Bonner County

Multi-Jurisdictional Hazard Mitigation Plan

Update 2017

The Multi-Jurisdictional Hazard Mitigation Plan

of

Bonner County, Idaho

and the Communities of

Clark Fork, Dover, East Hope, Hope, Kootenai, Oldtown, Ponderay, Priest River, & Sandpoint

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Cover Material

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EXECUTIVE SUMMARY

The Bonner County Multi-Jurisdiction Hazard Mitigation Plan (HMP) is an update to the October 2009 Bonner County All-Hazard Mitigation Plan. The Bonner County HMP 2017 update was guided by Dr. Frazier of the Hazards & Climate Impacts Research Center (HazCIRC), Bob Howard of the Bonner County Department of Emergency Management, and the Planning Committee. The Planning Committee was composed of members of the county's Department of Emergency Management, representatives from the incorporated cities of Clark Fork, Dover, East Hope, Hope, Kootenai, Oldtown, Ponderay, Priest River, and Sandpoint. Community involvement included a public survey and a public meeting.

Major changes include an updated and rewritten county profile, the inclusion of additional hazards, much more detailed and comprehensive risk and vulnerability assessments for the hazards of focus, and the addition of new mitigation actions. Additionally, the 2017 update builds a strong foundation for annual review and update, allowing Bonner County to maintain the HMP through the five-year review and update cycle.

The revised risk assessment resulted in changes in hazard return periods, probability of future occurrence, vulnerability, spatial extent, magnitude, and prioritization. The update process employed additional datasets and modeling, and included the use of the Spatially Explicit Resilience-Vulnerability model developed by Dr. Tim Frazier. This socioeconomic vulnerability model helps inform where susceptible populations are located across the county, and is important in efficiently allocating resource pre- and post-disaster.

Table 1. Summary of hazard occurrences and risk prioritization

Hazard	2009-2017 Occurrences	Casualties	Property & Crop Damage	Risk Prioritization
Avalanche	3	1 Fatality; 1 Buried	-	8
Civil Disturbance	-	-	-	-
Communicable Disease	724	35	-	4
Cyber Disturbance	-	-	-	-
Drought	1	-	-	-
Earthquake	16	-	-	5
Flood	14	-	$2.5 million	6
Food Shortage	-	-	-	-
Hazardous Material	30	3 Fatalities; 2 Injuries	-	1
Landslide	4	-	-	7

Impoundment Structure Failure	-	-	-	-
Severe Weather	182	5 Injuries	$4.1 million	3
Transportation Accident & Incident				-
Utility Outage	-	-	-	-
Volcanic Eruption	-	-	-	-
Wildfire	167	-	-	2

Mitigation actions were reviewed and updated per feedback from the Planning Committee and responsible agencies and departments. Additional mitigation actions were included based on Committee and public input. These actions were scored and ranked to better prioritize efforts and resources towards the completion of listed mitigation actions.

Finally, this document collects both the Bonner County Hazard Mitigation Plan and the Bonner County Community Wildfire Protection Plan. By consolidating the Hazard Mitigation Plan and the Community Wildfire Protection Plan, the 2017 update reduces duplicate planning efforts across the county, and provides a more holistic perspective of the county's hazards. Both plans were reviewed, updated, and revised to fulfill the requirements of the Federal Emergency Management Agency's Local Mitigation Review Tool and the guidelines set forth by the Idaho Department of Lands (IDL).

I. INTRODUCTION

1.1 Overview

The term 'hazard' defines any event with the potential to cause loss of life or property. Hazards affecting Bonner County include flood, earthquake, landslides, severe weather, wildfires, hazardous material spills, communicable diseases, and more. Hazards become disasters when individual and communities are negatively impacted by such events. This plan identifies the county's hazards, assesses the county's vulnerability to those hazards, and details proposed actions to reduce the loss of life and property from disasters. These actions are defined as mitigation.

Hazard mitigation consists of cost-effective actions that reduce, limit, or prevent individual or community loss from damaging, harmful, or costly hazards. Mitigation consists of many types of actions, including local planning and regulations, capital improvement projects, natural systems protections, education and awareness programs, and preparedness and response actions. Together, these types of actions form a mitigation strategy, which is detailed in this Hazard Mitigation Plan (HMP).

Mitigation is one of the four emergency phases. The other phases are preparedness, response, and recovery. Where mitigation includes activities designed to prevent an emergency, reduce the probability of emergencies happening, or reduce the losses of unavoidable emergencies, preparedness includes plans and preparations to save lives and help response and rescue operations. Response occurs immediately after an emergency, and includes actions taken to save lives and prevent further damage or loss of life. The last phase is recovery, which are those actions taken to return to a state of normalcy.

Figure 1. Emergency and disaster management cycle

Although often viewed as distinct and separate, the four emergency phases are a continuum across time and space undertaken by numerous agencies, organizations, and individuals. Mitigation can occur before and after an emergency or disaster, and mitigation actions can be built into both preparedness and recovery in order to address vulnerabilities and weaknesses that arise during and post-emergency. It is important to distinguish between the HMP and other emergency response or emergency management plans. Where emergency response and management plans direct and detail the county's strategy of allocating resources and efforts to respond to and recover from a disaster, mitigation plans identify past occurrences of hazards and associated losses, possible future occurrences and losses, and help guide and implement actions and projects to reduce or eliminate current and future losses. These plans are interrelated, however, and should be employed as a cohesive planning framework to reduce vulnerability and enhance resilience against hazards.

Often, hazard mitigation is divided into three categories:

- Policies and actions that keep the hazard away from people, property, and structures.

- Policies and actions that keep people, property, and structures away from hazards.
- Policies and actions that reduce the hazard impacts on people, property, and structures.

However, there are many types of hazard mitigation. Table 2 provides an overview and examples of mitigation types.

Table 2. Mitigation types, definitions, and examples

Type of Action	Explanation	Examples
Local Planning and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built (FEMA, 2013).	• Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Cyber security plans
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards (FEMA, 2013).	• Utility undergrounding • Structural retrofit • Floodwalls • Culverts • Safe Rooms • Acquisitions and elevation of structures in flood prone areas • Off-site record backups
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems (FEMA, 2013).	• Sediment and erosion control • Stream corridor restoration
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as *StormReady* or *Firewise* Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions (FEMA, 2013).	• Radio or television spots • Websites with maps and information • Real estate disclosure • Mailings to neighborhoods • Firewise • Stormready • Disease awareness • Cyber security training

Preparedness and Response Actions	Mitigation actions reduce or eliminate long-term risk and are different from actions taken to prepare for or respond to hazard events. Mitigation activities lessen or eliminate the need for preparedness or response resources in the future. When analyzing risks and identifying mitigation actions, the planning team may also identify emergency response or operational preparedness actions (FEMA, 2013).	• Creating mutual aid agreements with neighboring communities • Purchasing radio communications equipment • Developing procedures for notifying citizens of available shelter locations during and following an event

1.2 Plan Purpose & Benefits

Bonner County's HMP identifies both short- and long-term local policies and actions that help reduce risk and future losses from hazards. These policies and actions are practical, cost effective, and politically, culturally, and environmentally acceptable. Local stakeholders and the public are engaged throughout the planning process, and feedback and perceptions are vital to a sound and comprehensive HMP. These policies and actions help to more efficiently and effectively focus resources on hazards that present the greatest risks to the county's populations and resources, while also aligning with other community objectives. The HMP focuses on land use and capital investment, given the effect capital investments and land use have on modulating community and individual vulnerability.

Other benefits of undergoing the planning process and creating and maintaining an HMP include:

- Selection of Risk Reduction Actions – Hazard mitigation is a systematic process of identifying and analyzing the county's risks. By setting clear goals and identifying and implementing mitigation strategies, the county can reduce losses from disasters.
- Builds Local, State, & Federal Partnerships – The hazard mitigation plan builds partnerships through two-way communication and collaboration by involving various stakeholders at the local, State, and Federal levels.
- Facilitates Sustainability – Risk from hazards and sustainability of the county and its communities are linked. Without identifying and mitigation risks, the livelihood and continuance of the county and its communities is threatened. Enhancing resilience to hazards enhances sustainability.
- Establishes Funding & Resource Priorities – By coordinating and consolidating mitigation actions undertaken in the county into a unified strategy, the plan helps prioritize and articulate the county's and its communities' needs to the public, organizations and enterprise, and agencies with stakes in the county.

- Increase Hazard Awareness & Education – The hazard mitigation planning process increases education and awareness of hazards and risks in the county and its communities. This awareness helps individuals understand their risk, self-mitigate, and enhance their resilience. This can translate to support of mitigation actions in the county.

1.3 Legal Authority & Requirements

The legal basis of the HMP is the Stafford Act, as amended by the Disaster Mitigation Act (DMA) of 2000. The DMA emphasized pre-disaster planning, and Section 322 of the Act specifically addressed mitigation planning. The DMA requires state and local governments to prepare and maintain hazard mitigation plans in order to receive FEMA hazard mitigation project grants. This financial assistance can be sought pre- and post-disaster, and is therefore vital in all phases of emergency management.

The requirements for an HMP are located in 44 CFR §201.6 and include criteria for five elements:

- Planning Process
- Hazard Identification and Risk Assessment
- Mitigation Strategy
- Plan Review
- Evaluation
- Implementation and Plan Adoption

Detailed criteria for each of the requirements can be found in Appendix B.

1.4 Hazard Mitigation Plan Update

A community must review and revise their existing HMP, as required by 44 CFR§201.6(c)(v). The revision must reflect changes in development, progress made in local mitigation efforts, and changes in hazard and mitigation priorities. The update then must be resubmitted for approval within five years in order to maintain eligibility for FEMA mitigation grant funding. The county's previous HMP was originally completed and adopted in 2005, and expired in 2009. The plan was updated in 2017 through a collaborative effort between Bonner County and participating communities, the Hazards & Climate Impacts Research Center (HazCIRC), IOEM, and various agencies and organizations working within the county.

The update process built on the former plan but comprehensively updated the plan's various components. The planning process was rewritten to reflect the update process, and the risk assessment incorporated new hazard data and modeling to provide more comprehensive analysis of

the county's risks. The plan update considered population and development changes over the past seven years, and future development and population growth over the next five years. Likewise, updates were made to include historical hazard occurrences and associated losses after 2009 were included, local regulatory and planning capabilities, the progress of mitigation actions in the county, and new mitigation actions to be implemented in the county over the plan's five-year lifecycle.

1.5 Community Wildfire Protection Plan

A Community Wildfire Protection Plans (CWPP) is similar in nature to the HMP, though primarily focuses on wildfire. Following the enactment of the Healthy Forests Restoration Act (HFRA) in 2003, communities can engage in comprehensive forest planning with federal partners through the creation of a CWPP, which identifies and prioritizes hazards and needs associated with wildfire. In the State of Idaho, the CWPP is under the purview of the Department of Lands (IDL), and county CWPPs tier to the Idaho State Implementation Strategy for the National Fire Plan.

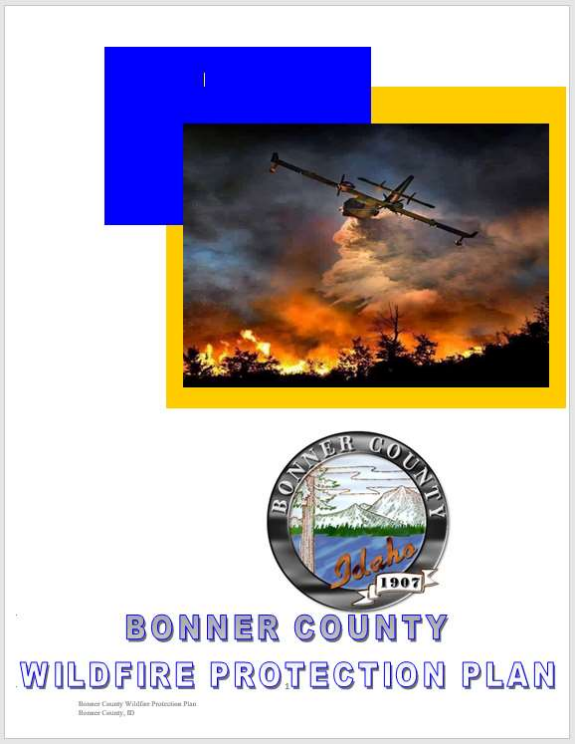


Figure 2. Bonner County Wildfire Protection Plan

Similar to the HMP, the Bonner County CWPP identifies and documents areas at risk to wildfire, details strategies and actions to decrease wildfire risk and losses, and provides assistance to residents, organizations, and agencies within the county.

Due to similar plan format and requirements, the 2017 plan update incorporated the Bonner County Community Wildfire Protection Plan (CWPP). This integration was made possible through an agreement between IOEM and IDL, a first in the nation. The integration process standardized both plans while fulfilling FEMA and IDL requirements. Advantages of integrating both plans include a more comprehensive overview of all hazards and mitigation strategies in the county, opens funding avenues not previously available, and allows for the maintenance of one consolidated document. The most updated CWPP is located in Appendix J.

1.6 Plan Organization

This plan is organized into the following sections:

- Introduction – Provides an overview of mitigation, hazards, and the basis of HMPs.
- Prerequisites & Promulgations – Provides an overview of the jurisdictions that adopted the HMP.
- Planning Process – Details the process undertaken for the 2017 plan update. This section identifies and details the planning committee, participating jurisdictions, and stakeholders.
- County Profile – Provides an overview of Bonner County and the many factors considered throughout the plan update.
- Risk Assessment – Details identified hazards and risks facing the county. Hazard profiles include hazard descriptions; hazard extents, magnitudes, and past occurrences; population, structure, and structure value exposure; socioeconomic vulnerability assessments; loss estimates; and land use and future developments in relation to hazards.
- Mitigation Strategy – Details the county's commitment and strategy to reduce loss of life and property from hazards and risks identified in the Risk Assessment. Includes goals, objectives, and specific actions. This section also includes funding avenues, detailed National Flood Insurance Program (NFIP) information, and more.
- Plan Maintenance – Details the county's commitment to maintaining the 2017 plan through the five-year lifecycle. The county will monitor, evaluate, and update the plan on a bi-annual basis, and engage the public throughout the process. This section also includes recommended updates for the 2022 plan update.

II. PREREQUISITES & PROMULGATIONS

2.1 Overview

Governing bodies have the authority to promote sound public policy regarding hazards. Copies of the signed resolutions and promulgations are included in Appendix A. Upon approval by IOEM and FEMA and adoption by the local jurisdictions, Bonner County and the other plan signatories gain eligibility for pre- and post-disaster federal funding assistance, such as grants from the Pre-Disaster Mitigation Grant Program and the Hazard Mitigation Grant Program.

2.2 Jurisdictional Adoption

The following incorporated places have the authority to adopt the plan:

- City of Clark Fork
- City of Dover
- City of East Hope
- City of Hope
- City of Kootenai
- City of Oldtown
- City of Ponderay
- City of Priest River
- City of Sandpoint

III. PLANNING PROCESS

3.1 Overview

The planning process is vital to the development and completion of a comprehensive HMP that best fits a county and its communities. As with almost all planning efforts, the plan is only as good as the process itself. A major component of the planning process is involvement and participation from representatives and stakeholders from the county, local communities, State and Federal agencies, and other organizations. Through the process, perspectives on hazards and risks, community assets, and mitigation needs are discussed and incorporated into the plan. The planning process consisted of the following phases:

- Plan Update Kick-Off – The planning process for the 2017 plan update began in August of 2015 with a kick-off meeting between the Bob Howard (Bonner County Emergency Manager), Dr. Tim Frazier (HazCIRC), and Mark Stephensen (IOEM State Hazard Mitigation Officer). A work plan was proposed and agreed on, including hazards of focus, timelines, mitigation and adaption planning and stakeholder engagement, and more.
- Plan Review & Evaluation – The 2009 plan was reviewed and evaluated according to the FEMA Local Mitigation Review Tool (2011) and a more stringent and comprehensive evaluation matrix developed by Frazier et al. (2013). The review and evaluation results guided the risk assessment and mitigation strategy for the 2017 plan update by identifying the strengths and weaknesses of the former plan.
- Risk Assessment – Hazard occurrences, damage assessments and estimations, and hazard impacts were collected for the county. Additional hazards were included in the 2017 plan update, and all hazard profiles updated to reflect current science and risk. Various probabilistic models; scenario-based loss estimates; population, structure, and critical facility exposure; and a comprehensive socioeconomic vulnerability analysis were employed to provide a more holistic and comprehensive assessment of the county's risks.
- Mitigation Strategy Review – The mitigation actions listed in the 2009 plan were reviewed and their status determined by the responsible agencies and departments. This involved reaching out to numerous individuals, agencies, and departments in the county in order to collect information on the progress, completion percent, timeline, and challenges of the mitigation actions. Overall mitigation goals and objectives were likewise visited and updated as necessary.
- Mitigation Strategy Update – New and additional mitigation actions were detailed and scored by the planning committee for inclusion into the 2017 plan update. Each jurisdiction was provided the opportunity to put forth mitigation actions for discussion and approval.
- Public Involvement & Outreach – The public was invited to attend a meeting to review the risk assessment, proposed mitigation actions, and provide comments and feedback. Large format maps provided a place for public participants to locate and draw areas of concern. A hazard survey provided opportunities for both the public and planning committee to provide local risk perceptions for inclusion into the 2017 plan update. Finally, a webpage provided an online

presence, and provided links to the draft plan, opportunity to comment and provide feedback, and links to the survey and CityEngine scene developed for Priest River.

- Plan Completion & Adoption – HazCIRC compiled all planning documentation, completed the risk assessment, and collected new mitigation actions to produce the first version Bonner County Hazard Mitigation Plan 2017 Update. The draft was distributed to the planning committee, IOEM, and the public for review and comment. Feedback and comments were incorporated into the second draft. Additional hazard profiles, modeling, and mitigation actions were also incorporated into the second draft. After the review and edit period, the plan was formally submitted to IEOM and FEMA for approval.

3.1.1 FEMA Requirements

This section was developed consistent with the process and requirements detailed by FEMA. This section satisfies the following FEMA requirements:

- FEMA 44 CFR §201.6(b) – An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
- FEMA 44 CFR §201.6(b)(i) – An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- FEMA 44 CFR §201.6(b)(ii) – An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activites, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- FEMA 44 CFR §201.6(b)(iii) – Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
- FEMA 44 CFR §201.6(c)(i) – [The plan shall document] 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.

3.2 Jurisdiction Participation

The hazard mitigation planning process is built on the participation of the county and the incorporated places within its boundaries. All nine jurisdictions were invited to participate in the 2017 plan update process. Table 3 details the participation of jurisdictions in Bonner County for both the 2009 and 2017 planning process.

Due to the rural nature of Bonner County, coordination of participation within each individual jurisdiction was limited due to time, geographic, and personnel constraints. Jurisdictional participation

was achieved through the attendance by representatives at planning meetings, who provided input and feedback regarding the risk assessment and mitigation strategy. Individual meetings were also held as needed between the emergency manager and the jurisdictions throughout the planning process.

Former City of Clark Fork Mayor Chris Riggins along with Bob Howard attended a one hour conference call with HazCIRC during the planning phase. Current Mayor Russ Schenck voiced projects identified by former Mayor Riggins, and the City of Clark Fork has stated intention to participate in the maintenance and update meetings annually along with all other cities.

The representatives for the City of Oldtown (Bryan Quayle) and the City of Priest River (Greg Snow) worked with Mr. Howard on the coordination and planning efforts. Finally, the City of Sandpoint participated in the conference call by HazCIRC.

Table 3. Jurisdictional participation

Name	2009 Participation	2017 Participation
Bonner County	Yes	Yes
City of Clark Fork	Yes	Yes
City of Dover	Yes	Yes
City of East Hope	Yes	Yes
City of Hope	Yes	Yes
City of Kootenai	Yes	Yes
City of Oldtown	Yes	Yes
City of Ponderay	Yes	Yes
City of Priest River	Yes	Yes

3.3 Planning Committee

The planning committee helped steer the 2017 plan update and played a key role in the development and completion of the update. The planning committee was headed by Bob Howard (Bonner County Emergency Manager) and included representatives from various county and city departments and agencies. Members of the planning committee participated in meetings, provided input on the risk assessment and past hazard occurrences, discussed current issues and potential problems facing the county, reviewed the status of mitigation actions listed in the former HMP, and put forward new mitigation actions for inclusion in the 2017 plan update. Table 4 details the planning committee, their titles and representing jurisdictions or agencies, and their participation history.

Table 4. Planning committee members

Name	Title	Jurisdiction or Agency	2009 Participation	2017 Participation
Annie Shaha	Mayor	Dover	No	Yes
Bob Hatfield	Chair	BONFIRE	Yes	-
Bob Howard	Emergency Manager	Bonner County	Yes	Yes
Christy Franck	City Clerk	East Hope	Yes	Yes
Don Hutson	Director	Bonner County Road & Bridge	Yes	-
Lisa Ailport	Planner	Kootenai, Dover, & East Hope	No	Yes
Mark Contor	Operations Manager	Northern Lights	No	-
Matt Mulder	Staff Engineer	Bonner County Road & Bridge	No	Yes
Nancy Lewis	Mayor	Kootenai	No	Yes
Saegen Neiman	Planner III	Bonner County Planning & Zoning	No	Yes
Shauna Harshman	Planner II	Bonner County Planning & Zoning	No	Yes

3.4 Stakeholder Participation

Stakeholders are those individuals, businesses, utilities, State and Federal agencies, and any other entity with an interest in hazard mitigation in Bonner County. Stakeholders provide information, perspectives, and input on all aspects of the planning process. Table 5 details stakeholders engaged throughout the 2017 plan update, their role and representation, and their contribution.

Table 5. Participating stakeholders

Name	Title	Jurisdiction or Agency	Participation
Susan Cleverly	State Hazard Mitigation Officer	IOEM	Planning Meeting
Ben Roeber	State Hazard Mitigation Planner	IOEM	Planning Meeting
Greg Snow	Commission member	Building, Planning and Zoning Priest River	Mitigation Review

Don Carter	Building Inspector & Floodplain Admin	Sandpoint	Mitigation Review
Eric Brubaker	Director & Floodplain Administrator	Planning, Parks, and Development Ponderay	Mitigation Review
Jim Peirone	Commissioner	West Priest Lake Fire District	Mitigation Review
Aaron Qualls	Planner	Sandpoint Planning & Zoning	Mitigation Review
Sandi McKee	Chief Financial Officer	Inland Power & Light	Planning Meeting
Jay Baker	Area Field Officer	IOEM	Planning Meeting
Mark Stephensen	Former State Hazard Mitigation Officer	IOEM	Planning Meeting

3.5 Planning Meetings

Meetings attended by the planning committee and other stakeholders were held to review the former HMP, propose updates and the update process, review the mitigation actions listed in the former HMP, discuss the risk assessment, and solicit new and additional mitigation actions. A webinar was also held for those unable to make the meetings and to increase community buy-in and participation in the planning process.

The following summaries provide an overview of the meetings and webinars held throughout the planning process, and Appendix C contains the presentations used in the meetings.

3.5.1 August 2015 Kick-Off Meeting

The kick-off meeting signified the beginning of the 2017 plan update, and was held in August, 2015. The meeting was attended by Bob Howard, Bonner County Emergency Manager, and Tim Frazier, Director of the HazCIRC. The meeting provided an overview of the grant, some of the hazards to be addressed, the work plan for the update process, mitigation and adaptation plan analysis criteria and metrics, and introduced socioeconomic vulnerability.

Hazards to be addressed included those specific to the county, included severe storms, windstorms, dam and levee breaks, earthquake, mud and landslide, fire, and drought. The need to incorporate climate impacts and climate vulnerability was discussed, as was multi-model evacuation modeling. Multi-model evacuation modeling employing a HazCIRC-developed MATSim custom travel demand model was presented, which identified evacuees based on a variety of data and modifiable to match county needs and assumptions.

The first step of the work plan discussed was an evaluation of the former HMP. Evaluations using both FEMA requirements and a more comprehensive HazCIRC-developed HMP evaluation matrix was discussed and approved. The HazCIRC-developed evaluation matrix was constructed to better assess the quality of HMPs, and incorporated much more stringent criteria that judged plans on their ability to minimize or prevent losses, their consideration of physical exposure, inclusion of probabilistic mapping and socioeconomic analyses, data quality, the localization of the plan to the county, and more. The Spatially Explicit Resilience-Vulnerability (SERV) model was then detailed, followed by examples of previous application and usability.

Additional aspects of the proposed planning process were discussed, including the need to better integrate the HMP with community planning (e.g., the Bonner County Comprehensive Plan), the need for better coordination across the county, its communities, and stakeholders, and the need for more extensive public participation throughout the planning process. The difficulty in linking hazard mitigation policy and practice was then discussed, focusing on competing interests, uncertainty in modeling, political environments, and measures to overcome these difficulties.

A skeleton structure of the 2017 plan update was proposed. Specifics included a probabilistic-based risk assessment, vulnerability assessment, hazard mitigation summaries and strategies, and benefit-cost analysis. The proposed end product of the process was a FEMA-certified HMP adopted and effective for five years. Figure 3 shows the proposed timeline that concluded the kick-off meeting.

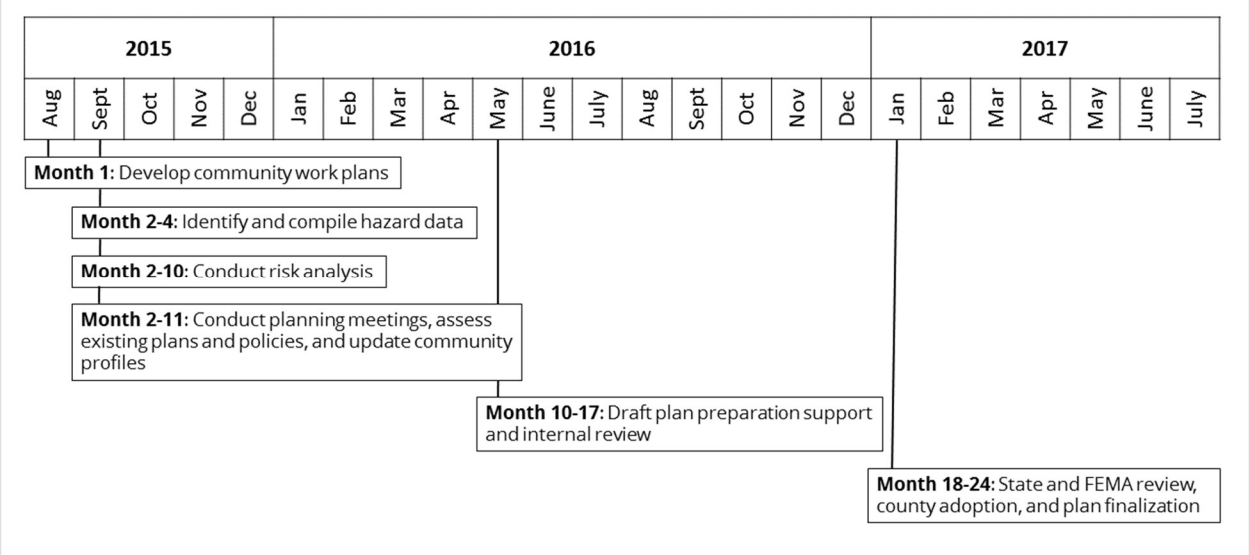


Figure 3. Planning timeline

3.5.2 October 20, 2015 Planning Meeting

Members of the planning committee met on Thursday, October 22, 2015 to discuss the evaluation of the former HMP. The meeting was held from 9:00am to 12:00pm at the Bonner County Administrative Building in Sandpoint, ID. The meeting was attended by the Bonner County Emergency Manager, the State Hazard Mitigation Officer from IBHS, and members of HazCIRC.

The meeting was facilitated by Dr. Tim Frazier, Alexander Peterson, and Michelle Ritchie of HazCIRC. The meeting commenced with a grant overview, progress made to date, and next steps in the planning process. An overview of the former HMP evaluation was discussed, beginning with the rationale for the evaluation matrix used. The matrix was developed by Dr. Tim Frazier and graduate students, and built on FEMA requirements by incorporating additional criteria based on pre- and post-disaster experiences and knowledge, interviews with local experts from across the US, and scientific and academic literature.

An overview of various models to be employed throughout the 2017 plan update were then presented. These models included the Spatially Explicit Resilience-Vulnerability (SERV) model and MATSim, a first-in, first-out evacuation model. Both models had been employed successfully across the country in both planning and scientific research. Also presented were ESRI's CityEngine, which visualizes hazard risk in 3D; a mitigation mapping model to highlight the potential area of effect of various mitigation measures; and the Idaho Department of Health & Welfare's (IDHW) Public Health Jurisdictional Risk Assessment (JRA) which assessed public health systems across Idaho from a hazards perspective.

Following this, a data inventory and web portal was presented. Also presented were 2017 plan updates specifically concerning mitigation, including the need for the incorporation of monitoring and evaluation metrics, a mitigation ranking method and feedback form, and future planning meetings to discuss these metrics.

3.5.3 February 19, 2016 Planning Meeting

The February planning meeting focused on reviewing the mitigation strategies listed in the former plan. The meeting was held at 9:00am on Friday, February 19, 2016 in Sandpoint, ID. It was attended by eight planning committee members, the State Hazard Mitigation Officer, and the IOEM Area Field Officer for the North region. Jurisdictional representation included Bonner County, and the communities of Dover, Kootenai, and East Hope.

The planning meeting commenced with a presentation by Dr. Frazier and Alexander Peterson of HazCIRC. The presentation consisted of an overview of the community work plan approved in the kick-off meeting held in August 2015 and the evaluation and update meeting held in October 2015. Progress made to date on all targeted areas of the 2017 plan update was detailed, including the risk assessment, the mitigation strategies, and the plan writing. Progress on the risk assessment was discussed with the planning committee, with each component and its associated timeline addressed. These components included the socioeconomic vulnerability assessment utilizing the SERV model, the

biophysical exposure assessment, CityEngine, the MATSim evacuation model, HazMat plume modeling, the landslide assessment, and the Level II Hazus-MH runs for earthquake and floods. Draft figures of the CityEngine scene of Priest River and the exposure components of the SERV model were shown to the committee.

Following discussion of the risk assessment, the work plan for the mitigation strategy review and update was presented. The work plan included the mitigation strategy review, a targeted comprehensive plan evaluation and summary to identify possible convergence areas between the plans, mapping current and possible mitigation actions areas-of-effect, and prioritizing and ranking the mitigation actions. Discussion on developing the plan structure and the writing and updating of the 2017 plan update followed, and the incorporation of the planning committee perspectives, the risk assessment results, and public comments from slated public meetings discussed.

The presentation then covered the primary purpose of the planning committee meeting, which was to review and begin evaluating the mitigation strategies listed in the former plan. The review examined the progress made towards implementing the mitigation actions throughout the county during the previous plan's lifecycle. Mandated in the update process by FEMA, the review and input from the planning committee provided a strong foundation for updating the mitigation strategies by revising, removing, carrying forward, or adding mitigation goals, objectives, and actions.

Copies of the Bonner County Mitigation Review form was passed out to all participants, with a digital version projected to better facilitate group discussion. This form was generated by extracting all mitigation goals, objectives, and actions from the former plan, and provided space to mark the status (ongoing, complete, incomplete, etc.), if the planning committee desires to carry the action forward in the update process, the percent complete if progress has been made, an estimated timeline for completion, the responsible agency, challenges to implementation, an assigned priority, and notes for any other relevant information.

Each mitigation action was then read aloud, with time allotted for group discussion on the progress towards implementation or completion of the action. Of the 112 mitigation actions listed in the former plan, 31 were determined to have progress, 15 were considered complete, 28 determined to have had no progress, and 41 as needing more information before being assigned a status. Information regarding the other fields (e.g., percent complete, timeline, etc.) was likewise discussed.

Following the mitigation strategy review, feedback was solicited on the Capabilities Assessment template and the Mitigation Actions Monitoring template. April 2016 was targeted for completion of the Stakeholder Involvement form and the FEMA Capabilities Assessment.

3.5.4 April 25, 2016 Planning Meeting

The planning committee met on Monday, April 25, 2016 to discuss progress made to date, new and revised mitigation actions, and preliminary risk assessment results. The planning meeting was held from 9:00am to 12:00pm in Sandpoint, ID. The meeting was attended by seven members of the

planning committee, including representatives from the county, Dover, East Hope, Inland Power and Light, and Bonner County Planning and Zoning.

The meeting was facilitated by Alexander Peterson and Elizabeth Boyden of HazCIRC, and commenced with a narrative on progress made to date on the 2017 plan update. Progress included reviewing all mitigation actions listed in the former plan and a concerted effort by HazCIRC to reach out to county and community officials for feedback on mitigation actions with unknown status. A risk perception survey to be distributed to Bonner County residents was discussed and approved by the planning committee.

After discussing progress made to date, committee members participated in a mapping exercise to list and map everyday community assets. These assets were defined as those places, areas, structures, etc. that are meaningful and that contribute to Bonner County's quality of life. Of note, the highways, bridges, dams, waterways and water sources, and public lands and access were listed as important to members of the planning committee. The committee members then discussed and mapped the priority assets across the county. After completing the first mapping exercise, the committee participated in a second mapping exercise to identify facilities and places in the county that are vital in response to and recovery from a disaster. Infrastructure, transportation, schools, shelters, natural protection (e.g., floodplains), and businesses and industries important in sustaining the county's economy were listed as vital by the committee members.

The preliminary risk assessment figures and results were then presented. Bonner County experienced losses totaling more than $7 million and four injuries since the former plan adoption in 2009, with three federal disasters declared during that same period. The preliminary socioeconomic vulnerability assessment employing the SERV model was detailed, and sensitivity and adaptive capacity figures shown. Hazard-specific results were presented for flood, earthquake, wildfire, hazardous materials, pandemic influenza, landslide, and severe weather.

Flood losses for seven recorded events totaled $2,679,963 during the 2009 to 2014 period, making it the primary loss-inducing hazard in Bonner County. Loss estimations were presented for the one percent annual chance (100-year) and the 0.2 percent annual chance (500-year) flood events. These loss estimation scenarios were modeled in Hazus-MH, FEMA's loss estimation software. Two scenarios employing different flood depth grids were run for the one percent chance flood loss estimation, including an interpolated depth grid created by HazCIRC and a non-regulatory depth grid provided by FEMA. One loss estimation scenario employing FEMA-provided non-regulatory depth grids was run for the 0.2 percent chance flood. Results in tabular and map forms were presented, with the planning committee providing feedback on the loss estimations.

Earthquake figures and loss estimation results were presented next. Three earthquake scenarios were run in Hazus-MH, including a probabilistic 7.0 magnitude earthquake with a 1,000-year return interval, a historical 1942 5.5 magnitude earthquake, and an arbitrary 6.0 magnitude earthquake with an epicenter located 10km under Sandpoint.

The requirements of updating and incorporating the Bonner County CWPP was discussed, with a preliminary wildfire risk assessment shown after discussions. The preliminary wildfire risk assessment showed historical ignition points and burn perimeters in the county over the period 2008 to 2013, with model outputs from the Fire Risk Index providing context of potential ignition and impacts in the future. The committee decided to explore other wildfire risk model options due to concerns regarding the applicability, statistical methods, and results of the Fire Risk Index.

The location, responsible parties, dates, and chemicals of reported hazardous material incidents over the 2009 to 2015 period were then presented, with a hazardous materials map showing exposure buffers around Tier II chemical facilities providing context of fixed-site hazardous materials risk. Reported communicable disease incidents were presented, and pandemic influenza model results showed the projected hospital admissions and deaths if the county were to experience an epidemic of 1918 and 1968 pandemic influenza strains. Landslide and severe weather incidents and figures were then presented. A preliminary landslide index incorporating susceptible slopes, aspects, canopy cover, and geologic types was shown, and data provided by the National Weather Service (NWS) detailed wind and hail incidents across the county.

Potential mitigation actions were discussed amongst committee members, and each member drafted and presented a list of mitigation actions. Actions for Dover included mitigating limited access, problematic sewer systems, drought and water supply concerns, elevating structures in the regulatory floodplain, and obtaining new regulatory floodplain maps from FEMA. Actions for Kootenai included mitigating issues with high water table and floods, constructing secondary access points, and preventing railroad-related accidents and losses. East Hope mitigation actions included wildfire knowledge and risk reduction programs, cooperation with the USFS, mapping existing infrastructure, assessing landslide risk, uniform addressing systems for emergency services, and stormwater capture.

A third exercise to map the mitigation areas of effects was planned but cancelled due to time constraints. The meeting concluded following discussions of a public meeting date in late May and the immediate tasks at hand to be completed prior to the public meeting.

3.5.5 June 28, 2016 Webinar

Stakeholders and members of the planning committee gathered for a Jurisdictional Participation Webinar held on Tuesday, June 28, 2016. The webinar was designed to increase community participation, with a focus on those communities that had yet to participate in the planning process. The webinar was attended by representatives from Ponderay, East Hope, Sandpoint, Northern Lights Electric Cooperative, the State Hazard Mitigation Officer, and the State Hazard Mitigation Planner.

The webinar was facilitated by Alexander Peterson and Elizabeth Boyden of HazCIRC, and commenced with introductions followed by a brief overview of the agenda. Progress made to-date, the timeline,

and targeted deadlines were discussed. The webinar covered the benefits of mitigation and the plan itself. The following FEMA requirements regarding eligibility to adopt the plan were presented:

- Communities must participate in the update process.
- Communities must review the HMP, risk assessment, and drafts.
- Communities must propose mitigation actions and priorities.

The webinar presentation continued through the risk assessment. Past hazard occurrences and losses, hazard exposure and risk maps, and results from hazard loss estimation scenarios were presented. The county's decision to incorporate the CWPP and benefits of doing so were likewise discussed during the webinar.

Following the risk assessment, the webinar concentrated on the county's mitigation strategy. A basic overview of mitigation, its purpose and benefit, and examples were presented to the participants, which was then followed by an open discussion of jurisdictional mitigation priorities. A representative from Northern Lights discussed the extent of damages from the 2014 wind event in the county and that there was an additional 1.5 million dollars in damage, most notably from power lines that was not captured in the risk assessment. Mitigation efforts such as tree trimming and burying power lines by Northern Lights, USFS and IDL were detailed, followed by areas of priority for mitigation. These areas included mountain tops and surrounding areas that are vulnerable to fire and wind. Northern Lights further discussed the crucial need of funding for additional mitigation of an estimated 10,000 power lines. It was noted that additional companies in the area (i.e., Avista Power) would also have the same concerns.

A representative from Sandpoint then stated that they would need to reach out to the police and fire departments for mitigation priorities. Additionally, no mitigation priorities were given from the Cities of East Hope and Ponderay. The webinar then concluded with a discussion of further outreach and that HazCIRC and the Bonner County Emergency Manager would reach out for those jurisdictions that did not participate in the webinar.

3.6 Review of Existing Plans

Planning mechanisms were reviewed in both the 2009 plan and 2017 update. In addition to re-reviewing those in the 2009 plan, the 2017 update focused more on in-depth evaluations and targeted integrations. The following documents were evaluated in-depth in the 2017 update:

- Bonner County All-Hazard Mitigation Plan (2009) – This plan was evaluated on both its fulfillment of the FEMA Local Mitigation Review Tool (2011) and a comprehensive HMP evaluation matrix developed by Frazier et al (2013). The FEMA Local Mitigation Review Tool lists and describes the requirements the HMP must fulfill according to the Code of Federal Regulation (CFR). The comprehensive HMP evaluation matrix provides more stringent and in-

depth criteria on which to evaluate HMPs. These criteria are an expansion of the FEMA requirements and included evaluations of internal and external plan characteristics, issue identification and vision, fact-based hazard assessments, mitigation strategies, policy frameworks, monitoring and implementation, planning processes, coordination of local hazard mitigation planning, and organization and presentation. Results of these evaluations provided guidance throughout the 2017 plan update process. The evaluation matrix and summary can be found in Appendix B.

- Bonner County Comprehensive Plan (2002, 2003, 2013) – The comprehensive plan is the document with the most regulatory power within the county, although the document is not regulatory in itself. According to Idaho's Local Land Use and Policy Act (LLUPA), the comprehensive plan needs to consider previous and existing conditions, trends, compatibility of land uses, desirable goals and objectives, or desirable future situations for 17 required components. The comprehensive plan guides the growth of the county and its communities. Often, the majority of the policies are carried out through zoning and subdivision ordinances, and policies within the plan are more likely to be implemented than if they were stated within a separate document, such as the HMP. Many comprehensive plans do not explicitly consider hazards, in spite of the potential for loss of life and property due to hazards and risks present within the county. The comprehensive plan was assessed to ascertain the current status and future potential of HMP integration. Results of this evaluation are collected in Appendix B.

Other plans reviewed and resources considered in the 2017 plan update included the following:

- Bonner County and Incorporated Area Floodplain Ordinances and Codes
- Bonner County Trails Plan (2012)
- State of Idaho Hazard Mitigation Plan (2013)
- Idaho State Transportation Plan (2014)
- Idaho Department of Transportation Traffic Flow Study (2014)
- Clark Fork River Delta Restoration Project Environmental Assessment Draft (2014)
- Pend Oreille Basin Management Plan (2014)
- Bonner County Economic Report (2015)
- Idaho Department of Health & Welfare Jurisdictional Risk Assessment: Panhandle Health District (2015)
- Priest River Airport Master Plan (2015)

3.7 Google Drive Folder

To help facilitate collaboration, cooperation, and access to plan documents and data, HazCIRC established a Google Drive folder. Planning committee members and stakeholders were granted access to the Google Drive folder and invited to comment and contribute to the data inventory, figures and maps, and meeting notes and summaries stored online. The folder was routinely updated as progress was made on the 2017 plan update. Drafts of the updated plan were likewise stored in the Google Drive folder, allowing committee members and stakeholders to review and provide feedback and comments.

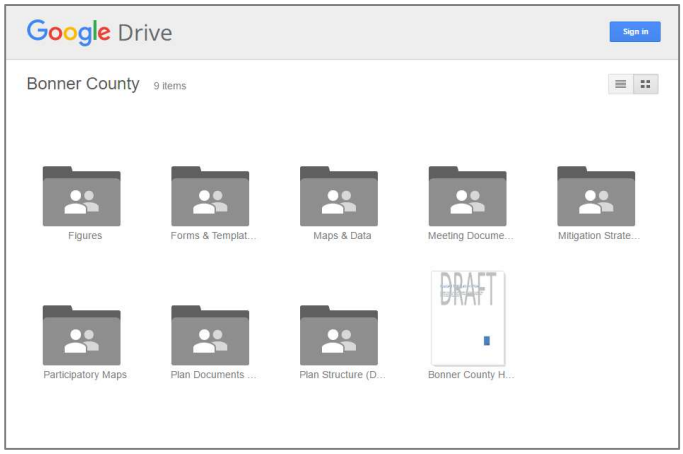


Figure 4. Screenshot of the Google Drive folder

3.8 Public Involvement

3.8.1 Risk Perception Survey

A survey to assess risk perceptions of various hazards across Bonner County was created and distributed to the planning committee and the public. The survey focused on events occurring after 2009, and solicited feedback on individual levels of concern, dissemination of safety and preparedness information, the vulnerability of community assets to hazards, and mitigation actions. The survey and survey responses are found in Appendix F.

3.8.2 Webpage

A webpage hosted on the HazCIRC website was developed to provide a central online presence throughout the update process.

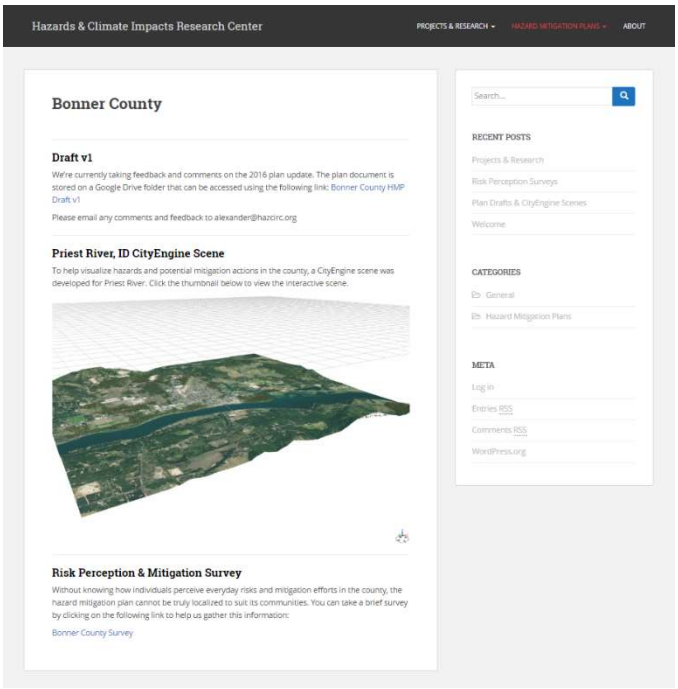


Figure 5. Plan update webpage

The webpage housed the first version draft of the 2017 plan update and subsequent revisions as edits, additional modeling and hazard profiles, and mitigation actions were completed. The website also housed preparedness information, the risk perception survey developed for the 2017 plan, and a web-based CityEngine scene of Priest River. Visitors were able to leave comments or email HazCIRC with feedback.

3.8.2 May 24, 2016 Public Meeting

A public meeting was held on Tuesday, May 24, 2016 at 7:00 PM at the Bonner County Administrative Building. A press release run in the local newspaper notified the public, with additional community recruitment by Bob Howard (Bonner County Emergency Manager). The meeting was attended by seven members of the community.

The meeting was facilitated by Dr. Tim Frazier and Alexander Peterson of HazCIRC. The meeting commenced with an overview of recent disasters in Bonner County, the need for hazard mitigation, and the benefits of maintaining a FEMA-approved HMP. An overview of the plan update detailed the process and timeline. An overview of the risk assessment was then presented and followed by discussion of proposed mitigation actions in the county. Attendees were then invited to provide feedback on the first draft of the plan update, areas of high risk across the county, and where they perceive needed mitigation.

An area 12 miles north of Sandpoint was identified as an area with problematic ingress and egress. Notably, wildfire was posited as posing a significant risk to the limited road network in the area due to fuel loadings, the topography, and lack of paved roads. The area of concern was marked on a provided large-format map by the citizen. Proposed mitigation to this risk included fuel reductions and vegetation thinning. The discussion of this risk prompted further mitigation actions in the form of identifying all mono-directional roads and an evacuation plan addressing identified areas of concern.

Large-scale events (such as a Cascadia earthquake and tsunami, or Yellowstone Caldera eruption) were then discussed. Discussion was prompted by concern from a local citizen regarding the lack of inclusion of events with the potential to induce surge-level casualties and disruption in the first draft of the plan update. A section on large-scale events was proposed for inclusion. Public awareness of shelter location was questioned by members of the public, and a mitigation action to increase public education regarding shelter locations and notification was proposed.

3.9 Plan Review & Approval

Following the completion of the draft, the plan was submitted to IOEM for state review prior to submission to FEMA Region X. Once FEMA Region X completes its review and approves pending adoption, the county will formally adopt the plan. The communities then have up to one year to also adopt the plan.

IV. COUNTY PROFILE

4.1 Overview

Hazard mitigation within Bonner County should be localized in order to maximize the reduction of losses to both life and property; therefore, it is pertinent to understand the county's characteristics, including current, past, and future trends. The county profile provides a comprehensive description of the county and its characteristics, which are further contextualized with regards to hazards in the Risk Assessment. The county is profiled in the following sections:

- Geographic Setting
- Climate and Weather
- Demographics
- Economy
- Transportation
- Water Resources
- Soils
- Critical Wildlife Habitat
- Land Cover
- Land Ownership

Where possible, updated data was gathered for the Bonner County Profile in order to make the content relevant to current trends and issues, and for later discussion with the plan. Data was gathered from the following sources:

- Idaho Fish and Game (2004)
- Idaho Department of Transportation (2014)
- United States Census (2017)
- Bureau of Economic Analysis (2015)
- Idaho Department of Labor (2017)
- Bonner County Geographic Information System Department (2017)

Following the above steps, content analyses was completed on the former HMP, chapters from the 2002, 2003, and 2013 Bonner County Comprehensive Plan, and the 2015 Bonner County Economic Report.

4.2 Geographic Setting

Bonner County is located in the Panhandle of Northern Idaho and bounded by the states of Montana and Washington, with Boundary County to the north and Kootenai County to the south. The county covers approximately 1.1 million acres, most of which is forested. Sixty percent of this area is

designated as public land. Dominant geographic features include the Selkirk and Cabinet Mountain Ranges, Priest Lake, and Lake Pend Oreille. The Selkirk Mountain Range separates the Priest Lake Basin on the west side of the county from the Purcell Trench. The Purcell Trench lies between the Selkirks and Cabinets and is dominated by Lake Pend Oreille, which is 46 miles in length and reaches depths of 1,100 feet. The Cabinet Mountain Range lies along the eastern boundary of Bonner County at the Montana state line. Selle Lowland, an extension of the Purcell Trench north of Sandpoint, is the most prominent valley in the county. Other valleys include the Clark Fork Valley in the northwestern part of the county and the Blanchard, Hoodoo, and Cocolalla Valleys in the southern part. The principal drainages in the area are the Clark Fork River and the Pend Oreille Rivers, both flowing east to west across the county. The Priest River flows north from the Pend Oreille River into Priest Lake.

Elevations in the county range from about 2,000 to 7,200 feet above sea level. The lowest elevation is found along the Pend Oreille River at the Washington-Idaho state line at 2,030 feet. The City of Sandpoint, located on a delta at the northern end of Lake Pend Oreille, is slightly higher in elevation at approximately 2,100 feet. The highest elevations are in the northern part of the county where mountain peaks of the Selkirk and Cabinet mountain ranges reach heights greater than 7,000 feet.

Sandpoint is the county seat of Bonner County. Incorporated towns include Clark Fork, Dover, East Hope, Hope, Kootenai, Oldtown, Ponderay, Priest River, and Sandpoint.

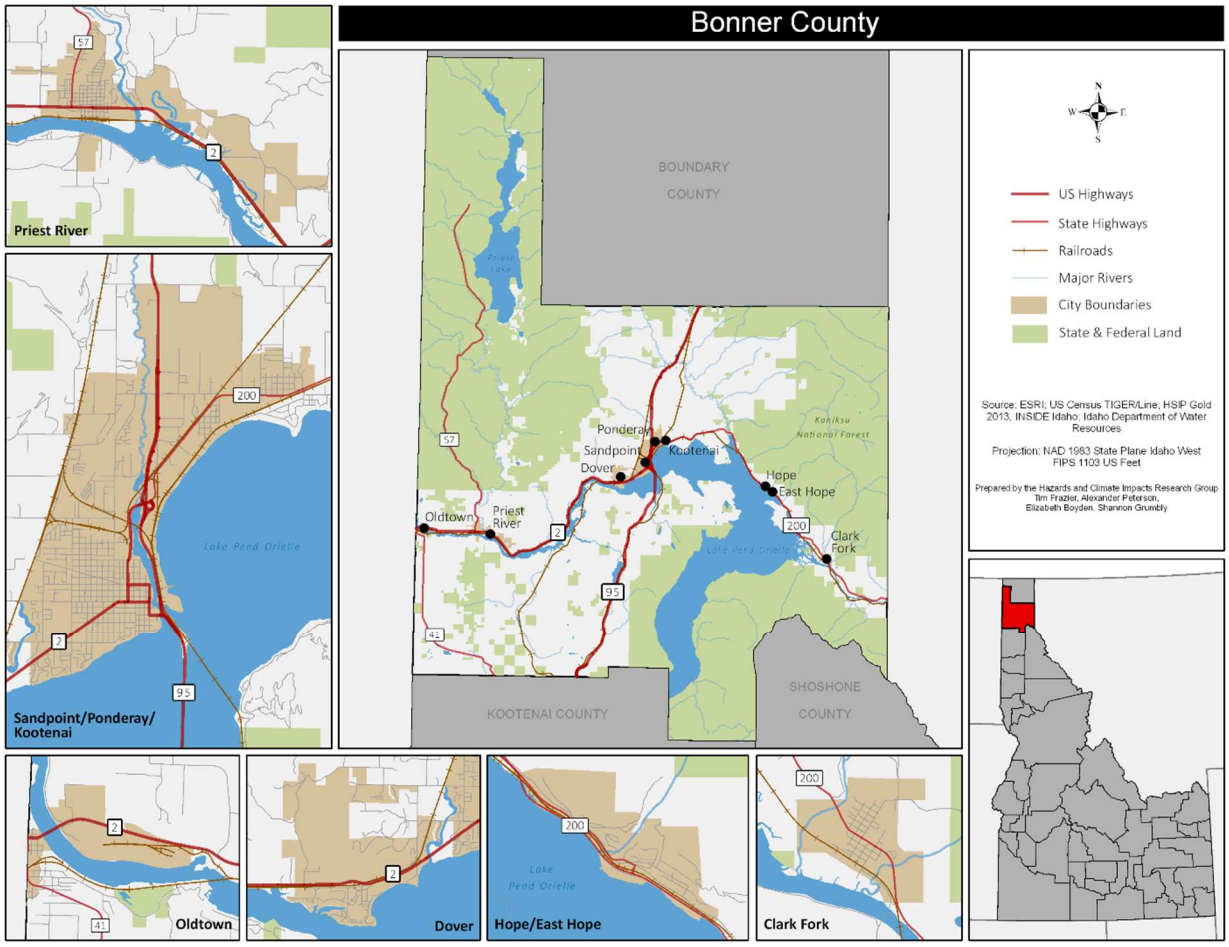


Figure 6. Topographic map

4.3 Climate & Weather

The climate in Bonner County is generally sub-humid characterized by warm, dry summers and cold, wet winters. Areas in the mountains have cooler summers and colder winters than areas in the valley. Annual precipitation in Bonner County ranges from 20 to 60 inches. The mountains in the northwest part of the county receive the highest amounts of precipitation. The southern part of the county receives the least amount of precipitation. Sandpoint's average annual precipitation is 33 inches. The driest months for Bonner County are normally July, August, and September and correspond to the height of the wildland fire season for Northern Idaho. Some rainfall normally occurs during these months, but extended dry periods can occur. Precipitation occurs year around in the mountains with deep snowpack accumulating during winter months. Chinook winds, which blow downslope and are warm and dry, often melt and evaporate snow. Precipitation during the summer months in the valleys occur mainly as rain showers with some thunderstorms.

Table 6. Monthly climatological normals (1981-2010)

Month	Total Precipitation Normal (inches)	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	4.09	34.6	22.0	28.3
February	2.90	39.4	22.9	31.1
March	3.13	47.9	28.4	38.1
April	2.25	57.1	34.1	45.6
May	2.77	66.3	41.0	53.6
June	2.72	72.9	46.8	59.9
July	1.46	81.9	50.2	66.1
August	1.11	81.9	48.6	65.3
September	1.54	72.0	41.4	56.7
October	2.51	57.4	33.4	45.4
November	4.79	42.3	28.0	35.1
December	4.64	33.6	21.5	27.5

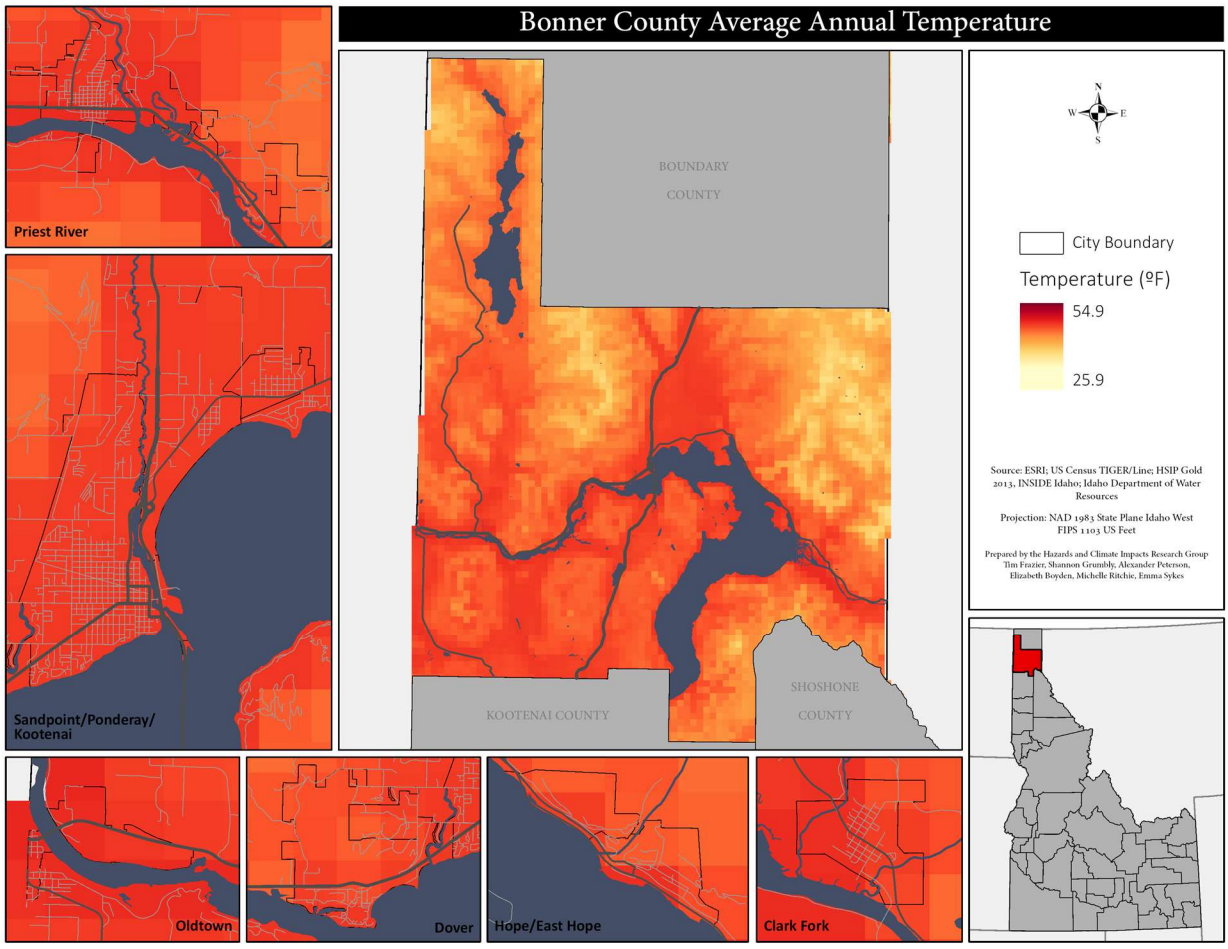


Figure 7. Average annual temperature

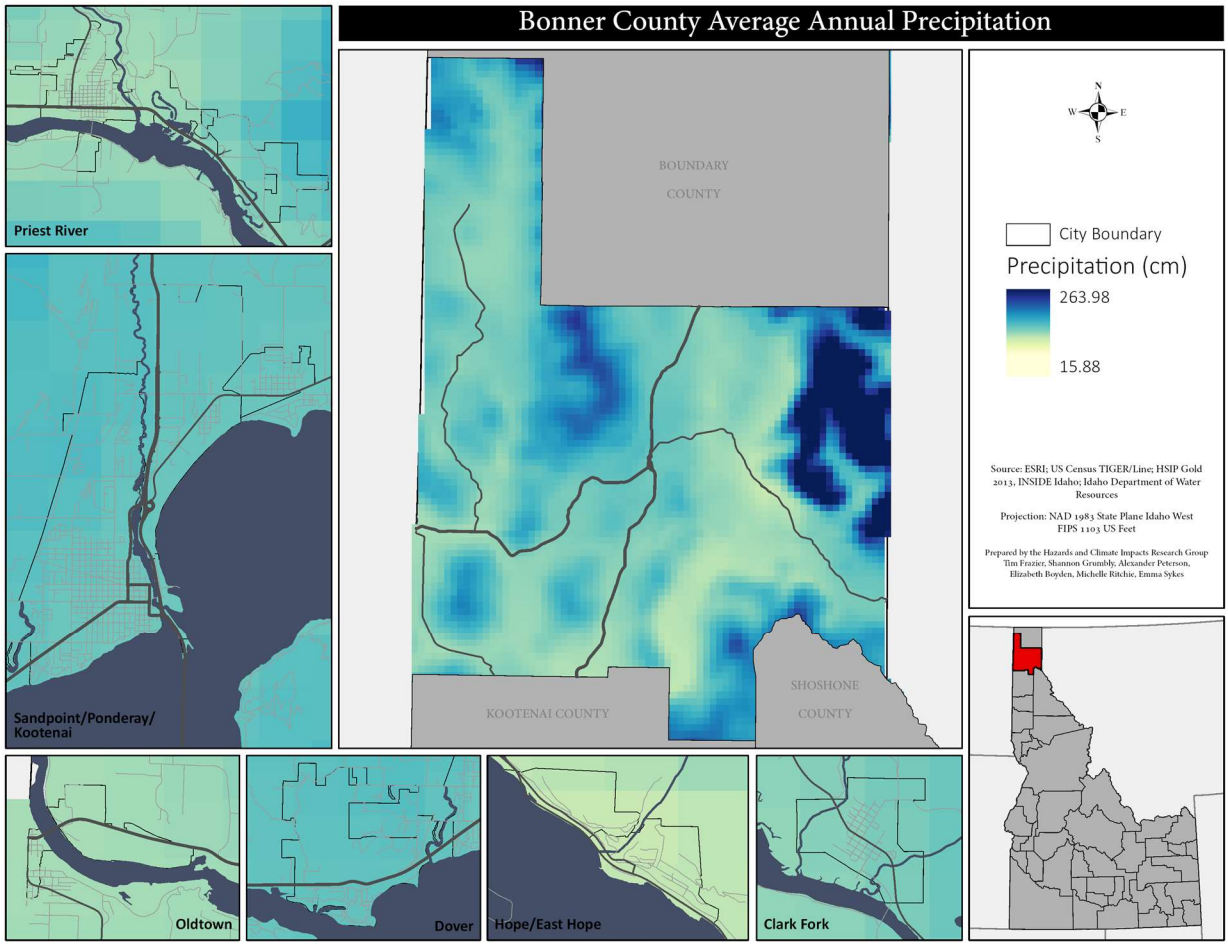


Figure 8. Average annual precipitation

4.4 Demographics

Population trends for Bonner County have been measured since its establishment in 1907. According to the 2010 U.S. Census, the county's total population was 40,877, with a 2015 estimate at 41,585. During its first 60 years, Bonner County's population grew three or four percent each decade until 1970 when the county experienced a population boom over the next 30 years. From 1970 to 2000, the population grew by 137 percent. Population growth then slowed from 2000 to 2010 at 11 percent, making it the 18th fastest growing county in the state of Idaho.

The urban-to-rural ratio increased over the past four decades, although Bonner County remains largely rural. The 2010 U.S. Census showed 72.4 percent of the population living in the rural areas and 27.6 percent living in urban areas. In comparison, the 1980 U.S. Census showed 81.5 percent of the population living in rural areas and 18.5 percent living in urban areas. Sandpoint is the only city within

the county that is considered to be an 'Urban Cluster,' which is defined for the 2010 U.S. Census as an "urban area that contains a population of at least 2,500 and less than 50,000." The city's population represents 18 percent of the total county population.

Bonner County encompasses approximately 1,738 square miles, with 39.6 percent privately owned. The remainder is owned by the state (15.2%), federal (44.4%) or local governments (0.8%). In 2010, there were 23.6 people per square mile compared to nine people per square mile in 1970. These numbers represent all lands, including government-owned lands, where few if any people reside. If restricted to private lands, there were 58.1 people per square mile in 2010.

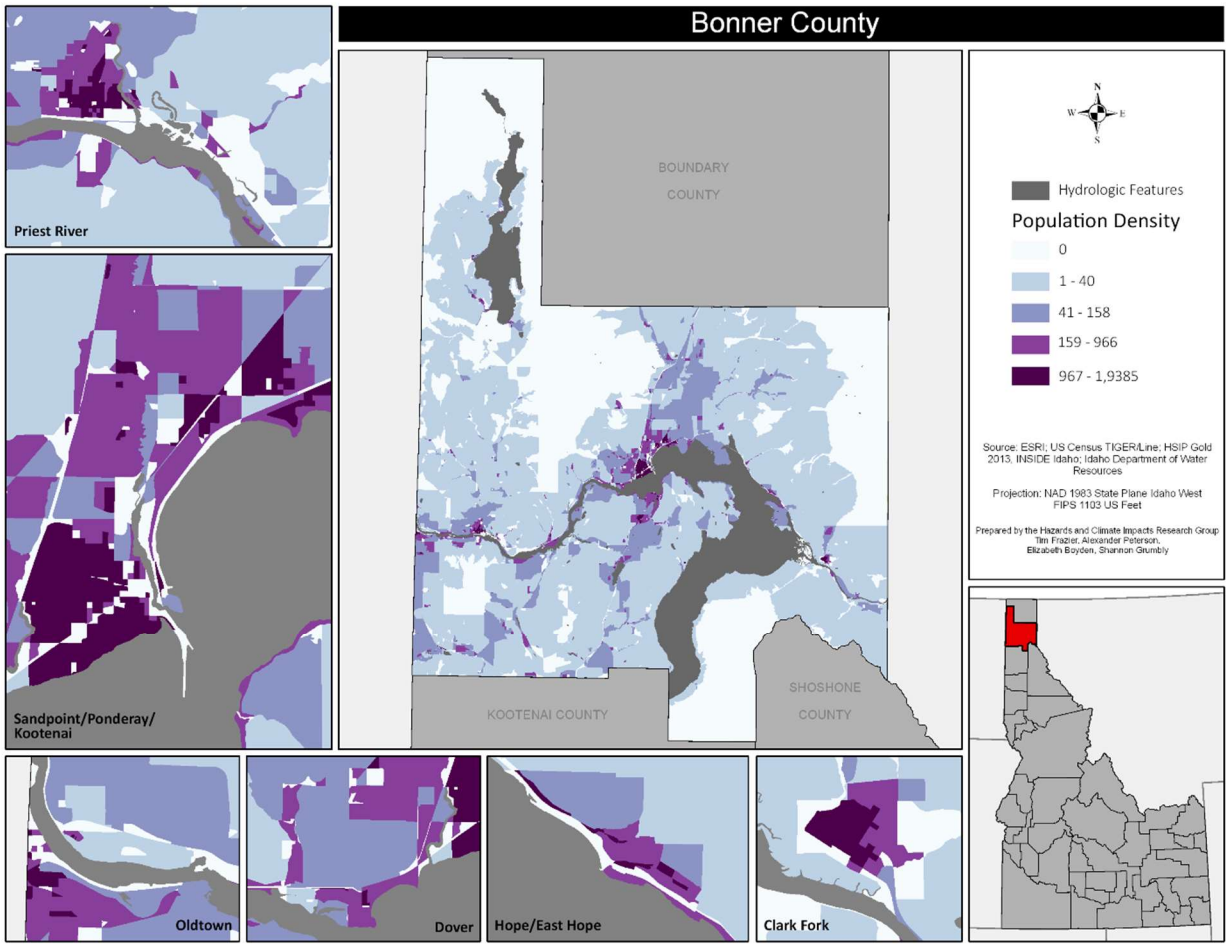


Figure 9. Population density

The race/ethnic composition of Bonner County remained relatively unchanged over the decades. The 2015 Census estimate showed 98 percent of the population as white, while in 1980 the population was 98.53 percent white. The female-to-male ratio in 2010 was .99-to one, with a 2014 estimate of one-to-one ratio. One of the most significant changes in Bonner County's population was the rising

number of people age 65 and older. According to the 2014 Census estimate, 21.4 percent of the county's population was 65 years or older, compared to 14.3 percent in 1990. Idaho's state percentage of people age 65 and older was 12.8 percent. Bonner County's median age was 45.8 years in 2010, the second highest statewide.

