STATE OF IDAHO HAZARD MITIGATION PLAN

IDAHO BUREAU OF HOMELAND SECURITY

NOVEMBER 2010

Executive Summary

Across the United States and in Idaho, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The toll on families and individuals can be immense, and damaged businesses cannot contribute to the economy. The time, money, and effort to respond to and recover from these disasters divert public resources and attention from other important programs and problems. In the past three years, Idaho has seen six Federal Disaster declarations and experienced numerous hazard events, including flood, wildfire, dam failure, winter storm, avalanche, and drought. **Hazard events occur in Idaho every single year; it is important to know the risk represented by those events and take actions to protect against them.**

The elected and appointed officials of the State of Idaho also know that with careful selection, mitigation actions in the form of projects, plans, and programs can become long-term, cost-effective means for reducing the impact of natural and human-caused hazards. Applying this knowledge, the State of Idaho's Mitigation Planning Update Executive Committee has collaborated to update the *State of Idaho Hazard Mitigation Plan* (the Plan). With the support of various officials, the State of Idaho, and the Federal Emergency Management Agency (FEMA), this Plan is a resource to guide the State toward greater disaster resistance in full harmony with the character and needs of the region.

If hazard events occur every single year, what is the risk they represent? Hazards occurring in Idaho have the potential for causing widespread loss of life and damage to property, infrastructure, and the environment. So it is important to define risk:

Risk = Probability x Consequence

The Plan analyzes risk by determining these factors as well as possible. Updated techniques to understand potential consequences (i.e., number of properties affected and dollar values of damage) are used in the Plan. The 2010 Plan profiles 12 hazards including flood, earthquake, wildfire, landslide, dam/levee failure, avalanche, drought, lightning, severe storm, wind/tornado, volcanic eruption, and hazardous materials. Of these hazards, from a statewide perspective, the three most significant are:

- Flood
- Earthquake
- Wildfire

Each of these hazards could result in an event that would cause over $1 billion in damages.

The purpose of hazard mitigation is to implement actions that eliminate the risk from hazards, or reduce the severity of the effects of hazards on people and property. Mitigation is any sustained action taken to reduce or eliminate a long-term risk to life and property from a hazard event. Mitigation encourages the long-term reduction of hazard vulnerability. Mitigation can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical community facilities, reduce exposure to liability, and minimize community disruption. Preparedness, response, and recovery measures support the concept of mitigation and may directly support identified mitigation actions.

The State of Idaho's hazard mitigation goals are to:

1. Save lives and reduce public exposure to risk from natural and man-made hazard events
2. Reduce or prevent damage to public and private property from natural and man-made hazard events
3. Enhance coordination between federal, State, regional, Tribal, and local agencies and the consistency of hazard impact reduction policy
4. Reduce adverse economic impacts of natural and man-made hazard events
5. Reduce adverse environmental or natural resource impacts from natural and man-made hazard events
6. Enhance vulnerability and risk assessments through the development and collection of data

Specific objectives and an action plan are found in Chapter 1. In the past three years, significant mitigation actions have been completed in Idaho. Over $16 million in funding has resulted in projects such as upgrading infrastructure to make it more resilient from flooding (bridge and culvert upsizing, stormwater management systems), wildfire mitigation projects (fuels reduction, outreach, etc.), and hazard warning systems**. Hazard mitigation works in Idaho, and national studies indicate that investments in hazard mitigation will pay dividends in the future – for every dollar spent on a hazard mitigation activity, there are four dollars in return.**

Finally, this Plan has been informed by the significant amount of mitigation planning that has occurred at the local level in Idaho. Information from 47 local mitigation plans was analyzed and used for this Plan update.

This Plan has been prepared in compliance with Section 322 of the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* (*Stafford Act* or the *Act*), 42 U.S. C. 5165, enacted under Section 104 of the *Disaster Mitigation Act of 2000*, (*DMA 2000*) Public Law 106-390 of October 30, 2000.

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CHAPTER 1: HAZARD SUMMARY AND MITIGATION STRATEGY

INTRODUCTION

What is Hazard Mitigation?

Hazard Mitigation is defined as ***any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards***.[1] The key phrases in this definition, "sustained action" and "reduce or eliminate long-term risk," make hazard mitigation different from other types of actions. Mitigation actions are usually permanent solutions to the hazards faced by Idahoans. Hazard mitigation is considered one of the four phases of emergency management. The other three phases are:

- *Preparedness:* Actions, programs and systems developed and implemented prior to disasters or emergencies
- *Response:* Actions designed to address the immediate and short-term effects of disasters or emergencies
- *Recovery:* Actions and programs designed to return conditions to an acceptable level

Mitigation actions can occur before or after a disaster event, so mitigation can be built into both preparedness actions and recovery actions to improve conditions and make them more resilient after future disaster events.

Types of Hazard Mitigation Actions

Hazard mitigation strategies to reduce specific risks can vary from very simple to complex. They comprise one or more hazard mitigation actions. There are so many different hazard mitigation actions that they are often classified into six categories:

1. Prevention
2. Property protection
3. Public education and awareness
4. Natural resource protection
5. Critical facilities protection
6. Structural projects

Prevention actions are intended to keep a hazard risk problem from getting worse. They ensure that future development does not increase hazard losses. Communities can achieve significant progress toward hazard resistance through prevention actions. This is particularly true in areas that have not been developed. Types (and examples) of prevention actions are:

- Planning and zoning (floodplain regulations)
- Open space preservation (parks and recreation areas)
- Land development regulations (large lot sizes)

[1] There are multiple definitions of hazard mitigation; the definition here is the one commonly used by FEMA.

- Stormwater management (clear ditches/larger retention basins)
- Capital improvement planning (no infrastructure extended into hazard areas)
- Building codes

Property Protection actions are used to modify buildings subject to hazard risk, or their surroundings, rather than to prevent the hazard from occurring. A community may find these to be inexpensive actions because often they are implemented or cost-shared with property owners. These actions directly protect people and property at risk. Protecting a building does not have to affect the building's appearance and is therefore a popular action for historic and cultural sites. Some examples of property protection actions are:

- Acquisition (the public procurement and management of lands that are vulnerable to damage from hazards)
- Relocation (involves permanent evacuation of hazard-prone areas through movement of existing hazard-prone development and population to safer areas)
- Elevation of structures above the base flood elevation
- Rebuilding (modifying structures to reduce damage by future hazard events)
- Floodproofing and localized flood control (protecting a floodprone building using one or more of several different methods)
- Creating defensible spaces around structures in and around the wildfire-urban interface
- Nonstructural seismic retrofits (includes strapping water heaters to walls, reinforcing connections for suspended ceilings, bookcases, electronics mounted on walls, etc.)

Public Education and Awareness activities inform and remind people about hazardous areas and the actions necessary to avoid potential damage and injury. The public can be informed about hazard mitigation through several avenues. Some examples include:

- Providing hazard maps and other hazard information
- Website
- Outreach programs that provide hazard and mitigation information to people who have not asked for it
- Asking business owners to provide hazard mitigation information to employees
- Mass mailings
- Notices to residents and property owners in a specific hazard-prone area
- Displays in widely used facilities, such as public buildings and malls
- Print media, radio/TV spots, and interviews
- Public access TV channel announcements
- Videotape/property owner handbook
- Presentations at meetings of neighborhood groups
- Tab in phone book
- Real estate disclosure
- Information in the public library or a library developed specifically for hazard mitigation information
- Available technical assistance
- School-age and adult education

Natural Resource Protection actions are intended to reduce the intensity of hazard effects, as well as to improve the quality of the environment and wildlife habitats. Park, recreation, or conservation agencies or organizations usually implement these activities. Examples of natural resource protection include:

- Erosion and sediment control
- Wetlands protection
- Dune restoration
- Reforestation
- Terracing

Critical Facilities Protection is essential because critical facilities can have a huge effect on the scope of the damage as well as the ability of the community to respond and recover from a hazard event.

Critical facilities include:

- Essential facilities, such as police stations, fire stations, and hospitals that are vital to the response effort
- Facilities that house populations requiring special consideration, such as nursing homes, prisons, schools, and secondary education facilities
- Facilities that can create secondary hazards, such as nuclear power plants and hazardous materials production or storage facilities

Structural Projects directly protect people and property at risk. They are called "structural" because they involve the construction of structures to control hazards. Some examples of structural projects are:

- Dams, reservoirs, dikes, levees
- Revetments
- High-flow diversions
- Debris basins
- Channel modifications
- Storm sewers
- Elevated roadways
- Debris basins

Framework for Hazard Mitigation in Idaho

Hazard mitigation is done on multiple levels and is intended to be both unilateral and overlapped. On an *individual* level, for example, a home or business owner can purchase flood or earthquake insurance. On a *community* level, mitigation actions can be any of those discussed earlier. At the *State or tribal nation* level, mitigation actions tend to focus on ensuring that programs are made available, protecting State facilities from hazards, and encouraging mitigation through programs, policies, and laws. It is important that both State and Federal agencies work cooperatively at the State level to reduce risk.

Hazard mitigation goals, objectives, and actions are described in *hazard mitigation plans.* Mitigation plans are created to protect the health, safety, and economic interests of residents by reducing the impacts of natural hazards. Plans are important because they:

- ✓ Increase public awareness and understanding of vulnerabilities and support specific actions to reduce losses from future natural disasters

- ✓ Expand understanding of potential risk reduction measures
- ✓ Create safer communities by reducing loss of life, injury, and property damage
- ✓ Reduce the financial impact on individuals, communities, and society as a whole
- ✓ Provide eligibility for FEMA post-disaster and pre-disaster mitigation funding

Currently, there are two primary mitigation plans at the State level in Idaho: the *Idaho State Hazard Mitigation Plan* (this document, which focuses on all hazard mitigation) and the *Idaho Statewide Implementation Strategy for the National Fire Plan* (which focuses on the hazard of wildfire only). At the tribal and local level are 47 locally adopted, FEMA-approved multi-hazard mitigation plans and 44 County Wildfire Protection Plans.

Who are the agencies involved in hazard mitigation in Idaho? Chapter 4 details the mitigation capability of the State. The primary State agencies implementing hazard mitigation in Idaho include the Idaho Bureau of Homeland Security (BHS) – Mitigation Section and the Idaho Division of Water Resources. At the Federal and local levels, many agencies are involved hazard mitigation. With so many agencies having a stake in hazard mitigation, three interagency working groups have been formed around Idaho's three biggest hazards: flood, earthquake, and wildfire. The interagency working groups are detailed in Appendix D.

Why Mitigate in Idaho?

Idaho is hazard prone. In fact, Idaho faces significant hazards and has experienced significant events in the past. Consider:

1910 Fire aftermath / Source: US Forest Service

- ✓ Idaho experienced the most significant wildfire event in U.S. history. IT CAN HAPPEN IN IDAHO! The 1910 fire burned 3 million acres (an area the size of the State of Connecticut), and destroyed two entire Idaho towns. In all, 86 people died and 7.5 billion board-feet of timber were consumed. Unfortunately, combinations of drought, extreme fires, weather, continuous fuels over landscapes, multiple large fires burning at the same time, and severe late-season wind events could cause such an event to occur again today. Using conservative cost estimation methodologies, such a fire today in total cost would approach $3.5 billion.

1976 Teton Dam Failure / Source: www.damsafety.org

- ✓ Idaho experienced one of the most significant dam failures in United States history. The Teton Dam failure in 1976 drained an impoundment 270 feet deep in less than six hours. Damage was swift and complete as 2 million cubic feet per second poured from the breach. Six communities were devastated, and thousands of homes and businesses were destroyed. The dam failure triggered significant landslides and resulted in serious impacts to the lower portion of the Teton River's ecology and to habitats in the Snake River as far down as Fort Hall. Damages, in today's costs, exceeded $2 billion.

- ✓ While the 1983 Borah Peak earthquake was bad – at a 6.9 magnitude, it resulted in approximately $26 million in damage, what would happen if a magnitude 6.9 earthquake occurred in Idaho Falls? State-of–the-art FEMA loss estimation tools such as HAZUS determined that such a scenario would generate the following losses: over 1,500 structures would be complete losses, and over 31,000 structures would be damaged. Total estimated losses would be $1.5 billion.

THE BOTTOM LINE IS THAT BILLION-DOLLAR DISASTERS HAVE OCCURRED AND WILL OCCUR IN IDAHO! Given the relatively small size of the State and its Gross Domestic Product – billion-dollar disaster losses would result in significant impacts – both economic and environmental. Hazard mitigation today can reduce the losses that will inevitably occur tomorrow.

MITIGATION STRATEGY

2008-2010 Mitigation Highlights

Mitigation funding for the period of 2008-2010 was significant (see Table 1-1). Compared to the previous three years (2005-2007), when FEMA Unified Hazard Mitigation Assistance (HMA) funding only averaged $198,179, Unified HMA funding averaged $1,788,172 during the most recent three year period - almost a tenfold increase. An analysis of the data indicates that this was primarily due to an increase in the FEMA Pre-Disaster Mitigation (PDM) funds awarded. Interest in the PDM program has increased significantly over the past few years; in 2010, over 30 applications were developed and submitted to the state for consideration. A project-by-project summary can be found in Table 1-2.

Table 1-1: Idaho Mitigation Funding Summary, 2008-2010

Year	Funding Source	Amount
2008	FEMA Unified HMA	$1,978,649
	Idaho Fire Plan	$4,192,584
2009	FEMA Unified HMA	$585,283
	Idaho Fire Plan	$7,247,969
2010	FEMA Unified HMA	$2,800,584
	Idaho Fire Plan	Not Available
SUBTOTAL:	FEMA Unified HMA	$5,364,516
SUBTOTAL:	Idaho Fire Plan	$11,440,553
TOTAL:		$16,805,069

1. Funding amounts are tied to funding cycle dates and HMGP declaration dates for Unified HMA and do not represent funds obligated in that year.

2. National Fire Plan funding includes Hazardous Fuels Treatment and Wildland Fire Planning and Assistance Funds only.

Sources: BHS database, Idaho Fire Plan Annual Reports 2008 and 2009.

As a State with a significant wildfire risk as well as a significant amount of public lands, the National Fire Plan funds for hazardous fuels treatment and wildland fire planning and assessment funds are important mitigation funding sources.

From 2008 to 2010, hazard mitigation funds were appropriated in the following way:

Unified HMA

- 24 percent to fund updates to local and State mitigation plans
- 16 percent to fund wildfire mitigation actions (fuels management, roof replacements, etc.)
- 50 percent to fund flood mitigation actions (stormwater management systems)
- 10 percent to fund other projects (warning systems, management costs, etc.)

Idaho Fire Plan

- 92 percent to fund hazardous fuels treatment programs (this can also include planning and fire education programs)
- 8 percent to fund wildfire planning and assistance programs (including the update of County Wildfire Protection Plans)

Based on the data above, mitigation funds are primarily going to the most significant hazards: flood and wildfire. Although no earthquake mitigation projects were funded during the most recent time period, earthquake mitigation projects have been funded in the past. The funding is consistent with the types of hazards declared in the past three years.

Table 1-2: Summary of HMA Grant Awards

Year	Grant Program	Project	Jurisdiction	Total Award
2007	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Bingham County	$29,000.00
2007	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Minidoka County	$48,000.00
2007	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Blaine County	$62,800.00
2007	HMGP	State of Idaho Seismic Isolation Project	State of Idaho, Office of the Comptroller	$100,000.00
2008	FMA	Comprehensive update to the All-Hazard Mitigation Plan	Ada County	$53,400.00
2008	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Clearwater County	$97,275.00
2008	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Shoshone County	$66,633.00
2008	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Benewah County	$103,946.00
2008	PDM	Comprehensive update to the All-Hazard Mitigation Plan	State of Idaho – Bureau of Homeland Security	$465,875.00
2008	HMGP	N. Viola Bridge Replacement Project	North Latah Highway District	$181,965.00
2008	LPDM	FireCorps: Fire Mitigation and Education in Valley County	University of Idaho	$455,151.90
2008	LPDM	Highlands Estates Wildfire Mitigation Project	Adams County	$200,000.00
2008	LPDM	Harriman State Park Fire Mitigation Project	Idaho Department of Parks and Recreation	$60,000.00
2008	LPDM	State of Idaho Public Safety Communication Sites - Wildfire Mitigation	State of Idaho – Bureau of Homeland Security	$124,470.00
2009	PDM	Fremont County Stormwater Management Project	Fremont County	$326,000.00
2009	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Ada County	$125,000.00
2009	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Latah County	$64,753.38
2009	HMGP	Tubbs Hill Hazardous Fuel Treatment Project	City of Coeur d'Alene	$34,000.00

Table 1-2: Summary of HMA Grant Awards

Year	Grant Program	Project	Jurisdiction	Total Award
2009	HMGP	Silverton Stormwater / Flash Flood Project	Shoshone County	$215,000.00
2009	HMGP	St. Joe Baldy Warning System	Benewah County	$16,750.00
2010	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Payette County	$25,000.00
2010	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Elmore County	$50,720.00
2010	PDM	Comprehensive update to the All-Hazard Mitigation Plan	Lewis County	$69,877.85
2010	FMA	Comprehensive update to the All-Hazard Mitigation Plan	Bannock County	$47,900.00
2010	FMA	Comprehensive update to the All-Hazard Mitigation Plan	Clark County	$49,900.00

Project Highlights

The following mitigation projects are among those funded during the past three years:

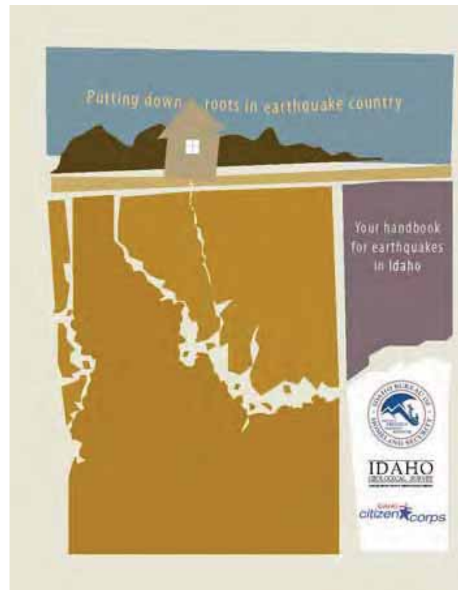
- ✓ *FireCorps: Fire Mitigation and Education in Valley County.* This project includes public awareness and education, retrofitting public structures for wildfire protection by replacing wood shake shingle roofs with metal (except historic dining hall), and vegetation management.
- ✓ *State of Idaho Public Safety Communication Sites - Wildfire Mitigation.* This project includes vegetation management and retrofitting of public structures including fuel reduction, replacement of combustible structural materials with non-combustible, use of insulated Bally Modular building, burial of propane tanks and utility lines, and enclosure of generator.
- ✓ *St. Joe Baldy Warning System.* The project includes the purchase and installation of an Emergency Alert System (EAS) Transmitter on St. Joe Baldy Mountain, a SAGE receiver box at KOFE Radio Station in St. Maries, and NOAA Weather Tone Alerts in St. Maries City Hall, Plummer City Hall, and Tensed City Hall.

North Viola Bridge in Latah County, before and after mitigation. Note that the small opening, which resulted in backwater flooding, was replaced with a wider span. Funding Source: HMGP, DR-1630.

- ✓ *Silverton Stormwater / Flash Flood Project.* This project involves the construction of a stormwater collection and management system for Sather Creek and two designated areas in the Town of Silverton Drainage Assessment.
- ✓ *City of Lewiston Stormwater System Improvements.* The project updates and rebuilds a stormwater drainage system in the area of the city that includes most of the government buildings and offices.

Planning and Outreach Highlights

The following planning and outreach projects were among those that took place in the past three years:



- ✓ *Putting Down Roots in Earthquake Country.* This booklet, funded by BHS using mitigation grant monies, was produced through a cooperative project with the Idaho Geological Survey. The booklet has been widely distributed since 2009 and well received by educators throughout the State. It will be distributed at every opportunity through any possible venue in the future.
- ✓ *Seismic Advisory Committee.* The Idaho Seismic Advisory Committee is a multidiscipline, interagency group that has been meeting regularly since September 2007. It was organized by BHS to develop and implement solutions to statewide earthquake preparedness and mitigation efforts. Additional information can be found in Appendix D.


PRESS RELEASE

Avert Disaster -
National expert to teach floodplain management workshop

- ✓ *Silver Jackets Team.* The Idaho Silver Jackets Team is the State-level implementation of the USACE's National Flood Risk Management Program (NFRMP) and holds quarterly meetings at a minimum. It was established by a USACE charter in the summer of 2009 to serve as a catalyst in developing comprehensive and sustainable solutions to flood hazard issues. Additional information can be found in Appendix D and in a recently published flood hazard guidebook.
- ✓ *Firewise.* Idaho Firewise was formed as a result of the Idaho State Fire Plan Working Group's 2007 National Fire Plan survey. This survey was distributed to all 44 counties, and the results indicated a need for a statewide fire education and prevention program. Idaho Firewise began in 2008; in 2010, it seems to have finally taken shape. Its mission

is to coordinate and increase statewide wildland fire education efforts.

- ✓ *No Adverse Impact Floodplain Management.* Nationally recognized floodplain management and property rights expert Edward A. Thomas, Esq. spoke at a one-day workshop on no Adverse Impact Floodplain Management in February of 2009. Thomas described the rights and duties of local government, protection of property rights and natural resources, and flood hazard liability.

Status of 2007 Mitigation Action Plan

The 2007 State Hazard Mitigation Plan (SHMP) identified 137 mitigation actions. During the Mitigation Solutions Workshop, the Executive Committee realized that the number and appropriateness of these actions (appropriate to a State plan versus a local plan) were inconsistent. For example, it is not appropriate for a State mitigation plan to include a local floodproofing project unless the project somehow has statewide significance (e.g., it is co-located with a State-owned critical facility). Furthermore, many actions were either not specific or not within the context of an SHMP. As such, there was a very low implementation rate of the actions (less than 10 percent). A more extensive discussion of the 2007 mitigation actions can be found in Appendix D.

2010 Mitigation Goals, Objectives, Actions

The purpose of setting mitigation goals, objectives, and actions at the State level is to ensure that:

- A mitigation vision is set for Idaho,
- Local mitigation objectives and actions that have been developed are consistent with the State's overall vision, and
- Specific actions, appropriate at the State level, are established to facilitate greater hazard mitigation activity.

Actions that are appropriate to a State-level hazard mitigation plan were identified for the 2010 update. Many of these actions focus on agency coordination, outreach, and data development.

2010 Mitigation Goals

The State of Idaho's hazard mitigation goals are to:

1. Save lives and reduce public exposure to risk from natural and man-made hazard events.
2. Reduce or prevent damage to public and private property from natural and man-made hazard events.
3. Enhance coordination between Federal, State, regional, Tribal, and local agencies and consistency of hazard impact reduction policy.
4. Reduce the adverse economic impacts of natural and man-made hazard events.
5. Reduce the adverse environmental or natural resource impacts from natural and man-made hazard events.
6. Enhance vulnerability and risk assessments through the development and collection of data.

2010 Mitigation Objectives

Mitigation objectives are the fundamental strategies prescribed by the Plan to achieve the mitigation goals. They specifically state how the goals will be achieved through action at State and other levels.

The State of Idaho's hazard mitigation objectives are to:

1. Improve State agency administrative and legislative coordination, cooperation, and capacity to identify and implement effective hazard mitigation strategies. (Goal 3)
2. Increase awareness of hazards and their impacts. (Goals 1,2,4,5)
3. Increase knowledge of hazard mitigation options. (Goals 1-5)
4. Improve statewide understanding of risk and vulnerability. (Goals 1-5)
5. Motivate communities and citizens to take preparedness and mitigation actions. (Goals 1,2)
6. Identify and integrate existing data. (Goal 6)
7. Develop common statewide datasets to enhance vulnerability and risk assessments. (Goal 6)
8. Develop cost-effective and feasible mitigation grant projects for existing buildings and infrastructure. (Goals 1,2)
9. Integrate the Virtual Idaho Portal (VIP) emergency management tool to enhance and complement the Plan. (Goals 2,3,4,6)

2010 Mitigation Action Plan

To implement the goals and objectives in the 2010 Plan, the actions shown in Table 1-3 were developed.

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-01	Establish communication and procedures with State Department of Administration related to purchasing land/buildings and natural hazards protection (goal 3; obj. 1,2)	Goal 3 Obj. 1,2	Unknown	A	N/A	+++	++	+++	8
2010-02	Recruit participation for hazard working groups from ISDO, Risk Management and ITD (goal 3; obj 1)	Goal 3 Obj. 1	IBHS	A	N/A	+++	+++	+++	9
2010-03	Create a working group to oversee data sharing, database construction and maintenance (HAZUS input datasets)	Goal 3,6 Obj. 1,5,6	Idaho Spatial Data Officer (L) IDWR (S) IBHS (S)	C (0.5 FTE est)	FEMA Risk MAP and Hazard Mitigation Mgmt Funds	+	++	+++	6

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-04	Develop and deliver 2 workshops every other year in different parts of the State for local officials on low impact development, No Adverse Impact, etc. and how to implement these activities	Goal 2,3 Obj. 3,4	IDWR (L) Private Consultant (S)	C (est. 60K every other year)	FEMA and EPA	+ +	++	+++	7
2010-05	Develop and execute an expansion of the ICRMP project (currently piloting 10 DFIRM counties)	Goal 6 Obj. 5	IDWR	D (est. $130k annually)	FEMA (75%) and matching funds from ICRMP (25%)	+	+	+++	5

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-06	Expand statewide flood awareness week to include school activities, promote community activities, and look at all flooding sources.	Goal 1,2 Obj. 2,3	Silver Jackets, Project WET	C (est. 30k annually)	Agency in-kind, look for some outside funding sources: Idaho Community Foundation or other private foundations funding educational activities	+++	+++	+++	9
2010-07	Form a team of experts from appropriate Federal and State agencies to produce and conduct all hazard training for local governments (cycle it in preparation for update of local mitigation plan)	Goal 1,2,3 Obj. 2,3,4,7	IGS(L) IDWR, USACE, FEMA, BHS (S)	C (est. 50k every other year)	BHS Mitigation	++	+	+++	6

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-08	In order to improve analysis of flood, landslide, seismic and wildfire hazards, obtain new or compile existing LIDAR data for populated areas of Idaho	Goal 6 Obj. 5,6	IGS, USGS, FEMA, BHS, IDWR	D	Congressional earmark	++	+	+++	6
2010-09	Produce liquefaction susceptibility maps populated areas	Goal 6 Obj. 5,6	IGS	D (cost should be spread over multiple years)	FEMA/BHS	+	++	+++	6
2010-10	Develop earthquake booklet teaching segments from the already developed "Putting Down Roots in Earthquake Country"	Goal 1,2 Obj. 2,3,4	BHS (L) IGS, Idaho Science Teachers Assoc (S)	C (est. 40k)	FEMA/BHS	+	++	+++	6

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-11	Develop and publish a Firewise guide specific to Idaho	Obj. 2	Idaho Firewise, BHS, ISFPWG	C (est. 40k)	FEMA/BHS	+	++	+++	6
2010-12	Seismic rehabilitation of vulnerable State facilities	Goal 1,2,4 Obj. 7	DPW, BHS	D (est. $50 million)	FEMA/BHS, Dept. of Building Fund	+	+	+ +	4
2010-13	Adopt and enforce statewide building codes	Goal 1,2,4 Obj. 4	State Legislature, Div. Building Safety (L) Industry (S), Western States Seismic Policy Council (S)	D (est. $100k)	Industry	++	+	+	4
2010-14	Develop and maintain statewide inventory of State and county facilities and infrastructure with an isolated server	Goal 6 Obj. 6,7	BHS	D (est. $200K)	FEMA	++	+++	+++	8

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-15	Structural and non-structural retrofits for county EOCs for multiple hazards (floodplain, high and extreme seismic areas, WUI)	Goal 1,2 Obj. 7	BHS	D (est. $3 million	FEMA PDM	++	++	++	6
2010-16	Conduct outreach activities to better inform local jurisdictions regarding protection of critical infrastructure	Goal 1,2,3 Obj. 1-3	BHS	D (est. $132k - (3k per county)	DOE (energy efficiency), DHS, agency in-kind	+++	+++	+++	9
2010-17	Standardized regulation of HVAC, plumbing, electrical and life safety codes	Goal 2 Obj. 1	DBS, Industry, Legislature	C (est. 25k staff time mostly)	Industry, code boards	+	+	++	4

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-18	Develop an inventory of flood hazards in the State and rank or prioritize them (i.e., a spatial map). Could be based on combination of losses, population exposure, etc.	Goal 6 Obj. 6	IDWR (L) BHS, FEMA (S)	D (est.250k)	USACE (planning continuing authority programs)	+	+	+++	4
2010-19	Complete the lower Boise interim feasibility study which will provide updated information on flood risk	Goal 1,2,6 Obj. 2,6	IWRB, USACE	D (est. $1.76 million)	IWRB (50%), USACE Federal funds	+	++	+++	6
2010-20	Increase capacity of State dam safety program including considering partnerships with Federal agencies	Goal 1,2,3 Obj. 1	IDWR	D	USACE Planning Assistance to States, IDWR	++	+	+++	6
2010-21	Identify an appropriate State role in the oversight of levees including interfacing with the new National Levee Safety Program	Goal 1,2,4,5 Obj. 1	BHS	Unknown	Unknown	+	+	+++	5

Table 1-3: 2010 Mitigation Action Plan

ID	Action	Goal(s), Objective(s) Addressed	Lead Agency L=Lead Agency S=Support Agency	Budget Category A=No cost B=0-10K C=10K – 100K D=100K+	Possible Funding Source	Cost Effective	Technically Feasible	Environmentally Sound	Sum of "+"
2010-22	Employ the State/county facilities and infrastructure database into the VIP system	Goal 2,3,4,6 Obj. 9	BHS	Unknown	Unknown	++	++	+++	7
2010-23	Integrate hazard mapping capabilities into the VIP system	Goal 2,3,4,6 Obj. 9	BHS	Unknown	Unknown	+	+++	+++	7
2010-24	Investigate compatibilities between VIP and HAZUS and apply those as needed.	Goal 2,3,4,6 Obj. 9	BHS	Unknown	Unknown	+	++	+++	6

CHAPTER 2: STATE OF IDAHO PROFILE

GEOGRAPHY AND ENVIRONMENT

The State of Idaho covers 83,564 square miles, with a land area of 82,412 square miles and 1,152 square miles of water. Its northeastern boundary is Montana, with Wyoming on the east, Utah and Nevada on the south, Oregon and Washington on the west, and British Columbia, Canada on the north. It has forests, deserts, mountains, narrow valleys, and plains. Altitudes range from 738 feet above sea level at the shores of the Snake River in Lewiston to 12,662 feet at the summit of Borah Peak. Steep mountain streams and large, forceful rivers are found throughout. With a 600-mile north-south profile, it has a vast exposure to the dominant westerly flow of weather, and its climatic characteristics vary not only from north to south, but from east to west. The geology, hydrography, climate, and land cover all play a role in the natural hazard environment that characterizes our State.

