, 1999, The Oregon Weather Book; NOAA Storm Events Database, http://www.ncdc.noaa.gov/stormevents/. Accessed November 12, 2015.

[8] NOAA Storm Events Database, http://www.ncdc.noaa.gov/stormevents/. Accessed November 12, 2015.

The CTWS Peer Group rated the Reservation **as having a "high" vulnerability to winter storm hazards**; meaning that more than 10-percent of the region's population or assets would be affected by a major emergency or disaster.

More information on this hazard can be found in the Risk Assessment for Region 6 of the Oregon NHMP.

### Mitigation Actions

Priority: MH #1, MH #2, MH #3, MH #4, MH #6

Potential: WT #1, WT #2, MH #8, MH #10, MH #11, MH #12, MH #13

## Hazardous Materials Events

**Significant Changes Since Previous Plan:**

This hazard was in the previous All Hazards Mitigation Plan. No changes except for minor content and format modifications have occurred.

### Characteristics

Hazardous materials may include hundreds of substances that pose a significant risk to humans. These substances may be highly toxic, reactive, corrosive, flammable, radioactive, or infectious. Numerous Federal, State, and local agencies including the U.S. Environmental Protection Agency (EPA), U.S. Department of Transportation, National Fire Protection Association, FEMA, U.S. Army, and the International Maritime Organization regulate hazardous materials.

Hazardous material releases may occur from any of the following:

- Fixed site facilities (such as refineries, chemical plants, storage facilities, manufacturing, warehouses, wastewater treatment plants, dry cleaners, automotive sales/repair, gas stations, etc.)
- Highway and rail transportation (such as tanker trucks, chemical trucks, railroad tankers)
- Air transportation (such as cargo packages)
- Pipeline transportation (liquid petroleum, natural gas, and other chemicals)

Unless exempted, facilities that use, manufacture, or store hazardous materials in the United States fall under the regulatory requirements of the Emergency Planning and Community Right to Know Act (EPCRA) of 1986, enacted as Title III of the Federal Superfund Amendments and Reauthorization Act (42 United States Code 11001–11050; 1988). Under EPCRA regulations, hazardous materials that pose the greatest risk for causing catastrophic emergencies are identified as Extremely Hazardous Substances (EHSs). These chemicals are identified in the *List of Lists – Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to- Know Act (EPCRA) and Section 112 of the Clean Air Act* (EPA 2005). Releases of EHSs can occur during transport and from fixed facilities.

Transportation-related releases are generally more troublesome because they may occur anywhere, including close to human populations, critical facilities, or sensitive environmental areas. Transportation-related EHS releases are also more difficult to mitigate due to the variability of locations and distance from response resources.

In addition to accidental human-caused hazardous material events, natural hazards may cause the release of hazardous materials and complicate response activities. The impact of earthquakes on fixed facilities may be particularly serious due to the impairment or failure of the physical integrity of containment facilities. The threat of any hazardous material event may be magnified due to restricted access, reduced fire suppression and spill containment, and even complete cutoff of response personnel and equipment. In addition, the risk of terrorism involving hazardous materials is considered a major threat due to the location of hazardous material facilities and transport routes throughout communities and the frequently limited antiterrorism security at these facilities.

On behalf of several Federal agencies including the EPA and U.S. Department of Transportation, the National Response Center serves as the point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment within the United States.

## History

The National Response Center Web-based query system of non-Privacy Act data show that since 1990, five chemical spills have occurred in Warm Springs. All of these gasoline spills occurred on Highway 26 and involved a tanker truck and/ or a passenger vehicle:

- 9/24/2013 – injuries but 0 fatalities, Tanker Truck hit Elk and rolled on HWY 26 near mile marker 82, released gasoline into creek, weather conditions were unknown, late evening.
- 11/22/2010 – 0 injuries or fatalities, Tanker Truck rolled on HWY 26 near mile marker 93, released gasoline into ground, weather conditions were snowy, late evening.
- 1/19/2001 – 0 injuries or fatalities, Tanker Truck jack-knifed on HWY 26 near mile marker 99, released gasoline into nearby wet weather ditch, weather conditions were overcast, late evening.
- 3/4/1999 - 0 injuries or fatalities, Tanker Truck rolled on HWY 26 near mile marker 77, released gasoline into nearby Beaver Creek, weather conditions clear and cold, mid-afternoon.
- 11/27/1991 - 0 injuries and 3 fatalities, car collided with Tanker Truck on HWY 26 near mile marker 86.7, released gasoline burned off in fire, weather conditions unknown, late evening.

In addition to oil and chemical spills, the EPA has recorded one airborne hazardous material release and two toxic releases in Warm Springs since 1996.

## Location and Extent

The EPA regulates six facilities on the Reservation. Of these facilities, two-thirds facilities are permitted to discharge to water and one-half are hazardous waste handlers. However, while

several of the small, fixed facilities (e.g., body shops) have varying uses of hazardous chemicals, in general these facilities do not pose a significant risk to the Reservation.

In addition to fixed facilities, hazardous material events have the potential to occur along Highways 26, 9, and 3, and the railroad tracks, which are located in close proximity to the Reservation. The trucks and trains that use these transportation arteries commonly carry a variety of hazardous materials including gasoline, other crude oil derivatives, and other chemicals known to cause human health problems. The Warm Springs River, Shitike Creek, and Tenino Creek are waterways most vulnerable to hazardous material transportation incidents.

Based on previous occurrences, the likelihood of a small oil or chemical spill occurring within the Reservation is every 4 years. However, more comprehensive information on the probability and magnitude of hazardous material events from all types of sources (such as fixed facilities or transport vehicles) is not available. Wide variations among the characteristics of hazardous material sources and among the materials themselves make such an evaluation difficult.

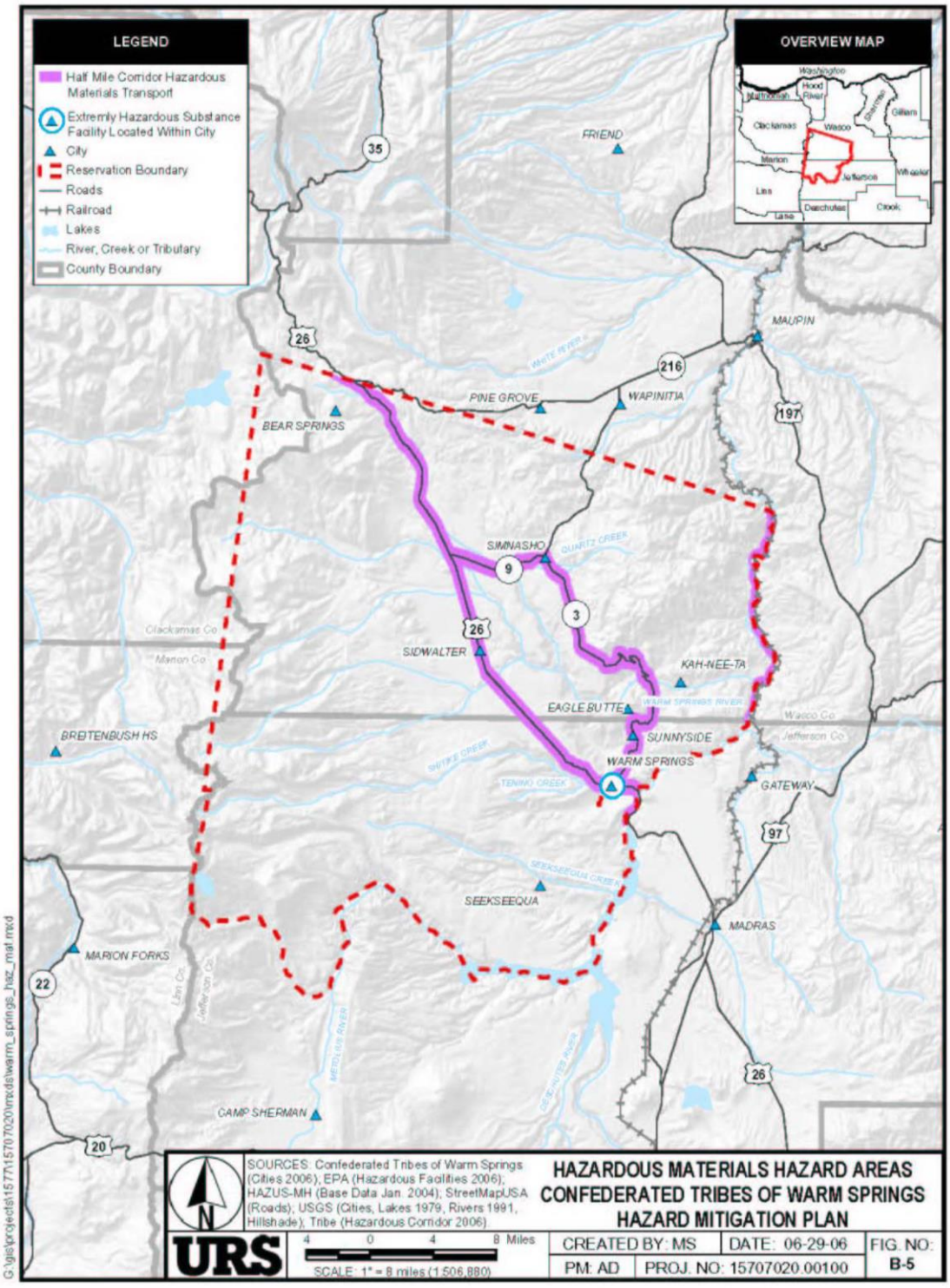
While it is beyond the scope of this Plan to evaluate the probability and magnitude of hazardous material events within the Reservation in detail, it is possible to determine the exposure of population, buildings, and critical facilities should such an event occur. Of the facilities that were required to file an annual EPA Tier II Material Inventory Report because of the presence of hazardous materials, one facility located in the community of Warm Springs was identified as having EHSs. Therefore, as shown in Figure 2-16, areas at risk for hazardous material events include the community of Warm Springs and any area within a ½-mile radius of Highways 26, 9, and 3, and the railroad tracks.

## Vulnerabilities

According to the 2006 exposure analysis, the entire community of Warm Springs falls within the community-wide buffer around the 1 EHS facility located on the Reservation. This includes 2,272 tribal members, 600 residential buildings (worth $42.2 million), and 22 critical facilities (worth $36.2 million).

The communities of Warm Springs, Simnasho, and Bear Springs are located within the ½-mile radius of Highways 26, 9, and 3, and the railroad tracks. Therefore 2,397 tribal members, 608 residential structures (worth $42.8 million), and 30 critical facilities (worth $71.1 million) are located within a hazardous materials transport corridor. However, these figures are for the entirety of the transportation corridors and, therefore, overstate the exposure since a hazardous material event along the corridors is unlikely to affect all of the area within the ½-mile buffer.

**Figure 2-16 Hazardous Materials Hazard Areas**




Source: CTWS HMP (2006); URS

# Federal Disaster and Emergency Declarations

Looking at the past events that have occurred in the county can provide a general sense of the hazards that have caused significant damage in the county. Where trends emerge, disaster declarations can help inform hazard mitigation project priorities.

President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Table 2-5 summarizes the major declared disasters that affected the CTWS and contiguous Oregon counties, since 1955. The table shows that there have been two major disaster declarations for the Reservation; there have been five additional disaster declarations for the surrounding contiguous lands.

An Emergency Declaration is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring. There have been two emergency declarations that have affected CTWS.

Fire Management Assistance may be provided after a jurisdiction submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. There has been one fire management assistance declaration for the Reservation.

**Table 2-5 FEMA Major Disaster, Emergency, and Fire Management Declarations for the Reservation and Contiguous Lands**

| Declaration Number | Declaration Date | Incident Period | | Jurisdiction | Incident | Individual Assistance | Public Assistance Categories |
|---|---|---|---|---|---|---|---|
| | | From | To | | | | |
| DR-184 | 12/24/1964 | 12/24/1964 | 12/24/1964 | Statewide | Heavy rains and flooding | Yes | A, B, C, D, E, F, G |
| DR-413 | 1/25/1974 | 1/25/1974 | 1/25/1974 | Wasco | Severe Storms, Snow Melt, Flooding | Yes | A, B, C, D, E, F, G |
| DR-1061 | 8/3/1995 | 7/8/1995 | 7/9/1995 | Wasco | Flash Flooding | None | A, B, C, D, E, F, G |
| DR-1099* | 2/9/1996 | 1/4/1996 | 2/21/1996 | CTWS, Statewide | Severe Storms, Flooding | None | A, B, C, D, E, F, G |
| DR-1510 | 2/19/2004 | 12/26/2003 | 1/14/2004 | Statewide | Severe Winter Storm | None | A, B, C, D, E, F, G |
| DR-1632* | 3/20/2006 | 12/18/2005 | 1/21/2006 | CTWS, Jefferson | Severe Storms, Flooding, Landslides, Mudslides | None | A, B, C, D, E, F, G |
| DR-1683 | 2/22/2007 | 12/14/2006 | 12/15/2006 | Wasco | Severe Winter Storms, Flooding | None | A, B, C, D, E, F, G |
| EM-3039 | 4/29/1977 | 4/29/1977 | 4/29/1977 | | Drought | None | A, B |
| EM-3228 | 9/7/2005 | 8/29/2005 | 10/1/2005 | | Hurricane Katrina Evacuation | None | B |
| FMA-2443* | 7/16/2002 | 7/13/2002 | 7/18/2002 | Jefferson | Eyerly Fire | None | - |

Source: FEMA, Disaster History. Major Disaster Declarations.
Note: * - a declaration that included the CTWS as a designated area.

# Vulnerability Assessment

Community vulnerabilities are an important component of the NHMP risk assessment. For more in-depth information regarding specific community assets and vulnerabilities, reference Appendix B: Community Profile.

**Significant Changes Since Previous Plan:**

The methodology and exposure analysis is unchanged since the previous plan since development in hazard areas has not changed. Hazards that are newly profiled lack significant data to perform an accurate exposure analysis; an action item is included to enhance the available data and improve the risk assessment through the FEMA led Risk MAP process. This section includes an enhanced community economic and demographic vulnerability assessment. Some content and format modifications have occurred.

## Methodology

The methodology used to prepare the dollar estimates for vulnerability is described below. Potential dollar losses are summarized in the hazard profiles above.

A conservative exposure-level analysis was conducted to assess the risks of the identified hazards (2006 NHMP). This analysis is a simplified assessment of the potential effects of the hazard on values at risk without consideration of probability or level of damage.

Using GIS, the locations of critical facilities were compared to locations where hazards are likely to occur. If any portion of the critical facility or community fell within a hazard area, the critical facility and/or entire community was counted as impacted. The exception for this analysis includes communities and critical facilities located within the 100-year floodplain (see Flood profile for further explanation).

Replacement values or insurance coverage were developed for physical assets. These values were obtained from HAZUS-MH, the CTWS, and the U.S. Census. For facilities that didn't have specific values per building in a multibuilding scenario, the buildings were grouped together and assigned one value. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

## Data Limitations

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk (data is as presented in the 2006 NHMP, available data has not changed). These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any

loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment, as well as approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and critical facilities to hazard. It was beyond the scope of this NHMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the NHMP. An action item is included to update the available data and to develop an enhanced Risk Assessment as part of the FEMA led Risk MAP process that is currently underway.

## Exposure Analysis

The results of the 2006 exposure analysis are summarized in the hazard profiles presented earlier and in the Tables 2-8 and 2-9 below.

## Table 2-6 Exposure Analysis: Population and Residential Structures

| Hazard | Risk | Communities | Population | Residential | |
|---|---|---|---|---|---|
| | | | | Number | Value |
| **Dam Failures** | Dam Inundation Zone | Warm Springs | 2,272 | 600 | $42,240,000 |
| **Floods** | 100-Year Flood Zone | Warm Springs, Kah-Nee-Ta | 492 | 133 | $9,363,200 |
| **Hazardous Materials Events** | ½-Mile Buffer Transportation Corridors | Warm Springs, Simnasho, Bear Springs | 2,397 | 641 | $45,126,400 |
| | Community Buffer EHS facility | Warm Springs | 2,272 | 600 | $42,240,000 |
| **Landslides** | Low | Sidwalter | 200 | 67 | $4,716,800 |
| | Moderate | Warm Springs, Bear Springs, Kah-Nee-Ta, Seekseequa, Simnasho | 2,697 | 741 | $52,166,400 |
| **Wildland Fires** | Moderate | | 0 | 0 | $0 |
| | High | Sidwalter | 200 | 67 | $4,716,800 |
| | Very High | Warm Springs, Bear Springs, Kah-Nee-Ta, Seekseequa, Simnasho | 2,697 | 741 | $52,166,400 |
| | Extreme | | 0 | 0 | $0 |
| **Winter Storms** | Moderate Freezing Rain | Sidwalter, Simnasho, Seekseequa | 400 | 133 | $9,363,200 |
| | High Freezing Rain | Warm Springs, Kah-Nee-Ta | 2,472 | 667 | $46,956,800 |
| | Moderate Snow Storm | Bear Springs | 25 | 8 | $563,200 |
| | High Snow Storm | | 0 | 0 | $0 |

Source: CTWS HMP (2006); URS

## Table 2-7 Exposure Analysis: Critical Facilities

| | | Offices and Facilities | | Enterprises | | Educational Facilities | | Gathering Places | | Police and Fire Stations | | Potable Water and WW Facilities | | Communication Facilities | | Kah-Nee-Ta Resorts | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hazard** | **Risk** | **No.** | **Value ($)[1]** | **No.** | **Value ($)[1]** | **No.** | **Value ($)[1]** | **No.** | **Value ($)[1]** | **No.** | **Value ($)[1]** | **No.** | **Value ($)[1]** | **No. ($)[1]** | **Value ($)[1]** | **No.** | **Value ($)[1]** |
| **Dam Failures** | Inundation Zone | 6 | $4,707 | 7 | $34,872 | 3 | $1,695 | 2 | $956 | 3 | $2,938 | 2 | $17,234 | 1 | $2,000 | 0 | $0 |
| **Floods** | 100-Year Flood Zone | 2 | $1,138 | 4 | $13,553 | 1 | $565 | 2 | $956 | 2 | $1,356 | 3 | $27,689 | 0 | 0 | 1 | $654 |
| **Hazardous Materials Events** | ½-Mile Buffer Transportation Corridors | 7 | $4,877 | 5 | $9,568 | 3 | $1,695 | 3 | $1,253 | 5 | $3,860 | 6 | $51,701 | 1 | $2,000 | 0 | $0 |
| | Community Buffer EHS Facility | 6 | $4,707 | 5 | $9,568 | 3 | $1,695 | 2 | $956 | 3 | $2,938 | 2 | $17,455 | 1 | $2,000 | 0 | $0 |
| **Landslides** | Low | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 1 | $678 | 2 | $13,557 | 0 | $0 | 0 | $0 |
| | Moderate | 7 | $4,877 | 7 | $34,872 | 3 | $1,695 | 4 | $1,550 | 7 | $4,775 | 5 | $44,923 | 1 | $2,000 | 2 | $33,854 |
| **Wildland Fires** | Moderate | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 |
| | High | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 1 | $678 | 1 | $6,778 | 0 | $0 | 0 | $0 |
| | Very High | 7 | $4,877 | 7 | $34,872 | 3 | $1,695 | 4 | $1,550 | 7 | $4,775 | 6 | $51,701 | 3 | $2,313 | 2 | $33,854 |
| | Extreme | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 |
| **Winter Storms** | Moderate Freezing Rain | 0 | $0 | 0 | $0 | 0 | $0 | 2 | $594 | 4 | $2,278 | 5 | $37,569 | 2 | $313 | 0 | $0 |
| | High Freezing Rain | 6 | $4,707 | 7 | $34,872 | 3 | $1,695 | 2 | $956 | 3 | $3,175 | 2 | $20,912 | 1 | $2,000 | 2 | $33,854 |
| | Moderate Snow Storm | 1 | $170 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 |
| | High Snow Storm | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 | 0 | $0 |

Source: CTWS HMP (2006); URS

## Population Assessment

The socio-demographic qualities of the community population such as language, race and ethnicity, age, income, and educational attainment are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Historically, 80 percent of the disaster burden falls on the public.[9] Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low-income persons. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning. For planning purposes, it is essential that Confederated Tribes of Warm Springs Reservation consider both immediate and long-term socio-demographic implications of hazard resilience.

### Population Vulnerabilities

- As of 2013, more than 30% of Confederated Tribes of Warm Springs's population is under the age of 15; indicating a high percentage of dependent youth.
- The CTWS age dependency ratio[10] is 60.7; indicating a high number of people not in the workforce.
- The CTWS has a population of older folks who are living alone; many of these individuals are in the northern part of the Reservation.
- Approximately 40% of all households are headed by single-parents.
- The median income for the town of Warm Springs ($44,929) is lower than the regions; however, it has been increasing since 2009.
- About one-third of tribal members meet the federal poverty; in the event of a natural disaster these individuals may require additional assistance.

## Economy Assessment

Economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery. It is imperative that the Reservation recognize that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.

[9] Hazards Workshop Session Summary #16, *Disasters, Diversity, and Equity*, University of Colorado, Boulder (2000).

[10] Dependency Ratio: the ratio of population typically not in the work force (less than 15, greater than 64)

### Economic Vulnerabilities

- Approximately 30% of the labor force is unemployed throughout the Reservation (45% in the north).In the event of a large—scale disaster, unemployment has the potential to rise when businesses and companies are unable to overcome the ramifications of the hazard event.
- About 40% of mortgage owners pay more than 35% of household income on housing (mortgage or rent) in the northern part of the Reservation.
- The largest occupation sectors are Professional and related (19%), Personal care and service (13%), and Office and administrative support (12%). In the event of a natural disaster, the manufacturing sector may not be as vulnerable in the short term as other sectors; however, other large industries such as retail and wholesale trade may be significantly affected by a disaster as these basic industries tend to rely on a stable disposable income, which may decline following a disaster.

## Environment Assessment

The capacity of the natural environment is essential in sustaining all forms of life including human life, yet it often plays an underrepresented role in community resiliency to natural hazards. The natural environment includes land, air, water and other natural resources that support and provide space to live, work and recreate.[11] Natural capital such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. When natural systems are impacted or depleted by human activities, those activities can adversely affect community resilience to natural hazard events.