4.5 Economy

Bonner County maintains diverse economies with four important economic sectors – manufacturing, advanced industries, travel and tourism, and health care. These sectors give Bonner County an economic advantage when compared against other counties in the state.

Bonner County has a relatively well-established, diverse, and healthy manufacturing sector. In 2013, labor earnings from manufacturing employment represented 15 percent of all labor in the county, compared to 12 percent in 2001. The average wage within the manufacturing sector was $38,058, which was 20 percent above earnings for all other sectors. Industries that play a major part within the manufacturing sector are wood-products related manufacturing and sawmills, and wood preservation. These industries include some of the largest employers within the county.

"Advanced Industries" in Bonner County are large and growing fast, particularly for a rural community. As defined by the Brooking Institution, these industries are sectors that invest heavily in research and development (R&D) and rely in large part on workers with skills in science, technology, engineering, and math (STEM). According to this definition, there are 99 advanced industry businesses within Bonner County. These include, but are not limited to, architectural and engineering services, management and technical consulting services, and computer systems design and related services.

Bonner County (and Sandpoint in particular) are popular summer and winter tourism destinations. Tourism is one of the major drivers of the local economy and helps market Bonner County's quality of life. Accommodation and food services make up the largest sector of the travel and tourism industry in the county at roughly 15 percent of total private employment in 2012. The next largest employers are the retail-based businesses, including gasoline stations, clothing and accessory stores, and miscellaneous store retails. This sector makes up roughly four percent of total private employment. Average annual wages in industries that include travel and tourism are $15,352, less than half the average of annual earnings for all private sector jobs at $31,464. This low annual wage is attributable both to lower paying jobs and to a higher proportion of part-time or seasonal jobs in these sectors. The notable outlier is passenger transportation, which employs 23 people with average annual earnings of $81,875.

As a large, growing, and steady employer, the health care sector is one of Bonner County's economic strengths and is well-suited to serve its aging population and new retiree residents. In 2012, there were 141 health-care related businesses in the county, most of which employed fewer than ten

people. Employment within the health care sector grew by 12 percent between 2004 and 2013, and was relatively immune to job losses during the recession. Despite the size and growth of healthcare in Bonner County, wages are lower than the county average ($28,896 compared to $32,489 across all sectors) and remained unchanged over the last decade after accounting for inflation.

Businesses in Bonner County are primarily small firms who sell locally, with 90 percent employing fewer than ten people. There are also a number of large businesses, both local- and export-oriented, that employ more than 100 people. A handful of very large companies employ more than 500 people. Schweitzer Mountain is the county's largest employer, with more than 500 people employed.

Although Bonner County created hundreds of jobs since the mid-1980s, its unemployment rate continues to remain higher than the State of Idaho as a whole. According to the Idaho Department of Labor, the county's unemployment rate was 5.9 percent in 2017, compared to the state at 3.9 percent. These unemployment rates decreased from 2014 for both Bonner County (8.6%) and the State of Idaho (6.2%). Unemployment rates remained higher in Bonner County compared to the state due to the loss of high-paying lumber jobs, the high level of unemployment in the winter and early spring, and the tendency of population growth to exceed employment growth.

According to the U.S. Bureau of Economics, Bonner County had a per capita personal income (PCPI) of $33,786 in 2014. This PCPI ranked 25th in the State of Idaho and was eight percent less than the state's average ($36,734) and 27 percent lower than the national average ($46,049). The 2014 measure reflected an increase of 2.1 percent in PCPI from 2013. The 2013-2014 state change was 3.1 percent and the national change was 3.6 percent. In 2004, the PCPI of Bonner was $25,078 and ranked 23rd in the state. The 2004-2014 compound annual growth rate of PCPI was three percent. In comparison, the compound annual growth rate for the state was 2.5 percent and for the nation was three percent.

4.6 Transportation

4.6.1 Highways

Three Idaho State Highways and two U.S. Interstate Highways carry thousands of vehicles daily through the boundaries of Bonner County. These highways include United States Interstate 95 (US-95), United States Interstate 2 (US-2), State Highway 200 (SH-200), State Highway 57 (SH-57), and State Highway 41 (SH-41).

US-95 is a four-lane highway running north of Coeur d'Alene to Sandpoint and its junction with US-2. The approach to Sandpoint is a two-mile long bridge across Lake Pend Oreille. Groundbreaking took place in October 2008 for a bypass around Sandpoint's downtown business district. US-2 and US-95 run concurrent for 35 miles north of Sandpoint into Boundary County. In 2014, average daily traffic flow counts for US-95, taken approximately six miles south of Sandpoint, was 11,500 and counts taken

for US-95 in Sandpoint where US-2 and SH-200 intersect was 10,000 (Idaho Department of Transportation).

US-2 (also known as Albeni Highway or Dover Highway) is a state highway running through Bonner and Boundary counties. It extends 80 miles from the Washington state line, where it enters the county in Oldtown and runs east to the Montana state line near Moyie Springs. In 2014, average daily traffic flow counts for US-2, taken just east of Priest River, was 5000 and counts taken for US-2 on the Idaho/Washington border near Oldtown was 10,000 (Idaho Department of Transportation).

SH-200 (also known as the Pend Oreille Scenic Byway) is a two-lane highway extending from Ponderay eastward to the Montana state border. SH-200 starts at its western junction in Sandpoint, and heads eastward along the north shores of Lake Pend Oreille until it ends at US-95 at the Montana state border and becomes Montana Highway 200. The road passes through the towns of Ponderay, Kootenai, Hope, East Hope, and Clark Fork. In 2014, average daily traffic flow counts for SH-200, taken just northwest of Hope, was 2,800 (Idaho Department of Transportation).

SH-57 is a route from Priest River to Nordman and serves the community of Priest River. In 2014, average daily traffic flow counts for SH-57, taken just north of Priest River was 2,400 and counts taken for SH-57, taken at Nordman, was 950 (Idaho Department of Transportation).

SH-41 runs from Interstate 90 in Post Falls through the communities of Spirit Lake and Blanchard to US-2 on the Washington state line. The northernmost 0.41 miles of SH-41 runs along State Street, with the southbound lane in the town of Newport, Washington, and the northbound lane in Oldtown, Idaho. In 2014, average daily traffic flow counts for SH-41, taken just south of Oldtown, was 3,600 and counts taken for SH-41 just south of Spirit Lake was 3,200 (Idaho Department of Transportation).

4.6.2 Rail

There are four rail lines passing through Bonner County. These include Burlington Northern (BNSF), Spokane International (Union Pacific), Port of Pend Oreille (Pend Oreille Valley Authority) and Amtrak.

The Washington Division of the Burlington Northern-Santa Fe line (BNSF) extends 50 miles through Bonner County from Athol to Elmira and north to the county line. There are two junctions in Bonner County located in Sandpoint and Dover. In addition, BNSF operates the Montana Rail Link Railroad which handles freight between Kootenai, Idaho and Butte, Montana. This line enters the county on the west near Oldtown and travels east into Montana, running a total of 80 miles through the county. Both lines are used to ship lumber, petroleum potash, and other products. Approximately three to seven trains travel through the county each day.

The Spokane International (Union Pacific) line passes through Sandpoint. The railroad is a line between Spokane, Washington and a connection with the Canadian Pacific Railroad southwest of Cranbrook, British Columbia. The rail line runs through Bonner County for 66 miles, and is used to

ship lumber, potash, and petroleum. Information is not available on the number of Union Pacific trains that travel through the county each day.

The Port of Pend Oreille operates freight train service in Bonner County between Oldtown and Sandpoint. The Pend Oreille Valley Authority is based in Usk, Washington. The freight train travels over the existing BNSF lines located on the north side of the Pend Oreille River in the county. The Oldtown to Sandpoint route is approximately 30 miles with one daily freight train.

Amtrak's Empire Builder passenger train serves Sandpoint on a daily basis. Two trains travel daily between Chicago and Seattle/Portland, passing through Bonner County.

There are approximately 162 rail crossings in Bonner County. These gated and ungated crossings include private, public, grade separated, and at-grade crossings. According to the NTSB, more than 80 percent of public railroad crossings do not have lights and gates, and 60 percent of all railroad accidents occur at these unprotected crossings.

4.6.3 Airports

There are four major airports located in Bonner County. These include Sandpoint Airport, Priest River Municipal Airport, Priest Lake Airport, and Cavanaugh Bay Airport. There are also numerous landing fields and several smaller public airstrips to serve the outlying areas of the county. Additionally, there are three private heliports and one U.S. Forest Service-operated helipad three miles south of Nordman at the Priest Lake Airport.

The Sandpoint Airport is located on approximately 60 acres in northwest Sandpoint and was established in the 1940s. The asphalt runway is 5,500 feet long and 75-feet wide. The airport registers about 18,000 operations (take-offs and landings) annually, with approximately 40 percent of this air traffic business-related. Another 40 percent use the Sandpoint facility for tourism-related activities, while the remaining 20 percent is attributed to recreational flying or training. State statistics categorize 73 percent of the Sandpoint air traffic as general transient aviation, 24 percent as local general aviation, and the remaining three percent as air taxi service.

The Priest River Municipal Airport is located east of State Highway 57 and north of the City of Priest River, and was established in 1921. The airport's asphalt runway is 2,950-feet long and about 48-feet wide. State statistics show that airport traffic is 81 percent transient and 19 percent local/general aviation.

The Priest Lake Airport is located about three miles south of Nordman, on the west side of Priest Lake and west of State Highway 57. The airstrip is public and operated by the U.S. Forest Service. The 4,000-foot long by 175-foot wide grass landing strip is open on a seasonal basis. The landing strip receives about 23 operations per week and is 100 percent transient general aviation.

The Cavanaugh Bay Airport is located about three miles north of the Coolin townsite on the east side of Priest Lake. The airport is open to the public, but unattended with no winter maintenance. The

grass runway is 3,100-feet long by 120-feet wide. The airport averages 86 landings and take-offs per week and is 100 percent transient general aviation.

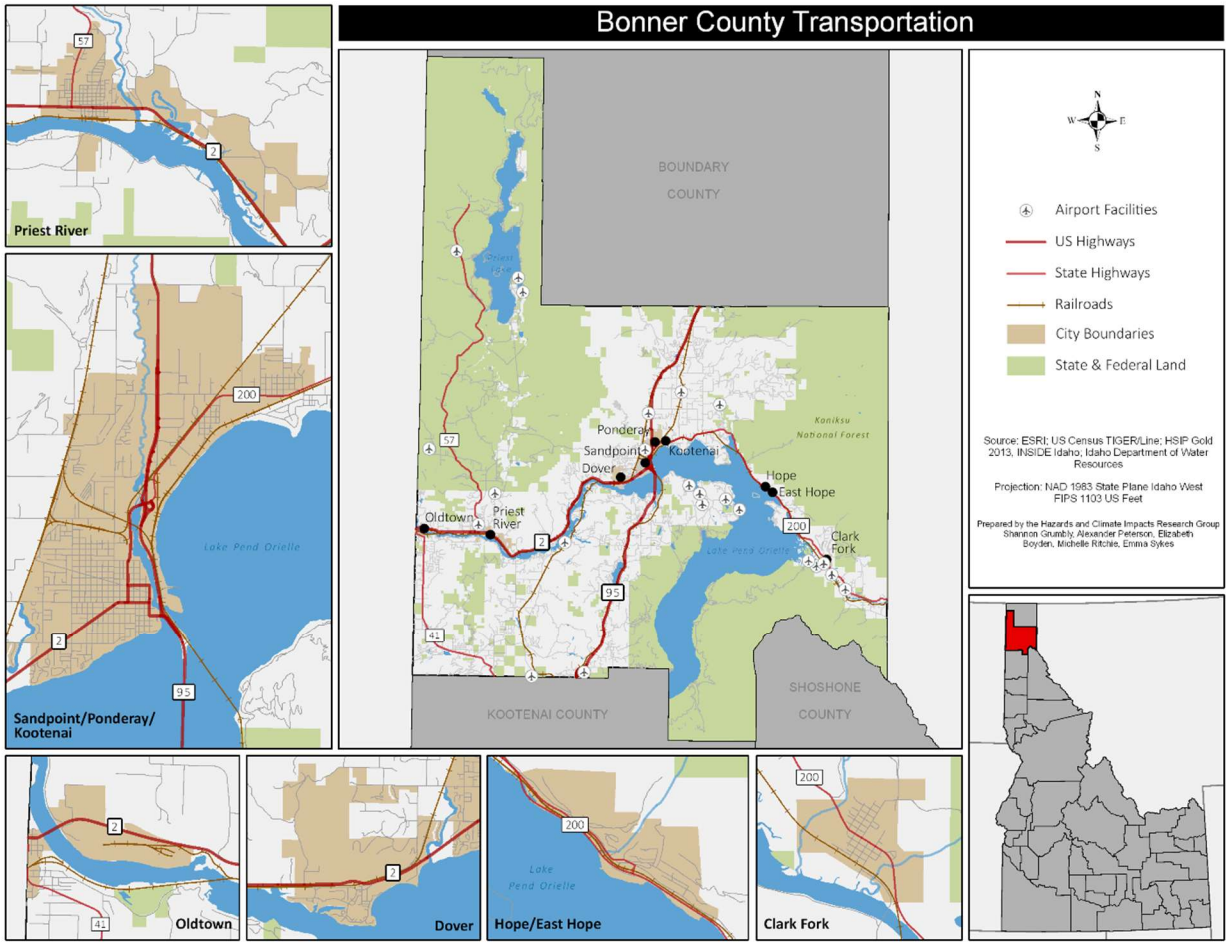


Figure 10. Transportation network map

4.7 Water Resources

4.7.1 Surface Water & Groundwater

About 9.5 percent, or 183 square miles, of Bonner County's total area is surface water – the most of any Idaho county. There are four main rivers in the county including Clark Fork River, Pend Oreille River, Pack River, and Priest River. These rivers are located within three watershed basins, including the Pend Oreille Basin, the Clark Fork Basin, and the Priest Lake and River Basin. A number of lakes in Bonner County also make up the 183 square miles of surface water. These include Lake Pend Oreille,

Priest Lake, Upper Priest Lake, East Side Lower Lake, West Side Lower Lake, Cocalalla Lake, Kelso Lake, Round Lake, Granite Lake, and Shepherd, Mirror, and Hoodoo Lakes. Lake Pend Oreille is the largest and deepest lake in Idaho, with the majority of the lake falling within the county boundary. Compared with the surface areas and maximum depths of natural fresh water lakes in the U.S., Lake Pend Oreille is the 21st largest and fifth deepest, covering approximately 90,000 acres and reaching depths of approximately 1,200 feet. Its maximum depth is exceeded only by Lake Superior, Lake Chelan, Lake Tahoe, and Crater Lake.

Bonner County lies within a portion of the Clark Fork-Pend Oreille Basin. The basin encompasses about 25,000 square miles in western Montana, northern Idaho, and northeastern Washington. The basin and its tributaries provide the source of waters entering and leaving Lake Pend Oreille. The Clark Fork River is the primary tributary that drains the Clark Fork-Pend Oreille Basin, with its headwaters near Butte, Montana. The river is fed by the Flathead, Bitterroot, St. Regis, and Blackfoot Rivers before flowing into Lake Pend Oreille. The Clark Fork River is an exceptionally long tributary that extends approximately 350 miles between Butte, Montana, and Lake Pend Oreille near Clark Fork, Idaho with an average annual river flow of 3,000 cubic feet per second (cfs).

The Pend Oreille River drains Lake Pend Oreille. Its basin lies mainly in Pend Oreille County, a sparsely settled rural region in northeast Washington. Much of the river basin also falls within the boundaries of the Kaniksu or Colville National Forests. The basin's topography consists of river bottom flatlands in a long and narrow trough between the Selkirk Mountains and Okanagan Highlands. The Pend Oreille River begins at the railroad bridge paralleling the "Long Bridge" near Sandpoint, Idaho, continuing to the City of Priest River, Idaho through the Albeni Falls Dam and into the State of Washington.

The Pack River is a northern tributary of Lake Pend Oreille, spanning nearly 40 miles and providing a range of uses from domestic and agricultural water supplies to cold water biota, salmonid spawning, and primary and secondary contact recreation. The Pack River is the second largest tributary to the lake, and is fed by a number of significant tributary watersheds. The watershed encompasses 101,207 acres of Bonner and Boundary counties in north central Idaho, and drains in to the northern tip of Lake Pend Oreille between the communities of Hope and Sandpoint.

Priest River drains into the Pend Oreille River near the City of Priest River. The total distance of the Priest River system from the international boundary to the Pend Oreille River is approximately 88 miles. Upper Priest River originates within the Nelson Mountain Range of British Columbia, and crosses into Idaho approximately six miles from its origin. It flows for a distance of 18.5 miles from the international boundary to Upper Priest Lake north of the Thoroughfare, which is a 2.7-mile-long channel with little to no gradient connecting Upper Priest Lake and Priest Lake. From the Priest Lake outlet, the Priest River flows for a distance of 45.5 miles to its confluence with the Pend Oreille River.

Underground water sources in Bonner County consist of five aquifers including the Pend Oreille River (Southside) Aquifer, the Newport Aquifer, Rathdrum Prairie Aquifer, the Priest River Aquifer, and the Kootenai Valley Aquifer.

The Southside Aquifer is one of the larger aquifers serving Bonner County and is located within the larger Pend Orielle River Aquifer. The Southside Aquifer is a little known glacial aquifer located in Sagle, Idaho. The general flow of water is to the north along Highway 95 and discharges into the Pend Oreille River in the Sagle Slough, Murphy Slough, and an unnamed slough on the Pend Oreille River west of Round Lake. The Southside Aquifer covers approximately 46 square miles and extends as far north as the south boundary of the Lake Pend Oreille following Highway 95 to four-miles south of Careywood, Idaho. The Southside Aquifer also extends east to the Montana-Idaho border following Cocolalla Creek and west following Westmond Creek, Mirror Lake, and Shepherd Lake. The aquifer varies from one to eight miles wide and is 17 miles long.

The Newport Aquifer serves Oldtown, Idaho, and Newport, Washington, encompassing 22 square miles within the boundaries of the Pend Orielle River Aquifer. Most of the drinking water comes from Idaho Springs located southeast of Oldtown. The Idaho Springs source consists of three springs located one mile southeast of Oldtown, and is sited on a plateau 150 feet above Oldtown and Newport. The springs are located on a 40-acre site owned by the West Bonner Water District No. 1. The estimated combined production of all three springs is 450 gallons per minute.

The Rathdrum Prairie Aquifer spans approximately 20 square miles in Bonner County, with a vast majority of the aquifer underlying Kootenai County, Idaho, and Stevens and Spokane Counties in Washington. The aquifer was created by periodic glacial outburst floods, which left well-washed sands and gravels. The composition of the aquifer is mainly very coarse, and all materials are very porous and permeable making it sensitive to contamination.

The Priest River Aquifer lies almost completely within the boundaries of Bonner County. The Priest River Aquifer is about 15,253 square acres (23.83 square miles), stretching from the Upper Priest Lake area to the Pend Oreille River. The aquifer is composed mainly of sands and gravels.

The Kootenai Valley Aquifer is located in Boundary and Bonner counties. The portion found in north-central Bonner County in the Elmira area represents about 208 acres. Detailed information is not yet available for the Kootenai Valley Aquifer.

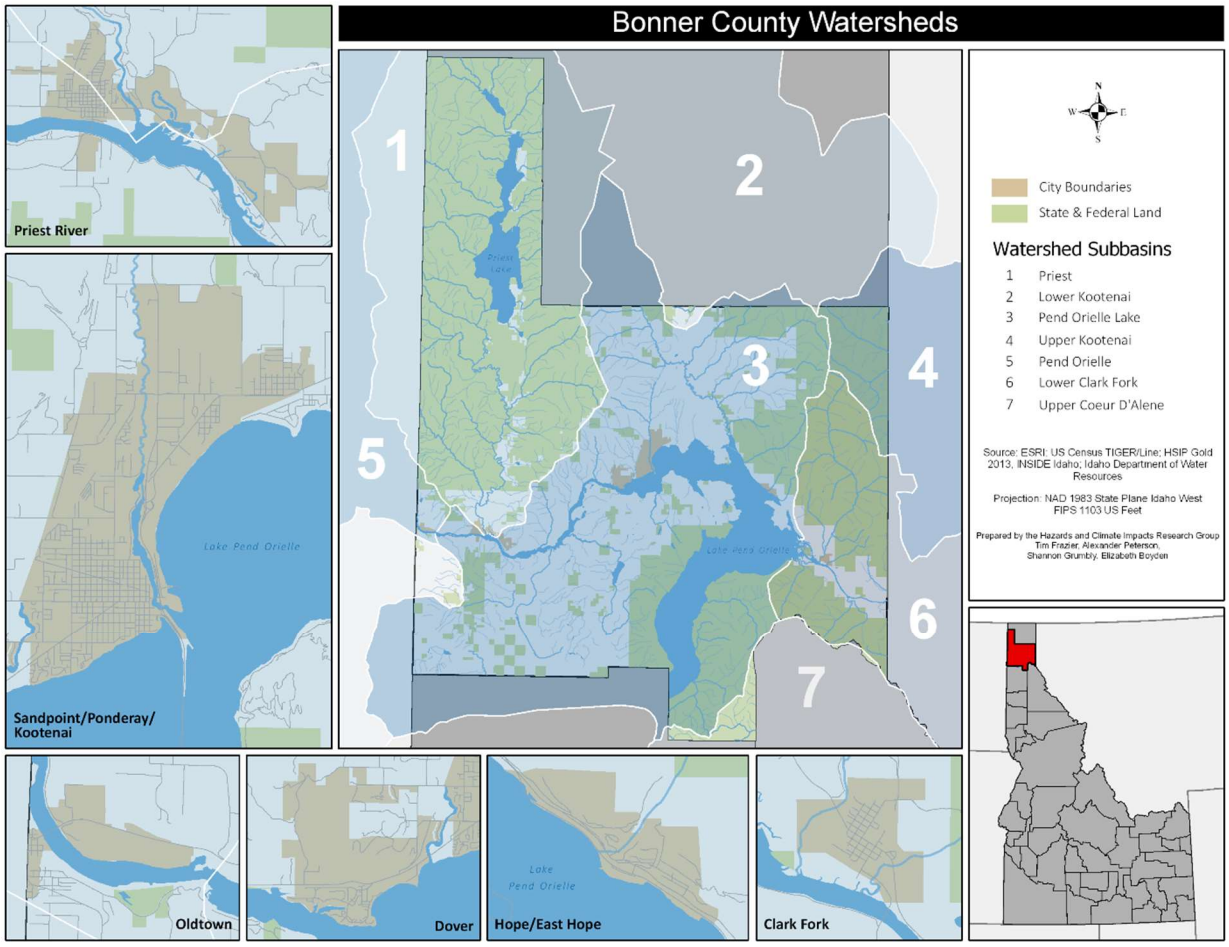


Figure 11. Watershed subbasins

4.7.2 Water Use & Dams

According to Bonner County's Comprehensive Plan, there are three municipal watersheds in the county. These include the Sandpoint, East Hope, and City of Hope watersheds.

The Sandpoint watershed in unincorporated Bonner County consists of approximately 8,000 acres lying northwest of the city in Townships 57 and 58 North, Rangers 2 and 3 West, of the Boise Meridian, Bonner County, Idaho. The watershed area is generally defined by the hydrographic ridge line of the Little Sand Creek drainage and encompasses lands located south of the Schweitzer Mountain Resort recreation area. The city's purest, least costly water is obtained from the 5.3-mile Little Sand Creek that courses through the watershed. Little Sand Creek's combined tributaries within the watershed equal 9.1 miles.

Sandpoint's intake and treatment facility for the Sand Creek water supply is located on Little Creek on city-owned land. The site is about two miles north of Sandpoint, adjacent to the Schweitzer Road and approximately one-third mile upstream from the valley floor. This has been the main source of municipal water since 1903. A 1.3 million-gallon storage dam/intake structure is located approximately one-half mile upstream from the treatment facility. The city also maintains an intake and treatment facility on leased land on Lake Pend Oreille as an alternative water supply.

The Little Sand Creek watershed area is not only the source of Sandpoint's principal water supply, but it also contains valuable timber, wildlife resources, open space, and recreational opportunities.

A number of natural disasters have impacted the watershed over the years. The most significant of those events included a large wildfire in the late 1950s and a "rain on snow event" in April of 1990 that washed out a significant portion of the Schweitzer Mountain Road and carried debris into the city water system. Other potential threats to the watershed are fire, erosion from road or other development, disease, and insects.

The City of East Hope obtains its water supply from Strong Creek watershed, which serves approximately 250 people. The entire basin upstream from the city's water diversion structure is within the U.S. Forest Service boundary, while ownership downstream is private. A 150,000-gallon storage tank is located north of the city on private property and it serves approximately 160 hook-ups. Minimal disturbance upstream from the diversion has occurred; however, recent logging has occurred downstream from the diversion structure and portions of the riparian vegetation has been removed. Watershed conditions on National Forest Lands above the East Hope water diversion are in good shape and have not been significantly impacted by timber harvest or other human disturbance. Other potential threats to the Strong Creek watershed include landslides due to steep slopes and fire.

The City of Hope obtains its water supply from natural springs. As of 2002, these springs were being tested by the Idaho Department of Environmental Quality to determine whether the springs are a result of surface water or groundwater sources.

Two major water impoundment structures in Bonner County exist on Lake Pend Oreille at the Albeni Falls Dam and Cabinet Gorge Dam. These dams are used mainly to generate hydroelectric power. Outlet Dam, located on Priest Lake, controls for recreation in the summer and releases water for downstream power consumption. The dam is operated by Avista Corp. under an agreement with the State of Idaho, the owner of the dam.

Albeni Falls Dam is located on the Pend Oreille River approximately six miles west of Priest River. The dam, a 65-feet-high concrete structure, was completed in 1952 at a cost of $34 million. It is owned by the U.S. Army Corps of Engineers and operated for hydroelectric power (42,600 kilowatts). The dam also functions to reduce the maximum lake level for flood control. The reservoir has a storage capacity of 1.56 million acre feet of water and provides recreational areas for visitors.

Cabinet Gorge Dam is located on the Clark Fork River, ¼-mile west of the Idaho-Montana state line and 20 miles downstream of the larger Noxon Rapids Dam. Operated by Avista Corp. for hydroelectric

power generation (20,000 kilowatts), Cabinet Gorge lies 7.5 miles upstream of the town of Clark Fork and 11 miles upstream of Lake Pend Oreille. Cabinet Gorge impounds a 20- mile long reservoir, containing approximately 105,000 acre-feet of storage at full pool elevation (2,175 feet). The dam, a 395-foot concrete arch between two concrete abutments, is 208 feet tall at its highest point. The spillway is controlled by eight vertical lift spillgates, each 40 feet wide by 35 feet high.

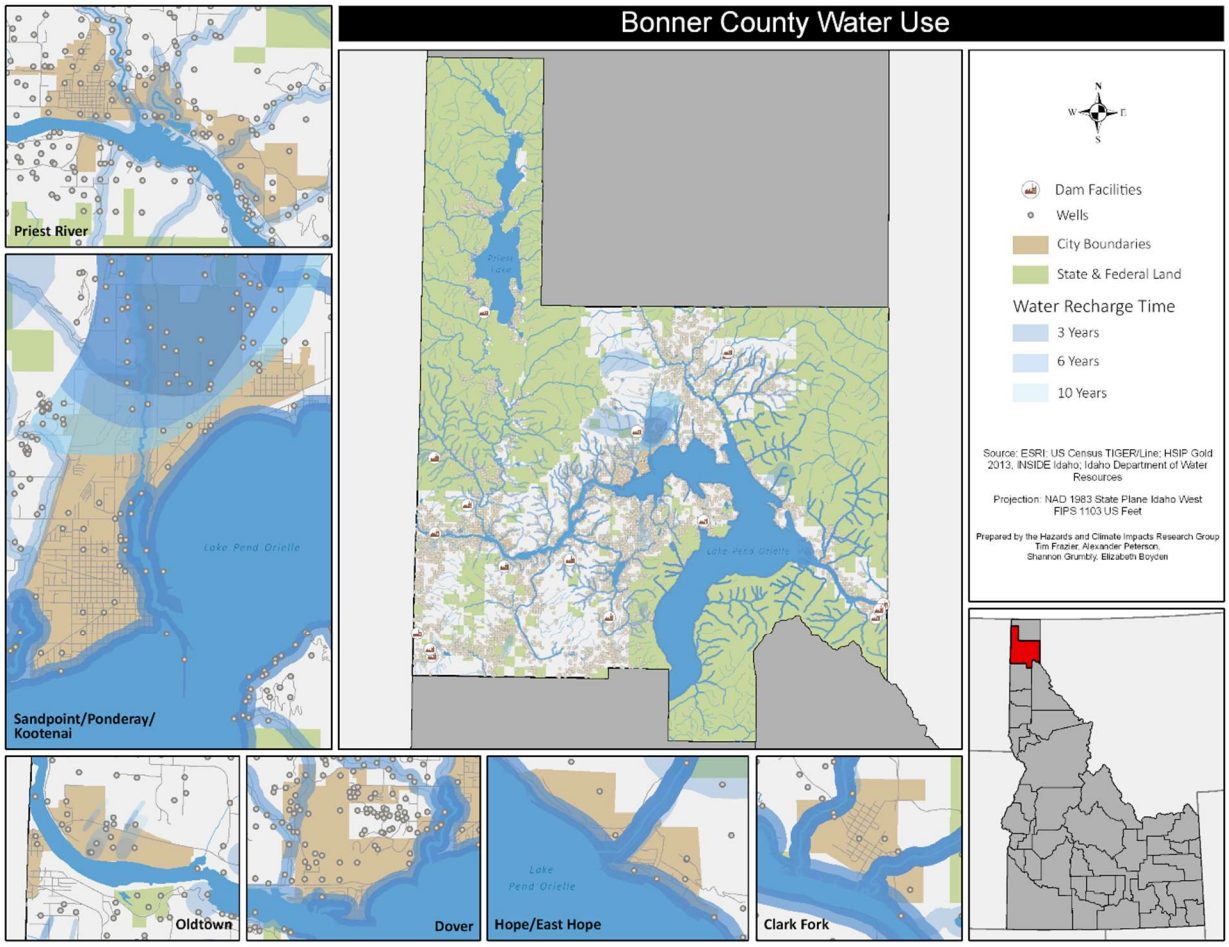


Figure 12. Surface water features and dam facilities

4.8 Soils

Only about 65,565 acres, or about six percent of the soils studied in Bonner County meet the requirements for prime farmland (Bonner County Comprehensive Plan). This acreage is scattered throughout Bonner County, but most of it is in the southwestern and north-central portions of the County. About one-third of this prime farmland is used for crops and pasture, while the remaining

area are woodland. The main crops grown on this land are spring wheat, oats, barley, and grass-legume hay. A total of 12 soil types are listed as farmland of statewide importance. There are 70,285 acres of land in Bonner County which has a soil type considered to be of agricultural importance, though not necessarily listed as "prime" by the soil survey.

4.9 Critical Wildlife Habitat

The varied vegetation and topography of Bonner County offer diverse habitat for a wide variety of wildlife. The plentiful waters of the county's rivers, lakes, and streams are wintering and breeding grounds for hundreds of bald eagles and ospreys and thousands of waterfowl. Forested foothills and mountains and the broad grass valleys provide habitat for moose, bear, elk, and deer and countless species of song birds, fur-bearing mammals, predators, and non-game animals. Wildlife is an important resource to Bonner County in terms of aesthetic values, economics, and recreation.

However, fish and wildlife habitats in the county are being lost to development at an accelerating pace. Many of the sites that are of most value to fish and wildlife are also highly attractive to rural developers. Some wildlife species (such as crows, ravens, starlings, and cowbirds) may benefit by rural residential development, yet many highly-valued fish and wildlife species are sensitive to disturbance and habitat alteration associated with rural developments. Some species (such as elk and bald eagles) are highly sensitive to disturbance, while other species (such as white-tailed deer) display considerable adaptability. To further complicate anticipated responses by wildlife, research has shown that deer, elk, many species of waterfowl, nesting and foraging bald eagles, and nesting great blue herons can habituate to certain human activities. In contrast to habituation, wildlife may become more sensitive with repeated disturbance, ultimately resulting in displacement from preferred habitat.

There are approximately 20 categories of critical habitat, where if developed, would likely reduce the capacity of the areas to support the impacted species. Critical habitats include, but are not limited to, white-tailed deer and mule deer winter range, moose habitat, great blue heron rookeries, harlequin duck breeding streams, and black tern nesting areas. Other critical wildlife habitats include elk winter range and calving habitat; waterfowl production, migration, and wintering areas; bald eagle nesting and foraging areas; grizzly bears spring and fall range; western grebe nesting area, and goshawk nesting and flammulated owl nesting habitat.

White-tailed deer and mule deer occupy most areas below 3,000 feet elevation during winter, as low-elevation areas generally experience less snow accumulations and milder temperatures than high-elevation areas. They also select closed forest stands that are southwest or west in aspect in order to optimize security and thermal cover at the expense of forest availability. Impacts of rural development on white-tailed deer and mule deer are magnified as development usually occurs in the small percentage (as little as five percent) of the land base that constitutes winter range. Development impacts include removal of forest canopy and hiding cover, and increased human-related

disturbances such as free-ranging dogs, snowmobiling, and cross-country skiing. In addition to direct mortality, harassment of white-tailed deer during the winter stress period may predispose animals to other forms of mortality such as starvation. Habitat losses associated with rural development tend to be permanent and consequently, impacts compound as development proceeds.

Moose habitat is widely dispersed in Bonner County. They generally prefer second-growth forests, openings, lakes, and wetlands or other aquatic sites. Moose prefer shrubby, mixed coniferous and deciduous forests with nearby lakes, marshes, and bogs. In certain parts of the Rockies, moose migrate to higher elevations during the winter months. Rural development may impact this critical habitat through the removal of hiding cover or through human-caused disturbance and direct calf mortality due to free ranging dogs.

The great blue heron is one of the largest American birds, measuring about four feet in height, with a six-foot wing span. The birds frequent shallow ponds, marshes, and the shores of lakes and rivers. Anywhere from a few to 50 or more birds may nest together in a colony. Great blue herons are very sensitive to human disturbance, but particularly so at rookery sites. Blue heron flushing distance at rookeries decrease as the nesting season progresses, and they habituate to fishermen boating past heronries, as opposed to unexpected disturbances such as people walking below the nest trees or motorcycles passing the heronry. There are four heronries around Lake Pend Oreille; however, one was not occupied in 1995. A fourth Bonner County heronry was located on Priest River near White Tail Butte.

Harlequin ducks have similar habitat requirements to the bull trout, which includes extensive cover in the form of pools, streamside vegetation and log jams, and they are very sensitive to human disturbance. They are ranked as a Game Species by Idaho Fish and Game (IDFG) and a Type 4 designation by the Bureau of Land Management (BLM), which indicates that this species is generally rare in Idaho with the majority of their breeding range outside the state. Rural development may impact the harlequin duck habitat through the removal of cedar/hemlock forest along breeding streams, water quality degradation, and direct human-caused disturbance.

Black tern nesting colonies are rare in northern Idaho and are ranked as a Protected Game Species by IDFG and a Type 3 designation by the BLM, which indicates that this species is experiencing significant decline in population or habitat and are in danger of regional or local extinctions in Idaho in the foreseeable future if factors contributing to their decline continues. Wetlands are known to support black terns and they nest on a floating mat of vegetation, in cattails, or other emergent vegetation. However, because potential nesting sites do not receive boat traffic, the only major threat would be loss of wetland habitat through drainage or wetland filling.

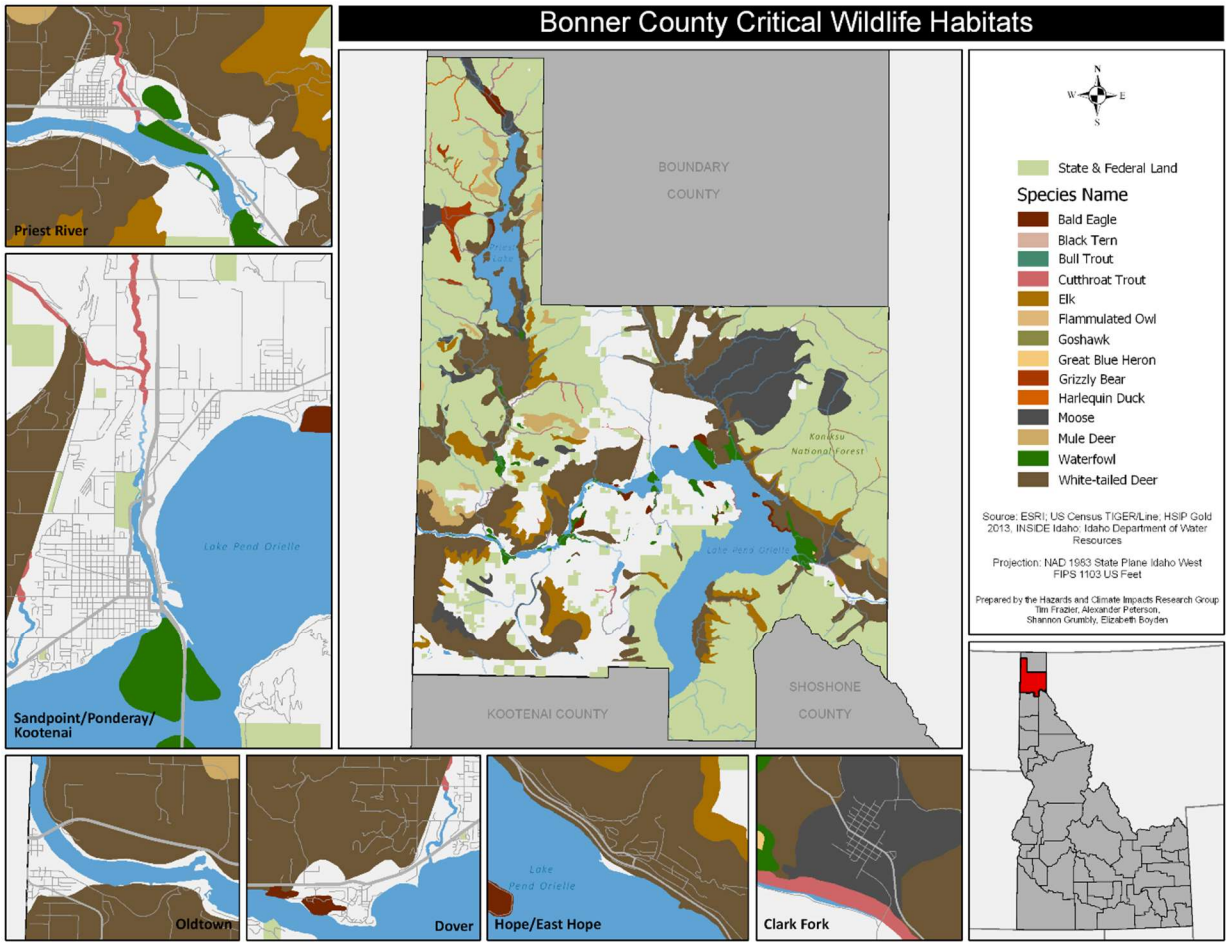


Figure 13. Critical wildlife habitat

4.10 Land Cover

Bonner County contains 15 classified land cover types according to the 2006 National Land Cover Database. Table 7 provides each land cover type along with a description, while Figure 14 shows land cover across the county.

Table 7. Land cover types

Land Cover Type	Description
Open Water	Areas of open water, generally with less than 25% cover of vegetation or soil.

Developed, Open Space	Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
Developed, Low Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
Developed, High Intensity	Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
Barren Land (Rock/Sand/Clay)	Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Deciduous Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
Mixed Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Grassland/Herbaceous	Areas dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
Woody Wetlands	Areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

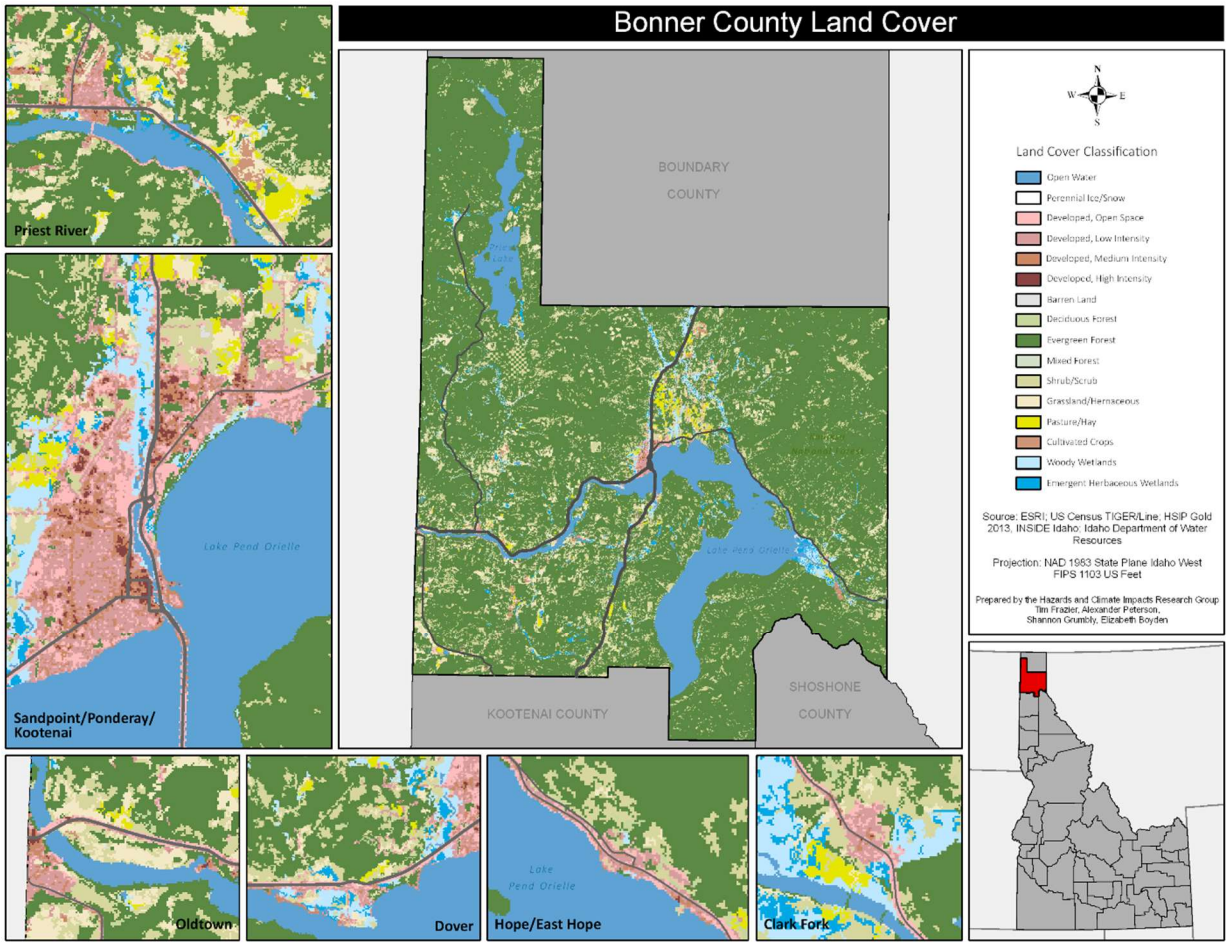


Figure 14. Land cover types map

4.11 Land Ownership & Management

Figure 15 shows the land ownership and management within Bonner County. The majority of the land within Bonner County is held in large, consolidated parcels managed either by the state or federal government, with land also owned by the county, municipalities, and private entities. About 40 percent of the county's land is privately owned and managed, with about 44 percent held by the federal government, 15 percent held by the state, and the remainder held by the municipalities.

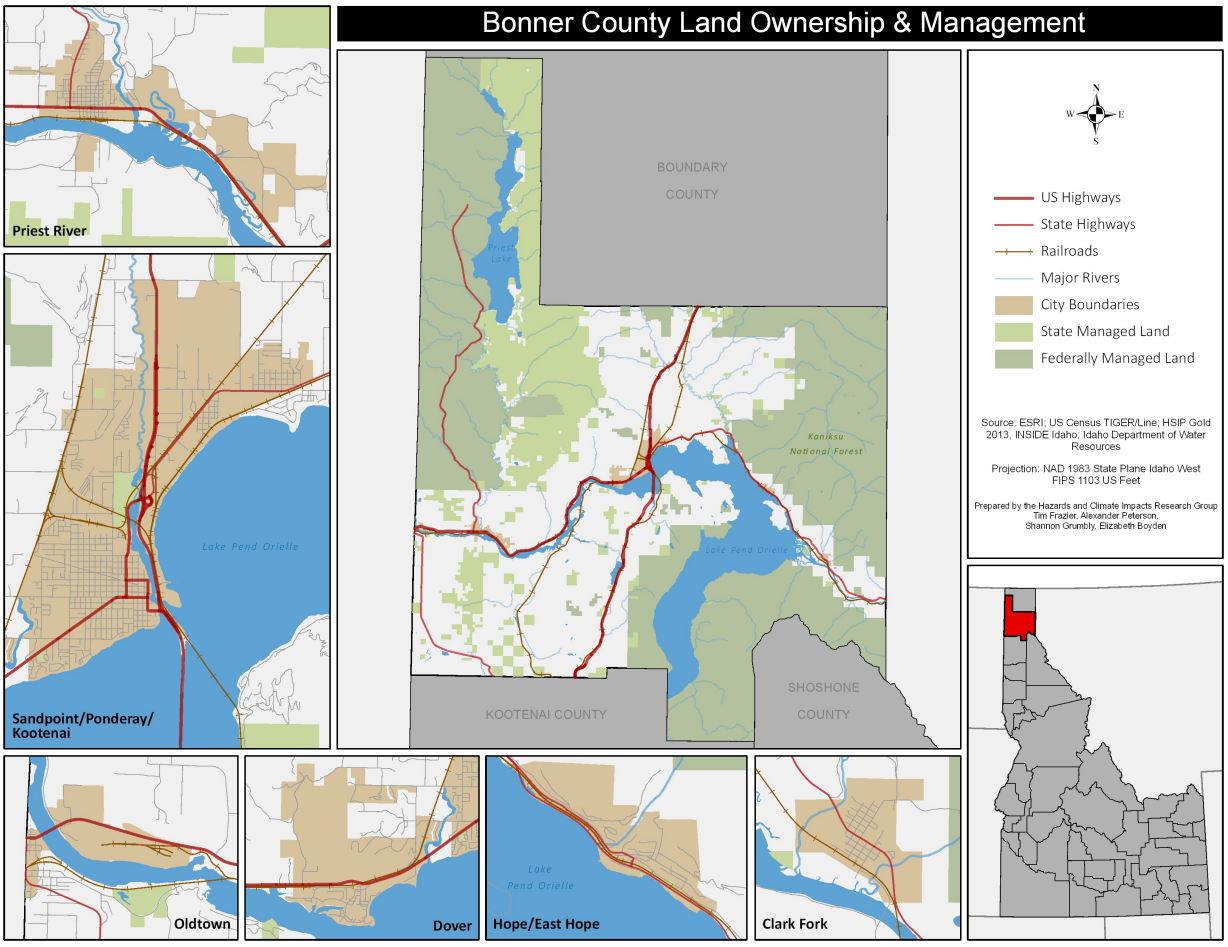


Figure 15. Land ownership and management

V. RISK ASSESSMENT

5.1 Overview

Risk assessments are key in aiding mitigation. A risk assessment identifies and characterizes hazards and potential socioeconomic impacts to the county and its citizens should a disaster occur. By undertaking a comprehensive risk assessment, the emergency manager and decision makers are able to compare, evaluate, and prioritize mitigation actions in the county and its communities in order to most effectively and efficiently reduce loss of life and property. The risk assessment also provides for more effective land use through zoning and planning, ultimately allowing for resilient growth in Bonner County.

Risk is a statement of probability that a hazard will cause a certain number of casualties and economic losses. The general method of the risk assessment is as follows:

- Assess the hazard (including the location, extent, magnitude, and frequency of hazard occurrence both in the past and the probability of future occurrence).
- Assess the number of individuals and property exposed to the hazard.
- Assess critical and essential facilities exposed to the hazard.
- Assess the socioeconomic vulnerability of the community to the hazard.
- Assess land use and future development in the county with regards to the hazard extent.
- Assess potential climate change impacts on the hazard.

The 2017 update significantly reworked the risk assessment in the former plan, with focus on ease of use, consistency, and flow. Changes included restructuring the risk assessment and hazard profiles, incorporating new and additional hazard occurrence data, incorporating more advanced modeling, and analyzing potential climate change impacts.

5.1.1 FEMA Requirements

The 2017 plan update developed the risk assessment consistent with the process and requirements detailed by FEMA. This section satisfies the following FEMA requirements:

- FEMA 44 CFR §201.6(c)(2)(i) – [The risk assessment shall include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
- FEMA 44 CFR §201.6(c)(ii) – [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

- (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
- (B) An estimate of the potential dollar losses to vulnerable structures identified in … this section and a description of the methodology used to prepare the estimate.
- (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.]

- FEMA 44 CFR §201.6(c)(iii) – For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

5.2 Hazard Identification & Profiling

The 2009 plan iteration identified hazards through discussions with the former steering committee, past hazard events and declared disasters, interviews with local experts, and public outreach. The 2017 plan iteration carried forward all considered hazards from the 2009 plan iteration, incorporated additional hazards that pose a risk to the county, and restructured the hazard profiles. Table 8 details the hazards profiled in the 2017 plan update as well as the former plan. For those hazards that were not a concern for the county hazard profiles have been moved to Appendix J for future consideration.

Table 8. Hazard profile inclusion and comparison

Hazard	2009 Profile	2017 Profile
Avalanche	Yes	Yes
Civil Disturbance/Terrorism	Yes	Yes
Communicable Disease	Yes	Appendix
Cyber Disturbance	-	Appendix
Drought	Yes	Yes
Earthquake	Yes	Yes
Flood	Yes	Yes
Food Shortage	-	Yes
Hazardous Material	Yes	Yes
Impoundment Structure Failure	Yes	Yes
Landslide	Yes	Yes
Severe Weather	Yes	Yes
Transportation Accident & Incident	Yes	Yes
Utility Outage	Yes	Yes
Volcanic Eruption	Yes	Appendix

Wildfire	Yes	Yes

Note that certain hazards individually profiled in the former plan were condensed in the updated plan. Transportation Accidents & Incidents incorporated aviation accidents, ground transportation accidents, and railroad accidents. Severe Weather was restructured to include severe thunderstorms, wind, and hail, tornadoes, and winter storms.

The method to profile each hazard varies, though a general framework was employed to standardize the profiles. Each hazard profile contains a detailed description of the hazard, including the geophysical, biophysical, or human causes, different types of the hazard, and potential impacts. Where applicable, previous occurrences are listed for the period of record. Narratives from local media provide context to some of these events. Likewise, probabilistic modeling was incorporated where applicable. Models employed in the risk assessment vary between the hazards, as no single model captures future hazard probability or impact. Similarly, population, improved structure values, and critical infrastructure exposure is detailed, followed by a socioeconomic vulnerability assessment. Land use and future development is then considered, detailing what land use types fall within hazard-prone areas and where development is located in relation to the hazard. Finally, each hazard is scored according to its risk.

5.3 Socioeconomic Vulnerability Assessment

Risk assessments often focus solely on the physical extent of hazards and the relative location of populations. Although exposure is highly influential in the impacts of hazards, additional factors amplify or dampen an individual's or community's susceptibility to loss. Susceptibility to loss is termed 'vulnerability', and understanding the many socioeconomic factors that influence vulnerability can help allocate resources and efforts to protect those most in harm's way. For example, elderly populations are often more vulnerable due to challenged mobility, which can increase evacuation time and require special care. Female populations are more vulnerable than male populations due to family responsibilities and lower average incomes.

This risk assessment employed the Spatially Explicit Resilience-Vulnerability (SERV) model (Frazier et al. 2013). The SERV model is an advanced socioeconomic vulnerability model designed to overcome the limitations of traditional vulnerability models. Traditional models lack the sophistication to produce sub-county results, account for the local characteristics of communities, or correctly apply spatial analyses and statistics; in contrast, the SERV model measures socioeconomic vulnerability at the sub-county level and takes into account different statistical considerations and methods. The SERV model analyzes multiple indicators (such as age, race and ethnicity, gender, and income) and their positive or negative effects on the population to determine census block-level sensitivity and adaptive

capacity (Table 9). Adaptive capacity is the ability of an individual or community to cope and adapt to a hazard. For example, people can use their savings to overcome property damage resulting from a flood. Sensitivity describes how an individual or community is affected by the hazard. An example of sensitivity is the lack of savings to overcome property damage resulting from a flood. The SERV model also takes into account exposure, or the proximity of an individual or community to a hazard. Finally, a measure of socioeconomic vulnerability is derived. This measure is hazard-specific, given differing vulnerability across the county. Note that census blocks with no population are not considered in the SERV model.

Table 9. Socioeconomic indicators used in the SERV model

Adaptive Capacity		Sensitivity	
Indicator	**Directionality**	**Indicator**	**Directionality**
No High School Diploma	-	Pop Female	+
College	+	Pop Below Poverty	+
Age Dependent	-	Race White	-
Owner Occupied Households	+	Race Minority	+
Female Head of Households	-	Disability	+
Not Single Sector Employment	+	Age Dependent	+
Sales Volume	+	Renter Occupied Households	+
Employee Number	+	Female Head of Households	+
Pop Below Poverty	-	Critical Facilities	-
Health Insurance	+	Essential Facilities	-
Labor Force	+	Dependent Population Locations	+
Female Employees	+	Public Venues	+
Critical Facilities	+	Overnight Venues	+
Essential Facilities	+	Sales Volume	-
		Employee Number	-

Adaptive capacity is relatively static within Bonner County (Figure 16). A number of census blocks with above and well above average adaptive capacity are found near Priest Lake, with additional highly adaptive blocks found proximate to Priest River, Oldtown, Dover, and Clark Fork. Below and well below average census blocks are generally found in the more rural areas of the county. In comparison, sensitivity within Bonner County is more spatially variable, with notable concentrations of census blocks exhibiting above and well above average sensitivity in the Sandpoint (Figure 17), Ponderay, and

Kootenai area, near Oldtown, Hope and East Hope, and in and around Clark Fork. Additional concentrations of highly sensitive areas are proximate to Lake Pend Orielle, as well as rural areas.

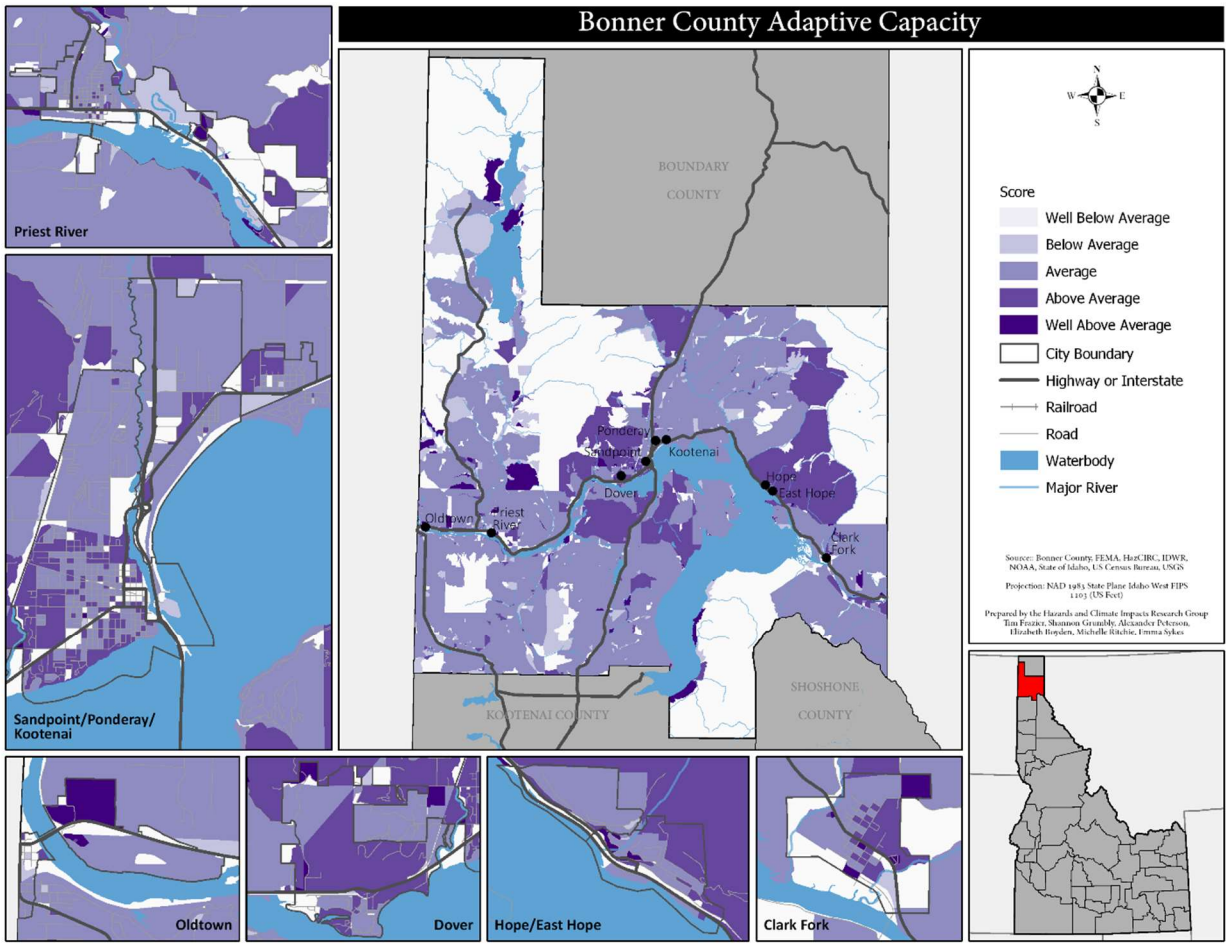


Figure 16. Adaptive capacity map

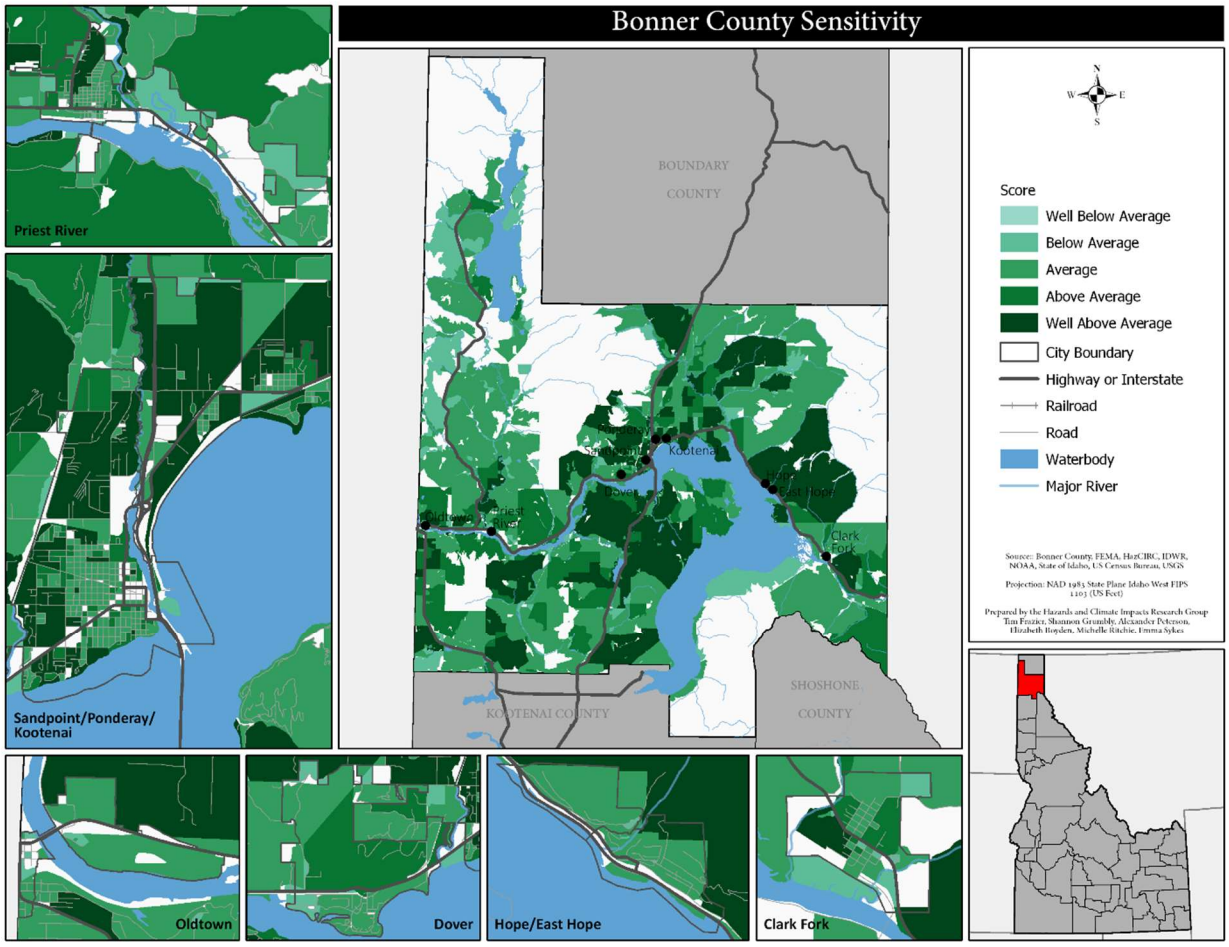


Figure 17. Sensitivity map

5.4 Population, Improved Parcel Values, & Critical Facilities Inventory

To profile hazard risk in Bonner County, the county's population, improved parcel values, and critical facilities are inventoried. Population counts are sourced from the 2010 US Census (Table 10). The improved parcel values were created by the Bonner County Assessor's Office, and parcel values total per jurisdiction are listed in Table 10. The last assessed value of those parcels with structures were summed to calculate the total parcel values. These data were used in a Geographic Information System (GIS) format and intersected with the spatial extent of hazards to quantify exposure.

Table 10. Population counts and improved parcel values by jurisdiction

Jurisdiction	Population	Num. of Structures	Assessed Value
Clark Fork	536	191	$13,416,084
Dover	511	342	$118,594,942
East Hope	208	165	$51,521,698
Hope	88	54	$10,548,987
Kootenai	678	273	$35,385,197
Oldtown	189	63	$6,003,470
Ponderay	1,133	204	$26,766,577
Priest River	1,780	650	$64,426,225
Sandpoint	7,376	2,957	$544,605,622
Unincorporated Areas	28,378	16,605	$3,946,690,469
Total	**40,877**	**21,504**	**$4,817,959,271**

Critical facilities are vital to the continuance of the county, with emphasis placed on those facilities important in disaster response and recovery or those with the potential to amplify life and property losses. Critical facilities are classified into four categories:

- Essential Facilities – Those facilities that are vital to response and recovery from a disaster, including emergency operation centers, police stations, fire stations, schools, and medical care facilities. Most of the county's essential facilities are located in and around the populated areas, such as Sandpoint and Priest River (Figure 18).
- Transportation Facilities – Transportation is vital in all phases of disaster management, as moving people out of hazardous areas, moving supplies into staging or other areas, and response depends on well-connected and sound transportation infrastructure. This includes airports and runways, railroads, highways, and bridges. The transportation network in the county converges on Sandpoint, with major arteries running north-south and east-west (Figure 19).
- Utility Facilities – Often termed 'lifelines' due to their importance in community continuity and in the post-disaster recovery phases. This include wastewater facilities, electric power facilities, and communication locations. Most of the county's utilities are located in and around Sandpoint (Figure 20).
- High-Potential Loss Facilities – Facilities, staging areas, and other locations with the potential to cause significant life and economic losses are classified as high-potential loss facilities. This includes dams and hazardous materials sites. Many of the county's hazardous materials sites are located in and around Sandpoint (Figure 21).