Source: Flickr

Geology and Terrain

Idaho features a diverse and dramatic geologic setting. Throughout much of the State, outcroppings, steep slopes, and high relief make the residents very aware of the foundation of the State. This immediacy also makes for a geologically active State, with earth movement through earthquakes and landslides, large and small, still shaping the terrain.

Northern and central Idaho is mountainous, with peaks reaching elevations over 12,000 feet. The continental divide runs along the lower portion of the border with Montana. The landscape is characterized by large changes in elevation in short distances (over 4,000 feet in some cases), steep slopes, and narrow V-shaped valleys. Past glaciations are evident in some areas. The northern portion of the State is underlain with ancient (1.4 billion years old) metamorphic rocks with pronounced layering. Major mountain ranges include the Selkirk, Coeur d'Alene, and Cabinet Mountains.

Central Idaho is underlain by the Idaho Batholith, a 70- to 100-million-year-old and deeply eroded complex of coarse-grained granitic rocks. This area is marked by massive mountain ranges such as the Sawtooth, Salmon River, and Bitterroots. The deeply eroded canyon of the westward-flowing reach of the Salmon River bisects this area. In both regions, the exposed rocks present an unstable terrain subject to slides and rock falls, and the landscape has been and is being formed by these factors. Soils formed from the granitic rocks of Central Idaho are given to instability after vegetation disturbance from wildland fires or logging.

The southern portion of the State, in contrast, is characterized by the broad basalt plains that are deeply cut by river valleys. This rock is part of one of the largest basaltic lava flows in North America and is quite young (geologically speaking). Although the volcanoes are now dormant, there is a possibility of renewed lava flows in the future. Where it is exposed as tablelands and steep cliffs, this type of rock is also unstable and given to slides and rock falls.

The subsurface geology of Idaho creates the potential for seismic activity throughout the State. Only the northernmost portion of the State (the Panhandle) and a belt running from the southwest to Rexburg in the east (corresponding somewhat to the Snake River Plain) are considered relatively inactive. The key phrase is "relatively," though; it is important to note that the entire State is considered to have at least a moderate seismic threat, and earthquakes can occur anywhere.

Climate

Idaho, although also diverse in climate, is generally characterized by warm, dry summers and cold, moist winters. Flanked by the Cascade Range on the west and the Rocky Mountains on the east, the State is shielded from the significant precipitation found on the Pacific coast and the severe arctic cold spells and destructive summer storms found on the Great Plains. In general, violent or prolonged adverse weather events (e.g., tornadoes and extended winter storms) are rare.

The State's annual average precipitation is 22 inches, but there is significant variation. The considerable north-south extent of the State (seven degrees of latitude) and lifting of air masses over the mountainous areas results in heavy precipitation in the north and in the central Idaho mountains (up to 60 inches, much as snow) and low precipitation in the downwind, "rain shadow" southern and eastern areas (down to 10 inches). Winter snowfall ranges from a low of 20 inches in the southwestern valleys and canyons to a record of 300 inches (and perhaps up to 400 inches) in the high mountains.

November, December, and January are generally the wettest months of the year in most Idaho locations. In the central and northern half of the State, a second cycle of precipitation usually occurs during spring. Spring and summer thunderstorm activity provides much of the moisture for the eastern communities located in the rain shadow of the central mountain mass. Idaho's significant north-south extent and altitudinal variations also influence temperatures, with the highest summer temperatures occurring in the south. Further from the moderating influences of the Pacific Ocean and generally higher in elevation, the southeastern corner of the State is cooler than the southwestern corner. Representative locations are described in the Table 2-1 below.

Table 2-1: Representative Climate Examples

City	Elevation (feet above sea level)	Annual Mean Precipitation	Mean Snowfall	July Average High Temperature (Fahrenheit)	January Average Low Temperature (Fahrenheit)	July Average Afternoon Humidity
Boise	2,840 ft.	12.1 in.	21.3 in.	90.2	21.6	22%
Coeur d'Alene	2,158 ft.	25.9 in.	52.2 in.	85.4	23.3	34%
Idaho Falls	4,730 ft.	10.9 in.	37.5 in.	86	10	25%
Lewiston	1,440 ft.	12.4 in.	19.8 in.	89	27.6	34%
Pocatello	4,450 ft.	12.1 in.	47.2 in.	88.1	14.4	38%
Twin Falls	3,670 ft.	10.4 in.	31.3 in.	85	18.6	27%

Water Bodies and Streams

Idaho's water bodies and streams play a key role in its natural hazard climate. Large rivers are found throughout the State and, due to the rugged terrain, they often share their floodplains with development. Most Idaho residents live near rivers that are subject to periodic flooding.

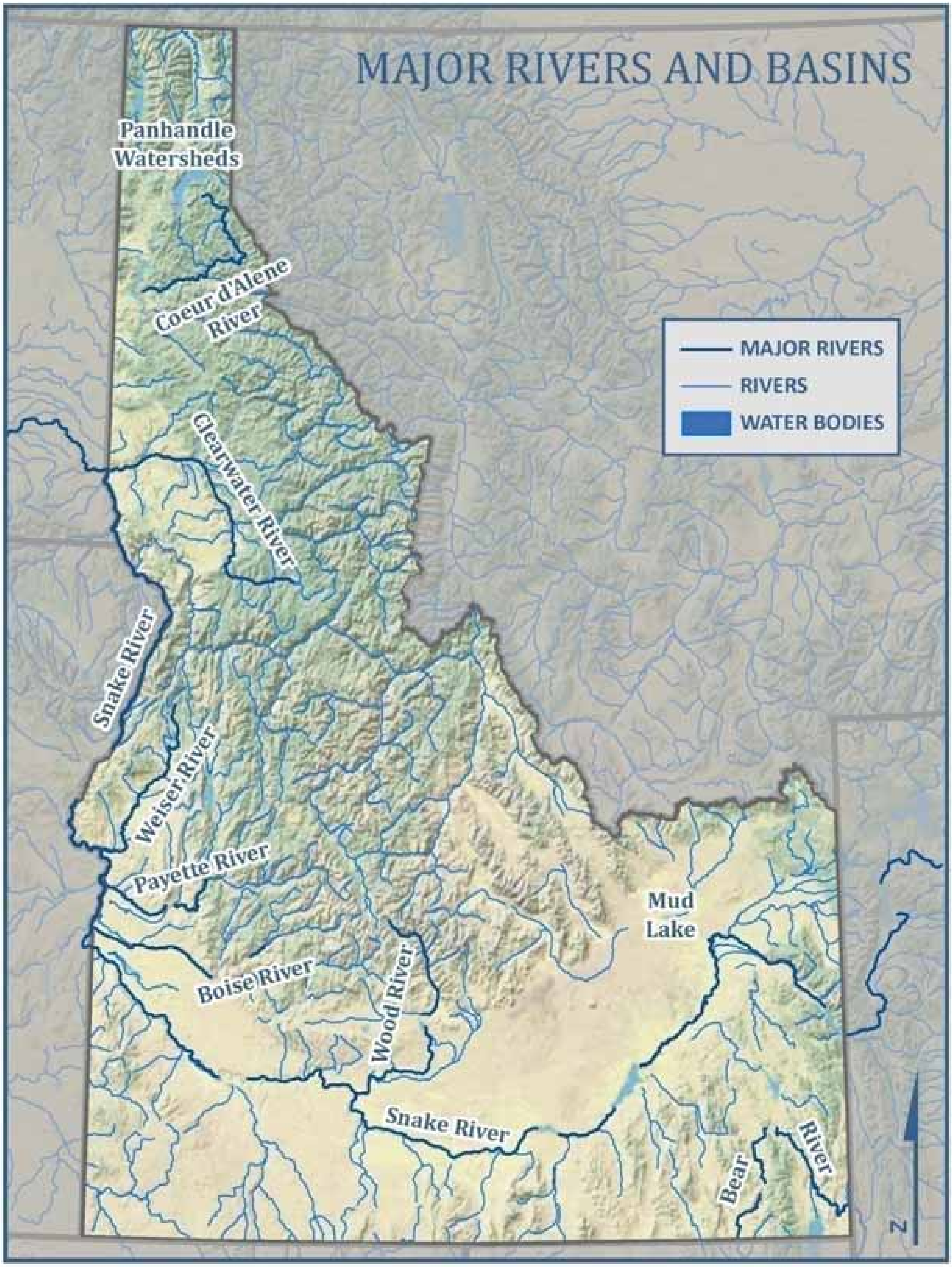
Much of Idaho's precipitation falls as snow, leading to a stream flow pattern keyed to spring and early summer snow melt. In general, stream flows are highest during this period and lowest in fall and winter.

Extensive water storage facilities (over 12 million acre-feet of storage) in the State modify this pattern, especially downstream along the larger rivers. These facilities and offstream use of the water can significantly alter the natural flow patterns.

The Snake River, cutting across the width of the southern portion of the State, is a key feature in the Idaho – its basin covers 88 percent of the State. The river is impounded at Palisades Reservoir upon entering the State from Wyoming and then flows from the reservoir onto the Snake River Plain. The river curves across southern Idaho through the State's largest valley, where the river may be completely depleted by irrigation diversions during the summer. Continuing west, the flow is replenished by the Snake Plain aquifer (groundwater comprises up to one-half of the flow at Glenn's Ferry). It then turns north to form the western boundary and travels through Hell's Canyon (the deepest canyon in North America) before turning west into Washington State at Lewiston. As it enters Hell's Canyon, the Snake is altered by river regulation for hydropower production and inflow from the Boise and Payette Rivers.

Major tributaries, such as the Salmon and the Clearwater, begin in the mountains of Central Idaho as small, steep streams and often maintain a relative steepness throughout their courses. Idaho's lakes include Dworshak Lake, a 53-mile long reservoir, and numerous alpine lakes in the high mountains. Two Panhandle rivers, Kootenai and Clark Fork, are regulated by dams upstream in Montana. Flood control and power production increase the flows from late summer through winter. The Clark Fork is also controlled by the Cabinet Gorge dam, whose power operations produce daily fluctuations (along with the Noxon Rapids Dam in Montana). The Spokane River flows west from Lake Coeur d'Alene, the State's largest lake, passing quickly out of the State at Post Falls. Two major tributaries, Coeur d'Alene and the St Joe, originate in Idaho's Bitterroot Range and flow into Lake Coeur d'Alene. Other large lakes in the northern Panhandle include Pend Oreille and Priest. Along with Lake Coeur d'Alene, these lakes are regulated by dams at their outlets. In general, lake levels are lowered in the late fall to provide for winter flood protection. Smaller lakes include Hayden Lake, Spirit Lake, the Upper and Lower Twin Lakes, and Hauser Lake.

The Bear River enters the State near Bear Lake, having drained a 2.500-square-mile, somewhat mountainous basin. At that point, it is regulated by upstream storage and is depleted by irrigation diversions in Wyoming and Utah. High flows are common in May and June, and very low flows in July, August, and September. Through Idaho, it is affected by reservoir releases for power generation, unregulated tributary inflow, and irrigation diversions. Its major tributaries, Thomas Fork and the Malad River, exhibit flows typical of unregulated streams. Peak runoff occurs during the snowmelt season and declines through the summer months. Major rivers and water bodies are shown on Map 2-1.



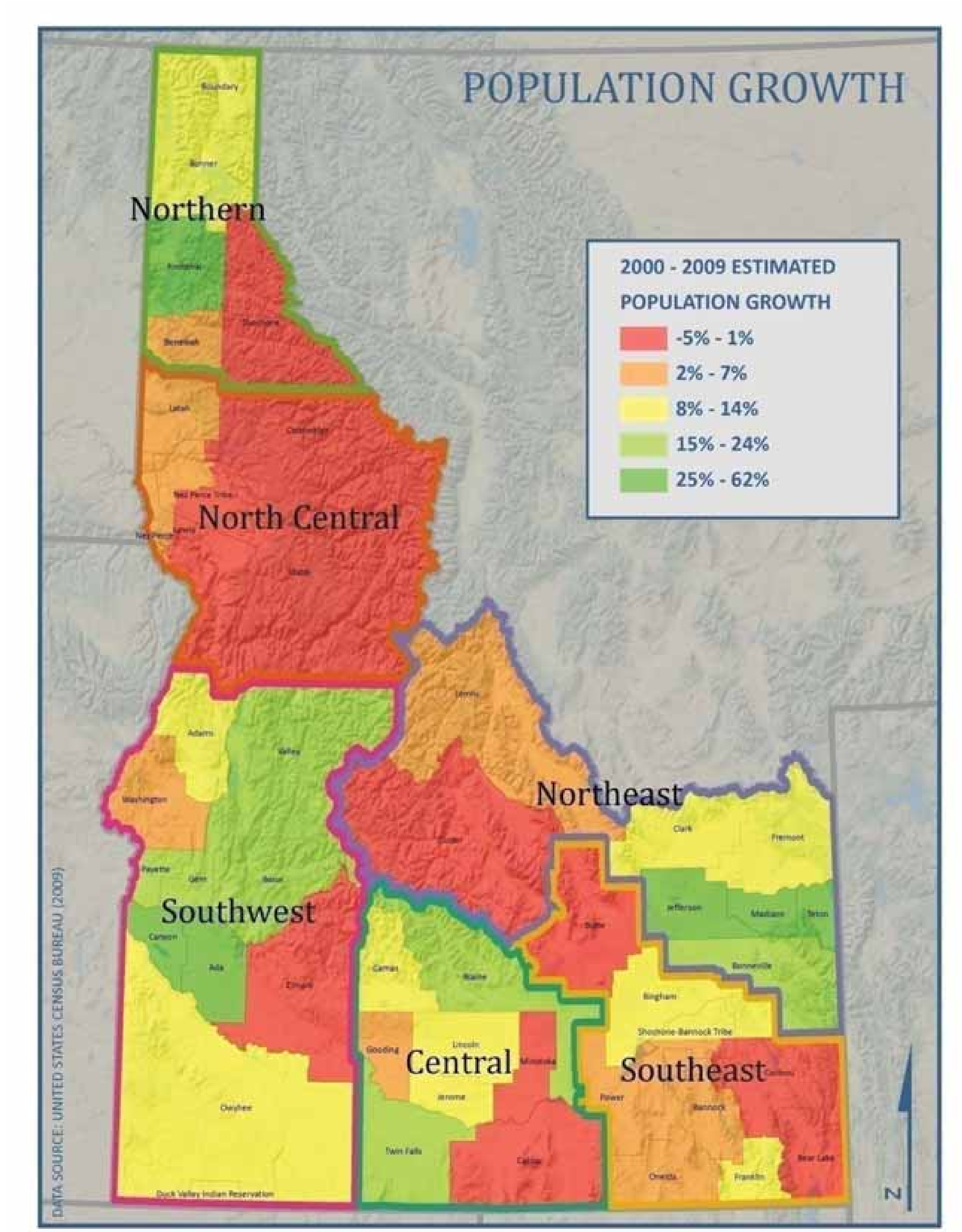
Map 2-1: Major Rivers and Basins of Idaho

POPULATION

Idaho contains 44 counties. The State's capital is Boise. According to the 2009 Estimated Census, the population of Idaho is 1,545,801. Idaho ranks as the 39th most populated State. Table 2-2 below depicts the 2009 Census estimate for county populations. Map 2-2 below depicts the population growth from 2000 to 2009. Although each of the six hazard mitigation regions (see Map 3.1 in Chapter 3) experienced some decline in population growth, the North-Central area had the largest amount of negative growth. The Southwest region experienced the most growth in population. Overall, the State population increased 19.5 percent between 2000 and 2009.

Table 2-2: Summary of 2009 Estimated Census Populations for Each County in Idaho

County	2009 Census Population (Estimated)	County	2009 Census Population (Estimated)
Ada County	384,656	Gem County	16,437
Adams County	3,520	Gooding County	14,430
Bannock County	82,539	Idaho County	15,461
Bear Lake County	5,774	Jefferson County	24,802
Benewah County	9,258	Jerome County	21,262
Bingham County	44,668	Kootenai County	139,390
Blaine County	22,328	Latah County	38,046
Boise County	7,445	Lemhi County	7,908
Bonner County	41,403	Lewis County	3,735
Bonneville County	101,329	Lincoln County	4,645
Boundary County	10,951	Madison County	38,440
Butte County	2,764	Minidoka County	19,226
Camas County	1,109	Nez Perce County	39,211
Canyon County	186,615	Oneida County	4,221
Caribou County	6,914	Owyhee County	11,223
Cassia County	21,698	Payette County	23,099
Clark County	952	Power County	7,734
Clearwater County	8,043	Shoshone County	12,660
Custer County	4,240	Teton County	9,337
Elmore County	28,820	Twin Falls County	75,296
Franklin County	12,676	Valley County	8,726
Fremont County	12,691	Washington County	10,119



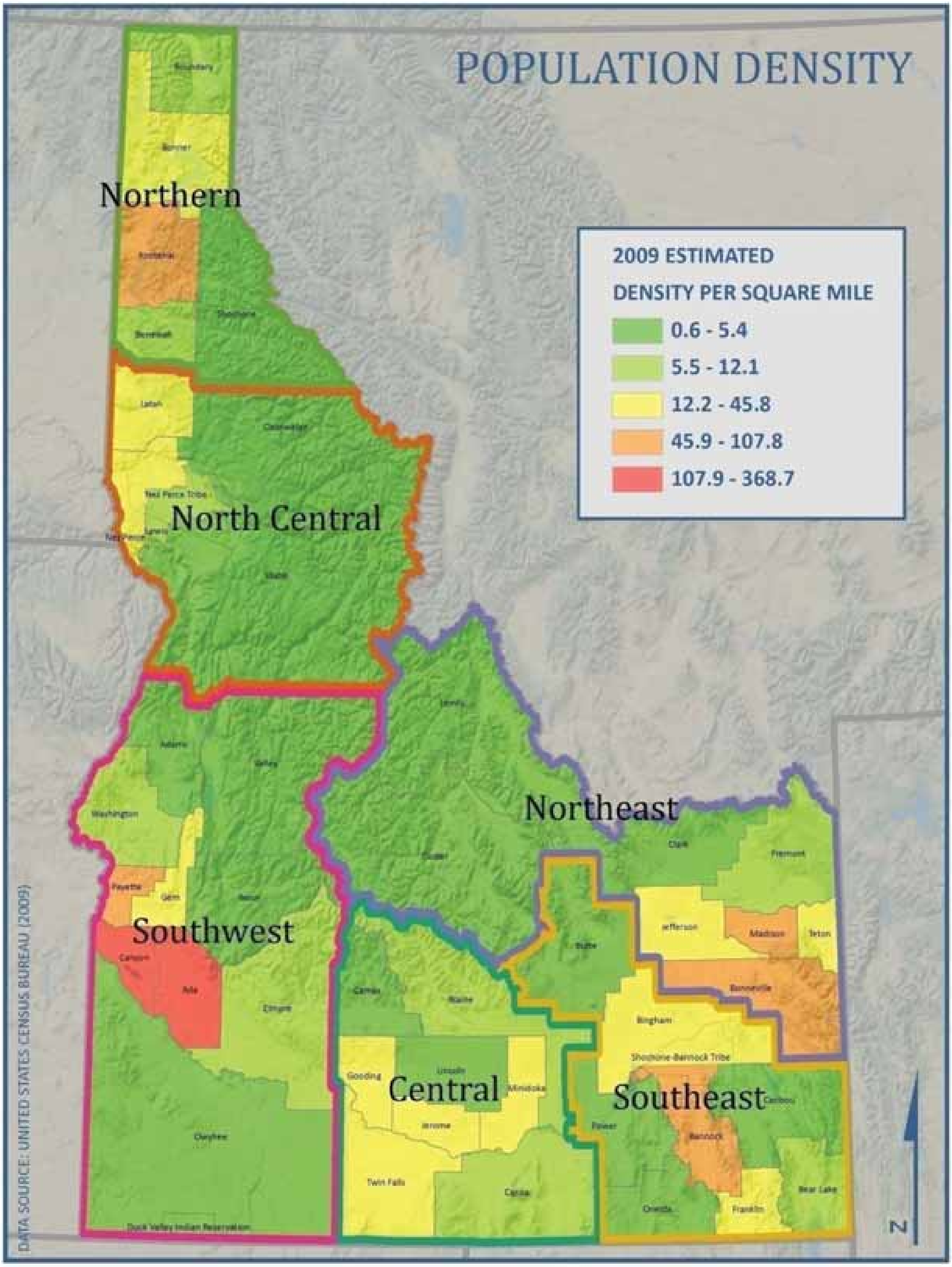
Map 2-2: Idaho Population Growth from 2000-2009

The most populous county in Idaho is Ada County, with a 2009 Estimated Census population of 384,656. Clark County, with a population of 952, is the least populated county. To differentiate between urban and rural, the Idaho Department of Commerce and Labor defined urban counties as those containing a town or city with a population of at least 20,000 residents. The largest towns or cities in rural counties have fewer than 20,000 residents. Under this definition Ada, Bannock, Bonneville, Canyon, Kootenai, Latah, Madison, Nez Perce, and Twin Falls counties are urban. Populations are most dense in and around cities. The City of Boise is the largest in Idaho. The second most populous city is Nampa. Found below, Table 2-3 lists most the populated cities and Map 2-3 shows population density throughout Idaho, based on the 2009 Estimated Census results.

Population density has a strong correlation with hazard vulnerability and loss. For example, urban areas like Boise and Nampa naturally have larger populations and numbers of structures; therefore, they will experience greater loss during hazard events.

Table 2-3: Most Populated Cities of Idaho

City	2009 Estimated Census Population
Boise City	205,707
Nampa	81,241
Meridian	68,516
Idaho Falls	55,312
Pocatello	55,076
Coeur d'Alene	43,805
Caldwell	43,281
Twin Falls	42,741
Lewiston	31,887
Rexburg	28,856
Post Falls	26,909
Moscow	24,338



Map 2-3: Idaho Population Density

LAND USE AND DEVELOPMENT TRENDS

The State of Idaho has a variety of land uses, ranging from agriculture to industrial. Agriculture has been the backbone of Idaho's economy for many years, since before the area became a State.

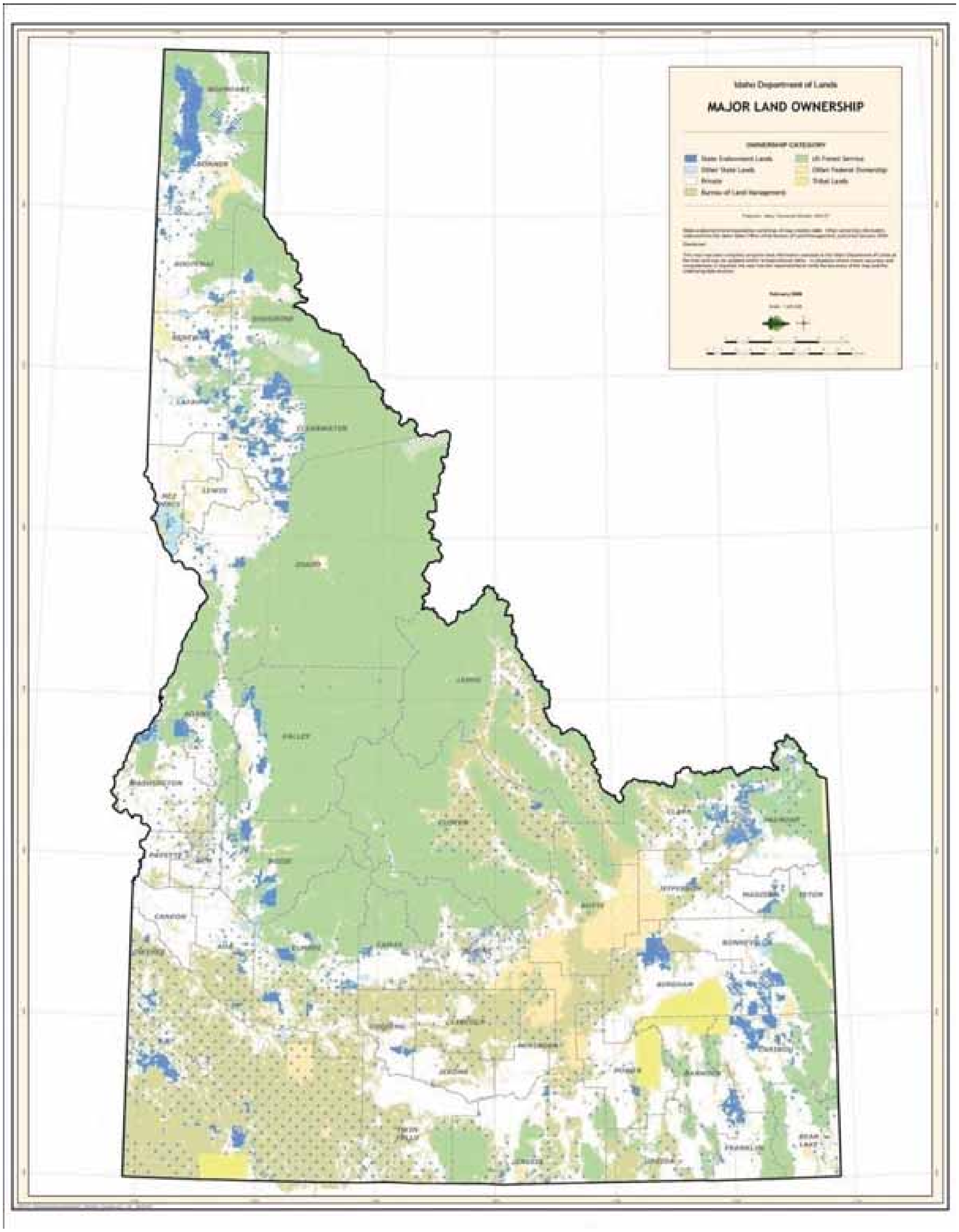
Idaho's growing season is about 200 days around the city of Lewiston, but it can be very brief at high altitudes. With no hurricanes and infrequent tornadoes, crop damage due to weather is minimal, with limited damage from hail and wind storms. Idaho's greatest threats to crops remain drought and invasive species. According to the United States Department of Agriculture (USDA), approximately 11,497,383 acres of land were used for agricultural purposes in 2007. Agriculture comprises 21.7 percent of the State's land use.

Forests cover approximately 26,600,000 acres and make up 41 percent of Idaho's land cover. According to the Idaho Forest Products Commission, approximately 89.6 percent of the forestland existing in 1630 is still present today. The United States government owns 63.8 percent of all the land in Idaho and manages nearly three-quarters of the Idaho forest. The rest of Idaho's forestland is divided between public and private ownership. The State of Idaho and other public agencies own 10 percent, or 2.2 million acres; forest products companies own 5 percent, or 1.1 million acres; and the remaining 10 percent, 2.2 million acres, is owned by ranchers, farmers, tribes, and other private landowners. Map 2-4 below shows land ownership in the State.

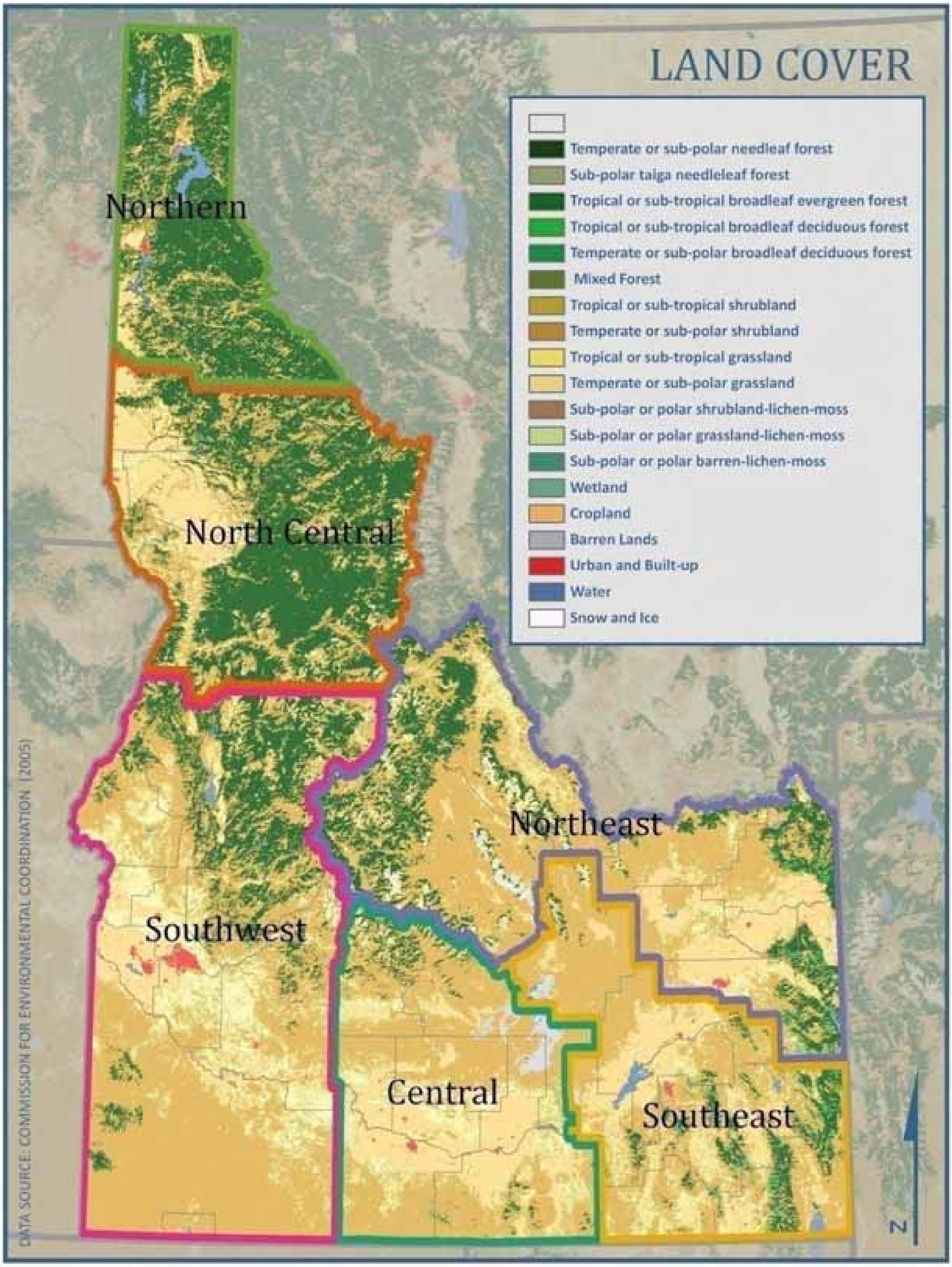
Land cover significantly affects hazard vulnerability. For example, counties with a large percentage of forest cover, such as those that contain the Clearwater National Forest, are more susceptible to wildfire hazards and also some invasive species. Map 2-5 displays areas of urban or built-up land cover in Idaho. As urbanization occurs, areas once covered by trees and grass are being replaced by impervious surfaces of roads, roofs, and parking lots. This urbanization reduces the infiltration of rainwater, thus increasing the amount of stormwater runoff and the potential for flash flooding.