### Environmental Vulnerabilities

- Dynamic weather and relatively flat (east of the Cascades), arid land across CTWS are indicators of hazard vulnerability when combined with the changing climate and severe weather related events. Both wet and dry cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more frequent flooding. Less precipitation in the summers and subsequently lower soil moisture with hotter temperatures will likely increase the amount of vegetation consumed by wildfire.
- Extended drought periods affect snowpack and agricultural irrigation.

## Built Environment, Critical Facilities, and Infrastructure Assessment

Critical facilities (i.e. police, fire, and government facilities), housing supply and physical infrastructure are vital during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to

[11] Mayunga, J. "Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building," (2007).

infrastructure failure. These conditions force communities to rely on local and immediately available resources.

### Housing Vulnerabilities

- It is crucial to maintain the quality of built capacity (transportation networks, critical facilities, utility transmission, etc.) throughout the area, as poor infrastructure can negatively affect the Reservation's ability to cope, respond, and recover from a natural disaster.
- Mobile home and other non-permanent residential structures account for 18% of housing. These structures are particularly vulnerable to certain natural hazards, such as windstorms and heavy flooding events.
- Based on U.S. Census data, more than two-thirds of the residential housing throughout the Reservation was built before the current seismic building standards of 1990.
- Approximately one-third of residential structures were constructed prior to the local implementation of the flood elevation requirements of the 1970's.
- The county has one-third of the housing units occupied by renters, versus two-thirds homeowners. Studies have shown that renters are less likely than homeowners to prepare for hazardous events.

### Critical Facilities and Infrastructure Vulnerabilities

- Some roads and bridges in the Reservation are highly vulnerable to hazards, specifically earthquakes. Because bridges vary in size, materials, siting, and design, any given hazard will affect them differently. The Reservation should pay considerable attention to roads and bridges that may become obstructed that serve as primary interstate travel routes (Highway 26), as this will likely have significant impacts on access in and out of the county and region. Oregon Department of Transportation has jurisdiction over the interstate and highways, but the Reservation may control maintenance in and around the communities.
- There are three high hazard dams located in, or near, the Reservation: Pelton, Pelton Reregulating, and Round Butte

## Risk Analysis

This NHMP utilizes a hazard analysis methodology that was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management over the years.

The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). Vulnerability and probability are the two key components of the methodology. Vulnerability examines both typical and maximum credible events, and probability endeavors to reflect how physical changes in the jurisdiction and scientific research modify the historical record for each hazard. Vulnerability accounts for approximately 60% of the total score, and probability approximately 40%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one

hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as demonstrated below.

## History (*Weight factor for category = 2)*

History is the record of previous occurrences. Events to include in assessing history of a hazard in your jurisdiction are events for which the following types of activities were required:

- The Emergency Operations Center (EOC) or alternate EOC was activated;
- Three or more Emergency Operations Planning (EOP) functions were implemented, e.g., alert & warning, evacuation, shelter, etc.;
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

**LOW =** 0 to 1 event in the past 100 years, scores between 1 and 3 points
**MODERATE =** 2 to 3 event in the past 100 years, scores between 4 and 7 points
**HIGH =** 4+ events in the past 100 years, scores between 8 and 10 points

## Probability (*Weight factor for category = 7)*

Probability is the likelihood of future occurrence within a specified period of time.

**LOW =** one incident likely within 75 to 100 years, scores between 1 and 3 points
**MODERATE =** one incident likely within 35 to 75 years, scores between 4 and 7 points
**HIGH =** one incident likely within 10 to 35 years, scores between 8 and 10 points

## Vulnerability (*Weight factor for category = 5)*

Vulnerability is the percentage of population and property likely to be affected under an “average” occurrence of the hazard.

**LOW =** < 1% affected, scores between 1 and 3 points
**MODERATE =** 1 - 10% affected, scores between 4 and 7 points
**HIGH =** > 10% affected, scores between 8 and 10 points

## Maximum Threat (***Weight factor for category = 10)***

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

**LOW =** < 5% affected, scores between 1 and 3 points
**MODERATE =** 5 - 25% affected, scores between 4 and 7 points
**HIGH =** > 25% affected, scores between 8 and 10 points

The table below presents the entire updated hazard analysis matrix for CTWS. The hazards are listed in rank order from high to low. The table shows that hazard scores are influenced by each of the four categories combined. With considerations for past historical events, the probability or likelihood of a particular hazard event occurring, the vulnerability to the community, and the maximum threat or worst-case scenario wildfire, winter storm, flood, and drought events rank as the top hazard threats (top tier). Windstorm, the Cascadia Subduction Zone earthquake, and volcano events rank next highest (middle tier). Crustal earthquakes and landslides comprise the lowest ranked hazards (bottom tier).

**Table 2-8 Hazard Analysis Matrix**

| Hazard | History | Vulnerability | Maximum Threat | Probability | Total Threat Score | Hazard Rank | |
|---|---|---|---|---|---|---|---|
| Wildfire | 20 | 50 | 100 | 70 | 240 | #1 | |
| Winter Storm | 20 | 50 | 90 | 70 | 230 | #2 | *Top Tier* |
| Flood - Riverine | 16 | 45 | 100 | 63 | 224 | #3 | |
| Drought | 20 | 35 | 80 | 70 | 205 | #4 | |
| Windstorm | 14 | 20 | 80 | 63 | 177 | #5 | |
| Cascadia Earthquake | 2 | 40 | 80 | 49 | 171 | #6 | *Middle Tier* |
| Volcano | 2 | 35 | 100 | 21 | 158 | #7 | |
| Crustal Earthquake | 2 | 25 | 70 | 7 | 104 | #8 | *Bottom* |
| Landslide | 6 | 15 | 40 | 21 | 82 | #9 | *Tier* |

Source: CTWS NHMP Peer Group, 2015.

Conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with sense of hazard priorities, but does not predict the occurrence of a particular hazard.

# SECTION 3: MITIGATION STRATEGY

Section 3 outlines Confederated Tribes of the Warm Springs Reservation's (CTWS) strategy to reduce or avoid long-term vulnerabilities to the identified hazards. Specifically, this section presents a mission and specific goals and actions thereby addressing the mitigation strategy requirements contained in 44 CFR 201.7(c). The NHMP Peer Group reviewed and updated the mission, goals and action items documented in this plan. Additional planning process documentation is in Appendix B.

## Mitigation Plan Mission

The Plan mission states the purpose and defines the primary functions of the CTWS's NHMP. It is intended to be adaptable to any future changes made to the Plan and need not change unless the community's environment or priorities change.

The mission of the Confederated Tribes of the Warm Springs Reservation NHMP is:

> *To promote sound public policy designed to protect tribal members, critical facilities, infrastructure, private property, and the environment from natural hazards.*

The 2015 NHMP Peer Group added a plan mission statement and agreed that it accurately describes the overall purpose and intent of this Plan. The Peer Group believes the concise nature of the mission statement allows for a comprehensive approach to mitigation planning.

## Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that CTWS members, and public and private partners can take while working to reduce the risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The 2015 CTWS NHMP Peer Group reviewed the previous plan goals and determined they would modify their goals to better align with mitigation objectives.

All the Plan goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available. Below is a list of the plan goals:

**Goal 1:** Protect life and injury resulting from natural hazards.

**Goal 2:** Minimize the impact of natural hazards while protecting, restoring, and sustaining environmental processes.

**Goal 3:** Minimize Tribal and private property damages and the disruption of essential infrastructure and services from natural hazards.

**Goal 4:** Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.

**Goal 5:** Increase the resilience of the Confederated Tribes of Warm Springs Reservation and their economy.

**Goal 6:** Minimize damage to historic and cultural resources.

**Goal 7:** Reduce development within mapped hazardous areas where the risks to people and property cannot be mitigated.

**Goal 8:** Increase communication, collaboration, and coordination among agencies at all levels of government and the private sector to mitigate natural hazards.

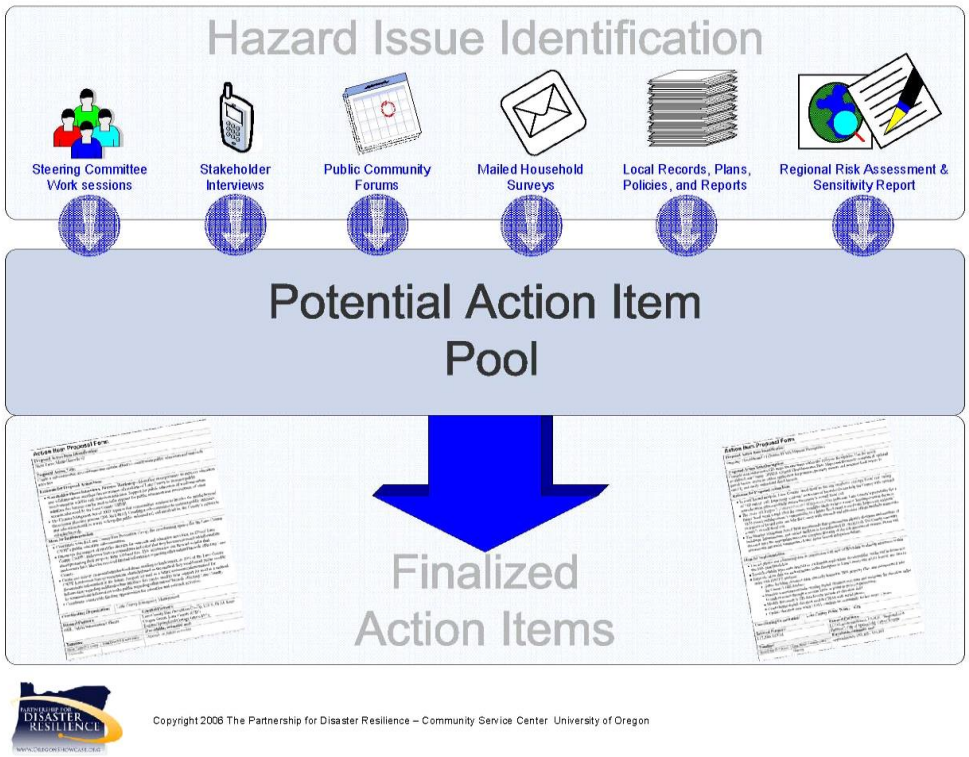
**Goal 9:** Integrate NHMP with the Peoples Plan and implementing measures.

(Note: although numbered the goals are not prioritized.)

## Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions. Action items can be developed through a number of sources. The figure below illustrates some of these sources.

**Figure 3-1 Development of Action Items**




Source: Oregon Partnership for Disaster Resilience, 2008.

The majority of the action items were first created during the 2006 NHMP planning process. During those processes, Peer Groups developed maps of local vulnerable populations, facilities, and infrastructure in respect to each identified hazard. Review of these maps generated discussion around potential actions to mitigate impacts to the vulnerable areas. The URS provided guidance in the development of action items by presenting and discussing actions that were used in other communities. During the update process OPDR took note of ideas that came up in Peer Group meetings and drafted specific actions that met the intent of the Peer Group. All actions were then reviewed by the Peer Group, discussed at length, and revised as necessary before becoming a part of this document.

## Priority Mitigation Actions (Action Plan)

Action items identified through the planning process are an important part of the comprehensive mitigation Action Plan. Action items are detailed recommendations for activities that local departments, tribal members, and others could engage in to reduce risk. CTWS first prioritized actions in 2006 using a simplified Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE/E) evaluation criteria. During the 2015 update the Peer Group reviewed the status and applicability of the eight (8) previously prioritized actions, revised them, and/ or added to the list of priority actions (See Appendix A for more information). In discussing which actions to prioritize the Peer Group considered the STAPLE/E approach (see Section 4 and Appendix C) and then voted on which actions to include in the updated prioritized Action Plan. Below is the list of high priority actions that the Peer Group will focus their mitigation efforts over the next five years; emphasizing attention on an achievable, high leverage, activities.

**Table 3-1 High Priority Mitigation Actions**

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Multi-Hazard #1 | Action Item: | Integrate natural hazard mitigation efforts into the People's Plan, building codes, development regulations, and Integrated Resources Management Plan. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Planning |
| | Potential Funding Source: | Local funding resources |
| | Implementation Timeline: | Mid-Term (3 to 5 years) |
| | Overall Benefit-Costs: | Integration creates a legal status for mitigation and guides local decision-making regarding land use and/ or capital expenditures. |
| | Contribution to Overall Mitigation Strategy: | Integration of natural hazard mitigation into the People's Plan, building codes, development regulations, and the Integrated Resources Management Plan will help to reduce vulnerability to natural hazards, support mitigation activities, and help to increase the speed in which action items are implemented. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Multi-Hazard #2 | Action Item: | Enhance and deliver education programs aimed at increasing awareness and mitigating the risk posed by hazards. At least twice each year a) provide information about the NHMP, b) describe progress toward implementation, and c) collect feedback on the NHMP from audiences. Accomplish these tasks by supporting Community Emergency Response Team programs/ training events that also include a mitigation component. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Three, unanimously affirmed in 2015 |
| | Department/ Agency: | Public Safety Branch |
| | Potential Funding Source: | PDM grants, Lindbergh Grants Program |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | This mitigation action is low cost, but has the potential to reach a larger number of people. |
| | Contribution to Overall Mitigation Strategy: | A public outreach program will help build and support local capacity to enable the public to prepare for, respond to, and recover from disasters. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Multi-Hazard #3 | Action Item: | Develop a plan and seek funding for backup electric and telecommunications systems for critical facilities. |
| | Priority: | High (Prioritized in 2006, affirmed in 2015) |
| | Votes: | Three, unanimously affirmed in 2015 |
| | Department/ Agency: | Public Utilities Branch |
| | Potential Funding Source: | Department of Homeland Security Preparedness Technical Assistance Program, PDM grants |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | This mitigation action addresses high risk situations - it is imperative that the tribal critical facilities can function during and after a disaster. |
| | Contribution to Overall Mitigation Strategy: | This program will help Tribal government agencies prepare for, respond to, and recover from disasters. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Multi-Hazard #4 | Action Item: | Develop a community evacuation plan to address multiple hazards. Develop routes, consistent advanced warning notification system, and community awareness plan. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Emergency Management |
| | Potential Funding Source: | Local funding resources |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | There is not currently a designated and widely known evacuation plan for mass evacuation needs, including dam safety and wildfire. Designated routes, a notification system, and community awareness are all required. There are many isoloated areas within the tribal lands that do not have cell coverage. Residents in these areas may not receive alerts when a natural disaster occurs (dam, wildfire, etc.). A robust warning system, coordinated amongst emergency services, may include reverse 911 and/ or other technologies designed to reach residents in rural areas. |
| | Contribution to Overall Mitigation Strategy: | A robust warning system ensures that the community is capable of receiving notifications and alerts of natural hazards, warning at-risk populations, and acting on alert. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Multi-Hazard #5 | Action Item: | Over the next five years, a) develop a prioritized list of critical public facilities, consistent with the Critical Infrastructure and Key Resources developed by the Federal Emergency Management Agency (FEMA), such as underground wastewater and stormwater collection and conveyance systems, radio communication systems, fire stations, schools and other buildings to be inspected for hazard vulnerability, b) develop a prioritization of facilities to be evaluated for hazard risk, c) seek funding for evaluations, d) develop a prioritized list of facilities/ services to be retrofitted, relocated, or replaced, e) secure funding for 2-3 retrofit projects per year. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Emergency Management/ Public Utilities |
| | Potential Funding Source: | Local funding resources, PDM, HMGP, Risk MAP |
| | Implementation Timeline: | Mid-Term (3 to 5 years) |
| | Overall Benefit-Costs: | Many critical facilities have not been evaluated for natural hazard vulnerability (seismic, flood, wildfire, etc.). A large-scale hazard event has the potential to severely damage local critical facilities, which can inhibit response and recovery efforts. Some funding sources may not be available unless they have already developed a prioritized list of critical facilities/services to be retrofitted, replaced, or relocated. |
| | Contribution to Overall Mitigation Strategy: | The identification and mitigation of critical facilities will reduce potential losses due to natural hazards and allow uninterupted response and recovery effots. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Multi-Hazard #6 | Action Item: | Over the next five years, a) identify critical transportation corridors (including primary emergency, evacuation, and access routes) and electric distribution routes b) develop a list of key backbone transmission and distribution routes that serve critical customers and enable efficient restoration to the broader distribution system c) develop a long-term plan to underground, relocate, or "harden" key electric distribution lines along critical corridors (including feasibility assessment and prioritization) d) seek funds and opportunities to relocate power poles and power lines, or harden existing facilities, where feasible and appropriate, to reduce interruption to the transportation system and to reduce risk of outages from severe winter storms, windstorms, or earthquakes. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Infrastructure Planning & Engineering, Utility providers |
| | Potential Funding Source: | Local funding resources, PDM, HMGP |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | Downed power lines result in power failures and block critical transportation routes. The loss of electric power for a long period of time (more than 72 hours) can lead to failures of multiple critical systems including health care, water filtration, wastewater treatment, communications, transportation, and others. Impassable roadways from downed lines also inhibit emergency response and restoration of critical services, such as drinking water and health care, and is particularly problematic if fuel for backup generators cannot be delivered. |
| | Contribution to Overall Mitigation Strategy: | The hazards most likely to impair surface transportation and disrupt electric service are severe winter storm (snow, ice, wind, downed trees, utility pole and wire failures) and earthquake (downed trees, utility pole and wire failures). |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Multi-Hazard #7 | Action Item: | Utilize the final multi-hazard risk report and assessment currently being developed by FEMA through the Risk MAP program to update the CTWS Hazard Analysis. |
| | Priority: | High (Added and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Emergency Management, Public Utilities, Planning, Natural Resources |
| | Potential Funding Source: | FEMA Risk MAP, Local funding resources |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | This mitigation action is low cost, but has the potential to reach a larger number of people. |
| | Contribution to Overall Mitigation Strategy: | Updating the hazard vulnerability assessment with data and analysis provided by Risk MAP will help to identify vulnerability to earthquakes, floods, landslides, and wildfires, support mitigation activities, and help to increase the Reservations resiliency. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Flood #1 | Action Item: | Update the stormwater management plan to include regulations to control runoff; both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Public Utilities, Planning, Natural Resources |
| | Potential Funding Source: | Local funding resources |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | This mitigation action is low cost, but has the potential to reach a larger number of people. |
| | Contribution to Overall Mitigation Strategy: | Updating the stormwater management plan will help to reduce vulnerability to landslides, support mitigation activities, and help to increase the speed in which action items are implemented. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Flood #2 | Action Item: | Identify and analyze repetitively flooded structures and infrastructure. Explore mitigation opportunities for repetitively flooded properties and, if necessary, carry out acquisition, relocation, elevation, and flood- proofing measures to protect these properties. |
| | Priority: | High (Prioritized in 2006, affirmed in 2015) |
| | Votes: | One, unanimously affirmed in 2015 |
| | Department/ Agency: | Infrastructure Planning & Engineering, Building Inspections & Permits |
| | Potential Funding Source: | HMGP, PDM, and FMA grants, Risk MAP, local funding resources |
| | Implementation Timeline: | Short Term (0-2 years) for the FEMA Risk MAP work/ Long Term (5+ years) for projects |
| | Overall Benefit-Costs: | The probability of future damage to repetitively damaged properties is high if this mitigation action is not implemented. |
| | Contribution to Overall Mitigation Strategy: | The identification and mitigation of repetitively flooded properties and infrastructure will reduce potential losses due to floods. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Flood #3 | Action Item: | Update the Flood Insurance Study, Flood Insurance Rate Maps, and revisit development codes to determine if floodplain standards are still adequate. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Emergency Management, Infrastructure Planning and Engineering, Planning, Natural Resources |
| | Potential Funding Source: | FEMA Risk MAP, local funding resources, Oregon Silver Jackets |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | The local flood maps are based on data that is approximately 40 years old. FEMA will update maps as resources allow but will prioritize communities that a) indicate an interest in updating local flood maps, and b) provide funding or other resources to support the updating of flood maps. FEMA is initiating a Risk MAP process which will include flood. Table 4 of the Middle Columbia-Hood River Discovery Report provides a list of flood mapping needs. |
| | Contribution to Overall Mitigation Strategy: | The availability of LIDAR data and other technologies offers superior ability to project and map riverine flooding in the area. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Landslide #1 | Action Item: | Create comprehensive geological mapping to areas prone to landslides and rockslides. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Emergency Management |
| | Potential Funding Source: | FEMA Risk MAP, local funding resources, Oregon Silver Jackets |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | Current landslide risk maps fare based on dated topographic maps. LIDAR data can provide substanially better information about landslide risk in the region. |
| | Contribution to Overall Mitigation Strategy: | This effort will help reduce the possibility of damage and losses due to landslides. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Landslide #2 | Action Item: | Use available data to determine areas and buildings at risk to landslides and propose Peoples Plan and land use policies accordingly. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Planning, Public Utilities, Natural Resources |
| | Potential Funding Source: | Local funding resources |
| | Implementation Timeline: | Mid-Term (3-5 years) |
| | Overall Benefit-Costs: | Integration of natural hazard mitigation into the People's Plan, building codes, development regulations, and Integrated Resources Management Plan will help to reduce vulnerability to natural hazards, support mitigation activities, and help to increase the speed in which action items are implemented. |
| | Contribution to Overall Mitigation Strategy: | This effort will help reduce the possibility of damage and losses due to landslides. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Landslide #3 | Action Item: | Develop a vegetation management plan. Proper vegetation can supply slope- stabilizing root strength, and facilitate in intercepting precipitation. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Natural Resources, Planning |
| | Potential Funding Source: | Local funding resources |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | Establishing and maintaining appropriate vegetation of areas above the bluff slope may be the single most important and cost-effective mitigation measure available. |
| | Contribution to Overall Mitigation Strategy: | This effort will help reduce the possibility of damage and losses due to erosion/ landslides. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Landslide #4 | Action Item: | Identify problem areas and implement stream stabilization measures to reduce the effects of erosion. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Natural Resources, Planning |
| | Potential Funding Source: | Local funding resources |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | Establishing and maintaining appropriate stream stabilization measures is cost-effective. |
| | Contribution to Overall Mitigation Strategy: | This effort will help reduce the possibility of damage and losses due to erosion/ landslides. The Risk MAP process may help to determine the appropriate stabilization techniques. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Wildfire #1 | Action Item: | Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques. |
| | Priority: | High (Prioritized in 2006, affirmed in 2015) |
| | Votes: | One, unanimously affirmed in 2015 |
| | Department/ Agency: | Fire Management |
| | Potential Funding Source: | AFG Program's Fire Prevention and Safety Grant, HMGP, PDM grants |
| | Implementation Timeline: | Ongoing |
| | Overall Benefit-Costs: | The probability of future damage from wildland fires is high if this mitigation action is not implemented. Additionally, this mitigation action addresses the highest natural hazard risk (wildland fires) on the Reservation. |
| | Contribution to Overall Mitigation Strategy: | This effort will help reduce the possibility of damage and losses due to wildland fires. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Wildfire #2 | Action Item: | Continue to conduct education/ outreach for creating defensible space around properties in wildland fire hazard areas. |
| | Priority: | High (Prioritized in 2006, affirmed in 2015) |
| | Votes: | One, unanimously affirmed in 2015 |
| | Department/ Agency: | Fire Management |
| | Potential Funding Source: | ANA Grants Program, AFG Program's Fire Prevention and Safety Grant, HMGP, PDM grants |
| | Implementation Timeline: | Short-Term (0-2 years) |
| | Overall Benefit-Costs: | The potential cost of this mitigation action seems reasonable for the size of the problem and its likely benefits. Additionally, this mitigation action addresses the highest natural hazard risk (wildland fires) on the Reservation. |
| | Contribution to Overall Mitigation Strategy: | This effort will help reduce the possibility of damage and losses due to wildland fires. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Wildfire #3 | Action Item: | Identify and inventory emergency water supplies; utilize GPS to map locations and available supply. At the beginning of fire season share this information with Fire Management. |
| | Priority: | High (Prioritized in 2006, revised and affirmed in 2015) |
| | Votes: | One, unanimously affirmed in 2015 |
| | Department/ Agency: | Fire Management and Public Utilities |
| | Potential Funding Source: | None needed, Department of Homeland Security Preparedness Technical Assistance Program |
| | Implementation Timeline: | Ongoing, prior to fire season |
| | Overall Benefit-Costs: | The cost of this mitigation action seems reasonable for the size of the problem and likely benefits. |
| | Contribution to Overall Mitigation Strategy: | This effort will help build the Fire and Safety Department's capacity to prepare for and respond to wildland fires. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Wildfire #4 | Action Item: | Reduce fuels and develop community fuel breaks in high risk, high priority wildland urban interface areas. |
| | Priority: | High (Prioritized in 2006, affirmed in 2015) |
| | Votes: | Three, unanimously affirmed in 2015 |
| | Department/ Agency: | Fire Management |
| | Potential Funding Source: | Hazard Reduction Program, AFG Program's Fire Prevention and Safety Grant, HMGP, PDM grants |
| | Implementation Timeline: | Ongoing |
| | Overall Benefit-Costs: | The probability of future damage to from wildland fires is high if this mitigation action is not implemented. Additionally, this mitigation action addresses the highest natural hazard risk (wildland fires) on the Reservation. |
| | Contribution to Overall Mitigation Strategy: | This effort will help reduce the possibility of damage and losses due to wildland fires. |