An inventory of these facilities was created using various sources in order to attain the highest quality data possible. The sources included the Homeland Security Infrastructure Program (HSIP) Gold 2013

dataset, data from the State of Idaho Hazard Mitigation Plan (SHMP) 2013 update, and Infogroup business 2014 data.

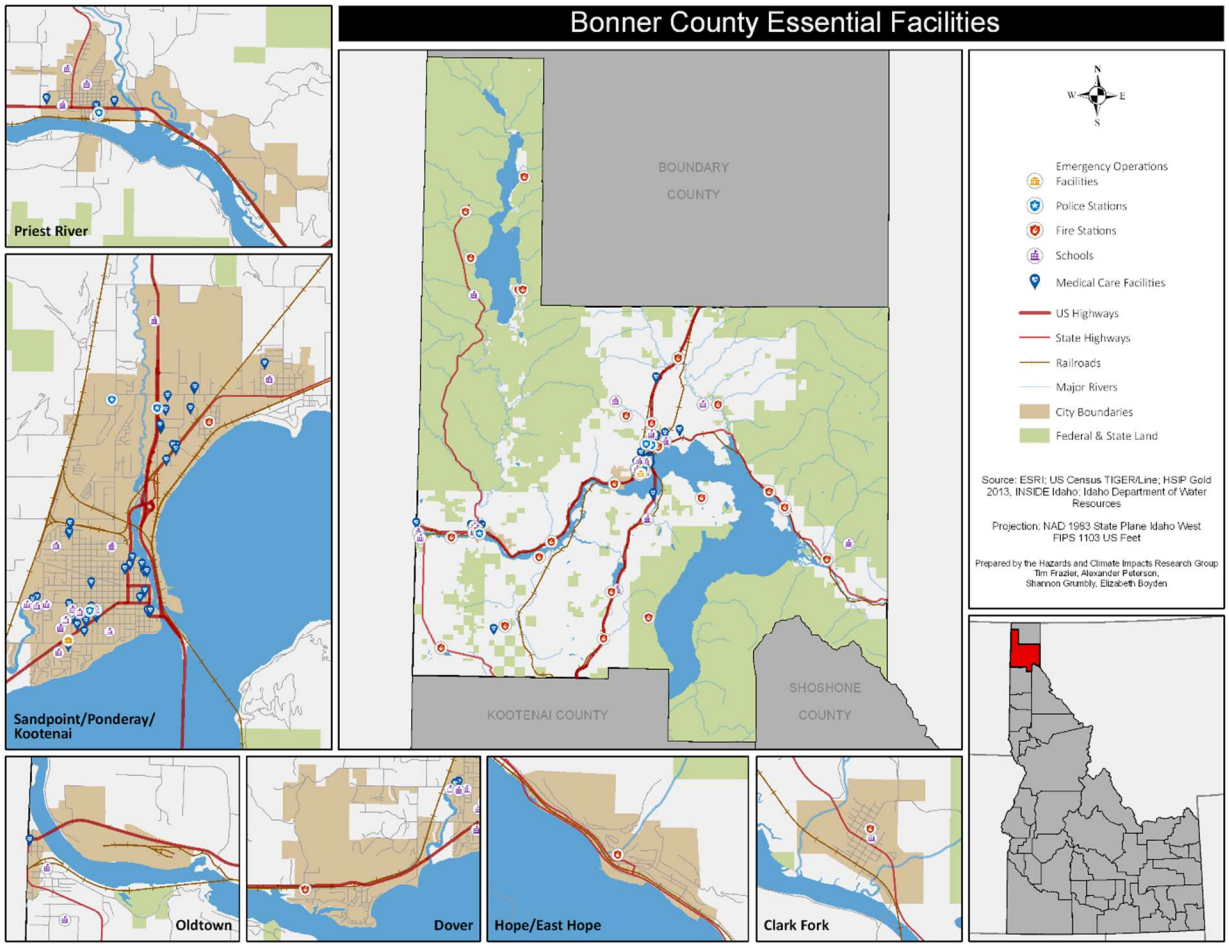


Figure 18. Essential facilities

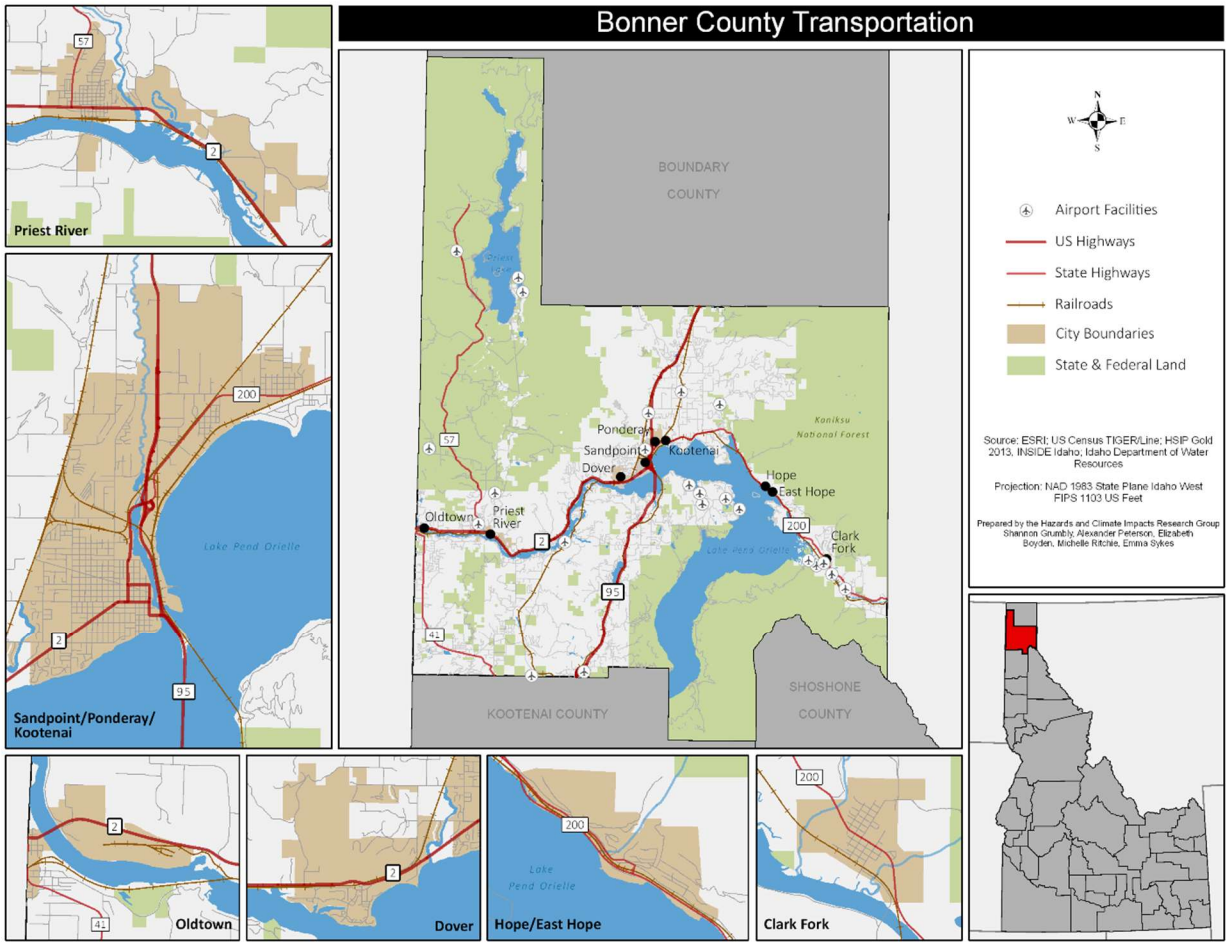


Figure 19. Transportation

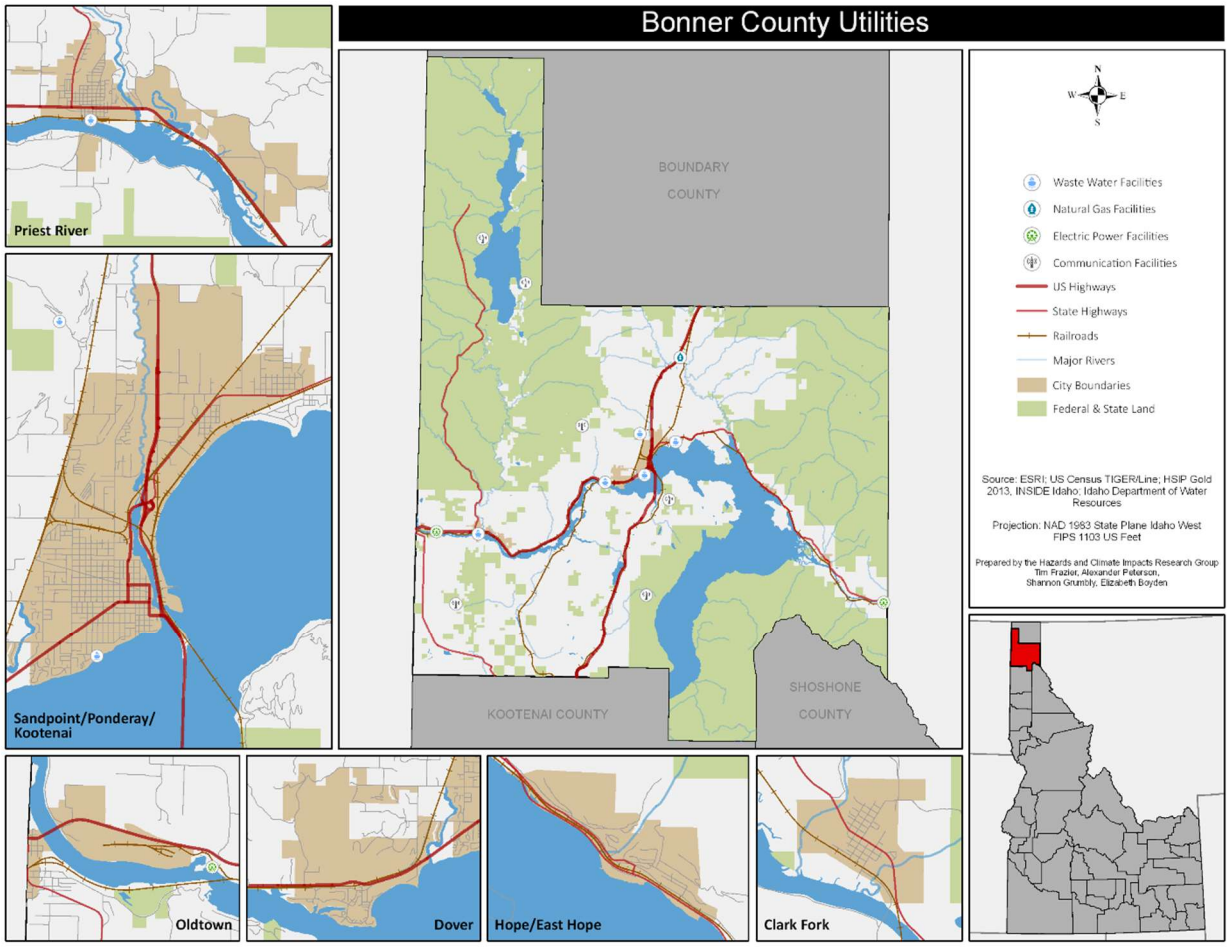


Figure 20. Utilities

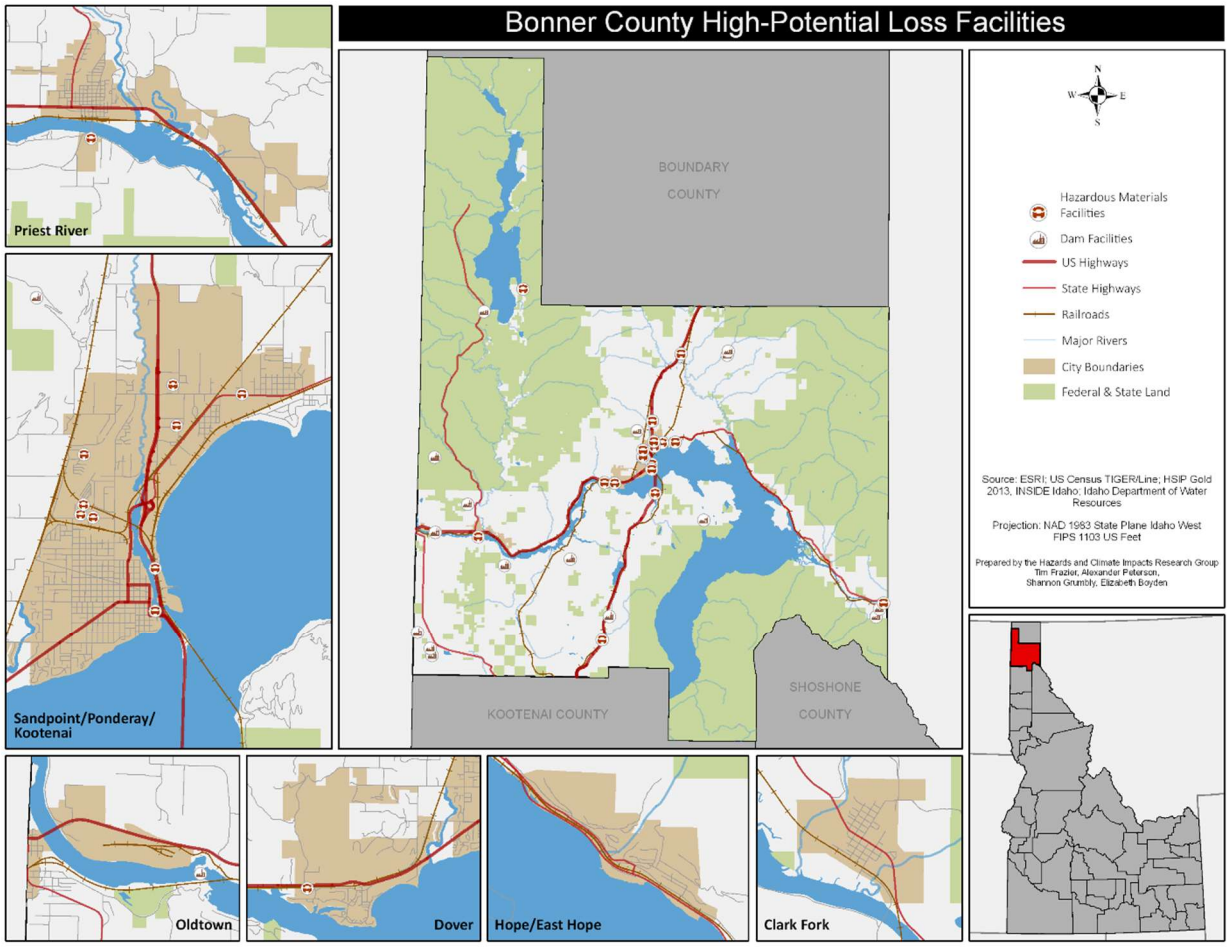


Figure 21. High-potential loss facilities

5.5 Land Use & Future Development

In 2005, Bonner County proposed a number of density ranges for various land uses. Land 0-2.5 acres in size was proposed for areas served by urban-like water and sewer services and good transportation networks and fire protection districts. These areas are generally located within the areas of city impact, where urban services are available or can be extended, or where taxing districts have been formed to provide sewer and water services as historic neighborhoods have arisen and expanded. Generally, these areas have little to moderate slopes. Within certain areas of city impact, sewer and water services are not available and steeper slopes prevail. These areas have been designated for lower densities. Included in this 0-2.5-acre density range are the county's recreation communities with full services, such as Schweitzer Mountain ski resort and the Hidden Lakes and Stoneridge golf and residential complexes.

Land 1-5 acres in size was proposed for areas on or near the fringes of city impact, which may be within fire districts and sewer or water districts, adjoining higher density, developed areas with public right-of-way access. Slopes are general level to moderate (0-10%). Expectations are for these areas to be served or annexed by nearby cities.

Land 5-10 acres in size was proposed for areas outside the sewer districts, but in areas where subsurface sewage disposal can be achieved without adverse impact to surface or ground water. These are areas outside the prime agricultural lands. Slopes are level to moderate. Access may be private or public roads, and sites are away from the city centers but generally accessible by nearby transportation networks. Areas of steeper slopes are excluded. These areas include critical wildlife habitat areas.

Land 10-20 acres in size was proposed for areas that include agricultural lands, forest land, sites on steeper slopes, where there are limited transportation networks. Certain critical wildlife habitat and wetlands may be present and steeper slopes (30% and greater) are predominate.

Land 20 acres and larger in size was proposed for areas that are road-less, remote, service-less private lands, and areas reserved for the prime timber and agricultural lands and certain municipal watersheds. Slopes may vary from level to steep and transportation systems also vary, since the primary focus of this designation is to preserve prime forest and agricultural lands.

Land 40 acres and larger in size was proposed for state and federal holdings within road-less, remote, service-less areas on steeper slopes devoted to timber production and management or public recreational uses. Included in these areas are some municipal watersheds.

These various land uses are incorporated within the Bonner County zoning map, the latest of which became effective in 2008.

Annexation is the process of expanding the legal boundaries of a city to include previously unincorporated areas. Idaho Law grants the established municipal annexation authority and the necessary procedures that cities must follow when undertaking the process of annexation. Municipal annexation is important for various reasons, including the following:

- Economic development
- Planned expansion of infrastructure
- Clear jurisdictional boundaries
- Fair share of taxation
- Unity of the urban community

In Idaho, land that is to be annexed must be adjacent or contiguous to the city and the city must have an Area of City Impact (ACI) ordinance in place. The area of city impact is defined as the “region surrounding a city that will eventually develop and become part of the municipality” and serves to define the area for city growth and establish the land use regulations governing the urban fringe area. When considering the extent of the area of city impact, the committee must consider the local trade areas, geographic factors, and areas that can reasonably be expected to be annexed by the city in the

future. An area of city impact agreement is negotiated between city and county officials and results in two specific ordinances, including an ordinance establishing the area of city impact map and an ordinance that sets forth whether the city or county's comprehensive plan, and zoning and subdivision regulations will apply in the area of city of impact. If agreed upon, this ordinance may use a combination of both county and city regulations.

Incorporated cities within Bonner County each have ACIs that extend outward from current boundaries (Figure 22). The City of Clark Fork has ACI boundaries that extend north, south of the Clark Fork River, east to include the Clark Fork Delta, and west. The Cities of Hope and East Hope have ACI boundaries that extend inland to the north, northeast, east and southeast. The Cities of Sandpoint, Ponderay, and Dover have ACI boundaries that extend inland to the west, north, and east. The City of Priest River has ACI boundaries that extend in all directions and include Priest River and its tributaries. The City of Oldtown extends its ACI boundaries majorly to the south, which includes portions of the Priest River. Small portions of the ACI boundary extend to the north and east however, these boundaries are in close proximity to the river. According to local officials and the planning committee, development is expected to remain relatively static in the plan's next lifecycle. This is consistent across all jurisdictions in the county (Bonner County Unincorporated Areas, City of Clark Fork, City of Hope, City of East Hope, City of Sandpoint, City of Dover, City of Ponderay, City of Priest River, City of Oldtown).

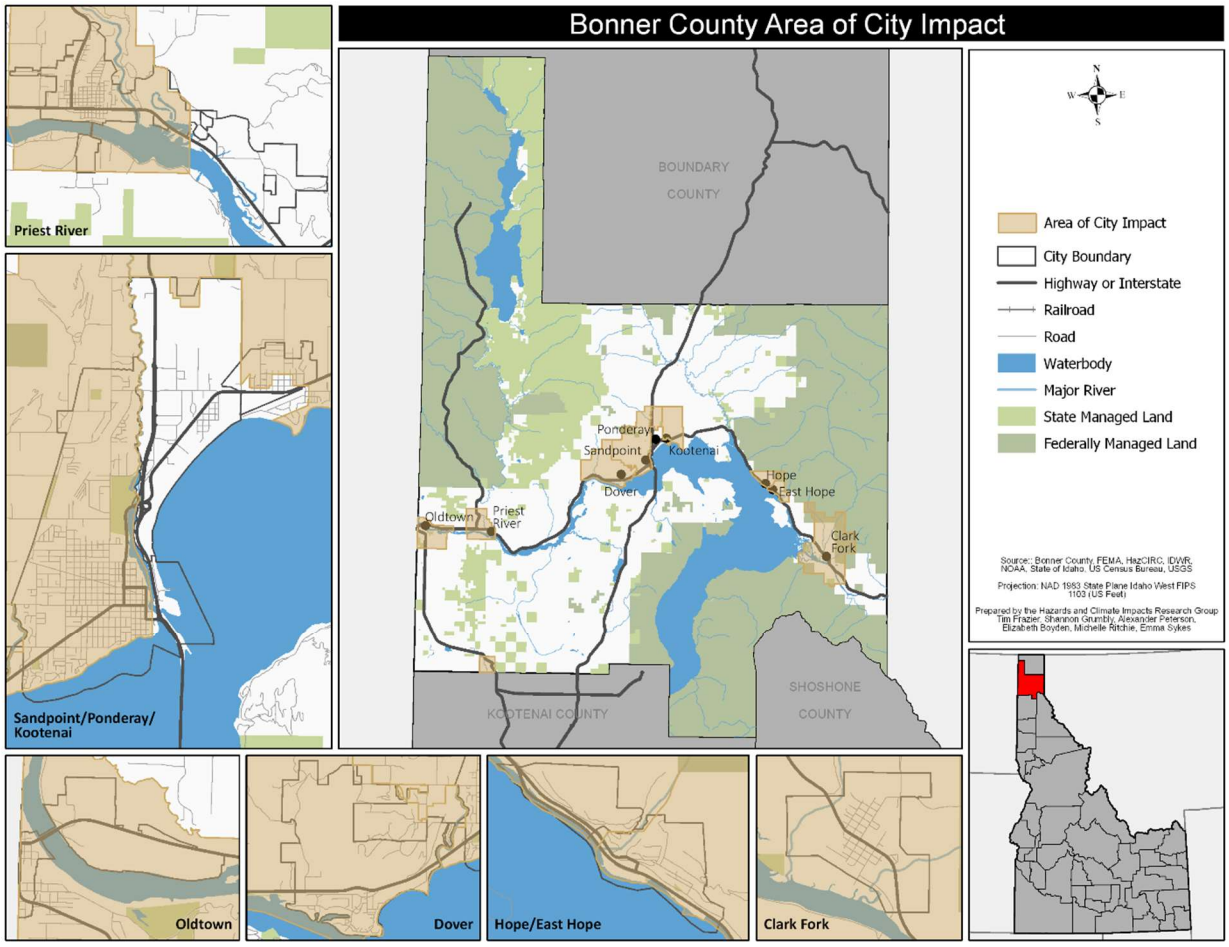


Figure 22. Area of City Impact

5.6 Avalanche

5.6.1 Overview

Although avalanches do not often cause widespread structural damages, there is an increasing trend in avalanche-caused casualties across the western US. It is important to mitigate potential loss of life and reduce resources expended during search and rescue. The 2017 update reorganized and expanded the avalanche hazard profile, incorporated additional data and modeling, and considered future development and climate impacts, to provide a more comprehensive analysis of avalanche risk.

Table 11. Avalanche summary

	1980-2008	2009-2017	Total
Occurrences	2	3	5
Disaster Declarations	-	-	-
Casualties	1 Fatality	1 Fatality; 1 Buried	2 Fatalities; 1 Buried
Property Damage	-	-	-
Repetitive Losses	-	-	-

5.6.2 Hazard Description

An avalanche is a mass of snow (often mixed with other debris such as ice, water, soil, rock, and trees) in motion down a slope. Avalanches occur rapidly, are difficult to predict with certainty, and are sometimes initiated by their victims.

The complex interaction of weather and terrain factors contribute to the location, size, and timing of avalanches. Avalanche danger increases with major snowstorms and periods of thaw. Most avalanches occur during or just after large snowstorms. About 90 percent of all avalanches start on slopes of 30-45 degrees, with slopes 25-50 degrees susceptible to the hazard. Avalanches occur most often on slopes above timberline that face away from prevailing winds. Avalanches can also occur on small slopes well below timberline, such as in gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to slopes and prevent avalanches from starting, though avalanches can release and travel through a moderately dense forest.

There are two types of avalanches: loose snow avalanches and slab avalanches. Loose snow avalanches originate from a single point and do not often cause damage, and are composed of dry, fresh snow deposits that accumulate atop a sub-layer composed of stable snow and ice. In contrast, slab avalanches are characterized by a simultaneous release of a cohesive snow layer (otherwise known as a 'slab') and can cause damage and loss of life. Slab avalanches are usually triggered by turbulence or when the internal cohesive strength of the slab layer is greater than the banding at the base and lateral slab boundaries. As the slab moves down the avalanche path it accelerates and gains mass. The avalanche path is determined by the physical characteristics of the terrain over which the avalanche moves, with three zones. The starting zone is located near the top of the ridge, bowl, or canyon usually with steep slopes between 25 and 50 degrees. The track zone has slopes between 15 and 30 degrees, and is where the avalanche normally reaches its greatest velocity and mass. Finally, the runout zone has slopes between 5 and 15 degrees and is located at the base of the path. Avalanches decelerate and deposit the snow and debris in the runout zone.

Of the major avalanche impacts, the interruption of communications lines occurs most frequently. Places of highest concern include ski areas, mountain passes, and other areas where transmission lines cross avalanche paths. Avalanches can also damage or interrupt transportation networks such as highways, railroads, and bridges. Road closures are not uncommon and vehicles are lost on occasion. The economic costs of these disruptions can be significant, especially in areas with limited access options. Forest resources, such as timber and wildlife habitat, may also be impacted by significant slides (IBHS, 2007).

Climate change might alter the frequency and magnitude of avalanches coincident with changes in precipitation. Increased snow loads, frost-thaw cycles, and the amount and pattern of precipitation can increase avalanche occurrence. The Intergovernmental Panel on Climate Change (IPCC) rates more intense precipitation events as an extremely likely occurrence, resulting in increased avalanches. However, increased temperatures can reduce avalanche occurrence, as warmer temperatures can reduce avalanche starting zones and dampen peak runoff. More comprehensive research should be

undertaken to assess the potential impacts of climate change on avalanche occurrence in Bonner County.

5.6.3 Hazard Extent, Magnitude, & Probability

Avalanches occur in the mountainous portions of the State of Idaho. For the period 1950-2017, 71 avalanche-related fatalities were reported in Idaho, placing the state seventh in the nation (Colorado Avalanche Information Center, 2017). Snowmobiling was the leading cause of these fatalities, with climbing and backcountry skiing as secondary causes. However, the geophysical processes that contribute to avalanche occurrence are statistically independent of past events, and avalanche occurrence is not directly attributable to any one single factor. Often, it is a combination of factors that result in an avalanche (such as snow depth, meteorological events, vegetative cover, and human disturbance). Given these limitations and the lack of reported events, it is difficult to develop return periods for avalanches; however, regional avalanche forecast centers employ the North American Avalanche Danger Scale (2010) to determine a qualitative probability of avalanche activity and recommended travel precautions based on observations (Table 12).

Table 12. North American Avalanche Danger System

Danger Level	Avalanche Probability/Triggers	Degree & Distribution of Avalanche Danger	Recommended Action in the Backcountry
Low (Green)	Natural avalanches very unlikely. Human triggered avalanches unlikely.	Generally stable snow. Isolated areas of instability.	Travel is generally safe. Normal caution is advised.
Moderate (Yellow)	Natural avalanches unlikely. Human triggered avalanches possible.	Unstable slabs possible on steep terrain.	Use caution in steeper terrain on certain aspects (defined in accompanying statement).
Considerable (Orange)	Natural avalanches possible. Human triggered avalanches probable.	Unstable slabs probable on steep terrain.	Be increasingly cautious in steeper terrain.
High (Red)	Natural and human triggered avalanches likely.	Widespread natural or human-triggered avalanches certain.	Unstable slabs likely on a variety of aspects and slope angles.
Extreme (Black)	Travel in avalanche terrain is not recommended. Safest travel on windward ridges of lower angle slopes without steeper terrain above.	Extremely unstable slabs certain on most aspects and slope angles. Large, destructive avalanches possible.	Travel in avalanche terrain should be avoided and travel confined to low-angle terrain well away from avalanche path runouts.

To overcome the difficulty of mapping avalanches and to derive avalanche extent within Bonner County, avalanche zones were classified based on the topographic slope across the county above treeline (Figure 23). It is important to note that this is not a technical nor comprehensive assessment of avalanche probability across the county. These zones were created by classifying slopes into the following zones:

- Starting Zones: 25-50 degrees
- Track Zones: 15-30 degrees
- Runout Zones: 5-15 degrees

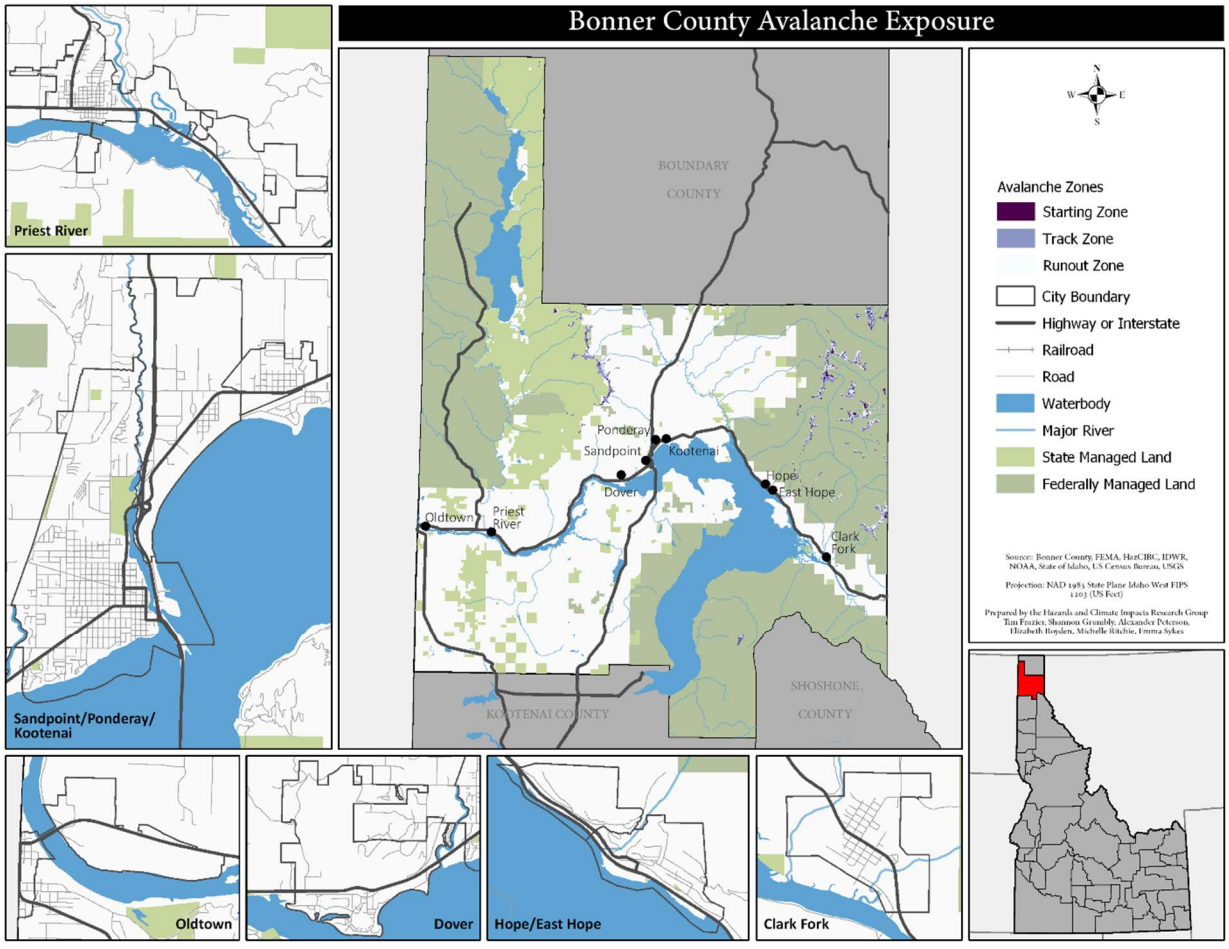


Figure 23. Avalanche zones map

Avalanche magnitude varies from low impact avalanches with minimal damage, to avalanches with the power to move large debris such as boulders. Table 13 shows the magnitude of estimated potential for a given range of impact pressure from an avalanche.

Table 13. Avalanche impacts pressure and damages

Impact Pressure		Potential Damages
kPa	lbs/ft^2	
2-4	40-80	Break windows
4-6	60-100	Push in doors, damage walls, roofs
10	200	Severely damage wood frame structures
20-30	400-600	Destroy wood frame structures, break trees
50-100	1,000-2,000	Destroy mature forests
>300	>6,000	Move large boulders

5.6.4 Hazard Occurrences

It is important to note that avalanches can occur throughout the winter and spring seasons in the backcountry. These avalanches are often not reported due to no losses of life or property, making it difficult to determine the precise number of actual occurrences. However, there have been reported avalanche occurrences in Bonner County (Table 14).

Table 14. Avalanche occurrences

Date	Casualties	Damage	Trigger	Area
2/22/2003	-	-	-	Unincorporated Area
3/10/2004	1 Fatality	-	-	-
3/13/2010	1 Fatality	-	-	McCormick Lake
12/7/2012	1 Buried	-	-	Schweitzer Mountain
1/5/2015	-	-	Skier	Schweitzer Mountain

Sources: NWS, Panhandle Avalanche Center

The following reports from local media provide context for some of the past events:

- March 15, 2010 – Members of the Priest Lake Search and Rescue team have recovered the body of a snowmobiler who died in an avalanche Saturday near McCormick Lake in Bonner County. Bill Olmo with Priest Lake Search and Rescue says the rider set off the avalanche Saturday afternoon while riding in a steep area on the back side of Echo Bowl near McCormick Lake. The Bonner County Sheriff's Office confirmed the identity of that rider as that of 32-year-old Marek Dabrowski. Olmo says search and rescue members happened to be riding in the area above Echo Bowl and saw the avalanche happen. They rushed to the aid of Dabrowski,

who was buried under three to four feet of snow. The search and rescue riders pulled Dabrowski from the snow and began CPR, but were unable to revive him. According to Olmo, the rescuers deemed conditions to be too dangerous to transport Dabrowski's body out of the area on Saturday. A private helicopter recovered the body at about 11:00 Sunday morning. Olmo says Dabrowski was an experienced rider from North Idaho and was riding with a buddy on Saturday when the avalanche happened. The other rider was not involved in the avalanche. Olmo says the recent snowfall, coupled with hard frozen snow from early-season storms has made for ideal avalanche conditions (KXLY.com).

- December 19, 2012 – Back-to-back avalanches at Schweitzer Mountain Resort earlier this month are underscoring dangerous conditions that are present in the Selkirk and Cabinet mountains. The slides occurred on Dec. 7 on Headwall, a front-side run located between Ridge Run and Stiles, according to Sean Briggs, the resort's marketing coordinator. Briggs said there was a hard ice layer below about 5 inches of light, freshly fallen snow. However, ski patrollers assessed the slope and deemed it to be at low risk of sliding. The first slide occurred when a skier hit the icy layer underneath the snow, lost his balance, fell and slid all the way to the bottom. It caused all that snow to pop and all that snow came down on him," said Briggs. The skier slid down to a little gully at the bottom of the run that acts as a trap. "Luckily, his friends were there and they were able to dig him out. And that happened to two more people within about 10 minutes," Briggs said. The first skier was trapped and could not free himself without help from his companions. Briggs said the extent of the burials in the second slide was unclear. Although rare, in-bounds avalanches are not unheard of at Schweitzer. Longtime patrollers told Briggs it's been at least 20 years since an in-bounds slide swept up a skier. "That being said, there's always inherent risks when you go skiing, whether you're in-bounds or out of bounds. It's never 100-percent safe," said Briggs. The U.S. Forest Service's Panhandle Avalanche Center posted a heads-up on its website on the day of the slides at Schweitzer. Avalanche forecaster Kevin Davis warned backcountry visitors that dangerous conditions existed because of new snow rapidly accumulating over a very thick ice crust. "Be careful out there. This is a bad time to go for a ride since the pack is still shallow and you will be pinballing off rocks and stumps and trees," Davis said in the advisory. Another advisory is scheduled to be released on Friday (Slides Highlight Danger Lurking in Snowpack, Bonner County Daily Bee).

5.6.5 Hazard Exposure & Vulnerability

As most recorded avalanches are human-caused, exposure is usually limited to individuals and parties in the backcountry. It is also possible that segments of the transportation network are exposed, notably those in high-elevation areas near steep slopes. A GIS analysis of the relative location of the county's population and structures in relation to avalanche zones indicated no populated census blocks or parcels with improved structures intersected avalanche zones.

Few critical facilities are located near the mapped avalanche zones. A socioeconomic vulnerability assessment was not conducted for this hazard given the limited number of occurrences and impacts in Bonner County.

5.6.6 Land Use & Future Development

Development in the mountainous areas of Bonner County can increase the risk of avalanches. Although avalanches are often naturally-sourced, human activity can cause avalanches, and the development and habitation of avalanche-prone areas increases both the probability and impact of avalanches. Although avalanches often start in areas with slopes usually too steep for moderate- to high-intensity development, development in the runout zone (between 5 to 30 degrees) directly beneath starting zones can be vulnerable to avalanche impacts. Development of new or expansion of existing ski resorts can also increase vulnerability to avalanches. It is important to note that although structural damages resulting from avalanches are minimal, there is an increasing trend in casualties due to increased recreational activities in backcountry areas. There are no mapped avalanche zones within the area of city impact.

5.7 Civil Disturbance/Terrorism

5.7.1 Overview

Civil disturbances can occur in all communities given the myriad of reasons that often drive civil unrest, protest, and terrorism. The 2017 update reorganized and expanded the civil disturbance hazard profile, incorporated additional data, and presented a more comprehensive and cohesive analysis of Bonner County's civil disturbance risk.

Table 15. Civil unrest and terrorism summary

	Before 2009	2009-2017	Total
Occurrences	1	-	1
Disaster Declarations	-	-	-
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

*Statistics not available

5.7.2 Hazard Description

The term 'civil disturbance' includes a number of intentional action designed to disrupt or influence society, government, or the economy. These include terrorism, violence, labor strikes, civil disobedience, demonstrations, riots, and open rebellion. Civil disturbance ranges from localized and small-scale (e.g., domestic violence) to regional or global and large-scale (e.g., mass riots and terrorism).

Civil disturbance is often spontaneous, and can involve large numbers of individuals incited to civil disobedience and protest. Such disturbance is driven by political and socioeconomic marginalization, grievances, conflict, and shortages of food and other vital resources. Planned civil disturbance – such as terrorism – can be but carried out by few individuals driven by more narrow causes (e.g., religion). Uncontrolled, angry or emotion-driven, and non-organized masses of people are often termed a 'mob'. Mobs are typically associated with disorder, and includes riots, lynches, and vigilante groups.

The following are some of the known causes of civil unrest:

- Abortion
- Government policy, corruption, and action
- Nuclear energy and weapons
- Race and ethnicity
- Civil liberties and human rights

- Gun control
- Immigration
- War and peace movements
- Poverty, homelessness, and inequality
- Trade, globalization, and markets

Northern Idaho has been associated with activist and extremist individuals and groups, notably hate groups adhering to racism, anti-Semitism, and technophobic and anti-government sentiment. Appearing in the 1970s, these groups were drawn to the region due to its ethnicity (majority white) and culture. Notable individuals and groups included Randy Weaver, the Aryan Nations, the Phineas Priesthood, and 11th Hour Remnant Messenger.

5.7.3 Hazard Extent, Magnitude, & Probability

It is difficult to identify and quantify the extent, magnitude, and probability of civil disturbance due to the number of activities and actions classified as such, as well as the spontaneous nature of these events. Similarly, the hazard's extent can range from localized and small-scale to far-reaching and large-scale, making it difficult to capture within this plan. Government buildings and entities, transportation facilities, and utility facilities (notably high-potential loss facilities) are often primary targets of civil disturbances.

Civil disturbance is often classified into the following categories:

- Low Severity – Localized civil disturbances, such as property intrusion, that require police dispatch. These incidents sustain little to no property damage and minimal physical harm. These events are high probability (routine disturbance calls).
- Moderate Severity – Civil disturbance resulting in business disruption and property damage but that do not require the use of physical force are classified as moderate severity. Physical harm is more substantive. These events are uncommon to rare, depending on location, culture, and socioeconomic status.
- High Severity – Highly contentious, requires the use of physical or chemical agents to restore order, and endanger the lives of residents and responders. This classification entails significant property damage or business interruption. These events are rare.

Civil disturbances will continue to occur in the future. Often, forewarning and prediction to some level is possible given known catalysts of civil disturbances, such as race riots, demonstrations, and mobs. Other forms of civil disturbance, such as terrorism, are more difficult to predict.

5.7.4 Hazard Occurrences

The ascendancy of the Aryan Nation in northern Idaho began when Richard Butler moved there in the early 1970s, looking to establish a white homeland. Eventually, the group began staging neo-Nazi gatherings and exporting violence from its compound about 10 miles north of Hayden Lake. The infamous 1992 shootout at Ruby Ridge that killed a deputy U.S. marshal and the wife and son of Randy Weaver, a white separatist but not a member of the Aryan Nation, focused national attention on members of the radical fringe living in the northern Idaho. The group went bankrupt in 2000 by a civil rights lawsuit argued by the Southern Poverty Law Center. The lawsuit forced the group to sell their 20-acre compound, and new leaders subsequently moved the group's headquarters to Pennsylvania.

In 1996, there were a series of bombings and bank robberies by members of the Phineas Priesthood, a sect that holds religious beliefs against banking, abortion and a strong central government. The Phineas Priesthood does not exist as an organization or formal group, but a number of individual extremists have identified themselves as Phineas Priests, often as a way to justify criminal acts they committed earlier. Men who identified themselves as Phineas Priest, all from the Sandpoint area, bombed a newspaper office and Planned Parenthood clinic and robbed two banks in the Spokane area before they were captured and sent to prison.

The 11th Hour Remnant Messenger, founded by two wealthy Californians after they moved to Sandpoint, for a time sent unsolicited mass mailings of anti-Semitic and racist brochures and videos to every home in Bonner County and to others around the nation. This group has reportedly left northern Idaho.

5.7.5 Hazard Exposure & Vulnerability

Homes, businesses, and critical facilities can all be exposed to civil disturbances. Essential facilities, such as police stations and courthouses, as well as high-potential loss facilities are often targeted during civil disobedience, riots, and mobs. These locations are also terrorist targets. Businesses – notably those in contentious industries, such as chemical manufacturing and natural resource extraction – are known targets for disruption.

To date, no detailed vulnerability assessment of civil disruption is available in the State of Idaho. A socioeconomic vulnerability assessment employing the SERV model was not conducted, due to the spontaneity and difficulty in modeling civil disruption.

5.7.6 Land Use & Future Development

Although civil disturbance can occur anywhere in the county, it is likely that events will be constrained to populated areas or areas proximate to government, including federal lands, and other critical facilities. Land use and future development is unlikely to directly impact civil disturbances.

5.8 Earthquake

5.8.1 Overview

Although earthquakes in Bonner County are relatively uncommon, the county experienced an earthquake swarm in 2015. Though no damage was reported, it is important to consider the possibility of a damaging earthquake scenario and possible losses. The 2017 update reorganized the earthquake hazard profile, incorporated additional data and modeling (including three loss estimate scenarios), and presented a more comprehensive and cohesive analysis of Bonner County's earthquake risk.

Table 16. Earthquake summary

	Before 2009	2009-2017	Total
Occurrences	3	16	19
Disaster Declarations	-	-	-
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

5.8.2 Hazard Description

An earthquake is a trembling of the ground resulting from the sudden shifting of rock beneath the earth's crust. Such events cause waves of energy to radiate from the point of release, causing the movement, shaking, and rolling felt during an earthquake event. The durations of earthquakes are normally limited to a few seconds (, but the resultant waves can travel hundreds to thousands of miles and can cause damage to locations far from the fault. Faults are the breaks, fractures, or fracture zones in the earth associated with seismic activity. These faults are classified as either active or inactive given any associated known geological activity, and can be sharp cliffs or scarps or buried below the earth's surface.

Movements associated with earthquakes are classified as a foreshock, main shock, or aftershock. Foreshocks occur before the actual onset of the earthquake (main shock), while aftershocks occur after the onset of the earthquake. Both can range between minutes and months, and can be large, damaging events that further impact an area.

Damages associated with earthquakes are influenced by the following:

- Seismic Activity – Varying between earthquake events, seismic activity ranges from localized, small points of energy release to widespread, large and destructive releases. The length of earthquakes ranges from brief (a few seconds) to more than a minute. Earthquake epicenters can be shallow or deep, with depth influencing the type of seismic waves felt and their destructive potential.
- Geology & Soil Types – The underlying geology and soil type of an area influences the propagation of the seismic waves and their impact. Stable geologic types (such as solid bedrock) are less prone to destructive shaking than more unstable geologic types, such as fill soils. The siting of structures and communities as a whole strongly influences the nature and extent of earthquake damages.
- Development & Development Quality – The type and quality of development is vital in considering earthquake damages to a county or community. Isolated, small earthquakes in densely-populated areas or areas with unreinforced masonry can be more devastating than a high-magnitude earthquake in a remote location or in an area with earthquake-appropriate building codes.
- Time of Day – Time of day determines the distribution of the population, and therefore the distribution of injuries and fatalities. Residences house more people in the evening and night, whereas business centers, schools, and other day-use locations house more people in the morning and afternoon. Day of the week is also important to consider, as people's work, travel, and activities vary between weekdays and weekends.

Damages from earthquakes varies, with most damages stemming from shaking. Secondary impacts, such as landslides, are often a result of shaking. The following describes some of the types of damage stemming from an earthquake:

- Shaking – Ranging from minor to severe, minor shaking can cause objects to fall and other minimal damage, while severe shaking causing large structures to collapse and extensive damages. Unreinforced masonry and wood frame structures are most prone to earthquake damage. Non-structural falling hazards include loose or poorly secured objects, and include objects such as bookcases, wall hangings, and building facades. These objects can cause additional structural damage, and injury or fatality. Shaking can also rupture dams, destroy power and telephone lines, gas, sewer, or water mains, and can cause fires or other hazards that impair response and recovery efforts.
- Ground Displacement – The most dramatic visual evidence of an earthquake, ground displacement often occurs along a fault line. Ground can be thrust upward, subside, or move laterally given a severe enough earthquake. Damages from ground displacement is normally limited to utility lines and transportation infrastructure, though structures situated on fault lines can also be impacted.
- Landslides & Avalanches – Earthquakes often cause cascading hazards. If meteorological conditions are right, such as in-place snowpack or recent rain events, even small earthquakes can cause rock falls, landslides, or debris flows.
- Liquefaction & Subsidence – Liquefaction occurs when the energy released from an earthquake weakens the strength and stiffness of a soil, while subsidence is the caving in or sinking of an area. Fill and saturated soils are notably at risk of liquefaction, which can result in widespread structural damage. Liquefaction and subsidence can also impact surface and subsurface water flow, which can impair individual or community wells as well as flash flood-like water flow. These impacts can likewise impact septic systems, which create additional health risks.
- Seiches – Oscillating waves in an enclosed body of water caused by an earthquake are termed seiches. Although not commonly damaging given their rarity, seiches can resemble tsunami characteristics and destructive potential. Shoreline development along a lake in earthquake-prone areas are then at risk of damage, as well as dams or flood mitigation structures such as levees. Seiches can also cause hydrothermal explosions.

5.8.3 Hazard Extent, Magnitude, & Probability

Earthquakes are measured in both magnitude and intensity. Earthquake magnitude refers to the energy released at the source of the earthquake, while intensity refers to the strength of shaking produced by the earthquake at a discrete location. Where magnitude is derived from seismograph measurements, intensity is determined by the effects on people, structure, and the environment. The most common measure of intensity is the Modified Mercalli scale:

Table 17. Modified Mercalli scale intensities and descriptions

Modified Mercalli Intensity	Description
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: USGS

The most common measure of magnitude is the Richter scale. The Richter scale measures magnitude as a function of the amplitude of waves recorded by seismographs, with adjustments to account for variations in distances between recording stations and the epicenter. Magnitude is expressed in whole numbers and decimals, and is measured logarithmically – that is, each whole number step corresponds to the release of about 31 times more energy than the preceding whole number.

The two major geologic faults crossing Bonner County are the Purcell Trench and the Hope Fault. The Purcell Trench extends from the southern boundary of Bonner County, intersecting the Hope Fault at

the city of Sandpoint, and continues to the city of Bonners Ferry. The Hope Fault is a major structural element that extends for about 80 miles southeast of Hope and probably many miles to the northwest. The main Hope Fault traverses Bonner County and then branches far out to the northwest from the town of Hope, across the Purcell Trench and into the Selkirk Mountains. The Newport Fault zone parallels the entire length of the eastern shore of Priest Lake. However, the fault is buried under glacial and fluvial deposits through most of the area.

Areas where the fault zone is exposed and other areas where bedrock is heavily fractured are considered potentially hazardous areas. There are also a number of faults in the mountainous areas on the eastern side of Lake Pend Oreille. According to the USGS, Bonner County has a moderate seismic risk. The City of Sandpoint is largely built on thick Quaternary lake deposits which may amplify shaking and liquefaction relative to bedrock under some conditions.

The USGS creates earthquake ground motion data for various probability levels across the US. These data are widely accepted and applied in risk assessments, insurance rate studies, building codes provisions, and other public policy. These data incorporate the best available scientific knowledge in earthquake hazards, and include findings in ground shaking, faults, seismicity, and geodesy.

When there is an earthquake, the forces caused by the shaking are measured as a percentage of gravity, or percent g (%g). The USGS's National Seismic Hazards Map describes the annual frequency of exceeding a set of ground motions. Figure 24 shows the probabilistic ground motions with a two percent probability of exceedance over the next 50 years for Bonner County. The contours seen in Figure 24 exhibit a west-to-east increase of earthquake probability in Bonner County; therefore, the eastern side of the county is more at risk of earthquake damage than the western side. Figure 24 also shows historical epicenter magnitudes, and seismic faults mapped by the Idaho Geologic Society (IGS). Overall, the USGS reports an 11.02 percent chance of a major earthquake within 50km of the county in the next 50 years.

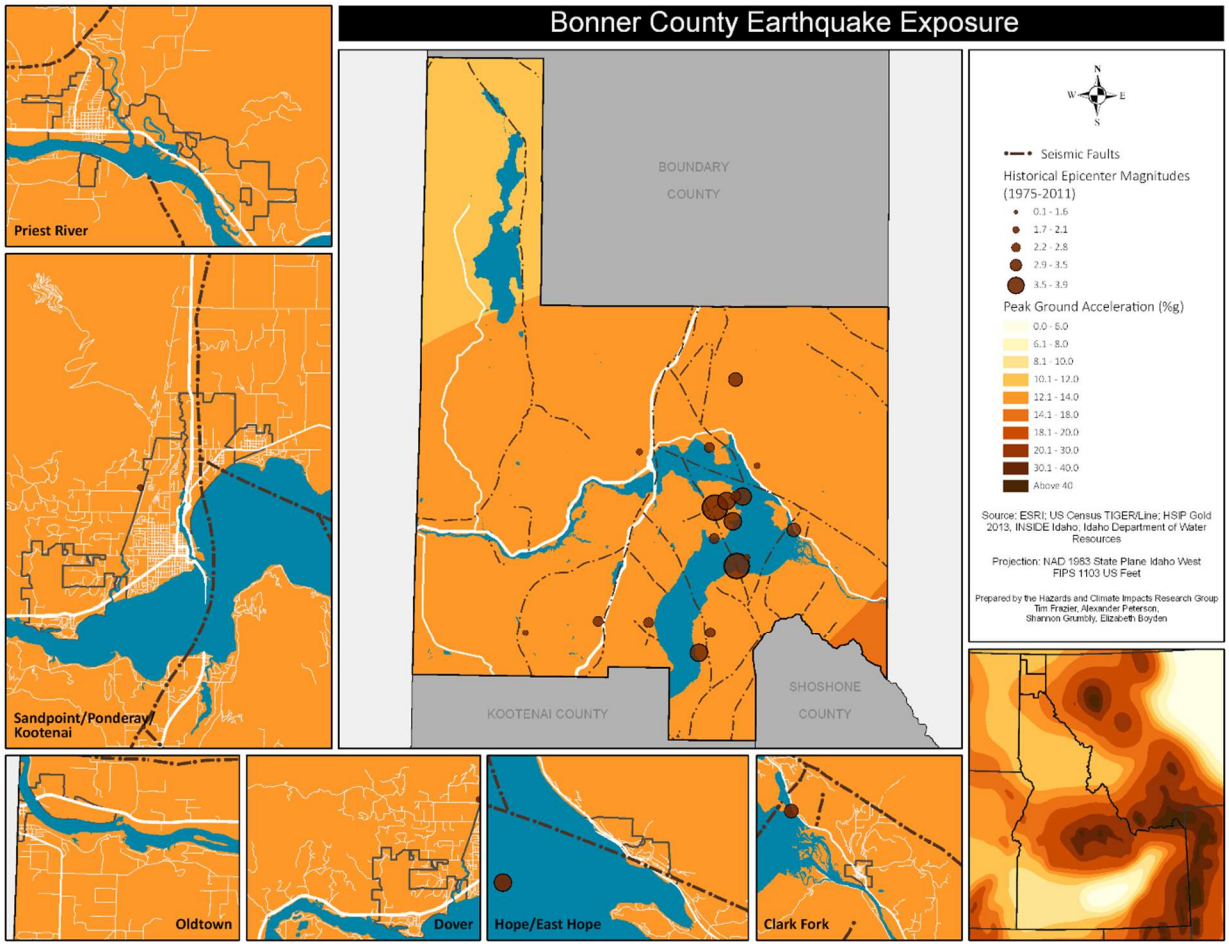


Figure 24. Earthquake occurrences and PGA

Although predicting future occurrences of earthquakes is nearly impossible, the USGS now produces a one-year seismic hazard forecasts (Figure 25). Figure 25 shows the USGS forecast for damage from earthquakes in 2017. Bonner County exhibits both low shaking intensities and less than one percent change of damage from earthquakes in 2017.

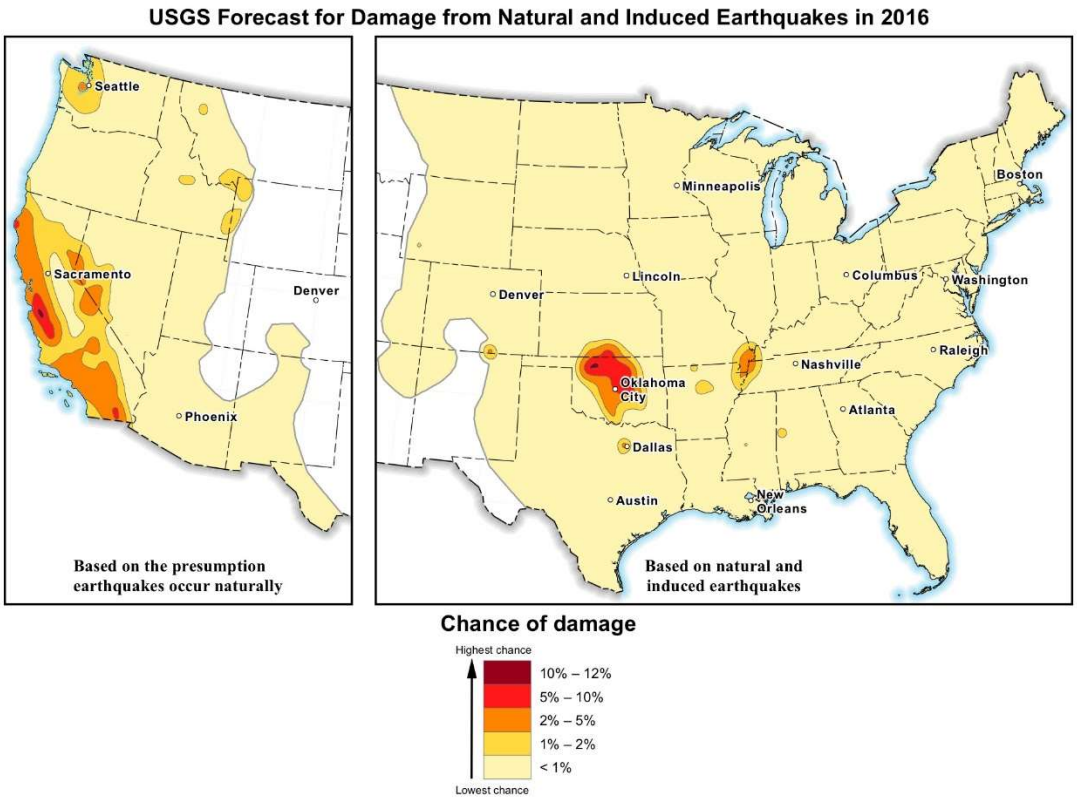


Figure 25. Earthquake probability for 2017

5.8.4 Hazard Occurrences

Most ground shaking activity in Bonner County has been the result of earthquakes centered outside the county. One such earthquake was the Borah Peak event on October 28, 1983. This earthquake is the largest ever recorded in Idaho, both in terms of magnitude and in the amount of property damage. The earthquake caused two deaths in Challis, about 120 miles northeast of Boise, and an estimated $12.5 million in damage in the Challis-Mackay area. A maximum Modified Mercalli intensity of IX was assigned to this earthquake because of surface faulting. Vibrational damage to structures was assigned intensities in the VI to VII range. The quake registered 7.4 on the Richter Scale and is reported to have cracked walls of at least one building in Sandpoint.

Several earthquakes were documented with epicenters near Rathdrum, Idaho, 60 miles south of Priest Lake. The largest of these events occurred in 1918, registering 5.5 on the Richter Scale with a Modified Mercalli scale intensity of VII. The most recent was in 1969, with a Modified Mercalli scale intensity of IV (Stover, in Bonner Co. Planning Department, 2002a).

Several earthquakes occurred since 1953 with epicenters near Bonners Ferry, Idaho, approximately 22 miles east of Priest Lake and 33 miles north of Sandpoint. The most recent of these was in 1968 and the largest had a Modified Mercalli scale intensity of IV (Stover, in Bonner County Planning Department, 2002a). There are no repetitive losses in Bonner County associated with earthquake.

According to the Idaho Geological Survey (Phillips, 2009), a minimum of 71 earthquakes occurred within 100 kilometers of Sandpoint between 1906 and 1980. The largest magnitude reported was 4.0, and he largest shaking intensity (Modified Mercalli) recorded was VI. Many smaller earthquakes with magnitudes less than 2.5 have occurred but were not reliably catalogued. Most of these earthquakes did not actually occur within Bonner County. Several larger earthquakes have occurred at greater distances and were felt in Bonner County. A recent example of a distant earthquake that was felt in Bonner County is the magnitude 5.6 Dillon, Montana earthquake that occurred on July 26, 2005.

Table 18 shows earthquake occurrence dates, magnitudes, depths, and damages.

Table 18. Earthquake occurrences

Date	Magnitude	Depth (km)	Casualties	Property Damage	Crop Damage
6/18/1988	3.4	5	-	-	-
1/20/2000	3.5	5	-	-	-
5/1/2003	2.8	10	-	-	-
8/3/2014	2.2	-	-	-	-
4/24/2015	3.7	-	-	-	-
4/24/2015	3.9	-	-	-	-
4/24/2015	3.3	10	-	-	-
4/24/2015	2.7	-	-	-	-
4/25/2015	2.2	-	-	-	-
4/29/2015	2	-	-	-	-
5/5/2015	2.1	7	-	-	-
5/19/2015	2.1	-	-	-	-
6/13/2015	3.1	-	-	-	-
6/26/2015	2.2	-	-	-	-
8/1/2015	2.4	-	-	-	-
11/10/2015	2.32	5	-	-	-
11/15/2015	2.24	-	-	-	-
11/24/2015	2.37	9	-	-	-
11/30/2015	2.4	5	-	-	-

Source: USGS

Below are accounts of earthquakes in the last five years:

- April 24, 2015 – A magnitude 4.1 earthquake rattled Bonner County on Thursday evening, according to the U.S. Geological Service. "We have no reports of damage in the county so far," said Bob Howard, Bonner County's Director of Emergency Management. The quake was detected at 7:32 p.m. and was centered about 14 miles southeast of Sandpoint, a preliminary earthquake report from USGS said. It registered at 22 stations and its depth was measured at 5 kilometers. After the quake, Bonner Dispatch received numerous reports of an explosion from callers in Sandpoint, Sagle, Hope and elsewhere. Residents at Priest Lake and Bonners Ferry also felt it. "We felt it up here in Samuels! Cupboard doors popped partially open & banged shut a couple of times," Cari and Jimmy Cruse said in a message posted to the Daily Bee's Facebook page. "Lots of shaking and my dog is traumatized," Carrie Block Corallino said in a post to the Bee's Facebook page. A USGS ShakeMap indicated that it could be felt in Boundary and Kootenai counties, in addition to eastern Washington and western Montana. The most recent earthquake activity in North Idaho was in 2003, when a magnitude 3.3 quake struck near Rathdrum, according to USGS. An intensity VI shock in 1942 centered near Sandpoint affected 25,000 square miles of Idaho, Washington and Montana. The Northern Pacific Railroad partially suspended operations to make sure boulders and slides were not covering any tracks. "Church services were interrupted, but only minor damage was reported by homes," the USGS earthquake almanac for Idaho said. The largest recorded earthquake in Idaho occurred in 1983, when a magnitude 5.9 earthquake near Borah Peak struck. It caused two deaths in Challis and an estimated $12.5 million in damage. Thursday's quake touched off a wave of speculation that it might be related to volcanic activity in the region or the globe. Howard said it was not immediately clear if the quake was directly related to volcanic activity, but he plans to discuss that aspect with Idaho Bureau of Homeland Security and USGS officials today (Bonner County Daily Bee).
- November 24, 2015 – Small shakes were felt around Sandpoint after a 3.4-magnitude earthquake centered about 12 miles southeast of the city on Monday around Lake Pend Oreille. Paul Bodin, research professor at the University of Washington, said more than 98 people felt the earthquake in 14 ZIP codes, all in North Idaho. According to the U.S. Geological Service, the quake was felt all around Lake Pend Oreille. The intensity of the quake reached a three, or "weak shaking," Bodin said. Usually damages occur around earthquakes reaching a six intensity. "It was pretty far from being damaging on the intensity scale," Bodin said. The earthquake was at a depth of 18 and a half kilometers, or about 10-12 miles deep into the ground, he said. Bodin said aftershocks could still occur. His closest radar is in Davenport, Wash., and it shows no activity for North Idaho. Earthquakes could have no aftershocks, have many or have a limited amount within the next few days from the original earthquake. "Earthquakes have different personalities," Bodin said. "The total duration of aftershocks doesn't correlate strongly with the magnitude of the earthquake." Bodin said there has been earthquakes more frequently in North Idaho, but that is because the area is known for seismic activity and he sees nothing unusual or surprising with the earthquake. The last earthquake

to shake Bonner County was April 23, when a 4.1-magnitude quake hit the area. "There's nothing I would consider unusual," Bodin said. "That part of Idaho is seismically active." The U.S. Geological Service owns the earthquake, in conjunction with Montana Bureau of Mines and Geology. "In a sense they located it and are collecting information about it," Bodin said (Bonner County Daily Bee).

5.8.5 Hazard Exposure & Vulnerability

Most of Bonner County's population resides in the moderate risk area, with a projected ground acceleration of 14 percent g (Table 19). The building inventory showed more than four billion dollars of assessed parcel values in this same category (Table 20). Notably, Clark Fork resides in the high-risk area, with a two percent chance of ground acceleration of 16 %g in the next 50 years.

Table 19. Population exposure to earthquakes

	Peak Ground Acceleration		
	12 %g	14 %g	16 %g
Clark Fork	-	536	-
Dover	-	511	-
East Hope	-	208	-
Hope	-	88	-
Kootenai	-	678	-
Oldtown	-	189	-
Ponderay	-	1,133	-
Priest River	-	1,780	-
Sandpoint	-	7,376	-
Unincorporated	659	27,556	163
Total	659	40,055	163

Table 20. Structure value exposure to earthquakes

	Peak Ground Acceleration					
	12 %g		14 %g		16 %g	
	Num. Structures	Total Value	Num. Structures	Total Value	Num. Structures	Total Value
Clark Fork	-	-	191	$13,416,084	-	-

Dover	-	-	342	$118,594,942	-	-
East Hope	-	-	165	$51,521,698	-	-
Hope	-	-	54	$10,548,987	-	-
Kootenai	-	-	273	$35,385,197	-	-
Oldtown	-	-	63	$6,003,470	-	-
Ponderay	-	-	204	$26,766,577	-	-
Priest River	-	-	650	$64,426,225	-	-
Sandpoint	-	-	2,957	$544,605,622	-	-
Unincorporated	1,793	$549,999,551	14,735	$3,383,417,993	77	$13,272,925
Total	1,793	$549,999,551	19,634	$4,254,686,795	77	$13,272,925

Similar to the population and assessed parcel value results, most of the county's critical facilities are located in the moderate risk area. Notably however, one electric power facility and two dams are located in the higher risk area. Earthquakes also pose a notable risk to the county's transportation network, including roads, highways, railways, and bridges. Power lines and communication infrastructure are also at risk to earthquakes.