Idaho land use and development is often defined by the State's transportation system. Roads, rail lines, airports, and ports are important for the transportation of people, goods, and services; therefore, development typically occurs around transportation hubs. Idaho has a widespread highway network of over 60,000 miles, which includes interstate highways such as Interstates 84, 86, 15, and 90 (See Map 2-6 below). Idaho's transportation system also includes about 4,000 bridges, 1,887 miles of rail lines, 68 county and city airports, 38 recreational and emergency airstrips, 14 public transportation providers, and one seaport, the Port of Lewiston (Idaho Department of Transportation (DOT)). The State of Idaho is responsible for nearly 5,000 miles of highway in Idaho, just 10 percent of all roadway miles in the State. However, according to the Idaho DOT, the State highway system accounts for 54 percent of the State's vehicle miles of travel. More discussion of development trends can be found throughout each hazard profile in Chapter 3.

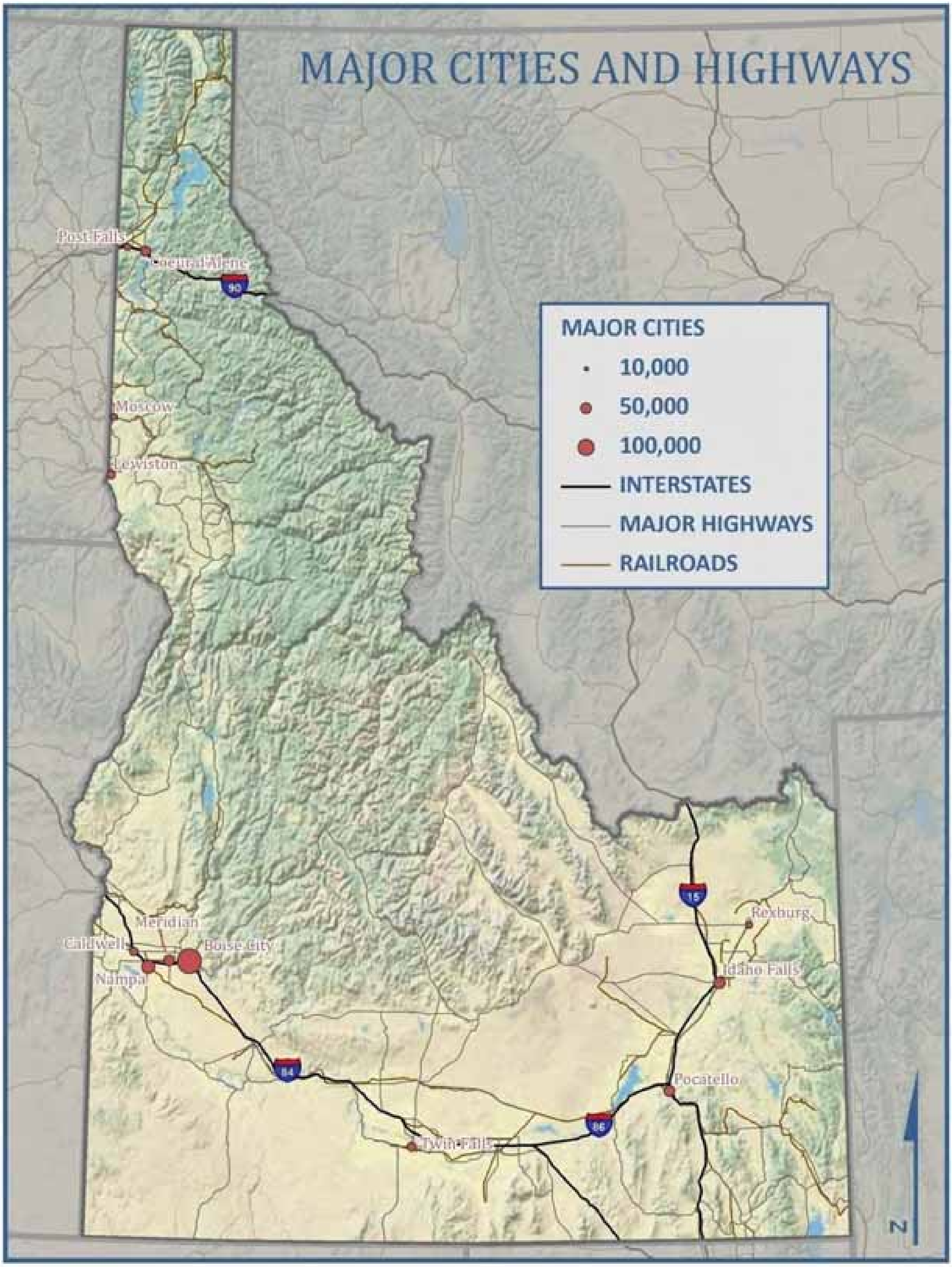
According to the Idaho Department of Labor, the State is projected to continue to grow. From 2000 to 2009, Idaho consistently ranked fifth among the fastest-growing States, with its population increasing by 20 percent or over 251,000 people. Idaho's labor force grew 14.9 percent from 1999 to 2009, despite a decline from 2008 to 2009. Despite a national recession, the average 2009 wage was up 0.6 percent from 2008 wages at $34,081. Housing has also increased from 527,824 units in 2000 to 647,502 units in 2009 (Census).



Map 2-4: Idaho Land Ownership / Source: Idaho Department of Lands



Map 2-5: Idaho Land Cover



Map 2-6: Major Roadways and Cities

CRITICAL INFRASTRUCTURE

Although advancement in the quality and availability of Geographic Information System (GIS) data has been positive in recent years, data limitations remain. For example, Idaho still lacks a database that tracks critical facilities, types, and associated replacement values. By definition, a critical facility is one that is deemed vital to an area's ability to provide essential services while protecting life and property. A critical facility may be a system or an asset, either physical or virtual. Examples of critical facilities are hospitals, police stations, fire stations, paramedic stations, and roadways. The BHS has included, as a mitigation action in the 2010 Plan update, a geospatial database to house, store, and collect data on critical infrastructure and State facilities. Appendix F of this Plan provides details regarding the HAZUS CDMS-compliant geodatabase being designed as part of this update. This database will allow facility and infrastructure data to be collected in a GIS platform; this data can then be analyzed to assist with vulnerability and loss estimations. Table 2-4 below summarizes the impacts that hazards can have on critical infrastructure and State facilities.

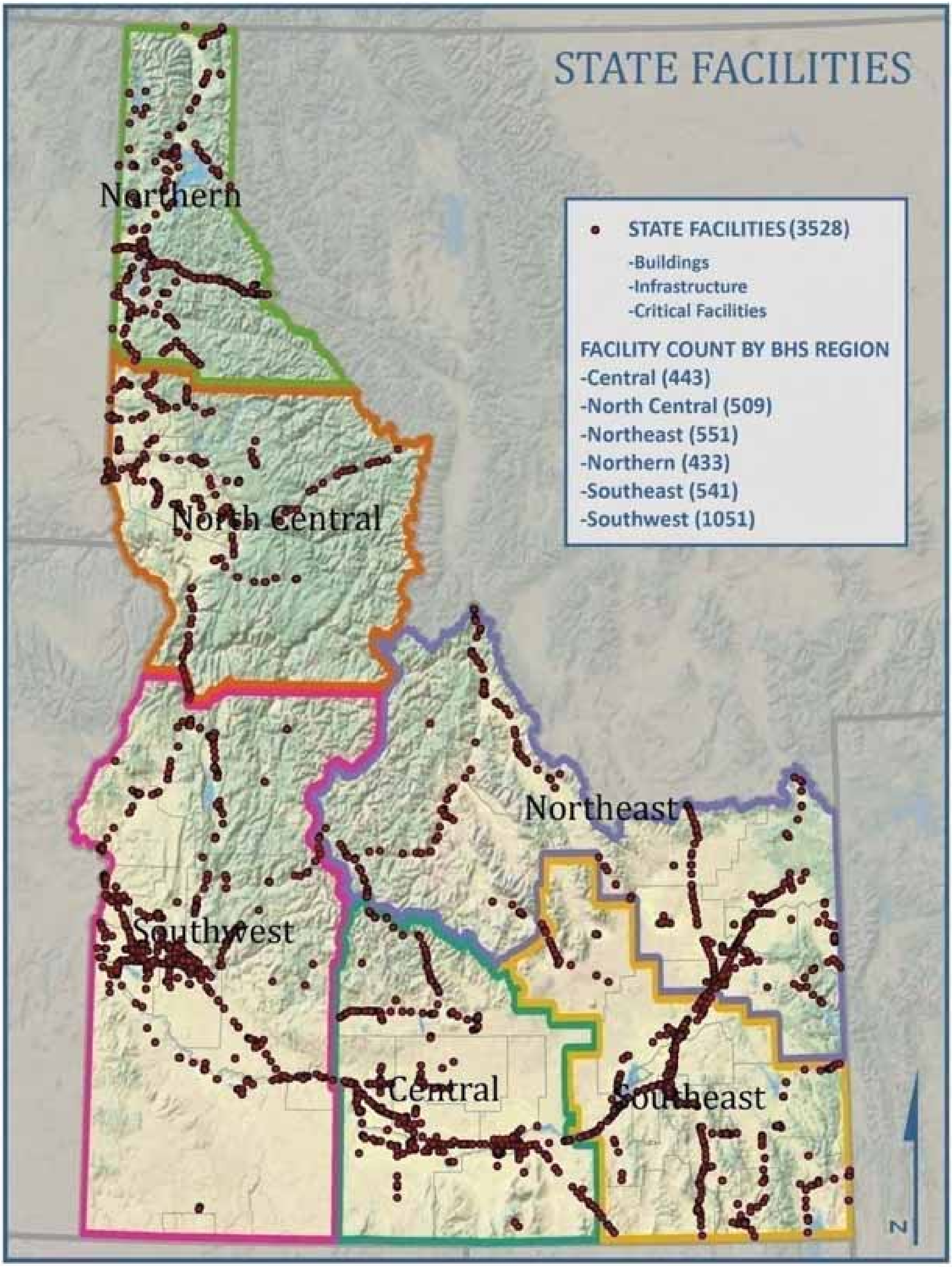
Table 2-4: Summary of Potential Impacts from Hazards on Critical Infrastructure and State Facilities

Hazards	Critical Infrastructure (Potential Impacts)	State Facilities
Wildfire	With the roll-up of the county plans, certain structures have been identified to be at risk. Whether they are critical facilities has yet to been determined. The GIS data provided was only location based. With the creation of a geodatabase, it is anticipated that more information on critical infrastructure will be provided in the next Plan update.	743 of the State's facilities are located in the top fifth of the State's communities with the highest wildfire risk (see Map 3-7 in Chapter 3).
Severe Storms	All infrastructure and State facilities can be at risk, in that they could be exposed to a severe storm.	
Flood	HAZUS-MH MR4 analysis has been conducted. It is anticipated that 64 essential facilities would experience damage in a 1-percent-annual-chance event. More information can be found in Table 3-5 in Chapter 3.	71 State facilities are located in the 1-percent-annual-chance floodplain (see Map 3-2 in Chapter 3).
Hazardous Materials	Major highways and railways would be affected.	
Wind / Tornado	No critical infrastructure or State facility is completely free of the threat of wind or tornadoes. Anticipated damages would include loss of power and productivity. Transportation routes may be disrupted from trees falling. Some facilities could experience roof/structure failure.	
Landslide	Major highways and railways would be affected.	

Table 2-4: Summary of Potential Impacts from Hazards on Critical Infrastructure and State Facilities		
Hazards	**Critical Infrastructure (Potential Impacts)**	**State Facilities**
Earthquake	A HAZUS analysis was conducted. Based on scenario magnitudes, HAZUS predicts damage to 1,135-1,177 essential facilities. More information can be found in Table 3-11 in Chapter 3.	HAZUS predicts government building damage but did not differentiate between local, State, and Federal governments.
Dam / Levee Failure	TBD	329 facilities are located in inundation areas (see the Dam/Levee Failure section in Chapter 3).
Drought	Some infrastructure and facilities could be affected by water shortages and have increased risk to wildfires.	
Avalanche	Major Highways and railways would be affected.	
Lightning	All infrastructure and State facilities can be at risk.	
Volcanic Eruption	Critical facilities located near Island Park are at greater risk. All infrastructure and facilities could be exposed to ashfall from a major eruption.	

STATE FACILITIES

The data provided for State facilities was only location based. Like the critical infrastructure data, State facility data needs to be collected, attributed, and stored in a geodatabase. The BHS has included this database as a mitigation action in the 2010 Plan Update (See Appendix F). This database will allow facility and infrastructure data to be collected in a GIS platform, so that it can be analyzed to assist with vulnerability and loss estimations. Map 2-7 shows the locations of State facilities throughout Idaho.



Map 2-7: State Facilities Location Map

CHAPTER 3: HAZARDS IN IDAHO

OVERVIEW AND PRIORITIZATION OF HAZARDS

Update Summary

The 2010 update builds on the 2007 SHMP's risk assessment. Specifically, the 2010 update includes:

- More extensive profiling of all hazards including the use of standardized subsections and updating of previous events/data through 2010
- Analysis and roll-up risk assessment information (damage/loss information, hazard prioritization) from 47 local mitigation plans (44 counties, three tribes)
- Inclusion of HAZUS-MH4 analysis of floods and earthquakes including:
  - HAZUS MH-4 flood runs and all standard reports for the 10-, 4-, 1-, and 0.2-percent events (corresponding to the 10-, 25-, 100-, and 500-year recurrence intervals, respectively)
  - scenario modeling of hypothetical events – two for floods and three for earthquakes
- Detailed consequence analysis of hypothetical events for the three hazards that have the most impact on Idaho: floods, earthquakes, and wildfires
- Development of a CDMS-compatible database shell for State facilities to be used in subsequent updates and preliminary risk assessment of State facilities/infrastructure for flood, earthquake, and wildfire (some preliminary data shown in SHMP, other data created as a dataset for future update and use)
- Addition of hazard extent and magnitude information for reference and use during local hazard mitigation plan writing and updates

Overview

The State of Idaho is prone to many natural and manmade hazards. Idaho has experienced thousands of hazard events, resulting in millions of dollars in losses and casualties, and 30 major Federal disaster and emergency declarations. Table 3-1 identifies the major Federal disaster declarations in Idaho since 1950. (The events listed in bold type have occurred since the 2007 SHMP Update.)

Table 3-1: Major Federal Disaster and Emergency Declarations

Date	Disaster Types	Disaster No.	Notes	Counties Affected
8/26/2010	**Hurd Fire**	**2853**	**Fire Management Assistance Declaration**	**Valley**
7/27/2010	**Severe Storms / Flooding**	**1927**	**Active event**	**Adams, Gem, Idaho, Lewis, Payette, Valley, Washington**

Table 3-1: Major Federal Disaster and Emergency Declarations

Date	Disaster Types	Disaster No.	Notes	Counties Affected
7/31/2008	**Flooding**	**1781**		**Kootenai, Shoshone**
8/30/2007	**Cascade Fire Complex**	**2726**	**Fire Management Assistance Declaration**	**Valley**
8/30/2007	**East Zone Fire Complex**	**2725**	**Fire Management Assistance Declaration**	**Valley**
8/29/2007	**Castle Rock Fire**	**2724**	**Fire Management Assistance Declaration**	**Blaine**
2/27/2006	Severe Storms / Flooding	1630		Owyhee
9/13/2005	Hurricane Katrina Evacuation	3244	Emergency Declaration	All 44 counties
7/6/2005	Heavy Rains / Flooding	1592		Nez Perce
9/1/2000	Wildfires	1341		Ada, Bannock, Bingham, Blaine, Clearwater, Custer, Elmore, Idaho, Jerome, Lemhi, Lewis, Lincoln, Power, Valley
6/13/1997	Flooding	1177		Benewah, Bingham, Bonner, Bonneville, Boundary, Butte, Custer, Fremont, Jefferson, Kootenai, Madison, Shoshone
1/4/1997	Severe Storms/Flooding	1154		Adams, Benewah, Boise, Bonner, Boundary, Clearwater, Elmore, Gem, Idaho, Kootenai, Latah, Nez Perce, Owyhee, Payette, Shoshone, Valley, Washington

Table 3-1: Major Federal Disaster and Emergency Declarations				
Date	**Disaster Types**	**Disaster No.**	**Notes**	**Counties Affected**
2/11/1996	Storms/Flooding	1102		Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, Payette, Shoshone
2/16/1984	Flooding (Ice Jams)	697		
1/18/1983	Earthquake	694		
5/22/1980	Volcanic Eruption (Mt. St. Helens)	624		
8/8/1979	20-Mile Fire	2038		
8/20/1977	Wilson Creek Fire	2029		
5/5/1977	Drought	3040	Emergency Declaration	
6/6/1976	Dam Collapse (Teton Dam)	505		
1/25/1974	Severe Storms/Flooding (Snowmelt)	415		
3/2/1972	Severe Storms/Flooding	324		
8/30/1967	Forest Fires	231		
12/31/1964	Heavy Rains/Flooding	186		
2/14/1963	Flooding	143		
2/14/1962	Flooding	120		
6/26/1961	Flooding	116		
7/22/1960	Wildfires	105		

Table 3-1: Major Federal Disaster and Emergency Declarations				
Date	**Disaster Types**	**Disaster No.**	**Notes**	**Counties Affected**
5/27/1957	Flooding	76		
4/21/1956	Flooding	55		

Source: FEMA website (August 2010) *http://www.fema.gov/news/disasters_state.fema?id=16*

Based on the data in Table 3-1, floods were a component of 16 disasters (53 percent); wildfires were a component of nine disasters (30 percent); severe storms were a component of eight disasters (27 percent); and drought, earthquake, volcano, dam collapse, and evacuation were a component of one disaster (3 percent). Since the 2007 update, there have been six disaster declarations: four for wildfires and two for floods (including severe storms).

Idaho's disaster declaration data is consistent with the FEMA Region in which Idaho is located. In FEMA Region X, the top four hazards in terms of the source of disaster declarations are floods, severe storms, fires, and earthquakes.

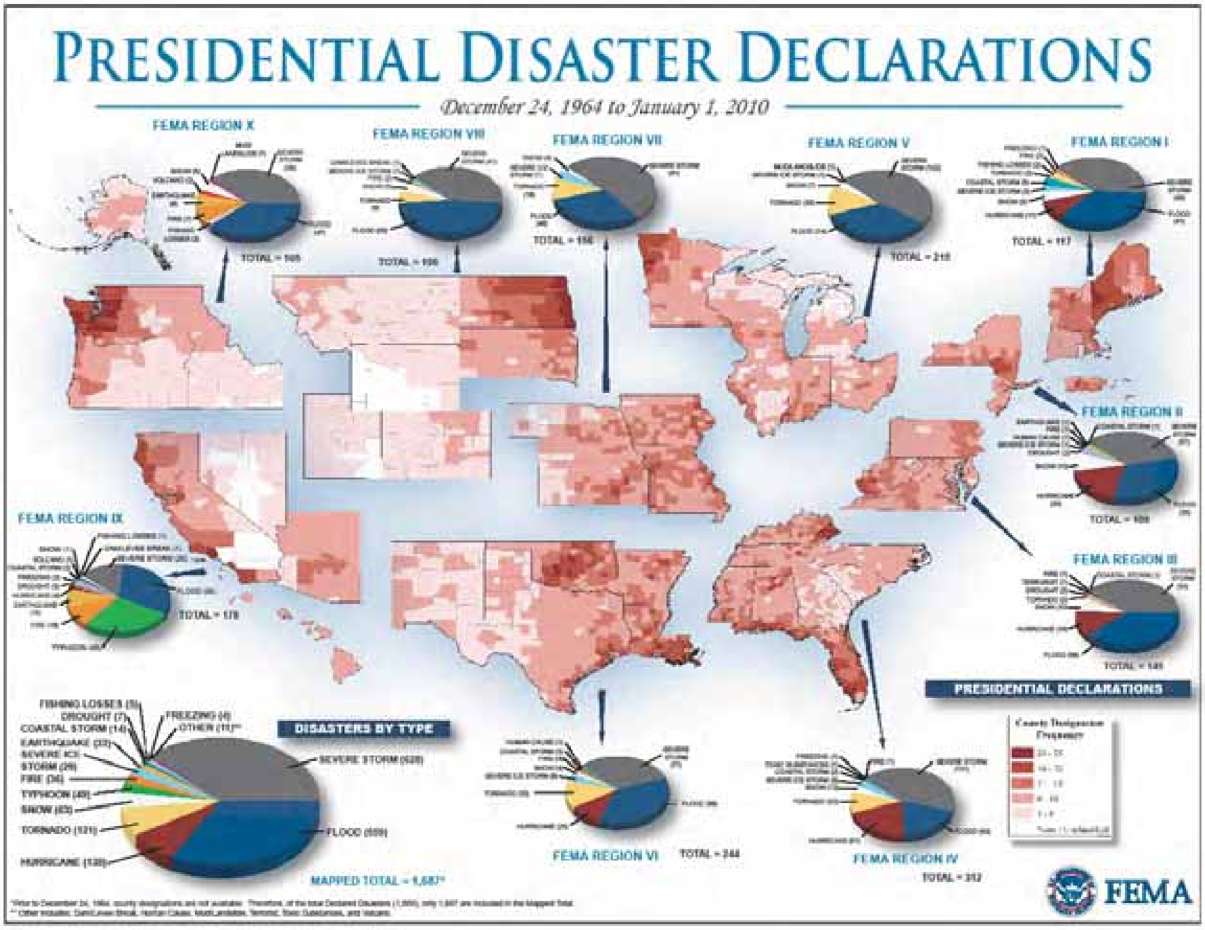


Figure 3-1: National Map of Presidential Disaster Declarations

Figure 3-1 (above) also shows that from a geographic distribution perspective, disaster declarations tend to occur more frequently in northern Idaho versus the rest of the State. Table 3-2 (below) shows the three most significant hazards for each of the 47 local hazard mitigation plans that were reviewed:

Table 3-2: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Hazards as Major

Hazard	Number Ranked as Major
Wildfire	41
Severe Summer / Winter Storm	35
Flood	26
Hazardous Materials	15
Wind / Tornado	8

Table 3-2: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Hazards as Major	
Landslide	6
Earthquake	5
Dam / Levee / Canal Failure	3
Drought	1
Avalanche	0
Lightning	0
Volcano	0

The 2010 SHMP profiles 12 hazards, including floods, earthquakes, wildfires, landslides, dam/levee/canal failure, avalanches, drought, lightning, severe storms, winds/tornadoes, volcanic eruptions, and hazardous materials. From a statewide perspective, the three most significant are:

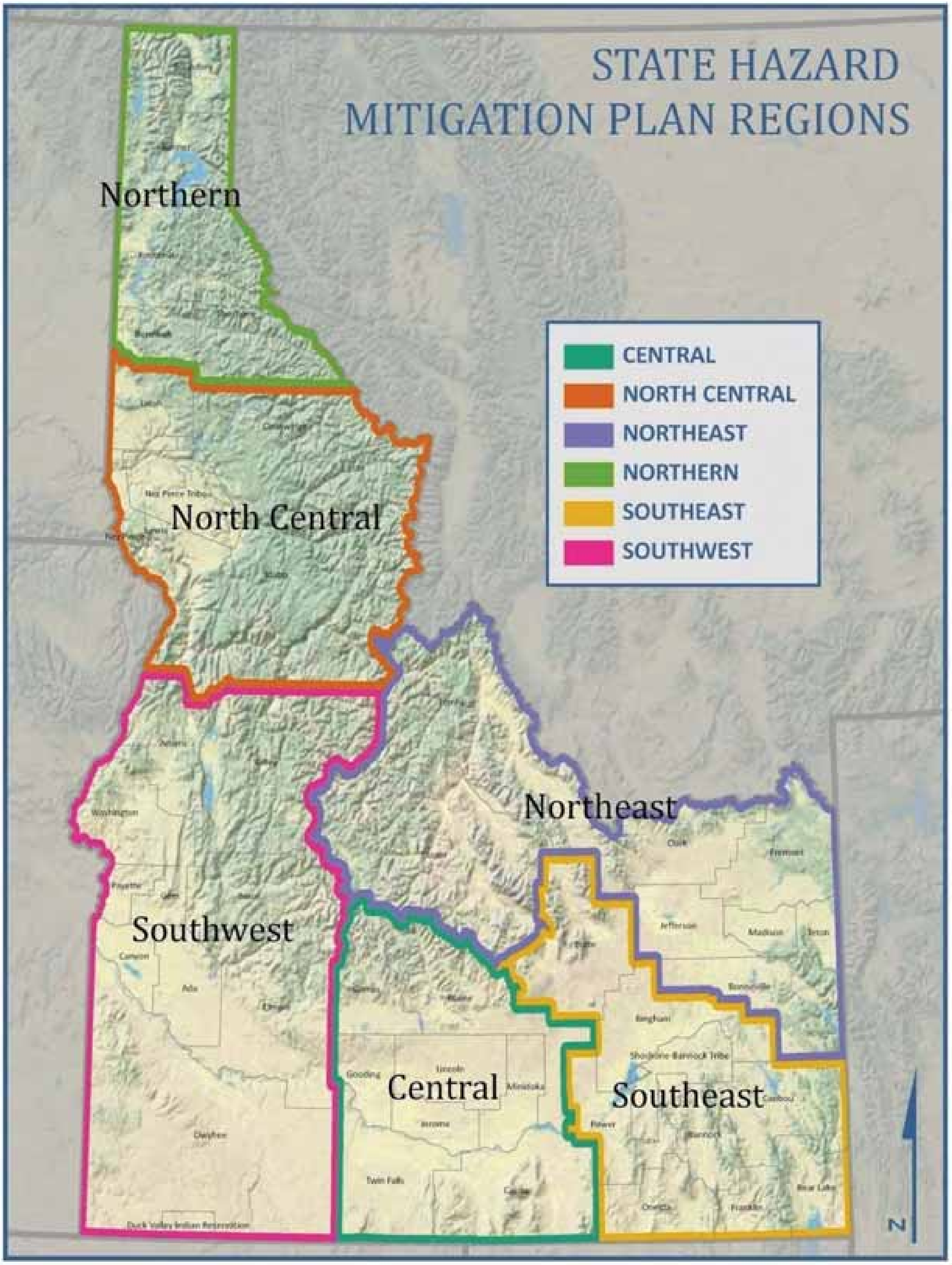
- Floods
- Earthquakes
- Wildfires

These hazards were similarly identified in the 2007 plan; however, the 2010 plan reaffirms this conclusion based on the type of recent major disaster declarations, an assessment of the types of historical disaster declarations, and the hazards identified as significant in local plans. As a result, the vulnerability analysis in the 2010 SHMP has additional risk assessment and vulnerability information for these three hazards. While the data indicate that severe storms occur frequently and are an element of many disaster declarations, they are not being considered as a significant hazard because of their impact in terms of consequences – severe storms are almost always associated with another type of hazard that is the real culprit in terms of impacts (i.e., flooding, tornadoes, or lightning). On the other hand, earthquakes have occurred relatively infrequently in the past (one declaration). Due to the widespread areas where earthquakes could occur and the potential impacts, however, earthquakes are being considered as significant. Based on the number of local plans identifying winds/tornadoes and landslides as significant, those hazards were considered as possible significant State hazards. However, due to the relatively low impact (statewide) of a wind event (see additional information on the tornado hazard profiled in this chapter), and the localized and relatively low impact of landslides, these were not considered as a significant statewide hazard. Hazardous materials were also identified in a number of local plans, but this hazard was not considered as a significant statewide hazard because it is man-made.

Chapter 3 covers six separate requirements of the Code of Federal Regulations (CFR) in 44 CFR 201.4: identifying hazards, profiling hazard events, assessing vulnerability by jurisdiction, estimating potential losses by jurisdiction, assessing the vulnerability of State facilities, and estimating potential losses of State facilities. These requirements are integrated into each profiled hazard. When this Plan was updated, the inventory of State facilities was still incomplete. As part of the 2010 update, a database structure was developed that contains key fields compatible with the HAZUS CDMS database, so that appropriate information can be collected for each facility. In the meantime, the existing dataset was used to assist in describing impacts to State facilities (buildings and infrastructure).

One large component of the 2010 plan update involved the analysis of all 47 local (county and tribal) mitigation plans currently approved by FEMA. To enable an accurate and timely analysis of all these plans, a database was designed to store specific plan details, information, and data sets. Once this master “roll up” database was created, all plans were reviewed and the relevant information was entered. Examples of the roll-up data include each local plan's: three major hazards, counts and types of mitigation actions, loss estimates for hazard events, and vulnerability assessments. These data allowed for a comparative analysis of all local plans and enabled further analysis and data extraction for incorporation into various sections of the 2010 State plan. Table 3-2, above, is one example of how the roll-up data were used.

Some of the data in Chapter 3 is summarized by the State Bureau of Homeland Security (BHS) region. There are six BHS regions in Idaho, as shown in Map 3-1. By summarizing data in this way, State mitigation actions or strategies can be developed and applied regionally. Similarly this will allow BHS field coordinators to better assist regions with their specific needs.