| 2015 Action Number | Criteria | Description |
|---|---|---|
| Wildfire #5 | Action Item: | Utilize national urban interface programs, including the Firewise Communities program, which emphasizes community responsibility for planning in the design of a safe community as well as effective emergency response and individual responsibility for safer homes. |
| | Priority: | High (Revised and Prioritized in 2015) |
| | Votes: | Unanimous |
| | Department/ Agency: | Planning, Fire Management, Emergency Management |
| | Potential Funding Source: | Local funding resources |
| | Implementation Timeline: | Ongoing |
| | Overall Benefit-Costs: | This mitigation action addresses high risk situations - it is imperative that individuals take individual action to reduce wildfire risk. |
| | Contribution to Overall Mitigation Strategy: | This program will help Tribal government agencies prepare for, respond to, and recover from disasters. |

Source: CTWS NHMP Peer Group, updated 2015

## Potential Action Items

The potential action items listed in the table below represent a list of actions that the Peer Group did not prioritize in 2015. During the maintenance process, as described in Section 4, the Peer Group will reevaluate actions and consider whether to prioritize any of the potential actions and/ or add additional actions that are not yet identified.

## Table 3-2 Potential NHMP Mitigation Actions

| Potential Action | | | Hazard Alignment | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2015 Action Number | 2015 Priority* | 2015 Description/ Notes | Drought | Earthquake | Flood | Landslide | Volcano | Wildfire | Windstorm | Winter Storm |
| Multi-Hazard #8 | M | Organize an annual event / fair for homeowners, builders, and Tribal Government that includes the distribution of NOAA weather radios, dissemination of information brochures about disasters and building retrofits, and demonstration of "defensible- space" concept and fire-resistant construction materials (for roofs/exterior finishes and nonflammable coverings for openings like chimneys and attics) etc. | X | X | X | X | X | X | X | X |
| Multi-Hazard #9 | M | Expand and disseminate hazard-related GIS information to other relevant agencies and communities. | X | X | X | X | X | X | X | X |
| Multi-Hazard #10 | L | Create a virtual and physical library that contains all technical studies, particularly natural resources. | X | X | X | X | X | X | X | X |
| Multi-Hazard #11 | H | Identify high hazard areas for hazard-specific signage in place. Purchase and install signs near these at-risk areas to notify public of potential hazards. | | | X | X | | X | X | X |
| Multi-Hazard #12 | L | Promote the emergency broadcast system. | X | X | X | X | X | X | X | X |
| Multi-Hazard #13 | M | Implement ice- and windstorm-resistant trees and landscaping practices to reduce tree-related hazards. | | | | | | | X | X |
| Earthquake #1 | H | Seismically retrofit vulnerable facilities and infrastructure to increase their resiliency to seismic hazards. Consider both structural and non-structural retrofit options. | | X | | | | | | |
| Flood #4 | M | Develop a Reservation-wide gauging and warning system for flash and riverine flooding. | | | X | | | | | |
| Flood #5 | H | Work with other agencies (Bureau of Indian Affairs, Bureau of Land Management, Oregon Department of Transportation, Army Corps of Engineers, Silver Jackets, etc.) to develop Mutual Aid Agreements for flooding and flash flooding. | | | X | | | | | |
| Flood #6 | H | Research various ways to protect waterways from hazardous materials events. | | | X | | | | | |
| Landslide #5 | L | Identify and restrict recreational and construction activities in high landslide hazard areas seasonally or as necessary. | | | | X | | | | |
| Wildfire #6 | M | Incorporate and update inline fire suppression into future building codes. | | | | | | X | | |
| Winter Storm #1 | L | Educate tribal members on driving in winter storms and handling winter-related health effects on humans and livestock. | | | | | | | | X |
| Winter Storm #2 | M | Explore the use of environmentally safe chemical deicers / abatement practices. | | | | | | | | X |

Source: CTWS NHMP Peer Group, updated 2015

* H = High, M = Medium, L = Low

# SECTION 4:
# PLAN IMPLEMENTATION AND MAINTENANCE

The Plan Implementation and Maintenance section details the formal process that will ensure that the NHMP remains an active and relevant document. The Plan implementation and maintenance process includes a schedule for monitoring and evaluating the Plan semi-annually, as well as producing an updated plan every five years. Finally, this section describes how the CTWS will integrate public participation throughout the Plan maintenance and implementation process.

**Significant Changes Since Previous Plan:**

The implementation and maintenance process has been modified since the previous plan; in particular, the system used to track the initiation, status, and completion of mitigation activities has changed as shown herein For details see Appendix A, Planning and Public Process.

## Implementing the Plan

The success of the CTWS NHMP depends on how well the outlined action items are implemented. In an effort to ensure that the activities identified are implemented, the following steps will be taken. The Plan will be formally adopted, a coordinating body will be assigned, a convener shall be designated, the identified activities will be prioritized and evaluated, and finally, the Plan will be implemented through existing plans, programs, and policies.

### Plan Adoption

The CTWS NHMP was developed and will be implemented through a collaborative process. After the Plan is locally reviewed and deemed complete, the CTWS Emergency Manager shall submit it to FEMA-Region X for review. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the CTWS will adopt the plan via resolution. At that point the CTWS will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds.

This NHMP meets the requirements of Section 409 of the Stafford Act and Section 322 of the DMA 2000. In addition, as required by 44 CFR 13.11(c) and 44 CFR 13.11(d), the CTWS will comply with all applicable Federal statutes and regulations during the periods for which it receives grant funding, as well as amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes. A copy of the resolution, adopted by the Tribal Council, assures FEMA that the Confederated Tribes will comply with both of the CFR requirements.

## Convener

The CTWS Emergency Manager will take responsibility for plan implementation and will facilitate the Hazard Mitigation Coordinating Body (Peer Group) meetings and will assign tasks such as updating and presenting the Plan to the rest of the members of the Coordinating Body. Plan implementation and evaluation will be a shared responsibility among all of the assigned Hazard Coordinating Body Members. The Convener's responsibilities include:

- Coordinate Steering Committee meeting dates, times, locations, agendas, and member notification;
- Documenting the discussions and outcomes of committee meetings;
- Serving as a communication conduit between the Peer Group and the public/stakeholders;
- Identifying emergency management-related funding sources for natural hazard mitigation projects; and
- Utilizing the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

## Coordinating Body

The CTWS Convener will form a Natural Hazard Coordinating Body (Peer Group) for updating and implementing the NHMP. The Coordinating Body responsibilities include:

- Attending future Plan maintenance and Plan update meetings;
- Serving as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Evaluating and updating the NHMP in accordance with the prescribed maintenance schedule;
- Developing and coordinating ad hoc and/or standing subcommittees as needed; and
- Coordinating public involvement activities.

### Members

CTWS agencies, organizations, and community members were represented and served on the Peer Group during the development of the CTWS NHMP (for a list of individuals see the Acknowledgements section of this NHMP):

To make the coordination and review of the CTWS NHMP as broad and useful as possible, the Coordinating Body will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified on individual action items found in Section 3.

# Implementation through Existing Programs

The NHMP includes a range of action items that, when implemented, will reduce loss from hazard events. Within the Plan, FEMA requires the identification of existing programs that might be used to implement these action items. The CTWS currently proscribe planning

goals through their Peoples Plan, capital improvement plans, Integrated Resources Management Plan, mandated standards, and building codes. To the extent possible, CTWS will work to incorporate the mitigation action items into existing programs and procedures.

Plans and policies already in existence often have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the action items contained in the NHMP through such plans and policies increases their likelihood of being supported and implemented.

Examples of plans, programs or agencies that may be used to implement mitigation activities include:

- Program Budgets
- Capital Improvement Programs
- Community Wildfire Protection Plans
- Comprehensive Land Use Plans
    - Integrated Resources Management Plans
- Economic Development Action Plans
- Zoning Ordinances and Building Codes

For additional examples of plans, programs or agencies that may be used to implement mitigation activities refer to list of plans in Appendix B, *Community Profile*.

# Plan Maintenance

Plan maintenance is a critical component of the NHMP. Proper maintenance of the Plan ensures that this Plan will maximize the CTWS efforts to reduce the risks posed by natural hazards. This section was developed by OPDR and includes a process to ensure that a regular review and update of the Plan occurs. The coordinating body and local staff are responsible for implementing this process, in addition to maintaining and updating the Plan through a series of meetings outlined in the maintenance schedule below.

## Meetings

The Coordinating Body will meet on a **semi-annual basis** (twice per year) to complete the following tasks. During the first meeting, prior to the wildfire season, the Coordinating Body will:

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the Plan and mitigation in general;
- Identify issues that may not have been identified when the Plan was developed; and
- Prioritize potential mitigation projects using the methodology described below.

The second meeting of the year will take place in early fall, following the wildfire season. During the second meeting the Coordinating Body will:

- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

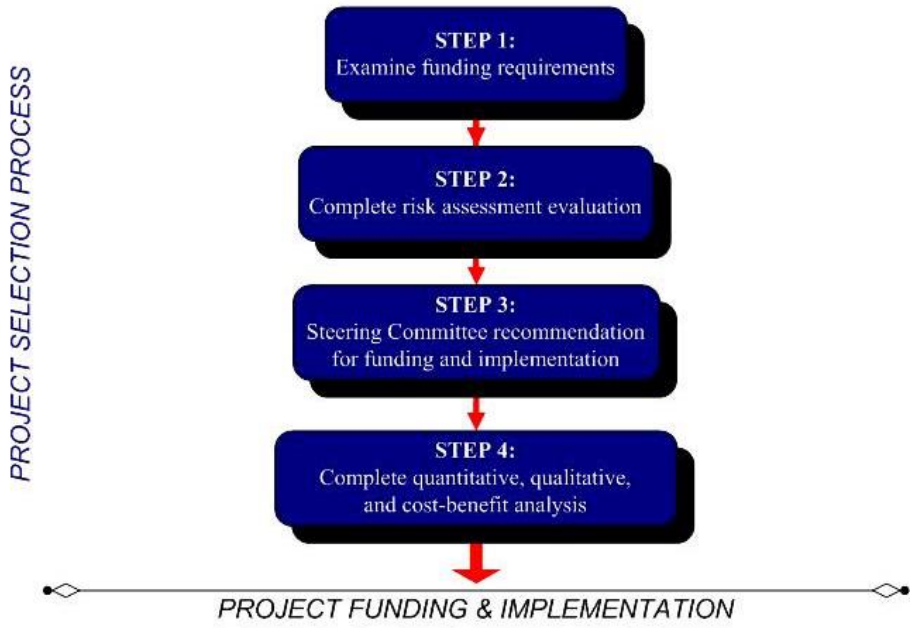
- Document progress of action items, including changes made to the the action, identification of implementation problems and appropriate strategies to overcome them, and whether the project has helped to achieve the appropriate goals identified in the plan.

The convener will be responsible for documenting the outcome of the semi-annual meetings. The process the Coordinating Body will use to prioritize mitigation projects is detailed in the section below. The Plan's format allows the CTWS to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a NHMP that remains current and relevant.

## Project Prioritization Process

CTWS has included a short list of prioritized actions. Because FEMA is in the process of completing updated multi-hazard risk assessment products (via Risk MAP), future mitigation plan maintenance meetings will revisit the prioritization process. The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore the project prioritization process needs to be flexible. Committee members, local government staff, other planning documents, or the risk assessment may be the source to identify projects. Figure 4-1 illustrates the project development and prioritization process.

**Figure 4-1 Action Item and Project Review Process**




Source: Oregon Partnership for Disaster Resilience, 2008.

### Step 1: Examine funding requirements

The first step in prioritizing the Plan's action items is to determine which funding sources are open for application. Several funding sources may be appropriate for the CTWS proposed

mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), Bureau of Indian Affairs, local general funds, and private foundations, among others. Please see Appendix D, *Grant Programs* for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the Coordinating Body will examine upcoming funding streams' requirements to determine which mitigation activities would be eligible. The Coordinating Body may consult with the funding entity, or other appropriate tribal, federal, state, or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the Coordinating Body's semi-annual Plan maintenance meetings.

## Step 2: Complete risk assessment evaluation

The second step in prioritizing the Plan's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The Coordinating Body will determine whether or not the Plan's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas, and whether community assets are at risk. The Coordinating Body will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future, or are likely to result in severe / catastrophic damages.

## Step 3: Coordinating Body Recommendation

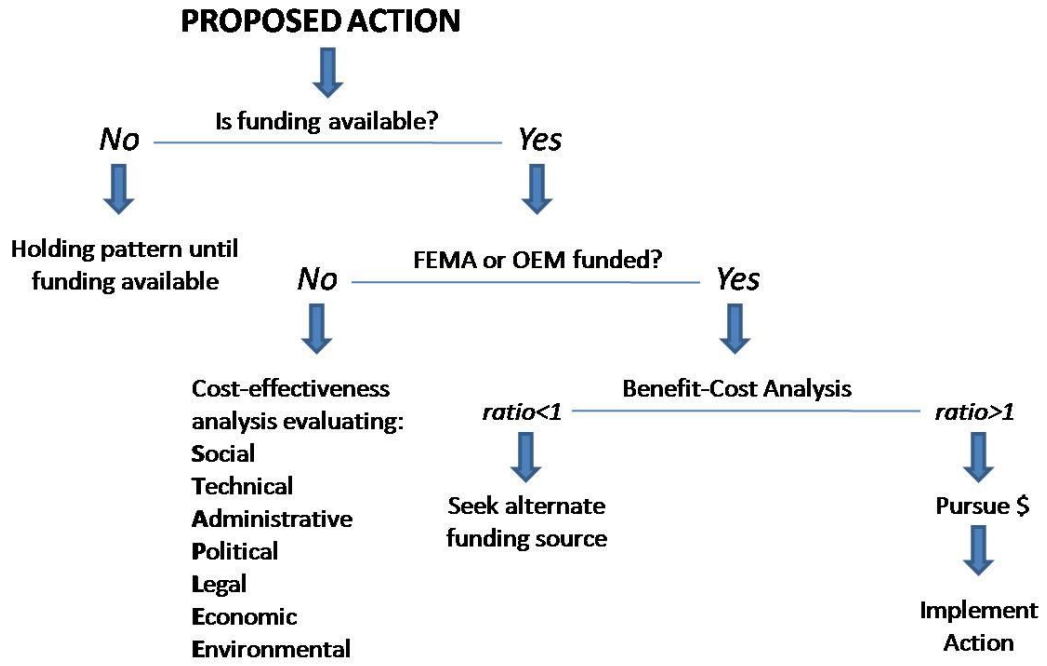
Based on the steps above, the Coordinating Body will recommend which mitigation activities should be moved forward. If the Coordinating Body decides to move forward with an action, the coordinating organization (Department/ Agency) designated on the action item form will be responsible for taking further action and, if applicable, documenting success upon project completion. If more than one department and/or agency are identified for a mitigation project, a single department and/or agency will be chosen to monitor the mitigation project implementation and closeout. The Coordinating Body will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

## Step 4: Complete quantitative and qualitative assessment, and economic analysis

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis

upon which to compare alternative projects. Figure 4.2 shows decision criteria for selecting the appropriate method of analysis.

**Figure 4-2 Benefit Cost Decision Criteria**




Source: Oregon Partnership for Disaster Resilience, 2010.

If the activity requires federal funding for a structural project, the Coordinating Body will use a FEMA-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The Coordinating Body will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. OPDR at the University of Oregon's Community Service Center has tailored the STAPLE/E technique for use in natural hazard action item prioritization.

## Continued Public Involvement and Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the CTWS NHMP. Although members of the Coordinating Body represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan.

To ensure that these opportunities will continue, the CTWS will:

- Place articles in the local newspaper directing the public where to view and provide feedback; and

- Use existing newsletters, such as schools and utility bills, to inform the public where to view and provide feedback.

In addition to the involvement activities listed above, CTWS will ensure continued public involvement by posting the CTWS NHMP on their website (http://www.warmsprings.com). The Plan will also be archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive (https://scholarsbank.uoregon.edu).

## Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. **The CTWS NHMP is due to be updated by September 29, 2021.** The Convener will be responsible for organizing the coordinating body to address plan update needs. The Coordinating Body will be responsible for updating any deficiencies found in the Plan, and for ultimately meeting the Disaster Mitigation Act of 2000's Plan update requirements.

The following 'toolkit' can assist the Convener in determining which Plan update activities can be discussed during regularly-scheduled Plan maintenance meetings, and which activities require additional meeting time and/or the formation of sub-committees.

## Table 4-1 Natural Hazards Mitigation Plan Update Toolkit

| Question | Yes | No | Plan Update Action |
|---|---|---|---|
| Is the planning process description still relevant? | | | Modify this section to include a description of the plan update process. Document how the planning team reviewed and analyzed each section of the plan, and whether each section was revised as part of the update process. (This toolkit will help you do that). |
| Do you have a public involvement strategy for the plan update process? | | | Decide how the public will be involved in the plan update process. Allow the public an opportunity to comment on the plan process and prior to plan approval. |
| Have public involvement activities taken place since the plan was adopted? | | | Document activities in the "planning process" section of the plan update |
| Are there new hazards that should be addressed? | | | Add new hazards to the risk assessment section |
| Have there been hazard events in the community since the plan was adopted? | | | Document hazard history in the risk assessment section |
| Have new studies or previous events identified changes in any hazard's location or extent? | | | Document changes in location and extent in the risk assessment section |
| Has vulnerability to any hazard changed? | | | Document changes in vulnerability in the risk assessment section |
| Have development patterns changed? Is there more development in hazard prone areas? | | | Document changes in vulnerability in the risk assessment section |
| Do future annexations include hazard prone areas? | | | Document changes in vulnerability in the risk assessment section |
| Are there new high risk populations? | | | Document changes in vulnerability in the risk assessment section |
| Are there completed mitigation actions that have decreased overall vulnerability? | | | Document changes in vulnerability in the risk assessment section |
| Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties? | | | Document any changes to flood loss property status |
| Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas? | | | 1) Update existing data in risk assessment section, or<br>2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update |
| Did the plan identify data limitations? | | | If yes, the plan update must address them: either state how deficiencies were overcome or why they couldn't be addressed |
| Did the plan identify potential dollar losses for vulnerable structures? | | | 1) Update existing data in risk assessment section, or<br>2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update |
| Are the plan goals still relevant? | | | Document any updates in the plan goal section |
| What is the status of each mitigation action? | | | Document whether each action is completed or pending. For those that remain pending explain why. For completed actions, provide a 'success' story. |
| Are there new actions that should be added? | | | Add new actions to the plan. Make sure that the mitigation plan includes actions that reduce the effects of hazards on both new and existing buildings. |
| Is there an action dealing with continued compliance with the National Flood Insurance Program? | | | If not, add this action to meet minimum NFIP planning requirements |
| Are changes to the action item prioritization, implementation, and/or administration processes needed? | | | Document these changes in the plan implementation and maintenance section |
| Do you need to make any changes to the plan maintenance schedule? | | | Document these changes in the plan implementation and maintenance section |
| Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)? | | | If the community has not made progress on process of implementing mitigation into existing mechanisms, further refine the process and document in the plan. |

Source: Oregon Partnership for Disaster Resilience, 2010.