The SERV model was employed to assess socioeconomic vulnerability to earthquakes in Bonner County (Figure 26). Earthquake exposure was quantified using the peak ground acceleration values as seen in Figure 24. The SERV model shows a concentration of well above average vulnerable census blocks located around Lake Pend Oreille. Vulnerable census blocks are seen across all incorporated cities in the county, as well as census blocks located in the unincorporated areas. In general, the western side of the county exhibits lower vulnerability than the central and eastern side.

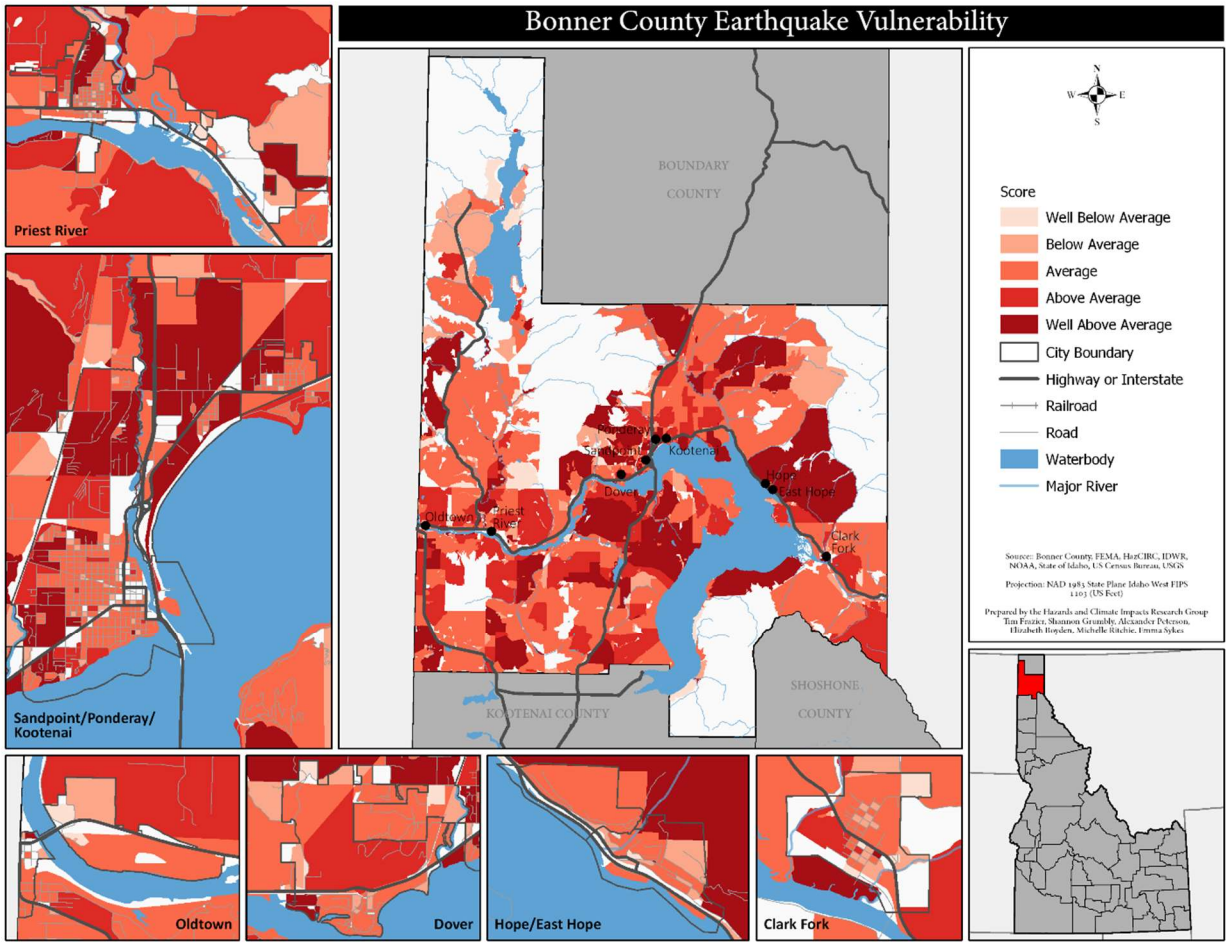


Figure 26. Socioeconomic vulnerability to earthquakes

5.8.6 Land Use & Future Development

Across the county, the ACIs are located in the moderate earthquake risk area. In general, development in Bonner County may increase earthquake risk through increased exposure of populations, structures, and critical infrastructure. The City of Dover, City of Ponderay, City of Priest River, and the City of Sandpoint have adopted the International Building Code including the International Residential Code and the enforcement of these building standards on new development can significantly reduce this risk, as they deliver guidance for how structures should be designed and constructed to limit seismic risk.

5.8.7 Loss Estimations

Hazus-MH was employed to estimate losses resulting from multiple earthquake scenarios in Bonner County. A Level II Hazus-MH analysis was performed for the county's earthquake loss estimation. Critical facilities were updated using various data sources including the HSIP Gold data, the SHMP data, and Infogroup economic data. These facilities were further validated and corrected using satellite imagery to ensure accurate positionality, as well as an estimated square footage to derive loss and replacement costs. National Earthquake Hazard Reduction Program (NEHRP) Soil Maps were produced in order to capture more accurate soil measure. In addition, a user-defined facilities (UDF) database was created from the Bonner County Assessor's Office data. The UDF included earthquake attributes derived from the Hazus-MH technical resources to provide a more accurate loss estimation. It is important to note that Hazus-MH is an empirical model that attempts to best capture the reality of losses stemming from hazard events, but the results are dependent on the data inputted into the model and the quality of its damage functions.

The following Hazus-MH scenarios were performed for Bonner County's Flood Risk Assessment:

- Probabilistic 1,000-year recurrent 7.0 Mercalli Scale magnitude earthquake
- Arbitrary 6.0 Mercalli Scale magnitude earthquake located under Sandpoint
- Historical 1942 5.5 Mercalli Scale magnitude earthquake

The loss estimates vary across the three scenarios. In general, the arbitrary 6.0 magnitude scenario shows significantly greater impacts than the either the probabilistic 7.0 magnitude and the historical 1942 5.5 magnitude scenario due to its location directly under much of the county's development. The loss estimates are broken into short-term response (Table 21); building-related losses (Table 22, Table 24, and Table 26), and critical facility losses (Table 28). Mapping the economic losses also shows differences in the spatial pattern of losses, with notably higher structural losses in and around Sandpoint in the arbitrary scenario (Figure 27, Figure 28, and Figure 29). The Hazus-MH summary reports are located in Appendix E.

Table 21. Short-term response needs

	1942 Historical 5.5	Probabilistic 7.0	Arbitrary 6.0
Debris (tons)	-	10,000	30,000
Truckloads (25 tons/truck)	-	280	1,320
Households Displaced	-	5	76
Shelter Needs	-	3	40
Casualties	1 at 2am 1 at 2pm 1 at 5pm	5 at 2am 5 at 2pm 4 at 5pm	15 at 2am 26 at 2pm 19 at 5pm

Table 22. Historical 5.5 magnitude earthquake building-related losses (thousands of USD)

	Income Losses				Capital Stock Losses			
	Wage	Capital-Related	Rental	Relocation	Structural	Non-Structural	Content	Inventory
Single-Family	-	-	$100	$370	$910	$4,550	$1,350	-
Other Residential	$10	-	$20	$90	$140	$460	$60	-
Commercial	$60	$60	$50	$70	$110	$340	$160	-
Industrial	-	-	-	$10	$30	$100	$60	$10
Others	$10	-	-	$20	$40	$130	$70	-
Total	**$80**	**$60**	**$170**	**$560**	**$1,230**	**$5,580**	**$1,700**	**$10**

Table 23. Historical 5.5 magnitude earthquake building-related loss totals (thousands of USD)

	Single-Family	Other Residential	Commercial	Industrial	Others
Total	**$7,280**	**$780**	**$850**	**$210**	**$270**

Table 24. Probabilistic 7.0 magnitude earthquake building-related losses (thousands of USD)

	Income Losses				Capital Stock Losses			
	Wage	Capital-Related	Rental	Relocation	Structural	Non-Structural	Content	Inventory
Single-Family	-	-	$290	$1,020	$2,340	$10,940	$2,890	-
Other Residential	$60	$30	$210	$510	$810	$2,990	$470	-
Commercial	$600	$560	$380	$510	$800	$2,640	$1,230	$30
Industrial	$30	$20	$10	$60	$210	$720	$420	$80
Others	$60	$10	$20	$150	$230	$730	$350	$10
Total	**$750**	**$620**	**$910**	**$2,250**	**$4,390**	**$18,020**	**$5,360**	**$120**

Table 25. Probabilistic 7.0 magnitude earthquake building-related loss totals (thousands of USD)

	Single-Family	Other Residential	Commercial	Industrial	Others
Total	**$17,480**	**$5,080**	**$6,750**	**$1,550**	**$2,290**

Table 26. Arbitrary 6.0 magnitude earthquake building-related losses (thousands of USD)

	Income Losses				Capital Stock Losses			
	Wage	Capital-Related	Rental	Relocation	Structural	Non-Structural	Content	Inventory
Single-Family	-	-	$780	$2,880	$5,760	$26,940	$7,780	-
Other Residential	$370	$160	$1,020	$970	$1,960	$10,020	$2,070	-
Commercial	$4,720	$4,500	$2,620	$3,830	$6,650	$20,480	$8,580	$210
Industrial	$100	$60	$40	$200	$800	$2,700	$1,630	$270
Others	$180	$50	$100	$760	$990	$3,050	$1,350	$20
Total	**$5,370**	**$4,770**	**$4,560**	**$8,640**	**$16,160**	**$63,190**	**$21,410**	**$500**

Table 27. Arbitrary 6.0 magnitude earthquake building-related loss totals (thousands of USD)

	Single-Family	Other Residential	Commercial	Industrial	Others
Total	**$44,140**	**$16,570**	**$51,590**	**$5,800**	**$6,500**

Table 28. Critical facility losses

		Damage	Inventory Value	Economic Loss	Loss Ratio Percentage
Historical 5.5 Magnitude Event	Hospitals	None	-	-	-
	Schools	None	-	-	-
	EOCs	None	-	-	-
	Police Stations	None	-	-	-
	Fire Stations	None	-	-	-
	Highway	None	$2,159,900	-	-
	Railways	Minimal	$268,900	$60	.02
	Bus	Minimal	$1,100	$30	2.7
	Airport	None	$300	-	-

	Potable Water	None	$31,730	-	-
	Wastewater	Minimal	$352,040	$840	.24
	Natural Gas	None	$14,870	-	-
	Communication	None	$1,000	-	-
	Total	**-**	**$2,829,840**	**$930**	**.03**
Probabilistic 7.0 Magnitude Event	Hospitals	None	-	-	-
	Schools	None	-	-	-
	EOCs	None	-	-	-
	Police Stations	None	-	-	-
	Fire Stations	None	-	-	-
	Highway	Minimal	$2,159,900	$1,140	.05
	Railways	Minimal	$268,900	$250	.09
	Bus	Minimal	$1,100	$100	9.1
	Airport	None	$300	-	-
	Potable Water	None	$31,730	-	-
	Wastewater	Minimal	$352,040	$8,620	2.4
	Natural Gas	Minimal	$14,870	$50	.34
	Communication	None	$1,000	**-**	**-**
	Total	**-**	**$2,829,840**	**$10,160**	**.36**
Arbitrary 6.0 Magnitude Event	Hospitals	Moderate	-	-	-
	Schools	None	-	-	-
	EOCs	None	-	-	-
	Police Stations	None	-	-	-
	Fire Stations	None	-	-	-
	Highway	Moderate	$2,159,900	$27,080	1.25
	Railways	Moderate	$268,900	$1,130	.42
	Bus	Moderate	$1,100	$500	45
	Airport	Minimal	$300	$20	6.7
	Potable Water	None	$31,730	-	-
	Wastewater	Moderate	$352,040	$58,520	16.6
	Natural Gas	Minimal	$14,870	$100	.67
	Communication	Moderate	$1,000	$150	15
	Total	**-**	**$2,829,840**	$87,500	3.1

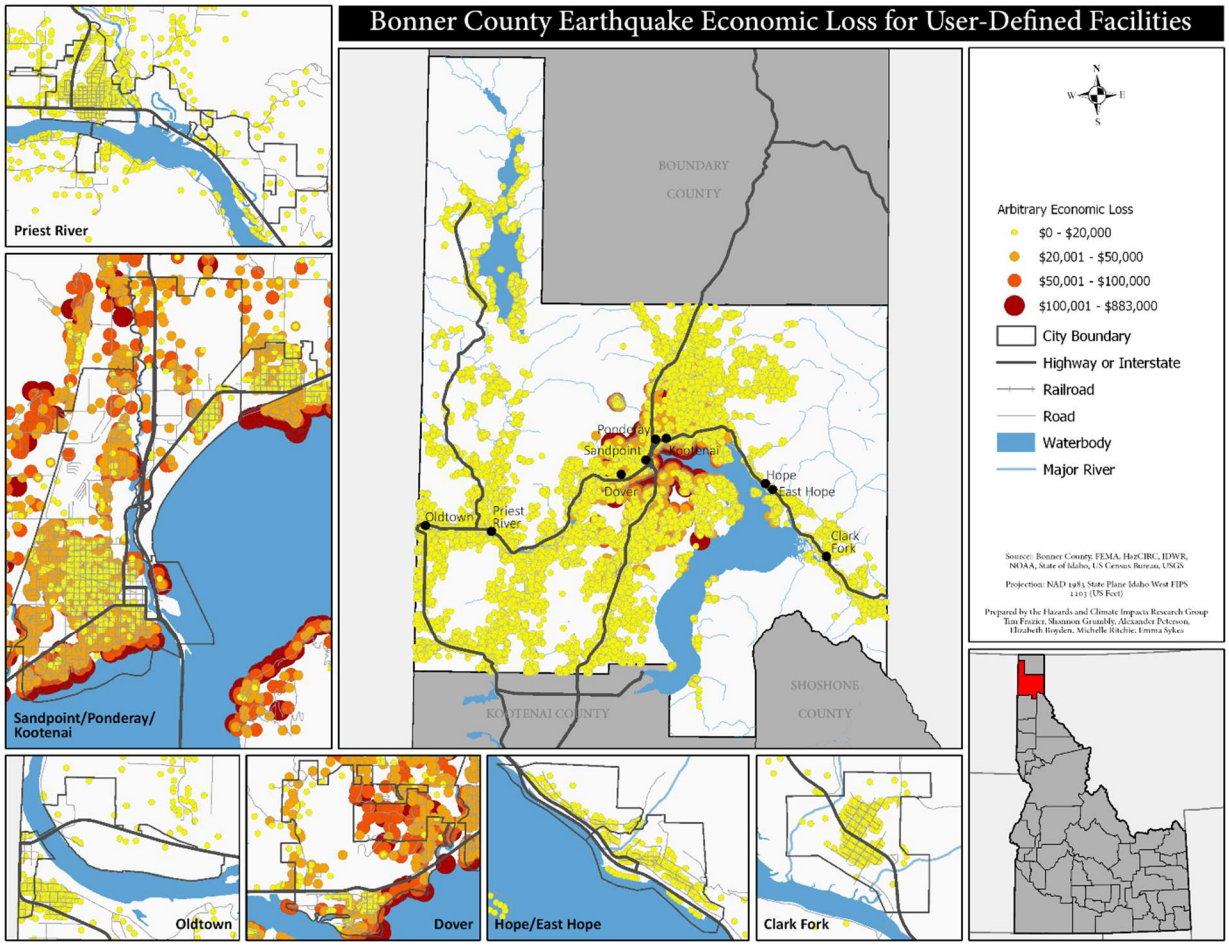


Figure 27. Arbitrary 7.0 magnitude earthquake building losses

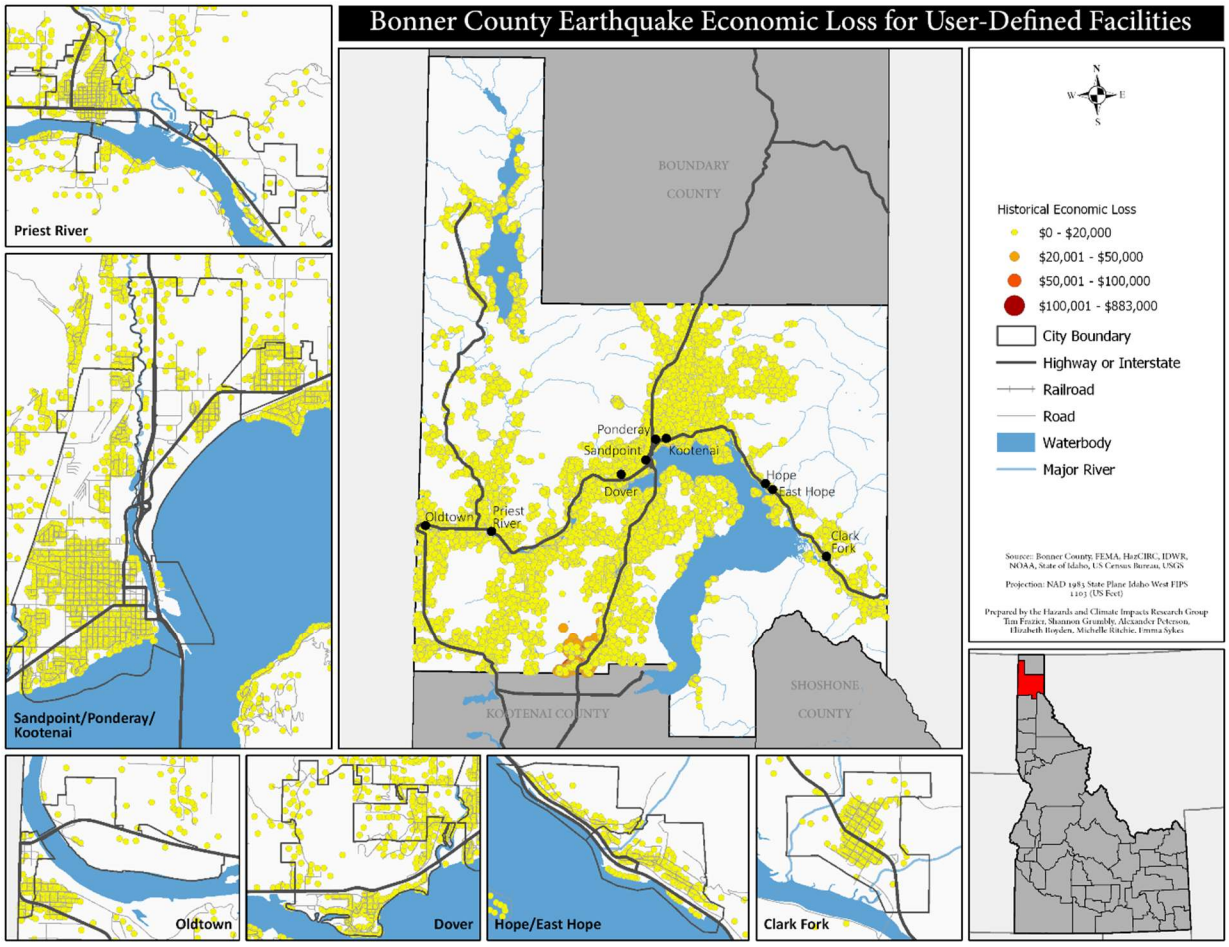


Figure 28. Historical 5.5 magnitude earthquake building losses

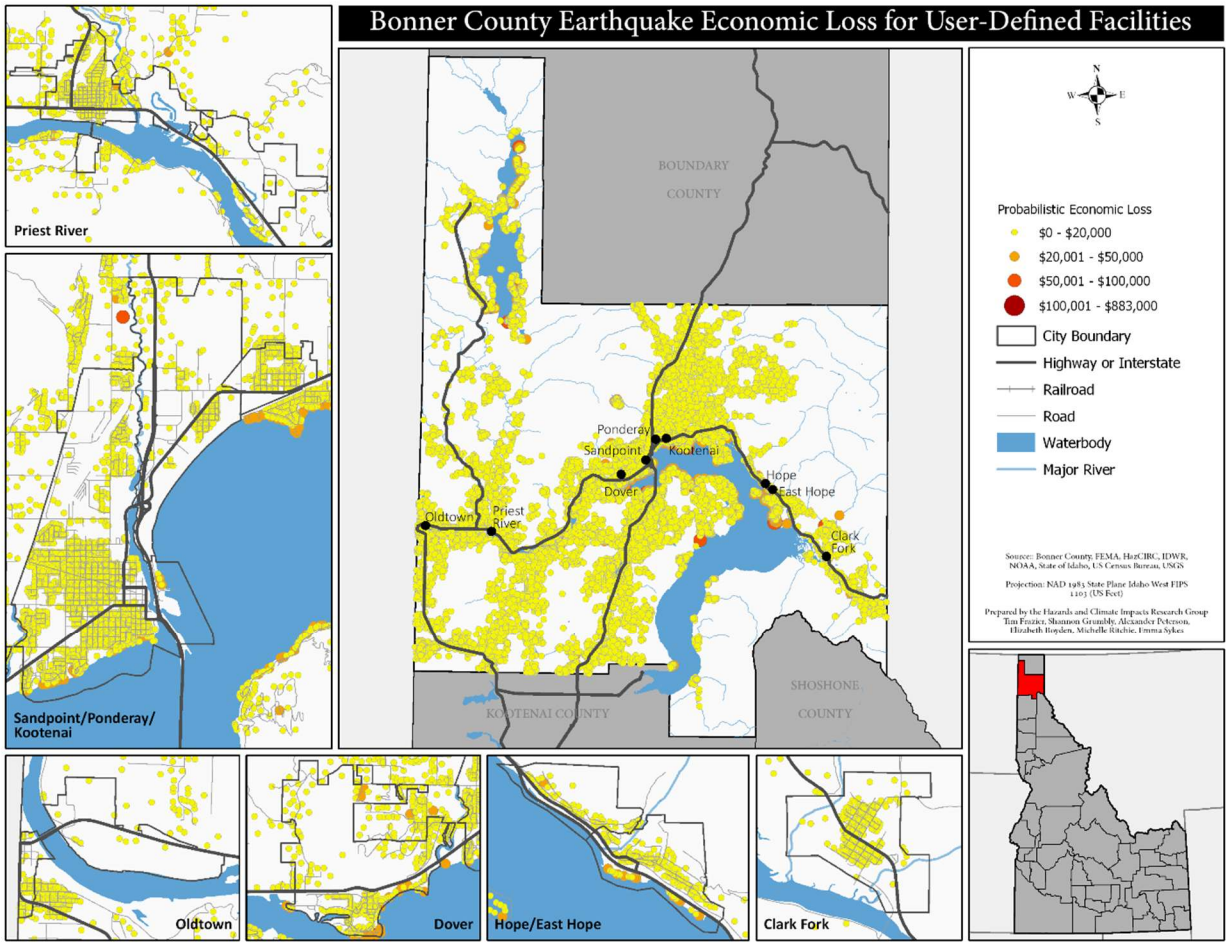
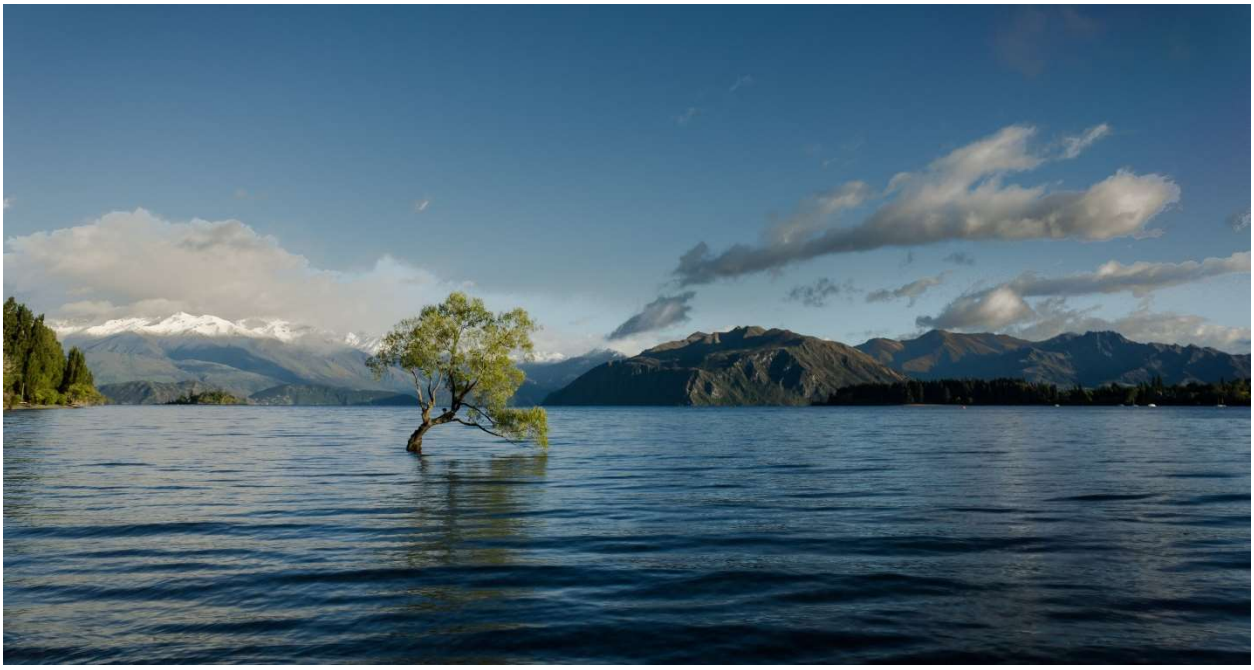


Figure 29. Probabilistic 7.0 magnitude earthquake building losses

5.9 Flood



5.9.1 Overview

Floods are one of the most common hazards across the US, and FEMA's administration of the National Flood Insurance Program (NFIP) makes it one of the highest profile hazards. Bonner County has experienced five Federal disaster declarations and more than $7 million in property damages from floods, making it one of the county's primary hazards. The 2017 update reorganized the flood hazard profile, incorporated additional data and modeling, and presented a more comprehensive and cohesive analysis of the county's flood risk.

Table 29. Flood summary

	Before 2009	2009-2017	Total
Occurrences	10	14	24
Disaster Declarations	4	1	5
Casualties	-	-	-
Property Damage	$4,871,906	$2,562,000	$7,433,906
Repetitive Losses	-	-	-

5.9.2 Hazard Description

Thousands of floods occur each year, making it one of the most common hazards in all 50 states. Flooding is a natural process where excess water overflows a waterway and inundates adjacent land. Flooding results from a number of different causes, including riverine flooding, flash flooding, ice or debris jam flooding, structural failures or breakages, precipitation or snowmelt, and mudflows. Floodplains are those areas the excess water inundates, and range from narrow and confined channels to wide and flat areas depending on the topographical features near the waterway. Floodplain characteristics contribute to the speed and characteristics of flooding. In narrow and confined channels, flooding is normally rapid but short duration, with deep and rapid floodwaters. In contrast, flooding can be relatively slow and shallow and last for long periods of time in flat floodplains. The size of a flood is influenced by many factors, such as the size of the catchment area or watershed, topographic characteristics such as mountainous slopes and elevation changes, land-use characteristics or structural modifications, and the characteristics of meteorological events.

The following are short descriptions of flood types:

- Riverine Flood – Most commonly thought of as a 'flood' given its commonality and dangers. Riverine flooding occurs when the floodplain (the lowland areas adjacent to rivers and lakes) is inundated with water, usually caused by a weather system with prolonged or intense rainfall. Large-scale weather systems can cause both large and small rivers and streams to flood, notably if prolonged or intense rainfall is distributed over a wide area. Localized weather systems can also produce flooding, though normally such systems impact smaller rivers and streams. Riverine flooding can result from snowmelt, which in turn can be caused by above-freezing temperatures and rain-on-snow events.
- Flash Flood – This type of flooding is characterized by a rapid rise in surface water levels, and normally characterized by high water flow velocity. Flash floods are capable of carrying large amounts of debris, such as trees and boulders, and are capable of extensive damage. Flash floods are often driven by intense rainfall events in areas with steep watershed or stream gradients. Dam or levee failure, wildfire, debris or ice jam breakage, and rapid snowmelt can cause flash floods as all can release large volumes of stored water in a short period of time. Urban development also drives flash floods due to an increase of impervious surfaces, inadequate or failing drainage systems, and channelization of rivers and streams.
- Alluvial Fan Flood – This type of flood occurs most commonly in the alluvial fans created by the meandering of streams and rivers, and are the most prevalent flood type in arid regions. Alluvial fans pose a significant flood risk due to active erosion, sedimentation, deposition, and unpredictability of flow paths. As the floodway fills with deposited sediment, the river or stream can quickly reach overbank flood stages and channelize a new floodway. Human activities often exacerbate flooding and erosion on alluvial fans by altering flow patterns and constructing impervious surfaces with the potential to carry high-velocity flows to lower portions of the fan.

- Ice & Debris Jam Flood – Similar in characteristics to riverine floods and flash floods, ice jams or debris can accumulate at obstruction points on a stream or river and restrict water flow upstream, causing the banks behind the obstruction to inundate. These jams can also break, resulting in a sudden large discharge of stored water to the downstream reaches. The formation of these jams is dependent on meteorological and other physical conditions, often occurring at natural channel constrictions or where the channel is shallow enough to allow waters to freeze. Human-built structures such as bridges can also act as obstruction points. Ice and debris jam flooding most often occurs in the fall, winter, and spring due to the formation and loss of ice. Flood damages from ice and debris jam breakages often exceed that caused by riverine flooding, as flood elevations are higher and more unpredictable and flood waters can also carry debris.

Floods kill an average of 150 people per year nationwide. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Effects from flooding can also include floating fuel tanks, inundation of subdivisions, road washouts, and basement flooding all of which can result in extensive damage.

5.9.3 Hazard Extent, Magnitude, & Probability

Lands proximate to a river that is identified as susceptible to flooding is termed the floodplain. Oftentimes, floodplains are delineated for the 100-year flood, otherwise known as the one percent annual chance floodplain. The 100-year flood designation corresponds to a statistically-independent one percent chance every year of water levels exceeding a set magnitude. It is important to note that this base flood level can occur every year, and can occur consecutively. Similarly, a 500-year flood corresponds to a 0.2 percent annual chance of water levels exceeding a set magnitude. Flood damage is influenced by the speed and volume of water flow, the inundation level and length of time, and the amount of sediment and debris carried and deposited by the floodwaters.

The majority of flooding in Bonner County is around the various rivers and streams that enter and exit Bonner County's lakes. The largest floods occur in late winter, when warm rains falling on melting snow amplify snowmelt. During these rain-on-snow events, Bonner County's smaller lakes are subject to some flooding. Flood season generally begins in April, peaks in May or June, and ends in July. Figure 30 shows the FEMA-mapped floodplain, with three corresponding regulatory flood zones. These zones are described below:

- Zone X – Areas identified in a community's FIS as areas of moderate or minimal hazard from the principal source of flood in the area. However, buildings in these zones could be flooded be severe, concentrated rainfall couple with inadequate local drainage systems. Local stormwater drainage systems are not normally considered in a community's FIS. The failure

of a local drainage creates areas of high flood risk within these rate zones. Flood insurance is available in participating communities but is not required by regulation in these zones.

- Zone A – Areas subject to inundation by the one percent annual chance flood event. Because detailed hydraulic analyses have not been performed, no BFEs or flood depths are shown. Mandatory flood insurance purchase requirements apply.
- Zone AE – Areas subject to inundation by the one percent annual chance flood event determined by detailed methods. BFEs are shown within these zones. Mandatory flood insurance purchase requirements apply.

It is important to note the difference between the regulatory floodplain and the physical floodplain. The regulatory floodplain corresponds to an area delineated by FEMA where specific regulations (e.g., the National Flood Insurance Program) apply. The regulatory floodplain is more limited than the physical floodplain, as it is delineated through surveys and modeling that cannot account for all waterways and waterbodies in the county. As Bonner County is one of the few counties in the state with Digital Flood Insurance Rate Maps (DFIRMS), this plan limits the risk assessment to the FEMA-mapped zones.

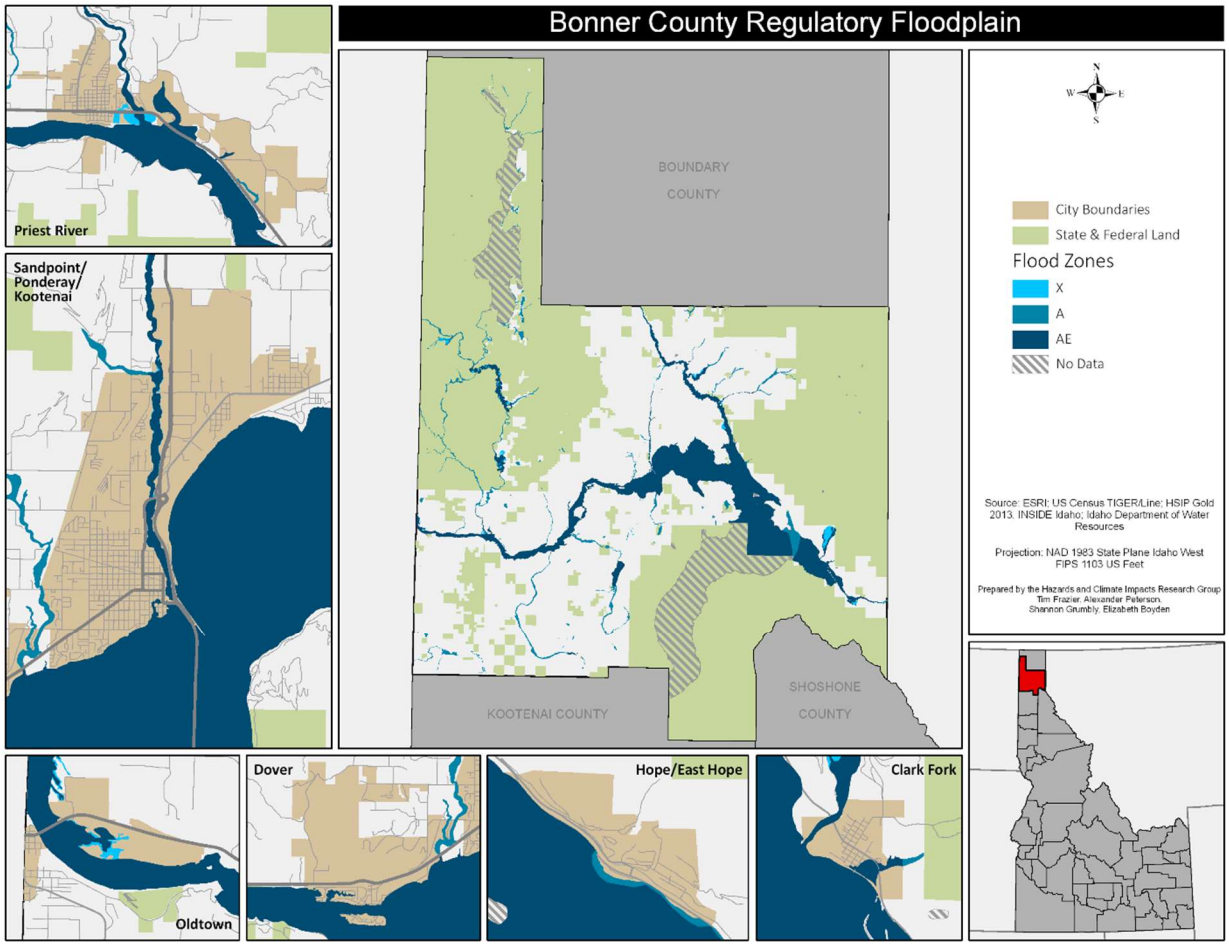


Figure 30. Regulatory floodplain map

5.9.4 Hazard Occurrences

Given Bonner County's ample surface water, floods have occurred regularly across the county. The county has had five flood-related Federal disaster declarations and more than $7 million in property damages, making it one of the primary loss-inducing hazards. Table 30 shows flood occurrences in the county.

Table 30. Flood occurrences

Date	Location	Type	Casualties	Property Damage	Crop Damage	Source
2/15/1982	-	Flood	-	$1,000,000	-	SHELDUS
3/2/1989	-	Flood	-	$7,143	-	SHELDUS
11/24/1990	-	Flood	-	$10,000	-	SHELDUS

4/5/1991	-	Flood	-	$500,000	-	SHELDUS
2/8/1996	-	Flood	-	-	-	SHELDUS
4/24/1996	-	Flood	-	$16,667	-	SHELDUS
5/1/1997	-	Flood	-	$571,429	-	SHELDUS
6/1/1997	-	Flood	-	$666,667	-	SHELDUS
5/26/1998	Sandpoint	Flash Flood	-	$100,000	-	SHELDUS, NWS
11/7/2006	Clark Fork	Flood	-	$2,000,000	-	SHELDUS
3/31/2011	Elmira	Flood	-	$1,790,000	-	NWS
6/17/2011	Factory	Flood	-	$20,000	-	NWS
7/1/2011	Factory	Flood	-	$20,000	-	NWS
1/29/2012	Cabinet	Flood	-	-	-	NWS
3/30/2012	Priest River	Flood	-	$72,000	-	NWS
3/30/2012	Westmond	Flood	-	$550,000	-	NWS
3/31/2012	Forest Siding		-	$70,000	-	NWS
6/6/2012	Forest Siding	Flood	-	-	-	NWS
6/6/2012	Clark Fork	Flood	-	$15,000	-	NWS
3/9/2014	Ponderay	Flood	-	$25,000	-	NWS
12/9/2015	Sandpoint	Flood	-	-	-	NWS
12/9/2015	Clark Fork	Flood	-	-	-	NWS
12/9/2015	Samuels	Flood	-	-	-	NWS
12/9/2015	Elmira	Flood	-	-	-	NWS

Source: NWS, SHELDUS

The following are disaster declarations summaries:

- Idaho Flooding, Landslides, and Mudslides (DR-1987)
    - Incident Period: March 31, 2011 to April 11, 2011
      Major Disaster Declaration declared on May 20, 2011
    - Affected Areas: Bonner County, Clearwater County, Idaho County, Nez Perce County, and Shoshone County
    - http://www.fema.gov/disaster/1987
- Idaho Flooding (DR-1177)
    - Incident Period: March 14, 1997 to June 30, 1997
      Major Disaster Declaration declared on June 13, 1997

    - Affected Areas: Benewah County, Bingham County, Bonner County, Bonneville County, Boundary County, Butte County, Custer County, Fremont County, Jefferson County, Kootenai County, Madison County, and Shoshone County
    - https://www.fema.gov/disaster/1177
- Idaho Severe Storms/Flooding (DR-1154)
    - Incident Period: November 16, 1996 to January 03, 1997
      Major Disaster Declaration declared on January 04, 1997
    - Affected Areas: Adams County, Benewah County, Boise County, Bonner County, Boundary County, Camas County, Clearwater County, Elmore County, Gem County, Idaho County, Kootenai County, Latah County, Nez Perce County, Owyhee County, Payette County, Shoshone County, Valley County, and Washington County
    - https://www.fema.gov/disaster/1154
- Idaho Storms/Flooding (DR-1102)
    - Incident period: February 06, 1996 to February 23, 1996
      Major Disaster Declaration declared on February 11, 1996
    - Affected areas: Benewah County, Bonner County, Boundary County, Clearwater County, Idaho County, Kootenai County, Latah County, Lewis County, Nez Perce County and Shoshone County
    - https://www.fema.gov/disaster/1102
- Idaho Severe Storms, Snowmelt, Flooding (DR-415)
    - Incident Period: January 25, 1974
      Major Disaster Declaration declared on January 25, 1974
    - Affected Areas: Adams County, Benewah County, Bonner County, Boundary County, Clearwater County, Kootenai County, Latah County, Shoshone County, and Washington County
    - https://www.fema.gov/disaster/415

The following sections detail previous occurrences across the incorporated cities:

- Clark Fork – The City of Clark Fork is located in a triangle formed by Lightning Creek to the west, Mosquito Creek to the east, and the Clark Fork River to the south. The Clark Fork River originates in the mountains of Montana and drains a basin of approximately 22,000 square miles. Lightning and Mosquito Creeks drain heavily timbered mountainous terrain to the north, and flow southerly to their confluence with the Clark Fork River, south of the town of Clark Fork. The City of Clark Fork is located on flood-prone land, with flood potential from the Clark Fork River, Lightning Creek, and Mosquito Creek. The major cause of flooding is rainfall on snow with subsequent melting (FEMA, 1981). Two severe floods from the Clark Fork River occurred in 1894 and in 1948. The flood of June 1948 had a discharge of 153,000 cubic feet per second (cfs). Both floods affected only the southern-most areas of the city. A flood from Lightning Creek in December 1921 affected only the southwestern part of the city. In January 1974, major flows were experienced in all tributaries near the City of Clark Fork. Lightning Creek carried large amounts of silt and debris, but no major flooding of the city resulted

(FEMA, 1981). A levee protects the west side of the city of Clark Fork from the 100-year flood hazards of Lightning Creek. The U.S. Army Corps of Engineers rebuilt the levee in 1959 and was reinforced in 2008. Dams on the upper Clark Fork River decrease the chances of flooding. The physical proximity of Clark Fork also protects the city from 100-year inundation. However, the greater part of the City of Clark Fork is affected by 500-year flows from the Clark Fork River, Lightning Creek, and Mosquito Creek.

- Kootenai – Flooding occurs on a regular basis in the City of Kootenai because parts of the current stormwater system do not have adequate capacity for rainfall, land use, and soil conditions. The area is relatively flat, with an average slope of approximately one percent. The runoff flows in a southeast direction from pastureland in the north through residential and commercial areas before being deposited in Boyer Slough and Land Pend Oreille (Black Diamond Engineering, 2005).
- Priest River – The source of flooding for the City of Priest River is the Priest River and Pend Oreille River. Pend Oreille River is a reservoir-like body of water due to presence of Albeni Falls Dam. The flooding from Priest River is confined to the shore areas, but the backwater from Pend Oreille River into Priest River floods a substantially larger area. A major impoundment structure exists on Lake Pend Oreille at Albeni Falls. This is mainly used for power production purposes and to control the annual minimum lake level to an elevation higher than would be experienced under the natural conditions and to reduce the maximum lake level for floods.
- Sandpoint – The City of Sandpoint is located on Lake Pend Oreille at the confluence of Lake Pend Oreille and Sand Creek, which are the primary sources of flooding for the city. Sand Creek originates north of the City of Sandpoint and drains an area of 38.5 square miles. The City of Sandpoint is situated on relatively flat land, with mountainous terrain to the west and northwest, and Lake Pend Oreille to the east and south. The main sources of flooding for the city are Sand Creek and Lake Pend Oreille. Lake Pend Oreille's elevation is controlled by Albeni Falls Dam. FEMA and the NFIP determined that flood prone areas in Sandpoint occur in the residential area south of the Central Business District and City Beach. Sand Creek and Chuck Slough also pose flood dangers as each are located along current municipal boundaries. These areas are designated with the FEMA 100-year flood boundary that represents a one percent chance per year of flooding (Sandpoint Comprehensive Plan, 2009). Sandpoint received excessive damage in the flood of January 1974, with the Governor proclaiming the county a disaster area.

Other flood events include the following:

- May 20 & 22, 2008 – A squad of inmate workers were deployed to Trestle Creek to fortify a sandbag line shielding Trailer Haven from flood water. Montana Rail Link crews scrambled to protect railroad infrastructure on the lake's north shore. A train-mounted crane shuttled between Clark Fork and Trestle Creek to combat bed loading beneath ridges so water could continue to pass. Residents were asked to use water conservatively because flooding in Strong Creek overwhelmed a diversion dam directing water to the treatment system. Runoff from melting snowpack was sending sediment boulders and trees down the creek. The sediment

formed a layer of mud on the treatment plant's sand filters, which reduced their output. The diversion dam was later completely plugged and Strong Creek found a path around the structure. The cascade of water and material in Strong Creek was also overwhelming the Montana Rail Link bridge next to Highway 200. Four excavators were scooping out tons of rock on either side of the bridge so the creek could continue to pas beneath it. Culverts under various county roads were working overtime or not at all. Water was washing over road sections on Upper Gold Creek, upper Pack River and East Spring Creek Road near the Clark Fork hatchery. (County Continues to Grapple with Flooding, Bonner County Daily Bee; May 22, 2008)

- December 10, 2015 – Bonner County declares a disaster because of the flooding and washed out roads. The emergency management director, Bob Howard, says it'll help get the resources they need much faster. North Boyer Road near Schweitzer Creek was one of the most heavily affected roads. Howard says it'll probably be closed for public travel for a few more days because the road and bridge professionals still need to work on it. It's also important not to drive over roads with water on them. "Water's going over the road. It also undercuts the road underneath the road surface so we make sure that's not the case because there's a potential a car can break through and end up down the stream or in a flood situation or accident," Howard says. People who live around the area say this is something you usually see in the spring. "We left early this morning because we noticed that the creek below our house was running out of control and it was obviously jumping outside of the old creek bed and finding new paths down," Bob Walsh says. Bob and Lynne Walsh live near where the creek diverted. They got a text alert from the Bonner County Sheriff's Office about the road conditions. "You could hear the large boulders that were tumbling down the creek with the force of the water," Lynne says about the snow melt and rain filled the waterways. "We've been working on our property up here for eight years, had everything parked out, cleaned up, little benches that my husband built," Lynne says. "That's all gone now. All underwater." They can take HWY 95 as a detour in the meantime. "This is how we get in and out to our house," Bob says. "So it'll be interesting to see what they'll have to do to get it back into its original creek bed." But they're not worried. They say they have confidence in the county's efforts (KHQ.com).

5.9.5 Hazard Exposure & Vulnerability

Most of Bonner County's population does not reside in a flood-exposed area; however, more than 15,000 people are located in census blocks that are in some way inundated by floods according to the FEMA regulatory floodplain maps. The communities of Sandpoint and Clark Fork show the highest numbers of residents exposed to floods. More than one billion dollars are exposed in Bonner County to the one percent chance annual flood event, with Hope, Priest River, and Sandpoint showing the highest exposed parcel values.

Table 31. Population exposure to floods

	Flood Event						
	0.01 Percent	0.002 Percent	Clark Fork	Lower Pack	N. Tributary	Main Priest R.	Sand Creek
Clark Fork	174	182	325	-	-	-	-
Dover	103	103	-	-	-	74	-
East Hope	-	-	-	-	-	-	-
Hope	-	-	-	-	-	-	-
Kootenai	-	-	-	-	-	-	-
Oldtown	-	-	-	-	-	13	-
Ponderay	4	4	-	-	-	-	4
Priest River	2	2	-	-	-	3	-
Sandpoint	620	620	-	-	-	615	88
Unincorporated	10,528	10,691	342	2,103	402	2,879	215
Total	11,154	11,317	342	2,103	402	3,497	303

Table 32. Structure exposure to floods

	Event						
	0.01 Percent	0.002 Percent	Clark Fork	Lower Pack	N. Tributary	Main Priest R.	Sand Creek
Clark Fork	18	22	88	-	-	-	-
Dover	104	116	-	-	-	31	-
East Hope	-	-	-	-	-	-	-
Hope	-	-	-	-	-	-	-
Kootenai	-	-	-	-	-	-	-
Oldtown	-	-	-	-	-	-	-
Ponderay	-	-	-	-	-	-	-
Priest River	15	15	-	-	-	1	-
Sandpoint	144	144	-	-	-	152	58
Unincorporated	691	767	123	56	21	245	2
Total	850	926	123	56	21	398	60

Table 33. Structure value exposure to floods (thousands of USD)

	Flood Event						
	0.01 Percent	0.002 Percent	Clark Fork	Lower Pack	N. Tributary	Main Priest R.	Sand Creek
Clark Fork	$1,185	$1,350	$6,116	-	-	-	-
Dover	$36,412	$39,891	-	-	-	$9,091	
East Hope	-	-	-	-	-	-	-
Hope	-	-	-	-	-	-	-
Kootenai	-	-	-	-	-	-	-
Oldtown	-	-	-	-	-	-	-
Ponderay	-	-	-	-	-	-	-
Priest River	$3,684	$3,684	-	-	-	$142	-
Sandpoint	$41,814	$41,814	-	-	-	$42,403	$24,971
Unincorp.	$2,852,493	$273,996	$22,883	$12,708	$3,774	$106,397	$263
Total	$2,897,991	$319,494	$22,883	$12,708	$3,774	$148,942	$25,234

Facilities located along all waterbodies should be hardened against flood inundation, especially those structures located in the A and AE flood zones. Most critical facilities are located outside the regulatory floodplain, although the geomorphological factors that determine flood inundation might change due to development, changes in climate, and changes in floodway characteristics. Priest River, Sandpoint, Hope and East Hope, and Dover all have critical facilities located near flood areas, and it is important to harden all critical facilities against flood damage.

The SERV model was employed to assess socioeconomic vulnerability to floods in Bonner County (Figure 31). Flood exposure was quantified using the 100-year regulatory floodplain, as seen in Figure 30, that include the X, A, and AE flood zones. The SERV model shows a concentration of well above average vulnerable census blocks located around Lake Pend Oreille. Vulnerable census blocks are seen across all incorporated cities in the county, as well as census blocks located in the unincorporated areas. In general, the western side of the county exhibits lower vulnerability than the central and eastern side.

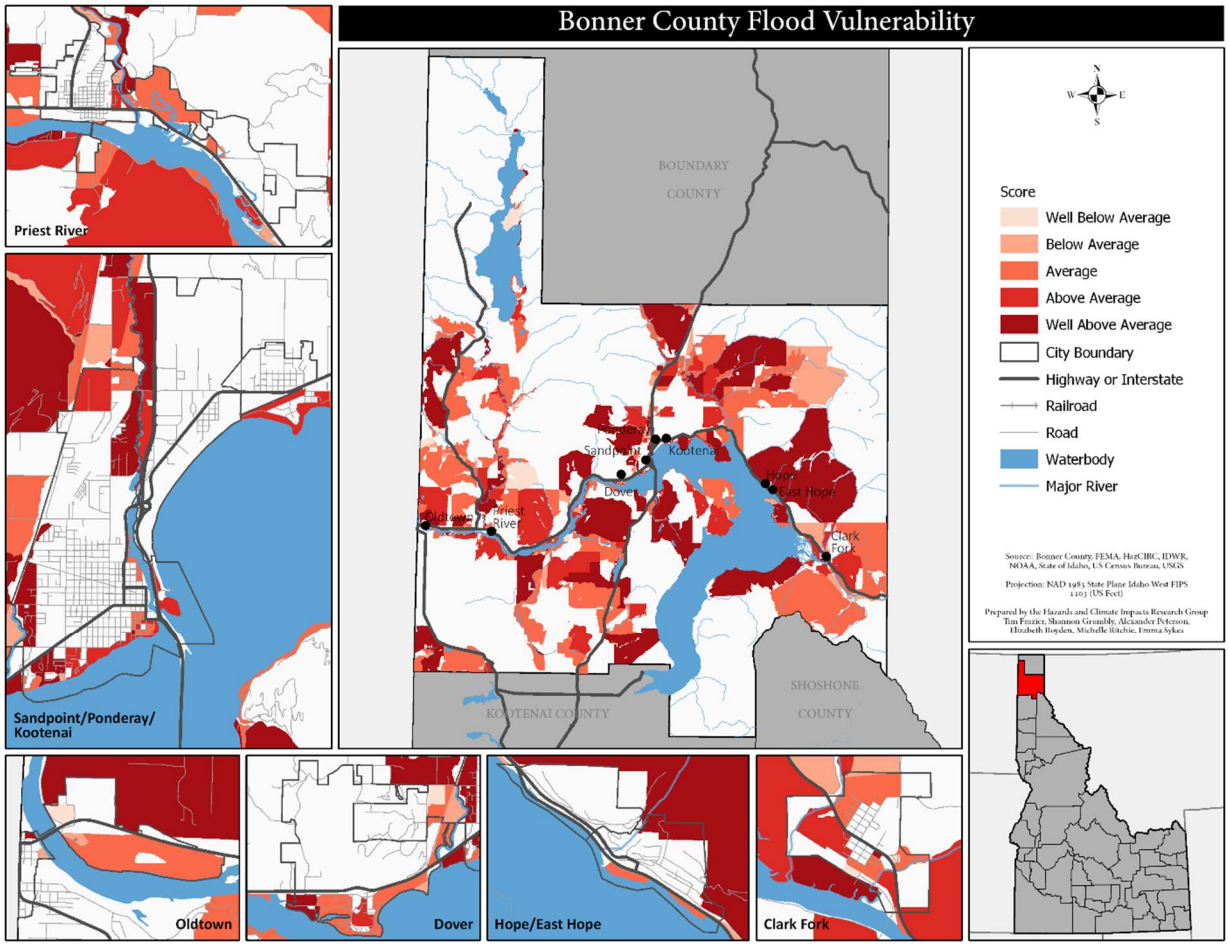


Figure 31. Socioeconomic vulnerability to floods

5.9.6 Land Use & Future Development

Waterline property often attracts development for recreation, scenic, or industrial uses; therefore, it is vital to assess how future development might enhance individual or community vulnerability to flood. According to local officials in Sandpoint, land located in and along the regulatory floodplain is limited, with little potential for future development.

Discussions with the Ponderay Planning Director indicated that future projects may be impacted by flooding. Currently, a bridge is being built on Schweitzer Cut-off road on the boundary of Ponderay and Sandpoint that will need a permit and thus be impacted by the NFIP regulations. An engineering study was completed and it was found that the new bridge will have large flow capacity, which may impact what occurs downstream in relation to increased water flow. The city also has plans for a park to build near the lake shore, which may be impacted by the flooding and NFIP regulations as well.

5.9.7 Loss Estimations

Hazus-MH was employed to estimate losses resulting from multiple flood scenarios in Bonner County. A Level II analysis was performed for Bonner County's flood loss estimation, and critical facilities were updated using various data sources including the HSIP Gold data, the SHMP data, and Infogroup economic data. These facilities were further validated and corrected using satellite imagery to ensure accurate positionality in the county, as well as an estimated square footage to derive loss and replacement costs. A UDF database was created from the Bonner County Assessor's Office. The UDF included flood-related attributes derived from the Hazus-MH user manuals to provide a more accurate loss estimation.

The following Hazus-MH scenarios were performed for Bonner County's Flood Risk Assessment:

- One percent annual chance flood event using an interpolated depth grid derived from the county's Digital Flood Insurance Rate Maps (DFIRM) and Base Flood Elevations (BFE) for the following stream reaches:
    - Clark Fork River
    - Lower Pack River
    - Main Priest River
    - North Tributary of Priest River
    - Sand Creek
    - Combined Reaches
- 0.01 percent annual chance (100-year) flood event using non-regulatory depth grid provided by FEMA.
- 0.002 percent annual chance (500-year) flood event using non-regulatory depth grid provided by FEMA.

The loss estimates vary across all the scenarios. In general, however, the scenarios employing the non-regulatory depth grids show similar displaced households, sheltered individuals, and truckloads to clear debris, while the interpolated river reaches show a higher amount of debris, structural losses, and building damage (Table 34). In comparison, damage to essential facilities is greater in the non-regulatory floodplain scenarios (Table 35). Mapping the structural losses also shows differences in the spatial pattern of losses, with distinct clusters of damage across the county (Figure 34, Figure 35 and Figure 36). Note that the three loss estimate maps share the same class breaks to allow for easier comparison across all scenarios. The Hazus-MH summary reports are located in Appendix E.

Table 34. Short-term response

	1 Percent Annual (interpolated)	1 Percent Annual (FEMA)	0.2 Percent Annual (FEMA)
Debris (Tons)	5,081	2,571	2,880
Truckloads (25 Tons/Truck)	203	103	115
Households Displaced	392	402	441
Individual Shelter Needs	491	417	457

Table 35. Damage to essential facilities

		Number of Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
1 Percent Annual (HazCIRC)	Hospitals	-	-	-
	Schools	-	-	-
	EOCs	-	-	-
	Police Stations	-	-	-
	Fire Stations	1	-	1
1 Percent Annual (FEMA)	Hospitals	-	-	-
	Schools	-	-	-
	EOCs	-	-	-
	Police Stations	-	-	-
	Fire Stations	2	-	2
0.2 Percent Annual (FEMA)	Hospitals	-	-	-
	Schools	-	-	-
	EOCs	-	-	-
	Police Stations	-	-	-
	Fire Stations	1	-	2

Table 36. Building-related economic losses (thousands of USD)

		Building Losses			Business Interruption			
		Building	Content	Inventory	Income	Relocation	Rental Income	Wage
1 Percent Annual (HazCIRC)	Residential	$40,480	$20,930	-	-	$30	-	-
	Commercial	$2,160	$5,560	$80	$20	-	-	$10
	Industrial	$790	$1,250	$160	-	-	-	-
	Others	$480	$2,330	$20	$10	-	-	$50
	Total	**$43,910**	**$30,070**	**$260**	**$30**	**$30**	**-**	**$60**
1 Percent Annual (FEMA)	Residential	$23,550	$12,140	-	-	$40	-	-
	Commercial	$720	$2,140	$40	$10	-	-	$10
	Industrial	$300	$520	$60	-	-	-	-
	Others	$150	$960	$10	-	-	-	$90
	Total	**$24,720**	**$15,760**	**$110**	**$10**	**$40**	**-**	**$100**
0.2 Percent Annual (FEMA)	Residential	$27,120	$14,010	-	-	$40	-	-
	Commercial	$900	$26,400	$50	$10	-	-	$10
	Industrial	$390	$680	$80	-	-	-	-
	Others	$180	$1,110	$10	-	-	-	$90
	Total	**$28,590**	**$42,200**	**$140**	**$10**	**$40**	**-**	**$100**

Table 37. Building economic loss totals (thousands of USD)

	Residential	Commercial	Industrial	Others
1 Percent Annual Total (HazCIRC)	$61,440	$7,830	$2,200	$2,890
1 Percent Annual Total (FEMA)	$35,730	$2,920	$1,760	$1,210
0.2 Percent Annual Total (FEMA)	$41,170	$27,370	$1,150	$1,390