Map 3-1: Idaho State Hazard Mitigation Regions

RISK ASSESSMENT: FLOOD

Description

Flooding is defined as the accumulation of water within a water body and the overflow of excess water onto adjacent floodplain lands. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding.

The National Oceanic and Atmospheric Administration (NOAA) defines the flood stage for river forecast points in the State of Idaho. Flood stage is the river height or flow which poses a definite hazard to life or property near a river. Roads, infrastructure, and property near a river will be inundated when the river exceeds the flood stage. The flood stage defined by the NWS is different than the regulatory flood, because flood impacts generally begin to occur at much lower stages than those representing a 100-year flood event.

Flooding has produced the worst disasters in Idaho, and significant events have occurred regularly throughout the history of the State. Flooding occurs frequently and is seen on a very regular basis in most communities. Some common types of flooding experienced in Idaho are riverine flooding, flash floods, alluvial fan flooding, and ice/debris jam flooding.

Source: BHS

There is often no sharp distinction between riverine floods, flash floods, alluvial fan floods, ice-jam floods, and dam-break floods that occur due to structural failures or the overtopping of embankments during flood events. Nevertheless, these types of floods are widely recognized and helpful in considering not only the range of flood risk but also appropriate responses.

Riverine Flooding. Overbank flooding of rivers and streams is the most common type of flood event. Riverine floodplains range from narrow, confined channels in the steep valleys of hilly and mountainous areas, and wide, flat areas in the Plains States and low-lying coastal regions. The volume of water in the floodplain is a function of the size of the contributing watershed, topographic characteristics such as watershed shape and slope, and climatic and land-use characteristics. In steep, narrow valleys, flooding usually occurs quickly, is of short duration, and floodwaters are likely to be rapid and deep. In relatively flat floodplains, areas may remain inundated for days or even weeks, but floodwaters are typically slow moving and relatively shallow and may accumulate over long periods of time.

The flooding of large rivers usually results from large-scale weather systems that generate prolonged rainfall over wide areas. These same weather systems may cause flooding in hundreds of smaller basins that drain to major rivers. Small rivers and streams are susceptible to flooding from more localized weather systems that cause intense rainfall over small areas. In some parts of the Northern and Western States, annual spring floods result from snowmelt, often caused by a rain-on-snow event, and the extent of flooding depends on the depth of winter snowpack and spring weather patterns.

The Idaho rivers identified as presenting the most significant flood risks are the Boise, Owyhee, Payette, Snake, Saint Joe, Saint Maries, and Weiser Rivers.

Flash floods are characterized by a rapid rise in water level, high velocity, and large amounts of debris. They are capable of tearing out trees, undermining buildings and bridges, and scouring new channels. Major factors in flash flooding are the intensity and duration of rainfall and the steepness of watershed and stream gradients. The amount of watershed vegetation, the natural and artificial flood storage areas, and the configuration of the stream bed and floodplain are also important. Flash floods may result from the failure of a dam, rapid snowmelt, loss of vegetation due to wildfire, or the sudden breakup of an ice jam. Any of these can cause the release of a large volume of water in a short period of time. Flash flooding in urban areas is an increasingly serious problem due to the removal of vegetation, paving and the replacement of ground cover with impermeable surfaces that increase runoff, and the construction of drainage systems that increase the speed of runoff.

Alluvial Fan Floods. Alluvial fans are deposits of rock and soil that have eroded from mountainsides and accumulated on valley floors in a fan-shaped pattern. The deposits are narrow and steep at the head of the fan, broadening as they spread out onto the valley floor. As rain runs off steep valley walls, it gains velocity, carrying large boulders and other debris. When the debris fills channels on the fan, floodwaters spill out and cut new channels. The process is then repeated, resulting in shifting channels and combined erosion and flooding problems over a large area. Alluvial fan flooding is most prevalent in the arid Western States.

Alluvial fan floods can cause greater damage than typical riverine flooding because of the high velocity of flow, the amount of debris carried, and the broad area affected. Floodwaters typically move at velocities of 15 to 30 feet per second (ft/s) – 5 to 10 meters per second – due to steep slopes and lack of vegetation. Human activities often exacerbate flooding and erosion problems on alluvial fans. Roads act as drainage channels, carrying high-velocity flows to lower portions of the fan, while fill, leveling, grading, and structures can alter flow patterns.

AFSPM CALLS FOR GREATER EMPHASIS REGARDING ALLUVIAL FAN FLOODPLAIN GUIDELINES

The Association of State Floodplain Managers has recognized the need for greater emphasis regarding the delineation and hazard risk of alluvial fans nationwide. In a white paper published February 8, 2011, the AFSPM Arid Regions Committee outlined recent successes and developments in Arizona and California regarding their respective efforts towards planning, risk assessment and analysis. Further, the Association specifically called upon its members "to encourage FEMA to update it alluvial fan floodplain delineation procedures." The need for this update is based upon 1. it's been 14 years since the last National Research Council study regarding alluvial fans, 2. shortfalls in current methodologies are unable to provide adequate engineering data needed for structure designs, and 3. there are new engineering tools not previously available for alluvial fan study including two-dimensional modeling, new geological dating techniques and new debris flow prediction and modeling tools. Such improvements will allow NFIP members to better manage the flood hazard and FEMA and NFIP members to better analyze sedimentation, erosion and debris flow hazards. The discussion paper includes 12 recommendations for changes in methodologies, delineations, training, investigation, data collection and alluvial fan floodplain management. The full document can be found at: http://www.floods.org/ace-files/documentlibrary/committees/Arid/ASFPM_Arid_West_Alluvial_Fans_02-11.pdf

The alluvial fan flood hazard is well established in Idaho as a Multihazard risk, both flood and seismic. As such, it is appropriate for the Plan to recognize this hazard and to plan for the mitigation of this hazard.

Ice Jam Floods. Flooding caused by ice jams is similar to flash flooding. Ice jam formation causes a rapid rise of water at the jam and extending upstream. Failure or release of the jam causes sudden flooding downstream. The formation of ice jams depends on the weather and physical conditions in river channels. Ice jams are most likely to occur where the channel slope naturally decreases, where culverts freeze solid, at headwaters of reservoirs, at natural channel constrictions such as bends and bridges, and along shallows where channels may freeze solid.

Ice jam floods can occur during fall freeze-up from the formation of frazil ice, during midwinter periods when stream channels freeze solid to form anchor ice, and during spring break-up when rising water levels from snowmelt or rainfall break the existing ice cover into large floating masses that lodge at bridges and other constrictions. Damage from ice jam flooding usually exceeds that caused by open water flooding. Flood elevations are usually higher than predicted for free-flow conditions, and water levels may change rapidly. Additional physical damage is caused by the force of ice striking buildings and other structures.

Location, Extent, and Magnitude

The land along a river that is identified as being susceptible to flooding is called the floodplain. The Federal standard for floodplain management under the National Flood Insurance Program (NFIP) is the "base floodplain" (also known as the 100-year or 1-percent-annual-chance floodplain). This area is determined using historical data indicating that in any given year there is a 1-percent chance of the base flood occurring.

A base flood is one that covers or exceeds the determined floodplain. In Idaho, flooding most commonly occurs in the spring of the year and is caused by snowmelt. Floods occur in Idaho every one to two years and are considered the most serious and costly natural hazard affecting the State. From 1976 to 2010, there were nine Federal and 26 State disaster declarations due to flooding. The amount of damage caused by a flood is influenced by the speed and volume of the water flow, the length of time the impacted area is inundated, the amount of sediment and debris carried and deposited, and the amount of erosion that takes place.

Floods vary greatly in frequency and magnitude. Small flood events occur much more frequently than large, devastating events. Statistical analyses of past flood events can be used to establish the likely magnitude and recurrence intervals (period between similar events) of future events. As discussed above, the most commonly reported flood magnitude measure is the “base flood.” In any given year, there is a 1-percent, or 1 in 100, probability that water levels will exceed this magnitude. Although unlikely, base floods can occur in any year, even successive ones. This magnitude is also referred to as the “100-year flood” or “regulatory flood” by the State government. Map 3-2, at the end of this section, shows the location of all FEMA-defined 1-percent-annual-chance flood areas for which information exists in digital format.

The floodplain is the area that normally carries water adjacent to the channel. Like “disaster,” this term has two meanings, practical and regulatory. In practical terms, a floodplain is the area inundated by floodwaters and obviously changes based on the magnitude of the flood. Where the surface of the land is relatively undisturbed, floodprone areas can be recognized by a well-defined natural, flat “floodplain”, by natural levees along stream banks, by alluvial fans, abandoned channel meanders, or by soil types that are associated with floodplains. In altered or urbanized areas, these features will be less distinct; they may be obscured or removed by development. Further, where structures have been placed in the floodplain, the processes may have been so altered that these features no longer accurately define the floodplain.

In regulatory terms, a floodplain is an area where specific regulations and programs (such as the NFIP) apply. Idaho Code defines the floodplain as “…land that has been or may be covered by floodwaters, or is surrounded by floodwater and inaccessible, during the occurrence of the regulatory flood.”

The floodway, a subdivision of the floodplain, is of special regulatory interest. More stringent regulations are often imposed in the floodway, because changes here can have a greater impact on the overall flood regime than those in the remainder of the floodplain (the “flood fringe”). The floodway is defined as “the channel of the river or stream and those portions of the floodplain adjoining the channel required to discharge and store the floodwater or flood flows associated with the regulatory flood.”

Application of these terms and concepts to flash and ice/debris jam break floods can be difficult. The term “inundation zone” may be used in place of floodplain and should be considered analogous. Like floodplains, inundation zones may be determined by projecting the anticipated volume of water (e.g., runoff from the "base" storm, the storage capacity of the dam that may fail, or excess runoff not conducted by a stormwater system). Historical inundation zones may be observed through field study of terrain features and vegetation, but, although they may be associated with recognizable terrain features such as canyons or gulches, areas subject to these floods are often less obvious than those located on a typical riverine floodplain.

The major rivers and basins in Idaho are profiled below and can be located on Map 2-1 in Chapter 2.

Snake River: Only a relatively small portion of the Snake River is susceptible to flooding; however, many of the floodprone areas are intensively populated. Flooding can cause extensive damage to land and buildings, highways, railroads, irrigation facilities, and utilities. Snake River floods generally occur in April through June, primarily from snow melt in the upper watersheds. Late spring or summer snow-melt floods typically occur as a series of high flows for periods of days or weeks. They can be compounded by warm spring rains that increase snow-melt rates and contribute directly to runoff. Flood damage along the Snake River, for the most part, is confined to the floodplain between Heise and American Falls Reservoir. The safe channel capacity of the Snake River in this reach varies from 15,000 cubic feet per second (cfs) to 30,000 cfs.

Regulation of the Snake River and some tributaries can significantly reduce natural flood flows through dams constructed for flood control and other purposes. Reservoirs that function for other purposes can reduce flood flows through informal flood control operation or incidental storage of floodwaters. Major dams in this region include Jackson Lake, Palisades, Island Park, and the Ririe Dam located on Willow Creek, a major tributary.

Levees provide some flood protection in the floodprone land between Heise and Roberts, near Shelley, and near Blackfoot. However, the streambed materials, low banks, and gradient induce the river to meander. Major channel shifts could unpredictably impinge upon the levees.

American Falls affords major regulation of Snake River flood flows, although little flood damage is likely along the Snake River from the dam downstream to Milner. This stretch of the river consists of a series of irrigation diversion pools and canyon reaches. Between Milner Dam and King Hill, the Snake River flows through a deep, narrow canyon cut in the Snake River Plain.

Mud Lake: Camas and Beaver Creeks are sources of surface inflow to Mud Lake, which has no effective outlet other than irrigation canals, evaporation, and seepage. Lands along Camas Creek near the lake and along the south side of the lake are susceptible to flooding. If the volume of inflow exceeds the available storage capacity of the lake, locally constructed dikes around the lake might fail and permit the flooding of farm areas south of the lake. The Mud Lake floodplain is principally used to produce crops. Portions of residential and associated developments in the communities of Terreton and Mud Lake, on the fringe of the floodplain, may suffer minor damages under extreme flood conditions.

Portneuf River: Flooding can occur in reaches along the entire length of the Portneuf River, downstream from Portneuf Reservoir and along Marsh Creek. The Pocatello area is protected by a rectangular concrete channel through the city with riveted levees on both ends, where development is less extensive. A 1988 U.S. Army Corps of Engineers (USACE) preliminary report on the Portneuf River examined constructing multiple-purpose storage reservoirs and enlarging the river channel. The study found that these proposals were not economically justified.

Wood River: Flood damage in the Wood River basin is most likely in a reach extending from Ketchum to Bellevue, near Gooding, and at Carey and Shoshone. The agricultural lands subject to flooding in the Big and Little Wood valleys are used primarily for pasture, hay, and grains. This area, however, is experiencing significant population growth, with an accompanying increase in flooding risk from Ketchum to Carrey.

Boise River: In the Lower Boise River Basin, the magnitude of flood flows has been partly diminished by irrigation diversions and storage reservoirs. The upstream reservoirs only protect against minor flood events. Boise, Garden City, Eagle, Star, Middleton, and agricultural lands downstream of Boise are still subject to periodic flooding in periods of high runoff. Ada and Canyon Counties are currently seeing increased development along rivers and streams, which greatly increases the flood hazard exposure.

Weiser River: Major flooding of the Weiser River is also possible. The fairgrounds at the Town of Cambridge and a portion of the area south of town are located in the river's floodplain. The agricultural enterprises in the lower 13 river miles of the Weiser River, from the Galloway Diversion to the mouth of the river, near the City of Weiser, are susceptible to flooding. Incidental storage in the Crane Creek and Lost Valley reservoirs can reduce peak flows by an estimated 3,600 cfs.

Payette River: The Payette River runs through several counties in central Idaho and has adversely affected not only those counties, but also the cities adjacent to the river, including Emmett and Payette. Most recently, the river flooded near Payette, causing several thousand dollars of damage.

Clearwater River: Flood flows in the Clearwater Basin can be expected to damage residential and commercial buildings in the cities of Orofino, Stites, and Kooskia on the main stem of the Clearwater. Towns on tributary streams are also subject to damages. Highway and railroad bridges and roadbeds can be undercut and washed out. Lumber operations are also at risk.

Flood control is an important function of the Dworshak project on the North Fork Clearwater. The reservoir is managed to alleviate flooding below Ahsahka and is a part of the regional flood control system of the Columbia River Basin. Dworshak regulation is considered essential in limiting floodwaters to 150,000 cfs or less through Lewiston.

Bear River: Spring snow-melt flooding in the Bear River Basin can exceed stream channel capacity and overflow onto adjacent low lands. More serious damage may be expected when heavy rain falls on frozen ground and/or a heavy snow pack. Thunderstorms are common during the summer and fall months, and these may produce localized cloudburst flooding. The total volume of water produced by this type of storm is relatively small, but the instantaneous runoff rate is high.

PacifiCorp's regulation of flows at Bear Lake has reduced the impact of flooding virtually every year on the main stem of the Bear River below Bear Lake. Bear Lake is operated to provide an annual pre-runoff storage volume equal to twice the average annual runoff. The USACE (1991) estimated the average annual damages from flooding and analyzed structural control measures in the basin. Most of the damage from floods can be expected to occur on agricultural land and property.

Panhandle Watersheds: Floodprone lands constitute a significant portion of the Panhandle basins. The Spokane, Kootenai, and Pend Oreille Basins have a long history of major flood events. However, the greatest potential damage is usually not along major rivers, but along tributary streams. Minor tributaries have steep gradients, and damages are generally the result of flash floods. Placer Creek, a tributary of the South Fork Coeur d'Alene River, places the town of Wallace at risk (flooding has occurred seven times in the last century).

1948 Flood Sandpoint, ID: Source: Ross Hall - www.ccrh.org

In the Spokane River Basin, flooding is expected mainly along the low-lying lands adjacent to tributary streams above Coeur d'Alene Lake in the Coeur d'Alene and St. Joe River valleys. Past property damage around Coeur d'Alene Lake has been relatively minor, but large areas may be inundated.

The Spokane River Basin above Coeur d'Alene Lake is unregulated by storage structures and is naturally draining. About 55 miles of levees along the lower Coeur d'Alene River, the St. Joe River, Pine Creek, and other minor tributaries protect over 4,000 acres of land adjacent to rivers and streams from flood events. However, levees in the vicinity of St. Maries have failed and may do so again. A levee at Coeur d'Alene protects the city against high lake levels.

A melting snow pack is the most likely source for major flooding on the Kootenai River. Libby Dam regulation can control all but about 1 percent of floods originating from the Kootenai River. A base flood can be controlled by the dam to a 27-foot stage at Bonners Ferry. Levees have been constructed at many locations on both major and minor streams in the basin. Over 95 miles of levees protect 32,000 acres along 51 river miles in the Idaho portion of the basin. Levees protecting Kootenai Flats are effective up to a river stage of 35 feet at Bonners Ferry.

Flooding in the Pend Oreille Basin may occur along the river lowlands and tributaries. Damages would likely be confined largely to grain crops and pasture land, although some low-lying roads and buildings may be affected around Lake Pend Oreille. Calispell Creek, a tributary of the Pend Oreille, can produce major flooding events. Likewise, the St. Joe River in Benewah County, the Morie River in Boundary County, and the Priest River in Bonner County are susceptible to spring flooding.

Coeur d'Alene River: The Coeur d'Alene River is prone to flooding in any season. Situated in a narrow valley, this region is receiving considerable pressure from development, sportsmen, and recreational users. Moreover, tens of millions of dollars have been spent in several remediation areas to remove topsoil contaminated by heavy metals from previous mining operations. There remains a good deal local concern regarding both the protection of these remedial actions and development in the floodplain. Portions of the Coeur d'Alene River are affected by Coeur d'Alene Lake when it is at or near the action or flood stage.

Past Occurrence

Disasters in Idaho, as determined by the U.S. Geological Survey and the Federal Emergency Management Agency, are listed in Tables 3-3 and 3-4 below. Table 3-3 lists the major riverine flood events and declared Flood Disasters, while Table 3-4 lists all State Disaster Declarations that involved flooding. Map 3-3, at the end of this section, shows the location of past major flood occurrences, summarized by county. Additional details regarding the declarations are provided below.

Table 3-3: Major Riverine Flood Events and/or Flood Disaster Declarations

YEAR	Area Affected / Type of Event
1894	State
1927	Upper Snake River Basin
1933	Spokane River Basin
1943	Boise and Payette Basins
1948	Northern and Western Idaho
1955	Southwest Idaho
1956	Floods
1957	Flooding
1959	Boise River Basin
1962	Southern and Eastern Idaho
1963	Portneuf and Clearwater Basins
1964	Statewide at Low Elevations
1972	Severe Storms, Extensive Flooding
1974	Northern and Central Idaho
1976	Teton Dam Failure
1984	Ice Jams and Flooding
1996	Storms and Flooding
1997	Severe Storms and Flooding
1997	Spring Flooding
2006	Severe Storms and Flooding Owyhee County
2008	Northern Flooding

Table 3-3: Major Riverine Flood Events and/or Flood Disaster Declarations	
2010	Northern Severe Storms and Flooding
Source: 2007 State Hazard Mitigation Plan and Federal Emergency Management Agency	

Three of the most notable events occurred in 1933, 1964, and 1974. In 1933, warm rain on low-elevation snow led to flooding in the Panhandle region and especially on the Coeur d'Alene River at Coeur d'Alene and the St. Joe River at St. Maries. Railroad tracks were covered with 6 feet of water, livestock drowned, all the families had to leave their homes, and in many cases, their houses were washed down the river. Levees were destroyed, and the entire St. Joe valley became one vast lake. (Additional flooding occurred in 1946, 1948, 1976, and 1996, despite levee construction by the USACE in 1942.)

At the end of December 1964, warm rains on snow caused the Payette, Clearwater, and Big and Little Wood Rivers to flood. The Payette River rose to record levels and flooded irrigation ditches and farmland; estimated damage was $21 million, and two deaths were reported.

Significant flooding struck the St. Joe River Valley again in January 1974. Damages were estimated at $5.5 – $4 million to public facilities (including roads and utilities) and $1.5 million to private property.

Summaries of significant flooding declarations are presented below:

Panhandle Floods – 1996: A combination of existing snow, 10 inches of new snow, and single-digit temperatures the last week of January 1996 caused ice to form on many rivers. The subsequent warming pattern during the first week of February resulted in flooding in the northern Panhandle counties beginning on February 6.

On February 11, 1996, the President declared a major disaster in the State of Idaho (designated DR-1102). Ten counties and the Nez Perce Indian Reservation were declared eligible for assistance. As of February 1, 2001, that assistance included $22,635,325 in public assistance, $71,639 in individual assistance, $301,081 from the Natural Resource Conservation Service (NRCS), and $5,022,353 in hazard mitigation grants.

In Clearwater County, 167 homes were damaged or destroyed, 40 commercial buildings were damaged, and one church was destroyed and two were damaged. In the Coeur d'Alene Basin (Kootenai and Shoshone Counties), it was reported that residents were stranded by the floodwaters and had to be contacted by boat, all-terrain vehicles, or helicopters.

St. Maries, the Benewah County seat, saw heavy damage despite an extensive levee system; over 100 homes and 19 commercial buildings were flooded. At one mill, 1 million board feet of lumber and a drying kiln were lost. Latah County damage included an estimated $1.6 million in damages to the University of Idaho.

Nez Perce County had damage near the community of Peck, where 11 homes were destroyed, six had major damage, and two had minor damage. Extensive damage was also reported on the Nez Perce Indian Reservation at Lapwai.

Districts 1 and 2 of the Idaho Transportation Department were hit hard by the disaster. In District 1, major damage occurred on U.S. Highway 97 at Carlin Bay; U.S. 2 was closed at Dover, where water covered one-quarter mile of highway. Idaho Highways 200 and 3 were also damaged. Interstate 90 was closed temporarily at Pinehurst and Cataldo. Idaho Highway 6 was closed at Harvard Hill, where approximately 2 miles of road were damaged.

In District 2, U.S. 95 had 10 miles of damage; it was closed south of Lewiston, where the road washed out in many locations. The stretch of road north of Lewiston at the Palouse Bridge was also closed. Damage occurred on U.S. 12 east, between Cottonwood Creek and Orofino; Idaho 3 was closed from east of Arrow Junction to Juliaetta, with a washout area that was 400 feet long and 12 feet deep. Areas of Idaho Highways 11 and 162 were closed due to rock and mudslides. State Highways 6, 7, 9, and 64 were also damaged, and portions were closed for a period of time.

Northern and Central Floods – 1996-97: During late December 1996, above-normal snowfall occurred in Northern and Central Idaho. This event was quickly followed by a warm, moist current of air from the subtropics that dumped warm rain on melting snow. The melting snow and heavy rains overwhelmed rivers and their tributaries, leading to severe flooding and widespread landslides mainly in the West-Central region of the State. On January 4, 1997 the President declared a Federal disaster (designated as DR-1154) in the State of Idaho due to severe winter storms, flooding, mud, and landslides related to the above-normal snowfall and spring runoff. Eighteen counties were declared eligible for Federal assistance. As of February 1, 2001, assistance included $19,404,105 in public assistance, $39,988 in individual assistance, $125,937 from the NRCS, $576,314 from the USACE, and $5,593,892 in hazard mitigation grants.

Flood damage was widespread. Railroad tracks and trestles were washed out in dozens of locations. Substantial gravel and silt deposits left by flood waters accumulated on agricultural lands; cattle were stranded and farm equipment was submerged and damaged. Pesticide containers and fuel tanks were disturbed by the sudden flooding on the Payette and Weiser Rivers.

In the City of Payette, approximately 120 homes and 30 businesses were flooded; most problems resulted from a levee break that resulted in floodwaters two to three feet above the base flood elevation. In Gem County, 14 levees were damaged, including all three levees in Emmett, which showed large cracks and sections slumped into the river.

On the Weiser River, irrigation canals carried floodwaters to portions of the floodplain that would not have normally been flooded by the river itself; some homes and businesses in Weiser were damaged or destroyed from floodwaters conveyed by these irrigation systems.

U.S. 55 was restricted for one week and U.S. 95 experienced eleven washouts that stranded residents for days. McCall was isolated, suffering severe economic hardship due to disruption of its winter recreation activities. Five fatalities occurred as citizens self-evacuated by private aircraft during extreme weather.

Northern and Southeastern Floods - 1997: In early March 1997, Northern Idaho received 12 to 18 inches of snow on top of an existing snowpack that exceeded 150 to170 percent of average. A rainstorm followed which resulted in a rapid snow melt. Precipitation for the month of March in this area was 187 percent of normal. The resulting flooding and mudslides lasted for an extended period and damaged many public facilities, including severe impacts to county road systems due to washouts. Additionally, hazardous material contaminants were identified in the Kellogg area. The President issued a Federal Disaster declaration (DR-1177) on June 13, 1997, for Benewah, Bonner, Boundary, Kootenai, and Shoshone Counties.

The Snake River Basin also received a significant amount of snowfall during the winter of 1996-97, with the snowpack exceeding 250 percent of normal in some higher elevations. By May, the substantial snowpack in the higher elevations along the continental divide started to produce above normal runoff. In order to accommodate the rapid accumulation, the Bureau of Reclamation began increasing its releases from Palisades Reservoir. By June 11, the flows coming out of the reservoir coupled with the high tributary discharges produced the highest flows on the Snake River since 1918.

At its peak, the Snake River flooded as far as a mile from its banks, and many places were inundated by five feet of water. On June 16, flood fights were conducted on the Snake River at Roberts where voluntary evacuations were in effect. River levels were close to overtopping existing flood control levees and flooding of agricultural lands began far from the main channel as irrigation canals overflowed their banks. Numerous closures of county roads and State highways from water and damage to bridges, especially in Jefferson County, had an impact on transportation as well as on response activities. On June 17, flood fighting efforts continued in several small towns, including Menan, Firth, Blackfoot, and Labelle. On June 18, Interstate 15 was closed for nearly 20 miles between Shelley and Blackfoot.

On July 7, 1997, six counties in Southeastern Idaho (Bingham, Bonneville, Custer, Fremont, Jefferson, and Madison) were added to the five northern counties already declared under DR-1177. On July 25, Butte County was also declared. As of February 1, 2001, total assistance included $11,365,667 in public assistance, $8,054 in individual assistance, $251,054 from the NRCS, and $1,691,458 in hazard mitigation grants.

The State estimated that approximately 500 people were displaced from their homes in Jefferson and Bingham Counties. Agricultural officials estimated that more than 50,000 acres of farm, pasture, and cropland had been flooded; 30,000 in Bingham County alone.

Table 3-4: Flood Related State Disaster Declarations 1976-2010			
Year	**Month**	**Federal**	**Counties Affected**
1979	January		Bingham, Washington
	February		Canyon, Washington
	February		Nez Perce
1980	March		Power, Oneida
1982	February		Bonner, Washington
	April		Blaine
1983	June		Jefferson
1984	May		Cassia
	May		Bannock, Twin Falls
	June		Jefferson
	June		Owyhee
	December		Lemhi, Butte
1985	January		Cassia
1986	January		Canyon, Payette, Washington
	February		Owyhee
	February		Boise
	June		Boise, Custer
1990	September		Elmore
1991	April		Bonner
1994	December		North Idaho
1996	February	X	Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, Shoshone
	May		Payette
	June		Boundary, Kootenai, Latah, Shoshone
1996-1997	November - January	X	Adams, Benewah, Boise, Bonner, Boundary, Clearwater, Elmore, Gem, Idaho,

Table 3-4: Flood Related State Disaster Declarations 1976-2010			
Year	**Month**	**Federal**	**Counties Affected**
			Kootenai, Latah, Nez Perce, Owyhee, Payette, Shoshone, Valley, Washington
1997	March – June	X	Benewah, Bingham, Bonner, Bonneville, Boundary, Butte, Custer, Fremont, Jefferson, Kootenai, Madison, Shoshone
2006	February-April		Camas, Lincoln, Gooding
2008	May-July	X	Kootenai, Shoshone
2010	June-July	X	Adams, Gem, Idaho, Lewis, Payette, Valley, Washington
Source: 2007 State Hazard Mitigation Plan and Federal Emergency Management Agency			

Extreme precipitation and runoff event flash floods occur throughout the State at all times of the year. Many are relatively small and do little damage; these are not well recorded. The National Weather Service did, however, record 121 flash floods during the period of 1982-2000, or an average of seven per year. A Bonner County flash flood in May 1991 received a State Disaster declaration; Federal assistance was denied.

The largest precipitation-related flash flood in recent history occurred August 20, 1959, inundating about 50 blocks in Boise and several hundred acres of farmland with water, rocks, and mud. On August 22, 1995, approximately two inches of rain fell on recently burned mountainous terrain near the North Fork of the Boise River, 45 miles to the northeast of Boise. These heavy rains caused a wall of water, rocks, and mud to flow down several creeks into the North Fork of the Boise River and over roads and campgrounds covering several vehicles.

On Sunday, May 27, 1973, a local dairy worker spotted a small hole in the Ridenbaugh Canal. Early in the afternoon, the canal bank failed sending a waist-deep wall of water into the large commercial dairy farm and adjacent residences in south Boise. A 30-foot wide gap was created in the canal bank. At the time of the breach, water in the canal was estimated to be flowing at 2,819cfs. Newspaper reports indicated emergency response was hampered until the water was stopped. It took workers at the head gate at Barber Bridge, three miles away, 15 minutes to divert water going into the canal. Water moved at least one vehicle and spread mud into an area nearly one mile square. Some residents were able to move their cars to higher ground. Nevertheless, damage in one commercial building included eight inches of standing water. Some basements in the area filled with 3.5 feet of water and many septic fields were inundated. The canal was repaired a week later and damage to the canal bank appeared to be caused by gophers. Twenty-five homes were affected and repairs and clean up took nearly three weeks. Local property owners joined in a class action law suit against the irrigation district responsible for the canal. A summary more recent, significant canal failures can be found in Table 3-5 (below).

Table 3-5: Significant, Recent Canal Failures

YEAR	Location: Description
2005	Emmett: Canal breach necessitated assistance from Gem County Road and Bridge Dept.
2006	Kuna: Flooded homes and crawl spaces
2010	Wilder: Washed out road
2010	Caldwell: Washed out roads and flooded several homes
2011	Caldwell: Flooded street, no apparent damage to homes, caused by gophers
2011	Jerome & Glenns Ferry: Flooded homes, basements, and streets, damaged section of main railroad tracks

Source: Idaho BHS

More recently, warm rain on snow lead to a significant flash flood event near Sandpoint in May 1991. The torrents blew out large sections of the road leading to 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 cleanout and repair the water treatment facility ran to several hundred thousand dollars. A State Disaster declaration provided some assistance but without a Federal declaration the costs to the local community were very high.