# Volume II: Appendices

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# APPENDIX A:
# PLANNING AND PUBLIC PROCESS

## Table of Contents



## Tables

# Memo

**To:** Federal Emergency Management Agency

**From:** Oregon Partnership for Disaster Resilience

**Date:** December 17, 2015

**Re:** List of changes to the 2006 CTWS NHMP for the 2015 Plan Update

## Purpose

This memo describes the changes made to the 2006 Confederated Tribes of Warm Springs Reservation (CTWS) Natural Hazards Mitigation Plan (NHMP) during the 2015 plan update process. Major changes are documented by plan section.

## Project Background

CTWS partnered with the Oregon Partnership for Disaster Resilience (OPDR) to update their Natural Hazards Mitigation Plan (NHMP). The Disaster Mitigation Act of 2000 requires communities to update their mitigation plans every five years to remain eligible for Pre-Disaster Mitigation (PDM) program funding, Flood Mitigation Assistance (FMA) program funding, and Hazard Grant Mitigation Program (HMGP) funding. OPDR met with members of the CTWS Peer Group in November 2014, and in May, September, and November 2015 to update portions of their NHMP. OPDR, with the Peer Group's guidance, made several changes to the 2006 NHMP. Major changes are documented and summarized in this memo.

## 2015 Plan Update Changes

The sections below only discuss *major* changes made to the 2006 CTWS NHMP during the 2015 plan update process. Major changes include the replacement or deletion of large portions of text, changes to the plan's organization, new mitigation action items. If a section is not addressed in this memo, then it can be assumed that no significant changes occurred.

The plan's format and organization have been altered to fit within OPDR's plan template. Table A-1 lists the 2006 plan section names and the corresponding 2015 section names, as updated (major Volumes are highlighted). This memo will use the 2015 plan update section names to reference any changes, additions, or deletions within the plan.

**Table A-1 Changes to Plan Organization**

| 2015 CTWS NHMP | 2006 CTWS HMP |
|---|---|
| Acknowledgements | - |
| Table of Contents | Table of Contents |
| CTWS Adoption Resolution and FEMA Approval Letter | Section 1; Appendix A (Adoption Resolution) |
| Crosswalk for DMA 2000 Compliance | Crosswalk for DMA 2000 Compliance |
| Volume I: Basic Plan | - |
| Plan Summary | Executive Summary |
| Section 1: Introduction | Section 2: Background; Section 4: Planning Process; Appendix C (Public Involvement) |
| Section 2: Risk Assessment | Section 5: Risk Assessment, Appendix B (Figures) |
| Section 3: Mitigation Strategy | Section 6: Mitigation Strategy |
| Section 4: Plan Implementation and Maintenance | Section 7: Plan Maintenance |
| Volume II: Appendices | Appendices |
| Appendix A: Planning and Public Process | Section 4: Planning Process; Appendix C (Public Involvement) |
| Appendix B: Community Profile | Section 3: Community Description; Section 5: Risk Assessment; Appendix B (Figures) |
| Appendix C: Economic Analysis of Natural Hazard Mitigation Projects | Appendix D (FEMA Benefit Costs Analysis) |
| Appendix D: Grant Programs and Resources | Section 6: Mitigation Strategy (6.2) |

Several new sections were added and formatting was changed throughout the 2015 CTWS Multi-jurisdictional NHMP. More information on changes to the plan are provided below.

# Front Pages

- The plan's cover has been updated.
- Acknowledgements have been updated to include the 2015 project partners and planning participants.
- The updated FEMA approval letter and CTWS resolution of adoption are included.

# Volume I: Basic Plan

Volume I provides the overall plan framework for the 2015 NHMP update. Volume I contains the following sections:

## Plan Summary

The 2015 NHMP includes an updated executive summary that provides information about the purpose of natural hazards mitigation planning and describes how the plan will be implemented. The summary also includes the mission, goals, a summary of hazard vulnerability, and lists out the high priority actions. This section also includes details on when the plan was adopted and approved and when it will expire.

## Section 1: Introduction

Section 1 introduces the concept of natural hazards mitigation planning and answers the question, "Why develop a mitigation plan?" Additionally, Section 1 summarizes the 2015 plan update process, and provides an overview of how the plan is organized. Major changes to Section 1 include the following:

- Section 1 is new to the 2015 plan and includes information formerly provided in the 2006 NHMP Section 2: Background, Section 4: Planning Process, and Appendix C (Public Involvement)
- Most of Section 1 includes new information that replaces out of date text found in the previous NHMP. The new text describes the federal requirements that the plan addresses.
- Section 1 of the 2015 update, outlines the entire layout of the plan update, which has been altered as described above.

## Section 2: Risk Assessment

Section 2, Risk Assessment, consists of three phases: hazard identification, vulnerability assessment, and risk analysis. Hazard identification involves the identification of hazard geographic extent, its intensity, and probability of occurrence. The second phase, attempts to predict how different types of property and population groups will be affected by the hazard. The third phase involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Changes to Section 2 include:

- Section 2 includes information formerly provided in the 2006 NHMP Section 5: Risk Assessment and Appendix B (Figures).
- Hazard identification, characteristics, history, probability, vulnerability, and hazard specific mitigation activities were updated. Specific changes are included in a text box at the beginning to each hazard profile. Additional information is provided within the Community Profile of Appendix B.
- NFIP information was updated.
- Updated Hazard Vulnerability Assessment for each of the identified hazards.
    - Hazard Analyses were created for hazards that were not included in the previous NHMP: including Drought, Earthquake, Volcano, and Windstorm.

## Section 3: Mitigation Strategy

This section provides the basis and justification for the mission, goals, and mitigation actions identified in the NHMP. Major changes to Section 3 include the following:

- Section 3 includes information formerly provided in the 2006 NHMP Section 6: Mitigation Strategy.
- A plan mission was added. The goals were reviewed, revised, deleted, and/or added to better align with Peer Group priorities and neighboring jurisdictions (primarily the State of Oregon, and Jefferson and Wasco counties)
- Mitigation actions are renumbered to align with the hazard that they are associated (the previous plan numbered actions according to their associated plan goal). Table A-2 shows the changes to the 2006 actions during the 2015 update process.

- The grey highlighted boxes indicate priority actions that are included in the Mitigation Action Plan; the grey text indicate actions that have been removed (complete, combined with other actions, or removed).

## Table A-2 Action Item Changes

| 2006 Number | 2015 Number | 2006 Priority* | 2015 Priority* | Status | In 2006 Action Plan? | In 2015 Action Plan? | 2006 Description | 2015 Description/ Notes |
|---|---|---|---|---|---|---|---|---|
| 1.A | Multi-Hazard #1 | L | H | Deferred | No | Yes | Update and adopt the newest Uniform Building Code, as needed. | Integrate natural hazard mitigation efforts into the People's Plan, building codes, development regulations, and Integrated Resources Management Plan. |
| 1.B | | H | H | Deferred | No | | Update the People's Plan to include natural and human-made hazards. | |
| 1.C | | H | H | Deferred | No | | Explore the need for hazard zoning and high-risk hazard land use ordinances. | |
| 1.D | Wildfire #6 | M | M | Deferred | No | No | Incorporate and update inline fire suppression into future building codes. | Incorporate and update inline fire suppression into future building codes. |
| 1.E | Multi-Hazard #8 | H | M | Deferred | No | No | Organize an annual event / fair for homeowners, builders, and Tribal Government that includes the distribution of NOAA weather radios, dissemination of information brochures about disasters and building retrofits, and demonstration of "defensible- space" concept and fire-resistant construction materials (for roofs/exterior finishes and nonflammable coverings for openings like chimneys and attics) etc. | Organize an annual event / fair for homeowners, builders, and Tribal Government that includes the distribution of NOAA weather radios, dissemination of information brochures about disasters and building retrofits, and demonstration of "defensible- space" concept and fire-resistant construction materials (for roofs/exterior finishes and nonflammable coverings for openings like chimneys and attics) etc. |
| 1.F | Flood #1 | H | H | Deferred | No | Yes | Update the stormwater management plan to include regulations to control runoff; both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides. | Update the stormwater management plan to include regulations to control runoff; both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides. |
| 2.A | Multi-Hazard #9 | M | M | Deferred | No | No | Expand and disseminate hazard-related GIS information to other relevant agencies and communities. | Expand and disseminate hazard-related GIS information to other relevant agencies and communities. |

Source: CTWS Peer Group

**Table A-2 Action Item Changes** (continued)

| 2006 Number | 2015 Number | 2006 Priority* | 2015 Priority* | Status | In 2006 Action Plan? | In 2015 Action Plan? | 2006 Description | 2015 Description/ Notes |
|---|---|---|---|---|---|---|---|---|
| 2.B | Multi-Hazard #2 | H | H | Ongoing | Yes | Yes | Create a mitigation outreach program that helps tribal members prepare for disasters. | Enhance and deliver education programs aimed at increasing awareness and mitigating the risk posed by hazards. At least twice each year a) provide information about the NHMP, b) describe progress toward implementation, and c) collect feedback on the NHMP from audiences. Accomplish these tasks by supporting Community Emergency Response Team programs/ training events that also include a mitigation component. |
| 2.C | Multi-Hazard #3 | H | H | Ongoing | Yes | Yes | Develop a plan and seek funding for backup electric and telecommunications systems for critical facilities. | Develop a plan and seek funding for backup electric and telecommunications systems for critical facilities. |
| 2.E | n/a | L | n/a | Deleted | No | n/a | Continue to support and fund Community Emergency Response Team programs that also include a mitigation component. | Combined with revised Action MH #2. |
| 2.F | Multi-Hazard #10 | L | L | Deferred | No | No | Create a virtual and physical library that contains all technical studies, particularly natural resources. | Create a virtual and physical library that contains all technical studies, particularly natural resources. |
| 2.G | Multi-Hazard #11 | H | H | Deferred | No | No | Identify high hazard areas for hazard-specific signage in place. Purchase and install signs near these at-risk areas to notify public of potential hazards. | Identify high hazard areas for hazard-specific signage in place. Purchase and install signs near these at-risk areas to notify public of potential hazards. |
| 2.H | n/a | M | n/a | Completed | No | n/a | Use Project 25 repeaters. | Complete. |
| 2.D | Multi-Hazard #4 | H | H | Partially Complete | No | Yes | Develop emergency evacuation programs for neighborhoods in dam inundation areas, high wildfire hazard areas, and flood-prone areas. | Develop a community evacuation plan to address multiple hazards. Develop routes, consistent advanced warning notification system, and community awareness plan. |
| 3.A | | M | H | Deferred | No | | Identify a more advanced warning system. | |
| 8.F | | L | H | Deferred | No | | Purchase and install verbal message signs to communicate ice hazards. | |

Source: CTWS Peer Group

**Table A-2 Action Item Changes** (continued)

| 2006 Number | 2015 Number | 2006 Priority* | 2015 Priority* | Status | In 2006 Action Plan? | In 2015 Action Plan? | 2006 Description | 2015 Description/ Notes |
|---|---|---|---|---|---|---|---|---|
| 4.A | Multi-Hazard #5 | H | H | Deferred | No | Yes | Identify and develop a list of vulnerable critical facilities and mitigate, if necessary. | Over the next five years, a) develop a prioritized list of critical public facilities, consistent with the Critical Infrastructure and Key Resources developed by the Federal Emergency Management Agency (FEMA), such as underground wastewater and stormwater collection and conveyance systems, radio communication systems, fire stations, schools and other buildings to be inspected for hazard vulnerability, b) develop a prioritization of facilities to be evaluated for hazard risk, c) seek funding for evaluations, d) develop a prioritized list of facilities/ services to be retrofitted, relocated, or replaced, e) secure funding for 2-3 retrofit projects per year. |
| 4.B | n/a | M | n/a | Deleted | No | n/a | Limit uses in floodways to those tolerant of occasional flooding, including but not limited to agriculture, outdoor recreation, and natural resource areas. | Included within revised Action MH #1 |
| 4.C | Flood #4 | M | M | Deferred | No | No | Develop a Reservation-wide gauging and warning system for flash and riverine flooding. | Develop a Reservation-wide gauging and warning system for flash and riverine flooding. |
| 4.D | n/a | M | n/a | Deleted | No | n/a | Continue to implement best management practices for floodplain areas. | Included within revised Actions MH #1 and FL #3 |
| 4.E | Flood #5 | H | H | Deferred | No | No | Work with other agencies (Bureau of Indian Affairs, Bureau of Land Management, Oregon Department of Transportation, etc.) to develop Mutual Aid Agreements for flooding and flash flooding. | Work with other agencies (Bureau of Indian Affairs, Bureau of Land Management, Oregon Department of Transportation, Army Corps of Engineers, Silver Jackets, etc.) to develop Mutual Aid Agreements for flooding and flash flooding. |

Source: CTWS Peer Group

**Table A-2 Action Item Changes** (continued)

| 2006 Number | 2015 Number | 2006 Priority* | 2015 Priority* | Status | In 2006 Action Plan? | In 2015 Action Plan? | 2006 Description | 2015 Description/ Notes |
|---|---|---|---|---|---|---|---|---|
| 4.F | Flood #2 | H | H | Deferred | Yes | Yes | Identify and analyze repetitively flooded structures and infrastructure. Explore mitigation opportunities for repetitively flooded properties and, if necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties. | Identify and analyze repetitively flooded structures and infrastructure. Explore mitigation opportunities for repetitively flooded properties and, if necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties. |
| 5.A | n/a | L | n/a | Deleted | No | n/a | Use various media outlets to post information regarding the safe handling and disposal of household chemicals at local landfill. | Remove, not related to natural hazards mitigation. |
| 5.B | Flood #3 | L | H | Deferred | No | Yes | Apply for funding to develop a flow study of the major corridors. | Update the Floood Insurance Study, Flood Insurance Rate Maps, and revisit development codes to determine if floodplain standards are still adequate. |
| 5.C | Flood #6 | H | H | Deferred | No | No | Research various ways to protect waterways from hazardous materials events. | Research various ways to protect waterways from hazardous materials events. |
| 5.D | n/a | H | n/a | Completed | Yes | n/a | Work with small and large businesses to ensure that they report chemical information to the Confederated Tribes of Warm Springs under the Emergency Planning and Community Right-to-Know Act, also known as SARA Title III, provisions. The provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment | Activity is an ongoing part of normal business. |
| 6.A | Landslide #1 | M | H | Deferred | No | Yes | Create comprehensive geological mapping to areas prone to landslides and rockslides. | Create comprehensive geological mapping to areas prone to landslides and rockslides. |

Source: CTWS Peer Group

**Table A-2 Action Item Changes** (continued)

| 2006 Number | 2015 Number | 2006 Priority* | 2015 Priority* | Status | In 2006 Action Plan? | In 2015 Action Plan? | 2006 Description | 2015 Description/ Notes |
|---|---|---|---|---|---|---|---|---|
| 6.B | Landslide #2 | M | H | Deferred | No | Yes | Identify high landslide hazard areas and limit future development. | Use available data to determine areas and buildings at risk to landslides and propose Peoples Plan and land use policies accordingly. |
| 6.C | n/a | M | n/a | Deleted | No | n/a | Develop a public outreach program that addresses the impacts of landslides on personal property. | Remove, not mitigaiton. Mitigation activities will be completed as a component of revised Action MH #2. |
| 6.D | Landslide #3 | L | H | Deferred | No | Yes | Develop a vegetation management plan. Proper vegetation can supply slope-stabilizing root strength, and facilitate in intercepting precipitation. Establishing and maintaining appropriate vegetation of areas above the bluff slope may be the single most important and cost-effective mitigation measure available. | Develop a vegetation management plan. Proper vegetation can supply slope- stabilizing root strength, and facilitate in intercepting precipitation. |
| 6.E | Landslide #5 | L | L | Deferred | No | No | Identify and restrict recreational and construction activities in high landslide hazard areas seasonally or as necessary. | Identify and restrict recreational and construction activities in high landslide hazard areas seasonally or as necessary. |
| 6.F | Landslide #4 | M | H | Deferred | No | Yes | Implement stream stabilization measures to reduce the effects of erosion. | Identify problem areas and implement stream stabilization measures to reduce the effects of erosion. |
| 7.A | Wildfire #1 | H | H | Ongoing | Yes | Yes | Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques. | Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques. |
| 7.B | Wildfire #2 | H | H | Ongoing | Yes | Yes | Develop and provide funding and/or incentives for creating defensible space around properties in wildland fire hazard areas. | Continue to conduct education/ outreach for creating defensible space around properties in wildland fire hazard areas. |
| 7.C | n/a | H | n/a | Completed | No | n/a | Develop and enhance Emergency Medical Services/fire mutual aid with neighboring communities and relevant agencies. | Complete. |

Source: CTWS Peer Group

**Table A-2 Action Item Changes** (continued)

| 2006 Number | 2015 Number | 2006 Priority* | 2015 Priority* | Status | In 2006 Action Plan? | In 2015 Action Plan? | 2006 Description | 2015 Description/ Notes |
|---|---|---|---|---|---|---|---|---|
| 7.D | Wildfire #3 | H | H | Ongoing | Yes | Yes | Identify and inventory emergency water supplies. | Identify and inventory emergency water supplies; utilize GPS to map locations and available supply. At the beginning of fire season share this information with Fire Management. |
| 7.E | Wildfire #4 | H | H | Ongoing | Yes | Yes | Reduce fuels and develop community fuel breaks in high risk, high priority wildland interface areas. | Reduce fuels and develop community fuel breaks in high risk, high priority wildland urban interface areas. |
| 7.F | Wildfire #5 | H | H | Ongoing | No | Yes | Utilize national urban interface programs, including the Firewise Communities program, which emphasizes community responsibility for planning in the design of a safe community as well as effective emergency response and individual responsibility for safer homes. | Utilize national urban interface programs, including the Firewise Communities program, which emphasizes community responsibility for planning in the design of a safe community as well as effective emergency response and individual responsibility for safer homes. |
| 7.G | n/a | H | n/a | Deleted | No | n/a | Adopt fire ordinances that include defensible space measures. | Included within revised Action MH #1 |
| 8.A | Multi-Hazard #12 | L | L | Deferred | No | No | Promote the emergency broadcast system. | Promote the emergency broadcast system. |
| 8.B | Winter Storm #1 | L | L | Deferred | No | No | Educate tribal members on driving in winter storms and handling winter-related health effects on humans and livestock. | Educate tribal members on driving in winter storms and handling winter-related health effects on humans and livestock. |
| 8.C | Multi-Hazard #13 | M | M | Deferred | No | No | Implement ice- and windstorm-resistant trees and landscaping practices to reduce tree-related hazards. | Implement ice- and windstorm-resistant trees and landscaping practices to reduce tree-related hazards. |
| 8.D | Winter Storm #2 | M | M | Deferred | No | No | Explore the use of environmentally safe chemical deicers / abatement practices. | Explore the use of environmentally safe chemical deicers / abatement practices. |
| 8.E | n/a | M | n/a | Deleted | No | n/a | Retrofit critical facilities for maximum load-bearing capacity with minimum weight. | Included within revised Action MH #1 |

Source: CTWS Peer Group

**Table A-2 Action Item Changes** (continued)

| 2006 Number | 2015 Number | 2006 Priority* | 2015 Priority* | Status | In 2006 Action Plan? | In 2015 Action Plan? | 2006 Description | 2015 Description/ Notes |
|---|---|---|---|---|---|---|---|---|
| 8.G | Multi-Hazard #6 | M | H | Deferred | No | Yes | Bury utility lines to avoid power outage due to winter storms (if risk is very high then only this action might be cost-effective). | Over the next five years, a) identify critical transportation corridors (including primary emergency, evacuation, and access routes) and electric distribution routes b) develop a list of key backbone transmission and distribution routes that serve critical customers and enable efficient restoration to the broader distribution system c) develop a long-term plan to underground, relocate, or "harden" key electric distribution lines along critical corridors (including feasibility assessment and prioritization) d) seek funds and opportunities to relocate power poles and power lines, or harden existing facilities, where feasible and appropriate, to reduce interruption to the transportation system and to reduce risk of outages from severe winter storms, windstorms, or earthquakes. |
| - | Multi-Hazard #7 | - | H | New | - | Yes | - | Utilize the final multi-hazard risk report and assessment currently being developed by FEMA through the Risk MAP program to update the CTWS Hazard Analysis. |
| - | Earthquake #1 | - | H | New | - | No | - | Seismically retrofit vulnerable facilities and infrastructure to increase their resiliency to seismic hazards. Consider both structural and non-structural retrofit options. |

Source: CTWS Peer Group

On May 6, 2015 and again on September 15, 2015 the CTWS Peer Group met to review the 2006 NHMP action items. The Peer Group reviewed and identified which of the 2006 NHMP's action items had been completed or not, or whether they should be deleted. Action items were deleted for a number of reasons, including not meeting basic action item criteria such as being measurable, assignable, or achievable. Steering Committee members reviewed edits to the actions over the next several months.

The 2006 NHMP included eight (8) actions within the Mitigation Action Plan; these were the prioritized actions that were to be implemented during. Below is an accounting of the eight actions:

**2006 Action 2.B:** CTWS participates in Firewise and promotes greenbelts (defensible space around residences). There is also an active school education program and utilize the community radio station as a method to relay information. 2015 update: This action is considered *Ongoing* and the action description was revised to provide greater specificity regarding how to accomplish the activities. This action remains in the Mitigation Action Plan as a priority action. The 2015 action number is Multi-hazard #2.