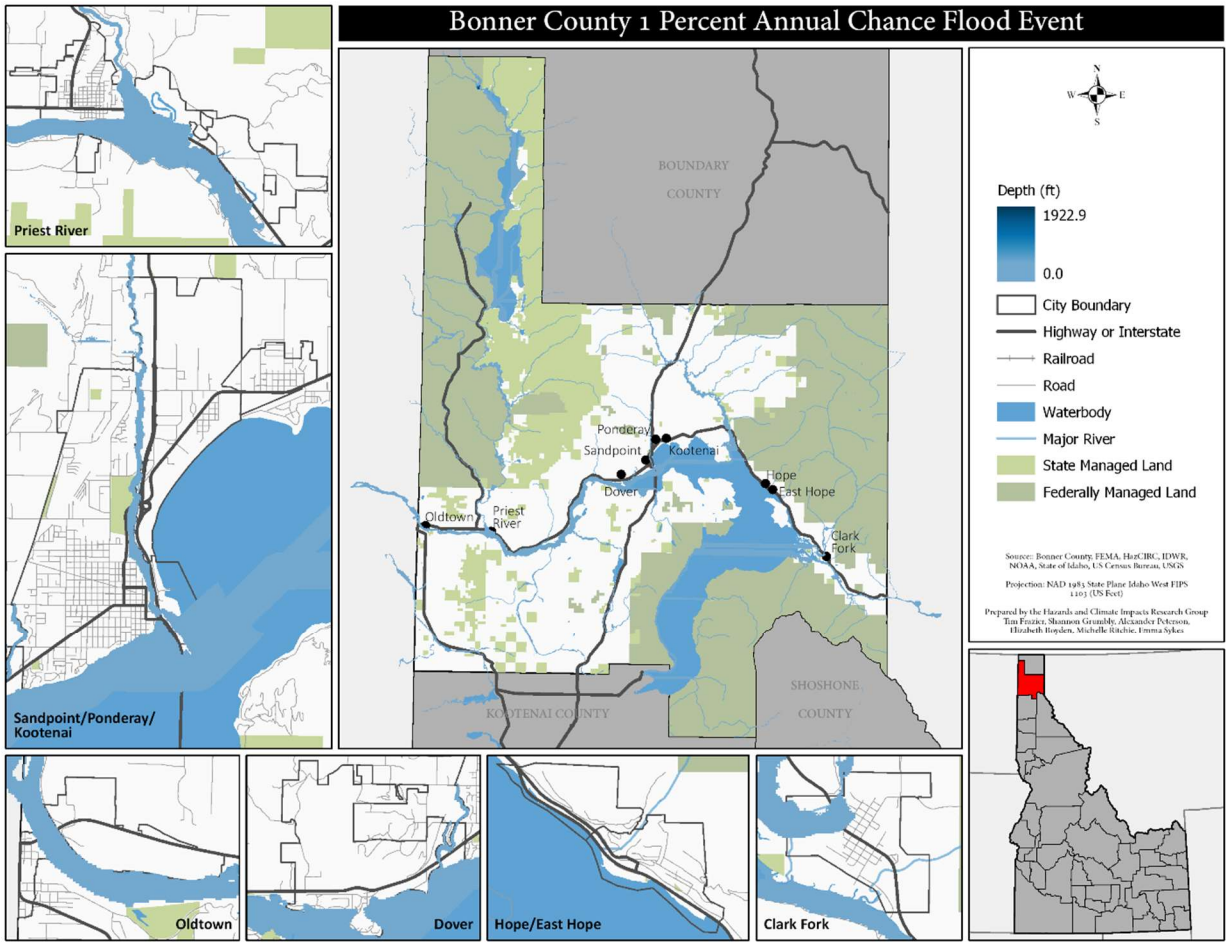


Figure 32. Modeled one percent annual chance flood extent and depth

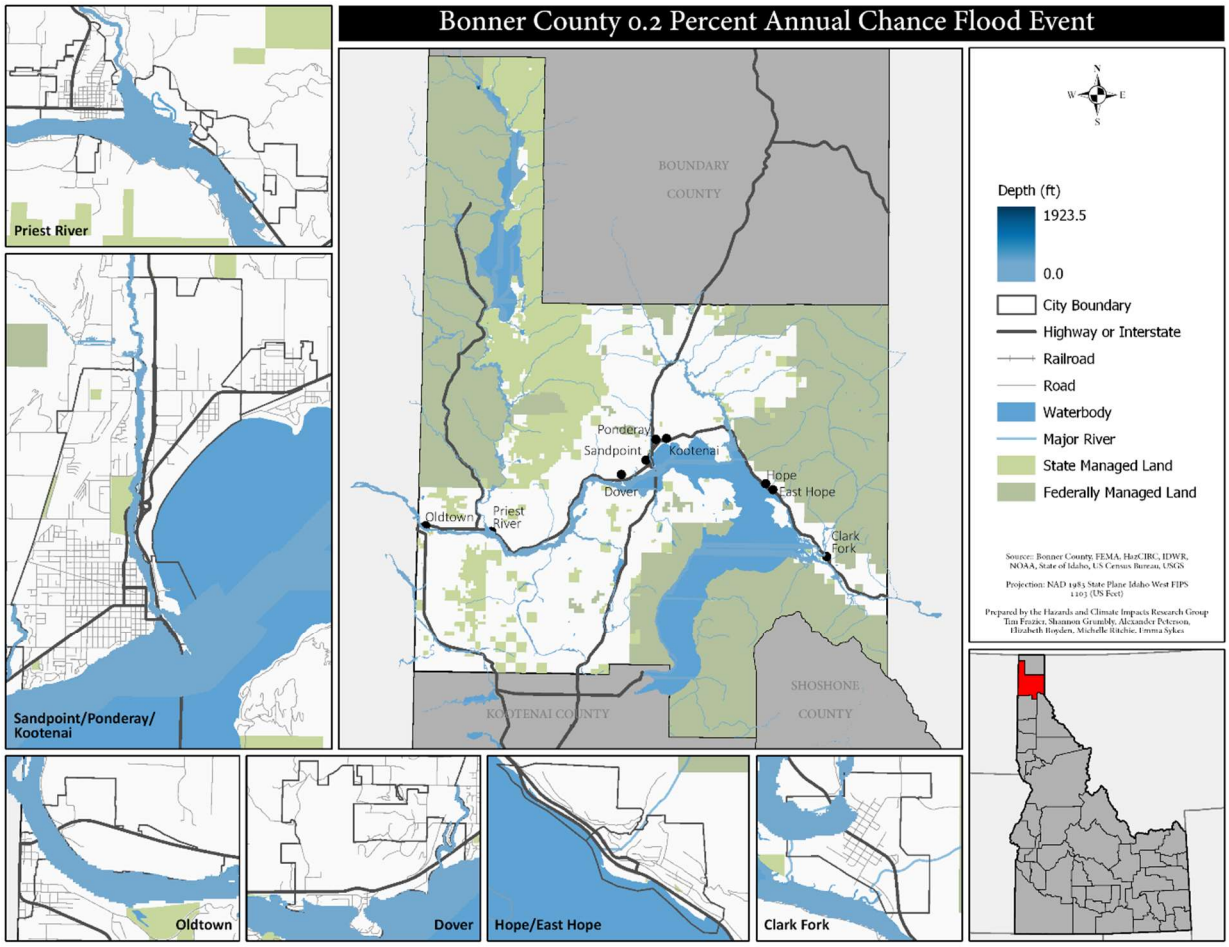


Figure 33. Modeled 0.2 percent annual chance flood extent and depth

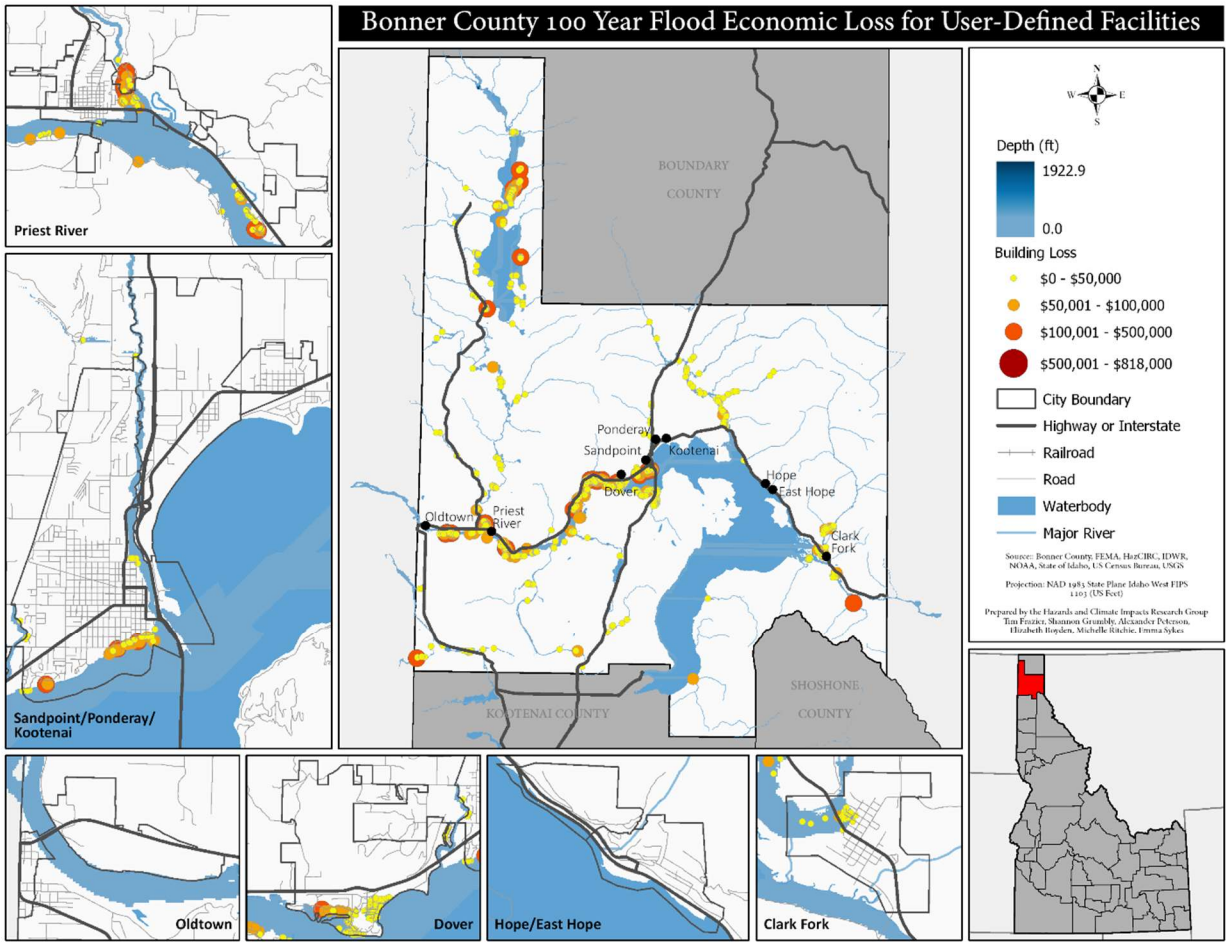


Figure 34. Loss estimates for the 1 percent annual chance flood event

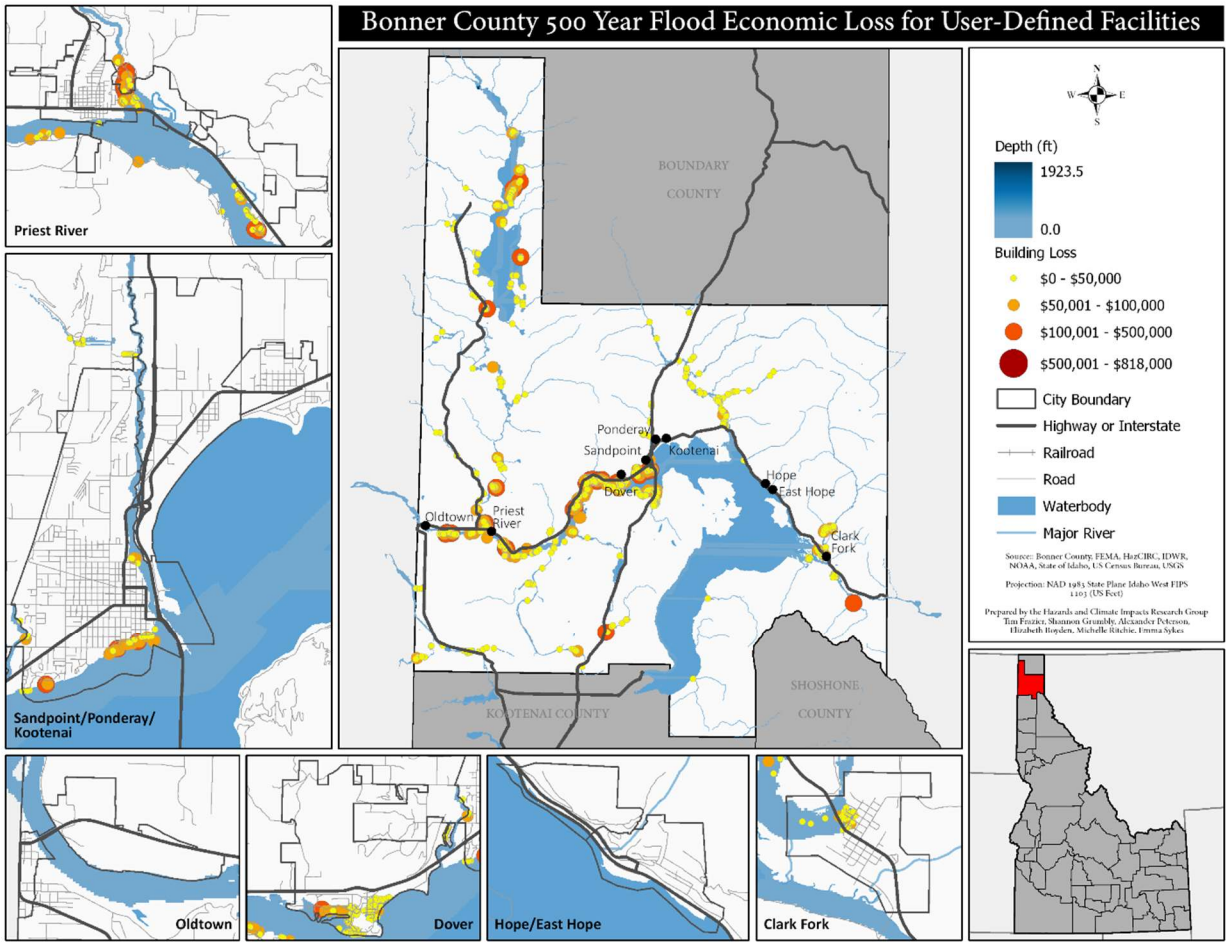


Figure 35. Loss estimates for the 0.2 percent annual chance flood event

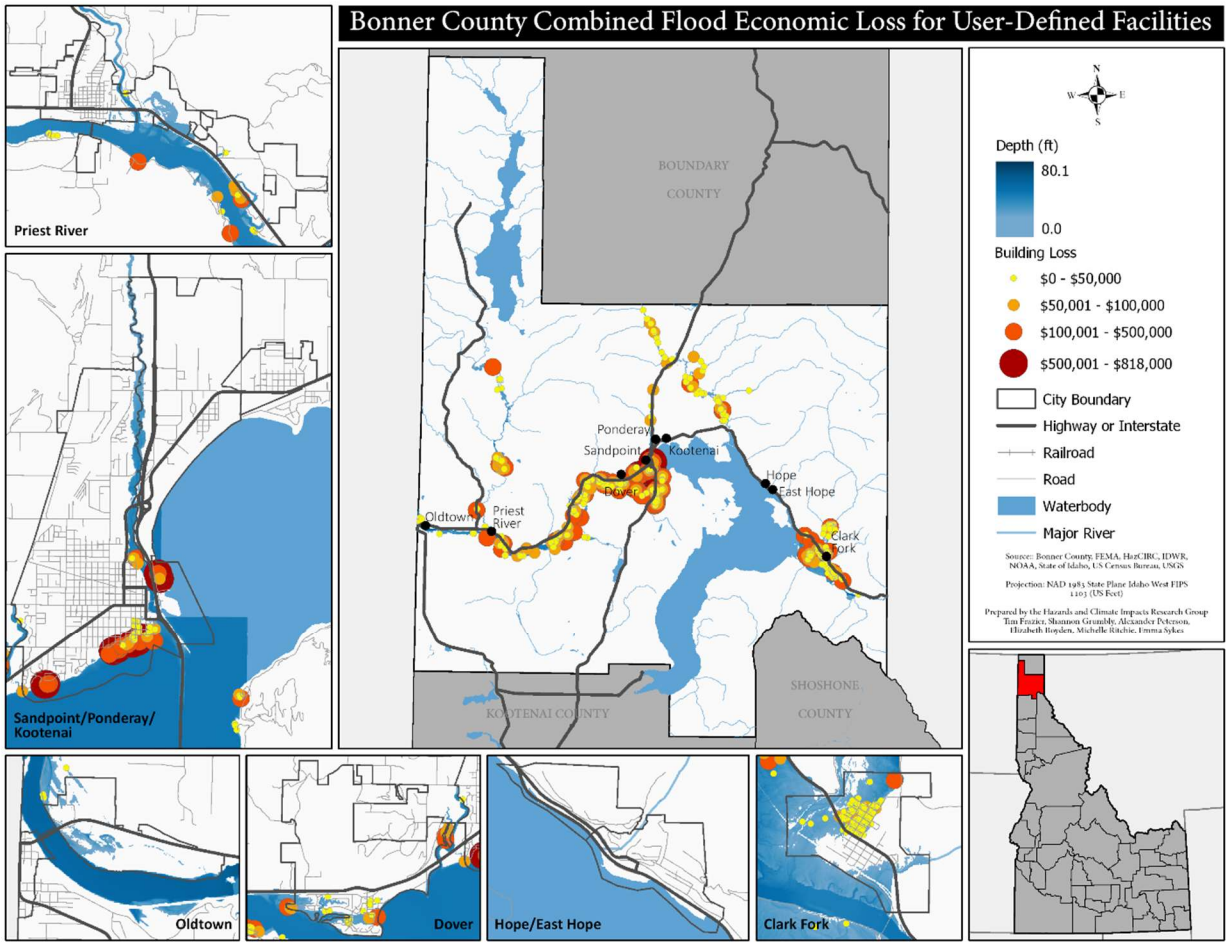


Figure 36. Loss estimates for the individual stream reaches

5.10 Hazardous Materials

5.10.1 Overview

Hazardous materials (hazmat) are often an unknown factor in mitigation planning. Transported chemicals pose a risk to individuals and areas adjacent to transportation corridors, and industry and manufacturing plant hazmat accidents can necessitate evacuation of large areas and require significant resources to contain and manage. The 2017 update reorganized the hazardous materials profile, incorporated additional data and modeling, and presented a more comprehensive and cohesive analysis of Bonner County's hazardous materials risk.

Table 38. Hazardous materials summary

	Before 2009	2009-2017	Total
Occurrences	11	30	41
Disaster Declarations	-	-	-
Casualties	-	3 Fatalities; 2 Injuries	3 Fatalities; 2 Injuries
Property Damage	$50,000	-	$50,000
Repetitive Losses	-	-	-

5.10.2 Hazard Description

A hazardous material is a substance known to harm humans and other living organisms and damage property. A release of a hazardous material can contaminate the environment and produce a health hazard to the immediate area, downwind, and/or downstream of the release location. Hazardous materials are regulated by the U.S. Environmental Protection Agency (EPA), which lists substances as either hazardous and extremely hazardous. Hazardous substances are those substances that tend to persist for long periods of time and pose long-term health hazards for living organisms, whereas extremely hazardous substances pose acute health hazards and immediate dangers to the lives of living organisms and can cause significant environmental damage. Hazardous materials include wastes, pollutants, and elevated-temperature materials.

A hazardous material can be released from a fixed facility (such as a manufacturing plant) or via transportation through the area. The most likely locations for transportation-related hazardous material release are highways and active railways. Given the non-static nature of transportation and

lack of disclosure by transportation companies, transportation-related releases pose a significant risk to populated areas and water resources.

The following are brief descriptions of common hazardous materials:

- Gasoline – Highly flammable, this substance has a high rate of exposure given its use in vehicles.
- Chlorine – An important and common industrial chemical, chlorine is volatile and highly reactive (especially in the proximity to a heat source). Chlorine can severely damage lungs and can kill people.
- Diesel Fuel – Similar to gasoline, diesel fuel has a high rate of exposure. This substance can irritate the eyes, skin, and respiratory systems, and can cause dizziness, headaches, and nausea.
- Propylene – Crucial in the petrochemical industry, propylene is used in the production of films, packaging, and more. This substance poses a fire hazard when handled due to its volatility and flammability.
- Sulfuric Acid – High corrosive, yet common in cleaning agents, fertilizer manufacturing, oil refining, and wastewater processing. If sulfuric acid comes into contact with human skin, it will cause severe burns. Inhaling sulfuric acid can result in serious lung damage.

5.10.3 Hazard Extent, Magnitude, & Probability

According to the Bonner County Emergency Operations Plan (2004), hazardous materials, including agricultural chemicals, are commonly produced, stored and used in Northern Idaho and are regularly transported via the regions roadways, railroads, and pipelines. Hazards ranges from small spills on roadways to major transportation releases on railways. Illegal methamphetamine operations are also a concern.

Concern was expressed at the public meetings that portions of Bonner County have the potential to become isolated if a hazardous material incident on the highway or railroad blocked evacuation routes. Due to the limited bridge crossings on Lake Pend Oreille, there is the potential that residents could become stranded in the event of a hazardous material incident.

The Areal Locations of Hazardous Atmospheres (ALOHA) model developed by the EPA and National Oceanic and Atmospheric Administration (NOAA) was employed to assess the county's risk to hazardous materials incidents. ALOHA models chemical releases and the dispersion of toxic clouds and their areas-of-effect, and is widely used for planning and response to chemical emergencies. The software generates the plume dispersion and threat zone of a chemical based on its properties, amount, storage and containment, and the atmospheric conditions at time of release, and models toxic gas clouds, flammable gas clouds, BLEVEs (Boiling Liquid Expanding Vapor Explosions), jet fires, pool fires, and vapor cloud explosions.

Chemical type, amounts, and locations were collected from the 2015 Tier II reports provided by IOEM. Tier II reports are required to be submitted by facilities storing hazardous materials at or above the threshold planning quantity defined by the EPA, and are designed to facilitate emergency planning. Figure 37 shows the location and exposure of hazardous materials based on Table 39.

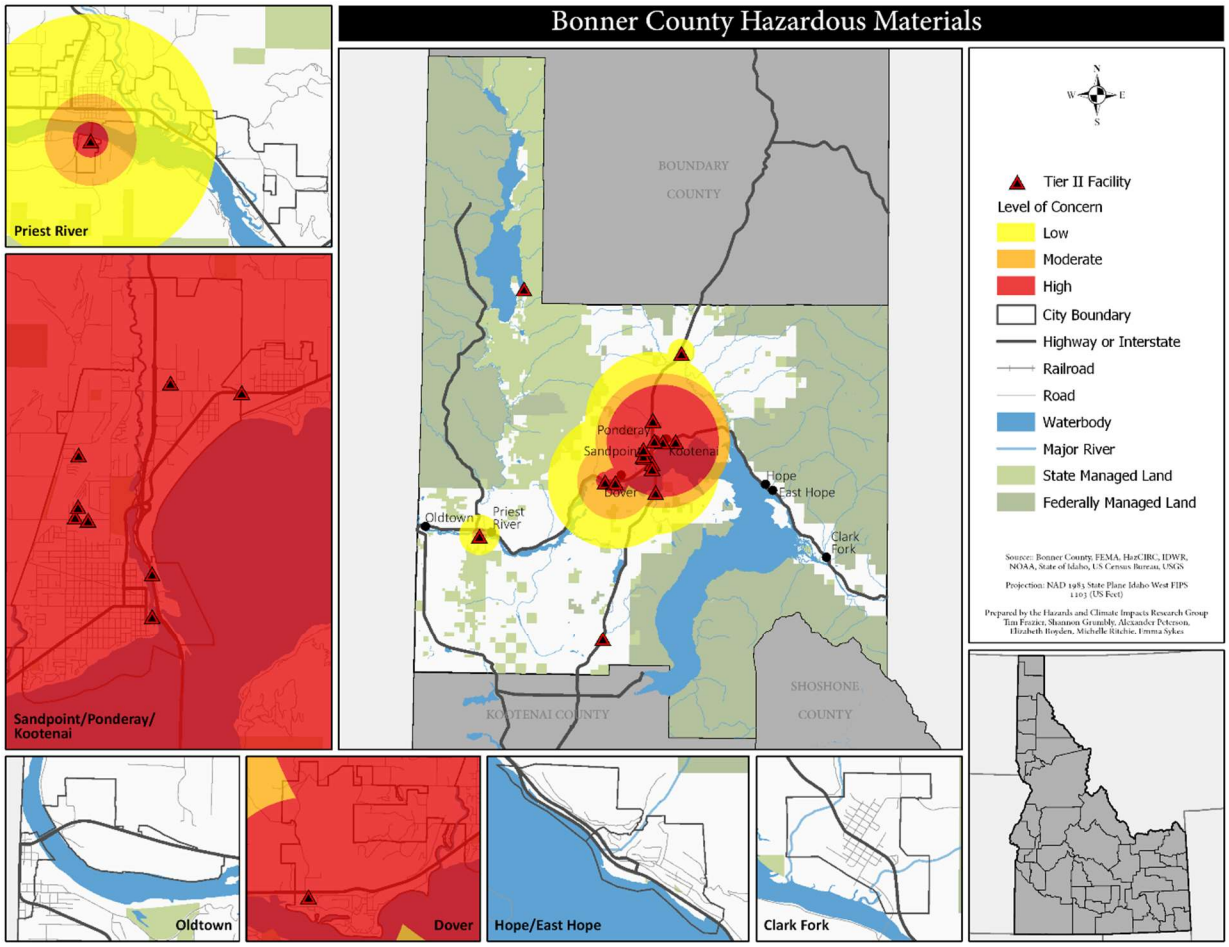


Figure 37. Tier II chemical facilities and levels of concern

Table 39. Tier II chemical facility data

Chemical	Amount	Unit	LOC Type
Propane	8,506	Pounds	AEGL
Propane	19,566	Pounds	AEGL
Fuel Oil, Diesel	35,500	Pounds	PAC
Calcium Chloride	10,300	Pounds	PAC

Asphalt Oil	13,900	Pounds	PAC
Sulfur Dioxide	300	Pounds	AEGL
Liquefied Petroleum Gas	64,872	Pounds	PAC
Liquefied Petroleum Gas	160,272	Pounds	PAC
Oxygen Diflouride	700	Pounds	AEGL
Fuel Oil, Diesel	500	Pounds	PAC
Sulfuric Acid	100	Pounds	AEGL
Sulfuric Acid	732	Pounds	AEGL
Sulfuric Acid	642	Pounds	AEGL
Hydraulic Oil	27,576	Pounds	PAC
Sulfuric Acid	840	Pounds	AEGL
Petroleum Hydrocarbon Turbine Oil	10,746	Pounds	PAC
Propylene Glycol (Dinitrate)	3,286	Pounds	AEGL

Source: IOEM

5.10.4 Hazard Occurrences

Although there are no repetitive losses associated with hazmat, Bonner County experiences hazmat incidents on a semi-annual basis (Table 40).

Table 40. Hazmat incident occurrences

Date	Location	Cause	Casualties	Damage	Material	Amount
9/14/2005	Oldtown	Operator Error	-	-	Hydraulic Oil	2 Cups
4/18/2006	-	Derailment	-	-	-	-
8/23/2006	Oldtown	-	-	-	-	-
10/3/2006	Hope	Vessel Sinking	-	-	Fuel Oil	2 Gallons
11/29/2007	Athol	-	-	-	-	-
1/15/2008	Oldtown	Other	-	-	Grease	6 Ounces
2/6/2008	Sagle	Vessel Sinking	-	-	Diesel Fuel	-
3/22/2008	Sagle	Vessel Sinking	-	-	- Oil	-
3/31/2008	Sandpoint	-	-	$50,000	Natural Gas, Fire Debris	-
7/10/2008	Ponderay	Other	-	-	Motor Oil	-

12/29/2008	-	Natural Phenomenon	-	-	Diesel Oil	-
2/23/2009	Sandpoint	Equipment Failure	-	-	Natural Gas	-
3/15/2009	Dover	-	-	-	Natural Gas	-
4/14/2009	Sandpoint	Operator Error	-	-	Fuel Oil 1-D	1 Gallon
8/9/2009	Priest River	Vessel Sinking	-	-	Diesel Oil	50 Gallons
8/10/2009	Sandpoint	Other	1 Fatality	-	-	-
8/12/2009	Naples	Equipment Failure	-	-	Diesel Oil	15 Gallons
9/20/2009	Sandpoint	Transport Accident	-	-	Unleaded Gasoline	-
12/12/2009	Oldtown	Equipment Failure	-	-	Turbine Oil	-
4/5/2011	Algoma	Transport Accident	-	-	-	-
4/5/2011	Algoma	Transport Accident	-	-	Fuel Oil 2-D	37 Gallons
4/21/2011	Bayview	-	-	-	Hydraulic Oil	1 Gallon
5/10/2011	Oldtown	-	-	-	-	-
9/9/2011	Blanchard	Dumping	-	-	Other Oil	-
1/23/2012	Oldtown	-	-	-	-	-
2/9/2012	Sandpoint	Other	-	-	Asbestos	-
3/31/2012	Samuels	Derailment	-	-	Grain	-
2/27/2013	Sagle	-	-	-	- Oil	200 Gallons
8/14/2013	Oldtown	Vessel Sinking	-	-	Unleaded Gasoline	1.5 Gallons
9/6/2013	-	Equipment Failure	-	-	Hydraulic Oil	10 Gallons
10/2/2013	Oldtown	Other	-	-	-	-
11/27/2013	Elmira	Other	1 Injury	-	-	-
12/31/2013	Algoma	-	1 Injury	-	-	-
4/16/2014	Athol	Equipment Failure	-	-	Diesel Oil	2,400 Gallons
8/27/2014	Priest River	-	-	-	Jet Fuel	-
11/25/2014	Ponderay	Equipment Failure	-	-	Hydraulic & Diesel Fuel Mix	125 Gallons
1/11/2015	Sandpoint	Over Pressuring	-	-	Natural Gas	-

8/14/2015	Sagle	-	-	-	-	-
8/26/2015	Bonners Ferry	Other	1 Fatality	-	-	-
10/8/2015	Cocolalla	Other	1 Fatality	-	-	-
2/2/2016	Oldtown	Other	-	-	Turbine Oil	1 Quart

Source: NRS

The following is an article from the local newspaper regarding a hazmat occurrence:

- March 12, 2006 – Two people were arrested after Bonner County Sheriff's deputies raided a suspected methamphetamine lab. Sheriff's deputies had been watching the home at 104 Highland Ave., according to court documents. Deputies, firefighters from the Sam Owen Fire District and East Hope Fire Department, and officials from the Panhandle Regional Hazardous Materials Response Team removed the toxic chemicals used to make the drug. The hazardous materials were taken away by a cleanup company from Spokane, Washington (Two Jailed after Drug Lab Raid in Hope, Bonner County Daily Bee).
- September 28, 2015 – On Tuesday September 29, 2015 there will be an exercise in cooperation between Bonner County Emergency Management and BNSF Railway. The exercise will take place on Pend Oreille River between Sandpoint City Beach and the Dover area. A partnership between the BNSF Railway and Bonner County Emergency Management in addition to other federal, state, and local agencies will combine efforts in exercising a "mock" hazardous materials spill. There will be boats, absorbent booms and other first responder resources on the river.

5.10.5 Hazard Exposure & Vulnerability

Dover, Kootenai, and Sandpoint maintain the same population exposed across all three exposure classes (Table 41). Priest River exhibited an increase from 0 people to 1,259 people between the highest and lowest exposure classes. Similarly, the jurisdictions exhibit similar patterns of exposed assessed parcel values (Table 42).

Table 41. Population exposure to hazmat

	Level of Concern		
	Low	**Moderate**	**High**
Clark Fork	-	-	-
Dover	511	511	511
East Hope	-	-	-
Hope	-	-	-

Kootenai	678	678	678
Oldtown	-	-	-
Ponderay	1,133	1,133	1,133
Priest River	-	649	1,763
Sandpoint	7,376	7,376	7,376
Unincorporated	5,168	7,497	11,696
Total	12,544	16,655	21,968

Table 42. Structures and structure value exposure to hazmat

	Level of Concern					
	Low		Moderate		High	
	Num. Structures	Total Value	Num. Structures	Total Value	Num. Structures	Total Value
Clark Fork	-	-	-	-	-	-
Dover	340	$118,276,086	340	$118,276,086	340	$118,276,086
East Hope	-	-	-	-	-	-
Hope	-	-	-	-	-	-
Kootenai	273	$35,385,197	273	$35,385,197	273	$35,385,197
Oldtown	-	-	-	-	-	-
Ponderay	204	$26,766,577	204	$26,766,577	204	$26,766,577
Priest River	-	-	-	-	640	$62,474,937
Sandpoint	2,957	$544,605,622	2,957	$544,605,622	2,957	$544,605,622
Unincorp.	2,761	$869,263,083	4,704	$1,440,906,363	6,567	$1,822,195,504
Total	5,718	$1,413,868,705	7,661	$1,985,511,985	10,368	$2,456,042,640

Many of the county's critical facilities are located in and around Sandpoint, and are located in the highest level of concern class. Many of Priest River's critical facilities are located in the moderate- and low-level concern classes.

Sandpoint, Kootenai, Ponderay, and Dover exhibit the highest levels of vulnerability to hazmat, given the location of Tier II chemical sites (Figure 38). Kootenai and Dover are notable in the number of census blocks exhibiting well above average vulnerability to hazmat. Census blocks in Priest River show lower vulnerability to hazmat incidents relative to other areas of the county; it is important to note that this analysis only considers the reported Tier II chemical sites, and not transportation or other non-regulated but dangerous chemicals. Oftentimes, agriculture maintain stocks of pesticides,

insecticides, and fuel. Likewise, the primary road and railway transportation routes through Bonner County are regularly used to transport hazmat, resulting in increased vulnerability along the county's transportation network.

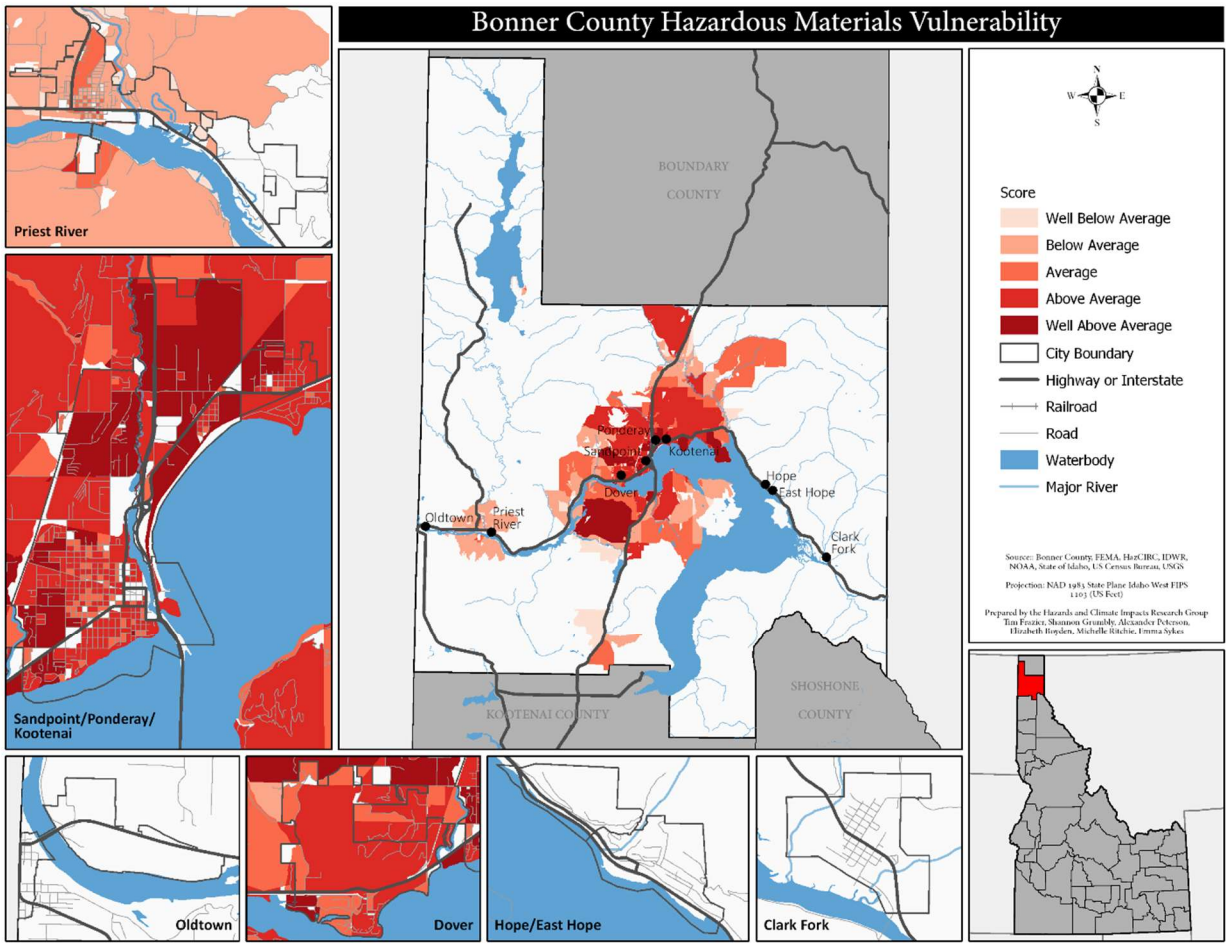


Figure 38. Socioeconomic vulnerability to hazmat

5.10.6 Land Use & Future Development

Similar to the above results, the ACI of Sandpoint, Ponderay, Kootenai, Priest River, and Dover are all located in areas of concern. As population and development increase in these areas, hazmat exposure and vulnerability will increase. Similarly, increased development both in and around the county can result in increased flow of hazmat on the county's transportation network.

5.11 Landslide

5.11.1 Overview

The hazard profile for landslides was significantly reworked in the 2017 update. Changes include a more detailed hazard description, the use of a landslide index developed by HazCIRC to better assess the landslide susceptibility, and a vulnerability assessment of landslides across the county.

Table 43. Landslide summary

	Before 2009	2009-2017	Total
Occurrences	1	4	5
Disaster Declarations	-	1	1
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

5.11.2 Hazard Description

Landslides are the movement of a mass of soil and rock down a slope, and can occur on any area composed of weak or fractured materials resting at an angle. Materials and movement together produce landslides, and are important in producing composite classification schemes. Landslide materials include rock (e.g., bedrock), debris (e.g., coarse material), and earth (e.g., fine material), and landslide movement types include falls (characterized by the free movement and rolling, bouncing, or sliding of soil and rock), slides (the lateral and downslope movement of partially-intact masses), and flows (viscous fluid-like movement of completely fragmented material saturated with water). Together, materials and movement produce landslides.

Types of landslides include rock falls, earth flows, and debris flows (often known as mud flows). Landslides such as debris flows can be difficult to distinguish from flash floods given their similar characteristics – debris flows often occur suddenly with significant destructive potential during or immediately after a period of intense rainfall and/or rapid snowmelt. The consistency of debris flows ranges from watery mud to thick, rocky mud with the capacity to carry large items such as boulders, trees, and cars. When the flow reaches flatter ground, the debris can spread over a broad area and accumulate in thick deposits. These types of meteorological-related landslides are most common in Idaho, although the state does not maintain a landslide inventory.

Many different physical and meteorological factors contribute to landslides. The physical morphology of the landscape can increase the susceptibility of failure, as generally the steeper the slope the more prone it is to landslide. Slope aspect captures rain shadow, wind, and solar radiation factors. In Idaho, west-facing aspects and slopes between 30 and 41 degrees were found to be most landslide-susceptible. Slope shape also influence landslides, as concave slopes (e.g., hollow, swale, gully) allow water and debris to accumulate, increasing landslide probability. Convex slopes (e.g., ridge, nose) do not allow such accumulation, and are less prone to landslide.

Surface materials and the underlying geology of slopes are also influential in landslide occurrence. In general, landslides occur where surface materials are weak. Surface materials that are impermeable are problematic as they allow subsurface water accumulation, while the geology underlying a slope controls the movement of subsurface water and can either reduce or amplify slope weaknesses. Vegetation can stabilize slopes, however, by increasing slope shear strength and removing water from the soil. The removal of vegetation (such as through wildfire and human disruption) can significantly increase the probability of landslides. Human activities such as road construction, timber harvesting, grazing, mining, and fire suppression all modify slope stability and contribute to landslides.

It is important to note that climate is a deterministic factor of landslides, and the size and timing of precipitation is influential in landslides. Depending on the soil saturation level prior to an event, a slide can follow days or even weeks after above-normal precipitation. Landslides most often occur in late spring and early summer, coincident with the seasonality of rainfall events.

Omitting weather-caused landslides, landslide occurrence is often coincident with other natural hazards, such as earthquakes, floods, and volcanic eruptions. Consequences of landslide in Idaho

generally occur directly at the site and downslope of the slide area, as well as in adjacent waterways. Temporary road closures and lengthy detours during debris removal and infrastructure repair are the most probable impacts. Landslides can also destroy structures, fuel and energy lines, and communication infrastructure.

5.11.3 Hazard Extent, Magnitude, & Probability

To-date, no statewide landslide assessment or inventory exists, and occurrence and risk data is difficult to obtain. To overcome this limitation, a proxy index incorporating the biophysical factors known to contribute to landslide susceptibility were aggregated and mapped. The analyzed biophysical factors included slope, aspect, canopy cover, and geologic type. Previous research found high slide occurrence on southeast-to-west facing aspects, and the least number of slides on north-facing aspects. Slopes between 31 and 40 degrees were likewise susceptible, with most landslides occurring in brush- and grass-covered landscapes. Finally, certain geologic classes are known to contribute to instability (Table 44).

Table 44. Geologic types known to cause slope instability

Type	Description
Kg	Granodiorite and two-mica granite (Cretaceous)—Granodiorite and granite containing biotite, commonly with muscovite.
Qs	Fluvial and lake sediment (Quaternary)—Largely fine-grained sediment, in part playa deposits of evaporative lakes.
Qg	Glacial deposits (Pleistocene)—Till and outwash consisting of gravel, sand, silt, and clay. Formed by valley glaciers at higher elevations and by the Cordilleran ice sheet in northern Idaho.
Tes	Sedimentary rocks (Eocene)—Fluvial, lacustrine, and air-fall deposits of conglomerate, volcanic sandstone, mudstone, and tuff near Challis, conglomerate north of Sandpoint, and conglomerate and sandstone of the Wasatch Formation in extreme southeastern Idaho.
Tcr	Columbia River Basalt Group (Miocene)—Large-volume lava flows of tholeiitic basalt, basaltic andesite, and subordinate andesite in western Idaho.
Qls	Landslide deposits (Quaternary)—Unsorted gravel, sand, and clay of landslide origin; includes rotational and translational blocks and earth flows.
Tcv	Challis Volcanic Group (Eocene)—Dacite, andesite, and rhyolite tuffs and flows and subordinate basalt and latite flows; covers large area in south-central Idaho.
Kpro	Riggins Group, Orofino series, and related rocks (Cretaceous to Permian)—Metasedimentary and metavolcanic schist, gneiss, amphibolite, and marble, all of uncertain age, along eastern margin of island-arc complex; typically hornblende-rich.
QTb	Basalt (Pleistocene and Pliocene)—Flows and cinder cones of olivine tholeiite basalt in and near Snake River Plain. Largely Pleistocene (<2.6 Ma) but includes flows as old as 3 Ma. Covered with 1-3 m (3-10 ft) of loess.

Slope and aspect were calculated from 10m digital elevation models (DEMs). Canopy cover was obtained from the 2011 National Land Cover Database (NLCD), while geologic types were obtained from the Idaho Geological Survey (IGS). Each factor was assigned a binary classification, with 0 indicating lack of susceptibility and 1 indicating susceptibility. The binary classifications were then summed to produce the Landslide Index (LI) shown in Figure 39. It is important to note that the LI is not a deterministic or probabilistic risk model, but a proxy index identifying the number of biophysical factors that contribute to landslides.

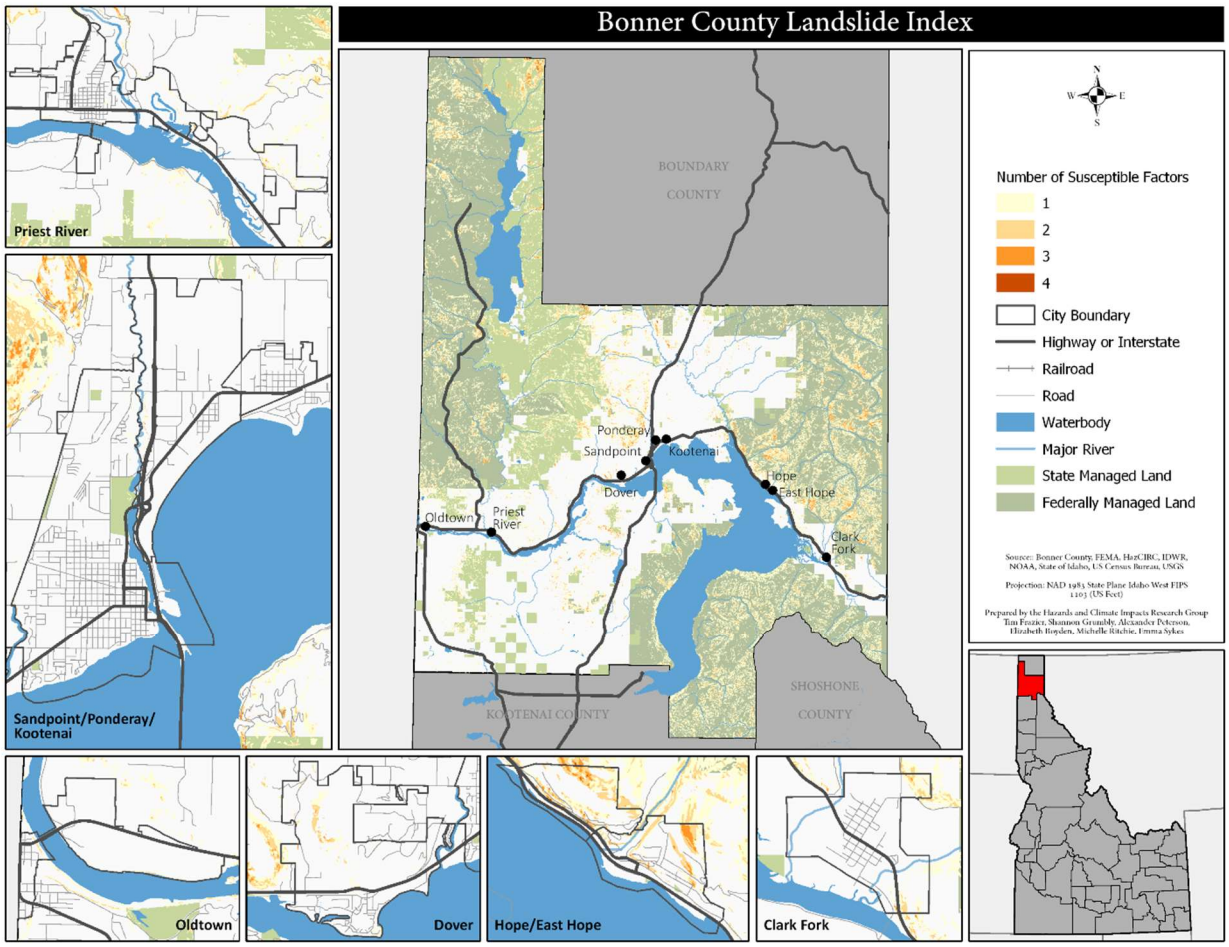


Figure 39. Landslide Index map

5.11.4 Hazard Occurrences

Bonner County has experienced landslide occurrences throughout its history. Similar to avalanches, however, not all landslide occurrences are reported, notably those in the backcountry or with no impact to lives and property. Table 45 shows reported landslide occurrence:

Table 45. Landslide occurrences

Date	Elevation (ft)	Casualties	Property Damage
4/1991	2,808	-	-
3/31/2011	2,231	-	-
3/31/2011	2,309	-	-
3/31/2011	2,275	-	-
3/31/2011	2,384	-	-

Source: USGS, IGS, IOEM, SHELDUS

Bonner County has had one Federal disaster declaration related to landslides and mudslides:

- Idaho Flooding, Landslides, and Mudslides (DR-1987)
    - Incident Period: March 31, 2011 to April 11, 2011
      Major Disaster Declaration declared on May 20, 2011
    - Affected Areas: Bonner County, Clearwater County, Idaho County, Nez Perce County, and Shoshone County
    - http://www.fema.gov/disaster/1987

The following are reports of reported landslides in Bonner County:

- April, 1991 – The damaging event that occurred near Sandpoint in April 1991 was classified in a State Disaster Declaration as a flash flood but the high debris load makes is somewhat indistinguishable from a debris flow. The torrents blew out large sections of the road leading to the Schweitzer Basin Ski Area stranding dozens of people, contaminated the city's primary water supply, and heavily damaged the water treatment facility. The cost to clean out and repair the water treatment facility ran to several hundred thousand dollars (IBHS, 2007).
- March, 1997 – In early March, Northern Idaho received 12 to 18 inches of snow on top of an existing snow pack that exceeded 150-170 percent of average. A rainstorm followed which resulted in a rapid snow melt. The resulting mudslides and flooding lasted for an extended period and damaged many public facilities including county road systems. The President issued Federal Disaster Declaration IDR-1177 on June 13, 1997 for Bonner and several other counties (IBHS, 2007).

5.11.5 Hazard Exposure & Vulnerability

The population exposed to landslides is detailed in Table 46, with assessed parcel value exposure shown in Table 47. East Hope and Sandpoint exhibit the highest population exposed, with Hope, Priest River, and Sandpoint exhibiting the highest assessed parcels with some level of landslide exposure.

Critical facilities across Bonner County are not located in high-risk landslide areas, though there are a number of transportation facilities located in landslide-prone areas in Hope, East Hope, and the unincorporated areas of the county.

Table 46. Population exposure to landslides

	Landslide Index			
	1	2	3	4
Clark Fork	3	-	-	-
Dover	-	19	-	-
East Hope	-	64	-	-
Hope	24	6	-	-
Kootenai	-	-	-	-
Oldtown	6	-	-	-
Ponderay	3	-	-	-
Priest River	2	-	-	-
Sandpoint	29	-	-	-
Unincorporated	762	237	34	-
Total	802	237	34	

Table 47. Structures and structure value exposed to landslides

	Landslide Index							
	1		2		3		4	
	Num. Struct.	Total Value	Num. Struct.	Total Value	Num. Struct.	Total Value	Num. Struct.	Total Value
Clark Fork	-	-	-	-	-	-	-	-
Dover	10	$8,627,188	1	$508,903	-	-	-	-
East Hope	3	$772,320	7	$1,408,285	-	-	-	-
Hope	9	$1,548,395	7	$1,103,898	4	$746,452	-	-
Kootenai	-	-	-	-	-	-	-	-
Oldtown	-	-	-	-	-	-	-	-
Ponderay	-	-	-	-	-	-	-	-
Priest River	3	$1,002,102	-	-	-	-	-	-
Sandpoint	3	$668,900	1	$293,854	-	-	-	-

Unincorp.	352	$95,112,049	206	$54,598,662	24	$5,886,046	-	-
Total	358	$96,783,051	207	$54,892,516	24	$5,886,046	-	-

Societal vulnerability to landslides is shown in Figure 40. Highly vulnerable census blocks are mainly located around Lake Pend Oreille, with Hope and East Hope, Priest River, and areas around Sandpoint, Ponderay, and Kootenai all exhibiting census blocks with above average landslide vulnerability. It is important to note that vulnerability was only calculated for those blocks with some level of exposure derived from the Landslide Index.

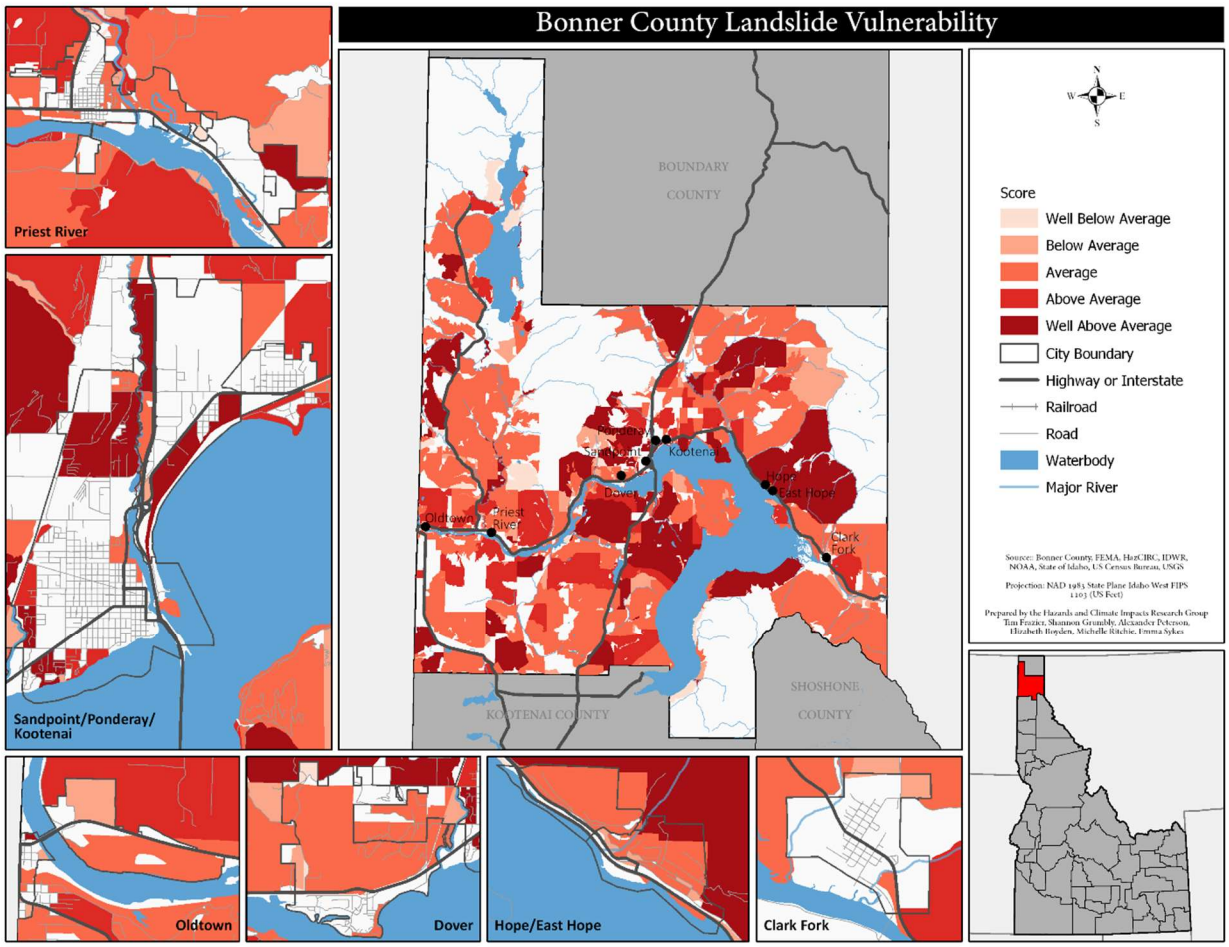


Figure 40. Socioeconomic vulnerability to landslides

5.11.6 Land Use & Future Development

The ACI of Sandpoint, Ponderay, and Kootenai have some level of landslide susceptibility, as do Hope and East Hope, Dover, and Clark Fork. Without landslide-related ordinances, it is possible that future development will increase the exposure and vulnerability of individuals to landslides. Development in the unincorporated areas of the county can likewise increase exposure and vulnerability, if the geophysical factors that cause landslides are not taken into consideration.

5.12 Severe Weather

5.12.1 Overview

Although the term 'severe weather' is nebulous, the plan defines severe weather as any destructive meteorological phenomenon. Such phenomena include (but are not limited to) winter storms, extreme heat and cold temperatures, hydrometeorological events (e.g., hail and heavy rain), thunderstorms, and wind. Often these events are coincident, making delineation difficult. The 2017 update consolidated severe weather-related hazard profile sections under one hazard profile, incorporated additional datasets in the risk assessment, and provided a more comprehensive and cohesive hazard profile on severe weather risk in Bonner County.

Table 48. Severe weather summary

	1950-2008	2009-2017	Total
Occurrences	210	182	392
Disaster Declarations	3	2	5
Casualties	20 Injuries	5 Injuries	25 Injuries
Property Damage	$2.5 Million	$4.1 Million	$6.6 Million
Repetitive Losses	-	-	-

5.12.2 Hazard Description

Extreme temperatures pose risk to both humans and the environment. The following are brief descriptions of extreme temperatures:

- Extreme Heat – Also known as a heat wave, extreme heat is a period of significant above-normal temperatures in a locality. Urban development amplifies extreme heat effects due the heat island effect. Extreme heat impacts human health through heat exhaustion, sunstroke, and heat cramps. Most susceptible are age-dependent populations, including the elderly and small children, and those with other and chronic illness. Environmental impacts include loss of wildlife and increased wildfire probability. Extreme heat can stress power grids due to an increase in energy demand for cooling.
- Extreme Cold – A period of significant below-normal temperatures in a locality is defined as extreme cold. Winds of 10 mph or greater can amplify extreme cold impacts. Advisories are issued when wind chill temperatures reach -20 degrees F or lower with winds of 10 mph or higher for one hour or more. Similar to extreme heat, extreme cold is of greatest concern under persistence over an extended period of time, and like extreme heat, the most susceptible are the age-dependent and those with chronic illness. The environmental and other impacts are similar, though extreme cold can be associated with the formation of ice and freezing which can result in flooding.

Severe storms are the most nebulous of severe weather. The term 'severe storm' is a general categorization of any atmospheric disturbance resulting in one or more meteorological phenomena with the potential to cause losses, such as thunderstorms, hail, lightning, and wind. Severe storms often produce cascading hazards, including floods and landslides.

- Hail – A product of thunderstorms and is defined as precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter falling from a cumulonimbus cloud. Created by the vertical cycle of a wind and water in a storm mass (or cell), the ice accumulation that forms hail can reach sizes up to four inches, though hail of three-fourths of an inch or greater is sufficient to classify a thunderstorm as severe. Nationally, hail causes nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. Severe hailstorms also cause considerable damage to buildings and automobiles, but rarely result in loss of life.
- Lightning – A product of the violent movement of air within a thunderstorm, and defined by the NWS as "visible electrical discharge produced by a thunderstorm." The discharge can occur within or between clouds, between clouds and air, between clouds and the earth's surface, and between the earth's surface and clouds. Lightning can be over 5 miles in length, generate temperatures above 50,000 degrees F, and carry 50,000 volts of electrical potential. Lightning strikes can be deadly, notably direct strikes where the person or structure is the direct path for lightning conduction to the ground. Side strikes are similar to a direct strike, but diverts to an alternate path from the initial grounding point. Conducted strikes occur when the electrical current is carried from the initial grounding point through a conductive material (such as

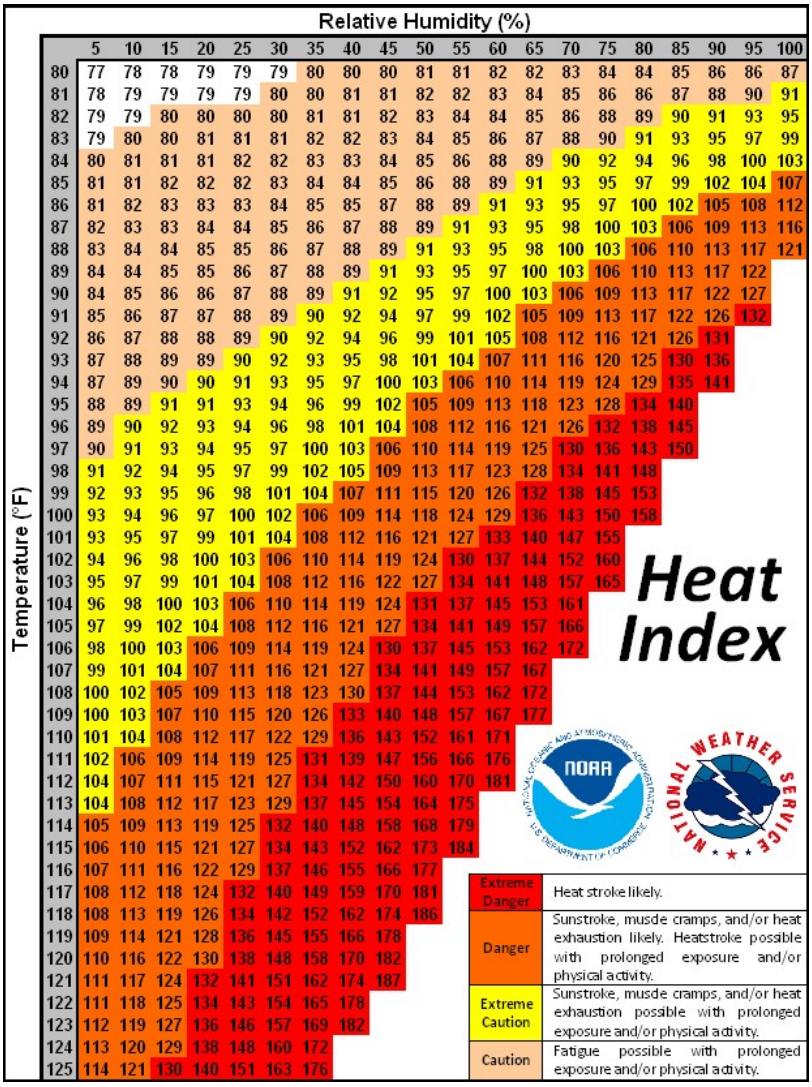
electrical and electronic equipment). Lightning can also induce secondary discharges by altering the electrical potential between adjacent structures, through the earth's surface, and in electrical equipment.

- Straight-Line Wind – A term used to distinguish between non-rotating and rotating winds, the latter often sourced from tornados. Straight-line winds are generated by thunderstorms and can reach speeds in excess of 100 miles per hour (mph). The National Weather Service (NWS) defines 'high winds' as sustained wind speeds of 40 mph or greater over a one-hour period or longer, or winds of 58 mph or greater over any period. Windstorms affect areas with significant tree stands, as well as areas with exposed property, major infrastructure, and aboveground utility lines. Of particular note are downbursts (also known as microbursts), which are a particular type of straight-line wind and are small areas of rapidly descending rain and rain-cooled air beneath a thunderstorm with potential wind velocities equal to that of a strong tornado.
- Thunderstorms – Produced when unstable atmospheric conditions exist and warm, moist air is forced upward and condenses to form cumulonimbus clouds. Most common in the spring and summer months during the afternoon and evening hours, thunderstorms persist an average of 10 to 20 minutes (though can persist much longer), during which they can produce heavy rain, hail, lightning, strong winds, and tornadoes. Thunderstorm types include dry thunderstorms, pulse severe thunderstorms, severe thunderstorms, and supercell thunderstorms. Dry thunderstorms are characterized by 'dry lightning', where lightning is observed but little to no precipitation reaches the earth's surface due to evaporation into the dry air beneath the storm cell. Pulse severe thunderstorms are single-cell thunderstorms that produce brief periods of severe weather, such as a tornado, winds of at least 58 mph, and/or at least three-fourths of an inch hail size. A severe thunderstorm is one in which winds reach at least 40 mph and/or hail of at least one-half inch in size. Finally, a supercell thunderstorm is the most dangerous. These storms produce downbursts, large hail, and long-lived violent tornados.
- Tornadoes – The most concentrated and violent storms produced by the atmosphere. A tornado is a column (also known as a vortex) of air composed of rotating wind and strong vertical motion. Wind speeds within the vortex range between 40 and 300 mph, and the vortex itself can travel at speeds up to 70 mph over a distance between10 and 200 miles (although shorter distances have been reported). Though damages are generally confined to a narrow path, tornadoes can devastate a large distance, and a single storm can produce multiple tornados.
- Winter Storms – Characterized by low/freezing temperatures, blowing snow, and ice. Like all severe storms, winter storms range in size, duration, and intensity, with potential to impact both large and localized areas. Severe winter storms deposit four or more inches of snow during a 12-hour period, or six inches during a 24-hour period. To be classified as a blizzard, winds must exceed 35 mph with temperatures below 20 degrees F. Particularly damaging are ice storms, characterized by cold rain freezing immediately on contact with a surface. In general, the principal hazards associated with severe winter storms are snow/ice

accumulation, extreme cold, and reduction of visibility. Such storms can also disrupt transportation, power and communication lines, and halt everyday activities.

5.12.3 Hazard Extent, Magnitude, & Probability

To quantify extreme heat and cold, the NWS employs a Heat Index and a Wind Chill Temperature index, respectively. The Heat Index accounts for both air temperature and relative humidity, and categorizes heat into likelihood of heat disorders due to exposure (Figure 41). Similarly, the Wind Chill Temperature index calculates the dangers from winter winds and freezing temperatures (Figure 42). The Wind Chill Temperature index accounts for air temperature, wind speed, and incorporates heat transfer theory (heat loss from the body).



Temperature (°F)	Relative Humidity (%)																			
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
80	77	78	78	79	79	79	80	80	80	81	81	82	82	83	84	84	85	86	86	87
81	78	79	79	79	79	80	80	81	81	82	82	83	84	85	86	86	87	88	90	91
82	79	79	80	80	80	80	81	81	82	83	84	84	85	86	88	89	90	91	93	95
83	79	80	80	81	81	81	82	82	83	84	85	86	87	88	90	91	93	95	97	99
84	80	81	81	81	82	82	83	83	84	85	86	88	89	90	92	94	96	98	100	103
85	81	81	82	82	82	83	84	84	85	86	88	89	91	93	95	97	99	102	104	107
86	81	82	83	83	83	84	85	85	87	88	89	91	93	95	97	100	102	105	108	112
87	82	83	83	84	84	85	86	87	88	89	91	93	95	98	100	103	106	109	113	116
88	83	84	84	85	85	86	87	88	89	91	93	95	98	100	103	106	110	113	117	121
89	84	84	85	85	86	87	88	89	91	93	95	97	100	103	106	110	113	117	122	
90	84	85	86	86	87	88	89	91	92	95	97	100	103	106	109	113	117	122	127	
91	85	86	87	87	88	89	90	92	94	97	99	102	105	109	113	117	122	126	132	
92	86	87	88	88	89	90	92	94	96	99	101	105	108	112	116	121	126	131		
93	87	88	89	89	90	92	93	95	98	101	104	107	111	116	120	125	130	136		
94	87	89	90	90	91	93	95	97	100	103	106	110	114	119	124	129	135	141		
95	88	89	91	91	93	94	96	99	102	105	109	113	118	123	128	134	140			
96	89	90	92	93	94	96	98	101	104	108	112	116	121	126	132	138	145			
97	90	91	93	94	95	97	100	103	106	110	114	119	125	130	136	143	150			
98	91	92	94	95	97	99	102	105	109	113	117	123	128	134	141	148				
99	92	93	95	96	98	101	104	107	111	115	120	126	132	138	145	153				
100	93	94	96	97	100	102	106	109	114	118	124	129	136	143	150	158				
101	93	95	97	99	101	104	108	112	116	121	127	133	140	147	155					
102	94	96	98	100	103	106	110	114	119	124	130	137	144	152	160					
103	95	97	99	101	104	108	112	116	122	127	134	141	148	157	165					
104	96	98	100	103	106	110	114	119	124	131	137	145	153	161						
105	97	99	102	104	108	112	116	121	127	134	141	149	157	166						
106	98	100	103	106	109	114	119	124	130	137	145	153	162	172						
107	99	101	104	107	111	116	121	127	134	141	149	157	167							
108	100	102	105	109	113	118	123	130	137	144	153	162	172							
109	100	103	107	110	115	120	126	133	140	148	157	167	177							
110	101	104	108	112	117	122	129	136	143	152	161	171								
111	102	106	109	114	119	125	131	139	147	156	166	176								
112	104	107	111	115	121	127	134	142	150	160	170	181								
113	104	108	112	117	123	129	137	145	154	164	175									
114	105	109	113	119	125	132	140	148	158	168	179									
115	106	110	115	121	127	134	143	152	162	173	184									
116	107	111	116	122	129	137	146	155	166	177										
117	108	112	118	124	132	140	149	159	170	181										
118	108	113	119	126	134	142	152	162	174	186										
119	109	114	121	128	136	145	155	166	178											
120	110	116	122	130	138	148	158	170	182											
121	111	117	124	132	141	151	162	174	187											
122	111	118	125	134	143	154	165	178												
123	112	119	127	136	146	157	169	182												
124	113	120	129	138	148	160	172													
125	114	121	130	140	151	163	176													

Extreme Danger	Heat stroke likely.
Danger	Sunstroke, musde cramps, and/or heat exhaustion likely. Heatstroke possible with prolonged exposure and/or physical activity.
Extreme Caution	Sunstroke, musde cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Caution	Fatigue possible with prolonged exposure and/or physical activity.

Figure 41. Heat Index chart

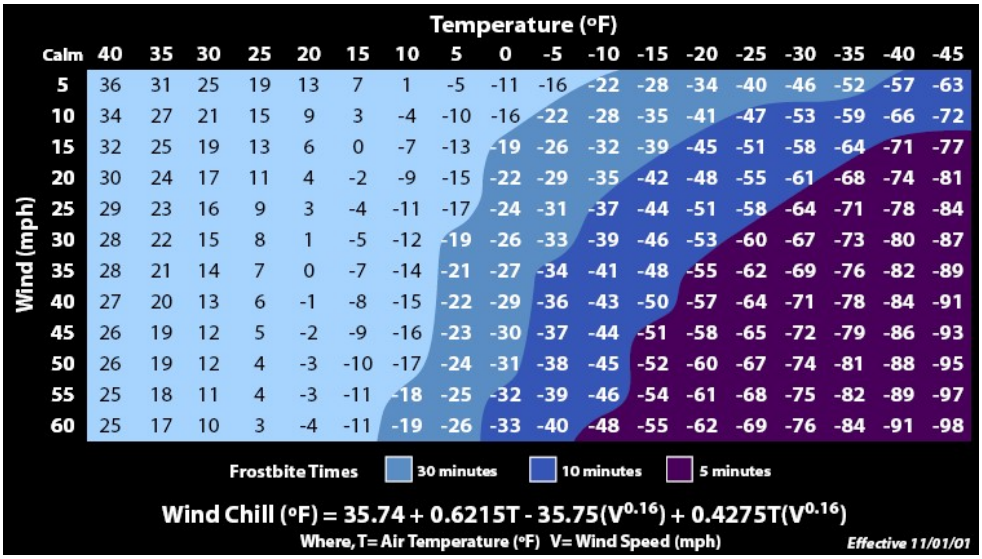


Figure 42. Wind Chill Index chart

Extreme heat does not normally affect Bonner County. The county's highest three-day mean maximum temperatures from 2009 were recorded at 99.0F and 98.0F, both in the summer of 2015. The county has not experienced a record low three-day mean minimum temperature since 1979. On average, the county's temperatures regularly drop into the teens during the winter, however.

Hail size comparisons are shown in Figure 43. In general, hail does not become severe until it reaches one inch in diameter (roughly the size of a quarter). Hail can affect the entirety of the county, with likely yearly occurrences.

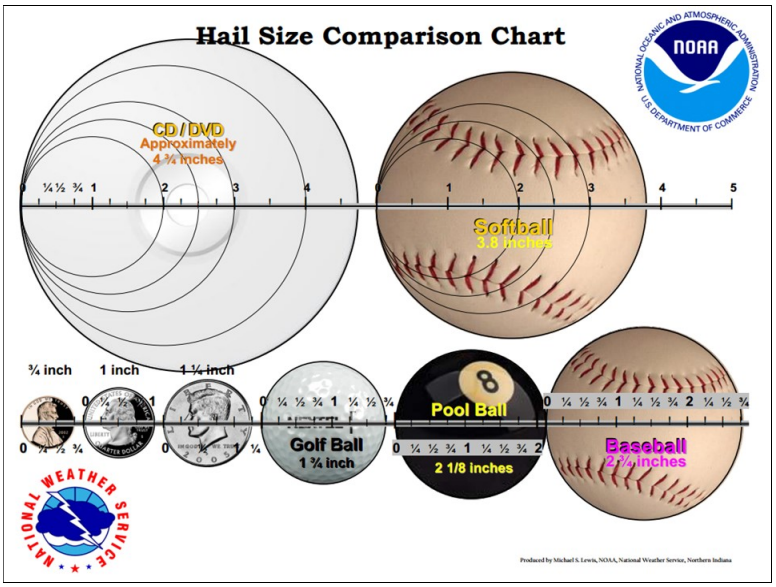


Figure 43. Hail size comparison chart

Table 49 shows general damage from wind speeds. Bonner County regularly experiences windstorms. Windstorms can affect the entirety of the county, with high probabilities of occurring in any given year.