On Saturday, June 25, 1992, between 4 pm and 5 pm, a severe thunderstorm moving from the southeast towards the northwest struck Boise, Idaho. More than one inch of rain fell in less than one hour over the Boise urban area and produced flash flooding. Unofficial storm totals were measured at 1.6 inches in southeast Boise. Many streets in the downtown area were flooded with water one to two feet deep. The storm and flash flood occurred during the Boise River Festival and impacted thousands of people who had gathered in downtown Boise for a parade and other festival activities.

On December 31, 1996 and January 1, 1997, warm heavy rain fell on extensive low elevation snow in Valley, Boise, Gem, Washington, and Adams Counties. The combination of rapid melting snow and the rain caused numerous mudslides and creeks to exceed their banks. Many roads, bridges, and railroads were washed out along with several homes. The community of South Banks was destroyed as mudslides carrying boulders the size of dump trucks and large trees bulldozed homes down to the canyon below.

It is important to remember that even "minor" events can take a toll in terms of loss of life and property. On July 30, 1996, after two hours of heavy rain on the slopes of Black Pine Peak in southeast

Cassia County, a flash flood swept across the east bound lanes of Interstate 84, forcing a vehicle off the highway into deep water in a roadside ditch. The vehicle rolled and was carried more than 1,000 feet, and the driver was killed.

On April 14, 2002, flash flooding damaged roads and bridges in Valley and Boise Counties. A debris flow during this event crossed the Banks to Lowman Road near Stair Case rapids. Valley County experienced over 1 million dollars in damage to roads and bridges in the Donnelley area due to small stream flooding.

The road to Atlanta along the Middle Fork of the Boise River was washed out 3 times from 2003 through 2005 due to flash floods and debris flows originating on water repellent soils in the 2003 Hot Creek Fire Burn scar. Vegetation has returned to the burn and the soil is not as water repellent as it was right after the fire, but some increased threat of flash flooding can be expected in this area through 2008.

On June 29, 2004, between 3:30 pm and 4:30 pm, a severe thunderstorm moving from the southeast towards the northwest struck Boise Idaho. Rainfall accumulations of 1.27 inches in one hour were measured in the north end of Boise that caused flash flooding to develop rapidly. Many streets in the downtown area and in the north end experienced flooding. Minor flood damage occurred to some north end businesses and residential areas. The State Capitol building also sustained some water damage when water entered portions of the basement.

In April 2006, a State disaster was declared and was extended several times to February 2007. The event was caused by above average spring precipitation, heavy runoff, and rapid snowmelt resulting in flooding in Camas, Lincoln, and Gooding Counties. The State's costs were as follows; Gooding County - no State monies were paid, Camas County - $454,171.14, and Lincoln County - $21,757.51.

Inadequate Urban Drainage Systems: Minor flooding is a common occurrence in Idaho's cities. Climate, mountainous surroundings, and rapid growth have in some cases resulted in insufficient urban drainage systems. For example, Pocatello is located at the mouth of the Portneuf Canyon with generally mountainous terrain bordering the city on the east and south. Showers and thundershowers in the late spring and summer may result in highly localized precipitation concentrations that overwhelm the urban drainage systems. Some level of flooding occurs in Pocatello nearly annually, typically in underpasses and other areas with limited natural drainage.

Although such flooding is often regarded as a mere inconvenience, significant damage can occur. In September 1998, hundreds of homes in Idaho Falls were damaged when 1.17 inches of rain fell in twenty-four hours overwhelmed the drainage system. Most recently, flash flooding from severe thunderstorms resulted in basement-flooding in Pocatello in 1999.

Ice jams have played a role in a number of floods in the State. Significant ice jams have occurred on: the Teton, Portneuf, and Snake Rivers in the east; the Little Lost (at Howe), Salmon, and Lemhi Rivers in the central region; the Payette and Weiser Rivers in the west; and the Kootenai (at Bonners Ferry) and Clearwater (extensive overbank flooding in 1974 and 1996) Rivers in the Panhandle region. The most notable ice jam flood was on the Lemhi River near Salmon in 1984, an event that led to a Federal

Disaster declaration. Ice jams on the St. Joe River caused significant flooding damage in St. Maries in 1997.

Lemhi Ice Jam Floods – 1984: In January 1984, extensive ice jam formation in the Lemhi River, just above the confluence with the Salmon River, led to flooding in and around the town of Salmon. Weather leading to this ice jam flood was typical, with nighttime temperatures averaging -20°F and daytime temperatures near 0°F. Although initial ice jam build-up began on December 22 in the Salmon River, aggressive ice control and flood fighting had allowed local crews to contain the floodwaters prior to January 19. Flood damage occurred on January 19, 21, 23, and 28. After the floodwaters receded, ice up to 3 feet thick remained in many homes and ice nearly 5 feet thick remained around homes and along streets. Ice jams are frequent in the area, but the flooding was labeled as a base flood event.

On February 16, 1984, President Reagan declared the Lemhi County ice jam, ice, and flooding damages a disaster (under the designation of DR-697). The entire county was included in the declaration. Disaster costs included approximately:

- $433,000 of public assistance – flood fighting, cleanup, and repair work (including extensive levee reconstruction by the USACE)
- $613,000 of private assistance – SBA home and business loans, insurance claims, and grants

Most of the damage was concentrated in Salmon and in adjacent developed agricultural fields. Only minor injuries were reported, but 325 people were displaced and 81 residences were damaged. Much credit was given to local search and rescue teams for preventing serious injury and loss of life. Businesses, roads, sewers, and levees were also damaged.

Woody debris commonly piles up in many drainage areas, especially those that have been logged. Lightning Creek (Pend Oreille), Lawyer Creek, and Little Wood River (Ketchum and Hailey) have all experienced flooding from debris jams. Flooding from such events tends to be localized but may cause significant damages.

Future Occurrence

Reported flood events of significance over the past 107 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the State experiencing a major flood event can be difficult to quantify, but based on the historical record of 22 major flood events since 1894, this type of event has occurred once every 4.86 years from 1894 through 2010.

[(Current Year) 2010] subtracted by [(Historical Year) 1894] = 107 Years on Record

[(Years on Record) 7] divided by [(Number of Historical Events) 22] = 4.86

From the historical frequency, we can calculate that there is a 20.56-percent chance of this type of event occurring each year.

Environmental Impacts

The environmental impacts of flooding can be quite wide-ranging, from the dispersion of low-level household wastes into the fluvial system to contamination of community water supplies and wildlife habitats with extremely toxic substances. Flood preparedness activities, such as forecasting and warning systems, can help to avoid some of these impacts. Indeed, actions undertaken prior to the event will have repercussions on the level of damages accruing from the flood. Effective remedial actions, such as sandbagging, can significantly reduce losses, and with planning, prevent some of these secondary environmental impacts. Specifically, the removal of fuel tanks and attention to hazardous wastes would eliminate some of the potential problems. In contrast, inadequate attention to these components of the flood hazard will invariably lead to additional problems and intensify adverse environmental impacts. Similarly, during a flood, variables such as depth of water, velocity of flows, and duration of inundation, in combination with land-use attributes, all contribute to the relative severity of flood impact. Floods of greater depth are likely to result in greater environmental damage than floods of lesser magnitude, in part because more area has been flooded. Floods of long duration will exacerbate environmental problems, because clean-up will be delayed and contaminants may remain in the environment for a much longer time. The argument is the same for other flood traits; extreme conditions are likely to precipitate additional environmental problems.

Development Trend Impacts

A good deal is known concerning the mechanisms behind flooding; consequently, floods generally come with warnings and floodwaters rarely go where they are totally unexpected by experts. Warnings are not always heeded, though, and despite their predictability, flood damages continue.

In many cases, the failure to recognize or acknowledge the extent of the natural hydrologic forces in an area has led to development and occupation of areas that can clearly be expected to be inundated on a regular basis. Most streams overflow what are commonly regarded as their channels at least once every one and one-half to two years. Despite this, communities are often surprised when the stream leaves its channel to occupy its floodplain. A past reliance on structural means to control floodwaters and "reclaim" portions of the floodplain has also contributed to inappropriate development and occupation and continued flood-related damages.

Unlike the weather and the landscape, this flood-contributing factor can be controlled. Development and occupation of the floodplain places individuals and property at risk. Such use can also increase the probability and severity of flood events (and consequent damage) downstream by reducing the water storage capacity of the floodplain, or by pushing the water farther from the channel or in larger quantities downstream.

Critical Infrastructure and State Facility Impacts

Based on GIS data, 71 of the State's 3,528 facilities are located in a 1-percent-annual-chance flood zone (see Map 3-2 at the end of this section). Due to the lack of information in the database for State facilities, it is not possible at this time to describe additional potential impacts of flooding to State facilities and infrastructure.

Vulnerability Assessment and Loss Estimation

Statewide Analysis

All 44 counties in the State were processed using FEMA's HAZUS-MH MR4 loss estimation software. The analysis was considered Level 1, because it used all HAZUS-supplied data for its loss estimation. For each county, a HAZUS study region was created and four hazard scenarios were analyzed for the 10-, 25-, 100-, and 500-year flooding events. All standard analyses were performed for each HAZUS scenario, and the Global Summary Reports are summarized in Table 3-6 (below) for the 25- and 100-year flooding events. The rationale for including the 25-year flooding event is to demonstrate that flood damages will occur from more frequent, less severe events. Each of the 44 HAZUS study regions were exported to .hpr files and delivered to the State, along with the Global Summary Reports.

Data summarized for each county included:

- Expected Building Damage (number of structures)
- Expected "Substantial" Building Damage (number of structures)
- Expected Essential Facilities Damaged (number of structures)
- Expected Building Loss Estimates ($)
- Expected Business Interruption Loss Estimate ($)

Table 3-6: HAZUS-MH MR4 Level 1 Loss Estimation Summary

	25-Year Flooding Event (4% Annual Chance)					100-Year Flooding Event (1% Annual Chance)				
County Name	Expected Building Damage (# of Structures)	Expected 'Substantial' Building Damage (# of Structures)	Expected Essential Facilities Damaged (# of Structures)	Expected Building Loss Estimates ($ Millions)	Expected Business Interruption Loss Estimate ($ Millions)	Expected Building Damage (# of Structures)	Expected 'Substantial' Building Damage (# of Structures)	Expected Essential Facilities Damaged (# of Structures)	Expected Building Loss Estimates ($ Millions)	Expected Business Interruption Loss Estimate ($ Millions)
Ada	4,023	868	22	887.31	19.60	5109	1015	27	1,116.39	36.20
Adams	10	1	0	5.72	0.02	13	2	0	6.52	0.02
Bannock	293	15	1	50.53	0.53	372	21	1	61.31	0.59
Bear Lake	16	0	0	6.58	0.24	16	0	0	7.47	0.24
Benewah	101	29	0	19.95	0.07	123	34	0	25.53	0.09
Bingham	127	5	0	18.51	0.16	155	8	0	22.43	0.20
Blaine	336	15	0	64.29	0.36	395	22	0	74.75	0.38
Boise	161	44	2	30.43	0.16	176	57	2	35.09	0.18
Bonner	494	183	6	110.78	0.56	127	15	4	32.16	0.19
Bonneville	79	8	0	45.49	0.51	153	20	0	70.35	0.75
Boundary	1	0	0	4.73	0.06	1	0	0	5.91	0.10
Butte	5	0	0	1.79	0.01	7	0	0	2.07	0.01
Camas	2	0	0	1.38	0.02	2	0	0	1.26	0.02
Canyon	3,128	503	36	755.81	8.77	14,653	2,073	100	2,728.28	20.57
Caribou	37	11	4	12.22	0.45	34	10	4	11.58	0.44

Table 3-6: HAZUS-MH MR4 Level 1 Loss Estimation Summary										
	25-Year Flooding Event (4% Annual Chance)					100-Year Flooding Event (1% Annual Chance)				
County Name	Expected Building Damage (# of Structures)	Expected 'Substantial' Building Damage (# of Structures)	Expected Essential Facilities Damaged (# of Structures)	Expected Building Loss Estimates ($ Millions)	Expected Business Interruption Loss Estimate ($ Millions)	Expected Building Damage (# of Structures)	Expected 'Substantial' Building Damage (# of Structures)	Expected Essential Facilities Damaged (# of Structures)	Expected Building Loss Estimates ($ Millions)	Expected Business Interruption Loss Estimate ($ Millions)
Cassia	162	25	4	43.72	0.54	225	33	4	60.75	0.75
Clark	2	0	0	1.11	0.05	5	1	0	1.60	0.06
Clearwater	127	79	0	30.31	0.41	142	83	2	37.27	0.75
Custer	45	4	2	15.43	0.10	48	5	2	15.74	0.10
Elmore	103	1	0	22.67	0.27	149	2	4	33.72	0.36
Franklin	12	0	2	8.33	0.04	13	0	2	9.53	0.04
Fremont	45	0	2	11.41	0.06	49	0	2	12.65	0.07
Gem	446	50	8	61.48	0.85	478	59	8	66.84	0.98
Gooding	288	0	14	49.95	0.85	349	4	14	59.33	0.92
Idaho	122	117	3	48.44	0.31	131	128	4	53.47	0.35
Jefferson	81	10	0	23.45	0.11	100	15	0	29.29	0.13
Jerome	0	0	0	0.02	0.02	0	0	0	0.03	0.00
Kootenai	634	164	3	222.23	1.78	786	213	5	260.81	2.00
Latah	93	18	4	49.88	0.68	129	25	5	62.05	0.77
Lemhi	21	1	0	10.17	0.10	25	1	0	12.39	0.11
Lewis	8	3	0	3.31	0.01	10	3	0	3.72	0.01
Lincoln	39	3	4	11.74	0.11	55	7	4	15.43	0.14
Madison	8	1	0	4.22	0.04	12	1	0	4.80	0.04
Minidoka	103	14	0	28.91	0.23	112	6	2	32.03	0.26
Nez Perce	230	93	12	338.07	5.80	227	112	15	358.32	5.89
Oneida	1	0	0	1.42	0.03	1	0	0	2.24	0.03
Owyhee	326	129	14	82.16	1.25	511	164	16	133.75	1.38
Payette	75	10	0	17.30	0.06	94	15	0	21.91	0.07
Power	0	0	3	2.16	0.01	0	0	4	2.39	0.02
Shoshone	365	59	6	97.43	0.96	431	71	6	115.19	1.09
Teton	12	1	0	7.38	0.07	26	3	0	10.96	0.08
Twin Falls	35	6	0	26.04	0.44	56	9	0	31.63	0.49
Valley	29	0	0	17.56	0.12	33	2	0	18.96	0.13
Washington	45	1	5	22.83	0.32	63	3	4	29.18	0.39

Additional Level 2 analyses were performed for two counties (Shoshone and Washington) using FEMA's HAZUS-MH MR4 loss estimation software. FEMA's Digital Flood Insurance Rate Map (DFIRM) data was processed by the HAZUS Flooding Information Tool (FIT) to develop an enhanced depth grid for use in the HAZUS loss estimation. For each county, a HAZUS study region was created and a hazard scenario was analyzed for the 100-year flooding event. All standard analyses were performed, and the Global Summary Reports are summarized in Table 3-7 (below). Since the FIT depth grids could only be created where a FEMA digital floodplain existed, not all stream reaches had Level 2 analysis performed (as was the case for the Level 1 study regions). Therefore, Map 3-4 (found at the end of this section) was created to compare the Level 1 and Level 2 results for these two counties. Both HAZUS study regions were exported to .hpr files and delivered to the State, along with the Global Summary Reports.

Data summarized for each county included:

- Expected Building Damage (number of structures)
- Expected "Substantial" Building Damage (number of structures)
- Expected Essential Facilities Damaged (number of structures)
- Expected Building Loss Estimates ($)
- Expected Business Interruption Loss Estimate ($)

Table 3-7: HAZUS-MH MR4 Level 2 Loss Estimation Summary

	100-Year Flooding Event (1% Annual Chance)				
County Name	Expected Building Damage (# of Structures)	Expected 'Substantial' Building Damage (# of Structures)	Expected Essential Facilities Damaged (# of Structures)	Expected Building Loss Estimates ($ Millions)	Expected Business Interruption Loss Estimate ($ Millions)
Shoshone	372	87	8	120.38	0.93
Washington	41	31	0	23.59	0.11

The results presented in Map 3-4 illustrate the added benefits of performing the Level 2 analysis. In this map, the loss estimates provided by the Level 1 and Level 2 HAZUS analyses were compared at the census block level. As noted above, this analysis could only occur in areas where DFIRM data existed. For both Shoshone and Washington Counties, a number of similar trends were revealed:

- The Level 2 and Level 1 data resulted in similar total loss estimates;
- The Level 2 loss estimates tended to be greater than the Level 1 estimates in areas of higher risk (i.e., smaller census blocks, which equate to higher population densities);
- The Level 2 loss estimates tended to be greater than the Level 1 estimates in census blocks near floodplains; and

- The Level 2 loss estimates tended to be lower than the Level 1 estimates in census blocks farther away from flooding sources.

Overall, this comparison seems to support the assumption that Level 2 analysis produces more accurate loss estimation, both from a perceived risk as well as a spatial point of view. Even though the total loss estimates were similar, the Level 2 results seemed to show greater loss estimates in areas of greater risk. Conversely, the Level 1 results showed lower loss estimates in the higher risk areas, while providing relatively higher loss estimates in the lower risk areas. This comparison confirms that HAZUS loss estimates can be improved through the use of more detailed input data sets. This also reinforces the importance of collecting improved facility data, one of the State's new goals identified during the 2010 mitigation plan update.

Compilation of Local Hazard Mitigation Plans

All 47 of the State's local hazard mitigation plans were analyzed for use in the statewide hazard mitigation plan update. Certain sections of the plans were collected in a central database that allowed additional analysis. These data were then summarized, and some of those results are provided below. Map 3-5, at the end of this section, highlights the 26 local plans that identified flooding as one of their significant hazards. For these jurisdictions that would be considered the most vulnerable to the hazard of flooding (based on their own prioritization), Table 3-8 summarizes the number of structures impacted by the flood hazard and the corresponding loss estimate.

Table 3-8: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Flood as a Significant Hazard

Local Plan	Flood Ranked as Significant	Structures in Special Flood Hazard Area	Loss Estimate
Ada	X	3,255	$5,900,000,000
Adams			
Bannock	X	8,320	$62,197,050
Bear Lake			
Benewah	X	102	$39,400,000
Bingham	X	1,682	$35,180,730
Blaine			
Boise			
Bonner			
Bonneville	X	4,993 (parcels)	$588,614,136
Boundary			
Butte			
Camas	X	717	$37,018,208
Canyon			
Caribou			
Cassia	X	6,615 (parcels)	$406,327,508
Clark			
Clearwater			

Table 3-8: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Flood as a Significant Hazard			
Local Plan	**Flood Ranked as Significant**	**Structures in Special Flood Hazard Area**	**Loss Estimate**
Custer			
Duck Valley Reservation	X	20	$1,726,962
Elmore	X	919	$111,000,000
Franklin			
Fremont	X	2,447 (parcels)	$127,637,480
Gem	X	3,489 (parcels)	$50,324,500
Gooding	X	1,319	$94,547,239
Idaho	X	1,732	$78,922,052
Jefferson	X	1964	$24,630,000
Jerome			
Kootenai	X	919	$220,542,143
Latah	X	341	
Lemhi			
Lewis	X	345	
Lincoln	X	546	$24,382,720
Madison	X	2,476 (parcels)	$24,630,000
Minidoka			
Nez Perce	X	193	$65,000,000
Nez Perce Tribe	X	370	$54,412,300
Oneida			
Owyhee			
Payette	X	193	$65,000,000
Power			
Shoshone	X	6,496 (private and over 50% of all public)	$472,346,537
Shoshone-Bannock Tribe			
Teton	X	1,672 (parcels)	$39,773,250
Twin Falls			
Valley	X	366	
Washington	X	615	

Consequence Analysis Scenario

Vulnerability was also assessed by conducting a consequence scenario that analyzed a hypothetical hazard event. The Executive Committee met on June 4, 2010, to analyze a number of hazard scenarios. All participants then summarized their thoughts in a two-page survey. The first page of the survey asked the committee to score (from 0 to 5, 5 being the direst) the short-term (0-6 month) and long-term (6+ months) consequences of each particular scenario as it pertained to the following systems:

- The public
- First responders
- Continuity of operations
- Property, facilities, and infrastructure
- Economic conditions
- Public confidence in government
- The environment

For the hazard of flooding, the scenario focused on an event in Boise City. This fictional event occurred at 10:00 p.m. and involved a 25-foot section of the New York Canal washing out. The resulting flow of 2,500 cfs of water then rushed upon the town's population. Figure 3-2 below summarizes the results of the survey. The committee determined that the short-term impact of this flood event was greater than its long-term impact. The public; first responders; property, facilities, and infrastructure; and public confidence in the government stood out as the systems most affected.

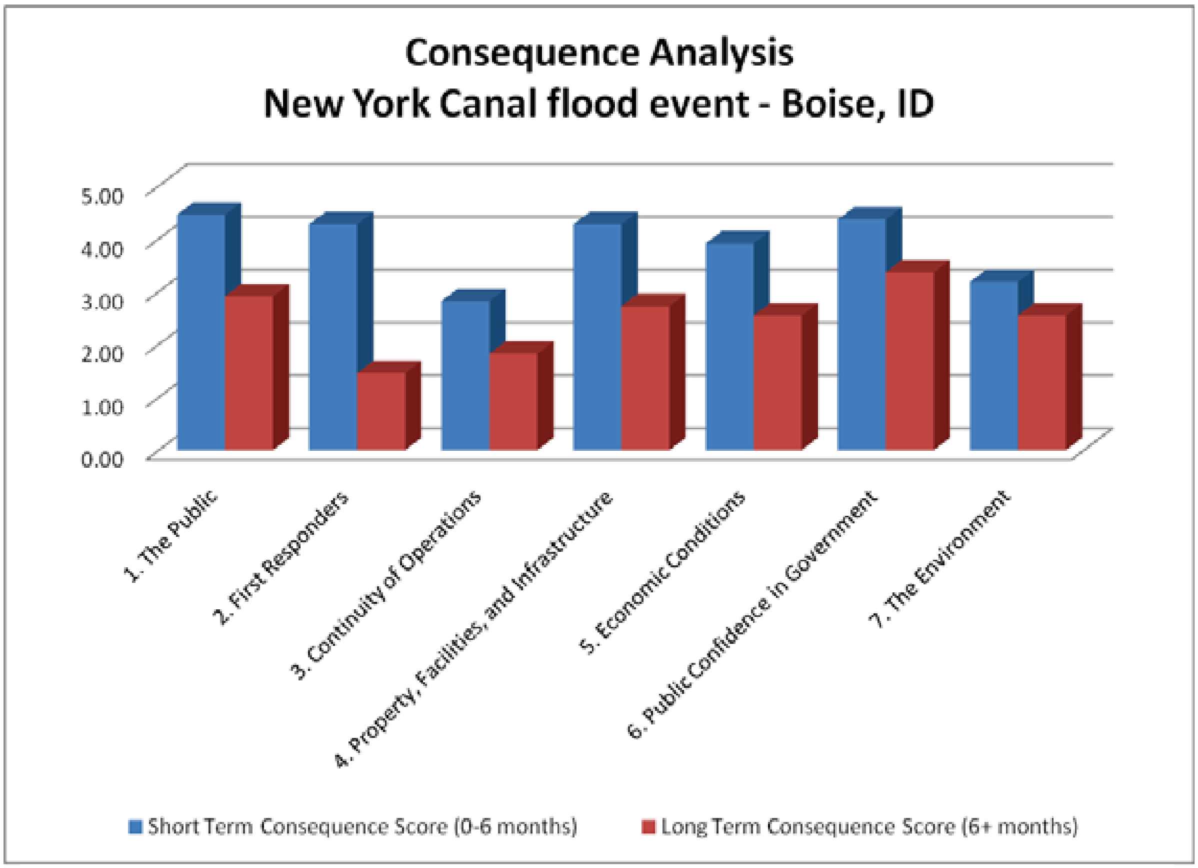


Figure 3-2: Consequence Analysis Flood

Mitigation Rationale

Flooding is the most serious, devastating, and costly of natural hazards and can occur virtually anywhere. Most Idaho residents live near rivers that are subject to periodic flooding. Floods in Idaho frequently damage roads, farmlands, and structures, often disrupt lives and businesses, and occasionally cause the loss of life. A few streams in Idaho are subject to almost annual flooding, but damaging floods are much less frequent in most areas. Historically, the greatest impact has been to the northern and north-central parts of the State, where communities are vulnerable to flooding from the many rivers, lakes, creeks, and canals in the area. The steep, mountainous terrain creates a floodprone environment, and development is often confined to areas adjacent to stream channels.

The nature and magnitude of flood-related damages are dependent on:

- Flow volume and velocity - High volume and/or velocity flows carry huge mechanical forces and are capable of damaging even substantial structures.
- Duration – Long-duration floods of even low volume can cause great damage due to prolonged inundation (e.g., crop damage).
- Bank stability - Bank erosion can alter channel paths and result in a substantial loss of property.
- Sediment load and in-stream debris - Siltation from sediment transport and deposition may decrease the carrying capacity of the channel, exacerbating flood events. Siltation may also decrease reservoir storage capacity, degrade fish and wildlife habitat, change the course of a stream, or introduce chemicals into the stream. In-stream debris increases the likelihood of mechanical damage and may raise flood levels when jams form.
- Secondary hazards - Secondary hazards associated with flooding include landslides, structural fires, hazardous materials releases, the spread of pollution, and disease.

Generally, flash floods and dam failures represent the greatest risks to life and limb due to the rapid onset, the potentially high velocity of water, and the huge debris load carried by floodwaters. While dam failures are a very rare event, they represent an extreme threat to life and property. When conditions allow, flash floods and dam failures may result in fast-moving walls of debris, mud, and water.

Flash floods from a series of fast-moving storms may produce more than one flood crest, and the sudden destruction of structures and washout of access routes may result in the loss of life. Flash floods caused by heavy precipitation are generally of a smaller scale than dam failures, but they happen somewhere in Idaho almost every year. Flash floods are a major cause of weather-related fatalities in the United States each year.

The possibility for injury and death from flash floods is heightened because they are so uncommon that people do not recognize the danger. For example, the rapid rise in water level and force may cause motorists to underestimate the depth and velocity of floodwaters, causing stalled and flooded vehicles and drowning; 50 percent of all flash-flood fatalities are vehicle related, usually occurring when motorists attempt to drive through floodwaters.

In general, human hazards during flooding include drowning, electrocution from downed power lines, leaking gas lines, fires and explosions, hazardous chemicals, and displaced wildlife. Economic losses and the disruption of social systems are often enormous. Floods may destroy or damage structures, furnishings, business assets including records, crops, livestock, roads and highways, and railways. They often deprive large areas of electric service, potable water supplies, wastewater treatment, communications, medical care, and many other community services and may do so for long periods of time.