**2006 Action 2.C:** Generators have been installed at critical facilities: administration office (2015); two at the Health Clinic (2010, 2013), one of these will transition to a mobile unit; telecommunications (2014); solar panels are also providing redundant energy production. 2015 update: This action is considered *Ongoing* and the action description was revised to provide greater specificity regarding how to accomplish the activities. This action remains in the Mitigation Action Plan as a priority action. The 2015 action number is Multi-hazard #3.

**2006 Action 4.F:** There was no activity towards this action since 2006. 2015 update: This action is considered *Deferred* and the action description was revised to provide greater specificity regarding how to accomplish the activities. FEMA initiated a multi-hazard risk assessment process through the Risk MAP program in 2015, which when complete will provide an updated Flood Insurance Study and Flood Insurance Rate Maps. This action remains in the Mitigation Action Plan as a priority action. The 2015 action number is Flood #2.

**2006 Action 5.D:** Chemical information is reported as a part of normal business under the Community Right-to-Know act. 2015 update: This action was *Deleted* since the activities involved in this action are not considered party of a NHMP. This action was removed from the Mitigation Action Plan.

**2006 Action 7.A:** Fuel management continues to occur within the boundary of CTWS. The updated Wildfire Prevention Plan (expected 2016) provides details to the application of fuels management. 2015 update: This action is considered *Ongoing* and there were no changes made to the action description. The 2015 action number is Wildfire #1.

**2006 Action 7.B:** A defensible space program exists and fire management routinely conducts knock-and-talks to inform residences of available resources and management techniques. The community promotes greenbelts and utilizes Firewise program information. 2015 update: This action is considered *Ongoing* and the action description was revised to account for the existing program and to acknowledge the need to continue outreach. The 2015 action number is Wildfire #2.

**2006 Action 7.D:** Emergency management and public works currently discuss water availability with fire departments/ management prior to fire season. 2015 update: This action is considered *Ongoing* and the action description was revised to acknowledge the existing meetings and to identify a need to provide GPS/ mapping of available water resources. The 2015 action number is Wildfire #3.

**2006 Action 7.E:** Public works routinely clears community fuel breaks in high risk areas, most recently during the County Line 2 Fire; Fire Management also routinely clears fuel breaks and conducts other fuels reduction projects. The update of the Wildfire Prevention Plan (expected in 2016) will provide additional detail. 2015 update: This action is considered *Ongoing* and there were no changes made to the action description. The 2015 action number is Wildfire #4.

In addition to the eight (8) identified priority actions listed in the 2006 CTWS NHMP there were two "potential actions" that have been completed:

**2006 Potential Action 2.H:** CTWS acquired and utilizes repeaters, as such this action is considered complete.

**2006 Potential Action 7.C:** CTWS has mutual aid agreements with surrounding jurisdictions (Oregon counties and cities, fire, police, Sherriff, and other emergency service providers); these agencies are described in greater detail within the recently adopted CTWS Emergency Operations Plan (2014); as such this action is considered complete.

The 2015 action item prioritization is based upon continuous community needs, the identification of new hazards, deferred action items, and current needs based upon the community risk assessment. They are designed to be feasibly accomplished within the next five years, and can be found in detail description within Section 3 of this NHMP. Several of these actions were identified at the steering committee meeting and later drafted by OPDR and steering committee members, reviewed and accepted by the committee.

The Peer Group opted to remove one action from the Mitigation Action Plan (2006 Action 5.D) and to add twelve additional actions: **MH #1, MH #4, MH #5, MH #6, MH #7, FL #1, FL #3, LS #1, LS #2, LS #3, LS #4, and WF #5.** All of the actions that were moved into the Mitigation Action Plan were previously identified during the 2006 NHMP process (although many of them have been edited, and/ or combine several actions) except for MH #7 which was added in 2015. The complete list of 19 priority actions can be found in Table 3-1.

## Section 4: Plan Implementation and Maintenance

The Peer Group did not formally meet since the previous version of this NHMP. Progress towards action items is documented in the previous section and within Section 3 of this NHMP. The Peer Group agreed to meet semi-annually (before and after fire season) and the CTWS Emergency Manager will continue to be the plan convener. The steering committee will discuss options to integrate the NHMP into other planning documents (including the comprehensive plan) during their semi-annual meetings.

The system identified in the previously approved plan to track the initiation, status, and completion of mitigation activities was changed in order to simplify, and thereby make achievable, the process. The updated process is described in Section 4, copied below is the

previously approved process in *italics*, underline text within parentheses describes the modification that was made:

> *Each department and agency identified [within the] Mitigation Action Plan, will specifically be responsible for monitoring mitigation project implementation and closeout. If more than one department and/or agency are identified for a mitigation project, a single department and/or agency will be chosen to monitor the mitigation project implementation and closeout* (no change made, described in Step 3, p. 4-5).
>
> *The status of the project implementation and closeout will be included with each annual review. In addition, each of these agencies and/or departments will be required to submit a closeout report at the conclusion of any mitigation project* (the Peer Group opted for a less formal closeout process as described within the section describing "Meetings" starting on p. 4-3).
>
> *A system of reviewing progress on achieving goals and implementing 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. As shown in Appendix E, the report will include the current status of the mitigation project, including any changes made to the project, the identification of implementation problems and appropriate strategies to overcome them, and whether or not the project has helped achieved the appropriate goals identified in the plan* (the Peer Group opted to not utilize a set form to document action item progress, the activity is listed as the fourth bullet under the activities of the second meeting, p 4-4).
>
> *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* (the overall strategy of the Peer Group is to update the plan as new information is available as described throughout Section 4).

# Volume II: Mitigation Resources

As described in Table 4-1 the previous NHMP provided a different structure for appendices. Below is a summary of the appendices included in the 2015 NHMP:

## Appendix A: Planning and Public Process

This planning and public process appendix reflects changes made to the CTWS NHMP and documents the 2015 planning and public process.

## Appendix B: Community Profile

The community profile has been updated to conform with the OPDR template and includes expanded demographic, housing, land use, and planning information that expands upon the plans identification of assets and vulnerabilities.

## Appendix C: Economic Analysis of Natural Hazard Mitigation Projects

This appendix is new to this NHMP and provides for the economic analysis of natural hazard mitigation projects. Some of the information that was included in the previous plans Appendix D (FEMA Benefit Cost Analysis) remains in this update.

## Appendix D: Grant Programs and Resources

Grant programs and resources were previously listed in the 2006 NHMP's Section 6: Mitigation strategy. This appendix expands and updates the list of available resources and grants. It should be noted that this list is not comprehensive and other resources should be considered by the Peer Group.

# 2015 NHMP
# PUBLIC PARTICIPATION PROCESS

## 2015 NHMP Update

The Confederated Tribes of Warm Springs Reservation is dedicated to directly involving the public in the review and update of the natural hazard mitigation plan. Although members of the Peer Group represent the public to some extent, tribal residents, adjacent jurisdictions, and other tribal agencies, businesses, and residents were also given the opportunity to provide feedback about the NHMP via public radio announcements and during the review period described below. The NHMP will undergo review on a semi-annual basis.

CTWS made the Plan available via the Oregon Partnership for Disaster Resilience's website for public comment from November 24, 2015 through the FEMA review period. Additional comments and material was provided by tribal members via interviews conducted by Emergency Management and two student workers.

Furthermore, a press release was sent to the local newspaper and with KWSO radio. Additionally, Dan Martinez, Emergency Manager provided an interview to KWSO discussing the updated mitigation plan.

## Public Involvement Summary

During the public review period there were zero comments received via the OPDR project page for the CTWS NHMP update. Members of the Peer Group provided edits and updates to the NHMP during this period as reflected in the final document.

# Peer Group

Peer Group members possessed familiarity with the CTWS community and how it's affected by natural hazard events. The Peer Group guided the update process through several steps including goal confirmation and prioritization, action item review and development, and information sharing to update the plan and to make it as comprehensive as possible. The Peer Group met on the following dates:

- **Meeting #1: Kickoff,** 11/20/2014
- **Meeting #2: Vulnerability and Hazard Risk Assessment,** 5/6/2015
- **Meeting #3: Mitigation Strategy, Implementation and Maintenance,** 9/15/2015
- **Meeting #4: Draft NHMP Review and Comments:** 11/18/2015

In addition, several members of the Peer Group participated in the FEMA L0582 Workshop – Mitigation for Tribal Governments, held in Warm Springs November 16-19, 2015. See Meeting #4 Sign-In for a list of attendees.

The Peer Group formed under the guidance of Dan Martinez, CTWS Emergency Manager. The Peer Group invested considerable time into the mitigation plan. For a full list of Peer Group members see the Acknowledgements section of this NHMP.

The following pages provide copies of meeting agendas and sign-in sheets from Peer Group meetings.

# Meeting #1: Kick-Off

**Meeting:** **Warm Springs Tribes Natural Hazards Mitigation Plan Update: Kickoff Meeting**

**Date:** November 20, 2014

**Time:** 9:00 AM – 10:30 AM

**Location:** Webinar

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**I. Introductions and Background** 15 minutes

a. Community Service Center Introduction
b. Project Context
c. Committee Introductions

**II. Natural Hazards Mitigation Planning** 30 minutes

a. Emergency Management Overview
b. Natural Hazard Mitigation Plans (NHMP) Overview
c. NHMP Update Process

**III. Warm Springs Tribes Report Out** 15 minutes

**IV. Review existing identified hazards and Mitigation Strategies** 25 minutes

a. Review identified hazards from expired NHMP
    - Provide updates to hazard histories
b. Review existing mitigation strategies
    - Identify progress that has been achieved
    - Consider NEW actions to include in updated NHMP

**V. Wrap-Up & Next Steps** 5 minutes

c. Questions
d. Next Steps
e. Schedule Future Meetings

!

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*Oregon Partnership for Disaster Resilience*
Community Service Center • 1209 University of Oregon
Eugene • Oregon • 97403-1209
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2014 Warm Springs Tribes NHMP Update Kick-off meeting

| | Name | E-Mail | 11-20-14 |
|---|---|---|---|
| 1 | Neal Morningsoul | nmorningsoul@yahoo.com | |
| 2 | Brett Whipple | brett.whipple@wstribes.org | |
| 3 | Nancy Collins | nancy.collins@ihs.gov | |
| 4 | Craig Graham | craig.graham@wstribes.org | |
| 5 | Ernestine Ruiz | ernestine.ruiz@wstribes.org | |
| 6 | Bill Lang | bill.lang@wstribes.org | |
| 7 | Don Courtney | don.courtney@wstribes.org | |
| 8 | Dan Martinez | danny.martinez@wstribes.org | |

8:45am - 12:00pm

# Meeting #2: Vulnerability & Hazard Risk Assessment

**Meeting:** Confederated Tribes of Warm Springs Natural Hazards Mitigation Plan Update:
Vulnerability and Hazard Risk Assessment

**Date:** May 6, 2015

**Time:** 8:00 am - 11:00 am

**Location:** Warm Springs Family Resource Center (1144 Warm Springs Street)

**I. Welcome and Introductions** (10 minutes)

**II. Review Hazard Identification** (45 minutes)
- a. Update of Hazard Inventories

**III. Review Vulnerability Information** (60 minutes)

**IV. Jurisdiction Specific Risk Assessment – Review/ Exercise** (60 minutes)
- a. Update and Review Hazard Analysis

**V. Next Steps** (5 minutes)
- a. Mitigation Strategy and Implementation Maintenance Meeting
- b. Prepare final draft of the NHMP for local review
- c. Submit updated plan to FEMA for review

## Meeting Sign-In

Warm Springs Tribes NHMP Update: Meeting #2: May 6, 2015
Warm Springs, OR

| Name | Email | Representing | Roundtrip mileage (if applicable) |
|---|---|---|---|
| Danie l Martinez | danny.martinez@wstribes.org | Tribes | |
| LEROY ARCHEN | LARCHEN1969@HOTMAIL.COM | | |
| Bill Lang | bill.lang@wstribes.org | Tribe | |
| Don Courtney | don.courtney@wstribes.org | CTWS | |
| Nancy Collins | nancy.collins@ihs.gov | CTWS | |
| TRAVIS WELLS | travis.wells@wstribes.org | CTWS Prog. Engr. | |
| Neal Morningowl | neal.morningowl@wstribes.org | tribe | |

# Meeting #3: Mitigation Strategies, Implementation and Maintenance

| | |
|---|---|
| **Meeting:** | **Confederated Tribes of Warm Springs Natural Hazards Mitigation Plan Update: Mitigation Strategies, Implementation and Maintenance** |
| **Date:** | September 15, 2015 |
| **Time:** | 1:30 pm – 4:00 pm |
| **Location:** | Warm Springs Family Resource Center (1144 Warm Springs Street) |

**I. Welcome and Introductions** **(5 minutes)**

**II. Review Previous Meeting** **(15 minutes)**

a. Update of Hazard Inventories

b. Hazard Vulnerability Assessment/ THIRA

**III. Overview of Mitigation Strategies Process Review Mission and Goals** **(15 minutes)**

a. Review NHMP Mission and Goals

**IV. Update Mitigation Strategy** **(60 minutes)**

a. Review and update existing mitigation action items
b. Develop new mitigation action items
c. Prioritize mitigation action items

**V. Overview of Implementation and Maintenance** **(20 minutes)**

**VI. Next Steps** **(5 minutes)**

a. Prepare final draft of the NHMP for local review
b. Submit updated plan to FEMA for review (estimated 10/15/2015)

## Meeting Sign-In

Warm Springs Tribes NHMP Update: Meeting #3: September 15, 2015
Warm Springs, OR

| Name | Email | Representing | Roundtrip mileage (if applicable) |
|---|---|---|---|
| Neal Morningowl | neal.morningowl@wstribes.org. | Tribal E.M student | |
| Don Courtney | don.courtney@wstribes.org | CTWS | |
| Danny Martinez | danny.martinez@wstribes.org | Emergency Mgmt. Hdqt | |
| Bill Lang | bill.lang@wstribes.org | Facility Manager | |
| TRAVIS WELLS | travis.wells@wstribes.org | TRIBAL ENGINEER | |
| Caroline M. Cruz | caroline.cruz@wstribes.org | Health & Human Services | |
| | | | |

# Meeting #4: Plan Overview

| | |
|---|---|
| **Meeting:** | **Confederated Tribes of Warm Springs Natural Hazards Mitigation Plan Update: Plan Overview Meeting** |
| **Date:** | November 18, 2015 |
| **Time:** | 2:00 pm – 4:00 pm |
| **Location:** | Warm Springs Family Resource Center (1144 Warm Springs Street) |

| | | |
|---|---|---|
| **I.** | **Welcome and Introductions** | **5 minutes** |
| **II.** | **Mission and Goals** | **15 minutes** |
| **III.** | **Risk Assessment**<br>a. Hazard Identification<br>b. Hazard History/ Update<br>c. Hazard Vulnerability Assessment | **45 minutes** |
| **IV.** | **Mitigation Strategies**<br>a. Review updated mitigation action items<br>b. Develop new mitigation action items | **45 minutes** |
| **V.** | **Implementation and Maintenance** | **10 minutes** |
| **VI.** | **Next Steps**<br>a. Prepare final draft of the NHMP for local review<br>b. Submit updated plan to FEMA for review | **5 minutes** |

SIGN-IN 9.16.15

<NAME> <DEPT> <BEST METHOD of CONTACT>

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# APPENDIX B: COMMUNITY PROFILE

Community resilience can be defined as the community's ability to manage risk and adapt to natural hazard impacts. In order to help define and understand the Reservation's sensitivity and resilience to natural hazards, the following capacities must be examined:

- **Natural Environment**
- **Social/ Demographic**
- **Economic**
- **Built Environment**
- **Community Connectivity**
- **Political**

The Community Profile describes the sensitivity and resilience to natural hazards of CTWS as they relate to each capacity. It provides a snapshot in time when the plan was developed and will assist in preparation for a more resilient community. The information in this section, along with the hazard assessments located in the Risk Assessment, should be used as the local level rationale for the risk reduction actions identified in Section 3 – Mitigation Strategy. The identification of actions that reduce the CTWS sensitivity and increase its resiliency assist in reducing overall risk of disaster.

**Significant Changes Since Previous Plan:**

Information in this section was updated to account for changes in development and includes updated demographic information where available. In addition, significant content was added to this section.

## Natural Environment Capacity

Natural environment capacity is recognized as the geography, climate, and land cover of the area such as, urban, water and forested lands that maintain clean water, air and a stable climate.[1] Natural resources such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. However, natural systems are often impacted or depleted by human activities adversely affecting community resilience.

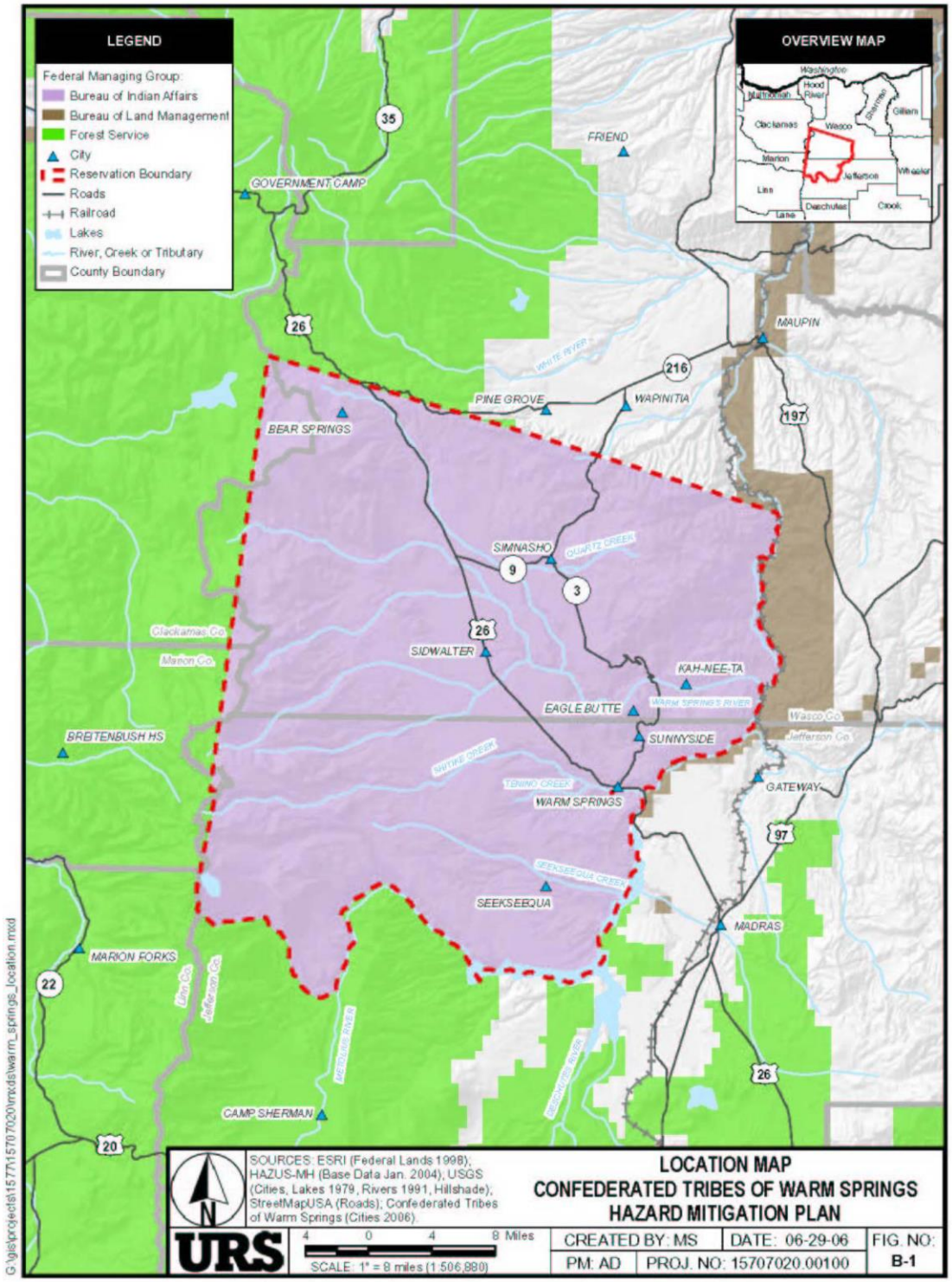
### History, Location, and Geography

Long before Europeans came to the Americas, the Wasco and the Walla Walla (later called the Warm Springs) tribes lived beside the Columbia River and Cascade Mountains. The Paiute lived throughout the vast plateaus to the southeast of Oregon's political border. These three tribes constitute the modern federation called the Confederated Tribes of

[1] Mayunga, J. 2007. Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building.

Warm Springs and own and occupy the Reservation, as shown in Figure B-1, which was created by the Treaty of 1855.

**Figure B-1 Location Map**




Source: CTWS HMP (2006); URS

Warm Springs became the political and economic center of the 600,000-acre Reservation that comprises much of the northern part of Central Oregon. In 1937, the three tribes adopted a constitution, Bill of Rights, and bylaws for the tribal government and in 1938 formally accepted a corporate charter from the United States for business endeavors. During the period between 1940 and 1970 The Confederated Tribes of Warm Springs came to be known as leaders among Native Americans in self-preservation, self-determination, and innovation for economic development efforts.