Table 49. Wind speeds and damage estimates

Wind Speed Estimate	Description
25-31 mph	Large branches in motion; whistling heard in telephone wires
32-38 mph	Whole trees in motion; inconvenience felt walking against the wind
39-54 mph	Twigs break off trees; wind generally impedes progress
55-72 mph	Damage to chimneys and TV antennas; pushes over shallow rooted trees
73-112 mph	Peels surfaces off roofs; windows broken; light mobile homes pushed or overturned; moving cars pushed off road
113-157 mph	Roofs torn off houses; cars lifted off ground

The Enhanced Fujita (EF) tornado scale is used by the NWS to estimate wind speeds within tornados based on damage to buildings and structures. The EF scale has six categories from zero to five representing increasing degrees of damage (Table 50). Although the county has experienced tornadoes, tornadoes do not occur frequently nor with damaging effects.

Table 50. Enhanced Fujita tornado scale and damage estimates

Category	3 Second Gust	Typical Damage
0	65-85 mph	Light damage. Causes some damage to siding and shingles.
1	86-109 mph	Moderate damage. Considerable roof damage. Winds can uproot tees and overturn single-wide mobile homes. Flagpoles bend.
2	110-137 mph	Considerable damage. Most single-wide mobile homes destroyed. Permanent homes can shift off foundations. Flagpoles collapse. Softwood trees debarked.
3	138-167 mph	Severe damage. Hardwood trees debarked. All but small portions of houses destroyed.
4	168-199 mph	Devastating damage. Complete destruction of well- built residences, and large sections of school buildings.
5	200-234 mph	Incredible damage. Significant structural deformation of mid and high-rise buildings.

Table 51 shows the warning and advisory criteria used by the NWS for winter weather. Winter weather occur in Bonner County on an annual basis, though they do not always cause damage. However, winter weather can affect the entirety of the county, and has high probability of occurrence in the future.

Table 51. Winter weather warning and advisory criteria

Winter Weather Event	Winter Weather Advisory	Winter Storm/Blizzard Warning
Snow	2-5 inches of snow in 12 hours	6 inches or more in 12 hours, or 8 inches in 24 hours
Blizzard	(see blowing snow)	Sustained winds or frequent gusts to 35 mph with visibility below a ¼ mile for three hours or more
Blowing Snow	Visibility at or less than a ½ mile.	Visibility at or less than a ½ mile in combination with snowfall at or greater than 6 inches and/or freezing precipitation
Ice/Sleet	(see freezing rain/drizzle)	Accumulations of ¼ inch or more of ice.
Freezing Rain/Drizzle	Light precipitation and ice forming on exposed surfaces.	None
Wind Chill	Wind chills of 20 to 39 degrees below zero with a 10 mph wind in combination with precipitation.	Wind chills 40 degrees below zero or colder with a 10 mph wind in combination with precipitation.

5.12.4 Hazard Occurrences

The NWS lists more than 250 events from 1950 to 2017 in the Storm Events Database for Bonner County. Table 52 details those events with casualties or losses, while Table 53 consolidates the recorded events by type, number of occurrences between 1950-2008 and 2009-2017, total casualties, and total property and crop damage.

Table 52. Severe weather occurrences

Date	Type	Magnitude	Location	Casualties	Property Damage	Crop Damage
8/19/1978	Tornado	F1	-	1 Injury	$25,000	-
1/31/1989	Winter Weather	-	-	-	$71,429	$7,143
8/12/1989	Thunderstorm Wind	65 knots	-	4 Injuries	-	-

12/18/1990	Winter Weather	-	-	-	$11,364	$205,828
4/9/1991	Tornado	F2	-	-	$250,000	-
8/24/1992	Winter Weather	-	-	-	$139	$13,889
11/21/1192	Winter Weather	-	-	-	$12,500	$210,919
1/1/1993	Winter Weather	-	-	-	-	$11,702
9/1/1993	Winter Weather	-	-	-	-	$18,617
6/13/1994	Thunderstorm Wind	-	-	-	$50,000	-
4/15/1995	Winter Weather	-	-	-	-	$155,338
5/31/1997	Thunderstorm Wind	60 knots	-	-	-	-
5/31/1997	Thunderstorm Wind	60 knots	Sagle	-	$85,000	-
5/31/1997	Thunderstorm Wind	60 knots	Oldtown	-	$10,000	-
5/31/1997	Thunderstorm Wind	60 knots	Priest River	-	$125,000	-
5/31/1997	Thunderstorm Wind	60 knots	Sandpoint	-	$90,000	-
1/11/1998	Cold/Wind Chill	-	-	-	$50,000	-
3/4/1998	Heavy Snow	-	-	-	$25,000	-
2/6/1999	Winter Storm	-	-	5 Injuries	-	-
12/18/1999	Winter Storm	-	-	6 Injuries	$200,000	-
3/13/2001	High Wind	-	-	-	$8,000	-
12/1/2001	Winter Storm	-	-	-	$100,000	-
8/30/2002	Lightning	-	Oldtown	2 Injuries	-	-
11/19/2003	High Wind	60 knots	-	-	$50,000	-
6/25/2004	Tornado	F0	Coolin	-	$100,000	-
6/25/2004	Thunderstorm Wind	60 knots	Sandpoint	-	$25,000	-
5/22/2006	Thunderstorm Wind	50 knots	Sandpoint	-	$50,000	-
12/15/2006	High Wind	65 knots	-	3 Injuries	$249,000	-
1/9/2007	Strong Wind	43 knots	-	-	$2,000	-
6/29/2007	Thunderstorm Wind	52 knots	Blanchard	-	$54,000	-
6/29/2007	Thunderstorm Wind	52 knots	Coolin	-	$200,000	-

6/29/2007	Thunderstorm Wind	52 knots	Sandpoint	1 Injury	$220,000	-
6/29/2007	Thunderstorm Wind	52 knots	Kootenai	-	$2,000	-
6/29/2007	Thunderstorm Wind	52 knots	Sandpoint	-	$2,000	-
7/10/2008	High Wind	52 knots	-	-	$590,000	-
4/8/2010	Strong Wind	48 knots	-	-	$15,000	-
5/3/2010	Strong Wind	45 knots	-	-	$3,000	-
2/21/2011	Strong Wind	39 knots	-	-	$5,000	-
5/14/2011	High Wind	52 knots	-	-	$5,000	-
1/20/2012	Winter Weather	-	-	-	$20,000	-
7/20/2012	Thunderstorm Wind	52 knots	Nordman	-	$6,000	-
7/20/2012	Strong Wind	52 knots	Nordman	-	$40,000	-
7/20/2012	Strong Wind	35 knots	-	-	$1,000	-
4/29/2013	Strong wind	48 knots	-	-	$1,000	-
6/29/2013	Lightning	-	Sagle	2 Injuries	-	-
8/25/2013	Thunderstorm Wind	52 knots	Oldtown	-	$500	-
10/27/2013	Strong Wind	42 knots	-	-	$1,000	-
11/2/2013	Strong Wind	24 knots	-	-	$1,000	-
7/23/2014	Thunderstorm Wind	65 knots	Lakeview	2 Injuries	$2,000,000	-
8/2/2014	Thunderstorm Wind	56 knots	Outlet Bay	-	$2,000,000	-
8/12/2014	Thunderstorm Wind	50 knots	Careywood	-	$500	-
11/17/2015	High Wind	50 knots	-	1 Injury	-	-

Source: NWS, SHELDUS

Table 53. Severe weather occurrences by type

Type	Number of Events		Total Casualties		Total Property Damage		Total Crop Damage	
	1950-2008	2009-2017	1950-2008	2009-2017	1950-2008	2009-2017	1950-2008	2009-2017
Cold/Wind Chill	6	3	-	-	$50,000	-	-	-
Hail	15	6	-	-	-	-	-	-

High Wind	7	7	3 Injuries	1 Injuries	$897,000	$5,000	-	-
Heavy Rain	2	-	-	-	-	-	-	-
Heavy Snow	12 1	114	-	-	$25,000	-	-	-
Lightning	1	1	2 Injuries	2 Injuries	-	-	-	-
Strong Wind	1	7	-	-	$2,000	$27,000	-	-
Thunderstorm Wind	27	18	3 Injuries	2 Injuries	$881,000	$4,047,000	-	-
Tornado	4	-	1 Injuries	-	$375,000	-	-	-
Winter Storm	19	3	11 Injuries	-	$300,000	-	-	-
Winter Weather	7	23	-	-	$20,000	-	$623,436	-

Source: NWS, SHELDUS

Below are summaries of severe weather-related Federal disaster declarations:

- Idaho Severe Winter Storms (DR-4252)
  - Incident Period: December 16, 2015 to December 27, 2015
    Major Disaster Declaration declared on February 01, 2016
  - Affected Areas: Benewah County, Bonner County and Kootenai County
  - https://www.fema.gov/disaster/4252
- Idaho Severe Storm and Straight-line Winds (DR-4246)
  - Incident Period: November 17, 2015
    Major Disaster Declaration declared on December 23, 2015
  - Affected Areas: Benewah County, Bonner County, Boundary County, Coeur d'Alene Indian Reservation and Kootenai County
  - https://www.fema.gov/disaster/4246
- Idaho Severe Storms/Flooding (DR-1154)
  - Incident Period: November 16, 1996 to January 03, 1997
    Major Disaster Declaration declared on January 04, 1997
  - Affected Areas: Adams County, Benewah County, Boise County, Bonner County, Boundary County, Camas County, Clearwater County, Elmore County, Gem County, Idaho County, Kootenai County, Latah County, Nez Perce County, Owyhee County, Payette County, Shoshone County, Valley County and Washington County
  - https://www.fema.gov/disaster/1154
- Idaho Storms/Flooding (DR-1102)

    - Incident Period: February 06, 1996 to February 23, 1996
      Major Disaster Declaration declared on February 11, 1996
    - Affected Areas: Benewah County, Bonner County, Boundary County, Clearwater County, Idaho County, Kootenai County, Latah County, Lewis County, Nez Perce County and Shoshone County
    - https://www.fema.gov/disaster/1102
- Idaho Severe Storms, Snowmelt, Flooding (DR-415)
    - Incident Period: January 25, 1974
      Major Disaster Declaration declared on January 25, 1974
    - Affected Areas: Adams County, Benewah County, Bonner County, Boundary County, Clearwater County, Kootenai County, Latah County, Shoshone County and Washington County
    - https://www.fema.gov/disaster/415

Below are accounts from local media:

- July 29, 2009 – It might be hyperbole to call it the storm of the century, but Monday night's colossal winds, booming thunder claps and near-constant lighting strikes were some of the most intense in years, wreaking havoc on dozens of area homes and sparking more than six wildfires. In Priest River alone, whole swaths the city were left battered by 60-plus mile per hour winds. In a span of three city blocks, as many as 10 homes and at least two cars were damaged by downed trees, and several homeowners were forced to temporarily seek shelter elsewhere. Intense winds brought down a 40-foot tree onto Chanda Mittan's backyard, crushing her fence, swimming pool and bike before landing on her neighbor's house. "My whole block is destroyed," Mittan said. "I live on Jefferson, and the three main streets that got hit were Lincoln, Jefferson and Jackson. There's probably six houses with trees right on them. There's a house right up the street from me that's just about cut in half." Just before 11 p.m., Johanna Johnson, who lives on Jackson Avenue, heard the winds pick up and felt her house being battered by tree branches and flying debris. In an instant, she heard a massive crash and was jarred out of bed by a large tree crashing through her roof and into her living room. Nobody was hurt, but Johnson said a large branch landed just feet from her daughter. She said the sights and sounds of the night will be etched in her mind forever. "It was loud," she said. "It was the loudest noise I've ever heard. It was like something just consuming the house." When the sun finally came out Tuesday morning and Johnson was able to survey her neighborhood, she was shocked at the level of damage. "It looked like a tornado hit outside," she said. "It was like a war zone." West Pend Oreille Fire Chief Les Kokanes called the weather "nasty" and said his department responded to 18 or 19 storm-related incidents Monday night and into Tuesday morning. Three businesses inside the city's historic Beardmore Building reported damage when a rainwater recycling unit mounted on the building's roof was blown away. While the winds were intense, they couldn't match the sheer spectacle of the bone-rattling thunder and near constant lighting strikes. It didn't break any records, but the storm produced an above-average number of strikes, according to Dave Lux of the U.S. Forest

Service. “Our lighting map showed about 3,340-some strikes, and that was just in the northern Panhandle that goes from Canada to southern Bonner County,” Lux said. Despite the extensive lighting strikes, Lux said the storm has so far produced only four small fires, all of which have been contained. Ed Robinson of the Idaho Department of Lands said his crew found two more storm-related fires, but said more will likely turn up in the coming weeks. “We’ll probably pick up a few fires each day for the next week or so,” he said. “They just lay low for a while. They end up in a log, smoldering, and when the weather conditions are right or the fuel conditions are right they’ll swell up and we’ll see them.” Those who live in the path of the storm are hoping the worst is behind them, but the National Weather Service is warning that harsher weather could be on the way. On Tuesday afternoon the service briefly put out a tornado warning for parts of western Bonner County, but downgraded to a severe thunderstorm warning soon after (Bonner County Daily Bee).

- November 18, 2015 – Crushing winds rocked North Idaho on Tuesday, causing flying debris, numerous downed trees and fences and leaving much of the region in a blackout without power into the night. “There’s downed power lines and trees across roads throughout Kootenai County.” Jim Lyon, spokesman for the Northern Lakes Fire Protection District, said shortly before 5 p.m. “We’re getting really stacked up and just can’t keep up with responding.” Emergency agencies advised residents to stay inside and away from exterior walls or windows. Meteorologist Randy Mann said winds in Kootenai County reached as high as 63 mph as of early evening. Gusts reached 71 mph at Spokane International Airport, a record for a non-thunderstorm event. “Category 1 hurricanes are 74 mph with sustained wind.” Mann said. “We’ve reached gusts that are near hurricane strength. This time of year we can get strong winds when there’s a battle between cold and warm. This is a battle for supremacy.” The storm even caused a power outage at Bonner County 911, knocking out the 911 system and radios for a period of time. Mann said the winds, which left the first valley snowfall of the winter in many valley areas on Tuesday morning as a seemingly distant memory, should die down to 15 mph today. As of 7:15 p.m., Kootenai Electric Cooperative had 5,700 members without power, including many in the Spirit Lake, Twin Lakes and Athol areas, due to trees on power lines. Utilities warned residents that they could be without power throughout the night. “Kootenai Electric Cooperative’s crews are responding to multiple weather-related outages across our service territory,” KEC spokeswoman Erika Neff said. “All of our crews are working to restore the outages, along with three contract crews. We ask for your patience as crews work as quickly and safely as possible in the storm.” Major business corridors, including Appleway Avenue and Northwest Boulevard in Coeur d’Alene, were blacked out. Avista Utilities had about 13,000 customers in Kootenai County without power as of early evening. Systemwide, the utility had 104,405 without power at 5:45 p.m. “Our outage information is updated every 10 minutes and every time it updates the numbers just continue to climb,” said Debbie Simock, Avista spokeswoman. Widespread outages also were reported by Northern Lights, Inc., and Avista Utilities in Bonner and Boundary counties as well as into Montana. Kootenai County Sheriff’s Office Lt. Stu Miller said his agency had 175 calls for service pending at 5:45 p.m. North Idaho College canceled all of its evening classes and activities. Glenn Lauper

of the Coeur d'Alene Fire Department said NIC's daycare was evacuated due to trees falling down on campus. Staff and students were moved to NIC's Student Union Building. Tim Martin, Coeur d'Alene street superintendent, said crews closed several roads due to downed trees and city crews waited for power companies to clear the lines. "One of the hardest-hit areas is the Fairway subdivision," Martin said. In addition damage in the neighborhoods, businesses also felt the effects of the high winds. Post Falls Police Capt. Greg McLean said Graffiti Sound Solutions behind Taco Bell had a window blown out. "Fences are down in the Windsong subdivision, causing dogs to run loose," McLean said. Roof damage also occurred on the roof of a building at the Kootenai County Fairgrounds. Most flights destined for Spokane International Airport were canceled on Tuesday night due to the high winds. In Bonner and Boundary counties, trees were reported down across highways 57, 41 and 95, throughout the night. In addition, there were reports that power lines were knocked down by the storm.

Although not comprehensive, Figure 44 shows aggregated severe weather events from the NWS Severe Storms Database.

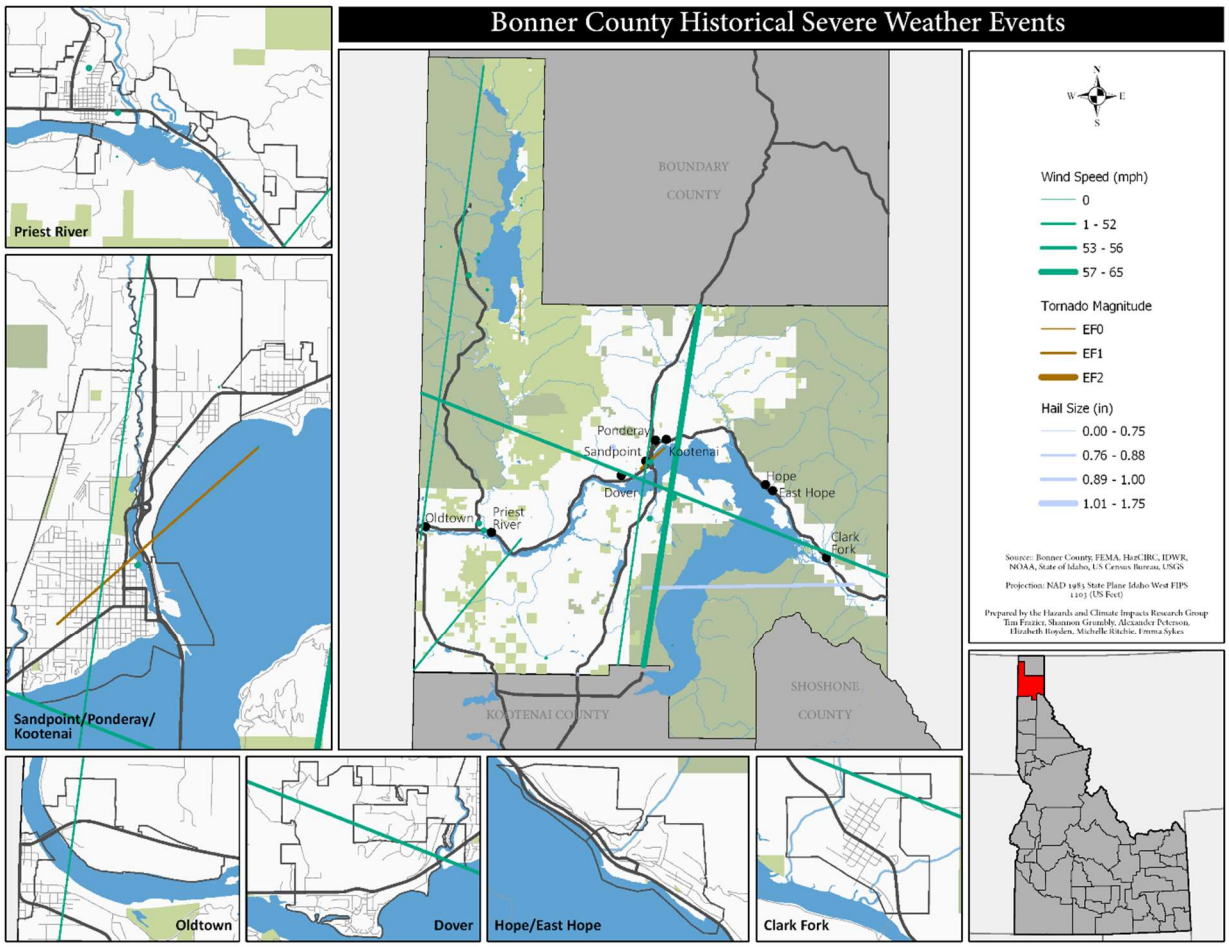


Figure 44. Historical severe weather events

5.12.5 Hazard Exposure & Vulnerability

Severe weather can occur anywhere within Bonner County, exposing all individuals and structures to a potentially damaging event. Individuals with above average sensitivity are more likely to experience losses should they be impacted by a severe weather event while those with below average adaptive capacity are less likely to overcome impacts.

5.12.6 Land Use & Future Development

All new development is at risk to severe weather. Development in rural areas and areas with limited road network are especially vulnerable to severe weather, as inclement weather can result in road closures, wildfire, and other cascading hazards.

5.13 Wildland Fire

5.13.1 Overview

Numerous wildland fires (also known as wildfires) have burned in Bonner County. Like many of the counties of the State of Idaho, wildfire often poses a high risk to the county's populations, structures, and natural resources. Together, the fuels, weather, and topography of the county make wildfire an annual hazard with potentially devastating consequences. The 2017 plan update incorporated the county's CWPP, which was updated in 2017.

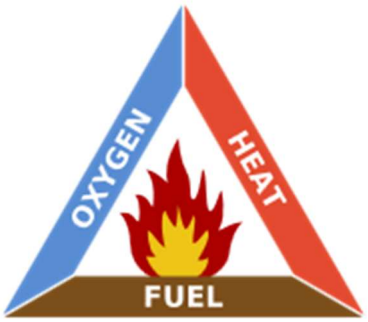
Table 54. Wildfire summary

	1980-2008	2009-2017	Total
Occurrences	762 Events (9,968 Acres)	167 Events (11,142 Acres)	929 Events (21,110 Acres)
Disaster Declarations	1	1	2
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

5.13.2 Hazard Description

A wildland fire is defined as any non-structure fire occurring in the wildland. Wildland fires – or wildfires – are unplanned events, and include grass fires, forest fires, and scrub fires. Wildfire is vital to the functioning of many ecosystems within the State of Idaho, and occurs across many different landscapes ranging from arid grassland to coniferous forests on a regular basis. Wildfire as a hazard poses a significant risk to human populations and development due to its extent and destructive potential. Both natural- and human-caused wildfires burn homes and structures, displace populations, and can require significant monetary, human, and technological resources to contain and suppress. Wildfires can also result in secondary hazards, such as flood, mudslide, and landslide.

Wildfires occur when the three primary elements of the fire triangle converge. Wildfires occur when an ignition source (e.g., lightning, an untended campfire, etc.) comes into contact with a combustible material such as vegetation. If sufficient heat is applied and there is adequate oxygen from the ambient air, the material will ignite with the potential to create a wildfire front.



A wildfire front is the intersection of active flame with unburned material, or the smoldering transition between unburned and burned material. There are four classification types of wildland fires:

- Surface Fire – Also known as crawling fires, this type of wildfire burns along forest floors and is fueled by low-lying vegetation such as leaf and timber litter, grass, and shrubbery.
- Ground Fire – These fires move slowly and normally have low damage potential. They are fed by roots, duff, and other buried organic matter, and can burn slowly for lengths ranging from days to months.
- Ladder Fire – These fires consume the material between low-level vegetation and tree canopies. A ladder fire can be a transition from a surface fire to a crown fire.
- Crown Fire – Also known as canopy or aerial fires, this type of wildfire burns suspended materials at the canopy level, such as vines, mosses, leafs, and needles. Crown fires can be devastating, and can spread rapidly dependent on conditions. Conditions that determine crowning include canopy height, weather (especially wind), suspended materials, and canopy continuity.

Wildfire is significantly affected by three principle factors:

- Topography – The arrangement of natural and built environments significantly influences fire behavior, primarily due to the movement of air over the terrain. For example, gulches and canyon act as chimneys by funneling air, intensifying wildfire with the potential to cause rapid spread. Other topographic factors include ridge tops and south-facing aspects, both of which complicate fire behavior with the potential to intensify wildfire. Likewise, slope and terrain type can act to inhibit or amplify wildfire intensity. Wildfire spreads rapidly up steep slopes, especially those on south-facing aspects where solar radiation preheats and dries fuels.

Downslope wildfires spread more slowly, while ridgetops can act as breaks to slow or prevent further spread.

- Fuel – Fuels are combustible material ignitable by wildfire, varying by burn qualities and quantities across a landscape. Often, fuels are classified by weight or volume and type, and expressed as fuel loading (i.e., tons per acre). Fuel types are classified by their estimated potential energy, expected flame length if ignited, and the effort required to contain a fire in a given fuel. Fuels are generally classified into three categories:
    - Ground Fuel – Vegetation close to or on the ground, including dead grass and leaves, pine needles, twigs, and branches.
    - Surface Fuel – Vegetation proximate to the ground but not lying on the ground. Usually entails shrubs, grasses, and low-hanging branches. Also known as ladder fuels.
    - Crown Fuel – Located in the crowns or tops of trees, crown fuels can be volatile and burn rapidly at extreme temperatures.
    - Other fuel-related factors that affect wildfire are fuel continuity and fuel moisture. Fuel continuity represents the distribution of fuels over the landscape and within a forest. Fuel moisture is the percentage of saturation within the fuel, and varies according to climatic and meteorological conditions. Low fuel moisture can significantly contribute to the ignition and severity of wildland fire.
- Weather – The most variable of all factors influencing wildfire, weather can ignite wildfire, cause it to spread and intensify, and also inhibit or dampen wildfire. High temperature, low humidity, and lightning strikes can result in significant wildfire activity, whereas cool temperatures, high humidity, and precipitation can suppress wildfire activity. Fronts and thunderstorm-produced winds impacts and directs wildfire fronts and flame length, as sudden changes in wind speed and direction can result in unpredictable and variable wildfire activity. The most damaging wildfires are usually driven by strong winds.

Wildfire across Idaho is changing, coincident with drought, insects, unusual warm temperatures, and past fire suppression activities. In Idaho, various bark beetles including the western pine beetle, mountain pine beetle, Douglas-fir beetle, and fir engraver are attacking large stands of trees. Because winter is no longer cold enough and long enough to keep these beetles in check, they survive to deplete the tree of nourishment and moisture throughout the year. Affected trees usually die within two or three years. Drought stress, disease infestation, and human disturbance are further impacting wildland fire occurrence and severity.

5.13.3 Hazard Extent, Magnitude, & Probability

Wildland fire can occur in any landscape in Bonner County. To assess wildland fire risk, flame length, fireline intensity, and crown fire activity are analyzed given their importance in determining potential fire hazards.

- Flame Length – Fire suppression activities and strategies are determined by fire behavior and intensity. Fire behavior can be thought of as a function of flame length, or the distance from the ground at the leading edge of the flame to the flame's tip. Flame length varies from less than one foot in length, to over 10 feet in length. Table 55 details flame length classifications.
- Fireline Intensity – A numerical product of a fire's rate of spread, fuel consumption, and heat yield at a given point on a fire's perimeter.
- Crown Fire Activity – Canopy base height is defined as the lowest point in a stand of trees where fuel is available for the vertical propagation of fuel through the canopy. Fire has a greater chance of transitioning into the tree canopies (becoming a crown fire) the closer the tree canopy is to the surface.

Table 55. Flame length and fire intensity classifications

Class	Flame Length	Fireline Intensity	Vegetation Types	Fire Suppression
Low	<4 ft	<100 Btu/ft/s	Grasses, forbs, cropland, some timber	Fires can generally be attacked at the head or flanks by crews with handtools. Handline should hold the fire.
Medium	4-8 ft	100–500 Btu/ft/s	Grasses, forbs, cropland	Fires are too intense for direct attack by handtools; handline cannot be relied on to hold fire. Bulldozers, engines, and retardant drops can be effective.
High	8-11 ft	501–1,000 Btu/ft/s	Sagebrush, timber	Fires can present control problems; torching, crowning, and spotting. Control efforts at head likely ineffective.
Very High	>11 ft	>1,000 Btf/ft/s	Sagebrush, timber	Crowning, spotting, and major fire runs probable. Control efforts at head ineffective.

This risk analysis likewise employed a modified wildfire risk model originally developed by IDL. The wildfire model incorporates slope, aspect, vegetation, wildfire occurrences, and the WUI. Slope and aspect were calculated from 10 meter DEMs obtained from USGS. Vegetation and wildfire occurrence data were obtained from the Landscape Fire and Resource Management Planning Tools (LANDFIRE) program, and the WUI used in the model was obtained from the SHMP.

Previous research showed slopes above 10 degrees, and east-, south-, and west-facing aspects more at risk to wildfire. Vegetation was classified into conifer, brush, and grass according to the potential fire severity. Fire occurrences were summarized by populated census block, and areas in the WUI were weighted more heavily than areas outside the WUI. Each factor was classified according to the impact and influence on wildfire and summed to create a composite of the biophysical risk. The results were then classified into low, moderate, and high risk for the Bonner County (Figure 45).

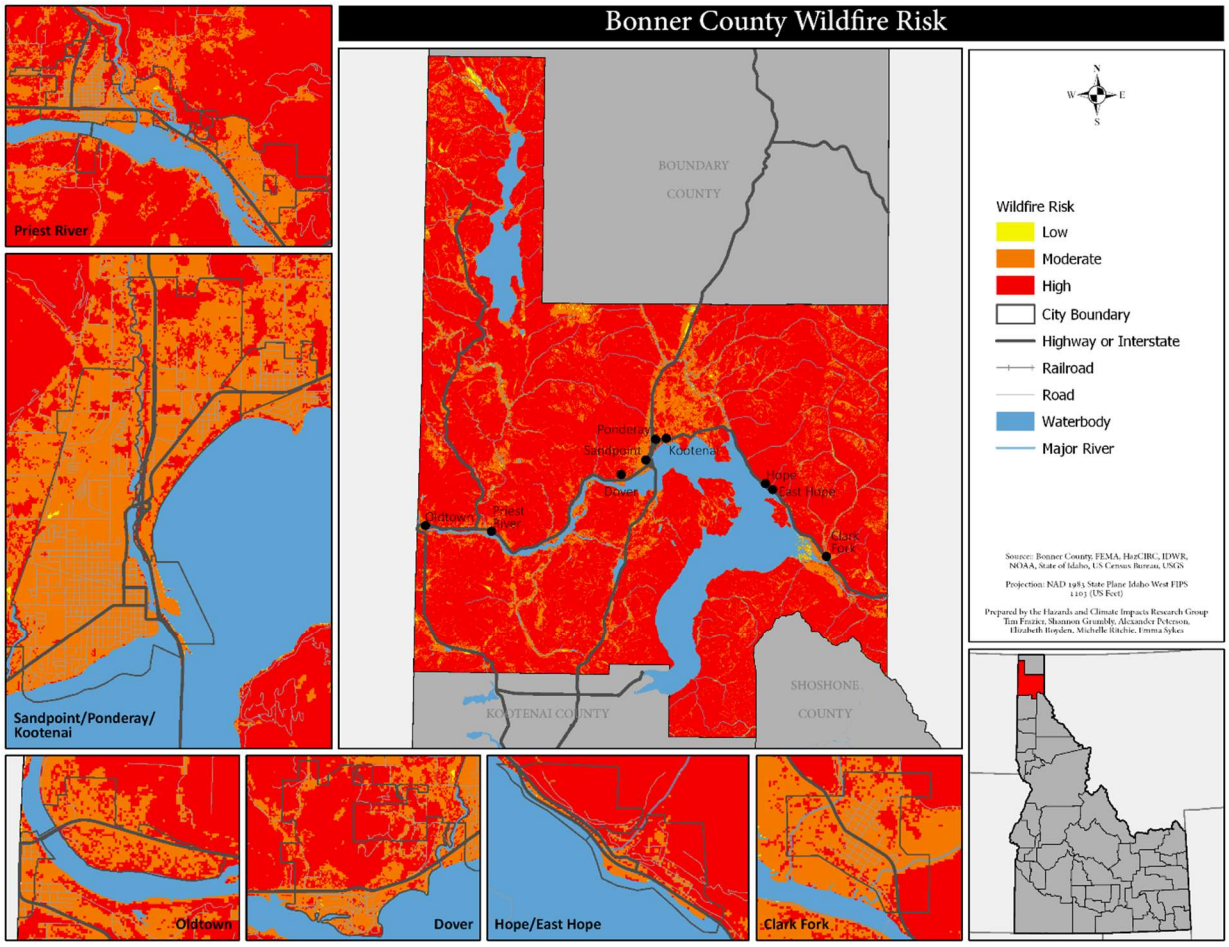


Figure 45. Wildfire risk model map

5.13.4 Hazard Occurrences

Nearly 1,000 wildfires burned more than 20,000 acres across Bonner County from 1980 onwards (Table 56). Wildfire is an annual event in Bonner County, as it is in many counties across the state. A majority of wildfire occurrence in the county were lightning-caused (643 lightning to 295 human-caused).

Table 56. Wildfire occurrences

Year	Total Fires	Num. Human Caused	Num. Lightning Caused	Total Acres	Acres Human	Acres Lightning	Casualties	Prop Dmg	Crop Dmg
1981	1	-	1	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-

1984	-	-	-	-	-	-	-	-	-
1985	1	-	1	.1	-	-	-	-	-
1986	52	25	27	54.9	52	2.9	-	-	-
1987	33	10	23	50.2	2.6	47.6	-	-	-
1988	30	7	23	20.3	2.8	17.5	-	-	-
1989	47	10	37	70.2	1.6	68.6	-	-	-
1990	26	9	17	8.8	1.3	7.5	-	-	-
1991	44	5	39	2321.5	0.5	2321	-	-	-
1992	30	6	24	317.7	0.6	317.1	-	-	-
1993	13	1	12	6.4	.1	6.3	-	-	-
1994	106	55	51	4283.8	2302	1981.8	-	-	-
1995	16	2	14	17.9	15	2.9	-	-	-
1996	23	13	10	295.8	291	4.8	-	-	-
1997	6	2	4	3.3	2.9	0.4	-	-	-
1998	35	8	27	7.6	1.7	5.9	-	$7,261	-
1999	25	13	12	5.1	3.7	1.4	-	-	-
2000	67	10	57	799.5	2.8	796.7	-	-	-
2001	28	3	25	271.1	230.3	40.8	-	-	-
2002	24	7	17	87.4	84	3.4	-	-	-
2003	19	4	15	36.1	10.7	25.4	-	-	-
2004	22	7	15	13.41	0.61	12.8	-	-	-
2005	22	5	17	12.05	4.4	7.65	-	-	-
2006	41	11	30	1261.1	4	1257.1	-	-	-
2007	23	14	9	6.55	2.1	4.45	-	-	-
2008	28	13	15	17.64	9.12	8.52	-	-	-
2009	42	12	40	147.47	3.12	144.35	-	-	-
2010	10	5	5	18.75	0.24	18.51	-	-	-
2011	24	12	12	4.81	1.51	3.3	-	-	-
2012	11	6	5	4	0.6	3.4	-	-	-
2013	16	6	10	4.85	1.1	3.75	-	-	-
2014	29	3	26	69.5	0.9	68.6	-	-	-
2015	35	11	24	10892.7	1664	9228.7	-	-	-
Total	**928**	**295**	**643**	**21110.53**	**4697.3**	**16413.13**	**-**	**$7,261**	**-**

Figure 46 shows the spatial distribution of wildland fires for those reported to the LANDFIRE database. A vast majority of reported fires are located in the eastern or western areas of the county, where State and Federal agencies manage the land.

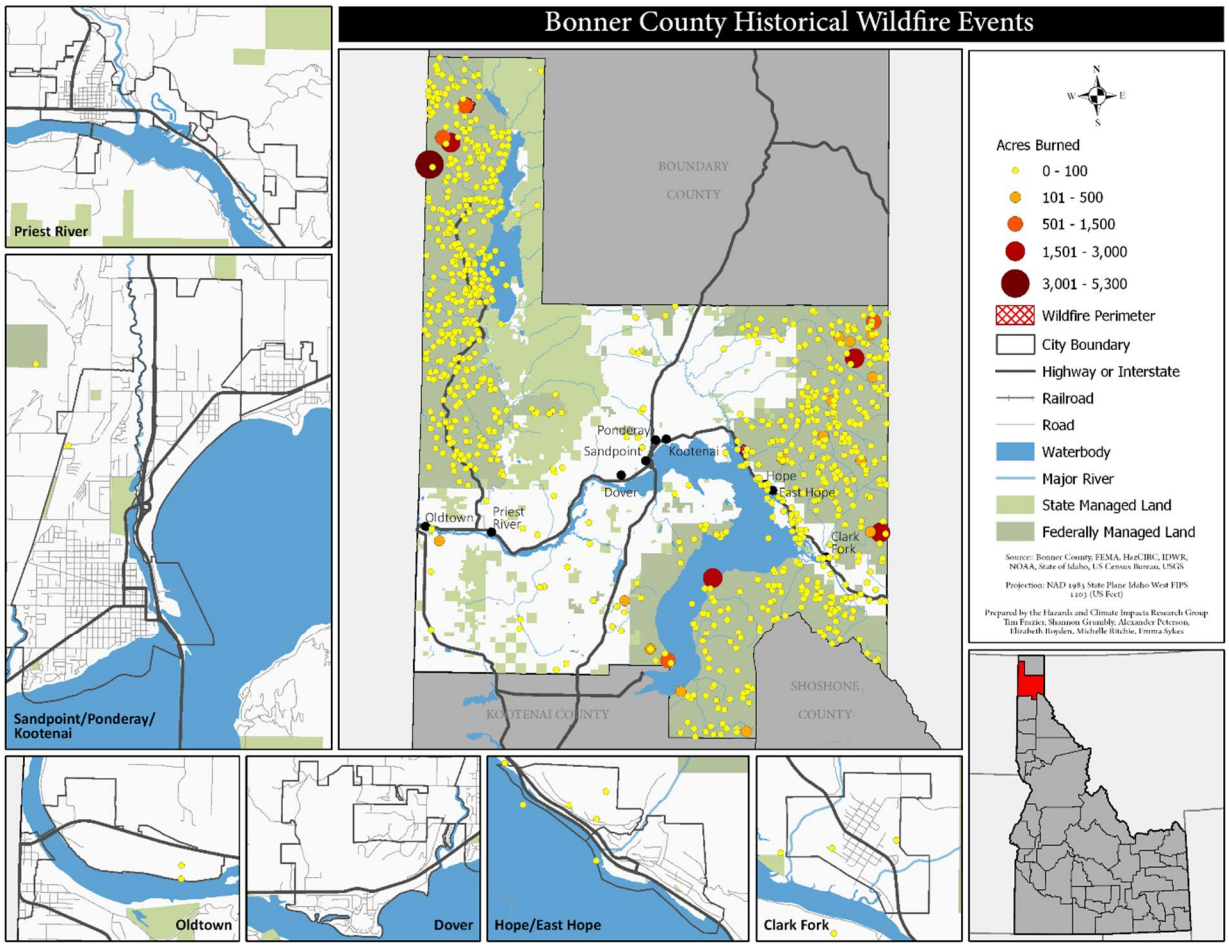


Figure 46. Historical wildfire events

Below are summaries of the Federal disaster declarations related to wildfire:

- Idaho Forest Fires (DR-231)
  - Incident Period: August 30, 1967
    Major Disaster Declaration declared on August 30, 1967
  - Affected Areas: Benewah County, Bonner County, Boundary County, Clearwater County, Idaho County, Kootenai County, Latah County, Lewis County, Nez Perce County and Shoshone County
  - https://www.fema.gov/disaster/231
- Idaho Cape Horn Fire (FM-5088)

- Incident period: July 05, 2015
  Fire Management Assistance Declaration declared on July 06, 2015
- Affected areas: Bonner County and Kootenai County
- https://www.fema.gov/disaster/5088

The following are media accounts:

- August 4, 2015 – Cape Horn fire in Idaho grows to 2,000 acres, emergency declared. Idaho's governor signed a Declaration of Disaster Emergency to help Bonner and Kootenai Counties fight the Cape Horn fire in Bayview, Idaho. Officials in Bonner County have requested federal help to fight the Cape Horn fire. The wildfire began Sunday afternoon and grew from 500 acres during the evening to more than 2,000 acres where it remained as of Tuesday morning. The cause of the fire is still under investigation and no injuries have been reported. Eight buildings were lost, six of which are homes on the eastern half of Cape Horn. It is 0 percent contained (MTN News).
- July 24, 2015 – Two more Bonner County fires have been reported this week, one near Laclede and another just moments ago on the road leading up to Schweitzer Mountain Resort. The Laclede blaze broke out Thursday around 4 p.m. and was responded to immediately by West Pend Oreille Fire District and some air personnel. "It was just across from the Riley Creek Campground," said Chief Les Kokanos of the West Pend Oreille Fire District. "There's a big bay back there where kids jump into the water. Helicopters scooped water out of there. That's what saved the day." Kokanos said there were three helicopters in action, as well as a handful of ground personnel, and the fire has been contained, burning just over nine acres. The outbreak on Schweitzer Mountain is just minutes old, as of this writing, and both Schweitzer Fire and Selkirk Fire Departments are responding to the call. It is reported to have broken out either on switchback two or four. "It doesn't sound like it's very big," said Schweitzer event director Mary Weber-Quinn. "I was talking with someone who just came up the hill and didn't even see it."

5.13.5 Hazard Exposure & Vulnerability

Most wildfire impacts to people or development occur in the Wildland-Urban Interface (WUI). The WUI consists of areas of development adjoining or mixing with forest or range wildland and wildland fuels. The WUI can range from urban areas adjoining wildlands, to isolated cabins and ranches. Specific WUI definitions vary according to each county's need; Bonner County adopted the following WUI definition, followed by the rationale for adoption:

- WUI Definition – Is an area where developed lands interact with undeveloped lands and includes the infrastructure and natural resources communities rely on for existence.
- Location – It is found in remote scattered development areas to highly developed urban areas and everywhere in between.

The forested landscape of north Idaho has adapted with wildland fire disturbances for centuries. Large fires events in north Idaho have historically been wind-driven events, occurring when uncontained fires were fueled by strong winds (such as the north Idaho and western Montana fires of 1910, MacPherson Fire of 1931, and Sundance Fire of 1967). These wind-driven fires often spread several miles within mere hours – the Sundance Fire traveled 16 miles in 9 hours (Anderson 1968). Firebrands were found 10-12 miles in advance of the Sundance Fire (Anderson 1968), and indicate the potential for spot-fires to develop well ahead of the main fire. It is during times of extreme fire behavior such as these when the communities in Bonner County, and fire fighters' safety is at the greatest risk from wildfire.

Fuel treatments to protect the values at risk within the county also aid in: reducing potential fire intensities, property and environmental damage, and increasing the effectiveness of suppression activities. Through the reduction of ground fuels, thinning of trees, and removal of ladder fuels, flame lengths will be lower in the event of a fire, which will reduce fire intensities and (where desirable) allow for more efficient and effective fire suppression. As canopy base height is raised through fuel treatments, and surface flame lengths are reduced, the potential of fire moving into the canopy is lessened and the effectiveness of suppression efforts increased. The values at risk within the county include much more than homes and other structures, encompassing recreation opportunities, water supplies, radio and telecommunications, public facilities, urban trees, shrubs, fences, utility poles and wires, street lights, private property, just to name a few. Indirect impacts of wildland fires include undesirable consequences such as erosion, sedimentation, loss of wildlife habitat, negative aesthetic effects, damage to timber resources, etc.

Fuels treatments around the communities within the county are performed with the goal of reducing flammability, fire intensity, firebrand production, potential for crown fire, and increasing the ability to suppress wildland fire. The amount of fuel reduction treatments and the location of those treatments on the landscape directly influence the growth of large wildland fires (Graham, McCaffrey, and Jain 2004). In addition, Graham, McCaffrey, and Jain (2004) state that reducing the potential for crown fire and fire growth will decrease the chance of developing a large wildland fire that affects human values in the wildland urban interface.

The effectiveness of fuel treatments in reducing potential fire intensities is well researched and supported. The amount of treatment necessary across the landscape for protecting values at risk from a wildland fire event is subject to site specific variability; such as the position on slope, windspeed, access, flammability, duration of the fire event, time of day, etc. Peterson et al. (2005) states that management of fuel across large landscapes is required to effectively reduce the area and severity of fires, as well as effects on local communities.

Research by Cohen (2000) has provided information on how structures catch on fire, and how once on fire the structures can contribute to the growth and spread of the fire. Cohen (2000) has shown that structures with typical ignition characteristics (wood sided, wood framed, asphalt composition roof) are at risk of catching on fire from several different sources. Structures can become ignited by

direct exposure from intense flames from a nearby source, which could be intensely burning vegetation or another structure. Structures may be at risk if the flame front is no more than about 100 feet away. Structures may be ignited from less intense sources against or very near the side of the structure. This can occur if firewood or other flammable material next to the structure is ignited by a ground fire or firebrands. Lastly, firebrands falling directly on roofs can ignite the structure if the roof is flammable (wooden shakes, for example) or if flammable debris is present, such as dry tree leaves or needles (Cohen 2000). In addition to individual structure ignition and combustion concerns, Finney and Cohen (2003) suggest that in order to effectively protect communities the amount of land that needs to be treated to reduce fire risk depends on the current structure of the vegetation, fuel loadings, topographic location, fire regime, and suppression concerns.

With the current forest structure, fire regimes changes, and suppression concerns in north Idaho; observed fire behavior indicates that a major component of risk exposure is created by a combination of rate-of-spread and long range spotting. In the absence of non-lethal fires (due to 80 + years of fire suppression), both ground and ladder fuels have increased due to tree growth, normal tree mortality, and insects and diseases, changing forest structures. Fire regimes are general classifications of the role fire would play across a landscape in the absence of modern human intervention, but includes aboriginal activities (Agee 1993, Brown 1995).

Successful establishment of spot fires in excess of one mile from the flaming front of an active fire occurred during the Sundance Fire (1967). In this condition, the spot-fires grew rapidly and generated burning embers that established additional spot-fires for miles down-wind.

Therefore, fuel modifications within this area would improve the conditions around**:**

- Individual homes
- Provide for increased fire fighter safety
- Protection of evacuation routes and critical infrastructure
- Protect values at risk
- Watersheds

The Bonner County WUI is shown in Figure 47.

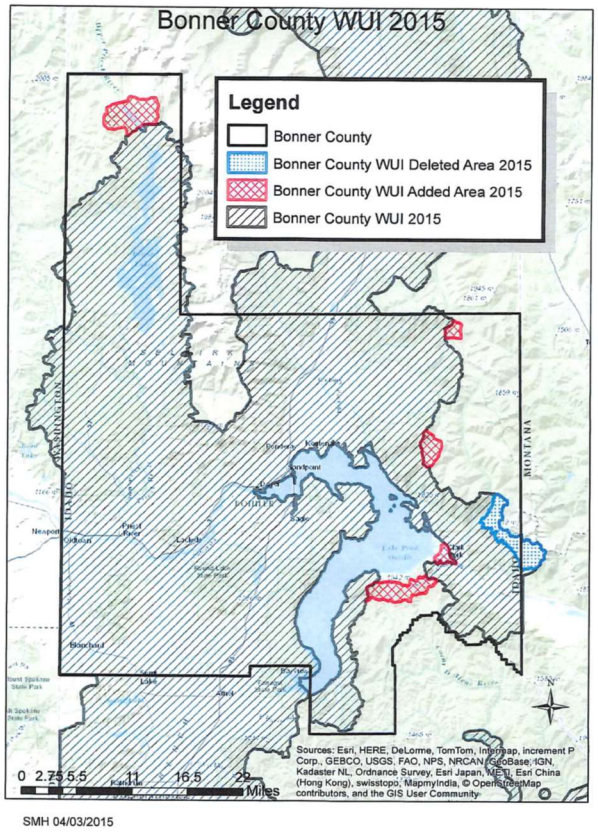


Figure 47. Bonner County Wildland-Urban Interface

The BonFire Steering Committee has designated the majority of the communities in Bonner County at high risk of wildfire, with the exception of the City of Sandpoint, which is considered moderate risk given the status of the watershed. Consequently, the majority of Bonner County is designated as a priority area. The terrain and fuel conditions that exist across the county dictate that all areas are at high risk to wildfire.

The GIS analysis using the wildfire risk model shows that although a majority of the county's land is classified as high, a nearly even split of the population is located in moderate and high risk areas (Table 57). A majority of the populations of Clark Fork, Kootenai, Oldtown, Ponderay, Priest River, and Sandpoint are located in moderate risk areas; in contrast, a majority of the population of Dover, East Hope, Hope, and in the unincorporated areas are located in high risk areas.

A majority of structures in the county are located in high risk areas, primarily due to number of structures in the high risk unincorporated areas (Table 58). Correspondingly, the sum of the structural values is greater than those located in low or moderate risk areas, indicating that most of Bonner County's improved parcels are at high risk to wildfire.

Table 57. Population exposure to wildfire

	Modeled Risk		
	Low	Moderate	High
Clark Fork	-	459	77
Dover	-	249	262
East Hope	-	68	140
Hope	-	16	72
Kootenai	-	678	-
Oldtown	-	180	9
Ponderay	-	1,083	50
Priest River	-	1,338	442
Sandpoint	-	7,351	25
Unincorporated	426	8,604	19,348
Total	**426**	**20,026**	**19,874**

Table 58. Structures and structure value exposure to wildfire

	Modeled Risk					
	Low		Moderate		High	
	Num. Structures	Total Value	Num. Structures	Total Value	Num. Structures	Total Value
Clark Fork	-	-	184	$12,772,626	7	$643,458
Dover	-	-	224	$69,240,067	118	$49,354,875
East Hope	-	-	78	$29,262,591	87	$22,259,107
Hope	-	-	2	$436,788	52	$10,112,199
Kootenai	-	-	261	$33,717,002	12	$1,668,195
Oldtown	-	-	59	$5,553,625	4	$449,845
Ponderay	-	-	170	$21,194,949	34	$5,571,628
Priest River	-	-	577	$54,955,828	73	$9,470,397
Sandpoint	-	-	2,896	$528,290,806	61	$16,314,816
Unincorp.	125	$33,408,326	6,689	$1,703,714,755	9,791	$2,209,567,388
Total	125	$33,408,326	11,140	$2,459,139,037	10,239	$2,325,411,908

5.13.6 Land Use & Future Development

Future development in Bonner County will on some level, be at risk to wildfire. Currently, the portions of the county with high wildfire risk are all lands surrounding the incorporated cities, including portions of each city's ACI. The incorporated cities themselves are at a low to medium fire risk; however, in the high density residential areas, there may be an increased population exposed to potential wildfire events

5.14 Utility Outage

5.14.1 Overview

Utility outages are often considered secondary hazards – hazards resulting from other hazards, such as severe weather. As the county experienced in 2015, prolonged power outages can have widespread impacts, and are therefore profiled in the 2017 plan update. Profiled utility outages include power outages and water outages (communication outages are profiled under Cyber Hazards). The 2017 plan update incorporated updated data, reworked and restructured the hazard profile, and included water outages in the Utility Outage profile.

Table 59. Utility outage summary

	Before 2009	2009-2017	Total
Occurrences*	995	579	1,574
Disaster Declarations	-	-	-
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

*Data limited to 2002-2012

5.14.2 Hazard Description

The two primary utility outages include the following:

- Power Outages – The loss of electricity for a period of time is deemed a power outage, and can be caused by hazards, human error, and equipment failure. Power outages have cascading impacts across an area or community, as power outages result in the loss of communications infrastructure, water supplies and distribution, emergency and response capabilities, and more. Often electricity is used to pump wells vital for individual or community continuity, and run heating and cooling systems important to both human comfort and health. Vulnerable populations needing powered medical equipment are especially threatened by long-term power outages.
- Water Outage – Often a result of power outages, both unexpected and scheduled shutdowns of community or well-based water supply systems are considered water outages. More specifically, water outages are a significant or complete reduction in water pressure that impair water-reliant systems, such as fire protection plumbing and heating systems. Such outages can also impact potable water, resulting in a lack of drinking water.

5.14.3 Hazard Extent, Magnitude, & Probability

Utility outages – specifically power outages – are a common hazard. Numerous events can result in utility outages, including scheduled maintenance, unscheduled maintenance, high and severe winds, wildfire, floods, and more. The extent of utility outages can vary from localized events (e.g., a problematic well, to a few houses in the same neighborhood lacking power) to the entire or a majority of the county. Likewise, the magnitude of utility outage can vary between intermittent and prolonged.

5.14.4 Hazard Occurrences

Although there are no recorded repetitive losses from utility outage, Bonner County has regularly experienced utility outages. Specifically, the county experienced more than 1,500 power outages from 2003 to 2012. Affected communities included Blanchard (55 outages), Clark Fork (114 outages), Dover (28 outages), Hope (199 outages), Oldtown (97 outages), Ponderay (29 outages), Priest River (215 outages), Sagle (460 outages), and Sandpoint (377 outages). Causes of these power outages were attributed to the following:

- Squirrels
- Birds
- Trees
- Snow
- Lightning
- Wind
- Ice

Table 60. Utility outage occurrences

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Clark Fork	11	12	3	11	19	22	4	13	7	12	114
Dover	5	-	-	2	5	3	1	7	-	5	28
East Hope	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	-
Hope	25	29	5	19	31	27	16	19	10	18	199
Kootenai	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	-
Oldtown	3	10	2	14	16	15	11	12	4	10	97
Ponderay	1	9	-	1	2	4	3	1	-	8	29
Priest River	19	18	6	28	31	31	35	17	12	18	215
Sandpoint	48	33	4	21	58	53	44	42	30	44	377
Unincorporated*	82	44	8	55	70	80	43	52	27	54	515

Total	194	155	28	151	232	235	157	163	90	169	1,574

*Only includes data for Blanchard and Sagle

Below are media accounts of utility outages in Bonner County:

- December 16, 2006 – A wind storm which roared through north Idaho and eastern Washington made a mess of area utility systems, knocking out power to almost 60,000 people around the region. Northern Lights reported power outages to about 8,000 customers in north Idaho and western Montana. Avista Utilities said the storm knocked out service to more than 50,000 customers in the Spokane area, and Kootenai and Bonner counties, and caused extensive damage to the utility's infrastructure. The storm sent trees into power lines causing broken poles and wires throughout the Northern Lights service area. The storm wasn't just pulling down lines but pulling over poles. At the height of the storm, homes and businesses in areas of Laclede and Priest Lake were among those which lost power. The next day, about 19,000 Avista customers were still without power, included 362 in the Hope/Clark Fork area, about 100 customers in the Oldtown area and a few in the Sagle area. (Windstorm Makes a Mess in Region, Bonner County Daily Bee).
- November 18, 2015 – Powerful thunderstorms raged across eastern Washington and Northern Idaho Friday afternoon, knocking down trees and utility poles. There were several reports of trees falling on power-lines and homes. Power was knocked out in several locations around the area. Bonner county dispatch told KHQ, "We have trees down on just about every road in the county". Avista has a total of more than 5,400 customers without power. The highest number is in the Sandpoint area with 4,500 customers without power. If those customers are without power when they wake up in the morning they should contact Avista and let them know. Avista says that some of these customers may not have power restored until late Sunday. Spokane has only a handful of customers left without power. Grangeville has about 500 customers without power. Coeur d'Alene has about 890 customers without power and they are expected to have power back on sometime today. Around 40 Inland Power and Light customers are without power in the Suncrest area. Kootenai Electric estimates around 2,000 customers without power in Kootenai County (Bonner County Daily Bee).

5.14.5 Hazard Exposure & Vulnerability

Utility outages can impact all of Bonner County, both in developed and rural areas. Rural areas, however, are more vulnerable to utility outage due to lack of utility redundancy and possible remoteness. Prolonged utility outages can have significant impacts on the county's economic well-being.

Vulnerabilities from utility outages include exposure to extreme temperatures, food poisoning, injury, supply interruption (e.g., food shortage and insecurity), and economic disruption. Special needs populations – such as those on respirators – are especially vulnerable to power outages.

5.14.6 Land Use & Future Development

Future land use and development in Bonner County could potentially increase the number of structures that lose power during severe weather events, as additional critical infrastructure is provided with the addition of new development.

5.15 Impoundment Structure Failure

5.15.1 Overview

The hazard profile for dams from the former plan was restructured include impoundment structure failures, such as dams, levees, and canals. Changes include more detailed hazard descriptions, a review of potential structure failure impacts, and an overall more comprehensive hazard profile.

Table 61. Impoundment structure failure summary

	Before 2009	2009-2017	Total
Occurrences	-	-	-
Disaster Declarations	-	-	-
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

5.15.2 Hazard Description

Impoundment structures are both human and natural-made structures designed to retain or store water, sediments, and other liquids or non-liquids. This term is applied broadly to include dams, canals, and levees.

- Dams – Defined as an artificial or natural barrier across a watercourse. Often, dams are designed to store, control, or divert water. Other uses include recreation, flood control, irrigation and water supply, hydroelectric generation, industrial and mining use, and to control mine tailings slurry, wastewater, and liquefied industrial or food processing byproduct. Dams are typically constructed of concrete and other earthen material. Dams can be built, owned, and operated by various entities and individuals, such as utility companies, State and Federal government, and private enterprise. The structural integrity of a dam depends on its design, its level of maintenance, weather and drainage, and exogenous factors. Dam failure can result from poor design, inadequate or improper maintenance, streamflow and runoff above design capacity, other hazards (e.g., earthquake and landslide), and through intentional harm. When a dam fails, the sudden surge of water downstream is comparable to riverine or flash flooding. Depending on the storage capacity of the reservoir, inundation can extend for long distances and have significant impacts if population and development are located downstream.
- Levees – Levees prevent flooding of adjacent land to waterways, and be either natural or constructed. Naturally occurring levees are ridges and buildup of sediment deposited by a river and are often relatively low in height, broad at the base with a narrow top, and slopes generally equal to the deposited material's angle of repose. In contrast, constructed levees are structures designed to contain, control, and divert streamflow, often built using soil, rock, or concrete, and can be tall steep or vertical structures. Although levees are constructed to reduce flooding and flood impacts, levees often inadvertently increase flood risk. Increased development proximate to the waterway, poor design, and improper or inadequate maintenance can result in levee failure. Levees can also fail through breaching, overtopping, erosion, and other hazards (e.g., earthquake and landslide).
- Canals – Canals are constructed waterways through which diverted water flows, usually to provide irrigation to agricultural land. There is an increasing awareness of the risk canals pose to development, as canals pose a potential flood risk that is often understudied or unknown. Similar to dams and levees, canals can be breached, overtopped, or break due to poor design and improper maintenance. Often, no regulation dissuades or prevents development adjacent to canals.

5.15.3 Hazard Extent, Magnitude, & Probability

Major water impoundment structures are located in Bonner County or have the potential to affect the county. The Bonner County Profile details all the dams in Bonner County. The three primary factors influencing the potential severity of dam failure include the height of the dam, the amount of water

impounded by the structure, and the extent of development and infrastructure located in the downstream inundation area. The US Bureau of Reclamation categorizes dams into three classifications:

- High Hazard Dam – A dam with the potential to cause loss of life and extensive economic losses, property damage, or environmental damage if failure occurs.
- Significant Hazard Dam – A dam not expected to cause loss of life if failure occurs, but with the potential to cause economic losses, property damage, utility loss, or other impact.
- Low Hazard Dam – A dam where failure or misoperation does not result in loss of life and has minimal economic or environmental impact.

The probability of impoundment structure failure is rated as low. However, aging infrastructure coincident with increased precipitation and temperature extremes can increase this probability.

5.15.4 Hazard Occurrences

There are no recorded incidents of water impoundment structure failures in Bonner County.

5.15.5 Hazard Exposure & Vulnerability

Property and populations located in the downstream inundation areas of dams, and development and populations proximate to levees and canals are at risk of exposure to impoundment structure failure.

5.15.6 Land Use & Future Development

As there have been no impoundment failures currently to date, future land use and development impacts are somewhat unknown. However, we can make an assumption that with increased development and more intensive land uses in the near future, the possibility of structural damage and loss of life and property increases.

5.16 Transportation Accidents & Incidents

5.16.1 Overview

Transportation accidents and incidents occur every day across the State of Idaho. Transportation accidents and incidents can involve aircraft, cars and trucks, trains, boats, and many other forms of transportation, and can result in injuries and fatalities, road closures and detours, and involve hazardous materials or cause cascading hazards (such as wildland fire). The 2017 plan update consolidated the aviation, ground, and railroad accident profiles, incorporated new data and occurrences, and mapped high risk intersections.

Table 62. Transportation accidents and incidents summary

	2003-2008	2009-2017	Total
Occurrences	2,210		
Disaster Declarations	-		
Casualties			
Property Damage	-	-	-
Repetitive Losses	-	-	-

5.16.2 Hazard Description

Transportation accidents and incidents are varied and involve many forms of transportation, such as the following:

- Aviation Transportation – Aviation accidents and incidents occur when the normal operation of an aircraft is disrupted, where an individual or group of people are injured or killed, and/or the aircraft is structurally damaged. Aviation accidents results from multiple causes, including mechanical failure, poor weather conditions, and pilot error.
- Ground Transportation – Accidents and incidents involving motor vehicles such as cars, buses, trucks, and motorcycles, and are the fifth leading cause of death in the US. Ground transportation accidents and incidents result from human error, mechanical failure, and purposeful intention, and can injure and kill those in other vehicles, pedestrians, and those in buildings.
- Rail Transportation – Defined as any collision, derailment, loss of control, or other events involving the operation of on-track equipment whether moving or standing that result in some loss or casualty. Railroad transportation accidents/incidents are only reported for those events with losses and/or damage above an established threshold, between rail equipment and vehicles and highway users at crossings, and any occurrence of injury or fatality to an

individual. For train incidents/accidents (those events with monetary damage to on-track rail equipment), the reporting threshold set by the Federal Railroad Administration is $8,500.

5.16.3 Hazard Extent, Magnitude, & Probability

Transportation accident and incident severity can range from little to no loss of life or property, to major events with significant casualties and property damage. Bonner County and its communities are likely to experience multiple transportation-related events each year. Probabilities are higher for high-traffic intersections, railway crossings, and airports.

5.16.4 Hazard Occurrences

Bonner County regularly experiences ground, aviation, and rail transportation accident and incidents. In total, the county experienced five railway events, seven aircraft crashes, more than 3,000 car and truck crashes since the last plan update. In spite of the high rate of occurrence, there are no repetitive losses stemming from transportation accidents or incidents in Bonner County.

Table 63. Aircraft accident and incident occurrences

Date	Location	Incident Type
6/23/1990	Priest River	Nonfatal
10/14/1991	Sandpoint	Nonfatal
5/24/1998	Sandpoint	Nonfatal
9/21/1998	Priest River	Nonfatal
9/4/1999	Sandpoint	Nonfatal
6/8/2003	Sandpoint	Fatal
8/15/2004	Sandpoint	Nonfatal
10/21/2005	Sandpoint	Nonfatal
12/3/2005	Sandpoint	Nonfatal
3/16/2006	Sandpoint	Nonfatal
8/23/2011	Cavanaugh Bay	Nonfatal
3/25/2012	Coolin	Nonfatal
8/15/2012	Coolin	Nonfatal
8/27/2012	Sand Point	Nonfatal
6/16/2013	Coolin	Nonfatal
7/8/2014	Sand Point	Nonfatal

10/8/2015	Hope	Fatal

Table 64. Ground transportation accident and incident occurrences

Year	Fatal	Injury	Total
2009	6	175	593
2010	7	195	577
2011	7	158	487
2012	10	147	456
2013	6	151	471
2014	8	154	501
Total	44	980	3,085

Table 65. Railroad accident and incident occurrences

Period	Number of Incidents	Fatalities	Injuries
2009-2017	5	1	-
1975-2008	149	22	33
Total	154	23	33

5.16.5 Hazard Exposure & Vulnerability

Exposure to transportation accidents and incidents is limited to the transportation network (see the Bonner Profile Transportation section), though aviation accidents and incidents can occur anywhere in the county. Notably, high-traffic intersections, major highways, railway crossings, and sharp curves exhibit higher exposure to accidents and incidents. Residences and structures along the transportation network are likewise exposed, as are any individuals in vehicles.

5.16.6 Land Use & Future Development

Population growth and development can increase the transportation accidents and incidents. Increased aviation, rail, and road traffic rates growth coincidently with development.

5.17 Food Insecurity & Food Shortage

5.17.1 Overview

Food insecurity and food shortage is often neglected in HMPs, yet poses a risk to the county. Bonner County's food is primarily sourced from west of Snoqualmie Pass, a not insignificant distance. The 2017 plan update added a basic hazard profile for food insecurity and food shortage, laying a foundation for further consideration and analysis.

Table 66. Food insecurity and shortage summary

	Before 2009	2009-2017	Total
Occurrences	-	-	-
Disaster Declarations	-	-	-
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

5.17.2 Hazard Description

Food security is achieved when all individuals have the physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences to maintain an active and healthy lifestyle. Collective security, or Community Food Security, is defined as a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through an economical and environmentally sustainable food system that maximizes community self-reliance and social justice. Disruptions of food security can result in food insecurity or food shortages. Although food security and food shortages are distinct terms, the concepts are intertwined. Today, food insecurity is not typically the sole product of poverty, but when individuals, households, and communities experience a lack of access to adequate foods temporally. On average, a US city has only a two or three-day supply of food and even a slight disruption in the supply chain could be catastrophic.

Based on a study done by Schuette (2014), indicators of food insecurity and food shortages for rural communities in Idaho fall into three categories:

- Food Availability, Access, & Utilization – Food access includes geographic access, economic access (e.g., price, transportation costs, and poverty), and informational access (e.g., educational, social, and cultural). The quality and access through nutrition education and assistance programs determines utilization. Indicators may include year-round food resource

outlets (e.g., grocery stores), poverty rates, food banks and food pantries, median household income, SNAP approved retail outlets, and households receiving SNAP benefits

- Stability – The stability of the region or its ability to cope with alterations to the regional food system. Indicators may include aggregated seasonal food resource outlets (e.g. CSA's, farmer's markets, community gardens). In addition, failure in the transportation network, such as road closures, are also indicators of food insecurity and food shortages in rural communities
- Demographic – Demographic indicators may include median age, labor force participation, male or female head of household, population over 65 years of age, and the attainment of health insurance.