General Mitigation Approaches

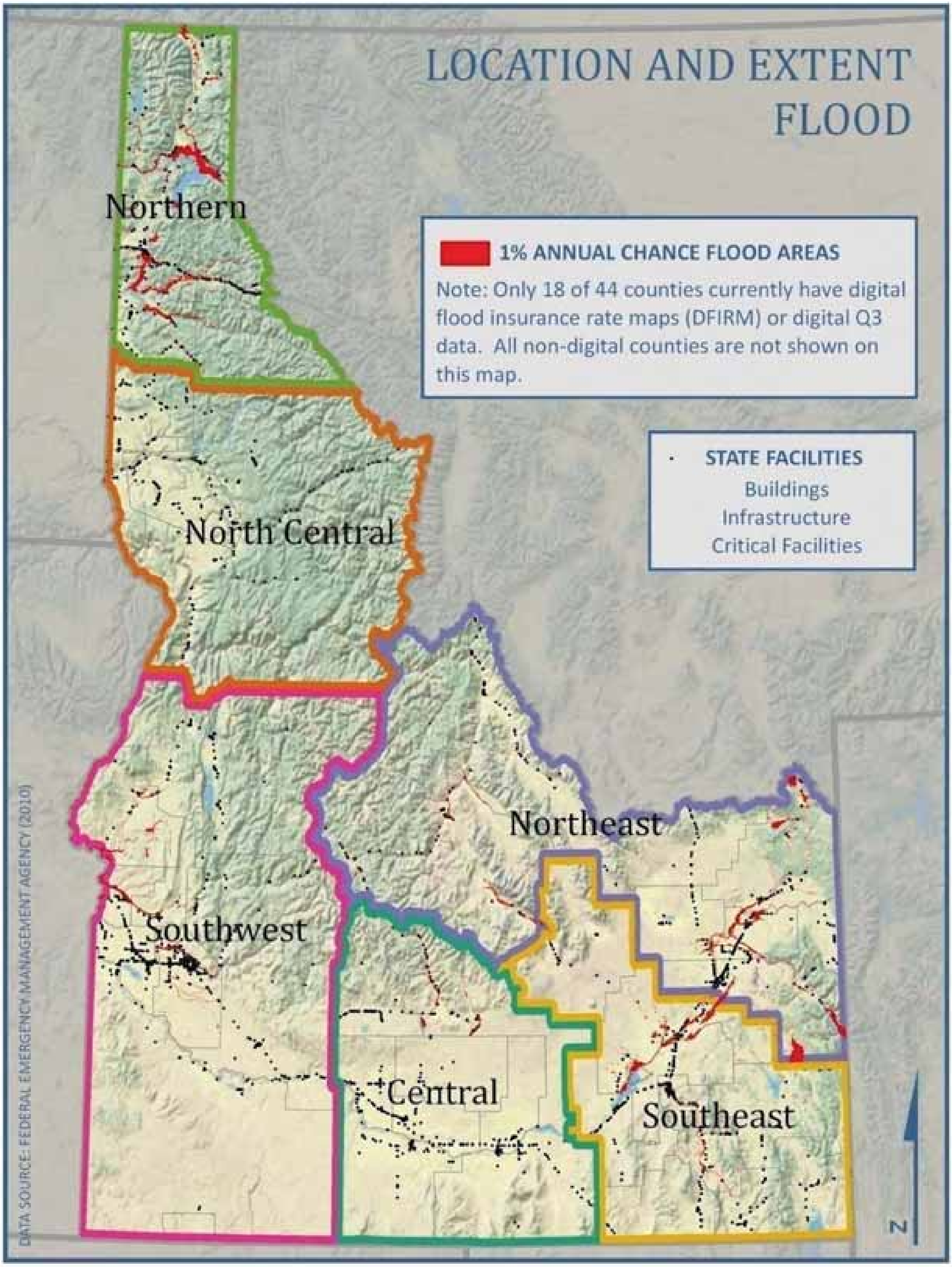
Flood mitigation is principally involved with accommodating desired social and economic goals while preventing losses to life, health, and property. In general, flood damage may be mitigated by keeping humans and structures separate from floodwaters through controls on land use, actions to increase water storage capacity, the removal or elevation of structures in floodplains, controlling development in floodplains, structural measures such as levees and dikes, and helping the public and decision makers to better understand flood hazards. Recommended steps to implement each of these approaches are presented in the following five categories:

- Hazard management
- Information/Education
- Infrastructure
- Regulatory
- Mapping and analysis

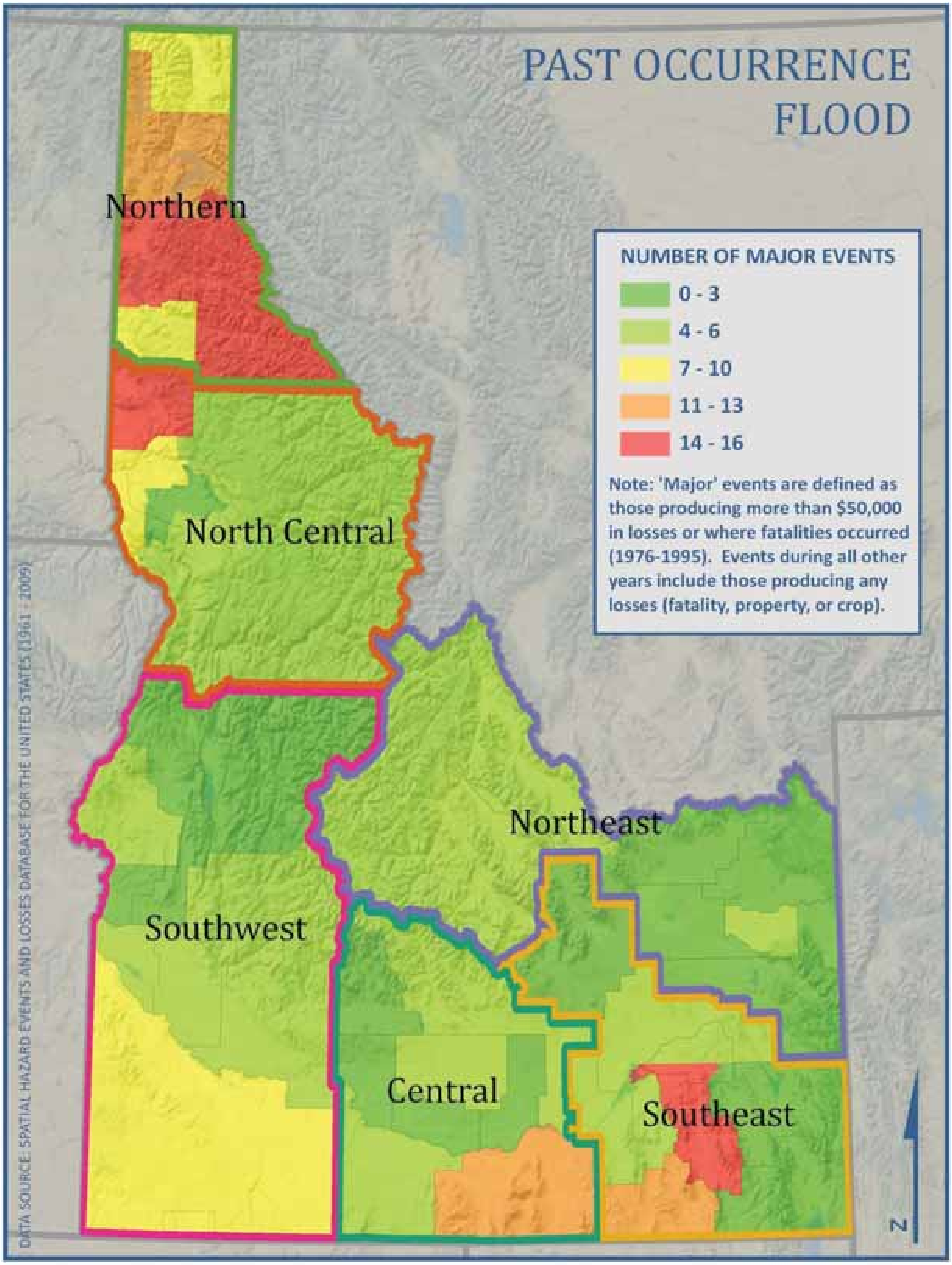
A key distinction of flooding, when compared to other hazards, is the extent to which the actions of others can influence the impact of flooding on a community. Activities in the upper portions of a basin that generate additional surface water runoff, in-stream debris, or sedimentation may increase flooding in downstream communities. It is essential that flood mitigation planning address the entire basin and that communities undertaking local planning efforts coordinate and cooperate with adjacent jurisdictions.

In comparison to riverine flooding, flash flooding comes with little warning and is considerably less predictable. Flash floods are generally triggered by more concentrated events (e.g., focused thunderstorms, overwhelmed infrastructure, and dam failures) that are harder to foresee with any reliability. Certain areas, though, due to their terrain and precipitation, can be identified as relatively high risk. Mitigation focuses on controlling the factors that can be controlled and providing for an effective evacuation, response, and recovery.

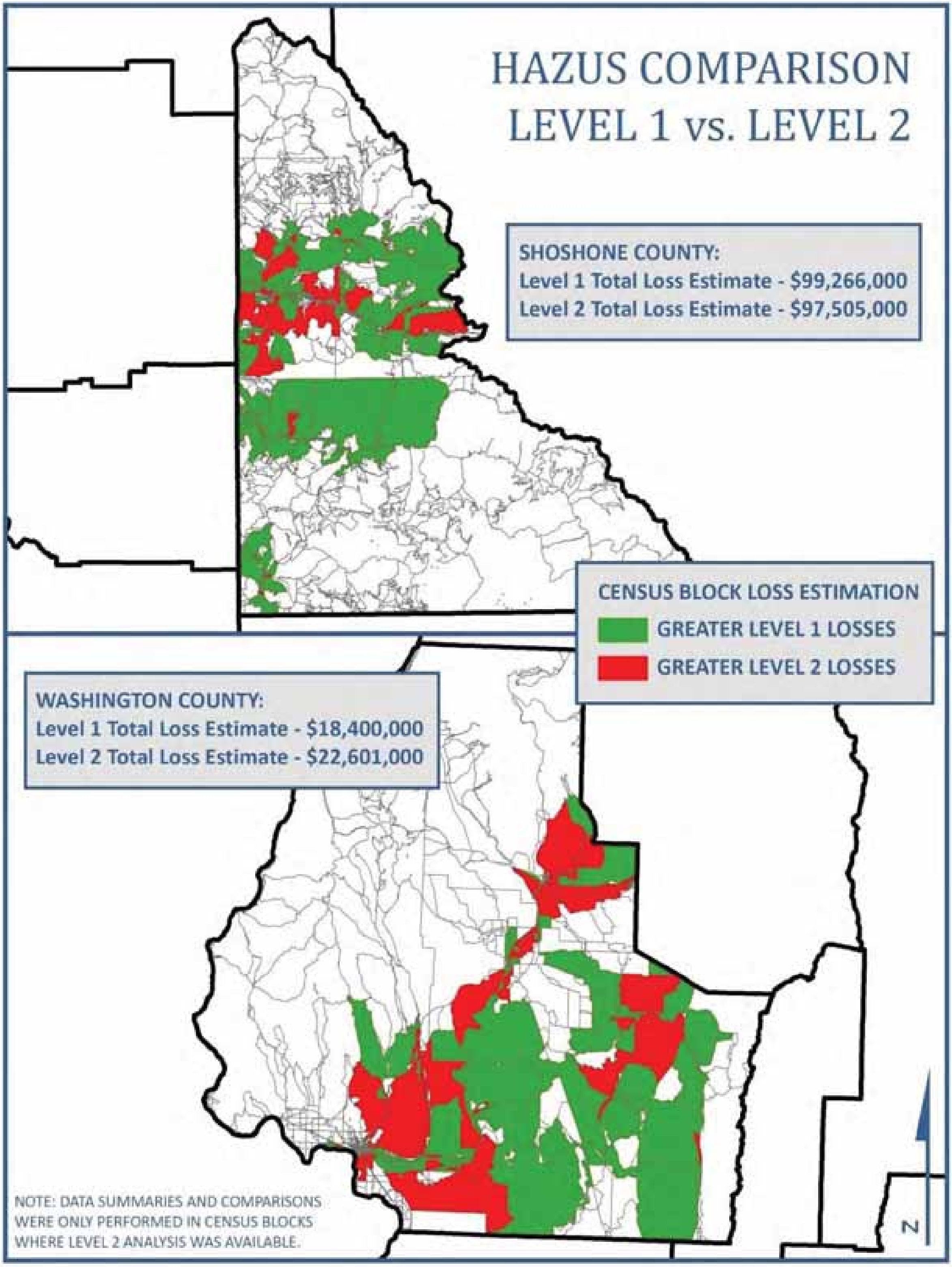
Mitigation for ice and debris jam floods is closely related to riverine and flash flooding mitigation and is not described separately. The obvious additional step is to control the jam-forming material prior to the event.



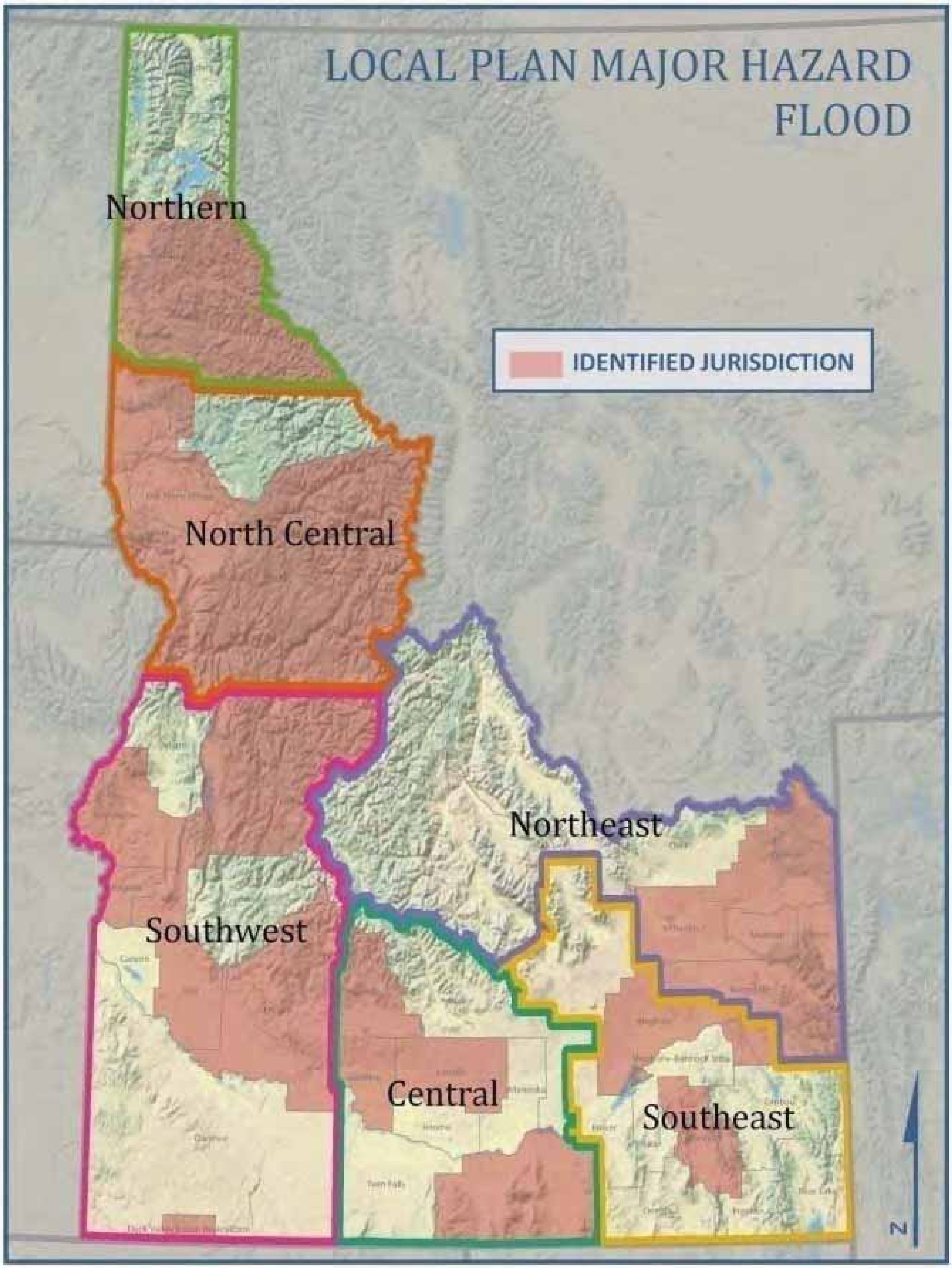
Map 3-2: Flood Location and Extent



Map 3-3: Flood Past Occurrence



Map 3-4: HAZUS Level 1 and Level 2 Loss Estimation Comparison

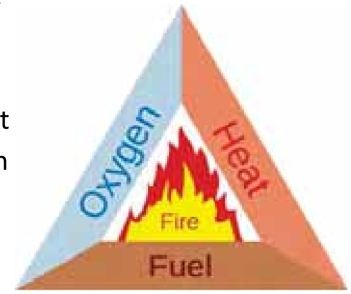


Map 3-5: Flood Identified as Local Plan Major Hazard

RISK ASSESSMENT: WILDFIRE

Description

Wildfires occur when all of the necessary elements of a fire triangle come together in a wooded or grassy area: an ignition source is brought into contact with a combustible material, such as vegetation, that is subjected to sufficient heat and has an adequate supply of oxygen from the ambient air. The hazard of wildfire is one that is significant not only in Idaho but in many areas of the United States.



A wildfire *front* is the portion sustaining continuous flaming combustion, where unburned material meets active flames, or the smoldering transition between unburned and burned material. As the front approaches, the fire heats both the surrounding air and woody material through convection and thermal radiation. First, wood is dried as water is vaporized at a temperature of 212°F. Next, the pyrolysis of wood at 450°F releases flammable gases. Finally, wood can smolder at 720°F or, when heated sufficiently, ignite at 1,000°F. Even before the flames of a wildfire arrive at a particular location, heat transfer from the wildfire front warms the air to 1,470°F, which pre-heats and dries flammable materials, causing materials to ignite faster and allowing the fire to spread faster. High-temperature and long-duration surface wildfires may encourage flashover or *torching*: the drying of tree canopies and their subsequent ignition from below.

Wildfires have a rapid forward rate of spread when burning through dense, uninterrupted fuels. They can move as fast as 6.7 miles per hour (mph) in forests and 14 mph in grass and range lands. Wildfires can advance tangential to the main front to form a flanking front, or burn in the opposite direction of the main front by *backing*. They may also spread by jumping or spotting, as winds and vertical convection columns carry firebrands (hot wood embers) and other burning materials through the air over roads, rivers, and other barriers that may otherwise act as firebreaks. Torching and fires in tree canopies encourage spotting, and dry ground fuels that surround a wildfire are especially vulnerable to ignition from firebrands. Spotting can create *spot fires* as hot embers and firebrands ignite fuels downwind from the fire. In Australian bushfires, spot fires are known to occur as far as 6 miles away from the fire front.

Large wildfires may affect air currents in their immediate vicinities by the stack effect: air rises as it is heated, and large wildfires create powerful updrafts that will draw in new, cooler air from surrounding areas in thermal columns. Great vertical differences in temperature and humidity encourage pyrocumulus clouds, strong winds, and fire whirls with the force of tornadoes at speeds of more than 80 kilometers per hour (50 mph). Rapid rates of spread, prolific crowning or spotting, the presence of fire whirls, and strong convection columns signify extreme conditions.

Fires can be generally characterized by their fuels, as follows (see additional discussion on fuels below):

- **Ground** fires are fed by subterranean roots, duff, and other buried organic matter. This fuel type is especially susceptible to ignition through spotting. Ground fires typically burn by smoldering and can burn slowly for days to months.
- **Crawling** or **surface** fires are fueled by low-lying vegetation such as leaf and timber litter, debris, grass, and low-lying shrubbery.
- **Ladder** fires consume the material between low-level vegetation and tree canopies, such as small trees, downed logs, and vines. Kudzu, Old World climbing fern, and other invasive plants that scale trees may also encourage ladder fires.
- **Crown**, **canopy**, or **aerial** fires burn suspended material at the canopy level, such as tall trees, vines, and mosses. The ignition of a crown fire, termed *crowning*, is dependent on the density of the suspended material, canopy height, canopy continuity, and sufficient surface and ladder fires in order to reach the tree crowns.

Three principal factors have a direct impact on the behavior of wildfires: topography, fuel, and weather.

Topography can have a powerful influence on wildfire behavior. The movement of air over the terrain tends to direct a fire's course. Gulches and canyons can funnel air and act as a chimney, intensifying fire behavior and inducing faster rates of spread. Similarly, saddles on ridge tops tend to offer lower resistance to the passage of air and will draw fires. Solar heating of drier, south-facing slopes produces upslope thermal winds that can complicate behavior.

Slope is an important factor. If the percentage of uphill slope doubles, the rate at which a wildfire spreads will likely double. On steep slopes, fuels on the uphill side of the fire are closer to the source of heat. Radiation preheats and dries the fuel, thus intensifying fire behavior. Terrain can also inhibit wildfires: fire travels down slope much more slowly than it does upslope, and ridge tops often mark the end of a wildfire's rapid spread.

Source: Idaho Firewise website

Fuels are classified by weight or volume (fuel loading) and by type. Fuel loading, often expressed in tons per acre, can be used to describe the amount of vegetative material available. If fuel loading doubles, the energy released also can be expected to double. Each fuel type is given a burn index, which is an estimate of the amount of potential energy that may be released, the effort required to contain a fire in a given fuel, and the expected flame length. Different fuels have different burn qualities. Some fuels burn more easily or release more energy than others. Grass, for instance, releases relatively little energy, but can sustain very high rates of spread.

Firefighters generally classify wildfire fuels into three types:

- **Ground Fuels**: This vegetation is close to or lying on the ground. Ground fuels include dead grass and leaves, needles, dead branches, twigs, and logs.
- **Surface Fuels**: These plants and trees are close to the ground but not actually lying on the ground. They are usually shrubs, grasses, low-hanging branches, and anything not located in the high branches of trees. They are also referred to as "ladder fuels", because a fire can move from ground fuels to surface fuels, then onto crown fuels.
- **Crown Fuels**: Crown fuels are found only in the crowns or tops of trees. They do not touch the ground and are usually the high branches of trees. When a wildfire burns in the tops of the trees, it is called a crown fire.

Continuity of fuels is an important factor. Continuity is expressed in terms of both horizontal and vertical dimensions. Horizontal continuity is what can be seen from an aerial photograph and represents the distribution of fuels over the landscape. Vertical continuity links fuels at the ground surface with tree crowns via ladder fuels.

Another essential factor is fuel moisture. Like humidity, fuel moisture is expressed as a percentage of total saturation and varies with antecedent weather. Low fuel moistures indicate the probability of severe fires. Given the same weather conditions, moisture in fuels of different diameters changes at different rates. A 1,000-hour fuel, which has a 3- to 8-inch (8- to 20-centimeter) diameter, changes more slowly than a 1- or 10-hour fuel.

Of all the factors influencing wildfire behavior, **weather** is the most variable. Extreme weather leads to extreme events, and it is often a moderation of the weather that marks the end of a wildfire's growth and the beginning of successful containment. High temperatures and low humidity can produce very vigorous fire activity. The cooling and higher humidity brought by sunset can dramatically quiet fire behavior.

Fronts and thunderstorms can produce winds that are capable of radical and sudden changes in speed and direction, causing similar changes in fire activity. A fire's rate of spread varies directly with wind velocity. Winds may play a dominant role in directing the course of a fire. The radical and devastating effect that wind can have on fire behavior is a primary safety concern for firefighters. In July 1994, a sudden change in wind speed and direction on Storm King Mountain led to a blowup that claimed the lives of 14 firefighters. The most damaging firestorms are usually marked by high winds.

Effects of/on Other Hazards

Other hazard events can cause wildfires, and wildfires can intensify other hazards. According to a 1991 case study, winds gusting to 62 mph (100 km/h) downed power lines, resulting in 92 separate wildland fires in Washington (The National Wildland/Urban Interface Fire Protection Initiative, 1992). Earthquakes also have the potential to cause wildfires.

By removing vegetative cover, wildfires can contribute to mudslides, landslides, and floods. According to the National Commission on Wildfire Disasters, the 1992 Foothills Fire near Boise was so hot that not only was the vegetation removed, but the soils were ". . . so heat damaged that they resist water penetration and cause flash runoff and erosion, as well as some that slide off steep slopes like dry sugar" (MacLeary, 1993).

Leading Causes of Fires in Idaho

All wildfires begin with an ignition source. Nationally, the U.S. Forest Service (USFS) figures for 1990 indicate that 25.7 percent of reported wildfires were caused by arson (Figure 3-3 below). Other specified ignition sources were debris burns (24 percent) and lightning (13.3 percent). Lightning can present particularly difficult problems when dry thunderstorms move across an area that is suffering from seasonal drought. Multiple fires can be started simultaneously. In dry fuels, these fires can cause massive damage before containment. Ignition by lightening is the dominant cause of fires in the western U.S. (approximately 2/3 of fires in the west are caused by lightning). According to Idaho Firewise, the leading human-caused sources are campfires, followed by debris burning, equipment use, and smoking.

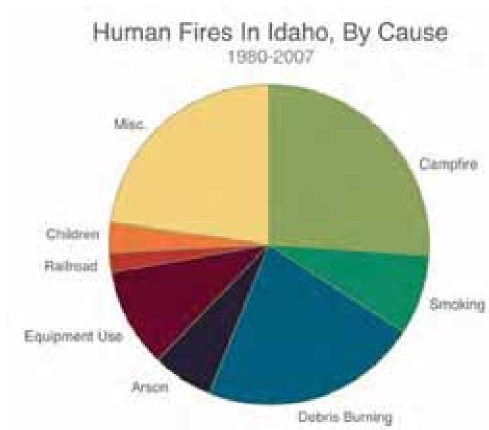


Figure 3-3: Idaho Wildfire Causes / Source: Idaho Firewise website

Location, Extent, and Magnitude

The majority of local mitigation plans in Idaho identify wildfire as a significant hazard, and fires can occur anywhere in the State. Fire is an important part of Idaho's different ecosystems. It serves as a cleansing agent for both forests and rangelands in many ways. Idaho has two principle ecosystems affected by fire: forests and rangelands.

Idaho's Forests

Roughly 41 percent of Idaho is covered in forests. Over time, the trees in these forests grow thick and close together, along with other vegetation, both dead and alive. When this happens, the forest needs to be cleaned out to keep trees healthy and to provide new forage for wildlife. Wildfire helps forests to "clean themselves" by burning dead trees and other vegetation, along with the crowded plants and trees. Some wildfires burn all vegetation in a forest, but many of them burn in a "mosaic" pattern, which means that not all trees and vegetation are burnt. After a wildfire, new vegetation has room to grow. Trees can start to rejuvenate, and new trees sprout because they have access to sunlight. Tender grasses begin to grow, which attracts wildlife such as elk, deer, and antelope. Forest lands predominate in the Northern, North Central, and Northeast planning regions.

Idaho's Rangelands

Rangelands form the majority of the remaining land in the State that is not used for agriculture. These areas do not receive much rain, and their native vegetation is made up of grasses, broad-leaved plants (forbs), and shrubs that can survive on little moisture, especially during the summer months. Rangeland can describe a prairie, plain, savannah, steppe, grassland, and many other ecosystems. Rangelands predominate in the Southwest, Central, and Southeast planning regions of Idaho.

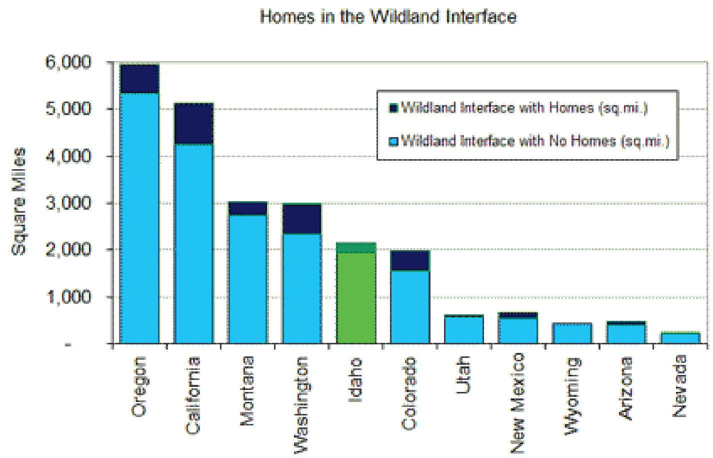


Figure 3-4: Homes in the Wildland Interface / Source: www.headwaterseconomics.org

Wildland-Urban Interface (WUI)

The WUI is the area where houses meet or intermingle with undeveloped wildland vegetation. The WUI is thus a focal area for human environment conflicts, such as the destruction of homes by wildfires, habitat fragmentation, introduction of exotic species, and biodiversity decline. Of the 11 Western States, Idaho has the fifth largest area of undeveloped, forested private land bordering fireprone public lands, and ranks sixth among Western States in the amount of forested land where homes have already been built next to public lands (Figure 3-4, above). Idaho has over 2,000 square miles of forested private lands that border public lands, of which 90 percent have not yet been developed. Housing in Idaho's WUI consumes 7.0 acres per person, compared to the 0.5 acres per person on other western private lands, and Idaho ranks seventh among Western States in the number of homes built in forested areas next to public wildlands.

Map 3-7, at the end of this section, depicts the locations of highest risk based on a ranking of the counties in Idaho by the total area of WUI in the county. It is in the WUI that the protection of structures from wildland fires is most challenging and human-caused fire ignitions are most common.

Past Occurrence

Recently, wildfire has been the most prolific source of Federal disaster declarations. Because fire location characteristics are not designated in official records, a substantive analysis of past events is difficult. Federal and State wildland firefighting agencies generally only note the number of fires and the acreage. The State Fire Marshall records the number of calls to certain types of fires (including outdoor fires) but does not note whether the call is related to wildland fires or the significance of the response.

Some illustrations of the wildland fire danger are possible. According to the Bureau of Land Management, there was an annual average of 297 fires over 205,433 acres from 1988 to 1997.

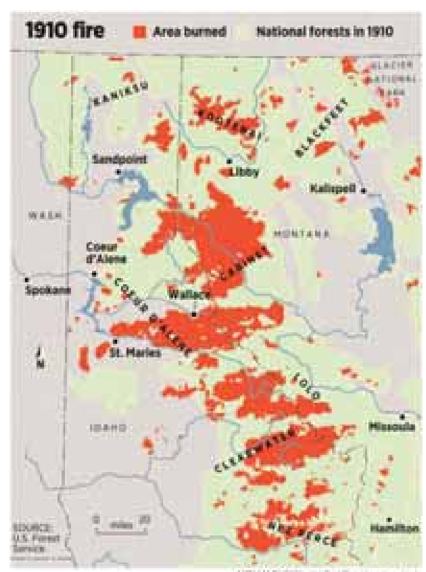
Table 3-8 (below) and Map 3-8 (at the end of this section) present some of the significant wildland fires that have been recorded in Idaho. While specific references to WUI-type losses are limited in this table, the scale and frequency of Idaho wildland fires are well illustrated.

1910 Fire

The following text was excerpted from an article written by Jim Kershner from the August 15, 2010, edition of the *Spokesman-Review*. Map 3-6 provides an overview of the event for reference.

> *Some came to call it The Big Blowup. Others called it the Big Burn. By any name, it was easily the biggest forest fire in the Inland Northwest's history – actually the biggest forest fire in U.S. history.*
>
> *A century ago, 3 million acres of North Idaho, Montana and Washington forest were turned to charcoal in two wind-whipped days. The towns of Taft, Haugan, DeBorgia in Montana, and Grand Forks and Falcon in Idaho, were destroyed. One-third of Wallace was obliterated. At least 85 people died.*
>
> *A forest the size of Connecticut was exploding in a fearsome whoosh – generating, with fire and oxygen, its own tornadoes and cyclones. One survivor called it "the sound of a thousand trains rushing over a thousand steel trestles." Another said it could be compared only to the "roar of Niagara Falls." The noise was a deafening combination of 60 mph gales, colossal fire-driven updrafts, and the clamor of hundreds of trees cracking, snapping and slamming against earth. One witness said it sounded like being in the midst of "heavy cannonading."*
>
> *1910 began with a disastrously snowy winter and then turned into an ominously dry spring and summer. The first wildfires in the Northern Rockies flared up in the unheard-of month of April. The drought persisted into summer and by late June and early July crews already were patrolling the forest "reserves," as the national forests were then called, putting out dozens of spot fires. By late July and early August thousands of fires were smoldering deep in the mountains of Idaho, Montana and Washington.*
>
> *The smokiest areas of all were in the vast St. Joe River drainage and the more thickly settled Coeur d'Alene River drainage of North Idaho.*
>
> *The fires had three main sources. Lightning strikes (including hundreds on July 26 alone); people, mainly farmers, prospectors and loggers who were clearing land and burning slash; and railroads, including one of the most audacious and expensive rail lines ever built, the Chicago, Milwaukee, St. Paul and Pacific line (called The Milwaukee*

Map 3-6: 1910 Fire / Source: United States Forest Service



Road) completed a year earlier over the Bitterroots. "Locomotives threw sparks like a Roman candle chugging down the tracks," wrote Pyne.