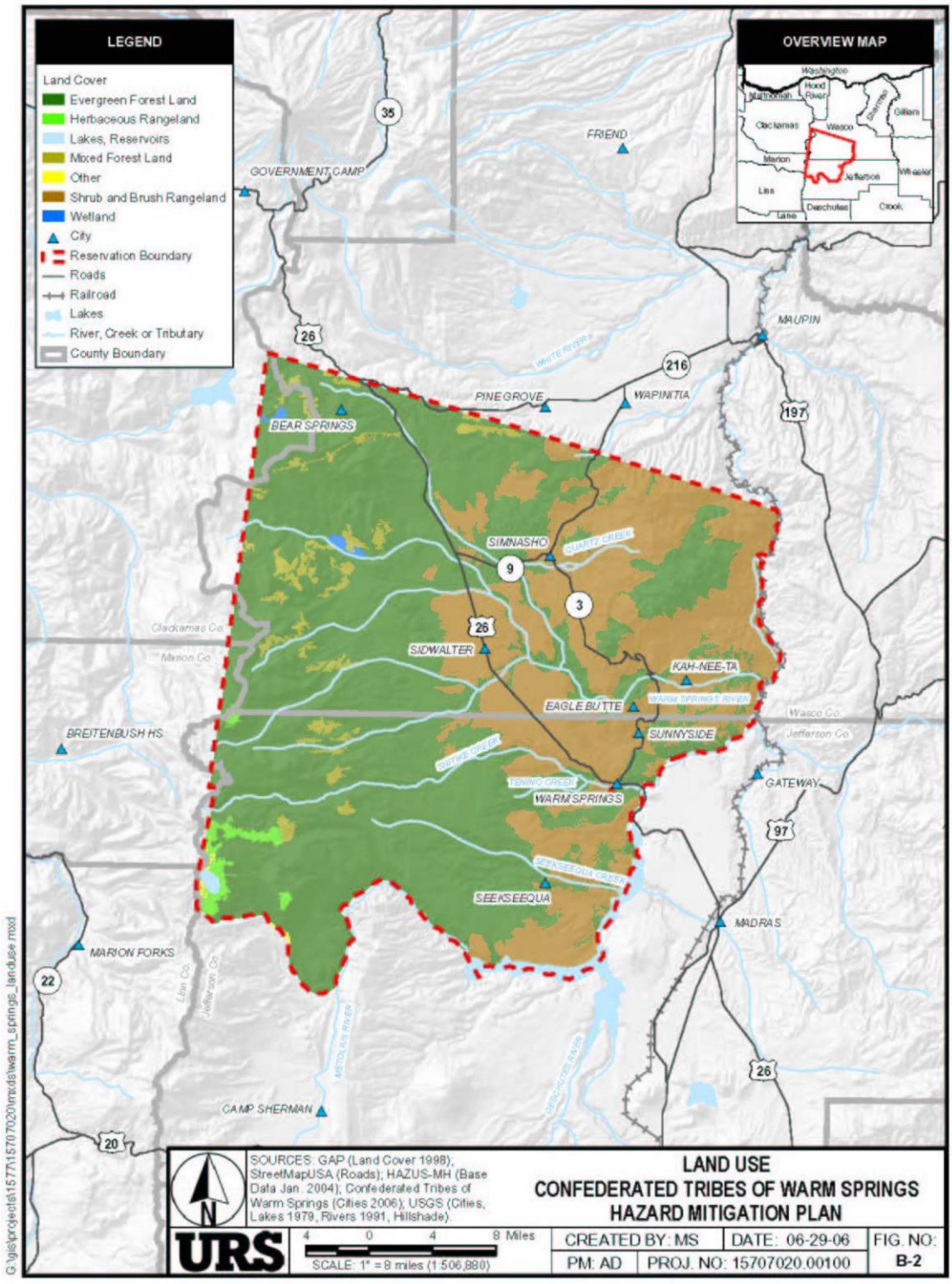
The Reservation includes alpine lakes, pristine rivers, deep canyons, and vistas of high desert and volcanic peaks. As shown in Figure B-2, over half the Reservation is forested; with the remainder primarily range land. Reservation lands extend from the summit of Oregon's Cascade Mountains and snowcapped Mt. Jefferson at 10,497 feet, east to the Deschutes River's elevation at 1,000 feet, with the Metolius River and Lake Billy Chinook forming the southern boundary.

## Climate

Climate refers to the temperatures, weather patterns, and precipitation in the region. This section covers historic climate information. Estimated future climate conditions and possible impacts are also provided (for a more detailed analysis refer to the State Risk Assessment.

Winter rainfall and storms, and hot, dry summers with occasional thunderstorms characterize the CTWS climate. The central and eastern parts of the Reservation are considered high desert, while the western third along the Cascades typically receives more rainfall. With a typical high desert climate, the region experiences over 300 days of sunshine per year. Windstorms are common in the region; power outages and debris carried by the wind significantly threaten life and property. Winter storms that can occur November through March bring heavy snows, rains, and ice. Winter storms can cause traffic accidents, flooding, and health threats brought about by inadequate household heating. Ice storms are frequent and can inflict structure damage, especially to utilities. Summer precipitation is very low, increasing the risk of wildfire and requiring irrigation for crops.

## Figure B-2 Land Use




Source: CTWS HMP (2006); URS

## Precipitation and Snowpack

Total precipitation in the Pacific Northwest region may remain similar to historic levels but climate projections indicate the likelihood of increased winter precipitation and decreased summer precipitation.[2]

Increasing temperatures affects hydrology in the region. Spring snowpack has substantially decreased throughout the West, particularly in areas with milder winter temperatures, such as the Cascade Mountains. In other areas of the West, such as east of the Cascades Mountains, snowfall is affected less by the increasing temperature, because temperatures are already cold, and more by precipitation patterns.[3]

While there are not yet specific precipitation and snowpack projects available for the CTWS, information available about the Pacific Northwest provides insight about the kinds of future patterns the area could experience.

The average annual precipitation ranges from around 10 inches for the lower elevations to more than 50 inches at some higher elevations in the extreme west of the Reservation.

## Temperature

There is a large temperature range in CTWS. The climate is typical of a high desert with cool nights and sunny days. Mean summer temperatures range from highs around 90 degrees Fahrenheit to lows around 40 degrees Fahrenheit. Mean winter temperatures range from highs around 50 degrees Fahrenheit to lows around 10 degrees Fahrenheit.

Temperatures in the Pacific Northwest region increased in the 20th Century by about 1.5 degrees Fahrenheit. Climate projection models indicate that temperatures could increasingly rise by an average of 0.2 degrees to 1.0 degrees Fahrenheit per decade. Average temperature change is projected to be 3.2 degrees Fahrenheit by 2040 and 5.3 degrees Fahrenheit by 2080. Temperature increases will occur throughout all seasons, with the greatest differences occurring in the summer months.[4]

## Hazard Severity

Dynamic weather and diverse geography across CTWS are indicators of hazard vulnerability when combined with the changing climate and severe weather related events. Both wet and dry cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more frequent flash flooding. Less precipitation in the summers and subsequently lower soil moisture with hotter temperatures will likely increase the amount of vegetation, such as rangeland and grasslands, consumed by wildfire.

[2] Ibid.

[3] Mote, Philip W., et. al., "Variability and trends in Mountain Snowpack in Western North America," http://cses.washington.edu/db/pdf/moteetalvarandtrends436/pdf, accessed February 2013.

[4] Climate Impacts Group, "Climate Change," http://cses.washington.edu/cig/pnwc/cc.shtml#anchor6.

## Synthesis

The physical geography, weather, climate and land cover of an area represent various interrelated systems that affect overall risk and exposure to natural hazards. The projected climate change models representing Central Oregon indicate the potential for increased effects of hazards, particularly drought and wildfire due to changing climate of the region. Central Oregon is projected to have warmer and drier summers with less precipitation. In addition, winter temperatures will be warmer, which means a decrease in mountain snowpack. These factors combined with periods of population growth and development intensification can lead to increasing risk of hazards, threatening loss of life, property and long-term economic disruption if land management is inadequate.

# Social/Demographic Capacity

Social/demographic capacity is a significant indicator of community hazard resilience. The characteristics and qualities of the community population such as language, race and ethnicity, age, income, educational attainment, and health are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

## Population

The majority of people across CTWS reside in Warm Springs; a Census Designated Place. The remaining population resides either in the northern portion of the Reservation (adjacent to Wasco County, designated as "North" in the tables of this profile) or in the rural areas outside of Warm Springs in the South (adjacent to Jefferson County, designated as "South" in the tables of this profile). Between 2009 and 2013, the Town of Warm Springs experienced an 11.0% increase in population (population growth is not available for the rural areas of the Reservation). The table below also shows geographic area and population density within the Reservation; the Reservation has approximately 1,007 square miles of land with an overall population density of 4.2 people per square mile, within the Town of Warm Springs the density increases to 74.5 people per square mile.

**Table B-1 Population Estimate**

| | | | 2009-2013 | | | |
|---|---|---|---|---|---|---|
| | 2009 | 2013 | Population Change | Percent Change | Land Area (sq. mi) | Population Density |
| **Total** | n/a | 4,188 | n/a | n/a | 1,007 | 4.2 |
| **North** | n/a | 938 | n/a | n/a | 598 | 1.6 |
| **South** | n/a | 3,250 | n/a | n/a | 409 | 8.0 |
| **Warm Springs** | 2,860 | 3,175 | 315 | 11.0% | 43 | 74.7 |

Source: Social Explorer Tables: ACS 2009 (5-Year Estimates) and ACS 2013 (5-Year Estimates). Tables T1, T2, and T3; U.S. Census Bureau.

The population has more than doubled since 1975. If non-Indian residents, those married into the tribe or other Indians, and members that do not live on the Reservation are

included, the total expected population for Warm Springs in 2020, as forecasted by Economic Development for Central Oregon, is approximately 8,692 total residents.

The following is a list of Tribal Communities and their populations as of 2000 (updated values were not available):

- Bear Springs: Population - 25, Residential Buildings - 8
- Kah-Nee-Ta: Population - 200 (may expand to 2,000 during peak tourist season), Residential Buildings – 67
- Seekseequa: Population – 100, Residential Buildings – 33
- Sidwalter: Population - 200, Residential Buildings – 67
- Simnasho: Population – 100, Residential Buildings - 33

Population size itself is not an indicator of vulnerability. More important is the location, composition, and capacity of the population within the community. Research by social scientists demonstrates that human capital indices such as language, race, age, income, education and health can affect the integrity of a community. Therefore, these human capitals can impact community resilience to natural hazards.

## Race

The impact in terms of loss and the ability to recover may also vary among minority population groups following a disaster. Studies have shown that racial and ethnic minorities can be more vulnerable to natural disaster events. This is not reflective of individual characteristics; instead, historic patterns of inequality along racial or ethnic divides have often resulted in minority communities that are more likely to have inferior building stock, degraded infrastructure, or less access to public services. The table below describes CTWS' population by race and ethnicity.

The majority of the population in CTWS is racially American Indian (84.4%). Approximately, 11% of the population is ethnically Hispanic or Latino.

**Table B-2 Race and Hispanic or Latino Origin**

| Race | Total | North | South | Warm Springs |
|---|---|---|---|---|
| Total Population | 4,188 | 938 | 3,250 | 3,175 |
| White | 7.5% | 3.8% | 8.5% | 8.6% |
| Black or African American | 0.3% | 0.0% | 0.4% | 0.4% |
| American Indian and Alaska Native | 84.4% | 80.2% | 85.6% | 85.4% |
| Asian | 1.2% | 4.5% | 0.3% | 0.3% |
| Native Hawaiian and Other Pacific Islander | 3.2% | 5.1% | 2.6% | 2.7% |
| Some Other Race | 0.2% | 0.0% | 0.2% | 0.3% |
| Two or More Races | 3.3% | 6.4% | 2.3% | 2.4% |
| Hispanic or Latino (of any race) | 11.0% | 11.7% | 10.8% | 11.0% |
| Not Hispanic or Latino | 89.0% | 88.3% | 89.2% | 89.0% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T13; U.S. Census Bureau.

## Age

Of the factors influencing socio demographic capacity, the most significant indicator in CTWS may be age of the population. As depicted in the table below, as of 2013, 7.2% of the population is over the age of 64 and 30.1% is less than 15. The CTWS age dependency ratio[5] is 60.7. The age dependency ratio indicates a higher percentage of dependent aged people to that of working age.

**Table B-3 Population by Vulnerable Age Groups**

| Jurisdiction | Total | < 15 Years | | > 64 Years | | 15 to 64 | Age Dependency Ratio |
|---|---|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent | | |
| **Total** | 4,188 | 1,261 | 30.1% | 321 | 7.7% | 2,606 | 60.7 |
| **North** | 938 | 249 | 26.5% | 55 | 5.9% | 634 | 47.9 |
| **South** | 3,250 | 1,012 | 31.1% | 266 | 8.2% | 1,972 | 64.8 |
| **Warm Springs** | 3,175 | 992 | 31.2% | 234 | 7.4% | 1,949 | 62.9 |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T5; U.S. Census Bureau.

The age profile of an area has a direct impact both on what actions are prioritized for mitigation and how response to hazard incidents is carried out. School age children rarely make decisions about emergency management. Therefore, a larger youth population in an area will increase the importance of outreach to schools and parents on effective ways to teach children about fire safety, earthquake response, and evacuation plans. Furthermore, children are more vulnerable to the heat and cold, have few transportation options and require assistance to access medical facilities. Older populations may also have special needs prior to, during and after a natural disaster. Older populations may require assistance in evacuation due to limited mobility or health issues. Additionally, older populations may require special medical equipment or medications, and can lack the social and economic resources needed for post-disaster recovery.[6]

## Families and Living Arrangements

Two ways the census defines households are by type of living arrangement and family structure. A householder may live in a “family household” (a group related to one another by birth, marriage or adoption living together); in a “nonfamily household” (a group of unrelated people living together); or alone. CTWS is predominately comprised of family households (84.9%). Of all households, 10.7% are one-person non-family households. The Northern part of the Reservation has the highest percentage of individuals living alone.

[5] The age dependency ratio is derived by dividing the combined under 15 and 65-and-over populations by the 15-to-64 population and multiplying by 100. A number close to 50 indicates about twice as many people are of working age than non-working age. A number that is closer to 100 implies an equal number of working age population as non-working age population. A higher number indicates greater sensitivity.

[6] Wood, Nathan. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon. U.S. Geological Survey, Reston, VA, 2007.

**Table B-4 Household Type**

| | Total Households | Family Households | | Nonfamily Households | | Living Alone All Ages | |
|---|---|---|---|---|---|---|---|
| | Estimate | Estimate | Percent | Estimate | Percent | Estimate | Percent |
| **Total** | 1,072 | 910 | 84.9% | 162 | 15.1% | 115 | 10.7% |
| **North** | 239 | 177 | 74.1% | 62 | 25.9% | 47 | 19.7% |
| **South** | 833 | 733 | 88.0% | 100 | 12.0% | 68 | 8.2% |
| **Warm Springs** | 794 | 694 | 87.4% | 100 | 12.6% | 68 | 8.6% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T17; U.S. Census Bureau; and U.S. Census Bureau, 2009-2013 American Community Survey, Table B11001.

The table below shows household structures for families with children. Nearly 60% of all households within the Reservation are family households that have children; There are about twice as many single parent households that are headed by females than by males. These populations will likely require additional support during a disaster and will inflict strain on the system if improperly managed.

**Table B-5 Family Households with Children by Head of Household**

| | Total Households | Family Households with Children | | Single Parent (male) | | Single Parent (female) | |
|---|---|---|---|---|---|---|---|
| | Estimate | Estimate | Percent | Estimate | Percent | Estimate | Percent |
| **Total** | 1,072 | 640 | 59.7% | 155 | 14.5% | 308 | 28.7% |
| **North** | 239 | 152 | 63.6% | 19 | 7.9% | 75 | 31.4% |
| **South** | 833 | 488 | 58.6% | 136 | 16.3% | 233 | 28.0% |
| **Warm Springs** | 794 | 474 | 59.7% | 136 | 17.1% | 219 | 27.6% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T18; U.S. Census Bureau.

## Income

Household income and poverty status are indicators of socio demographic capacity and the stability of the local economy. Household income can be used to compare economic areas as a whole, but does not reflect how the income is divided among the area residents. The 2013 median household income across CTWS is $44,215. Median household incomes increased in the Town of Warm Springs by 19% and for the northern part of the Reservation by 9%. Data is not available for other geographies due to Census tract boundary changes that occurred between 2009 and 2013.

**Table B-6 Median Household Income**

| | 2009 | 2013 | Percent Change |
|---|---|---|---|
| **Total** | n/a | $44,215 | n/a |
| **North** | $40,500 | $44,141 | 9.0% |
| **South** | n/a | $45,096 | n/a |
| **Warm Springs** | $37,771 | $44,929 | 19.0% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T57; U.S. Census Bureau.
Note: 2009 dollars are adjusted for 2013 using the Social Explorer Inflation Calculator.

The table below identifies the percentage of individuals that are below the poverty level in 2013. It is estimated that nearly 31% of individuals live below the poverty level across the Reservation. Poverty rates in CTWS are higher than in the counties that surround the Reservation.

**Table B-7 Poverty Rates**

| | Total Population | Poverty Status | Percent |
|---|---|---|---|
| **Total** | 4,121 | 1,269 | 30.8% |
| **North** | 934 | 324 | 34.7% |
| **South** | 3,187 | 945 | 29.7% |
| **Warm Springs** | 3,112 | 943 | 30.3% |

Source: U.S. Census Bureau, 2009-2013 American Community Survey, Table S17021.

Cutter's research suggests that lack of wealth contributes to social vulnerability because individual and community resources are not as readily available. Affluent communities are more likely to have both the collective and individual capacity to more quickly rebound from a hazard event, while impoverished communities and individuals may not have this capacity –leading to increased vulnerability. Wealth can help those affected by hazard incidents to absorb the impacts of a disaster more easily. Conversely, poverty, at both an individual and community level, can drastically alter recovery time and quality.[7]

## Education

Educational attainment of community residents is also identified as an influencing factor in socio demographic capacity. Educational attainment often reflects higher income and therefore higher self-reliance. Widespread educational attainment is also beneficial for the regional economy and employment sectors as there are potential employees for professional, service and manual labor workforces. An oversaturation of either highly educated residents or low educational attainment can have negative effects on the resiliency of the community.

[7] Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

According to the U.S. Census, about 80% of the CTWS population over 25 years of age has graduated from high school or received a high school equivalency, with approximately 10% going on to earn a Bachelor's and/ or a Graduate or professional degree.

**Table B-8 Educational Attainment**

| Jurisdiction | Total | North | South | Warm Springs |
|---|---|---|---|---|
| **Population 25 years and over** | 2,186 | 503 | 1,683 | 1,629 |
| **Less Than High School** | 20.5% | 23.5% | 19.6% | 18.5% |
| **High School Graduate (includes equivalency)** | 31.3% | 39.2% | 29.0% | 29.1% |
| **Some college** | 38.5% | 25.5% | 42.4% | 43.2% |
| **Bachelor's degree** | 4.7% | 7.4% | 3.9% | 4.1% |
| **Graduate or professional degree** | 5.0% | 4.6% | 5.1% | 5.2% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T25; U.S. Census Bureau.

## Health

Individual and community health play an integral role in community resiliency, as indicators such as health insurance, people with disabilities, dependencies, homelessness and crime rate paint an overall picture of a community's well-being. These factors translate to a community's ability to prepare, respond to, and cope with the impacts of a disaster.

The Resilience Capacity Index recognizes those who lack health insurance or are impaired with sensory, mental or physical disabilities, have higher vulnerability to hazards and will likely require additional community support and resources. The percentage of population in CTWS without health insurance is about 20%. The percentage of uninsured changes with age, the highest rates of uninsured are within the 18 to 64 age category, with nearly 45% of the population without health insurance. The ability to provide services to the uninsured populations may burden local providers following a natural disaster.

**Table B-9 Health Insurance Coverage**

| | | Without Health Insurance | | | | |
|---|---|---|---|---|---|---|
| | | Total Population | | Under 18 | 18 to 64 | 65 years |
| Jurisdiction | Population | Number | Percent | years | years | and older |
| **Total** | * 3,194 | * 1,037 | 20% | 20% | 45% | 5% |
| **Warm Springs** | 3,119 | 998 | 20% | 19% | 44% | 6% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T146; U.S. Census Bureau.

## Synthesis

For planning purposes, it is essential to consider both immediate and long-term socio-demographic implications of hazard resilience. Immediate concerns include the growing elderly population and the high percentage of age dependent population (those who do not work because of being too young or too old). The current status of other Social/-demographic capacity indicators such as graduation rate, poverty level, householders living alone, and single-parent households can have long-term impacts on the economy and stability of the community ultimately affecting future resilience.

# Economic Capacity

Economic capacity refers to the financial resources present and revenue generated in the community to achieve a higher quality of life. Income equality, housing affordability, economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. Once any inherent strengths or systematic vulnerabilities become apparent, both the public and private sectors can take action to increase the resilience of the local economy.

## Regional Affordability

The evaluation of regional affordability supplements the identification of Social/demographic capacity indicators, i.e. median income, and is a critical analysis tool to understanding the economic status of a community. This information can capture the likelihood of individuals' ability to prepare for hazards, through retrofitting homes or purchasing insurance. If the community reflects high-income inequality or housing cost burden, the potential for home-owners and renters to implement mitigation can be drastically reduced. Therefore, regional affordability is a mechanism for generalizing the abilities of community residents to get back on their feet without Federal, State or local assistance.

### Housing Affordability

Housing affordability is a measure of economic security gauged by the percentage of an area's households paying less than 35% of their income on housing.[8] Households spending more than 35% are considered housing cost burdened. The table below displays the percentage of homeowners and renters reflecting housing cost burden across the region.

The northern region of the Reservation has a greater percentage of homeowners with a mortgage spending more than 35% of their income on housing (38%) than the Reservation as a whole (10%). Among renters, nearly 25% of renters in the Town of Warm Springs pay more than 35% of their income on rent. In general, the population that spends more of their income on housing has proportionally fewer resources and less flexibility for alternative investments in times of crisis.[9] This disparity imposes challenges for a community recovering from a disaster as housing costs may exceed the ability of local residents to repair or move to a new location. These populations may live paycheck to paycheck and are extremely dependent on their employer, in the event their employer is also impacted it will further the detriment experienced by these individuals and families.

[8] University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. http://brr.berkeley.edu/rci/.

[9] Ibid.

**Table B-10 Households Spending > 35% of Income on Housing**

| Jurisdiction | Owners | | Renters |
|---|---|---|---|
| | With Mortgage | Without Mortgage | |
| Total | 10.0% | 17.5% | 18.8% |
| North | 38.0% | 17.2% | 0.0% |
| South | 4.1% | 17.6% | 24.0% |
| Warm Springs | 4.4% | 19.3% | 24.0% |

Source: U.S. Census Bureau, 2009-2013 American Community Survey, Tables B25070 and B25091.