Stability is a particular important consideration with respect to increasing climate variability. With climate abnormalities and other temporal changes, stability has become a more widely accepted unit of analysis. Additionally, research has shown that residents may be able to get more of their nutrients from local food sources if communities concentrate on seasonal availability. Coping strategies will be vital for community food security in the future with climate change variability.

5.17.3 Hazard Extent, Magnitude, & Probability

The extent of food instability and shortages can range from localized (e.g., a single household) to the entire county. Localized food instability and shortage is often a result of low income status, disability, or other impairing factors, while larger-scale events result from distal hazard events that affect food distribution networks or county-wide disasters.

5.17.4 Hazard Occurrences

Bonner County relies on food transported into the county from Seattle. Trucks must come over Snoqualmie Pass, which is subject to periodic closure. During the summer, the Pass experiences closures and delays from construction, rock blasting, transportation accidents, and maintenance. During the winter, inclement weather, avalanche, maintenance, and accidents often cause delays and closures.

The winter of 2015 closed more than the previous four years, primarily due to collisions from heavy snowfall. If the Pass were to close for an extended period of time, Bonner County is likely to experience food shortages.

5.17.5 Hazard Exposure & Vulnerability

Those most vulnerable to food shortages are low-income families, disabled individuals, and children and elderly. If food shortage were to result from another hazard – such as heavy snowfall closing

Snoqualmie Pass for a consecutive stretch of days – those most sensitive are most likely to experience food shortage.

5.17.6 Land Use & Future Development

There are no land use implications for food shortage and insecurity; however, continued population growth and development will result in an increased food demand. Increased demand during baseline conditions can result in more significant vulnerability to food shortage and insecurity throughout the county.

5.18 Drought

5.18.1 Overview

Drought is caused by a myriad of factors that act across time and space, making predictions difficult. However, drought can have widespread impact on private and public water sources, agriculture, and other natural resource-based economic sectors, and understanding the risk is vital to mitigation. The 2017 update reorganized the drought hazard profile, incorporated additional data and modeling, and presented a more comprehensive and cohesive analysis of Bonner County's drought risk.

Table 67. Drought summary

	Before 2009	2009-2017	Total
Occurrences*	3	1	4
Disaster Declarations	-	-	-
Casualties	-	-	-
Property Damage	-	-	-
Repetitive Losses	-	-	-

*US Drought Monitor extreme drought

5.18.2 Hazard Description

Defined concisely, drought is the physical shortage of water. A broader definition of drought is a deficiency of precipitation over an extended period of time, resulting in shortages of water resources vital to community and ecosystem continuity. Often, drought is simply perceived as a period of unusually dry weather; however, it is important to distinguish between the types of droughts:

- Meteorological Drought – Defined as below-normal precipitation over a set period of time. Often this type of drought is region-specific based on regional climatology. This drought type is often what is thought of as 'drought'.
- Agricultural Drought – This type of drought occurs when a reduction in soil moisture results in unmet demand for crops. This drought type is region-, crop-, and time-specific, and usually occurs after meteorological droughts. Agricultural drought can cause significant crop losses and economic disruption for agriculture-dependent communities.
- Hydrological Drought – This type of drought is driven by a deficiency of surface and subsurface water resources, often indicated by reduced streamflow, lake or reservoir water levels, and groundwater table heights. Due to the complex hydrological network that feeds surface and subsurface water resources, hydrological drought occurs after meteorological drought.
- Socioeconomic Drought – This type of drought occurs when individuals or communities are impacted by physical water shortages. Socioeconomic drought impacts can vary according to an individual's or community's ability to adapt or mitigate.

Drought is a complex hazard, given the many interrelated factors that determine and influence water supply, such as the amount, frequency, and intensity of precipitation, evapotranspiration from vegetation and surface water, and human use such as groundwater withdrawals. Drought can also drive other hazards, such as wildfire, insect infestation, and vegetation disease and mortality. Drought is also a special type of hazard because it does not often require evacuation or often constitute an immediate threat to life or property. People are not suddenly rendered homeless or without food and clothing. The general effect of a drought is economic hardship, but it can resemble other types of disasters in that those impacted are deprived of their livelihoods, and communities can suffer economic decline. This is notably so for communities reliant on agriculture or water resources as economic drivers.

Empirical studies over the past century across the globe showed that drought is often caused by a multiple of factors, often synergistic in nature. These factors span local to global, and include groundwater levels, streamflow, soil moisture, vegetation, and large-scale global weather patterns. Climate teleconnections, such as El Nino and La Nina, can significantly influence drought frequency and magnitude. Due to the complexity of drought, no cohesive or comprehensive model exists to date to project drought beyond a short timeframe. Currently, the US Drought Monitor is updated weekly and widely used by planners, policymakers, and scientists, and should be the go-to source for drought information. Additionally, the NWS Climate Prediction Center produces seasonal drought outlooks which can also be employed in the near-term.

Drought in Idaho is often associated with warm winters with reduced snowfall and snowpack. Mountain snowpack feeds a significant portion of Idaho's water supply, and low snowpack results in low streamflow and groundwater recharge. Above-normal winter and spring temperatures further impact snowpack and can cause drought. The Idaho Drought Plan was last revised in 2001, and provides historic information, guidance, and a framework for management of water shortage situations. The Idaho Drought Plan is designed as a resource and educational tool to be used when future water shortages occur.

5.18.3 Hazard Extent, Magnitude, & Probability

The extent and magnitude of drought can vary widely through time and space. The US Drought Monitor classifies drought into five magnitudes based on numerous metrics, such as the Palmer Drought Severity Index, CPC Soil Moisture Model, USGS Weekly Streamflow, and more:

- Abnormally Dry (D0) – If the county is entering a drought, possible impacts include short-term dryness that can slow planting or the growth of crops and pastures. If coming out of drought, impacts can include lingering water deficits and crops or pastures unable to recover.
- Moderate Drought (D1) – Potential impacts include some damage to crops and pastures; the development of water shortages due to reduced streamflow, reservoir recharge, and low wells.
- Severe Drought (D2) – Potential impacts likely include crop and pasture losses, common water shortages, and water restrictions.
- Extreme Drought (D3) – Potential impacts include major crop and pasture losses, and widespread water shortages and restrictions.
- Exceptional Drought (D4) – Significant and widespread crop and pasture losses, and water emergencies resulting from minimal reservoir storage, streamflow, and groundwater levels.

Losses associated with the more significant droughts can include:

- Crop, dairy and livestock, timber, and fishery production losses.
- Recreation losses.
- Losses associated with Increased energy costs resulting from increased energy demand and reduced hydroelectric generation capacity.
- Losses associated with reduced tax revenue.
- Losses from non-navigable waterways.
- Loss of long-term economic growth and development.

The extent of drought can be localized, especially in mountainous areas with numerous microclimates (i.e., Bonner County). However, cumulative drought impacts can span the entire county, impacting all watersheds, waterways, aquifers, and more (see Figure 24 for percent area classified as drought). Temporally, drought can be both short- and long-term. Short-term drought is normally defined as drought conditions lasting six or less months. Short-term droughts impact those ecosystem services

reliant on precipitation, groundwater, and meteorological conditions, such as agriculture and grasslands. In contrast, long-term drought is typically defined as drought conditions lasting more than six months, with impacts on ecosystem services such as hydrology, long-term water storage, and more.

Forecasting drought is difficult due to the number of contributing factors. However, drought is a naturally occurring climatic phenomena, and is an expected phase of almost all geographic regions in the state. Climate change can reduce snowfall, change precipitation patterns and extremes, and result in significantly reduced or modified streamflow magnitude, timing, and spatial distribution. These climate impacts can result in increased drought occurrence and severity.

5.18.4 Hazard Occurrences

Given the many types of drought and the difficulty in measuring drought, it is often difficult to report every drought occurrence, and no singular comprehensive database recording drought occurrence and impacts exists. The NWS Storms Event Database records no instances of drought, and there are no reported repetitive losses associated with drought in Bonner County. The county has not had a drought declaration by IDWR; although IDWR drought declarations do not entail financial assistance or support to affected counties, they do impact the administrative processing of applications for temporary changes in water rights. Such changes can include changes to diversion, existing water rights, exchanges, and more.

The SHELDUS database does list seven statewide drought incidents that potentially affected the county (Table 68). Likewise, the US Department of Agriculture (USDA) list Bonner County as a primary recipient of a secretarial drought designation in 2015 (note that this data is limited to years after 2011). Finally, Figure 48 shows drought occurrence from the US Drought Monitor for the years 2000 to 2015, with four occurrences of extreme drought and multiple occurrences of moderate to severe drought.

Table 68. Drought occurrences

Date	Location	Comment	Casualties	Property Damage	Crop Damage	Source
8/31/1988	Statewide	Drought	-	-	$22,740	SHELDUS
10/31/1988	Statewide	Drought	-	$22,740	$22,740	SHELDUS
6/30/1992	Statewide	Extreme Drought	-	-	$1,874,839	SHELDUS
7/31/1992	Statewide	Drought	-	-	$1,917,449	SHELDUS
8/31/1992	Statewide	Extreme Drought	-	-	$1,917,449	SHELDUS
9/30/1992	Statewide	Extreme Drought	-	-	$1,874,839	SHELDUS

10/31/1992	Statewide	Drought	-	$191,744	$1,917,449	SHELDUS

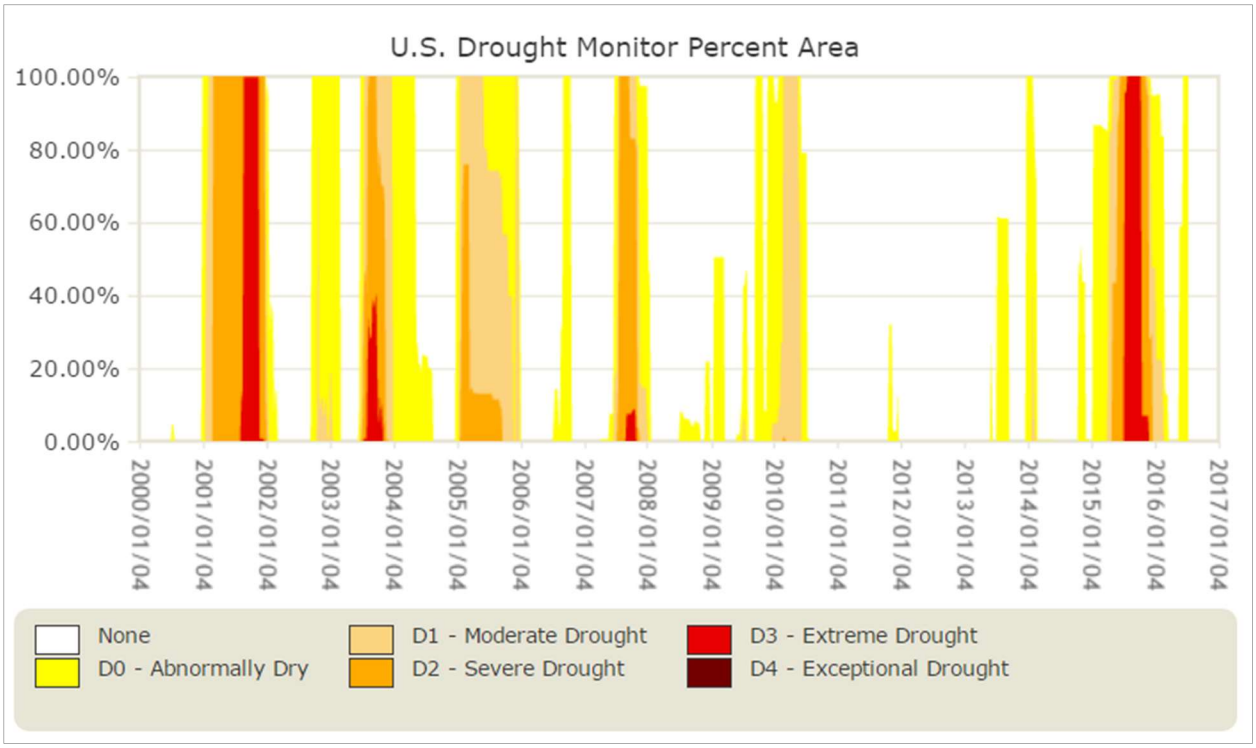


Figure 48. US Drought monitor percent area

Local media reports help contextualize drought in Bonner County:

- July 15, 2015 – Five Idaho Panhandle counties have been declared federal disaster areas because of drought conditions, the U.S. Department of Agriculture announced today. The five counties are Bonner, Benewah, Clearwater, Kootenai and Latah. The declaration qualifies producers to apply for federal drought relief programs administered by the USDA's Farm Service Agency. Producers in five other Idaho counties and three in Washington also can apply for assistance because their counties border the disaster area. The five contiguous counties in Idaho are Boundary, Idaho, Lewis, Nez Perce and Shoshone. The contiguous counties in Washington are Pend Oreille, Spokane and Whitman. The declaration today was the latest involving Idaho counties dating back to early February. Producers must apply for low-interest emergency loans within eight months of a declaration (Capital Press).
- July 15, 2015 – The U.S. Department of Agriculture (USDA) has designated Benewah, Bonner, Clearwater, Kootenai and Latah counties in Idaho as primary natural disaster areas due to damages and losses caused by a recent drought. "Our hearts go out to those Idaho farmers and ranchers affected by recent natural disasters," said Agriculture Secretary Tom Vilsack.

"President Obama and I are committed to ensuring that agriculture remains a bright spot in our nation's economy by sustaining the successes of America's farmers, ranchers, and rural communities through these difficult times. We're also telling Idaho producers that USDA stands with you and your communities when severe weather and natural disasters threaten to disrupt your livelihood." Farmers and ranchers in Boundary, Idaho, Lewis, Nez Perce and Shoshone counties in Idaho also qualify for natural disaster assistance because their counties are contiguous. Farmers and ranchers in the following counties in Montana and Washington also qualify for natural disaster assistance because their counties are contiguous. Those counties are: Montana Lincoln, Mineral, Missoula and Sanders Washington Pend Oreille, Spokane and Whitman. All counties listed above were designated natural disaster areas on July 15, 2015, making all qualified farm operators in the designated areas eligible for low interest emergency (EM) loans from USDA's Farm Service Agency (FSA), provided eligibility requirements are met. Farmers in eligible counties have eight months from the date of the declaration to apply for loans to help cover part of their actual losses. FSA will consider each loan application on its own merits, taking into account the extent of losses, security available and repayment ability. FSA has a variety of programs, in addition to the EM loan program, to help eligible farmers recover from adversity. Additional programs available to assist farmers and ranchers include the Emergency Conservation Program, The Livestock Forage Disaster Program, the Livestock Indemnity Program, the Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program, and the Tree Assistance Program. Interested farmers may contact their local USDA Service Centers for further information on eligibility requirements and application procedures for these and other programs.

5.18.5 Hazard Exposure & Vulnerability

Drought can affect all economic sectors, with particular significance on the energy, agriculture, and natural resource sectors (e.g., timber). Because precipitation is variable across both time and space, classifying drought exposure and vulnerability is difficult. Drought exposure can be both local and statewide, with similar variable impacts. Dryland agriculture and water-related recreational businesses are the most drought vulnerable sectors. If impacted, Bonner County could experience long-term economic consequences (see 5.9.3). A socioeconomic vulnerability assessment using the SERV model was not completed given the difficult in classifying drought and its impacts on non-agriculture populations. Critical facilities vulnerable to drought include Bonner County's hydroelectric facilities, as drought can reduce the amount of water available to produce electricity.

5.18.6 Land Use & Future Development

Land use and future development in Bonner County can increase both the risk and severity of drought occurrence. Uses and development on residential, commercial, industrial, rangeland and agricultural lands throughout the county can increase water usage from both surface water and groundwater

sources, which can result in reduced surface flow and groundwater tables. Reductions in both surface flow and groundwater resources can result in more frequent drought occurrences. Private and public wells, irrigated agriculture, and hydroelectric utilities can be significantly affected.

Of particular concern with drought are future climate impacts. The Northwest is expected to experience increased temperatures year-round, reduced precipitation, and increased seasonal variability coupled with seasonal shifts in the timing and type of precipitation. Snowpacks that provide water storage will likely melt earlier in the year. Combined with less summer precipitation and increased temperatures, earlier peak flows are expected. These stronger flows can flood out smaller dams, and result in both short- and long-term drought conditions.

5.19 Risk Calculations & Rankings

5.19.1 Overview

To better inform the mitigation strategy, risk was quantified using an advanced statistical method. Risk calculations provide a numerical ranking of the relative impact of each hazard, taking into account both past occurrences and magnitudes, and the current exposure of populations and structures. The numerical output from each hazard-specific risk calculations were then compared and ranked to allow for a standard means of comparing disparate hazards that often entail many different impacts.

The standardized scores, risk score, and hazard rankings are shown in Table 69. Due to limitations in the data, risk calculations were limited county-wide calculations and to avalanche, communicable disease (specifically pandemic influenza), earthquake, flood, hazmat, landslide, severe weather, and wildfire.

The following seven hazards consistently affect Bonner County:

- Wildfire
- Winter Storms
- Flooding
- Hazardous Material Incidents
- Severe Wind
- Landslides
- Earthquakes

According to local officials and the planning team, these same hazards should be the focus of the mitigation strategies developed in this 2017 plan update. There should be additional focus on flooding and severe wind in the plan's 2017-2022 lifecycle as the county has experienced multiple disaster declarations in the past few years for these specific hazards. Note that in the 2017 plan update winter storms and severe wind have been merged into a severe weather hazard profile.

5.19.2 Methodology

To derive the risk calculation, population and structure value exposure for all hazard magnitudes was weighted and summed. Return periods, fatalities, injuries, property and crop damage from past occurrences, and the weighted exposure were standardized using the z-score. The final risk score was derived from the following equation:

*Risk = Return Period * (Fatalities + Injuries + Property Damage + Weighted Exposure)*

Table 69. Risk calculations and rankings

	Standardized Scores							Risk Ranking
	Return Period	Fatalities	Injuries	Prop Damage	Population Exposure	Structure Exposure	Risk Score	
Avalanche	2.33	-0.34	-0.32	-0.56	-1.58	-1.30	-9.58	8
PanFlu	0.01	2.64	-0.86	-0.61	-0.48	-0.30	0.00	4
Earthquake	0.44	-0.43	-0.86	-0.68	0.50	0.51	-0.42	5
Flood	0.50	-0.43	-0.86	0.72	-0.57	-1.09	-1.11	6
Hazmat	0.23	-0.16	0.12	-0.58	1.08	1.03	0.35	1
Landslide	1.75	-0.43	-0.71	-0.71	-1.14	-1.12	-7.18	7
Severe Weather	0.04	-0.43	1.41	1.41	0.23	0.18	0.11	3
Wildfire	0.04	-0.43	1.11	1.41	1.36	1.37	0.20	2

VI. MITIGATION STRATEGY

6.1 Overview

Bonner County's mitigation strategy represents a comprehensive effort to reduce or eliminate potential losses from the hazards detailed in the risk assessment. The goals, objectives, and actions that comprise the mitigation strategy were carried forward from the form plan, with additional goals, objectives, and actions developed through collaborative effort across the county that included its communities, various State and Federal agencies, and through public engagement.

6.1.1 FEMA Requirements

The 2017 plan update developed the mitigation strategy consistent with the process and requirements detailed by FEMA. This section satisfies the following FEMA requirements:

- FEMA 44 CFR §201.6(c)(3) – A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.
- FEMA 44 CFR §201.6(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
- FEMA 44 CFR §201.6(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, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1,2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
- FEMA 44 CFR §201.6(c)(3)(iii) – An action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to cost benefit review of the proposed projects and their associated costs.
- FEMA 44 CFR §201.6(c)(3)(iv) – For multijurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.
- FEMA 44 CFR §201.6(c)(4)(ii) – A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive capital improvements, when appropriate.

6.2 Mitigation Successes & Highlights

Bonner County actively mitigates against various hazards and risks. The following are some of the successes and highlights of past mitigation efforts:

- Removal of Structure from Floodway – In 2015, Bonner County received a $508,935 pre-disaster mitigation grant from FEMA to raze a home that was built in a floodway at the confluence of the Pack River and Grouse Creek. The county's intent is to restore the property back to its natural state; but until then the property is being used and managed for recreation purposes, such as a pullout for kayakers and canoeists. The county building department, which no longer exists, approved the construction of the 3,700-square foot home in 1994, but FEMA later determined there was no required analysis of the home's impact on the base flood elevation. The home has jeopardized Bonner County's standing in the NFIP program, in which more than 200 landowners rely on for flood insurance. This project (estimated at $678,580 to complete) has been the largest acquisition of property in Idaho in several decades (Bonner County Daily Bee, 2015).
- Above & Beyond FEMA Floodplain Minimum Requirements – Bonner County has been a participant in the NFIP since the 1980's and have made efforts to go above and beyond meeting the minimum FEMA floodplain requirements. These stringent requirements include having to construct at least one foot above BFE, where FEMA only requires construction within the floodplains to be at BFE. The county also prohibits any construction within the floodway, unless the development or structure is water dependent for public or quasi-public entities or public or private utilities or is necessary to comply with lawful requirements. These encroachments must provide certification that they will not result in any increase in flood levels.
- Increasing CRS Score – During the completion of the 2009 AHMP, Bonner County had a Class 9 rating within the CRS Program. Since then, the county has implemented various activities in order to improve to a Class 8 Rating, which is the current rating, and to within 70 points of a Class 7 rating. Flood hazard reduction standards have been adopted since the last plan update including provisions for anchoring, construction materials and methods, and utilities, with specific provisions for residential construction, non-residential construction, below grade crawl space construction, manufactured homes, and recreational vehicles. Public outreach activities have also improved with the construction of a floodplain webpage on Bonner County's website, as well as the creation and distribution of brochures and flyers regarding pertinent floodplain information. Bonner County has also increased its mapping activities through the GIS mapping of setbacks and open space areas, with additional non-regulatory flood inundation mapping for planning purposes.
- Trestle Creek Bridge Reconstruction – During the completion of the 2009 AHMP, Bonner County put forth a mitigation action to replace the trestle creek highway and railroad bridge along Highway 200. As of 2013, the highway bridge reconstruction was successful. The project

was completed within a single construction season due to precast components being constructed off-site and then strategically installed. This new bridge replaced a 73-year-old span that had a lowly sufficiency rating due to a deteriorating bridge deck, superstructure, and substructure. The $3.4-million-dollar project also aided efforts to mitigate impacts to threatened bull trout and kokanee, which included a seven-week environmental window to do in-stream work for the project; in which the fish showed up a day after completion. The project also included removing deadfall debris that had accumulated under the bridge and the adjacent railroad bridge, which could have had a detrimental effect if not removed during a flash flood event (Bonner County Daily Bee, 2013).

- Star Lane Property Elevation Not Within FEMA Regulatory Floodplain – During the completion of the 2009 AHMP, Bonner County put forth a mitigation action to investigate options to elevate or buy-out a house located on Star Lane; which was below flood elevation and repeatedly flooded. This project was successfully completed and the house was elevated.
- Clark Fork Delta Restoration Project – The Clark Fork Delta Restoration Project is a project that despite not being implemented by Bonner County and its incorporated cities, should be recognized for its beneficial impacts within the county for hazard mitigation. The construction of the Albeni Falls Dam resulted in the rise of water levels of the Pend Oreille River, which inundated 8,900 acres of deep-water marsh and destroyed 6,617 acres of wetland habitat. Wetlands are a great example of natural hazard mitigation as they trap and slowly release surface water, rain, snowmelt, groundwater and flood waters, as well as slow down the pace of flood waters. The Clark Fork Delta Restoration Project aims to protect existing areas within the delta from further erosion using environmentally compatible stabilization methods; and to restore and enhance the edges and interior areas, which will add habitat complexity and promote diverse native riparian vegetation and ultimately decrease flooding vulnerability within surrounding communities and increase overall water quality.

6.3 Mitigation Goals & Objectives

Mitigation goals and objectives frame the mitigation strategy, and provide the framework in which mitigation actions are situated. Mitigation goals are general statements of desired outcomes for the community, and provide direction for decisions within the strategy. Mitigation objectives are specific statements that are measurable and help fulfill the mitigation goals. In general, there were no major changes in the 2017 update to the plan's overarching goals and objectives that were listed in the former plan. Those goals and objects that pertained to mitigation actions completed and not carried forward were removed, while new goals and objectives were added for new mitigation actions as appropriate. Table 70 details the county's goals and objectives.

Table 70. Mitigation goals and objectives

Goal 1. Reduce impacts from all hazards	
1.1	Obtain capital equipment to mitigate impacts from all hazards
1.2	Perform hazard management activities to mitigate impacts from all hazards
1.3	Develop information/outreach and public education project to mitigate impacts from all hazards
1.4	Conduct mapping/analysis/planning projects to mitigate all hazards
Goal 2. Reduce impacts from wildfire	
2.1	Obtain capital equipment to mitigate impacts from wildfire
2.2	Construct infrastructure projects to mitigate impacts from wildfire
2.3	Perform hazard management activities to mitigate impacts from wildfire
2.4	Conduct mapping/analysis/planning projects to mitigate wildfire hazard
2.5	Implement regulatory projects to mitigate impacts from wildfire
Goal 3. Reduce impacts from winter storms	
3.1	Perform hazard management activities to mitigate impacts from winter storms
3.2	Develop information/outreach and public education project to mitigate impacts from winter storms
3.3	Implement regulatory projects to mitigate impacts from winter storms
Goal 4. Reduce impacts from flooding and impoundment structure failure	
4.1	Construct infrastructure projects to mitigate impacts from flooding
4.2	Perform hazard management activities to mitigate impacts from flooding
4.3	Develop information/outreach and public education project to mitigate impacts from flooding
4.4	Conduct mapping/analysis/planning projects to mitigate flooding
4.2	Implement regulatory projects to mitigate impacts from flooding
Goal 5. Reduce impacts from hazardous material incidents	
5.1	Obtain capital equipment to mitigate impacts from hazardous material incidents
5.2	Construct infrastructure projects to mitigate impacts from hazardous material incidents
5.3	Perform hazard management activities to mitigate impacts from hazardous material incidents
5.4	Develop information/outreach and public education project to mitigate impacts from hazardous material incidents
5.5	Conduct mapping/analysis/planning projects to mitigate hazardous material incidents
Goal 6. Reduce impacts from severe wind events	
6.1	Conduct mapping/analysis/planning projects to mitigate severe wind events
Goal 7. Reduce impacts from landslides	
7.1	Construct infrastructure projects to mitigate impacts from landslides
Goal 8. Reduce impacts from earthquakes	
8.1	Perform hazard management activities to mitigate impacts from earthquake hazard

8.2	Develop information/outreach and public education project to mitigate impacts from earthquakes
8.3	Conduct mapping/analysis/planning projects to mitigate earthquake hazard
Goal 9. Reduce impacts from avalanche	
9.1	Conduct mapping/analysis/planning projects to mitigate avalanche hazard
Goal 10. Reduce impacts from civil disturbance/terrorism	
10.1	Perform hazard management activities to mitigate impacts from terrorism
Goal 11. Reduce impacts from drought	
11.1	Perform hazard management activities to mitigate impacts from drought
Goal 12. Reduce impacts from utility outages	
12.1	Perform hazard management activities to mitigate impacts from utility outages
Goal 13. Reduce impacts from food shortage	
13.1	Perform hazard management activities to mitigate impacts from food shortages
Goal 14. Reduce impacts from transportation accidents & incidents	
14.1	Perform hazard management activities to mitigate impacts from transportation & incidents

6.4 Mitigation Actions

6.4.1 Overview

Mitigation actions are specific projects, plans, programs, policies, or activities designed to reduce risk or eliminate risk to human life and property from the hazards identified in the risk assessment. The 2017 plan update steering committee reviewed the mitigation actions listed in the former plan, assessed the level of progress and challenges to successful implementation, and made decisions on which mitigation actions to carry forward or eliminate.

Table 71 details the 2017 HMP update status of each 2009 priority mitigation action. These actions have either been marked as Completed, Deferred, Ongoing/Iterative, Deleted. In addition to 2017 statuses, the mitigation actions that were carried forward into the plan's next lifecycle have updated lead agencies, timelines, costs, and funding sources where appropriate. Table 72 details new mitigation actions put forth by the planning committee.

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Table 71. Bonner County Mitigation Actions (2009 AHMP Priority Actions)

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
All Hazards	1. Implement a tabletop exercise to establish a list of needs for response to hazard events.	1.3	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-2 Funding: FEMA	Ongoing	Timeline: Annual Est Cost: $3500 Funding Sources: IOEM Grants/Jurisdictional Budgets	Funding Challenges
	2. Obtain a new repeater to improve communications in Priest Lake area.	1.1	Bonner Co. 911	Priest Lake Area	Year 1-2 Funding: Homeland Security	Deferred	Timeline: Based on funding Est Cost: 50,000 Funding Sources: IOEM Grants/Budget	Funding Challenges
	3. Obtain a backup generator for repeater sites.	1.1	Bonner Co. 911	Bonner County	Year 1-2 Funding: Homeland Security, Federal Surplus Bureau	Deferred	Timeline: Based on Funding Est Cost: 25,000 Funding Sources: IOEM Grants/Budget	Funding Challenges
Utility Outage	4. Obtain generators for emergency shelters and city/county critical facilities.	1.1	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 3-4 Funding: Homeland Security, Federal Surplus Bureau	Deferred	Timeline: 2018 Est Cost: 25,000 each Funding Sources: IOEM Grants/Budget	Funding Challenges 2017 PRIORITY

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
All Hazards	5. Obtain site surveillance equipment for repeater sites to reduce vandalism.	1.1	Bonner Co. 911	Bonner County	Year 1-2 Funding: Homeland Security, Federal Surplus Bureau	Deferred	Timeline: Based on Funding Est Cost: 25,000/site Funding Sources: IOEM Grants/Budget	Funding Challenges
	6. Pre-stage response supplies in areas around the county.	1.2	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-5 Funding: Bonner County, Red Cross, Homeland Security	Deferred	Timeline: 2-3 Est Cost: 25,000 Funding Sources: IOEM Grants, Red Cross, Bonner County	
	7. Create evacuation plan that addresses railroad stranding residents when crossings are blocked, with focus on McGee road and other limited ingress/egress areas due to railroad and water e.g. Dover, Ponder Point).	1.4	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1 Funding: Homeland Security	Revised	Timeline: 2017 Est Cost: 22,000 Funding Sources: SHSP Grant	Add McGee Road and Evacuation plan needs to be updated 2017 PRIORITY

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	8. Create an outreach brochure on evacuation procedures (including early notification information) targeted at locals and visitors.	1.3	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1 Funding: Bonner County	Ongoing	Timeline: Annual Est Cost: $2500 Funding Sources: IOEM Grants/Title III Funds	Iterative
	9. Coordinate with Red Cross for designation of shelters.	1.2	Red Cross	Bonner County	Year 1 Funding: Red Cross	Completed	N/A	N/A
	10. Implement a reverse 911 system including cell phones for emergency notification.	1.2	Bonner Co. 911	All jurisdictions	Year 3-4 Funding: Bonner County	Completed	N/A	N/A
Wildfire	11. Create a GIS layer of the water sources in the county.	2.4	BONFIRE	Bonner County	Year 1-5 Funding: Bonner County	Ongoing	Timeline: 2018 Est Cost: $5000 Funding Sources: County Budget	There are multiple water layers within the publication data through Bonner County.

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	12. Update GIS layer where defensible space has been created through BONFIRE program	2.4	BONFIRE	Bonner County	Year 1-5 Funding: Bonner County	Revised	Timeline: 2018 Est Cost: $1000 Funding Sources: County Budget	Revised to remove Red Zone
	13. Continue to fund the BONFIRE defensible space program.	2.3	BONFIRE	Bonner County	Year 1-5 Funding: Bonner County	Ongoing	Timeline: 2017 Est Cost: $300,000 Funding Sources: Western States Grant	
	14. Install dry hydrants throughout the County as determined by local fire districts.	2.3	Bonner Co. Dept. Emergency Management & BONFIRE	Bonner County	Year 1-5 Funding: Homeland Security	Deferred	Timeline: 2022 Est Cost: 100,000 Funding Sources: Grants	
	15. Consider adoption of the International Fire Code to guide construction of new buildings, subdivisions and infrastructure.	2.5	Bonner Co. Commissioners	Bonner County	Year 1-5 Funding: Bonner County	Ongoing	Timeline: 2025 Est Cost: 1000 Funding Sources: County Budget	Individual fire districts have adopted, but not county-wide.

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	16. Consider adoption of the International Building Code to guide construction of new buildings, subdivisions, and infrastructure	2.5	Bonner Co. Commissioners	Bonner County	Year 1-5 Funding: Bonner County	Ongoing	Timeline: 2025 Est Cost:1000 Funding Sources: County Budget	Individual incorporated areas have adopted (minus Clark Fork). Conditional use permit required by County.

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	17. Construct fire breaks in the following locations: East Side Road, back side of Hoodoo, West Settlement Road north of Priest River, around Blanchard – Pole Line Road/Blanchard Cutoff Road, Schweitzer access road, Highway 57 between Priest River and Priest Lake, Gold Hill, Garfield Bay, South Grouse, Al's Welding Road, Hummingbird Land, Spirit Mountain, Hoodoo Mountain Road, Pine View Road, and Bear Road.	2.3	BONFIRE	Bonner County Unincorporated areas	Year 1-5 Funding: National Fire Plan	Ongoing	Timeline: 2022 Est Cost: 800,000 Funding Sources: Grants/Private Sector funding	Fire breaks were constructed in the City of Blanchard with the power utility company 2017 PRIORITY
	18. Require County Planning Department to notify fire districts of new houses permitted for construction.	2.5	Bonner Co. Planning & Zoning	Bonner County	Year 1-5 Funding: Bonner County	Ongoing	Timeline: 2020 Est Cost: 500 Funding Sources: County Budget	County notifies all new structures built. Revised to include "continue notifying"

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
Winter Storms	19. Provide training or video on how to measure snow moisture to determine when shoveling of roofs is necessary.	3.2	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1 Funding: FEMA, National Weather Service	Deferred	Timeline: 2018 Est Cost: 200 Funding Sources: NWS wages/County Budget/IOEM Grants	National Weather Service provides training
	20. Implement a building code that requires roofs to be designed to withstand an appropriate snow load.	3.3	Bonner Co. Commissioners	Bonner County	Year 1-3 Funding: Bonner County	Ongoing	Timeline: 2020 Est Cost: 1000 Funding Sources: County Budget	Dover adopted building codes (2010), and inform applicants of 55psf roof load design mandate
	21. Develop and distribute educational material on how to prepare for winter.	3.2	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-2 Funding: Bonner County, National Weather Service, Red Cross	Ongoing	Timeline: 2018 Est Cost: 1000 Funding Sources: County Budget/IOEM Grants	Red Cross provides educational material
	22. Perform retrofits on public buildings to withstand snow loads.	3.1	County, Cities, School Districts	All jurisdictions	Year 1-5 Funding: Bonner County, Idaho Office of Emergency Management (Formerly BHS)	Deferred	Timeline: 2025 Est Cost: 2 million Funding Sources: Grants/School District Budgets	

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
Flooding and Impoundment Structure Failure	23. Replace Trestle Creek highway and railroad bridge	4.1	Idaho Transportation Dept. & Montana Rail Link	Bonner County	Schedule determined by ITD Funding: Idaho Transportation Dept, Federal Dept of Transportation, Montana Rail Link	Ongoing	Timeline: 2025 Est Cost: 500,00 Funding Sources: MRL	Highway bridge complete. 50% project completion
	24. Re-engineer new waterline for City of Clark Fork to replace line obliterated by bridge replacement.	4.1	City of Clark Fork	City of Clark Fork	Year 1 Funding: Corps of Engineers Grant w/ 25% match, City of Clark Fork.	Deferred	Timeline: 2025 Est Cost: 3 million Funding Sources: Corps of Engineers Grant/City Budget	
	25. Schneiders Road - Repair shoulder and armor slope along creek.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 1-2 Funding: Bonner County	Completed	N/A	Completed in 2012
	26. Crosswhite Road - Perform geotechnical investigation and stabilize road bank along creek.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 3-4 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost: 500,000 Funding Sources: Bonner County Budget	

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	27. Sanborn Creek Road - Perform hydrologic study and install larger culvert at Sanborn Creek crossing.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 1-2 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost: 500,00 Funding Sources: Bonner County Budget	
	28. Cavanaugh Bay Road - Replace wood structure with culvert or bridge at Soldier Creek.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 2-3 Funding: Bonner County	Completed	Timeline: N/A Est Cost: 930,000 Funding Sources: Bonner County Budget	Completed
	29. North Riley Creek Road - Replace double culverts with one larger culvert that will allow debris to flow through culvert.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 3-4 Funding: Bonner County	Completed	N/A	Completed in 2014
	30. Johnsons Cutoff - Perform hydrologic study and install larger culvert.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 4-5 Funding: Bonner County	Deferred	Timeline: Est Cost: Funding Sources:	
	31. Grouse Creek Road - Rebuild channel on private land or install larger culvert at road to mitigate potential channel jump due to undersized culvert.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 1-2 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost: 300,000 Funding Sources: Bonner County Budget	

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	32. Upper Gold Creek Road - Install larger culvert or bridge structure at Rapid Lightning Creek.	4.1	Bonner Co. Road & Bridge	Bonner County Unincorporated areas	Year 3-4 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost:300,000 Funding Sources: Bonner County Budget	
	33. Ontario Street - Replace restricting culverts with slough bridges as originally constructed.	4.1	City of Dover Public Works	City of Dover	Year 3-4 Funding: City of Dover	Completed	N/A	Might come back to at a later point and add more to.
	34. Construct small levee at Trestle Creek.	4.2	Bonner Co. Dept. Emergency Management	Bonner County Unincorporated areas	Year 3-4 Funding: Corps of Engineers, Idaho Water Resources	Completed	N/A	Might come back to at a later point and add more to
	35. Construct City of Kootenai Stormwater Master Plan	4.2	City of Kootenai Public Works	City of Kootenai	Year 1-5 Funding: City of Kootenai	Deferred	Timeline: 5 years Est Cost: 1 MILLION Funding Sources: City of Kootenai	
	36. Disseminate information on floodplain management and participation in National Flood Insurance Program	4.3	Bonner Co. Dept. Planning	Bonner County	Year 1-5 Funding: Bonner County	Completed	Timeline: N/A Est Cost: Funding Sources:	N/A

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	37. Identify structures/parcels located in the special flood management area.	4.4	Bonner County Dept. Planning	All jurisdictions	Year 1-2 Funding: Bonner County	Completed	Timeline: N/A Est Cost: Funding Sources:	
	38. Update flood maps and flood data in compliance with National Flood Insurance Program	4.4	Bonner Co. Dept. Planning and City Floodplain Managers	Bonner County, Sandpoint, Priest River, Clark Fork	Year 1-5 Funding: Bonner County, Sandpoint, Priest River, Clark Fork	Completed	Timeline: N/A Est Cost: Funding Sources:	Completed for County. Ponderay also updated DFIRM November 18, 2009. Dover's FIRM maps were provided in 2009 and contain the new datum for which all flood waters in Bonner County have been assessed against. Localized mapping has been undertaken

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	39. Adopt and enforce adequate floodplain management ordinances for existing and new development in special flood hazard areas	4.5	Bonner County Dept. Planning	All jurisdictions	Year 1-5 Funding: Bonner County	Ongoing	Timeline: 1-5 years Est Cost: Funding Sources:	Consistent with NFIP
Hazardous Materials	40. Construct new bridge and west side access at Dover.	5.2	Bonner Co./ Idaho Transportation Dept	City of Dover	Year 1-5 Funding: IDT	Ongoing	Timeline: 5 years Est Cost: 2 million Funding Sources: ITD	Emergency access was constructed. 50% project completion.
	41. Obtain haz-mat trailers (3) for Bonner County.	5.1	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-2 Funding: Homeland Security	Completed	N/A	N/A
	42. Obtain boats (3) and equipment that could be used by the fire districts for haz-mat and fire purposes.	5.1	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-2 Funding: Homeland Security	Completed	Timeline: n/a Est Cost: Funding Sources:	County has access to Sheriff and other agency resources. 66% project completion
	43. Update resource list of emergency response supplies/vendors.	5.3	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-5 Funding: Bonner County	Ongoing	Timeline: 2 years Est Cost: 600 Funding Sources: County Budget/IOEM Grants	As needed

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
Wind	44. Develop a response plan for wind events.	6.1	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-5 Funding: FEMA, National Weather Service	Ongoing	Timeline: 3 years Est Cost: 1000 Funding Sources: NWS/Grants	Needs to be updated in Emergency Management plan
Landslide and Avalanche	45. Kelso Lake Road - Perform geotechnical investigation prior to slope stabilization and potentially moving road away from slide area.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 1-2 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost:300,000 Funding Sources: Bonner County Budget	
	46. Talache Road - Perform geotechnical investigation prior to slope stabilization in a couple areas and potentially moving road away from slide area.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 2-3 Funding: Bonner County	Completed	N/A	N/A
	47. Bottle Bay Road - Potentially buy additional right-of-way and perform rock blasting and rock removal of upper slope.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 4-5 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost:800,000 Funding Sources: Bonner County Budget	Possible funding challenges

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	48. Old Priest River Road - Perform geotechnical investigation prior to slope stabilization.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 1-2 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost:300,000 Funding Sources: Bonner County Budget	
	49. Dufort Road - Perform geotechnical investigation prior to slope stabilization.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 2-3 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost:300,000 Funding Sources: Bonner County Budget	
	50. Peninsula Road - Perform geotechnical investigation on cut slopes prior to slope stabilization.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 3-4 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost:300,000 Funding Sources: Bonner County Budget	
	51. E. River Road - Previously repaired but potentially may require purchase of land and slope stabilization in accordance with geotechnical recommendations	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 4-5 Funding: Bonner County	Completed	N/A	N/A

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	52. Eastshore Road - Perform geotechnical investigation prior to slope stabilization a several locations along road to reduce potential of rock above sliding on road.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 5-6 Funding: Bonner County	Deferred	Timeline: 5 years Est Cost:900,000 Funding Sources: Bonner County Budget	
	53. Denton Road - Perform geotechnical investigation prior to slope stabilization in a couple areas.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 1-2 Funding: Bonner County	Ongoing	Timeline: 5 years Est Cost:500,000 Funding Sources: Bonner County Budget	Investigated one slide area. 25% project completion
	54. Johnson Creek Road - Acquire 404 Permit and install rip-rap stabilization along Clark Fork River and Johnson Creek.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 2-3 Funding: Bonner County	Completed	N/A	N/A
	55. Lightning Creek Road - Install jersey rail along base of slide area.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 3-4 Funding: Bonner County	Completed	N/A	N/A

Hazard	Action Item	Goals & Objective Addressed	Lead Agency	Jurisdiction	Former Est. Cost, Timeline & Funding Sources	New Status Update	New Timeline, Cost, & Funding Sources	Comments
	56. E. Spring Creek Road - Perform geotechnical investigation prior to slope stabilization in a couple areas.	7.1	Bonner Co. Road & Bridge	Bonner County Unincorporated Areas	Year 4-5 Funding: Bonner County	Ongoing	Timeline: 5 years Est Cost: 300,000 Funding Sources: Bonner County Budget	Concrete eco-blocks installed in 2013
Earthquake	57. Implement non-structural projects in existing and future critical facilities.	8.1	Bonner Co. 911	All jurisdictions	Year 3-4 Funding: FEMA	Deferred	Timeline: 5 years Est Cost: Funding Sources: FEMA	
	58. Implement structural retrofits on public buildings in Bonner County	8.1	City Engineers	All jurisdictions	Year 1-5 Funding: FEMA	Deferred	Timeline: 2025 Est Cost: 2 million Funding Sources: FEMA	
Civil Disturbance/Terrorism	59. Investigate hardening security of community utility systems (water, sewer or other municipal facilities).	10.1	Bonner Co. Dept. Emergency Management	All jurisdictions	Year 1-5 Funding: Idaho Office of Emergency Management (Formerly BHS)	Deferred	Timeline: 5 years Est Cost: 600,000 Funding Sources: IOEM grants	

Table 72. Bonner County new mitigation actions

Action	Goal & Objective	Hazards Addressed	Jurisdiction	Timeline	Lead Agency	Community Partners	Cost Estimate	Funding Sources	STAPLEE SCORE & RANK
60. Replace the reservoir and fence at the reservoir site	1.2	All hazards	Bonner County and West Bonner Water and Sewer District	2 years funding; 1+ years construction	West Bonner Water and Sewer District	City of Oldtown	$500,000	DEQ loans and grants; USDA-RD loans	Score: 69 Feasibility Rank: 1
61. Purchase mitigation supplies including PPE for first responders to enhance response capabilities to a hazmat incident	5.3	Hazmat	Bonner County, Bonner County Emergency Management, NNFD, CCBFD, WPLFD, WPOFD, WSFD, SFD, NSFD, SOWFD, CFFD	1-2 years	Bonner County Emergency Management, NNFD, CCBFD, WPLFD, WPOFD, WSFD, SFD, NSFD, SOWFD, CFFD	Multiple, including local, state, and federal agencies	Not provided	Mitigation grants	Score: 68 Feasibility Rank: 2

Action	Goal & Objective	Hazards Addressed	Jurisdiction	Timeline	Lead Agency	Community Partners	Cost Estimate	Funding Sources	STAPLEE SCORE & RANK
62. Evaluate, plan and prepare for major events that have the potential to disable utility infrastructure i.e. power companies and meet the requirement to apply for 404 funds during declared disasters	1.2	All hazards	Bonner County and Utility Companies	1-5 years	Bonner County and utility Companies	Multiple, including local, state, and federal agencies	Not provided	Budgets and grants	Score: 68 Feasibility Rank: 3
63. Oldtown sidewalks and bike paths	1.2	All hazards	City of Oldtown	1 year funding; 4 years construction	City of Oldtown	ITD	$150,000	Safe Routes to Schools grants (ITD)	Score: 66 Feasibility Rank: 4
64. Gate and fence water system facilities	1.2	All hazards	City of Hope	1 year funding; 2 years construction	City of Hope	-	$75,000	DEQ loans and grants; city water fund	Score: 65 Feasibility Rank: 5
65. Backup power generator, water treatment facility	1.2	All hazards	City of Priest River	1-2 years	City of Priest River	N/A	$50,000 – $60,000	None provided: See funding sources tables	Score: 64 Feasibility Rank: 6

Action	Goal & Objective	Hazards Addressed	Jurisdiction	Timeline	Lead Agency	Community Partners	Cost Estimate	Funding Sources	STAPLEE SCORE & RANK
66. Dedicated fiber link	1.2	All hazards	City of Priest River	1-2 years	City of Priest River	Concept Communications	$15,000 - $20,000	None provided: See funding sources tables	Score: 63 Feasibility Rank: 7
67. Grandview improvements	1.2	All hazards	City of Hope	-	City of Hope	-	$250,000	None provided; See funding sources tables	Score: 62 Feasibility Rank: 8
68. Facility surveillance	1.2	All hazards	City of Priest River	1-3 years	City of Priest River	N/A	Not provided	None provided: See funding sources tables	Score: 61 Feasibility Rank: 9
69. Facility security fencing	1.2	All hazards	City of Priest River	1-3 years	City of Priest River	N/A	Not provided	None provided: See funding sources tables	Score: 60 Feasibility Rank: 10
70. Replace the culvert located on Pine Street where Bonner County and the City of Sandpoint boundaries intersect	4.2 & 7.1	Flood and landslide	Bonner County and City of Sandpoint	1-2 years	Bonner County and the City of Sandpoint	Multiple, including local, state, and federal agencies	Not provided	Budgets and grant funding	Score: 60 Feasibility Rank: 11

Action	Goal & Objective	Hazards Addressed	Jurisdiction	Timeline	Lead Agency	Community Partners	Cost Estimate	Funding Sources	STAPLEE SCORE & RANK
71. Identify and enhance shelter facilities by adding emergency generator power throughout Bonner County	1.2	Severe weather, flooding, wildfire	Bonner County and Bonner County Public Safety Agencies	As funding becomes available	Bonner County Emergency Management	Lake Pend Oreille School District, West Bonner County School District & Fire Districts	$800,000	Grant funding	Score: 57 Feasibility Rank: 12
72. Develop and implement an emergency fuel storage system county wide for public safety	1.2	All hazards	Bonner County, Cities of Priest River, Oldtown, Dover, Sandpoint, Ponderay, Kootenai, Hope, East Hope, and Clark Fork	1-2 years	Bonner County, Cities of Priest River, Oldtown, Dover, Sandpoint, Ponderay, Kootenai, Hope, East Hope, and Clark Fork	Multiple, including local, state, and federal agencies	$200,000	Budgets and grant funding	Score: 53 Feasibility Rank: 13
73. Safe water supply	1.2 & 11.1	Drought, hazmat, and terrorism	City of Dover	3-5 years	City of Dover, City of Sandpoint, and DEQ	City of Sandpoint, Syringa Water, DEQ	$100,000 for connection; $2.5 million for new intake, monitoring, communication system	Dover Urban Renewal; Syringa Water; DEQ	Score: 51.5 Feasibility Rank: 14

Action	Goal & Objective	Hazards Addressed	Jurisdiction	Timeline	Lead Agency	Community Partners	Cost Estimate	Funding Sources	STAPLEE SCORE & RANK
74. Evaluate public facilities and make improvements according to earthquake preparedness standards	8.1	Earthquake	Bonner County, Cities of Priest River, Oldtown, Dover, Sandpoint, Ponderay, Kootenai, Hope, East Hope, and Clark Fork	3-5 years	Bonner County, Cities of Priest River, Oldtown, Dover, Sandpoint, Ponderay, Kootenai, Hope, East Hope, and Clark Fork	Multiple, including local, state, and federal agencies	Not provided	Mitigation grants	Score: 50 Feasibility Rank: 15

75. Develop education and public outreach to engage adjacent landowners to improve slope management practices. Continue low-cost mitigation options, such as maintenance of slide fences, ditches and other drainage facilities. Workers and emergency response personnel must be trained in the appropriate techniques and safety measures for dealing with spills and incidents. The general public should be made aware of the hazards of household	14.1, 7.1, 5.2	Transportation Accidents & Incidents, Landslides, HazMat	Bonner County and all cities	2030	Idaho Transportation Department, Bonner County Road and Bridge, City Public Works, Emergency Management	N/A	$500 million	FEMA grant opportunities and departmental budgets	Score: 37 Feasibility Rank: 16

Action	Goal & Objective	Hazards Addressed	Jurisdiction	Timeline	Lead Agency	Community Partners	Cost Estimate	Funding Sources	STAPLEE SCORE & RANK
chemical products and methods for properly disposing of these products.									
76. Identify other food sources, ration food, and prioritize who should get the food.	13.1	Food insecurity/shortage	Bonner County and all cities	2030	Emergency Management	Private sector	$300 million	FEMA grant opportunities and departmental budgets	Score: 14 Feasibility Rank: 17

6.4.2 Changes in Mitigation Action Priorities

Due to limitations replicating the 2009 mitigation action prioritization methodology, the 2017 plan update has not carried forward all the former plan's mitigation actions, but only the priority actions. Those are all listed in Table 71. From these actions that were carried forward, local officials and the planning committee chose three new priority mitigation actions for the plan's 2017-2022 lifecycle. The priority mitigation actions are:

- Obtain generators for emergency shelters and city/county critical facilities.
- Create evacuation plan that addresses railroad stranding residents when crossings are blocked, with focus on McGee road and other limited ingress/egress areas due to railroad and water e.g. Dover, Ponder Point).
- Construct fire breaks in the following locations: East Side Road, back side of Hoodoo, West Settlement Road north of Priest River, around Blanchard – Pole Line Road/Blanchard Cutoff Road, Schweitzer access road, Highway 57 between Priest River and Priest Lake, Gold Hill, Garfield Bay, South Grouse, Al's Welding Road, Hummingbird Land, Spirit Mountain, Hoodoo Mountain Road, Pine View Road, and Bear Road.

For the new mitigation actions that were added into the plan, we used a modified STAPLEE scoring method. Each jurisdiction that put forth a mitigation action was given a worksheet to score that action based on FEMA's STAPLEE criteria. STAPLEE includes scores for Social, Technical, Administrative, Political, Legal, Economic, and Environmental factors. Included within each overall factor were more detailed factors (e.g. community acceptance and effect on vulnerable populations for the Social factor). The cost/benefit analysis for each action is included in the Economic factor score. Each detailed factor was scored using a scale from 0 to 5 or a binary Yes/No. These scores were then summed for the overarching STAPLEE factor, and ranked in descending order. Directionality was included in the Legal, Economic, and Environmental factors. The STAPLEE scoring are shown on a sample Mitigation Action Scoring Worksheet provided in Appendix I. These scores do not determine the county's mitigation priorities but rather lay out the overall feasibility of each action.

6.5 Federal & State Planning & Regulatory Capabilities

A number of federal and state regulations and policies form the legal framework in which to implement Bonner County's hazard mitigation goals and projects. A list of these regulations and plans is presented below:

- Federal
    - The Federal Civil Defense Act of 1950
    - Public Law 96-342, The Improved Civil Defense Act of 1980

- Public Law 91-606, Disaster Relief Act
- Public Law 93-288, The Robert T. Stafford Disaster Relief Act of 1974.
- Presidential Executive Order 11988, Floodplain Management
- Presidential Executive Order 11990, Protection of Wetlands

- State of Idaho
  - Idaho State Code Title 46, Chapter 10, State Disaster Preparedness Act
  - Idaho State Code Title 39, Chapter 71, Hazardous Material Act
  - Idaho State Title 67, Chapter 65, Local Land Use Planning Act
  - Governor's Executive Order 2000-04, April 20, 2000

6.6 County Planning & Regulatory Capabilities

Bonner County and its incorporated communities employ other measures that regulate development and certain activities in hazardous areas. These include, but are not limited to: Subdivision and Planned Unit Development (PUD) regulations, zoning designations and regulations, unique land use regulations, building codes and development standards and regulations, environmental standards, and other county and city ordinances.

Throughout the lifecycle of this HMP, each jurisdiction should continue to maintain and enforce these planning and regulatory capabilities. Each jurisdiction should strive to adopt additional planning mechanisms that address hazard mitigation. Examples of these mechanisms can be found in *Section 7.3 Examples of Regional Best Practices for Hazard Mitigation & Comprehensive Plan Integration, Section 7.4 Implementation through Existing Plans & Programs and Section 7.5 Recommended Strategies & Tools for Implementation & Future Updates.*

6.6.1 Subdivision & PUD Ordinance

The purpose of a subdivision and PUD regulation is not only to provide a simple method of conveying land by a developer, but also to address factors associated with the orderly development of land and provision of services and infrastructure, such as sidewalks and open space. A common practice in Idaho is the adoption of subdivision and PUD regulations for hazardous areas. These regulations may include the completion of a hazardous area analysis during the application process, often submitted with the preliminary plat, or compliance with other adopted hazardous area ordinances. If it is determined that a subdivision is located within a hazardous area or has the presence of hazardous conditions an additional environmental impact statement may also be necessary.

Bonner County has adopted subdivision regulations (Title 16, Chapter 6) that include provisions for environmental features design standards. Subdivisions are required to be designed around identified natural hazards (highly erosive soils on steep slopes, landslide areas, rock falls, areas of subsidence,

floodplains to protect building sites and roads from damage from such hazards. Additionally, all subdivisions shall meet the requirements of Chapter 7, "Environmental Standards" of the County Code. Bonner County also provides provisions for Conservation Subdivisions that encourage creative and flexible site design that is sensitive to the land's natural features and adapts to the natural topography and requires that existing site conditions (e.g. floodplains, topography, existing wells, springs, wetlands) be analyzed and included in both the Preliminary and Final Plats for subdivisions.

The City of Dover has adopted subdivision regulations (Ordinance 118) that includes provisions for plats and construction plans. Within the contents of the preliminary plat, existing conditions need to be analyzed and construction plans need to include erosion and sediment control plans, with the possibility of a stormwater management plan if requested. Additionally, fire protection measures must be taken and provided within the construction plans.

The City of Sandpoint has adopted subdivision regulations (Title 10, City Code) that include requirements for preliminary plats, such as the location of wetlands and the inclusion of a contour map for the proposed subdivision. Additionally, the city code includes general and specific building requirements that impose mitigation actions such as the dedication of provision of parks or green space and the construction of flood control canals or devices that remediate any potential compromised quality of service delivery. Sandpoint also includes Planned Unit Development density incentives where increased preservation of open space or natural features results in increased lot density.

6.6.2 Zoning and Land Use

Zoning is the means through which cities and counties implement land use control by dividing the community into districts for the purpose of regulating the use of private property and the spacing, size, and placement of buildings. The original purpose of zoning was to protect residential areas from incompatible commercial and industrial uses. The contemporary purpose of planning expanded to include the protection and conservation of natural, historical, and cultural resources, as well as regulate development in hazardous areas.

The zoning authority in Idaho is inherent within the police power of states to impose restrictions on private rights in order to protect the health, safety, morals, and general welfare of the public. The Idaho LLUPA delegates this zoning authority to the cities and counties.

The Idaho LLUPA requires all cities and counties in the state to adopt a zoning ordinance that consists of a zoning map and the text of the ordinance, as well as provisions for variance applications and the timely processing of permits. This ordinance must be in accordance with the comprehensive plan, yet if the zoning ordinance and the comprehensive plan conflict the zoning ordinance must always be in line with the current conditions of the city or county.

Bonner County has established Zoning Districts including, but not limited to Forestry Districts, Agricultural Districts, Rural Districts, and Recreational Districts that ensure compatible land uses and

that these land uses fit the characteristics of the land and account for hazardous areas. For example, residential development is limited on forested lands to not only ensure the vitality of the forestry industry, but to limit development on potentially hazardous slopes and hillsides.

The City of Dover has also implemented land use ordinances that specifically limit development on hazardous sites. The city has designated hillside and river corridor zones that regulate density, land uses, and building site and building standards in order to prevent future damages from floods and/or landslides.

The City of Ponderay has adopted regulations for unique land uses that include provisions for the storage of chemicals and flammable liquids, filling, grading, lagooning, dredging, or other earthmoving activity, as well as provisions for conservation and urban density allocation.

6.6.3 Building Codes & Development Standards

Building codes are regulations that govern the design, construction, alteration and maintenance of structures. These codes specify the minimum requirements for safeguarding the health, safety, and welfare of those who occupy buildings. Rather than creating and maintaining their own codes, most communities adopt those maintained by the International Code Council (ICC).

Bonner County has not adopted building codes however, various cities within the county have. The City of Dover, City of Ponderay, City of Priest River, and the City of Sandpoint have adopted the International Building Code including the International Residential Code, International Energy Conservation Code and the International Fire Code. The City of Ponderay has modified its code to include 90 mph wind speed, severe weathering, and -10 degrees' Fahrenheit construction standards.

Bonner County has also adopted specific development standards for the Alpine Villages (Title 12 Chapter 4, City Code) in order to mitigate potential losses from severe winter conditions on Schweitzer Mountain. Additionally, standards for specific uses that pose special problems that may have a detrimental influence on surrounding land uses are provided including, but not limited to how to store flammable liquids, fuel, gas, chemicals, pesticide, and fertilizer.

6.6.4 Environmental Standards

Bonner County has adopted environmental standards (Title 17, Chapter 7) that include provisions for shorelines; grading, stormwater management and erosion control; wetlands; wildfire; flood damage prevention; and hillsides. Each environmental standard includes requirements including, but not limited to, setbacks, land use restrictions, buffers, delineations and reconnaissance, site analyses, and protection.

The City of Sandpoint has adopted an ordinance that states water service shall not be extended to any person, entity, or structure lying within five meters of a wetland.

6.6.5 Other City & County Ordinances

Bonner County and its incorporated cities have adopted other city ordinance that aid in the mitigation of hazards. Bonner County has established provisions for emergency management, emergency medical services, phosphorus bans, emergency communications, animal diseases, smoke detector requirements within manufactured structures, building location permits, and county road naming and addressing system.

The City of Dover has adopted an open burning ordinance and park regulations that include firework and fire provisions.

The City of Ponderay has adopted an ordinance for open burning and for the ban of Phosphorus in regard to public health and sanitation, as well as an ordinance requiring rabies vaccinations for pets. Additionally, the city has adopted ordinances for building numbering.

The City of Priest River has adopted ordinances for fireworks and outdoor burning in regard to public health and sanitation.

The City of Sandpoint has adopted ordinances that have created and set aside duties for the fire department, as well as an ordinance prohibiting the certain uses of fireworks. The city has also adopted a noxious weed control act that sets asides landowner and citizen duties in order to control for noxious weeds. Other ordinances related to public health and safety include a ban on products containing phosphorus, and air quality designations and advisory alert criteria.

The city codes and/or ordinances for the Cities of Clark Fork, East Hope, Hope, Kootenai, and Oldtown were not available for review.

6.7 National Flood Insurance Capabilities

6.7.1 Overview

In response to the mounting flood-related losses over the 20th century, the US Congress passed the National Flood Insurance Act (NFIA) of 1968, which instituted the National Flood Insurance Program (NFIP). The NFIP made flood insurance available to communities that agreed to adopt and enforce floodplain management ordinances, through hazard mitigation planning, site design and construction standards, and land use regulations. The NFIP was based on the premise that populations located in flood-prone areas (e.g., the 100-year floodplain) should bear a substantial portion of the cost to reduce community vulnerability and bear responsibility for a majority of losses should the community experience a flood disaster. Table 73 details the county's participation and policies in the NFIP.

Table 73. National Flood Insurance Program statistics

Community Name	NFIP Status	CRS Status	Flood Claims	Claims Paid	Repetitive Loss Properties	Total NFIP Policies	Total Insurance Coverage	Average Premium Price
Unincorporated	Yes	Yes	22	$68,660	-	196	$47,059,200	$677
City of Clark Fork	Yes	No	0	$0	-	2	$359,200	$623
City of Dover	Yes	No	0	$0	-	7	$2,058,300	$790
City of East Hope	Yes	No	0	$0	-	29	$6,398,300	$845
City of Hope	Yes	No	0	$0	-	0	-	-
City of Kootenai	Yes	No	0	$0	-	0	-	-
City of Oldtown	Yes	No	0	$0	-	0	-	-
City of Ponderay	Yes	No	0	$0	-	0	-	-
City of Priest River	Yes	No	0	$0	-	1	$350,000	$520
City of Sandpoint	Yes	No	11	$75,407	-	106	$26,950,000	$529
Total	-	-	33	$144,067	-	341	$27,300,000	$1,049

6.7.2 NFIP Community Rating System

The NFIP Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: reduce flood losses; facilitate accurate insurance rating; and promote the awareness of flood insurance.

The CRS provides for 10 classes, with Class 1 having the most premium credit and communities in Class 10 receiving none. A community's CRS class is based on the number of credit points calculated for the activities that are undertaken to reduce flood losses, facilitate accurate flood insurance rating, and promote the awareness of flood insurance. Bonner County participates in the CRS with a Class eight rating, reducing the total NFIP premium by $13,427.

The following is a brief description of the 18 activities that receive credit under the CRS:

- 300 Series – Public information
    - 310 - Elevation Certificates
    - 320 - Map Information Service
    - 330 - Outreach Projects

    - 340 - Hazard Disclosure
    - 350 - Flood Protection Information
    - 360 - Flood Protection Assistance
- 400 Series – Mapping and Regulations
    - 410 - Additional Flood Data
    - 420 - Open Space Preservation
    - 430 - Higher Regulatory Standards
    - 440 - Flood Data Maintenance
    - 450 - Storm Water Management
- 500 Series – Flood Damage Reduction
    - 510 - Floodplain Management Planning
    - 520 - Acquisition and Relocation
    - 530 - Flood Protection
    - 540 - Drainage System Maintenance
- 600 Series – Flood Preparedness
    - 610 - Flood Warning
    - 620 - Levee Safety
    - 630 - Dam Safety

Additional benefits a community realizes from participation in the CRS include:

- The CRS floodplain management activities provide enhanced public safety, a reduction in damage to property and public infrastructure, avoidance of economic disruption and losses, reduction of human suffering, and protection of the environment.
- A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.
- Technical assistance in designing/implementing some activities is available at no charge. A CRS community's flood program benefits from having an added incentive to maintain its flood programs over the years. The fact that the community's CRS status could be affected by the elimination of a flood-related activity, or a weakening of the regulatory requirements for new development, should be taken into account by the governing board when considering such actions. A similar system used in fire insurance rating has had a strong impact on the level of support local governments give to their fire protection programs.
- Implementing some CRS activities, such as floodplain management planning, can help a community qualify for certain federal assistance programs.

6.7.3 NFIP Repetitive Loss Properties

Repetitive loss properties under the NFIP are those which have had two or more flood losses reported which were paid more than $1,000 for each loss within a 10-year period. Significant repetitive loss properties are those that have experienced four or more separate building and content claims since

1978 each exceeding $5,000. Bonner County has no repetitive loss or significant repetitive loss properties.

6.7.4 Current & Future NFIP Compliance

Communities participating in the NFIP within Bonner County adopted and enforced floodplain management ordinances in order to maintain good standing within the program. Bonner County implemented additional floodplain management activities since the plan's last update in 2009, including the creation and distribution of informational flyers and brochures as well as additional flood mapping updates for planning purposes.

The incorporated cities of Dover, Ponderay, Priest River, Kootenai, and East Hope and Sandpoint have adopted flood damage ordinances that include specific and general standards for development within floodplains.

The city codes and/or ordinances for the Cities of Clark Fork, Hope, and Oldtown were not available for review.