The forest rangers at Wallace acquired a small fleet of velocipedes, or "speeders," which were like bicycles that could be used on railway tracks. The rangers scooted along behind the trains and put out the fires alongside the tracks.

By mid-August, thousands of firefighters — including thousands of Army troops — were out in the mountains. Most were already exhausted from cutting fire lines (essentially, trenches) for miles through wilderness. The rangers were only too aware that hundreds of small fires were still alive, creeping along through brush and smoldering in the duff. The rangers' biggest fear was that a big wind would whip all of these fires into flame simultaneously.

On Aug. 20, 1910, that's exactly what happened.

Fire crews deep in the forests noticed with apprehension that the wind was freshening from the southwest. By mid-day it was a full-blown gale on the mountain ridges — the dreaded "Palouser," named for the Palouse country to the southwest.

The crews knew the winds boded ill, but it wasn't until that afternoon that they looked up to see a truly horrifying sight: Huge black clouds, like giant inky thunderheads, blotting out the sun. These were clouds of smoke, ash and cinders, carried high aloft by giant, roaring updrafts. It meant that those hundreds of small fires across the Clearwater, St. Joe, Coeur d'Alene and Bitterroot regions had flared, marched and in many cases, joined up together and created a massive chain reaction of fuel, flame and oxygen. It was a true firestorm, massive enough to create its own roaring vortexes. Witnesses estimated clouds of smoke and ash 2,000 feet in the air.

Down on the ground, these winds and updrafts created crown fires that moved faster than a man could run – faster than a locomotive could steam, said some witnesses. Entire mountainsides of trees were blown down like matchsticks.

The scale was immense. Telegraph operators sent out desperate messages describing the approach of a solid line of flame 30 miles wide, and that was no exaggeration. Today, you can drive Interstate 90 east from Wallace, Idaho to just short of St. Regis, Mont. — about 45 miles — and be within the old burn zone every mile of the way. And this was by no means the only burn zone in the Northern Rockies – just the biggest.

Fires of 2000

During the fires of 2000, smoke from the fires became a constant companion to residents throughout the State, affecting the health, recreation, and daily life of many communities. Several times, the Idaho Department of Environmental Quality issued air quality advisories to several communities in Idaho because of "very unhealthy" or "hazardous" air quality concerns. The town of Salmon requested and received air purifiers for their residents.

The recorded losses include 700 cattle on one ranch in Dietrich, Idaho. Within the State of Idaho, 109 structures were destroyed: 38 residences (homes, cabins, or trailers), 70 outbuildings, and one commercial building/business. A total of 9,568 structures were threatened: 6,061 primary residences, 1,635 outbuildings, and 1,872 commercial building/businesses. The town of Atlanta imported potable water because the town's water system was damaged.

Emergency closures of Federal and State lands affected approximately 3 million acres. Over 2,000 miles of trails, over 80 miles of river, and almost all public airstrips were closed. Restrictions were placed on campfires, smoking, and the use of chainsaws and other equipment.

These closures and restrictions had an enormous impact. Many businesses that depend on the region's tourism in the summer and fall seasons suffered economically. During the 26 days that the Salmon River in the Frank Church River of No Return Wilderness was closed to recreation, 4,000 outfitter floaters, 2,300 private floaters, and 140 commercial jet boaters who were scheduled to float the river were unable to take their trips. These lost trips resulted in a loss of personal income and employment for surrounding communities. The closures also affected the plans of about 600 hunters, who had booked guided hunts in the wilderness area, in addition to the large number of resident hunters depending upon big game for their winter food supply.

During the period 1976 to 2000, 12 wildland fire events (or groups of events) resulted in State-declared disasters. Nine of these disasters covered the entire State. Throughout the West, the number of large wildfires, and of acres burned by them, has increased over the last decade, as have the costs of attempting to put them out. Table 3-9 lists all significant wildfires that have occurred in Idaho.

Table 3-9: Significant Idaho Wildfires

Year	Disaster Declarations (1976-2000)	WUI Impact	Comments
1910	-	X	85 lives lost; fire consumes 1/6 of north Idaho forests, destroying many communities
1960	-		Large fires burn in Hells Canyon and Idaho City areas
1967	-		10 counties in Panhandle affected; 50,000 acres burned in nine hours
1985	State (2)		Two Statewide declarations (July and August)
1986	State		Statewide declaration
1987	State (4)		Three counties declared individually: Ada (June), Adams (August), and Bannock (August); Statewide declaration in August

Table 3-9: Significant Idaho Wildfires			
Year	**Disaster Declarations (1976-2000)**	**WUI Impact**	**Comments**
1989	State	X	The worst fires since 1910 burn thousands of acres in south-central Idaho, partially destroying the town of Lowman and leading to State-wide declaration
1992	State (2)	X	One life lost in the worst fire season in Idaho history to date; one of two Statewide declarations was for an unusual spring event (April)
1994	State	X	One life lost and one home lost; summer wildfires burn over 750,000 acres, resulting in a Statewide declaration
1999			Mule Butte, BLM Aberdeen District, 138,915 acres
2000	State, Federal	X	More than 1,500 individual fires: Clear Creek, Salmon Challis National Forest 216,961 acres; Crystal Complex, Idaho Falls BLM District, 220,042 acres; SCF Wilderness, Salmon Challis National Forest, 182,600 acres; Diamond, Payette National Forest, 149,772 acres
2003			Cramer Complex Fire, 13,845 acres, two lives lost
2005			Wildland fire totals: 1,154 fires, 442,391 acres. Clover Complex, Twin Falls BLM District, 192,846 acres; East Idaho Complex, Idaho Falls BLM District, 192,450
2006			Wildland fire totals: 1,831 fires, 933,548 acres
2007	State, Federal		Wildland fire totals: 1,473 fires, 1,980,552 acres. Cascade Fire complex, East Zone Complex, Castle Rock Complex
2008			Wildland fire total: 997 fires, 116,796 acres
2009			Wildland fire total: 1,142 fires, 22,681 acres
2010	State, Federal		Wildland fire total through Sept 18: 908 fires, 608,821 acres, Hurd.
Source: National Interagency Fire Center, http://www.nifc.gov/fire_info/fire_stats.htm			

Future Occurrence

There is a 100-percent chance of wildfires occurring in any given year in Idaho. Based on the past six years, an average of 1,251 wildfires occur each year, burning an average of 684,000 acres. However, while the number of wildfires per year is relatively consistent, the number of acres burned can be highly variable. Considering factors affecting growth and forest health, the future occurrence of this hazard should not be expected to diminish from current trends.

Environmental Impacts

Idaho has experienced several large, long-lasting wildfires in recent years, which burned thousands of acres at a time. These fires are not always considered to be good for the forest, because they burn such a large amount of vegetation all at one time. Wildlife is often affected by these large burns. For example, animals such as deer, elk, rabbits, chipmunks, and other foraging creatures must find new areas to forage for food when thousands of acres have burned all at one time. It is safe to say that these large burns are "bad fires."

Why do we have large fires? In many cases, large fires occur because of hot, dry temperatures and an intense build-up of vegetation in the forest. When wildfires do not burn frequently in a given forest, the vegetation accumulates and provides more fuel for larger fires. More fuel means more fire, which in turn creates large wildfires that are difficult to suppress and spread quickly.

Good fires occur when a fire ignites and burns slowly, burning mostly ground vegetation and a few trees. These fires help Idaho's ecosystems by cleaning out dead and/or crowded vegetation, but leaving the majority of large trees alive and able to repopulate the forest.

Some trees rely on wildfire to repopulate the forest. Many of these trees drop "serotinous cones" from their branches. The seeds, sealed in the cone by resin, are stored for many years until they are exposed to intense heat that melts the resin covering the cone and allows the cone to open. The seeds are then able to germinate when conditions are optimum; in the ashes immediately after a forest fire. For example, the Lodgepole Pine trees in many of Idaho's forests drop serotinous cones on the forest floor. These trees are considered "fire dependent," because they need fire in order to spread their seeds.

Wildfire plays an important role in the health of Idaho's rangelands, just as it does in Idaho's forests. Juniper trees grow on Idaho's rangelands. They are also fire dependent. Without regular wildfires, juniper trees begin to grow in areas where sagebrush and grasses grow naturally. The juniper trees crowd out the sagebrush and grasses, causing habitat loss for sagebrush-dependent birds such as the sage grouse.

Wildfire can also bring opportunities for noxious weeds to grow on Idaho's rangelands. Cheatgrass is one invasive weed that is widely distributed throughout the western U.S. It is not native, meaning that it was introduced from another continent. Cheatgrass probably originated in southwestern Asia; scientists think that grain brought from Europe in the late 1890s had cheatgrass seeds in it, and they were then spread to Idaho's rangelands. Because cheatgrass can grow in Idaho's climate and soils, it has spread rapidly throughout Idaho's rangelands.

After fires burn on Idaho's rangelands, cheatgrass begins to grow before Idaho's native plants, because it sprouts early in the spring. When cheatgrass grows first, Idaho's native plants do not have soil and water to grow. Cheatgrass is also very flammable and grows in a continuous bed of grass, whereas Idaho's native grasses grow in clumps with separation between them. Because cheatgrass covers large areas, wildfire burns rapidly through it, creating larger, faster-moving wildfires that are difficult to control.

Development Trend Impacts

From 2001 to 2007, the annual appropriations to the Federal agencies with wildland fire management missions averaged $2.9 billion per year. This is a doubling of funds compared to the period from 1996 to 2000, when the average appropriations were $1.2 billion. When adjusted for inflation, this represents an increase from $1.5 billion to $3.1 billion (in 2007 dollars). Nationally, the reasons for this include a build-up of fuels, resulting in part from past fire suppression policies; a warming climate, including drought in the West; and the development of homes adjacent to fireprone public lands (see Figure 3-5).

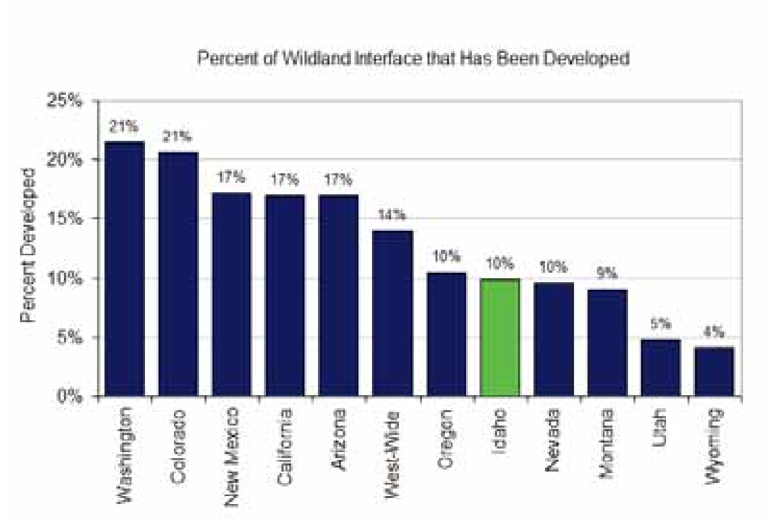


Figure 3-5: Wildland-Urban Interface / Source: www.headwatereconomics.org

Numerous studies have resulted in different figures for the size and number of homes in the WUI, and the fact is that there is no agreed spatial definition of the "WUI zone," but all studies agree that the WUI is extensive and is rapidly expanding. For example, USFS researchers estimate that 44 million homes in the continental United States are located in the WUI, with approximately 8.4 million of these homes built during the 1990s. NAPA predicts that by 2030, the number of homes in the WUI will be 40-percent higher than 2001 levels. According to Headwaters Economics, only 14 percent of available private land in the WUI is developed (10 percent in Idaho), leaving a huge potential for growth in the remaining 86 percent of the acreage.

According to a 2007 study by Headwater Economics, based on the large number of undeveloped private land in the WUI, future development trends will result in increased wildfire risk, especially to homes and personal property. Figure 3-5 indicates that only 10 percent of the WUI in Idaho has been developed.

In Idaho, the current risk of wildfire (number of square miles of WUI with existing homes) and the potential risk (number of square miles of WUI that remains undeveloped) are both highest in the northern parts of the State. Bonner County, where 8,020 homes are spread across 77 square miles of WUI, ranks fourth in the West in terms of existing wildfire risk. Shoshone County also has extensive development (more than 20 square miles) near fireprone wildlands. Northern Idaho has an exceptionally high potential risk. Combined, the 10 most northern counties in Idaho have more than 1,500 square miles of undeveloped, forested private land adjacent to fireprone wildlands, where homes are likely to be built in the future.

Critical Infrastructure and State Facility Impacts

Based on GIS data, 743 of the State's 3,528 facilities are located in the in top fifth of the State's highest wildfire risk counties (see Map 3-7, at the end of this section). Due to the lack of information in the database for State facilities, it is not possible at this time to describe additional impacts to State facilities and infrastructure.

Vulnerability Assessment and Loss Estimation

Statewide Analysis

Wildfire risk is complicated. More than the other major hazards, wildfire risk has major consequences for both the natural and human environments. Also, there is no consensus on what constitutes the WUI. Different Federal agencies have different definitions of the WUI. For the purposes of this plan, the analysis done by Headwater Economics in a 2007 statewide analysis of wildfire is the most recent and applicable study. This study ranked the counties relative to one another in terms of wildfire risk. Counties are ranked by the number of square miles of developed land in the WUI; these are shown on Map 3-7, at the end of this section. Since guidelines for the amount of defensible space necessary to protect homes range from 40 to 500 meters, a threshold of 500 meters was used to identify where residential development has occurred adjacent to fireprone public lands. This is a conservative estimate of the WUI and the associated risk of fire, since it is unknown how many homeowners within this zone have followed defensible space guidelines.

Similarly, wildfire losses are difficult to estimate. Losses are usually the result of several types of costs:

- **Direct Costs**: Wildfire costs are most easily measured when they have immediate and direct impacts. This category prominently includes Federal, State, and local suppression costs. These costs, in turn, can be broken down into expenditures for aviation, engines, firefighting crews, and agency personnel. In addition to suppression costs, other direct costs include private property losses (insured and uninsured), damage to utility lines, damage to recreation facilities, loss of timber resources, and aid to evacuated residents. Most of these costs are incurred during or immediately following the fire.
- **Rehabilitation Costs**: Immediate emergency rehabilitation costs are sometimes considered direct, since those costs are incurred in the days, weeks, and months following the fire and are clearly attributable to the wildfire event. The costs are shouldered by Federal, State, and local agencies and, again, the data are relatively accessible. Longer-term rehabilitation costs, however, are harder to measure, and ongoing rehabilitation expenses may not be clearly connected to the wildfire event. Watersheds damaged by fire, in particular, can take many years to recover and require significant restoration activities. Post-fire flooding events can create additional damage to the already scarred landscape, and subsequent impacts may include an increase in invasive species and erosion.

- **Indirect Costs**: Once the fire has been extinguished and rehabilitation efforts have begun, additional costs continue to accumulate. These costs have historically escaped accounting by land management agencies, and may extend years beyond the wildfire event. Indirect wildfire costs include lost tax revenues in a number of categories, such as sales and county taxes, as well as business revenue and property losses that accumulate over the longer term. For example, properties that escape damage in the fire may still experience dramatic drops in value as the area recovers.
- **Special Costs**: Beyond the indirect costs associated with wildfire are longer-term costs, often called "special" costs. Putting a numerical value on human life is always a dubious effort, but some standardized numbers do exist for guidance. When a firefighter perishes in the line of duty, families receive a set sum for their loss; this number serves as a proxy for the cost of lost life. Loss of civilian life, ongoing health problems for the young, old, and those with weak respiratory or immune systems; and mental health needs also fall into this category but are rarely quantified. Additionally, there is an extensive loss of ecosystem services, some of which are inherently difficult to quantify—aesthetic and scenic beauty and wildlife existence values.

The USFS determined that over a 20-year period, suppression actions cost an average $582 per acre. According to the study *The True Cost of Wildfire in the Western U.S.,* by the Western Forestry Leadership Coalition, the true costs of wildfire are shown to be far greater than the costs usually reported to the public; total expenses range from 2 to 30 times the reported suppression costs. Estimates of total costs appear to be determined by a host of factors including fire severity, nearby population density, terrain, and the boundaries of the analysis itself. Based on the past five-year average number of acres burned and the costs cited above, the average annual losses in Idaho have been approximately $80 million.

Compilation of Local Hazard Mitigation Plans

All 47 of the State's local hazard mitigation plans were analyzed for use in the State's hazard mitigation plan update. Certain sections of the plans were then collected into a central database that allowed for further analysis. These data were summarized, and some of the results are provided below. Map 3-9, at the end of this section, highlights the 14 local plans that identified wildfire as one of their significant hazards. For these jurisdictions that would be considered the most vulnerable to the hazard of wildfire (based on their own prioritization), Table 3-10 summarizes the number of structures impacted by the wildfire hazard and the corresponding loss estimate.

BHS directly participates in the Idaho State Fire Plan Working Group (ISFPWG), which is described in Appendix D. The ISFPWG is a multiagency (local, State and Federal) organization that has oversight of the county Community Wildfire Protection Plans (CWPPs). As a matter of practice, the CWPPs are developed in collaboration with the State Fire Plan and have been integrated into the counties' Local All-Hazard Mitigation Plans. Consequently, the BHS maintains a high degree of confidence in the local plans and the oversight of the ISFPWG as a means of coordinating and implementing viable, comprehensive, and locally derived wildfire hazard mitigation plans.

Table 3-10: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Wildfire as a Significant Hazard			
Local Plan Name	Wildfire Ranked as Significant	Structures in Hazard Area	Loss Estimate
Ada	X		
Adams	X		
Bannock	X		
Bear Lake	X		
Benewah	X		
Bingham	X	4,184	$364,802,960
Blaine	X	15,651	$5,116,656,494
Boise	X		
Bonner			
Bonneville	X	2,405 (parcels)	$114,414,454
Boundary	X		
Butte	X	2,452 (parcels)	$21,335,858
Camas	X		
Canyon			
Caribou	X	376	
Cassia	X	4,469	$289,455,008
Clark	X		$100,000
Clearwater	X		
Custer	X	8,066	$322,082,265
Duck Valley Reservation	X		
Elmore	X	10,527	
Franklin	X		$1,000,000s
Fremont			
Gem	X	5,888	
Gooding	X		
Idaho	X		
Jefferson	X	2,076	$141,369,512
Jerome	X	7,059	$403,067,346
Kootenai	X	2,2855	$1,928,226,724
Latah	X		
Lemhi	X	9,746	$458,784,542
Lewis	X		
Lincoln	X		

Table 3-10: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Wildfire as a Significant Hazard			
Madison			
Minidoka	X	3,060 (parcels)	$303,454,379
Nez Perce	X		
Nez Perce Tribe	X	771	$27,858,600
Oneida	X	2,705 (parcels)	$13,720,490
Owyhee	X		
Payette	X		
Power	X	2,452	$206,151,132
Shoshone	X		$38,232,892
Shoshone-Bannock Tribe	X		
Teton			
Twin Falls	X	2,4576 (parcels)	$1,219,382,497
Valley	X		
Washington	X		

Consequence Analysis Scenario

Vulnerability was also assessed by conducting a consequence scenario that analyzed a hypothetical hazard event. The Executive Committee met on June 4, 2010, to analyze a number of hazard scenarios. All participants then summarized their thoughts in a two-page survey. The first page of the survey asked the committee to score (from 0 to 5, 5 being the direst) the short term (0-6 month) and long-term (6+ months) consequences of each particular scenario as it pertained to the following systems:

- The public
- First responders
- Continuity of operations
- Property, facilities, and infrastructure
- Economic conditions
- Public confidence in government
- The environment

For the hazard of wildfire, the scenario focused on an event in the City of McCall. This event was intended to replicate a wildfire that occurred in August 1910. Figure 3-6 summarizes the results of the survey. The committee determined that the short-term impact of this wildfire event was greater than its long-term effects. The public and first responders stood out as being the systems most impacted.

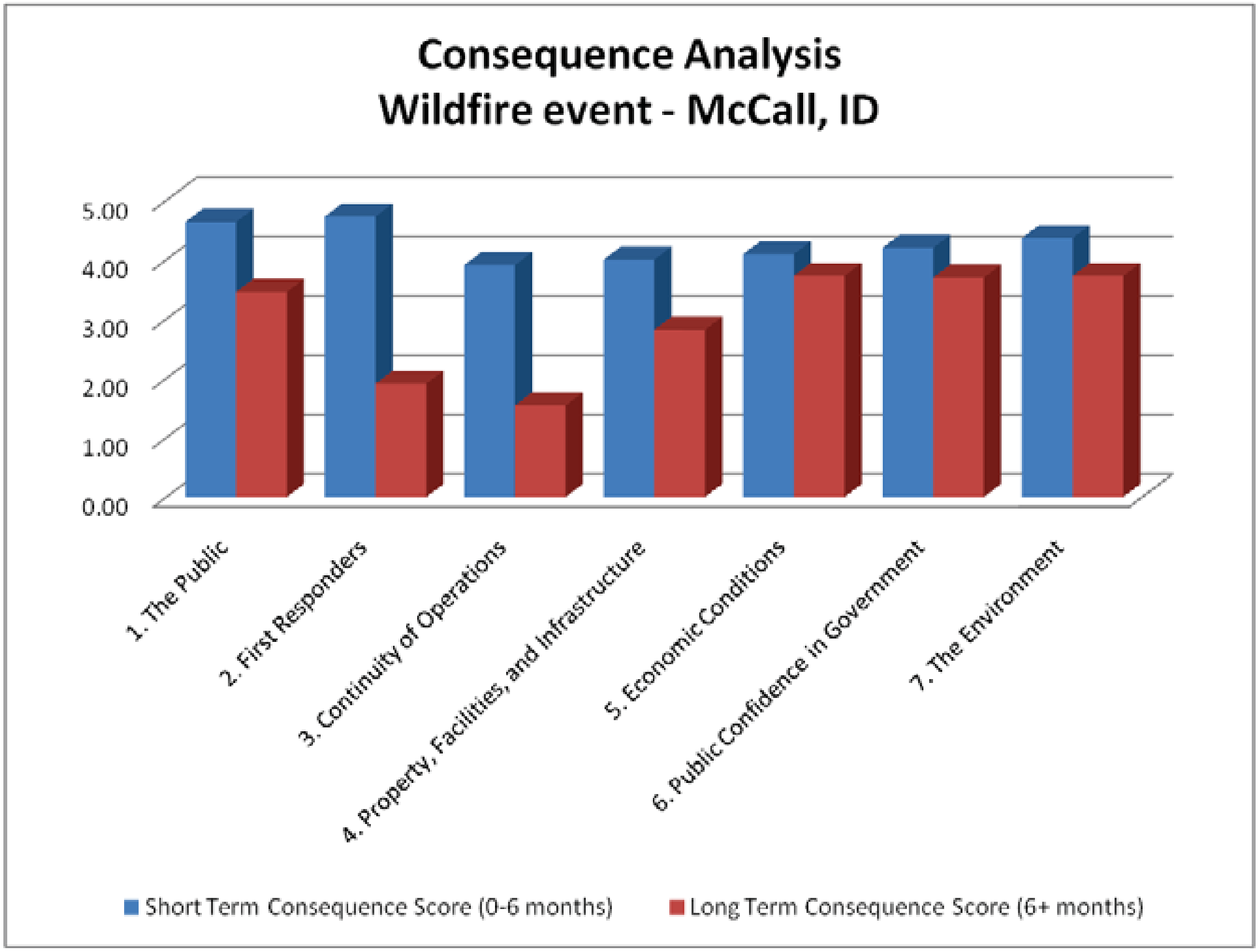


Figure 3-6: Consequence Analysis Wildfire

Mitigation Rationale

Wildfires are one of the most frequently occurring hazards in the State; in terms of total costs, they are one of the costliest, year in and year out, even though many of these costs may be externalized. It is considered a major hazard. The focus of wildfire mitigation is on the WUI, where most existing and new development is occurring. A significant area of Idaho's WUI is undeveloped.

Source: BHS

Recent studies on large-scale fires indicate that developed property in the WUI can be protected, even in intense firestorms. Thus, the application of correct mitigation techniques is critical.

General Mitigation Approaches

Wildfire experts generally agree that increased fire suppression efforts alone will not be successful in stopping the large, intense wildfires likely to occur in the next several decades. Such conflagrations as occurred in summer 2000 are generally impossible for firefighters to stop and are only extinguished by rainfall or depletion of the fuel load.

It is clear, therefore, that the elimination of wildfires is not the goal of WUI fire mitigation. As a practical matter, and as discussed above, it has been shown that the immediate suppression of all wildfires is not an effective long-term strategy. The goal is to rather to eliminate or reduce the risks to human lives, property, and desired resource values.

The specific goal of this Plan is to eliminate or reduce those risks in the WUI. Mitigation of WUI fires generally takes the form of creating fire-resistant landscapes and development, and eliminating possible ignition sources.

There are many possible ways to mitigate effects of wildfires. Approaches include the following:

1. Continue programs to reduce fuel loads in critical areas.
2. Publish maps identifying areas with a high probability of wildland fires.
3. Increase public awareness of the financial consequences of building homes in fireprone areas and of mitigation activities that can be taken (i.e., defensible space areas).
4. Improve land-use planning and land-use regulatory mechanisms for fireprone areas.
5. Add incentives for counties to sign firefighting cost-share agreements.
6. Purchase or obtain easements on fireprone lands.

WUI Mitigation: Deer Creek Defensible Space - in the Wake of the Poe Cabin Fire

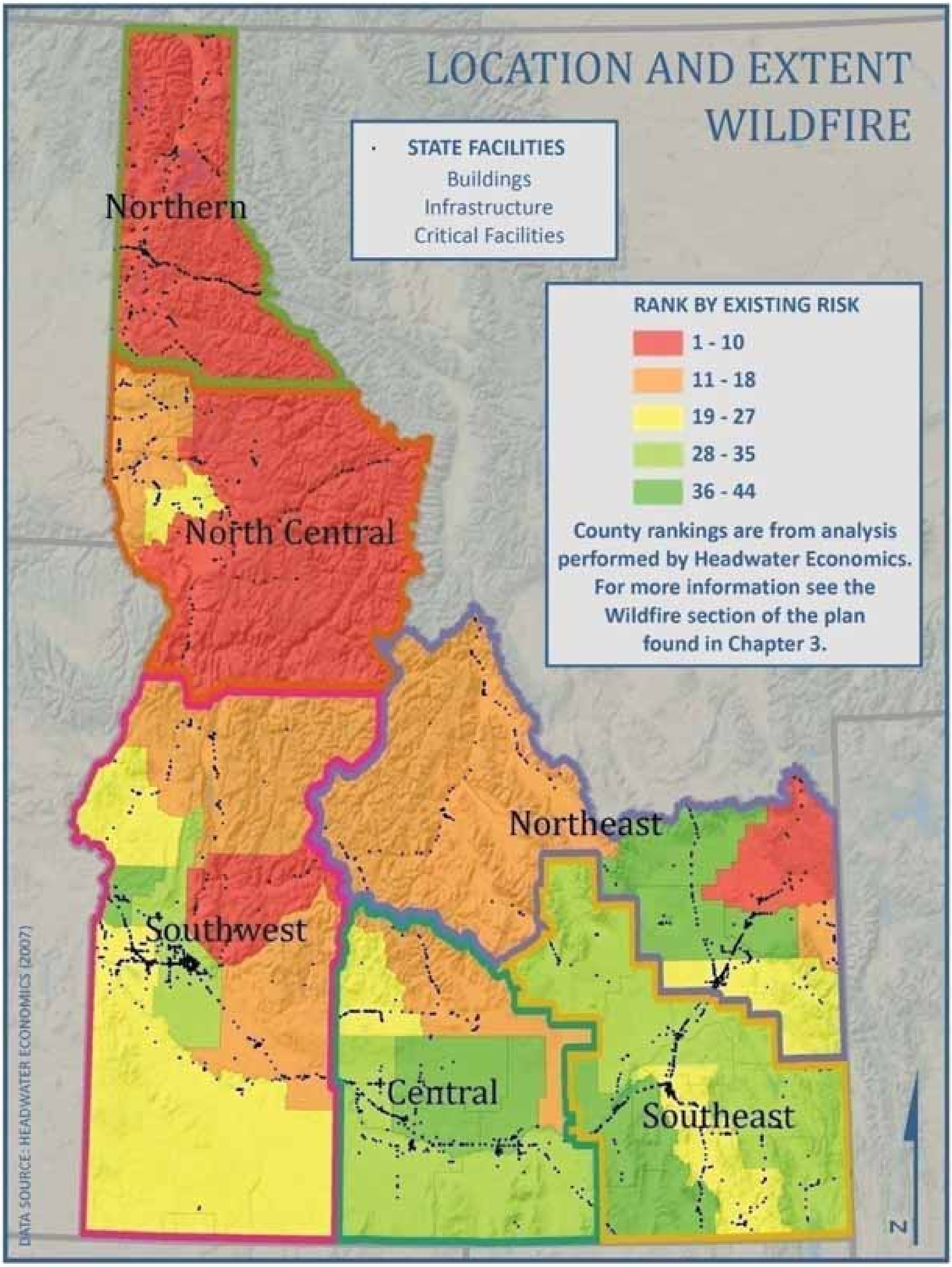
Susan Jenkins, Nez Perce NF Fire Prevention Technician

In 2003, the full-time residents of the upper Deer Creek drainage united to plan and implement a defensible space project in an effort to reduce woodland fuel accumulation. A combination of dense brush, steep terrain, the presence of beetle-killed trees, and over fifty years of fire suppression had created a dangerously high level of wildfire risk.