## Employment and Wages

According to the US Census, unemployment for the Town of Warm Springs has declined since 2009 by 1.2%. However, the Reservations unemployment rate remains remains higher than the adjacent region. Overall, in 2013, the Reservation had an unemployment rate of 29%, with about 45% unemployment in the northern part of the Reservation and about 24% in the Town of Warm Springs. Additionally, the labor force represents just under two-thirds of the Reservation population.

**Table B-11 Labor Force and Unemployment Rate**

| | 2009 Labor Force | | | 2013 Labor Force | | | Change in Unemployment Rate (2009-2013) |
|---|---|---|---|---|---|---|---|
| | Number | Percent | Unemployment Rate | Number | Percent | Unemployment Rate | |
| Total | n/a | n/a | n/a | 1,780 | 62.9% | 29.0% | n/a |
| North | n/a | n/a | n/a | 442 | 68.4% | 45.0% | n/a |
| South | n/a | n/a | n/a | 1,338 | 61.3% | 23.7% | n/a |
| Warm Springs | 1,135 | 64.3% | 25.2% | 1,315 | 61.8% | 23.6% | -1.6% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T33; U.S. Census Bureau.

The table below displays the occupation for the employed population 16-years and older. As of 2013, there were 1,005 individuals employed. The majority of the employed work either in *Professional and related* (19%), *Personal care and service* (13%), *Office and administrative support* (12%), or *Production* (10%) occupations. Between 2009 and 2013 the *Farming, fishing, and forestry* (417%), *Transportation and material moving* (203%), and *Production* (109%) occupations saw the greatest percent increase in employment.

**Table B-12 Occupation for Employed Population (16+)**

| Jurisdiction | 2009 | | 2013 | | Percent Change in Employment (2009-2013) |
|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | |
| Employed civilian Population 16 Years and over: | 849 | 100% | 1,005 | 100% | 18% |
| Management, business, and financial operations occupations | 34 | 4% | 33 | 3% | -3% |
| Professional and related occupations | 141 | 17% | 187 | 19% | 33% |
| Healthcare support occupations | 25 | 3% | 33 | 3% | 32% |
| Protective service occupations | 59 | 7% | 68 | 7% | 15% |
| Food preparation and serving related occupations | 46 | 5% | 30 | 3% | -35% |
| Building and grounds cleaning and maintenance occupations | 53 | 6% | 39 | 4% | -26% |
| Personal care and service occupations | 78 | 9% | 134 | 13% | 72% |
| Sales and related occupations | 109 | 13% | 55 | 5% | -50% |
| Office and administrative support occupations | 119 | 14% | 123 | 12% | 3% |
| Farming, fishing, and forestry occupations | 12 | 1% | 62 | 6% | 417% |
| Construction, extraction, and maintenance occupations | 95 | 11% | 49 | 5% | -48% |
| Production occupations | 47 | 6% | 98 | 10% | 109% |
| Transportation and material moving occupations | 31 | 4% | 94 | 9% | 203% |

Source: Social Explorer Tables: ACS 2009 (5-Year Estimates) and ACS 2013 (5-Year Estimates). Tables T50, U.S. Census Bureau.

The tribal economy is based primarily on natural resources, including hydropower, forest products, and ranching. Tourism and recreation also make important contributions. The Confederated Tribes of Warm Springs has approximately 604 employees. Tribal enterprises of Kah-Nee-Ta Resort and Warm Springs Forest Products Industries are the next two largest employers at 285 and 204 employees.

## Synthesis

The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery. A higher than average unemployment rate and housing affordability are concerns for economic stability following a natural disaster. Because the major employers are key to post-disaster recovery efforts, the region is bolstered by its major employment sectors. It is important to consider what might happen to the economy if the largest revenue generators and employers are impacted by a disaster.

# Built Environment Capacity

Built Environment capacity refers to the built environment and infrastructure that supports the community. The various forms, quantity, and quality of built capital mentioned above contribute significantly to community resilience. Physical infrastructures, including utility and transportation lifelines, are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding regions due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

## Land Use and Development Patterns

Large-scale development of tribal resources began in 1942 with a 20-year contract for selective harvest of 500 million board feet of Reservation lumber, followed by the purchase of a plywood plant and sawmill in 1967. The tribes also negotiated agreements for use of tribal lands for the Pelton and Round Butte dams, which provided a revenue stream for tribal activities and projects. Proceeds from these enterprises provided capital for further land acquisition and additional developments in recent years such as the Kah-Nee-Ta Lodge Resort, Indian Head Casino, and Museum at Warm Springs.

In the early 1970s the Confederated Tribes of Warm Springs established the Warm Springs Industrial Park and Warm Springs National Fish Hatchery. The industrial park offers building sites to nontribal members on a lease-only basis. In 2000 the Confederated Tribes entered into an agreement with Pacific Power to purchase the Warm Springs Power Enterprise hydroelectric dam on the Deschutes River.

In 2001, Warm Springs Ventures was created as the business arm of the Confederated Tribes, to diversify and broaden the local economy through new potential business opportunities both on and off the Reservation. The corporation's priority is to generate new revenue for the Confederated Tribes.

The Comprehensive Plan of 1999 broadly describes how the tribal government intends to monitor the change in the number of vacant sites, etc., with a view to encourage new development.

The Reservation has a low population density and 76-percent of the population resides in the Town of Warm Springs. Figure B-2 shows general land use patterns for the Reservation. Since the previous NHMP 38 new housing units were added in the Greeley Heights Subdivision in southwest Warm Springs. In addition a new K-8 grade school was built near the subdivision, and the Casino was built along Highway 26.

## Housing

In addition to location, the characteristics of the housing stock affect the level of risk posed by natural hazards. The table below identifies the types of housing most common throughout the Reservation. Of particular interest are mobile homes, which account for about 18% of the housing. Mobile homes are particularly vulnerable to certain natural hazards, such as windstorms, and special attention should be given to securing the structures, because they are more prone to wind damage than wood-frame construction.[10] In other natural hazard events, such as earthquakes and floods, moveable structures like mobile homes are more likely to shift on their foundations and create hazardous conditions for occupants.

[10] Ibid.

**Table B-13 Housing Profile**

| | Total Housing Units | Single Family | | Multi-Family | | Mobile Homes | |
|---|---|---|---|---|---|---|---|
| | | Number | Percent of Total | Number | Percent of Total | Number | Percent of Total |
| **Total** | 1,203 | 789 | 65.6% | 197 | 16.4% | 217 | 18.0% |
| **North** | 300 | 191 | 63.7% | 56 | 18.7% | 53 | 17.7% |
| **South** | 903 | 598 | 66.2% | 141 | 15.6% | 164 | 18.2% |
| **Warm Springs** | 860 | 559 | 65.0% | 141 | 16.4% | 160 | 18.6% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T97, U.S. Census Bureau.
Note: the percentages listed in the table above do not reflect the number of structures that are built within special flood hazard areas, or that are at risk of seismic damage.

Aside from location and type of housing, the year structures were built has implications. Seismic building standards were codified via the Uniform Building Code starting in 1974; more rigorous building code standards were passed in 1990s that accounted for the Cascadia earthquake fault. Therefore, homes built before the 1990s are more vulnerable to seismic events. Also in the 1970's,FEMA began assisting communities with floodplain mapping as a response to administer the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Upon receipt of floodplain maps, communities started to develop floodplain management ordinances to protect people and property from flood loss and damage. The table below illustrates the number and percent of homes built between 1970 and 2013. Regionally about one-quarter of the housing stock was built prior to 1970, before the implementation of floodplain management ordinances. Just over 43% of the housing stock was built before 1990 and the codification of seismic building standards. Approximately one-third of the Reservation's housing stock was built after 1990.

**Table B-14 Year Structure Built**

| | Total Housing Units | Pre 1970 | | 1970 to 1989 | | 1990 or later | |
|---|---|---|---|---|---|---|---|
| | | Number | Percent of Total | Number | Percent of Total | Number | Percent of Total |
| **Total** | 1,203 | 303 | 25.2% | 519 | 43.1% | 381 | 31.7% |
| **North** | 300 | 72 | 24.0% | 154 | 51.3% | 74 | 24.7% |
| **South** | 903 | 231 | 25.6% | 365 | 40.4% | 307 | 34.0% |
| **Warm Springs** | 860 | 231 | 26.9% | 326 | 37.9% | 303 | 35.2% |

Source: U.S. Census Bureau, 2009-2013 American Community Survey, Table 25034.

As the previous table indicates, the majority of the housing stock is single-family homes, a trend that is continuing with new construction. Since the previous plan 38 new housing units have been built in the Greeley Heights Subdivision adjacent to a new K-8 school.

## Critical Facilities

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., hospitals, police, fire and rescue stations, school districts and higher education institutions). The interruption or destruction of any of these facilities would have a debilitating effect on incident management.

A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, such as preserving the quality of life in the Reservation and fulfilling important public safety, emergency response, and disaster recovery functions. The critical facilities owned by the Confederated Tribes of Warm Springs are listed in Table B-15 and shown in Figures B-3 and B-4. Tribally owned and operated critical facilities include the following:

- Seven tribal offices and facilities
- Seven tribal enterprises
- Three schools
- Four gathering places
- Eight police and fire stations
- Seven potable water and wastewater facilities
- Three communication facilities
- Indian Head Casino
- Kah-Nee-Ta resorts

### Table B-15 Critical Facilities

| Category | Facility | Location | Estimated Structure Value |
|---|---|---|---|
| Tribal Offices and Facilities | Administration Building | Warm Springs | $659,000 |
| | Senior Services Department | Warm Springs | $659,000 |
| | Indian Health Services | Warm Springs | $1,452,000 |
| | Family Resource Center | Warm Springs | $659,000 |
| | High Lookee Lodge | Warm Springs | $619,000 |
| | Forestry and Natural Resources | Warm Springs | $659,000 |
| | Ranger Station | Bear Springs | $170,000 |
| Tribal Enterprises | Pelton/Round Butte Hydroelectric Project, Warm Springs Power Enterprises | West of Madras, along the Deschutes River | $20,335,200 |
| | Warm Springs National Fish Hatchery | North of Warm Springs, along the Warm Springs River | $4,969,000 |
| | The Museum at Warm Springs | Warm Springs | $7,600,000 |
| | Warm Springs Forest Product Industries | Warm Springs | $492,000 |
| | Warm Springs Ventures / The Plaza at Warm Springs | Warm Springs | $492,000 |
| | Warm Springs Composite Products | Warm Springs | $492,000 |
| | Warm Springs Construction | Warm Springs | $492,000 |

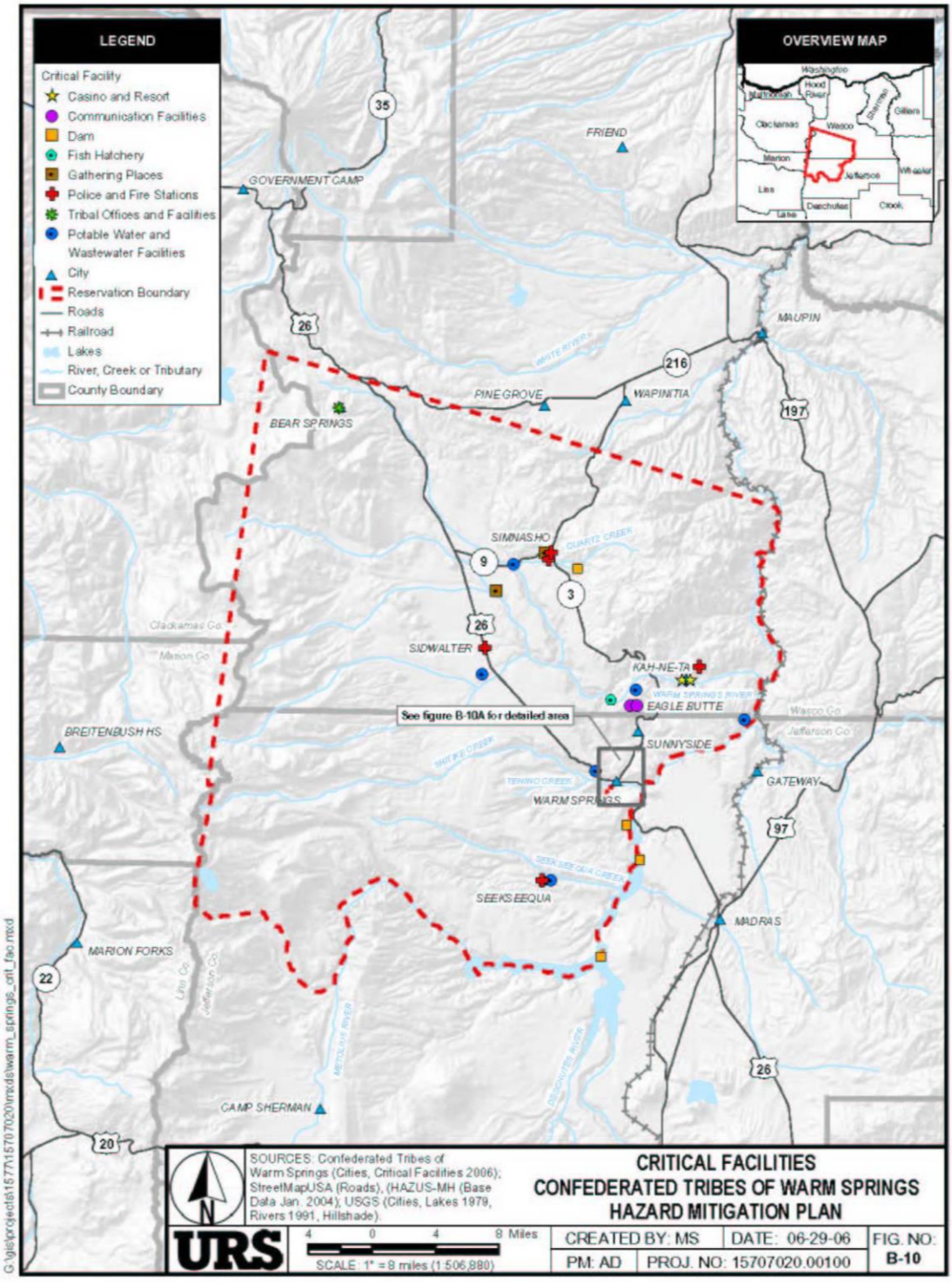
Source: CTWS HMP (2006); URS and Hazus-MH

**Table B-15 Critical Facilities** (continued)

| Category | Facility | Location | Estimated Structure Value |
|---|---|---|---|
| **Educational Facilities** | Early Childhood Education | Warm Springs | $565,000 |
| | Warm Springs K-8 Academy | Warm Springs | n/a |
| | Higher Education Building | Warm Springs | $565,000 |
| **Gathering Places** | Agency Longhouse | Warm Springs | $297,000 |
| | Simnasho Longhouse | Simnasho | $297,000 |
| | Hehe Longhouse | west of Simnasho | $297,000 |
| | Community Center | Warm Springs | $659,000 |
| **Police and Fire Stations** | Police Station | Warm Springs | $1,582,000 |
| | Police Substation | Simnasho | $243,900 |
| | Fire and Safety Building / Station | Warm Springs | $678,000 |
| | Fire Management Complex | Warm Springs | $678,000 |
| | Fire Station | Seekseequa | $678,000 |
| | Fire Station | Sidwalter | $678,000 |
| | Fire Station | Simnasho | $678,000 |
| | Fire Substation | Kah-Nee-Ta Resorts | $237,100 |
| **Potable Water and Wastewater Facilities** | Potable Water Facility | Simnasho, along Quartz Creek | $6,778,400 |
| | Potable Water Facility | Northwest of Warm Springs, along Shitike Creek | $6,778,400 |
| | Potable Water Facility | Sidwalter | $6,778,400 |
| | Potable Water Facility | Seekseequa | $6,778,400 |
| | Wastewater Facility | Warm Springs, along Shitike Creek | $10,455,300 |
| | Wastewater Facility | Sunnyside | $10,455,300 |
| | Wastewater Facility | Kah-Nee-Ta | $10,455,300 |
| **Communication Facilities** | Qwest Facility | Warm Springs | $2,000,000 |
| | Radio Station | Eagle Butte | $200,000 |
| | Radio / Cell Tower | Eagle Butte | $113,000 |
| **Casinos & Resorts** | Kah-Nee-Ta Village | Kah-Nee-Ta, along the Warm Springs River | $654,200 |
| | Kah-Nee-Ta Lodge and Casino | Kah-Nee-Ta, above the Warm Springs River | $33,200,000 |
| | Indian Head Casino | Warm Springs | n/a |

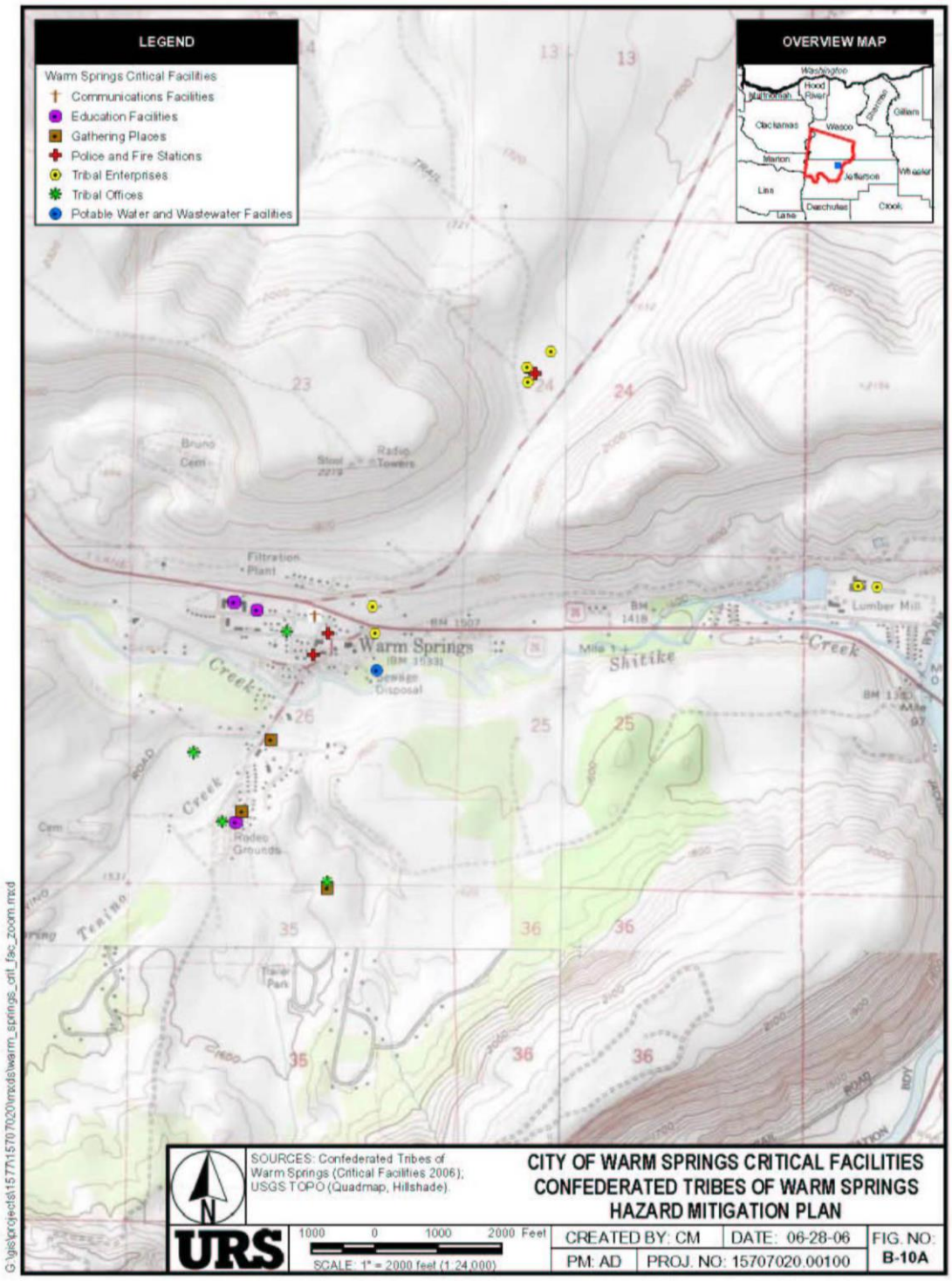
Source: CTWS HMP (2006); URS and Hazus-MH

## Figure B-3 Critical Facilities (Reservation)




Source: CTWS HMP (2006); URS

**Figure B-4 Critical Facilities (Warm Springs)**




Source: CTWS HMP (2006); URS

## Synthesis

Given the unique dependent, rural nature of CTWS, maintaining the quality of built capacity throughout the area is critical. The planning considerations seemingly most significant are contingency planning for medical resources and lifeline systems due to the imminent need for these resources. Functionality of hospitals and dependent care facilities are a significant priority in providing for CTWS residents. One factor that is critical to consider in planning is the availability of medical beds in local hospitals and dependent care facilities. In the event of a disaster, medical beds may be at a premium providing not just for the growing elderly population, but the entire Reservation. Other facilities to consider are utility lifelines and transportation lifelines such as, airports, railways, roads and bridges with surrounding counties to acquire utility service and infrastructure repair.

While these elements are traditionally recognized as part of response and recovery from a natural disaster, it is essential to start building relationships and establishing contractual agreements with entities that may be critical in supporting community resilience.

# Community Connectivity Capacity

Community connectivity capacity places strong emphasis on social structure, trust, norms, and cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it may be dramatically different from one city to the next as these capitals reflect the specific needs and composition of the community residents.

## Social Systems and Service Providers

Social systems include community organizations and programs that provide social and community-based services, such as employment, health, senior and disabled services, professional associations and veterans' affairs for the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income, etc.). The Reservation can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The presence of these services are more predominantly located in urbanized areas of the Reservation (town of Warm Springs), this is synonymous with the general urbanizing trend of local residents.