Communities participating in NFIP within Bonner County will continue to enforce their floodplain management ordinances over this plan's life-cycle in order to maintain good standing within the program; this will be done with oversight and collaboration with the State Floodplain Coordinator and FEMA. Within the next 5 years Bonner County will seek to increase NFIP documentation and to have the county's DFIRMs remapped. The Cities of Dover and East Hope plan to have a community assistance visit during the summer of 2017 in order to learn more about how the cities can better administrate their floodplain ordinances and inform the public of the program. Both cities also plan to review their current floodplain ordinance and align them with the updated NFIP baseline ordinance.

6.8 Mitigation Funding Programs & Opportunities

Mitigation assistance can be sought after through various funding sources. These sources can be financial, technical, or education/outreach related. Provided below are funding sources that are available for communities and individuals within Bonner County.

Table 74. Funding sources for mitigation actions

Name: Bureau of Land Management (BLM) Communities at Risk (Community Assistance) Program
Description: Provides financial assistance to local jurisdictions in Idaho for efforts that support fire prevention activities. Funds may be used for planning efforts (including the use of GIS software and support), the hiring of

countywide WUI coordinators, and education efforts such as FIREWISE. Funds may also be used to reduce hazardous fuels accumulations on non-Federal lands; however, use of funds for this purpose may require environmental clearance. Applications are available through Grants.gov. Please contact your local BLM line officer or fire mitigation specialist for more information.

Eligible Recipients: County Wildland Fire Interagency Groups, county governments, communities, not-for-profit entities.

Additional Information:
Jon Skinner, Idaho Fire Mitigation Specialist
Bureau of Land Management, Idaho State Office
(208) 373-3854

Name: Community Assistance Program – State Support Services Element (CAP-SSSE)

Description: This program provides funding to States to provide technical assistance to communities in the National Flood Insurance Program (NFIP) and to evaluate community performance in implementing NFIP floodplain management activities.

Additional Information: http://www.fema.gov/plan/prevent/floodplain/fema_cap-ssse.shtm

Name: Community Development Block Grant (CDBG) Program

Description: The CDBG program provides grants and technical assistance to federally designated and non-designated municipalities for any type of community development. An Entitlement component provides funding for designated communities via a set formula. The Competitive component provides funding of up to $500,000 to non-federally designated communities. These grants may be used for infrastructure improvement, public services, or development and planning, but 70% of the project must benefit low- and moderate-income persons. CDBG money can be used as matching funds for the FEMA HMA grant programs.

Additional Information: U.S. Department of Housing and Urban Development; Phone: 208-334-1990
ID_Webmanager@hud.gov

Name: Community Forestry Program

Description: The Community Forestry Program transfers technology and provides financial assistance to develop awareness and understanding of the value of sound urban/community forestry management among community citizens and leaders. Assistance is provided to Idaho communities to establish and enhance sustainable urban and community forestry management programs for public and private lands.

Additional Information: http://www.idl.idaho.gov/bureau/community_forestry/home/index.htm

Joyce Jowdy
Phone: 208-666-8622
Fax: 208-769-1524
Email: jjowdy@idl.idaho.gov

Name: The Conservation Reserve Program (CRP)

Description: The CRP is a voluntary program for agricultural landowners. Through CRP, landowners can receive annual rental payments and cost-share assistance to establish long-term, resource-conserving vegetative covers on eligible farmland. The Commodity Credit Corporation (CCC) makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50% of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years.

Additional Information:

USDA/FSA
Idaho State FSA
9173 West Barnes Drive
Boise, ID 83709-1573
Phone: 208-378-5650
Fax: 208-378-5678

Name: Continuing Authorities Program

Description: Congress has provided the USACE with a number of standing authorities to study and build water resource projects for various purposes without additional project specific congressional authorization. The types of projects addressed by the Continuing Authorities Program include emergency streambank and shoreline erosion, small flood control projects, small navigation projects, and snagging and clearing for flood control.

Additional Information: US Army Corps of Engineers cenww-pa@usace.army.mil

Name: Department of Commerce/Economic Development Authority (EDA)

Description: EDA was created by Congress pursuant to the Public Works and Economic Development Act of 1965 to provide financial assistance to distressed communities, both rural and urban. EDA's mission is to lead the Federal economic development agenda by promoting innovation and competitiveness, preparing American regions for growth and success in the worldwide economy. EDA will fulfill its mission by fostering entrepreneurship, innovation, and productivity through investments in infrastructure development, capacity building, and business development. These investments will be made to attract private capital investments and higher-skill, higher-wage jobs to regions experiencing substantial and persistent economic distress. EDA works in partnership with distressed regions to address problems associated with long-term economic distress and to assist regions experiencing sudden and severe economic dislocations, such as those resulting from natural disasters, conversions of military installations, changing trade patterns, and the depletion of natural resources. EDA investments generally take the form of grants to or cooperative agreements with eligible recipients.

EDA provides assistance via:

- Construction Grant Program
- Planning Grants
- Revolving Loan Fund
- Technical Assistance Grants

Additional Information:

Economic Development Authority
Jackson Federal Building, Room 1890
915 Second Avenue
Seattle, WA 98174-1001
Phone: 206-220-7660
Fax: 206-220-7669
A. Leonard Smith, Regional Director
lsmith7@eda.doc.gov

Idaho Department of Commerce
700 W State Street
P.O. Box 83720
Boise, ID 83720-0093
Phone: (208) 334-2470
Fax: (208) 334-2631

Name: Department of Homeland Security Grant (HSGP) Program

Description: The HSGP consists of three sub-programs: the State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), and Operation Stonegarden (OPSG). The SHSP is the core assistance program in this suite; it provides funds to build capabilities at the State and local levels and to implement the goals and objectives included in State homeland security strategies and initiatives in their State Preparedness Reports. At least 25% of these funds are dedicated towards anti-terrorism activities. UASI focuses on enhancing regional preparedness in metropolitan areas, while OPSG is intended to enhance cooperation and coordination among law enforcement agencies in a joint mission to secure the U.S. border. Program priorities include the integration of law enforcement, fire, and emergency medical service providers for a coordinated response to mass casualty incidents; and support citizen preparedness drills and exercises. Priorities may vary each fiscal year.

Additional Information: http://www.bhs.idaho.gov/Pages/FinanceAndLogistics/Grants.aspx

Name: Department of Transportation/Federal Highway Administration (FHWA) Emergency Relief Program

Description: Congress authorized in Title 23, United States Code, Section 125, a special program from the Highway Trust Fund for the repair or reconstruction of Federal-aid highways and roads on Federal lands which have suffered serious damage as a result of (1) natural disasters or (2) catastrophic failures from an external cause. This program, commonly referred to as the emergency relief or ER program, supplements the commitment of resources by States, their political subdivisions, or other Federal agencies to help pay for unusually heavy expenses resulting from extraordinary conditions.

Additional Information:

FHWA Idaho Division Office
3050 Lakeharbor Lane, #126
Boise, ID 83703
FHWA Office Phone : (208) 334-1843

Name: Drought Assistance Programs

Description: Natural disaster is a constant threat to America's farmers and ranchers and rural residents. USDA provides assistance for losses from drought, flood, fire, freezing, tornadoes, pest infestation, and other calamities.

Additional Information:

Dennis McNees, Commodity Technician (Emergency Food Assistance)
Tel: (208) 332-6820
Fax: (208) 334-2228
Email: dwmcnees@sde.idaho.gov

Gene Sue Weppner (Food Stamp- Emergency Assistance)
Program Manager
Division of Welfare
State of Idaho
450 West State Street, 2th Floor
Boise, ID 83720
Tel: (208) 334-5656
Cell: (208) 850-8250
Fax: (208) 334-5817
Email: weppnerg@dhw.idaho.gov

Christine Baylis, CPM
Policy Specialist
Idaho Department of Health & Welfare
Division of Welfare
State of Idaho
450 West State Street, 2nd Floor
Boise, ID 8372
Tel: (208) 334-5742
Fax: (208) 334-5817
Email: baylisc@dhw.idaho.gov

Name: Emergency Management Performance Grants (EMPG)

Description: The Federal Government, through the EMPG Program, provides necessary direction, coordination, and guidance, and provides necessary assistance, as authorized in this title so that a comprehensive emergency preparedness system exists at all levels for all hazards for States, Territories, federally-recognized tribes and local communities. Participating communities develop performance goals for their emergency management programs and design projects to meet those goals. After being funded, the participants must evaluate progress and report back to BHS to remain eligible.

Additional Information: http://www.fema.gov/fy-2013-emergency-management-performance-grants-empg-program-0

Name: Environmental Planning and Historic Preservation (EHP) Program

Description: The EHP Program integrates historic preservation considerations with FEMA's mission of preparedness, response, recovery, and mitigation. During disaster recovery operations, the agency assesses damages to historic and cultural resources, provides technical assistance to States and local jurisdictions, and ensures compliance with applicable Federal laws and regulations, such as the National Historic Preservation Act.

Additional Information: http://www.fema.gov/environmental-planning-and-historic-preservation-program

Name: Federal Excess Personal Property Program

Description: The program is administered by the USDA's Forest Service with delivery through the State Forester. The Federal Excess Personal Property (FEPP) program re-utilizes excess Federal property obtained from military and other Federal sources for use in rural and wildland firefighting. This equipment is loaned by agreement to State Foresters, who can sub-loan it to local firefighting organizations.
Eligible Recipients: Rural Fire Departments serving 10,000 people or less.

Additional Information:

Dee Sessions
Stewardship/Forest Land Enhancement Program/Legacy/Forest Resource Management/Cooperative Watershed/CostShare
Phone: 801-625-5189
Email: dsessions@fs.fed.us

Cathy Scofield
Coop Fire - Idaho, N. Dakota, and Montana
Phone: 406-329-3409
cscofield@fs.fed.us

Name: FEMA: Firefighter Assistance Grants

Description: This competitive grant from the Federal Emergency Management Agency provides direct assistance to fire protection organizations. Funds may be awarded for training safety and equipment, firefighting vehicles, fire prevention equipment, or emergency services.

Eligible Recipients: fire departments at all levels.

Additional Information: Firefighter Assistance Grants website: http://www.fema.gov/welcome-assistance-firefighters-grant-program or firegrants@dhs.gov

Name: Fire Management Assistance Grant Program

Description: Fire Management Assistance is available to State, local, and Tribal governments for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. The Fire Management Assistance declaration process is initiated when a State submits a request for assistance to the FEMA Regional Administrator at the time a "threat of major disaster" exists. The entire process is accomplished on an expedited basis, and FEMA's decision is rendered in a matter of hours.

Additional Information:

Federal Emergency Management Agency
Federal Regional Center
130 - 228th Street, Southwest
Bothell, WA 98021-8627
(425) 487-4600

Name: Flood Mitigation Assistance Program (FMA) Program

Description: The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA provides funding to States, Territories, federally-recognized tribes and local communities for projects that reduce or eliminate long-term risk of flood damage to structures insured under the NFIP. FMA funding is available for flood hazard mitigation projects, plan development and management costs. Funding is appropriated by Congress annually.

Additional Information: http://www.fema.gov/pre-disaster-mitigation-grant-program

Name: Flood Plain Management Services (FPMS) Program

Description: Section 206 of the 1960 Flood Control Act (PL 86-645), as amended, provides the authority for the U.S. Army Corps of Engineers (USACE) to provide assistance and guidance on all aspects of floodplain management planning. The program develops or interprets site-specific data on obstructions to flood flows, flood formation and

timing; and the extent, duration, and frequency of flooding. Upon request, program services are provided to State, regional, and local governments, Indian Tribes, and other non-Federal public agencies without charge.

Additional Information: US Army Corps of Engineers cenww-pa@usace.army.mil

Name: Forest Stewardship Program (FSP)

Description: the FSP provides technical assistance, through State forestry agency partners, to nonindustrial private forest owners to encourage and enable active long-term forest management. A primary focus of the FSP is the development of comprehensive, multi-resource management plans that provide landowners with the information they need to manage their forests for a variety of products and services.

Participation in the FSP is open to any non-industrial private forest landowners who are committed to the active management and stewardship of their forested properties for at least 10 years. The FSP is not a cost-share program. Cost-share assistance for plan implementation may be available through other programs, such as the Forest Land Enhancement Program.

Additional Information:

Dee Sessions
Stewardship/Forest Land Enhancement Program/Legacy/Forest Resource Management/Cooperative Watershed/CostShare
Phone: 801-625-5189
Email: dsessions@fs.fed.us

Name: Hazard Mitigation Assistance Grant Program (HMAGP)

Description: The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA provides funding to States, Territories, federally-recognized tribes and local communities for projects that reduce or eliminate long-term risk of flood damage to structures insured under the NFIP. FMA funding is available for flood hazard mitigation projects, plan development and management costs. Funding is appropriated by Congress annually.

Additional Information: http://www.fema.gov/government/grant/hma/index.shtm

Name: Hazardous Materials Emergency Preparedness Grant (HMEPG)
Description: Grant funds will be passed through to local emergency management offices and HazMat teams having functional and active LEPC's.
Additional Information: http://www.bhs.idaho.gov/Pages/FinanceAndLogistics/Grants.aspx

Name: Idaho Fish and Wildlife Foundation
Description: The Idaho Fish and Wildlife Foundation is dedicated to the conservation of natural resources; fish, wildlife, and habitat. The Foundation is a 501 (c) (3) nonprofit organization established in 1990 and is headquartered in Boise, Idaho. Board members represent all regions of the State and work to enhance Idaho's fish and wildlife habitat. The Foundation grants funding for statewide conservation and education projects.
Additional Information: (208)334-2648 or ifwf@idfg.idaho.gov

Name: Individuals and Households Program (IHP)
Description: The IHP is a combined FEMA and State program. When a major disaster occurs, this program provides money and services to people in the declared area whose property has been damaged or destroyed and whose losses are not covered by insurance. In every case, the disaster victim must register for assistance and establish eligibility.
Additional Information: http://www.fema.gov/individual-assistance-program-tools

Name: Inspection of Completed Works Program
Description: Civil works structures whose failure or partial failure could jeopardize the operational integrity of the project, endanger the lives and safety of the public, or cause substantial property damage are periodically inspected and evaluated to ensure their structural stability, safety, and operational adequacy. For structures constructed by the USACE and turned over to others for operation and maintenance, the operating entity is responsible for periodic inspection and evaluation. The USACE may conduct the inspection on behalf of the project sponsor, provided appropriate reimbursement to the USACE is made. However, the USACE may participate in the inspection with the operating entity at the government's expense.

Additional Information: US Army Corps of Engineers cenww-pa@usace.army.mil

Name: Internal Revenue Service (IRS) Casualty Loss-Special Disaster Provisions

Description: Special tax law provisions may help taxpayers and businesses recover financially from the impact of a disaster, especially when the Federal government declares their location to be a major disaster area. Depending on the circumstances, the IRS may grant additional time to file returns and pay taxes. Both individuals and businesses in a federally declared disaster area can get a faster refund by claiming losses related to the disaster on the tax return for the previous year, usually by filing an amended return.

The IRS also offers audio presentations on Planning for Disaster. These presentations discuss business continuity planning, insurance coverage, recording keeping and other tips to stay in business after a major disaster.

Additional Information: http://www.irs.gov/businesses/small/article/0,,id=156138,00.html

Name: National Earthquake Hazards Reduction Program (NEHRP)

Description: Under NEHRP, The National Earthquake Technical Assistance (NETAP) Program is a technical assistance program created to provide short-term, no-cost architectural and engineering support related to earthquake mitigation. Examples of NETAP projects are seismic retrofit/evaluation training, evaluation of seismic hazards to critical/essential facilities, post-earthquake evaluations of buildings, and the development of retrofit guidance for homeowners. BHS administers this program in Idaho.

Additional Information: http://www.fema.gov/plan/prevent/earthquake/training_pubs.shtm for training information. For more information:

Ms. Tamra Biasco
Federal Emergency Management Agency
(425) 487-4645
tamra.biasco@dhs.gov

Name: National Flood Insurance Program (NFIP)

Description: The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP. Communities participate in the NFIP by adopting and enforcing floodplain development controls designed to reduce future flood risks in the 1-percent-annual-chance floodplain. The program is available to all floodprone communities (participation in NFIP is voluntary), and most eligible communities have elected to

participate. IDWR administers the program in Idaho, and insurance is sold through State-licensed companies. The NFIP includes Increased Cost of Compliance (ICC) coverage for new and renewed Standard Flood Insurance Policies. ICC is an effective way to help cover costs of meeting community floodplain ordinance requirement for high risk properties and may be considered in combination with other funding streams.

Community Rating System - The NFIP's Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community actions meeting the three goals of the CRS.

Additional Information: http://www.fema.gov/business/nfip/

Name: National Oceanic Atmospheric Restoration Center Grants

Description: The NOAA Restoration Center is devoted to restoring the Nation's coastal ecosystems and preserving diverse and abundant marine life. Through its strong commitment to restoration and by promoting partnerships and local stewardship, our programs inform and inspire people to act on behalf of a healthier coastal environment

Additional Information:

Lauren Senkyr
Idaho NOAA
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232
Phone: 503-231-2110
Fax: 503-231-6265
Lauren.Senkyr@noaa.gov

Name: Pacific Northwest Region Water Quality Program

Description: The goal of the Pacific Northwest Program is to provide leadership for water resources research, education, and outreach to help communities, industry, and governments prevent and solve current and emerging water quality and quantity problems. To achieve this goal, the Partners have developed a coordinated regional water quality effort based on promoting and strengthening individual State programs.

The Pacific Northwest Program promotes regional collaboration by acknowledging existing programs and successful efforts; assessing program gaps; identifying potential issues for cross-agency and private sector collaboration; and developing a clearinghouse of expertise and programs. In addition, the program establishes or

enhances partnerships with Federal, State, and local environmental and water resource management agencies, such as placing a University Liaison within the offices of EPA Region 10.

Additional Information:

Robert L. Mahler
Ph.D., Professor
University of Idaho
Soil and Environmental Sciences,
Soil Science Division
Moscow, ID 83844-2339
Phone: 208-885-7025
FAX: 208-885-7760
bmahler@uidaho.edu

Name: Planning Assistance to States Program

Description: Section 22 of the Water Resources Development Act (WRDA) of 1974, as amended, provides authority for the USACE to assist States, local governments, and other non-Federal entities in the preparation of comprehensive plans for the development and conservation of water and related land resources. Section 208 of the WRDA of 1992 amended the WRDA of 1974 to include Native American Tribes as equivalent to a State.

Additional Information: US Army Corps of Engineers cenww-pa@usace.army.mil

Name: Pre-Disaster Mitigation (PDM) Program

Description: The PDM Program, authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, is designed to assist States, territories, Federally-recognized tribes, and local communities in implementing a sustained pre-disaster natural hazard mitigation program. The goal is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis.

Additional Information: http://www.fema.gov/pre-disaster-mitigation-grant-program

Name: Public Assistance (PA) Program

Description: Funding provided through federally declared disaster assistance programs may be used for mitigation actions as part of the recovery process. This funding is administered by BHS. Examples of such applications include the PA Program. The measures must apply only to the damaged elements of a facility rather than to other, undamaged parts of the facility or to the entire system. Section 406 mitigation measures are considered part of the total eligible costs of repair, restoration, reconstruction, or replacement of a facility. They are limited to measures of permanent work, and the Applicant may not apply mitigation funding to alternate projects or improved projects if a new replacement facility is involved. Required upgrades meeting applicable codes and standards are part of eligible restoration work and are not considered mitigation measures.

Additional Information: http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit/hazard-mitigation-funding-under-section-406-0

Name: Rehabilitation and Inspection Program

Description: The Rehabilitation and Inspection Program is the USACE program that provides for inspection of flood control projects, the rehabilitation of damaged flood control projects, and the rehabilitation of federally authorized and constructed hurricane or shore protection projects

Additional Information: US Army Corps of Engineers cenww-pa@usace.army.mil

Name: Reimbursement for Firefighting on Federal Property

Description: Under Section 11 of the Federal Fire Prevention and Control Act of 1974, fire departments may be reimbursed for fighting fire on property owned by the Federal government. Only firefighting costs over and above normal operating costs are reimbursable. Claims are submitted to USFA and are reviewed by the Deputy Administrator to ensure they meet the criteria outlined in the Code of Federal Regulations.

Additional Information: Reimbursement is paid to the fire departments by the U.S. Department of Treasury after a claim is approved for payment. For more information, please contact the USFA's Tim Ganley at (301) 447-1358.

Name: Rural Fire Assistance (RFA) Program

Description: Eligible Recipients: Rural Fire Departments serving 10,000 people or less that are adjacent to BLM land. Types of projects or purchases that are acceptable:

• Personal Protective Equipment

• New-generation fire shelters/case
• Communications equipment
• Basic Tools
• Basic Wildland Fire Training

Contact BLM for specifics on purchasing guidelines.

The U.S. Fish & Wildlife Service, Bureau of Indian Affairs, and National Park Service also have RFA funds available for rural fire departments with protection areas adjacent to these Federal lands. Please contact your local Federal representative for information.

Additional Information:

BLM Rural Fire Assistance Program (RFA):
Jon Skinner, Rural Fire Assistance Coordinator
Bureau of Land Management, Idaho State Office
(208) 373-3854

Name: Rural Housing Programs

Description: This service is responsible for providing safe, sanitary, and affordable housing for rural families with very low income, low income, and moderate income. The Rural Housing Program delivers its services through a wide range of housing programs, including programs supporting single-family homeownership, multi-family rental housing, and farm labor housing.

Additional Information:

Roni Atkins, Director, Housing Program Director
9173 West Barnes, Ste A1
Boise, ID 83709
Phone: 208-378-5630
E-Mail: roni.atkins@id.usda.gov

Name: Small Business Administration (SBA) Disaster Loan Programs

Description: The SBA Disaster Loan Program provides businesses low-interest, long-term loans to repair or replace damaged property owned by the business, including real estate, machinery and equipment, inventory, and supplies. Homeowners may also qualify for low-interest loans to help rebuild or repair their homes or repair or replace uninsured or underinsured flood-damaged personal property. Renters may qualify for loans to repair or

replace personal property. Economic Injury Disaster Loans provide working capital to small businesses and small agricultural cooperatives to assist them through the recovery period.

Additional Information: Small Business Administration; Phone: (916) 735-1500

Name: State Dam Safety Program

Description: The State DSP is administered in Idaho by the IDWR. This program focuses on inspection, classification, and emergency planning for dam safety and permitting of Emergency Action Plans (EAPs). Funding may be used for a variety of projects, including dam safety – related training for State personnel and training in the field for dam owners on conducting annual maintenance reviews; revision of State maintenance and operation guidelines; improvements to dam inventory databases; and, creation of dam safety videos and outreach materials.

Additional Information:

The Idaho Water Center
322 East Front Street
PO Box 83720
Boise, Idaho 83720-0098
Phone: (208) 287-4800
Fax: (208) 287-6700

Name: The Steele-Reese Foundation Grant Program

Description: The Steele-Reese Foundation, a trust for charitable purposes, was created by Eleanor Steele Reese on August 10, 1955. The foundation makes grants to charitable organizations operating in Idaho and Montana, and in the southern Appalachian mountain region of eastern Kentucky.

Rural Conservation: Examples include composting programs, wildlife projects, ecosystem protection programs, and water projects. All conservation/environmental programs must be locally, rather than regionally, focused. National organizations are eligible for support only if all Steele-Reese funds will be employed directly in projects located in the geographical areas served by this foundation.

Rural Health: Examples include hospices; preventive health programs; equipment for clinics, small hospitals, EMS and ambulance units; family-planning programs.

Rural Humanities: Examples include local arts groups and local historical projects.

Additional Information:

Linda Tracy
Western Program Director
The Steele-Reese Foundation
PO Box 8311
Missoula, MT 59807-8311
E-mail: linda@steele-reese.org
Phone: (406) 207-7984
Fax: (207) 470-3872

Name: USDA Farm Service Agency's (FSA) Emergency Conservation Program (ECP)

Description: The ECP provides emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland damaged by natural disasters and to carry out emergency water conservation measures in periods of severe drought. Funding for ECP is appropriated by Congress.

County FSA committees determine land eligibility based on onsite inspections of damage, taking into account the type and extent of damage. For land to be eligible, the natural disaster must create new conservation problems that, if untreated, would:

• impair or endanger the land;
• materially affect the land's productive capacity;
• represent unusual damage which, except for wind erosion, is not the type likely to recur frequently in the same area; and
• be so costly to repair that Federal assistance is or will be required to return the land to productive agricultural use.

Additional Information: http://disaster.fsa.usda.gov

Name: USDA Farm Service Agency's (FSA) Tree Assistance Program (TAP)

Description: TAP provides financial assistance to qualifying orchardists and nursery tree growers to replant or rehabilitate eligible trees, bushes and vines damaged by natural disasters occurring on or after Jan. 1, 2008, and before Oct. 1, 2011. TAP was authorized by the 2008 Farm Bill and is funded through the Agricultural Disaster Relief Trust Fund.

Additional Information:

USDA/FSA
Idaho State FSA
9173 West Barnes Drive
Boise, ID 83709-1573
Phone: 208-378-5650
Fax: 208-378-5678

Name: USDA Water and Waste Disposal Programs

Description: The Rural Utilities Service (RUS), the Rural Business-Cooperative Service, and the Rural Housing Service comprise USDA's Rural Development mission area. As the name suggests, the three agencies' programs are designed to meet the needs of people who live in rural areas, including infrastructure, housing, health and medical, education, and employment. The Rural Utilities Service's Water Programs Division has four programs, which provide financial and technical assistance for development and operation of safe and affordable water supply systems and sewage and other forms of waste disposal facilities.

Recipients must be public entities. These can include municipalities, counties, special purpose districts, Indian Tribes, and corporations not operated for profit, including cooperatives. A new entity may be formed to provide the needed service, if an appropriate one does not already exist.

Additional Information:

USDA/FSA
Idaho State FSA
9173 West Barnes Drive
Boise, ID 83709-1573
Phone: 208-378-5650
Fax: 208-378-5678

Name: U.S. Department of Housing and Urban Development (HUD) Programs

Description: HUD awards grants to organizations and groups for a variety of purposes. To participate in the HUD grants program, you need to be registered with Grants.gov.

Some HUD programs and services are:

- HUD 5-H Homeownership Program
- HUD Home Program
- HUD Partnership for Advancing Technology in Housing

- HUD/Federal Housing Administration (FHA) Title I Home Repair Loan Program
- HUD/FHA Section 203(h) Mortgage Insurance for Disaster Victims
- HUD/FHA Section 203(k) Rehabilitation Mortgage Insurance Program
- HUD Disaster Recovery Grants

Additional Information: http://portal.hud.gov/hudportal/HUD or

HUD Boise Field Office
Plaza IV, Suite 220
800 Park Boulevard
Boise, Idaho 83712-7743
Phone: (208) 334-1990
Fax: (208) 334-9648

Name: U.S. Forest Service/Idaho Department of Lands (USFS/IDL) Community Fire Protection and BLM Partnership Funds

Description: Provide funding for hazardous fuels treatments on private lands adjacent to National Forests (Community Fire Protection) and BLM (Partnership Fund) boundaries. Funds may only be used for hazardous fuels work and not for related activities.

Eligible Recipients: County Wildland Fire Interagency Groups (or county governments)

Additional Information:

Tyre Holfeltz
Idaho Department of Lands
tholfeltz@idl.idaho.gov
208-666-8653

Name: Volunteer Fire Assistance (VFA) Program

Description: The Volunteer Fire Assistance (VFA) Program, formerly known as the Rural Community Fire Protection (RCFP) Program, provides financial, technical, and other Federal assistance to State Foresters and other appropriate officials to organize, train and equip fire departments in rural areas and rural communities to suppress fires. A rural community is defined as having a population of 10,000 or less. This 10,000-person limit for participation facilitates the distribution of VFA funding to the neediest fire departments.

Eligible Recipients: Rural Fire Departments serving 10,000 people or less.

Additional Information: VFA Program Website: http://www.fs.fed.us/fire/partners/vfa/ or

Ken Ockfen
ID Department of Lands
3284 W. Industrial Loop
Coeur d'Alene, ID 83815
(208) 769-1525
Fax: (208) 769-1524
kockfen@idl.idaho.gov

Name: Water Quality Improvement Projects

Description: Department of Environmental Quality (DEQ) administers Federal and State funds used to provide grants and low-interest loans to eligible entities for specific activities designed to improve the quality of Idaho's water resources. Each grant and loan has its own application requirements and time schedule. In addition, DEQ often receives notice of funding opportunities for water quality improvement projects from other agencies and organizations and passes relevant information on to stakeholders. These are not DEQ-administered funds or programs, and DEQ is not involved in decisions relating to them but provides the information as a public service.

Additional Information:

Water Quality Division
DEQ State Office
1410 North Hilton
Boise, Idaho 83706
Phone: (208) 373-0502
Fax: (208) 373-0576

Name: Western States Fire Manager's Grant Program

Description: This grant program is the primary source of funding used to conduct hazardous fuels treatments on private lands in Idaho. The ILRCC prioritizes all applications received in Idaho. These applications are then reviewed by a panel of Western States Fire Managers, where final funding decisions are made.

Eligible Recipients: County Wildland Fire Interagency Groups (or county governments)

Additional Information:

General ILRCC questions:
Suzanne Schedler, Administrative Assistant
Idaho Department of Lands
3780 Industrial Ave South
Coeur d'Alene, ID 83815
Phone: (208) 666-8649
Fax: (208) 769-1524

Specific questions regarding policies or procedures of the ILRCC:
Craig Glazier, Idaho National Fire Plan Coordinator
Idaho Department of Lands/USDA Forest Service
Phone:(208) 666-8646

Name: The Wilburforce Foundation Grant Program

Description: Wilburforce Foundation protects wildlife habitats in Western North America by actively supporting organizations and leaders advancing conservation solutions. Wilburforce makes investments that contribute to the following types of outcomes:

- Increase access to and use of scientific, legal, political, and economic information resources;
- Improve the efficiency and effectiveness of grantee organizations conservation leaders, and other allies;
- Increase communication, cooperation and collaboration among grantees, stakeholders, decision-makers and/or allies;
- Increase awareness, support and utilization of conservation policies, plans and practices that protect wildlife habitat;
- Decrease or mitigate threats to wildlife habitat;
- Improve the protected status of wildlife habitat;
- Improve the ecological resilience of the landscapes in which we work.

Additional Information:

Wilburforce Foundation
3601 Fremont Ave N, #304
Seattle, WA 98103-8753
Phone: 206-632-2325
Fax: 206-632-2326
Email: grants@wilburforce.org

VII. PLAN MAINTENANCE

7.1 Overview

To remain an effective and relevant document, it is vital the plan is actively maintained throughout the five-year lifecycle. This section describes the method and schedule for monitoring, evaluating, and updating the HMP, as well as continued community participation throughout the five years. This section also details existing plans, policies, and programs that the county and responsible agencies can employ or work through to more effectively implement the mitigation strategy, as well as recommended updates for 2022.

7.1.1 FEMA Requirements

This section is consistent with the process and requirements detailed by FEMA. The FEMA requirements addressed in this section include:

- FEMA 44 CFR §201.6(c)(4)(i) – A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
- FEMA 44 CFR §201.6(c)(4)(ii) – A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, where appropriate.
- FEMA 44 CFR §201.6(c)(4)(iii) – A discussion on how the community will continue public participation in the plan maintenance process.

7.2 Monitoring, Evaluation, & Updating

Required by FEMA, monitoring, evaluating, and updating the HMP throughout its five-year lifecycle is important in maintaining the plan's relevance to Bonner County. Often, HMPs are left unmaintained until after the mandatory five-year update deadline, at which point the county and the incorporated cities that adopted the plan become ineligible for further pre-disaster and recovery funding assistance from federal entities. To avoid loss of potential funding, the 2017 plan will be engaged on an annual basis until it's the following update in 2022.

The Bonner County AHM Plan will be reviewed every two years, or as deemed necessary by knowledge of new hazards, vulnerabilities, or other pertinent reasons. The review will determine whether a Plan update is needed prior to the required five year update. The Plan review will document completed mitigation projects, identify new mitigation projects and evaluate the mitigation priorities and existing programs. There have been no repetitive losses associated with hazards identified in Bonner County.

Should repetitive losses be subsequently identified during the plan maintenance reviews, applicable strategies will be formulated to address and mitigate them.

The Bonner County DEM director will be responsible for scheduling a meeting of the AHM Plan Steering Committee and Local Emergency Planning Committee (LEPC) to evaluate the significance of the Plan. The meeting will be open to the public and advertised in the local newspaper to solicit public input. The AHM Plan Steering Committee and LEPC will evaluate each section of the plan and implementation of mitigation projects. The Bonner County DEM director will prepare a status report summarizing the outcome of the plan evaluation meeting and post it on the Bonner County website to update local citizens.

Three years after adoption of the Plan, the Bonner County DEM director will apply for a planning grant through FEMA to update the Plan. Upon receipt of funding, Bonner County will solicit bids in accordance with county contracting procedures and hire a contractor to assist with the Plan update. The proposed schedule for completion of the Plan update is one year from award of a contract, to coincide with the five-year adoption date of the original AHM Plan.

The Bonner County DEM director will be responsible for the five-year Plan update. The update will bring the Plan up to date and incorporate new or more accurate information. Upon completion, the updated Plan will submit the updated Plan to the Board of County Commissioners, incorporated jurisdictions and public for review and adoption. Before the end of the five-year period, the updated Plan will be submitted to the State Hazard Mitigation Officer and FEMA for approval. The Bonner County DEM director will notify all holders of the AHM PLAN when changes have been made. An e-mail will be sent to individuals and organizations on the AHM Plan stakeholder's list to inform them that the updated plan is available on the Bonner County website.

Mitigation actions can be implemented through both independent action and collaborative action of the many organizations and entities working in Bonner County; however, it is the responsibility of the Bonner County DEM director and planning committee to maintain progress reports of the start, progress, and end of mitigation action implementation across Bonner County. The Mitigation Action Progress Report located in Appendix G should be used at the commencement, major milestones, and successful or unsuccessful completion of all mitigation-related projects implemented in the county. The annual compilation of these reports will then provide the foundation for the mitigation review and update in 2022.

The Bonner County DEM director and planning committee will also re-evaluate the plan after any losses are incurred after a hazard event. Losses incurred during and after a disaster provide the opportunity to assess vulnerabilities, potential future issues, and needed mitigation actions to reduce future loss of life and property. If the need arises, the planning committee will initiate a plan update before the required five-year update, with focus on the risk assessment and mitigation strategy.

In order to provide a comprehensive evaluation, the Bonner County DEM director and planning committee will distribute the Internal Capabilities Assessment Form located in Appendix G to all organizations with technological and human resources able to respond to and recover from a disaster.

The bi-annual compilation of these reports provides an avenue for assessing the county's equipment and human resource needs, and can form the basis of the capabilities section in the 2022 plan update while providing additional mitigation actions.

Updates or modifications of the HMP during the five-year period will require a public notice and meeting prior to submitting the revisions to the adopting communities. The revised plan will be posted in public meeting spaces (such as the County Administration Building) and online, and comments and feedback will be solicited. This feedback will be incorporated into the revised plan before final submission.

7.3 Examples of Regional Best Practices for Hazard Mitigation & Comprehensive Plan Integration

Including hazard mitigation policies within a community's comprehensive plan is a vital step towards reducing hazard risk and vulnerability. These policies can then be implemented through regulatory growth management strategies. This section provides "best practice" examples of integrating hazard mitigation policies into comprehensive plans from communities in Idaho and the nearby states of Alaska, Oregon, and Washington.

7.3.1 City of Driggs, Idaho

The City of Driggs is located in the Teton Valley between the Teton and Big Hole Mountains in eastern Idaho. The city is at risk to hazards such as drought, winter storms, flooding, earthquakes, and wildfire. The city includes not only the Idaho LLUPA-mandated hazardous area chapter in its comprehensive plan, but also includes a recommended future land use map that designates the floodplain as preferred open space and wetlands. The hazardous area chapter of the comprehensive plan includes a goal, objective, and detailed actions aiming to reduce hazard vulnerability. The overall goal for the hazardous area chapter in the City of Driggs Comprehensive Plan is to "minimize risk or damage or injury from known hazards." In order to achieve this goal, the city proposed detailed actions that can be implemented through the state's growth management strategies. These actions (which are often one of the weakest components of hazardous area chapters around the state) include the following:

- Developing a floodplain ordinance
- Requiring PUDs to place all building envelopes outside of the 100-year floodplain and providing incentives for this option
- Continuing to work with county, state, and federal agencies, and other organizations on a restoration plan for Teton Creek
- Continuing to adopt the most recent International Building Code

- Enforcing the business license requirements for inspections of potential hazards prior to allowing occupancy for new uses
- Working with the Teton County Fire District and other emergency management officials to assess zoning and development regulations for potential hazardous uses
- Using pamphlets and a website to educate the public on the risks of radon, testing services, and mitigation systems

7.3.2 City of Albany, Oregon

The City of Albany, Oregon is located between the Cascade and Coast mountain ranges at the confluence of the Willamette and Calapooia rivers. The city is at risk to flooding, windstorms, severe weather, earthquakes, wildfires, and volcanic eruption. The State of Oregon requires each city and county to adopt a comprehensive plan and the corresponding zoning and land-division ordinances needed to put the plan into effect. Within a city or county comprehensive plan, 19 statutory goals need to be addressed. The City of Albany Comprehensive Plan includes the mandatory hazardous area goal, hazard maps, hazard mitigation policies addressing flood events and steep slopes, and specific implementation methods for these policies. Going above and beyond the minimum requirement of including the mandated hazardous area goal within its comprehensive plan, the City of Albany is a noteworthy success due to its integration of hazard mitigation into the required housing goal. Often, hazardous area components are standalone chapters and rarely integrated into other community goals and policies. However, the City of Albany addressed hazards within their future housing projections. The city calculated projected housing needs using various growth rate scenarios and then compared the results to the buildable land, which excludes floodplains, wetlands, and slopes. This example is a proactive, long-term growth management success as the city successfully analyzed and determined that there was enough buildable land to meet the projected community's housing needs until 2025.

7.3.3 City of Nome, Alaska

The City of Nome, Alaska is located in northwest Alaska on the southern tip of the Seward Peninsula. The city is at risk to coastline flooding, coastal storm surge, erosion, severe weather, and earthquakes. The State of Alaska allows municipalities to implement land use regulations, such as zoning or subdivision ordinances, but mandates that in order to do so the municipality must first adopt a comprehensive plan by ordinance. This comprehensive plan has minimum requirements that include statements of policies, goals, and standards; a land use plan; a transportation plan; a community facility plan; and implementation recommendations. The City of Nome goes above the minimum requirement by including not only a hazardous area chapter, but one which is completely designated to the stand-alone HMP. This integration technique is noteworthy given the rarity amongst comprehensive plans to contain detailed contents of an HMP. Likewise, it's rare for the HMP process to be directly cited within a hazardous area chapter in comprehensive planning. The end result

ensures consistency between the two plans and can lead to an increase in the implementation of hazard mitigation policies within the city.

7.3.4 Kittitas County, Washington

Kittitas County is located in the center of Washington State, starting in the high Cascade Mountains and extending east to the Columbia River. The county is at risk to severe weather, earthquake, flood, avalanche, landslide, and wildfire. The State of Washington adopted the Growth Management Act (GMA), which provides various tools and strategies to manage growth, protect rural character, protect critical areas, and conserve natural resources. The GMA's detailed policy framework requires fast-growing cities and counties to address 14 goals within their comprehensive plan. These goals include housing; capital facilities; utilities; transportation; rural lands (for counties); and shoreline chapters (if applicable). Also required by the GMA is the designation and protection of critical areas and the designation of natural resource lands. By adopting the local HMP by reference within the comprehensive plan, Kittitas County goes above the minimum requirements to provide information, goals, and policies related to frequently flooded areas and geologically hazardous areas. Kittitas County's adoption of the HMP is noteworthy as comprehensive plans often omit HMP references and only provide general information relating to hazards, making it difficult to plan for growth while simultaneously attempting to reduce the risk from hazard events.

7.4 Implementation through Existing Plans & Programs

Bonner County can implement hazard mitigation projects through its comprehensive plan and other growth management strategies that are used within the state of Idaho.

7.4.1 Incorporate Hazard Mitigation into the Comprehensive Plan

A comprehensive plan, which sometimes is called a general plan, is the official statement of a local government establishing policies for its future long-range development. According to Idaho's Local Land Use and Policy Act (LLUPA), comprehensive plans consider previous and existing conditions, trends, compatibility of land uses, desirable goals and objectives, or desirable future situations for 17 required components. A comprehensive plan is what guides the growth of the community and has the most regulatory power, although the document is not always regulatory in itself. Policies discerned within the comprehensive plan are more likely to be implemented than if they are relegated to other, separate documents (such as the HMP).

Therefore, integrating the HMP into the comprehensive plan can facilitate communication and collaboration between planners and emergency managers to make certain that appropriate hazard assessment information is considered during future land use and development planning. This two-way communication helps reduce risk and future losses to hazards within the community.

Other benefits for implementing the HMP into the county comprehensive plan include:

- Enhancing both the comprehensive planning process and the natural hazard mitigation strategy.
- Reducing a community's vulnerability to hazards and disasters.
- Support effective pre- and post-disaster decision making.
- Creating an effective planning tool.
- Helping speed the return of an impacted community to normalcy following a hazard event.
- Providing a forum for analysis of potentially sensitive issues.

Idaho's LLUPA requires each city and county to prepare a comprehensive plan that guides the growth of the community through land use planning. Within a comprehensive plan, it is required to include current conditions and future desired conditions for 17 different components. One of these components must be designated to natural hazards, however natural hazard mitigation can be incorporated into multiple components of the comprehensive plan. Examples of this incorporation include, but are not limited to, incorporating hazard mitigation into the following components:

- Land Use – Ways through which hazard mitigation can be incorporated into the land use component of the comprehensive plan is by clearly identifying the natural hazard areas; designing policies to discourage development or redevelopment within natural hazard areas; and designing policies at providing adequate space for expected future growth in areas outside natural hazard areas.

- Transportation – Ways through which hazard mitigation can be incorporated into the transportation component is by designing policies that limit access to hazard areas and guide growth to safe locations; designing policies that aim at having facilities function under disaster conditions (e.g., evacuation); and designing policies to have contingencies in place in case of bridge or other transportation infrastructure failure.

- Property Rights – Ways through which hazard mitigation can be incorporated into the property rights component is by designing policies that balance private property rights and hazard mitigation; designing policies that aim at making partnerships and/or agreements between landowners and local governments for use of land for hazard mitigation; and designing policies to reduce conflict or provide mediation during hazard mitigation disputes.

- Natural Resources & Environment – Ways through which hazard mitigation can be into through the natural resources and environment component is by providing a list or map of environmental systems that protect development from hazards; designing policies to maintain and restore protective ecosystems; designing policies to provide incentives for development located outside protective ecosystems; designing polices to limit development

in flood prone areas; designing policies to protect wildlife migration corridors along rivers and streams to serve as habitat and environment protection; designing policies to preserve natural vegetation and woodlands on steep slopes to reduce the likelihood of landslides; and designing policies to conserve woodlands without development to reduce building exposure to wildfires. Hazard mitigation can also be coupled with environmental policies (e.g., clean air, clean water, endangered species) and watershed management policies.

- Recreation & Open Space – Ways through which hazard mitigation can be incorporated into the recreation and open space component is by designing policies to convert or contain floodplain land, steep slope, and areas vulnerable to wildfire or other hazards into open space or recreational areas to minimize damage to life and property.
- Economic Development – Ways through which hazard mitigation can be incorporated into the economic development component is by providing a list or map of business locations that are within hazardous areas; designing policies to provide adequate space for expected business growth in areas located outside natural hazard areas; designing policies to aid economic recovery post-disaster; designing policies to educate business owners about hazards and their risks; designing policies to assist business owners with hazard mitigation and preparedness; and designing policies to use the community's safety to attract potential new businesses to the area.
- Population – Ways through which hazard mitigation can be incorporated into the population component is by providing a list or map of populations within hazardous areas; providing a list or description of populations that are socio-economically vulnerable; designing policies to educate the public about hazards; designing policies to assist the public with hazard mitigation and preparedness; designing policies to aid the public with post-disaster recovery; designing policies that protect the public from risk to natural hazards; and designing policies to develop response plans for natural hazard events.
- School Facilities & Transportation – Ways through which hazard mitigation can be incorporated into the school facilities and transportation component is by providing a list or map of school facilities within hazardous areas; designing policies so that school facilities are designed to function under disaster conditions; designing policies in order to be able to utilize school facilities in safe areas as emergency shelters; designing policies that provide contingencies in case of school facility or transportation infrastructure failure; and designing policies for locating future facilities outside of hazardous areas.
- Public Services, Facilities, & Utilities – Ways through which hazard mitigation can be incorporated into the public services, facilities, and utilities component is by providing a list or map of public facilities within hazardous areas; designing policies to limit public expenditure for infrastructure and public facilities in high-hazard areas; designing policies that link water treatment facilities, stormwater management, and sewerage and solid waste with hazard mitigation; designing policies to interconnect service networks and allow more than one route to any point in order to reduce vulnerability when failures do occur; designing capital

improvement policies that steer development away from hazardous areas; designing policies that aim for the safe location of critical facilities outside of hazardous areas; designing policies that aim to have facilities function under disaster conditions; and design policies that utilize other major facilities in safe areas as emergency shelters.

- Special Areas or Sites – Ways through which hazard mitigation can be incorporated into the special areas or sites component is by providing a list or map of special sites or areas within hazardous areas; designing policies that aim to apply appropriate hazard retrofitting techniques or standards to protect historic or other special site structures from hazard events; and designing policies in order to protect special areas or sites that may double as hazard mitigation (e.g., wildlife refuges, wetlands).
- Housing – Ways through which hazard mitigation can be incorporated into the housing component is by providing a list or map of housing developments within hazardous areas, and designing policies that aim to use appropriate hazard retrofitting techniques for current or future housing located within hazardous areas or that aim to discourage development or redevelopment in hazard areas.
- Community Design – Ways through which hazard mitigation can be incorporated into the community design component is by designing policies that aim to use design standards that are appropriate for housing located within hazardous areas or that aim to discourage development or redevelopment within hazardous areas.
- Agriculture – Ways through which hazard mitigation can be incorporated into the agriculture component is by designing policies to the adopt agricultural techniques that help prevent, mitigation, or reduce the risk of impacts from hazard events; designing policies that aid the agricultural sector with recovery post-disaster; and designing policies that are designed to educate agricultural landowners about preventative measures they can implement to reduce risk to hazard events including but not limited to:
    - Storing hay bales and equipment in areas less likely to be flooded
    - Installing ponds or swales to capture Stormwater
    - Planting vegetation that can tolerate inundation
    - Land management practices to improve the capability of the soil to retain water
- Public Airport Facilities – Ways through which hazard mitigation can be incorporated into the public airport facilities component is by providing a list or map of current airport facilities within hazardous areas; designing policies aimed at retrofitting current or developing future airport facilities and infrastructure that adhere to multi-hazard building codes; designing policies to encourage the creation of emergency response plans for airport facilities during disasters; designing policies that aim to utilize facilities in safe areas as emergency shelters and for those facilities that are located within hazard areas; and making sure the airport facilities can function under disaster conditions. Lastly, policies should be aimed at developing contingencies in case of airport facility infrastructure failure.

7.4.2 Targeted Hazard Mitigation Integration into the Bonner County Comprehensive Plan

A comprehensive plan evaluation focusing on HMP integration was conducted to assess the current status and future potential of integrating the HMP within the Bonner County Comprehensive Plan. The evaluation consisted of 18 sections, one for each of the required LLUPA components and an overall evaluation of the comprehensive plan. The evaluation was completed at the county level, although the matrix is also applicable to the incorporated areas and cities. Within each section, component goals, implementations, and policies and plan content were evaluated using a yes/no criterion in addition to supplemental comments regarding the success or future potential of hazard mitigation elements into the comprehensive plan.

Bonner County has various opportunities that allow it to integrate hazard mitigation into its comprehensive plan. There are no overall goals for the comprehensive plan, which provides for the creation of overall comprehensive plan goals that are inclusive of hazard mitigation. These goals can be taken from the 2017 HMP plan update if appropriate.

The county's overall implementation strategy is by means of annual evaluations and necessary revisions. Various components of the comprehensive plan were updated in 2005, 2013, and at other times. Future updates of comprehensive plan components present an opportunity for hazard mitigation integration. The most recently updated components of the comprehensive plan now include detailed Implementation sub-components. These updated components include objectives and policies in addition to a detailed action plan for successful implementation. The county can enhance community resilience and lessen losses if detailed implementation plans that incorporate hazard mitigation are produced for the other outdated components. The sections Hazardous Areas, Natural Resources, School and Transportation Facilities, and Housing were strongest with regards to hazard mitigation integration.

Within the Hazardous Areas component, Bonner County provides the history and description of each relevant hazard, its location, and the significance of the hazard on the county as a whole. A map of the seismic risk is provided, as well as policies on NFIP compliance. Other policies that incorporate hazard mitigation include the wildfire plans and policies within development patterns, the identification and discouragement of development on excessive slopes, and the identification of avalanche areas.

Within the Natural Resources component, Bonner County excelled in the creation of policies that maintain and restore protective ecosystems, which can help aid in natural flood hazard mitigation. The county established policies that aim to preserve sensitive lands, such as floodplains through means of conservation easements, land trusts, etc.

The School and Transportation component also performed well for HMP integration through the development of policies aiming to avoid hazardous areas for the location of future school facilities. Furthermore, the objective to utilize school facilities for other function has the potential to be vital to

hazard mitigation and disaster response, as school facilities can be used as shelter during disaster situations.

Bonner County integrated hazard mitigation into the Housing section by including the land and number of structures located within SFHA, as well development standards for flood and fire safety. For example, the comprehensive plan exceeds the minimum NFIP floodplain development standards by requiring the elevation and flood proofing of structures one foot above the base flood level and prohibiting development within the floodway.

The county's inclusion of hazard mitigation elements within the comprehensive plan exceeds that normally seen in Idaho. Potential remains, however, to strengthen both the comprehensive plan and the hazard mitigation plan by incorporating additional hazard mitigation elements in the other comprehensive plan components. Incorporating these elements will help facilitate successful implementation of mitigation actions, provide opportunities for more sustainable development, and enhance the county's resilience to hazards.

Examples of incorporable mitigation elements include providing a list or map of community assets, discerning vulnerable populations exposed to hazards, and including the HMP's risk assessment within the Hazardous Area section. The future land use map can include the location of hazardous areas, and land use and mitigation objectives can be integrated through policies specific to limiting or discouraging development within these areas. Within the Transportation section, policies designed to guide growth to safe locations by prohibiting the development and creation of transportation infrastructure in hazardous areas can enhance transportation resilience to hazards. Given that recreation and rural character is important to Bonner County, there is an opportunity to create policies to convert or attain floodplain land, steep slope, areas vulnerable to wildfire, or other hazards into open space or recreational areas. Such policies and use of open land can minimize damage to both life and property. Additional policies within this section can aim to protect special areas or sites (e.g., wildlife refuges, wetlands, and scenic areas) that may double as hazard mitigation. Moreover, due to the recent disaster declarations within the county and losses sustained, mitigation policies directly addressing severe wind hazards should be considered priority for targeted integration between the plans.

Other potential mitigation activities and policies with integration potential are found in the HazCIRC Bonner County Comprehensive Plan Evaluation for HMP Integration, located in Appendix B. FEMA resources including *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, *Smart Growth Audit*, and *Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan* are also tools to facilitate integration.

Other examples of how the HMP can be implemented through existing programs include (taken from 2009 HMP):

- Hazards and risks addressed in new or updated Emergency Operations Plans should be consistent with those identified in the AHM Plan.

- Goals and policies identified in new or updated Comprehensive Plans should include those identified in the AHM Plan.
- Projects listed in new or updated Capital Improvement Plans should include those identified in the AHM Plan.
- Projects listed in new or updated Stormwater Management Plans should include those identified in the AHM Plan.
- Adopt building codes to reduce the effects of hazards identified in the AHM Plan.
- Adopt or update zoning ordinances that would reduce, restrict, or provide regulatory guidance for development in hazard areas.
- Partner with other organizations and agencies with similar goals to adopt and/or promote building codes that are more disaster resistant.
- Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects.
- Allocate County resources and assistance for mitigation projects.
- Partner with other organizations and agencies in the Idaho Panhandle to support hazard mitigation activities.

7.5 Recommended Strategies & Tools for Implementation & Future Updates

The following implementation strategies and recommendations provide opportunities for Bonner County to strengthen the use of mitigation coincident with the growth management process, reduce vulnerability and risk, and increase community resilience.

7.5.1 Future Acquisitions Map

Idaho's LLUPA presents the authority to cities and counties to adopt, amend, appeal, or repeal a future acquisitions map in accordance with the notice and hearing procedures provided in section 67-6509, Idaho Code. The map shall designate land proposed for acquisition by a public agency for a maximum of 20 years. Lands that may be designated on this acquisition map include:

- Streets, roads, other public ways, or transportation facilities proposed for construction or alteration
- Proposed schools, airports, or other public buildings
- Proposed parks or other open space
- Lands for other public purposes

Bonner County can utilize the risk assessment and partner with local, state, or federal agencies (e.g., USFS, BLM, Parks & Recreation, etc.) to identify hazardous areas and designate them on a Future Acquisitions Map. Mapping hazard areas on a future acquisitions map can help recognize the linkages

between conservation of open space and risk reduction to property and life. Areas to potentially identify in plan maps include:

- Steep slopes
- Flood hazard areas
- Wildland-urban interface
- Subsidence zones
- Avalanche paths
- Unstable soils
- Other geologic hazard areas

7.5.2 Flood Control District

Inherent in the roles of local government is protecting citizens and property from injury and damage by natural hazards. In order to carry out this role, Bonner County and its incorporated cities have the power to implement a Flood Control District that provides funding and policy oversight for flood protection projects and programs.

Funding for a flood district can come from a property levy tax, an amount determined by each community, per $1,000 assessed value. This funding can be put towards projects including but not limited to:

- Mitigation projects identified in HMPs
- Flood containment levees and bank stabilization projects
- Providing for a regional flood warning center and emergency response
- Flood facility maintenance
- Public education and outreach
- Mapping and technical studies, and
- Mechanisms for citizen inquiry and public response

A Flood Control District can act as an independent special purpose government and should consist of a Board of Supervisors responsible for developing a plan for funding maintenance and repairs of flood control facilities. Other committees should include an Executive Committee that meets monthly, develops policy recommendations, and oversees the day-to-day business of the District; an Advisory Committee that makes annual recommendations to the Board of Supervisors related to the annual budget; and a Watershed Technical Committee that ensures that watershed-scale issues and technical information are factored into the decision-making of the flood district.

7.5.3 Funding Opportunities

The costs of mitigation actions and projects can vary from minimal to many millions of dollars. Structural and critical infrastructure projects in particular often require financial assistance. However, funding is often cited as the limiting factor in the successful implementation or completion of a risk-reducing action. Departmental and agency funds can be limited and pre-allocated to non-mitigation activities, while grants and other sources of funding are ignored or unknown.

Therefore, it is important that the communities within Bonner County coordinate and actively seek financial assistance for mitigation actions. This assistance can come in the form of grants, loans, technical assistance, or in-kind contributions. Given the complexity of financial assistance, it is recommended that the communities within Bonner County designate a point of contact or committee for seeking out, applying, and distributing grants and other funds. Such designation or committee should work across local, state, and federal institutions, and keep a shared calendar of important dates for grants and other sources of funding. Likewise, this position can help communities identify any initiatives or activities that can be accomplished using existing programs or budgets.

7.5.4 Communicate Mitigation Successes

Communicating successfully completed mitigation actions and projects can help garner further support for continuing mitigation efforts. Communicating successes through public service announcements, newspaper and website articles, social media, and other avenues helps inform the general public of the risks in their community and the efforts undertaken to mitigate such risks. Likewise, communicating these successes can help garner institutional support by highlighting cost-effective and resource-efficient actions with the potential to reduce the monetary costs of hazards. It is recommended the communities within Bonner County cooperatively develop a county-wide public outreach strategy and regularly communicate mitigation successes. Example outreach methods include the following:

- Participating in community events
- Interviews
- News media, including radio, newspaper, and television
- Presentations to governing bodies
- Social media
- Community-specific meetings
- Website

7.5.5 Comprehensive Socioeconomic Vulnerability Assessment

Socioeconomic vulnerability is the predisposition of an individual or population to be negatively impacted by a hazard due to existing socioeconomic or demographic characteristics. For example, elderly populations are often more vulnerable to hazards due to challenged mobility, requiring

additional evacuation time and special care. Likewise, female populations are more vulnerable than male populations to disasters due to family responsibilities and lower average incomes, making it more difficult for female populations (notably single parent female head of households with children) to recover. Understanding socioeconomic vulnerability is crucial in mitigation planning, yet is often omitted in both risk assessments and mitigation strategies.

When socioeconomic vulnerability is accounted for, the model employed often lacks the sophistication to produce an accurate measure of vulnerability. These traditional models produce results at resolutions too coarse for sub-county mitigation efforts. Although appropriate for studies or plans written at the state- or nation-wide scale, these models are inappropriate for county- or regional planning and analysis. Likewise, traditional vulnerability models are often generalized and do not consider the distinct local characteristics of a community, relying on general statistical analyses of demographic data collected in the decadal census. Finally, these models are often statistically incorrect, and do not account for the spatial patterns and relationships of the indicators used as proxy measures of vulnerability.

To overcome these limitations, the SERV model was developed by Dr. Tim Frazier at HazCIRC. This model addressed these limitations by accounting for local community characteristics, incorporating advanced spatial analysis and statistics, and producing sub-county results. The SERV model accounts for a community's ability to overcome stressors, its sensitivity to stressors, and the population exposed to various magnitudes of a hazard to produce a comprehensive vulnerability score. The SERV model was employed in this 2017 HMP Risk Assessment to identify areas at greater risk to loss of lives and property from various hazards. However, a more comprehensive and targeted vulnerability assessment should be undertaken to identify the underlying factors amplifying vulnerability.

The targeted socioeconomic vulnerability assessment should employ the Geographically-Weighted Spatially Explicit Resilience-Vulnerability (GWSERV) model (Figure 50). The GWSERV is an improvement on the SERV model, and is the most advanced socioeconomic vulnerability model to date. The GWSERV employs geographically-weighted factor analysis to provide high-resolution localized analyses and results. The GWSERV does not simply produce a measure of vulnerability, but provides stakeholders and decision makers with the primary underlying socioeconomic and demographic indicators driving vulnerability (Figure 49). This knowledge and information is vital to best target mitigation efforts, and to reduce community vulnerability and enhance community resilience.

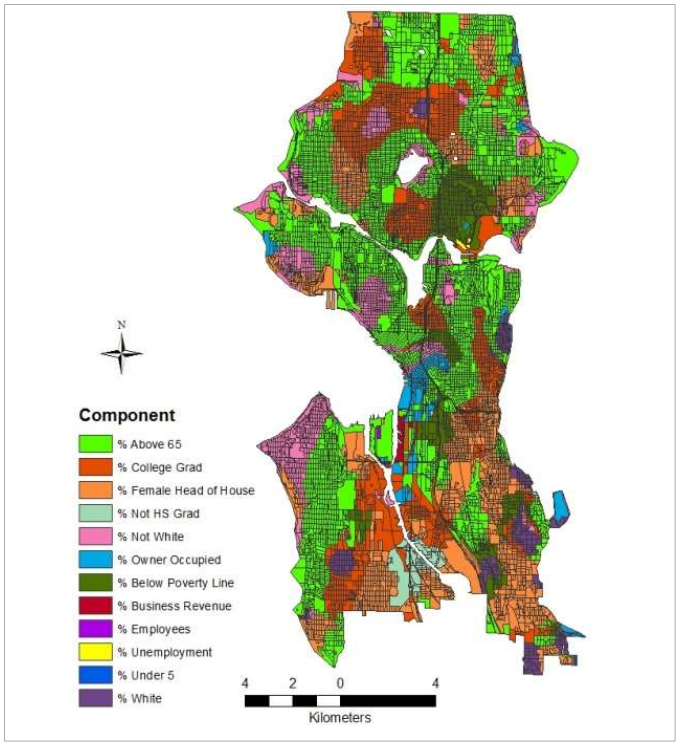

Figure 49. Example GWSERV results

7.5.6 Improved GIS Mapping & Data Management

GIS mapping and data management are foundational in understanding risk, effectively targeting mitigation efforts, managing development for sustainability, and ultimately enhancing community resilience to hazards. GIS maps in combination with high-quality data provide the means to visualize the extent and magnitude of hazards, the potential losses if a disaster were to occur, and the location of vulnerable populations. GIS analyses can help improve the understanding of hazard impacts and expose areas or populations of concern that might otherwise stay hidden. Such maps and data help identify and prioritize mitigation areas, and can likewise be used to assess mitigation areas of effect.

Given the utility of GIS maps and data, it is recommended that the communities within the Bonner County maintain comprehensive and high-quality GIS data. Examples of data include but are not limited to the following:

- Building stock (with hazard-specific attributes)
- Historical hazard occurrences
- Future hazard probabilities
- Critical facilities and infrastructure data
- Land use and zoning
- Areas of city impact and future development

- Socioeconomic vulnerability
- Community assets
- High potential loss facilities
- Geo-coding of mitigation actions

Such data provides a foundation on which to build a comprehensive GIS program to reduce community vulnerability and enhance resilience. For example, developing a building stock dataset with hazard-specific attributes allows for the creation of User-Defined Facilities (UDF) for use in Hazus-MH loss estimations. The inclusion of UDFs produces more accurate results than the general building stock included in the software. However, like all modeling, the output and results of Hazus-MH loss estimations and other GIS models are dependent on the quality of the input dataset. Therefore, it is important to build datasets with appropriate levels of detail and accuracy. Building and using data that captures real-world conditions greatly increases its reliability and usability.

To maintain high-quality data, communities within the watershed can standardize and share data collection and archiving. Likewise, the counties and communities can format all newly-permitted construction records and assess existing construction records to create an accurate and standardized dataset of structures.

7.5.7 Develop a Post-Disaster Recovery Plan

Although mitigation is vital to reducing community vulnerability and enhancing community resiliency, it is only one aspect of the disaster continuum. Another aspect that should be considered through the planning process is recovery following a disaster. Disaster recovery is defined by FEMA as a return of community systems and structures to a "normal state", which is usually held as the pre-disaster state of the community. Together, planning for both mitigation and recovery allows communities a more holistic approach to hazards and risk, and ultimately facilitate greater community resiliency.

To produce a holistic mitigation strategy, Bonner County and a cooperative county-wide group should prepare post-disaster recovery plans (PDRPs). The PDPR is the means to identify and plan for issues a community is likely to face after a disaster. The primary goals of a PDRP are to identify and prioritize key issues; establish partnerships within the community, with neighboring communities, and state and federal agencies; develop a recovery strategy implementable immediately following an event; and more effectively and efficiently allocate resources. Through the PDPR planning process, communities can also identify pre-disaster mitigation projects and enhance response and preparedness capabilities. Undertaken at the county scale, PDPRs can greatly enhance the resiliency of the Bonner County through a bioregional approach by building relationships vital in both the pre-, during-, and post-disaster periods, illuminating region-wide issues that may arise in the post-disaster period, and instituting a plan to seize the short-yet-vital window in the post-disaster period to enhance resiliency across multiple spatial scales.

To best formulate the PDRPs, the following strategies (but not limited to) should be included in the PDRPs:

- Post-disaster recovery plans
- Recovery ordinances
- Business and government continuity plans
- Post-disaster buildable lands inventories
- Utility recovery and reconstruction plans
- Temporary shelter, housing plans, and business plans
- Establishment of a coordinating organization and guiding principles for reconstruction

7.5.8 Climate Impacts Assessment

The impacts of a changing climate can be detrimental to a community, especially if the community is dependent on agriculture, seasonal precipitation, or is unable to cope with the degree of changes in climate systems. At the county-level, these impacts can translate to vegetative shifts, loss of critical wildlife habitat, changed precipitation regimes, increased wildfire, drought, and severe storms, and more. Understanding county-level impacts and the cascading impacts on communities is important in preparing for, adapting to, and mitigating against negative changes while providing opportunity for capitalizing on positive changes. A climate impacts assessment provides this understanding, and is recommended for Bonner County. A climate impacts assessment identifies the systems and processes within the watershed and its communities that are affected by climate, and how these systems can be impacted by shifts in temperature, precipitation, and other aspects of climate. Through the assessment process, climate impacts are analyzed and described based on the best-available science to inform management activities about the positives and negatives likely to occur in the short- and long-term. The assessment identifies and promotes best practices for adaption and mitigation, and is a tool to build public awareness and understanding of climate change. Likewise, the assessment can build partnerships with local, state, and federal stakeholders and partners, which are vital to enhancing community resilience.

7.5.9 Appreciative Inquiry: Asset Based Workshop during next HMP Update Process

In order to maintain eligibility for FEMA mitigation grant funds, HMPs must be updated every five years. This update process must include an open public involvement process constituting a more comprehensive approach to reducing the effects of natural hazards. However, due to the complex and technical nature of hazards planning, participation is often low in communities. This presents opportunity to implement the “Appreciative Inquiry Approach” developed by Freitag et. al 2014, in which the goal is to highlight local assets that promote well-being and adaptive capacities for recovery after an imagined disaster with a focus on non-hazard community factors.

This approach could be adapted and used for Bonner County during their next HMP update in order to prioritize mitigation actions and increase public support and participation. This process entails holding community workshops where the public would participate in two mapping exercises. The first of the two mapping exercises prompt the public to identify community assets that are important to their wellbeing during everyday life. The second of the two mapping exercises prompts the public to identify community assets that they feel are important during a disaster scenario. After the completion of these two mapping exercises, local officials and stakeholders can identify the overlapping areas and assets in the two maps and consider them to be Areas of Mitigation Interest (AOMI) in the HMP.