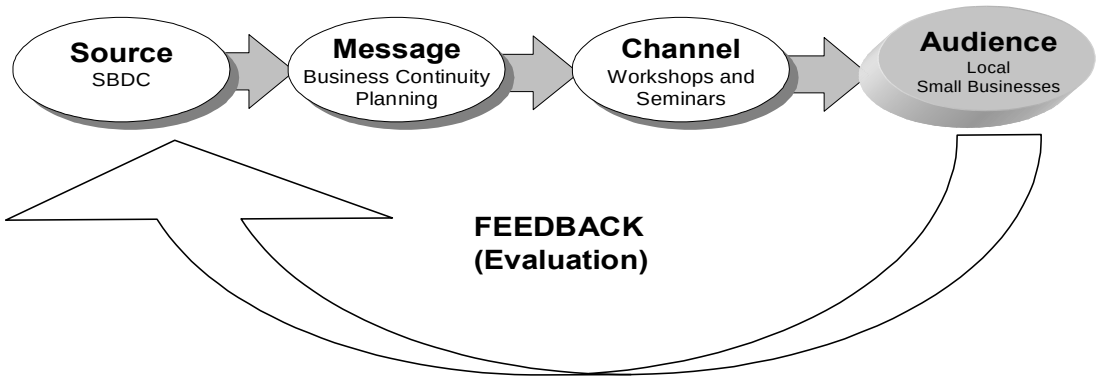
The following is a brief explanation of how the communication process works and how the community's existing social service providers could be used to provide natural hazard related messages to their clients.

There are five essential elements for communicating effectively to a target audience:

- The source of the message must be credible,
- The message must be appropriately designed,

- The channel for communicating the message must be carefully selected,
- The audience must be clearly defined, and
- The recommended action must be clearly stated and a feedback channel established for questions, comments and suggestions.

**Figure B-5 Communication Process**




Source: Adapted from the U.S. Environmental Protection Agency Radon Division's outreach program

## Community Stability

Community stability is a measure of rootedness in place. It is hypothesized that resilience to a disaster stems in part from familiarity with place, not only for navigating the community during a crisis, but also accessing services and other supports for economic or social challenges.[11] The table below estimates residential stability across the Reservation. It is calculated by the number of people who have lived in the same house and those who have moved within the same region (county) a year ago, compared to the percentage of people who have migrated into the region. CTWS overall has geographic stability rating of about 93% (i.e., 93% of the population lived in the same house or moved within the Reservation).

**Table B-16 Regional Residential Stability**

| Jurisdiction | Population | Geographic Stability | Same House | Moved Within Same County |
|---|---|---|---|---|
| **Total** | 3,193 | 93% | 87% | 6% |
| **North** | n/a | n/a | n/a | n/a |
| **South** | n/a | n/a | n/a | n/a |
| **Warm Springs** | 3,118 | 92% | 86% | 6% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T130, U.S. Census Bureau.

[11] Cutter, Susan, Christopher Burton, Christopher Emrich. "Disaster Resilience Indicators for Benchmarking Baseline Conditions". Journal of Homeland Security and Emergency Management.

### Homeownership

Housing tenure describes whether residents rent or own the housing units they occupy. Homeowners are typically more financially stable but are at risk of greater property loss in a post-disaster situation. People may rent because they choose not to own, they do not have the financial resources for home ownership, or they are transient.

Collectively, about two-thirds of the occupied housing units in CTWS are owner-occupied. Conversely, one-third are renter occupied. The northern reservation has more than double the southern reservation's vacancy rate, about 16% to 7%.

**Table B-17 Housing Tenure and Vacancy**

| | Occupied Units | Owner-occupied | | Renter-occupied | | Vacant^ | |
|---|---|---|---|---|---|---|---|
| | | Estimate | Percent | Estimate | Percent | Estimate | Percent |
| **Total** | 1,072 | 695 | 64.8% | 377 | 35.2% | 117 | 8.8% |
| **North** | 239 | 158 | 66.1% | 81 | 33.9% | 52 | 15.7% |
| **South** | 833 | 537 | 64.5% | 296 | 35.5% | 65 | 6.5% |
| **Warm Springs** | 794 | 498 | 62.7% | 296 | 37.3% | 61 | 6.4% |

Source: Social Explorer Tables: ACS 2013 (5-Year Estimates). Tables T93 and T96, U.S. Census Bureau.
^ = Functional vacant units, computed after removing seasonal, recreational, or occasional housing units from vacant housing units.

According to Cutter, wealth increases resiliency and recovery from disasters. Renters often do not have personal financial resources or insurance to assist them post-disaster. On the other hand, renters tend to be more mobile and have fewer assets at risk of natural hazards.[12] In the most extreme cases, renters lack sufficient shelter options when lodging becomes uninhabitable or unaffordable post-disaster.

## Synthesis

CTWS has distinct social and cultural resources that work in favor to increase community connectivity and resilience. Sustaining social and cultural resources, such as social services and cultural events, may be essential to preserving community cohesion and a sense of place. The presence of larger communities makes additional resources and services available for the public. However, it is important to consider that these amenities may not be equally distributed to the rural portions of the Reservation and may produce implications for recovery in the event of a disaster.

In the long-term, it may be of specific interest to the CTWS to evaluate community stability. A community experiencing instability and low homeownership may hinder the effectiveness of social and cultural resources, distressing community coping and response mechanisms.

# Political Capacity

Political capacity is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for political capital to

[12] Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics and the built environment.[13] Resilient political capital seeks to involve various stakeholders in hazard planning and works towards integrating the Natural Hazard Mitigation Plan with other community plans, so that all planning approaches are consistent.

## Government Structure

Pursuant to the provisions of the Indian Reorganization Act, the Confederated Tribes of Warm Springs adopted a Constitution, Bylaws, and Corporate Charter. These organic documents set out the tribal membership, objectives, powers and authority, and make provisions for a Tribal Council to act on behalf of the membership to carry out tribal goals. They represent the policies of the membership and provide specific delegation of governmental powers from the general membership to the Tribal Council.

The Tribal Council's primary responsibility is to carry out the objectives of the Constitution and Bylaws, which includes promotion of tribal advancement and protection of tribal treaty rights, resources, and sovereignty. Council members make the key decisions, such as authorizing referendums, on behalf of the People. Since 1983, the Tribal Council's actions have led to achievement of the Health and Wellness Center, Early Childhood Education Center, Museum at Warm Springs, and Elder Care Assisted Living Facility, reconstruction of Kah-Nee-Ta Village, and development of Indian Head Casino, among a number of other projects. The Tribal Council also initiated the Scholarship Fund, Senior Citizens Pension Fund, and the "Rainy Day" Fund (Revenue Reserve Fund).

## Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.[14]

The CTWS Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the Reservation's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the Reservation's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan. Implementing the natural hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the Reservation's resources. In

[13] Mileti, D. 1999. Disaster by Design: a Reassessment of Natural Hazards in the United States. Washington D.C.: Joseph Henry Press.

[14] Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.

addition to the plans listed below the Reservation also has zoning ordinances (including floodplain development regulations) and building regulations.

The CTWS currently supports pre- and post- disaster hazard mitigation through its regulations, plans, and programs. Tribal mitigation policies include building codes, floodplain ordinances, burn permits, and mutual aid agreements. Mitigation planning includes a hazard mitigation administration plan, comprehensive plan, resource management plan, and emergency operations plan. In addition, the Confederated Tribes participates in several hazard mitigation programs including a fuel management program. Table B-18 summarizes the CTWS hazard mitigation legal and regulatory capabilities.

**Table B-18 Legal and Regulatory Resources available for Hazard Mitigation**

| Type of Mitigation | Regulatory Tool | Name/Type | Evaluation of Regulatory Tool on Hazard Mitigation |
|---|---|---|---|
| Pre-Disaster Mitigation | Plans | People's Plan | This comprehensive plan guides overall growth and development on the Reservation. This plan currently does not address hazard mitigation. |
| | | Integrated Resource Management Plan | Establishes standards for all development codes and any ground disturbances. Updated in 2012. |
| | | Hazard Analysis Priorities | This document is not a regulatory tool. However, it identifies the nature, location, history, and probability of natural and human-made hazards on the Reservation. This information is useful for hazard profiling. Updated in 2015 (see Section 2 of the NHMP). |
| | | Wildfire Prevention Plan | This is not a regulatory tool. However, it identifies the wildfire risk areas and prescribes treatment techniques. This is the key document used for funding of prevention staff and is integrated into the wildfire section of this plan. Adopted 2011, an update is expected in 2016. |
| | Polices | Forest Protection Fire Ordinance | This ordinance is designed to limit fires by regulating the use of materials that can cause wildland fires, such as the proper use of campfires and the disposal or use of ignited substances. |
| | | Uniform Building Code | The Uniform Building Code applies to both residential and commercial buildings. Structures built to code are less likely to be vulnerable to hazardous conditions, including windstorms, wildland fires, etc. |
| | | Burn Permits | This policy is currently used to limit burning during bad air quality days. However, it could be used to limit burning during the summer and autumn, when the Reservation is most susceptible to wildland fires. |
| | Programs | Geographical Information Systems | The tribal GIS Department manages land-cover and hazard information for the Confederated Tribes of Warm Springs. This information is useful for identifying hazard-prone areas and areas of current and future development. |
| | | Forest Department Fuel Management Program | The Forestry Department is involved in fuel management for wildland fire hazard areas on the Reservation. This program reduces fuel load and therefore wildland fire potential. |
| | | Hazard Reduction Program | This program funds various hazard mitigation activities, including fuel reduction. |
| Post-Disaster Mitigation | Plans | Emergency Operations Plan | This plan standardizes incident management and response to human-made and natural hazards. Updated January 2015. |
| | Policies | Mutual Aid Agreements | Mutual Aid Agreement with neighboring counties and communities. Mutual Aid for fire fighting includes fire responders and their equipment. Mutual Aid ensures the efficient utilization of all available resources needed to mitigate an extraordinary event. |
| Development in Hazard-Prone Areas | Policies | Floodplain Ordinance | The Floodplain Ordinance regulates development in the identified 100-year floodplain. Adopted in 2002. |

Source: CTWS HMP (2006); URS, updated in 2015.

# Appendix C: Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Oregon Interagency Hazards Mitigation Team, *Oregon Hazard Mitigation Plan*, (Oregon Military Department – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

## Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

# What are some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

## Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Oregon Military Department – Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

## Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

### Investing in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

### Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur on the basis of one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own

merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

## STAPLE/E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

**Social**: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

**Technical**: The jurisdiction's public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

**Administrative**: Elected officials, Tribal government, or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

**Political**: Consult the Tribal government, mayor, city council or city board of commissioners, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

**Legal**: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

**Economic**: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)

- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

**Environmental**: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

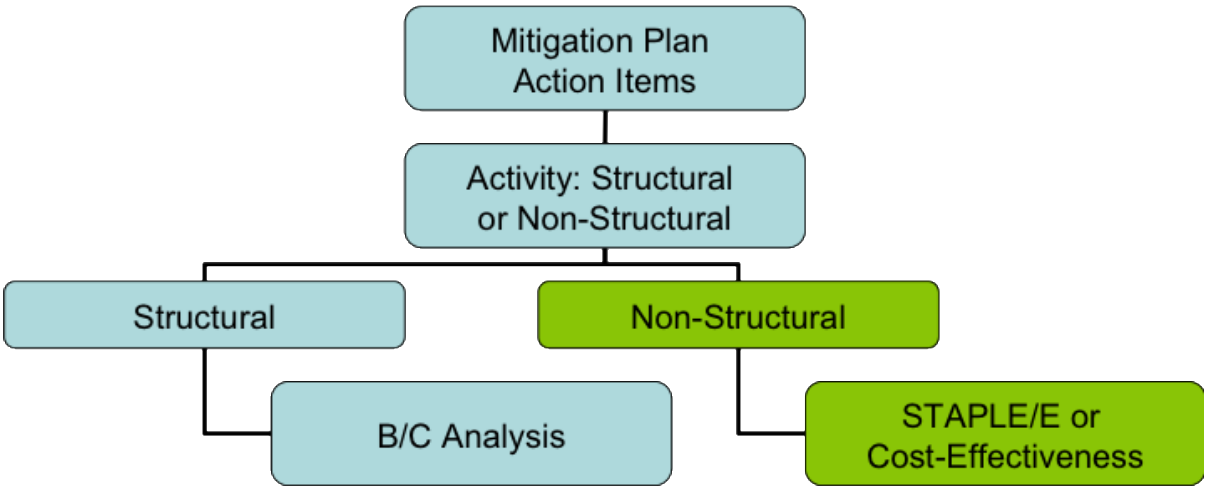
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

# When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

**Figure C-1 Economic Analysis Flowchart**




Source: Oregon Partnership for Disaster Resilience. 2005.

## Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

### 1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying economic costs.

### 2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- ***Determine the project cost***. This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits***. Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage

value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- ***Consider costs and benefits to society and the environment***. These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.

- ***Determine the correct discount rate***. Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

### 3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- ***Internal rate of return***. Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

## Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided

- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

## Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

## Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

# Resources


CUREe Kajima Project, *Methodologies for Evaluating the Socio-Economic Consequences of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates, Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation* Projects, Riverine Flood, Version 1.05, Hazard Mitigation Economics, Inc., 1996

Federal Emergency Management Agency, *Report on the Costs and Benefits of Natural Hazard Mitigation*. Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in the City of Portland*, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects* Volume V, Earthquakes, Prepared for FEMA's Hazard Mitigation Branch, Ocbober 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olsen Associates, Prepared for Oregon Military Department – Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000.)

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

# APPENDIX D:
# GRANT PROGRAMS AND RESOURCES

## Introduction

There are numerous local, state and federal funding sources available to support natural hazard mitigation projects and planning. The Oregon Natural Hazard Mitigation Plan includes a comprehensive list of funding sources (refer to Oregon NHMP Chapter 2 Section F(1)). The following section includes an abbreviated list of the most common funding sources utilized by local jurisdictions in Oregon. Because grant programs often change, it is important to periodically review available funding sources for current guidelines and program descriptions.

The fiscal capability assessment lists the specific financial and budgetary tools that are currently available, as well as potentially available, to the Confederated Tribes for hazard mitigation actions. These capabilities, which are listed in Table D-1, include private, State, and Federal entitlements. General tribal funds are already committed to day-to-day activities and, therefore, are currently not available for hazard mitigation. Additional information on these and additional funding resources are provided in the pages that follow.

**Table D-1 Potential Financial Resources for Hazard Mitigation**

| Sources | Financial Resource | Effect on Hazard Mitigation |
|---|---|---|
| Current | Confederated Tribes of Warm Springs – Hazard Reduction Program | Tribal funding used to mitigate wildland fires. |
| Current | Indian Community Development Block Grant Program | U.S. Housing of Urban Development provides critical housing and community development resources to aid disaster recovery. |
| Potential | Imminent Threat, Indian Community Development Block Grant Program | Funding to alleviate or remove imminent threats to health or safety (e.g., drought). |
| Potential | Indian Reservation Roads Transportation Funding | Providing safe access through hazard-prone areas. |
| Potential | EPA's Brownfield Program | This program can mitigate the effects of hazardous materials by providing direct funding for Brownfield assessment, cleanup, revolving loans, and environmental job training. |
| Potential | Administration for Native Americans (ANA) Grant Programs | These discretionary funds can be used to fund a variety of environmental management programs, including the identification and assessment of human and natural hazards and their associated risks, and the development and implementation of plans, policies, and ordinances. |
| Potential | Department of Homeland Security Preparedness Technical Assistance Program | This grant provides direct assistance to communities to improve their ability to prevent, protect against, respond to, and recover from major events. A primary objective of the program is to enhance the capacity of the community to develop, plan, and implement effective strategies for human-made preparedness. |

**Table D-1 Potential Financial Resources for Hazard Mitigation** (continued)

| Sources | Financial Resource | Effect on Hazard Mitigation |
|---|---|---|
| Potential | Assistance to Firefighters Grant (AFG) Program's Fire Prevention and Safety Grant | The AFG funds the Fire Prevention and Safety activity and the Firefighter Safety Research and Development activity. These grants are to be used for fire prevention or safety programs and activities. |
| Potential | FEMA Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) grants, and Pre Disaster Mitigation (PDM) grants | HMGP grant funding is available to State, tribal, and local communities after a Presidentially declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects. PDM funding is available on an annual basis. This grant can only be used to fund PDM plans and projects only. FMA grant funding assists States, tribes, and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to structures insurable under the NFIP. |
| Potential | National Flood Insurance Program (NFIP) | The NFIP makes Federally backed flood insurance available to homeowners, renters, and business owners in NFIP-participating states, tribes, and communities. |
| Potential | Lindbergh Grants Program | Annual grants program that provides $10,580 per project that balance the advance of technology and the preservation of the natural/human environment. Can be used for conservation of natural resources (i.e., sustainable development codes) and public outreach/education projects. |

# Post-Disaster Federal Programs

## Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. http://www.fema.gov/hazard-mitigation-grant-program

## Physical Disaster Loan Program

When physical disaster loans are made to homeowners and businesses following disaster declarations by the U.S. Small Business Administration (SBA), up to 20% of the loan amount can go towards specific measures taken to protect against recurring damage in similar future disasters. http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans

# Pre-Disaster Federal Programs

## Pre-Disaster Mitigation Grant Program

The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds. http://www.fema.gov/pre-disaster-mitigation-grant-program

## Flood Mitigation Assistance Program

The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:

- Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims;
- Encouraging long-term, comprehensive hazard mitigation planning;
- Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
- Complementing other federal and state mitigation programs with similar, long-term mitigation goals.

http://www.fema.gov/flood-mitigation-assistance-program

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY13 Hazard Mitigation Assistance Unified Guidance, available at: https://www.fema.gov/media-library/assets/documents/33634. Note that guidance regularly changes. Verify that you have the most recent edition.

For Oregon Military Department, Office of Emergency Management (OEM) grant guidance on Federal Hazard Mitigation Assistance, visit:
http://www.oregon.gov/OMD/OEM/pages/all_grants.aspx - Hazard_Mitigation_Grants

Contact: Dennis Sigrist, dennis.sigrist@oem.state.or.us

# State Programs

## Seismic Rehabilitation Grant Program

The Seismic Rehabilitation Grant Program (SRGP) provides state funds to strengthen public schools and emergency services buildings so they will be less damaged during an earthquake. Reducing property damage, injuries, and casualties caused by earthquakes is the goal of the SRGP. http://www.orinfrastructure.org/Infrastructure-Programs/Seismic-Rehab/

## Community Development Block Grant Program

The Community Development Block Grant Program promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities, especially for low and moderate income persons. Eligible Activities Most Relevant to Hazard Mitigation include: acquisition of property for public purposes; construction/reconstruction of public infrastructure; community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months which pose immediate threats to health and welfare. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

## Oregon Watershed Enhancement Board

While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately $20 million in funding annually. More information at: http://www.oregon.gov/OWEB/Pages/index.aspx

# Federal Mitigation Programs, Activities & Initiatives

## Basic & Applied Research/Development

### National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation.

Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the National Institute for Standards and Technology (NIST). The agencies focus on research and development in areas such as the science of earthquakes, earthquake performance of buildings and other structures, societal impacts, and emergency response and recovery. http://www.nehrp.gov/

### Decision, Risk, and Management Science Program, National Science Foundation.

Supports scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis, perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423

## Hazard ID and Mapping

### National Flood Insurance Program: Flood Mapping; FEMA

Flood insurance rate maps and flood plain management maps for all NFIP communities. http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping

### National Digital Orthophoto Program, DOI – USGS

Develops topographic quadrangles for use in mapping of flood and other hazards. http://www.ndop.gov/

### Mapping Standards Support, DOI-USGS

Expertise in mapping and digital data standards to support the National Flood Insurance Program. http://ncgmp.usgs.gov/standards.html

### Soil Survey, USDA-NRCS

Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes. http://soils.usda.gov/survey/printed_surveys/

## Project Support

### Coastal Zone Management Program, NOAA.

Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration. http://coastalmanagement.noaa.gov/

### Community Development Block Grant Entitlement Communities Program, US Department of Housing and Urban Development

Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- in come persons. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement

### National Fire Plan (DOI – USDA)

The NFP provides technical, financial, and resource guidance and support for wildland fire management across the United States. Addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability. http://www.forestsandrangelands.gov/

### Assistance to Firefighters Grant Program, FEMA

FEMA AFGM grants are awarded to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. Three types of grants are available: Assistance to Firefighters Grant (AFG), Fire Prevention and Safety (FP&S), and

Staffing for Adequate Fire and Emergency Response (SAFER).
http://www.fema.gov/welcome-assistance-firefighters-grant-program

### Emergency Watershed Protection Program, USDA-NRCS

Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp

### Rural Development Assistance – Utilities, USDA

Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.
http://www.rurdev.usda.gov/Utilities_Programs_Grants.html

### Rural Development Assistance – Housing, USDA.

The RDA program provides grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary. http://www.rurdev.usda.gov/HAD-HCFPGrants.html

### Public Assistance Grant Program, FEMA.

The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.
http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit

### National Flood Insurance Program, FEMA

The NFIP makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements. http://www.fema.gov/national-flood-insurance-program

### HOME Investments Partnerships Program, HUD

The HOME IPP provides grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons. http://www.hud.gov/offices/cpd/affordablehousing/programs/home/

### Disaster Recovery Initiative, HUD

The DRI provides grants to fund gaps in available recovery assistance after disasters (including mitigation).
http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/dri

### Emergency Management Performance Grants, FEMA

EMPG grants help state and local governments to sustain and enhance their all-hazards emergency management programs. http://www.fema.gov/fy-2012-emergency-management-performance-grants-program

### Partners for Fish and Wildlife, DOI – FWS

The PFW program provides financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats. http://www.fws.gov/partners/

### North American Wetland Conservation Fund, DOI-FWS

NAWC fund provides cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats. http://www.fws.gov/birdhabitat/Grants/index.shtm

### Federal Land Transfer / Federal Land to Parks Program, DOI-NPS

Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space. http://www.nps.gov/ncrc/programs/flp/index.htm

### Wetlands Reserve program, USDA-NCRS

The WR program provides financial and technical assistance to protect and restore wetlands through easements and restoration agreements. http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands

### Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service.

Reauthorized for FY2012, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. http://www.fs.usda.gov/pts/