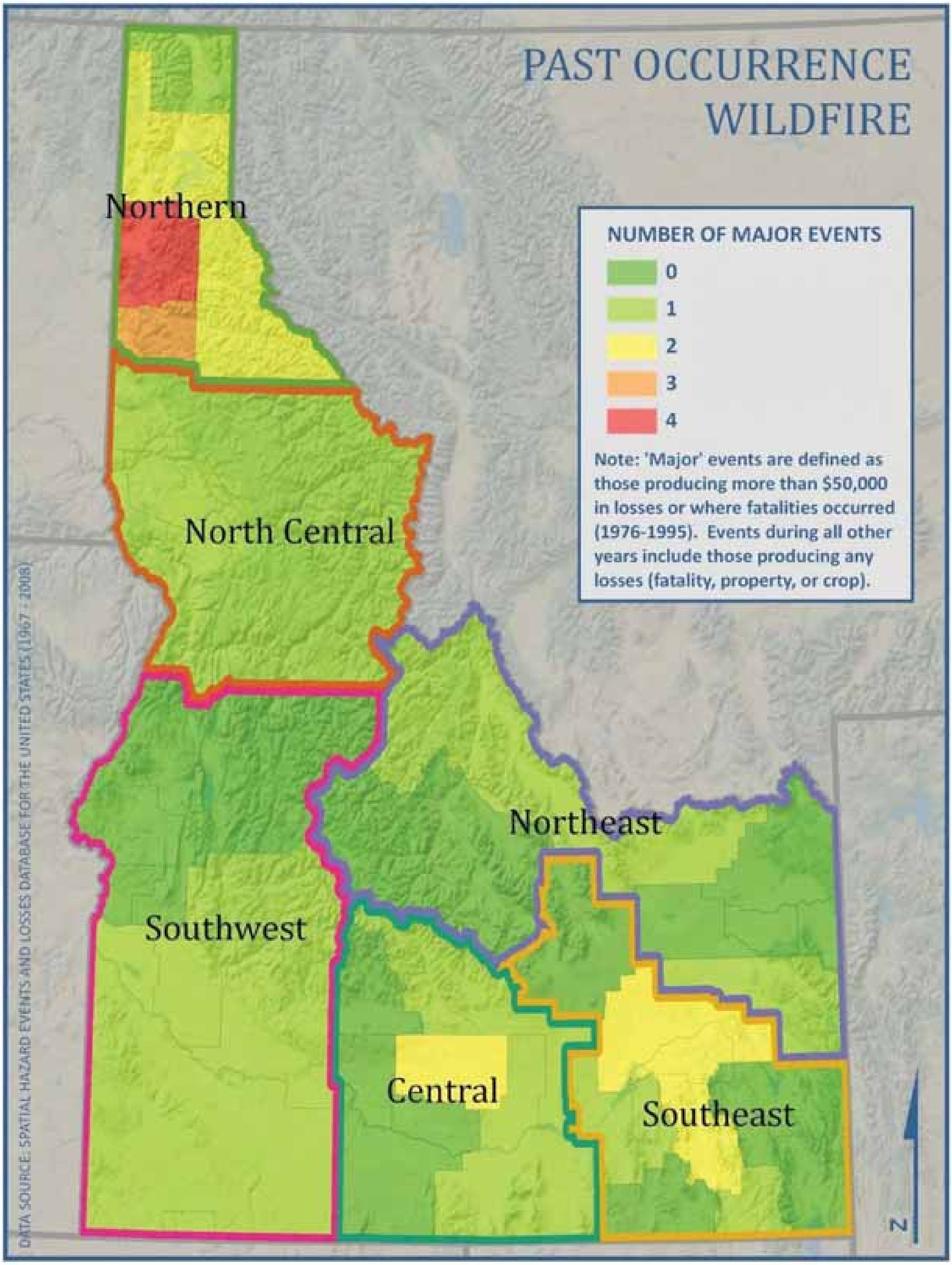
In 2004 a grant was awarded to residents through Framing Our Community. The funds awarded allowed for assessments on structures in upper Deer Creek, completion of a fire prevention plan, and the reduction of fuels surrounding homes and other structures in the area. While only required to give a ten percent match to the funds awarded, homeowners provided equal amounts to that of the grant in both money and labor.

On July 20th of this year, residents had their defensible space tested when the Poe Cabin fire spilled into the Deer Creek drainage. Crossing from the western ridge to the head of Deer Creek, the fire raced downhill through both the ground fuels and treetops of surrounding woods. Many fled quickly, leaving their homes and possessions behind. Others were cut off from escape routes by the flames and were forced to ride out the storm, defending their properties and themselves.

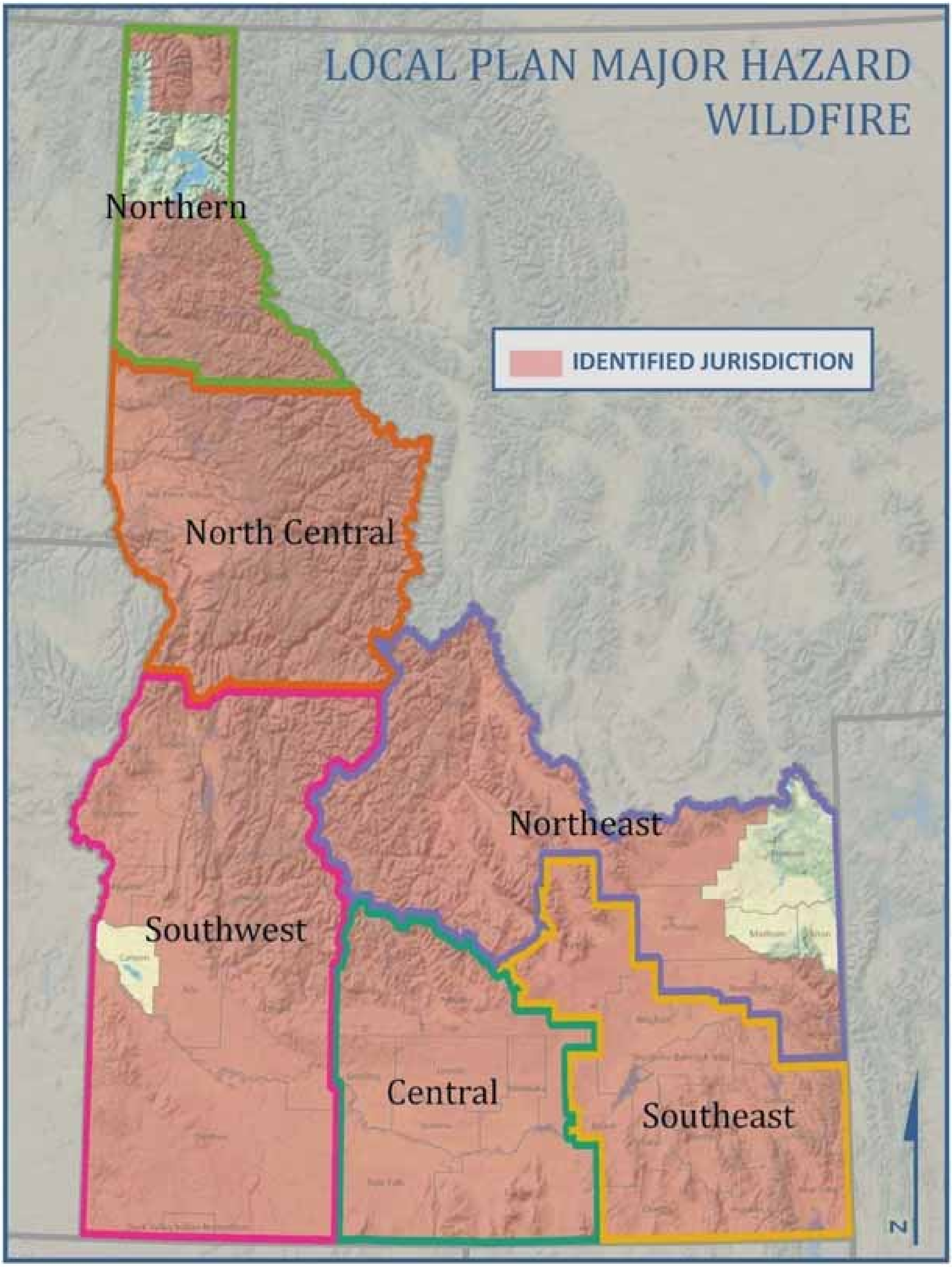
From this event, it became quite clear for one community that none of us have control over natural elements or what happens on public lands; but, how <u>we</u> manage our private lands and structures can make the difference in surviving a wildfire.



Map 3-7: Wildfire Location and Extent



Map 3-8: Wildfire Past Occurrence



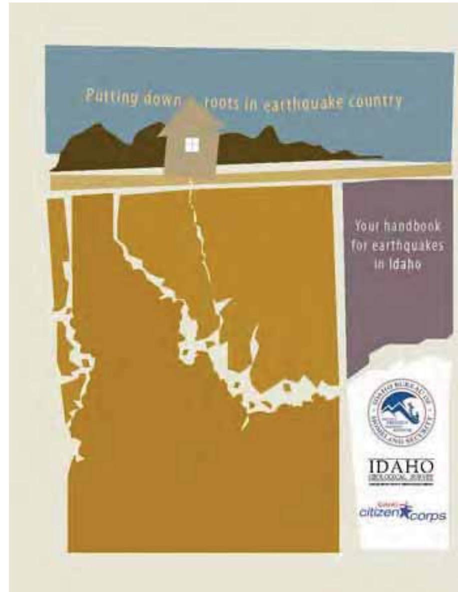
Map 3-9: Wildfire Identified as Local Plan Major Hazard

RISK ASSESSMENT: EARTHQUAKE

Description

Idaho's earthquakes result from three causes:

- Plate Tectonics
- Crustal Stretching
- Hotspot/Volcanic Activity



An excellent source of additional information on the earthquake hazard in Idaho is the publication *Putting Down Roots in Earthquake Country*

http://www.idahogeology.org/uploads/Earthquake-9-10-09.pdf

The surface of the earth (the crust) is made up of large masses, referred to as tectonic plates. Many of the world's earthquakes result from forces along the margins of these tectonic plates. These earthquakes occur when pressure resulting from these forces is released in a sudden burst of motion. Such earthquakes are produced in coastal California, Oregon, and Washington. The largest of these distant events may be felt in Idaho.

However, most earthquakes in Idaho have origins (the epicenter) far from plate boundaries. Much of the earth's crust in southern and central Idaho has undergone tremendous stretching, resulting in parallel, linear mountains and valleys. This region is called the Basin and Range and extends into the adjoining States of Montana, Utah, Wyoming, and Nevada. Basin and Range stretching is continuing today. Earthquakes from these crustal movements can also cause severe ground shaking in Idaho.

Finally, Idaho earthquakes may be associated with magmatic activity. This activity is associated with the "Yellowstone Hotspot." The hotspot is a conduit carrying molten rock (magma) from deep within the earth into the crust. Pressures within the hotspot zone lead to earthquakes. Although there are currently no surface releases of magma through volcanoes or volcanic vents, the hotspot is very seismically active. Dozens of small earthquakes are recorded in the Yellowstone region each month.

Earthquake Mechanics

Regardless of the source of the earthquake, the associated energy travels in waves radiating outward from the point of release. When these waves travel along the surface, the ground shakes and rolls, fractures form, and water waves may be generated. Earthquakes generally last a matter of seconds, but the waves will travel around the world in a matter of minutes and may cause damage elsewhere.

Breaks in the crust associated with seismic activity are known as "faults" and are classified as either active or inactive. Faults may be expressed on the surface by sharp cliffs or scarps or may be buried below surface deposits.

"Foreshocks" may occur months or minutes before the actual onset of an earthquake. Although smaller than the main shock, some foreshocks are large, damaging earthquakes. "Aftershocks," which range from minor to major, may occur for months after the main earthquake. In some cases, strong aftershocks may cause significant additional damage, especially if the initial earthquake affected emergency management and response functions or weakened structures.

Idaho has active faults that have produced a number of historic earthquakes. These faults are classified as normal faults and were produced by Basin and Range stretching. The faults extend into the crust at dips of about 60 to 70 degrees. Earthquakes along the faults occur at depths of less than 35 kilometers. Seismologists term these shallow earthquakes.

Factors Contributing to Damage

The damage associated with each earthquake is subject to four primary variables:

- The nature of the seismic activity
- The composition of the underlying geology and soils
- The level and quality of development of the area struck by the earthquake
- The time of day

Seismic Activity: The properties of earthquakes vary greatly from event to event. Some seismic activity is localized (a small point of energy release), while other activity is widespread (e.g., a major fault letting loose all at once). Earthquakes can be very brief (only a few seconds) or last for a minute or more. The depth of release and type of seismic waves generated also play roles in the nature and location of damage; shallow quakes will hit the area close to the epicenter harder, but tend to be felt across a smaller region than deep earthquakes.

Geology and Soils: The surface geology and soils of an area influence the propagation (conduction) of seismic waves and how strongly the energy is felt. Generally, stable areas (e.g., solid bedrock) experience less destructive shaking than unstable areas (e.g., fill soils). The siting of a community or even individual buildings plays a strong role in the nature and extent of damage from an event.

Development: A small earthquake in the center of a major city can have far greater consequences than a major event in a thinly populated place. The two major Idaho earthquakes, Hebgen Lake (1959) and Borah Peak (1983) were very strong but occurred in isolated areas with small populations. The damage, compared to that of earthquakes of similar magnitude in heavily populated areas, was relatively light.

Time of Day: The time of day that an event occurs controls the distribution of the population in an affected area. On work days, the majority of the community will transition between work or school and home, so the time of day will affect the location of the population. The relative seismic vulnerability of each location can strongly influence the loss of life and injury resulting from an event.

Types of Damage

While damage can occur by movement at the fault, most damage from earthquake events is the result of shaking. Shaking also produces a number of phenomena that can generate additional damage:

- Ground displacement
- Landslides and avalanches
- Liquefaction and subsidence
- Seiches

Shaking: In minor events, objects fall from shelves and dishes are rattled. In major events, large structures may be torn apart by the forces of the seismic waves. In all but the largest quakes, structural damage is generally limited to older structures that are poorly maintained, constructed, or designed. Unreinforced masonry buildings and wood frame homes not anchored to their foundations are typical victims. In areas of severe seismic shaking hazard, Intensity VII or higher can be experienced even on solid bedrock. In these areas, older buildings especially are at significant risk.

Loose or poorly secured objects also pose a significant hazard when they are loosened or dropped by shaking. These “non-structural falling hazard” objects include bookcases, heavy wall hangings, and building facades. Home water heaters pose a special risk, due to their tendency to start fires when they topple over and rupture gas lines. Crumbling chimneys may also be responsible for injuries and property damage.

Dam and bridge failures are significant risks during stronger earthquake events, and may result in considerable property damage and loss of life.

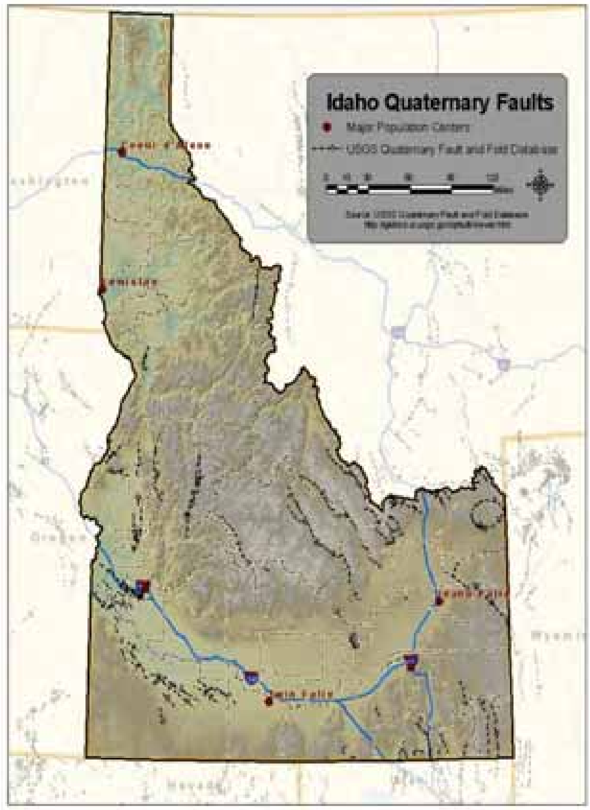
Ground Displacement: Often, the most dramatic evidence of an earthquake is the displacement of the ground along a fault line (see Maps 3-10 and 3-11). The Borah Peak event created a surface fault nearly 22 miles long and generated a scarp face up to 9 feet high in certain locations. Utility lines and roads may be disrupted, but damage directly attributable to ground displacement is generally limited. In rare instances, structure located directly on the fault line may be destroyed by the displacement.

Landslides and Avalanches: Even small earthquake events can cause landslides. Rock falls are common as unstable material on steep slopes is shaken loose, but significant landslides or even debris flows can be generated if conditions are ripe. Roads may be blocked by landslide activity, hampering response and recovery operations. Avalanches are possible when the snowpack is sufficient.

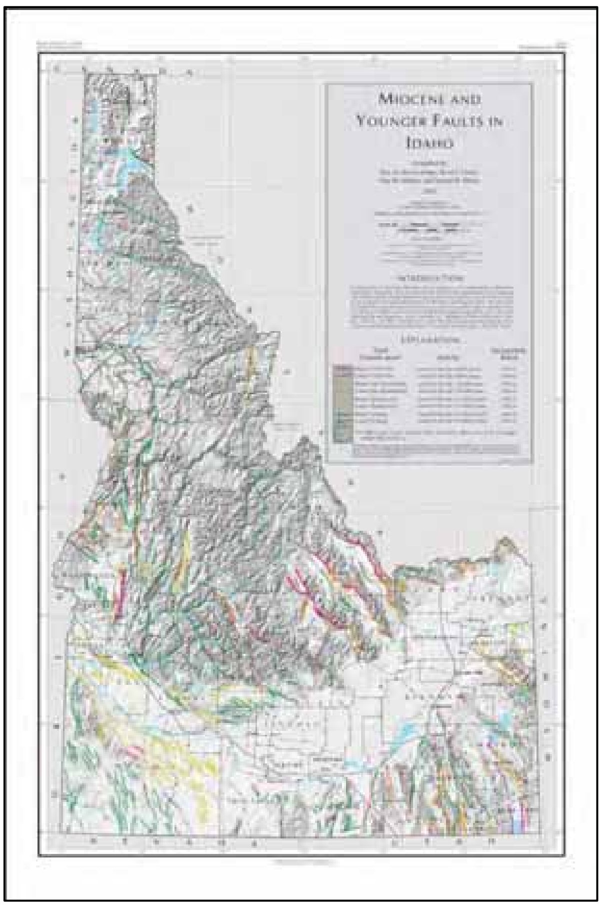
Liquefaction and Subsidence: Soils may liquefy and/or subside when impacted by the seismic waves. Fill and previously saturated soils are especially at risk. The failure of the soils can lead to widespread structural damage. The oscillation and failure of the soils may result in increased water flow and/or failure of wells, as the subsurface flows are disrupted and sometimes permanently altered. Increased flows may be dramatic, resulting in geyser-like water spouts and/or flash floods. Similarly, septic systems may be damaged, creating both inconvenience and health concerns.

Seiches: Seismic waves may rock an enclosed body of water (e.g., a lake or reservoir), creating an oscillating wave referred to as a "seiche." Although not a common cause of damage in past Idaho earthquakes, there is a potential for large, forceful waves similar to a tsunami (tidal wave) to be generated on the large lakes of the State. Such a wave would be a hazard to shoreline development and pose a significant risk on dam-created reservoirs. A seiche could either overtop or damage a dam, leading to flash flooding downstream.

Further, such events may create the right conditions for a hydrothermal explosion. Yellowstone National Park and the adjacent Snake River plain have experienced 18 large hydrothermal



Map 3-10: Quaternary Faults in Idaho / Source: United States Geological Survey



Map 3-11: Miocene and Younger Faults in Idaho / Source: Idaho Geological Survey

explosions over the past 14,000 years, according to the USGS. This is the most frequent type of explosion in the park. Three areas in Yellowstone; Mary Bay, Turbid Lake, and Indian Pond were apparently formed by large hydrothermal explosions. Mary Bay is nearly one mile across. The following URL provides a link to a recent USGS report regarding hydrothermal hazards in Yellowstone [http://pubs.usgs.gov/of/2007/1071]

Location, Extent, and Magnitude

As indicated earlier, just as there are multiple sources of seismic activity in Idaho, the location of seismic activity varies as well. Many earthquakes occur along faults; however, Idaho has a considerable number of unmapped faults and many small to moderate earthquakes do not occur on faults. Map 3-10 shows the older Quaternary faults (<1.6 million years ago). The USGS normally ignores these faults unless there is recognized slip in the fault. Map 3-11 shows the faults in Map 3-10 plus older, inactive faults (which correlates to no slippage in 10,000 to 15,000 years).

Map 3-13, at the end of this section, shows the locations of recorded seismic events with an overlay of State facilities. From that map, the highest risk areas are in the Northeast and Southeast BHS planning regions, with some risk in the Southwest region as well. However, Map 3-14, Past Earthquake Occurrence (also located at the end of this section) shows seismicity in the Northern region as well.

The important fact regarding Idaho seismicity is that most Idaho earthquakes are not associated with known faults. This is easily seen when plots of recorded seismicity are compared with fault maps. Many, if not most, Idaho earthquakes are not on mapped faults. One explanation for this is Idaho's poor seismic monitoring. A low density of seismic monitoring stations, as exists in Idaho, would result in inherently poor earthquake location precision. Another possibility is that a number of unknown faults exist and that small earthquakes are occurring away from faults. However, large earthquakes generally occur on large, well-known faults.

The Yellowstone Tectonic Parabola is a region of earthquakes, active faulting, and topographic uplift surrounding the eastern Snake River Plain. This plain was formed as the North American continent passed over a stationary plume or "hotspot" of hot rock rising from the earth's mantle. The pattern of earthquake activity in eastern and central Idaho seems to be related to interactions between the hotspot and Basin and Range extension.

Geologists divide the region into five tectonic belts based on historical earthquake activity and the age and amount of movement on prehistoric faults. Within the Snake River Plain, earthquake activity is very low. Earthquake activity increases and faults become younger away from the plain, culminating in a band of youthful, active faults that forms the tectonic parabola on the east. Faulting and earthquakes in western and northern Idaho are not well-explained by the Yellowstone tectonic parabola model.

The extent and magnitude of earthquakes are measured in two ways:

- Magnitude (as measured by the Richter Scale) – measures the energy that is released
- Intensity (as measured by the Modified Mercalli Intensity Scale [MM]) – measures physical effects

Magnitude is calculated by seismologists from seismograph readings and is most useful to scientists comparing the power of earthquakes. Magnitude is often described using the Richter scale. An earthquake of Magnitude 2.5 or less is usually not felt. Dishes rattling and china shaking occur at Magnitude 3.0, and magnitudes greater than 6.5 are devastating events when the earthquake strikes in or near a populated area.

The Modified Mercalli Intensity Scale is a subjective description of the physical effects of the shaking, based on observations at the event site. The damage from earthquake shaking is affected by several factors, such as distance from the epicenter and local geology and soils. On the Modified Mercalli Intensity Scale, a value of I is the least intense motion, and XII is the greatest ground shaking. Unlike magnitude, intensity can vary from place to place and is evaluated from people's reactions to events and the visible damage to man-made structures. The following is a brief explanation of the Modified Mercalli Scale:

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.

Another way to measure intensity is through ground acceleration. This is expressed as either “peak ground acceleration” (PGA) or “spectral acceleration” (SA) expressed relative to the acceleration of gravity (g) and determined by seismographic instruments. While Mercalli [MM] and PGA intensities are arrived at differently, they correlate reasonably well. SA is the basis for the locations and extents found in Map 3-13. What is important here is that ground and spectral accelerations are quantitative measures, while MM is qualitative. Engineers and others interested in designing earthquake-resistant structures need the quantitative information, but a great deal of useful data can quickly be gathered by untrained people with the qualitative MM scale. Both PGA and SA have units of acceleration of gravity (or percent of acceleration of gravity). PGA and SA are further defined at: http://earthquake.usgs.gov/learn/glossary/?term=spectral%20acceleration%20%28SA%29

Figure 3-7 correlates PGA and MM. Additional information can be found on the USGS website at: http://earthquake.usgs.gov/earthquakes/shakemap/background.php.

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	[illegible]	[illegible]

Figure 3-7: Correlation between Ground Acceleration and Intensity / Source: United States Geological Survey

Geologic evidence shows that movement on the faults in and around Idaho can cause earthquakes of magnitude 6.5 to 7.5, with potentially catastrophic effects.

Past Occurrence

Earthquakes in Idaho are common; in fact, during a one-week period ending on September 23, 2010, Idaho experienced four earthquakes, all with a magnitude of less than 2. Idaho experiences hundreds of earthquakes every year, but most are too small to feel. On average, Idaho experiences shaking strong enough to damage chimneys every 10 years, and a more significant event about every 20 years (Table 3-11). From 1872 through the end of 2000, over 2,000 seismic events have been recorded in the State of Idaho. Map 3-14 illustrates past earthquake occurrences in Idaho.

Table 3-11: Significant Idaho Earthquakes			
Year	**Magnitude***	**Location**	**Notes**
1872	7.4	Lake Chelan, WA	Largest quake in Washington State; felt strongly in North Idaho
1884	6	Bear Lake Valley	Considerable damage to houses in Paris, ID
1905	6	SW Idaho or NE Nevada	Considerable damage at Shoshone, ID
1913	5	Adams County	Broke windows and dishes
1914	6	Utah-Idaho State line	Intensity VII; between Ogden, UT and Montpelier, ID
1915	7.75	Pleasant Valley, NV	Considerable damage in SW Idaho, 100 miles from epicenter
1916	6	North of Boise	Boise residents rushed into the street, chimneys fell

Table 3-11: Significant Idaho Earthquakes			
Year	**Magnitude***	**Location**	**Notes**
1918	5	North Idaho	Widely felt near Sandpoint
1925	6.6	SW Montana	Felt throughout Idaho
1926	4	North Idaho	Felt at Avery and Wallace
1927	5	Connor Creek	On Idaho-Oregon border, west of Cascade
1934	6.6	Hansel Valley, UT	Largest Utah event on record; 20 miles south of Idaho border; 2 fatalities
1935	6.25	Helena, MT	Extensive damage; multiple large events felt throughout Idaho; 4 fatalities
1936	6.4	Walla Walla, WA	Damaging earthquake; widely felt in Idaho
1942	5	Sandpoint area	Cracked plaster; rock fell onto railroad tracks
1944	6	Central Idaho	Knocked people to ground in Custer County
1944	4	Lewiston area	Widely felt in northern Idaho
1945	6	Central Idaho	Epicenter near Clayton; slight damage in Idaho City and Weiser
1947	6.25	Southwest Montana	Epicenter in Gravelly range, 10 miles north of Idaho border
1947	5	Central Idaho?	Several large cracks formed in a well-constructed brick building
1959	7.3	Hebgen Lake, MT	Major event, extensive fault scarps; 20 miles from Idaho; 29 fatalities
1960	5	Soda Springs	Foundations and plaster cracked
1962	5.7	Cache valley	Heavily damaged older buildings
1963	5	Clayton	Plaster cracked and windows broken
1969	5	Ketchum	Cement floors cracked
1975	6.1	NW Yellowstone	Widely felt in Yellowstone region
1975	6.1	Pocatello Valley	Some 520 homes damaged in Ridgedale and Malad City
1977	4.5	Cascade	Drywall, foundations cracked; ceiling beams separated
1978	4	Flathead Lake, MT	Felt in NW Idaho
1983	6.9	Bora Peak	Major event, 21-mile surface scarp; 11 buildings destroyed, 2 fatalities
1984	5	Challis	Largest of many Borah Peak aftershocks

Table 3-11: Significant Idaho Earthquakes			
Year	**Magnitude***	**Location**	**Notes**
1988	4.1	Cooper Pass	Montana border NE of Mullan
1994	5.9	Draney Peak	Remote area of Wyoming border; 1 injury from falling flower pot
1994	3.5	Avery area	Rare North Idaho event centered near Hoyt Mountain
1999	5.3	Lima, MT	In Red Rock valley, just north of Idaho border
2001	4	Spokane, WA	At least 75 felt events at shallow depth beneath the city
2005	5.6	Dillon, MT	Felt across Idaho
2005	4	Alpha Swarm	Four events of M4, thousands of smaller tremors south of Cascade
2008	6.0	Wells, NV	Felt strongly throughout southern Idaho

**Magnitudes without decimals are approximate / Source: United States Geological Survey*

Hotspot-related seismic activity is confined to the Yellowstone region on the eastern border of the State. Dozens of small earthquakes (less than Magnitude 3.0) occur here each month, with larger events occurring about once a month. Fault-related seismic activity occurs throughout the State but is concentrated in the central mountains and in the southeast corner. Idaho has a substantial number of known and suspected active faults. However, USGS uses only seven faults to compute the probabilistic seismic hazard maps for Idaho. Nonetheless, when identified, these faults can be useful for projecting future seismic activity.

Photo courtesy of the Deseret News

Hebgen Lake, 1959

The Hebgen Lake earthquake (August 18, 1959) originated in Montana but was felt and caused considerable damage in Idaho. The Magnitude 7.3 event generated Intensity X shaking, killed 28 people as a result of an enormous landslide, formed "Quake Lake," and did $11 million damage to roads and timber. Many campers in the Yellowstone area were trapped for days (eventually rescued with the assistance of smoke jumpers and helicopters), and a fishing lodge dropped whole into a lake. There were six aftershocks of Magnitude 5.5

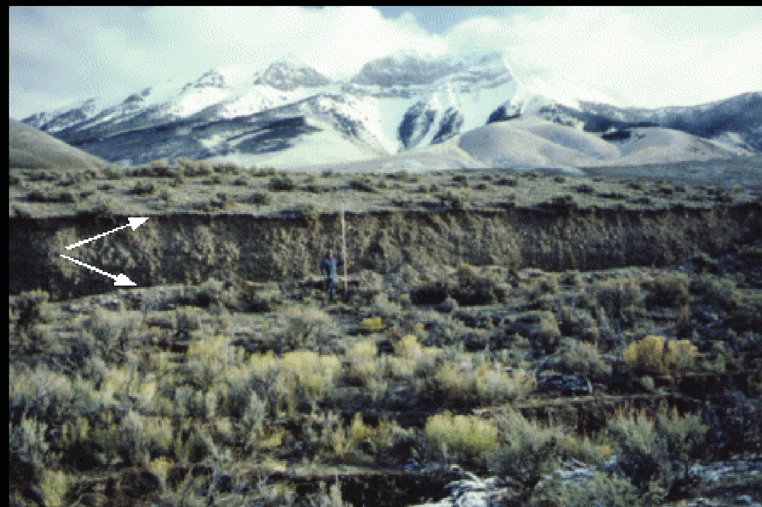


Photo courtesy of A.J. Crone, U.S. Geological Survey, Denver, CO.

or greater within one day, and one of Magnitude 5.8 in 1964. The initial earthquake was felt in an area of over 450,000 square miles.

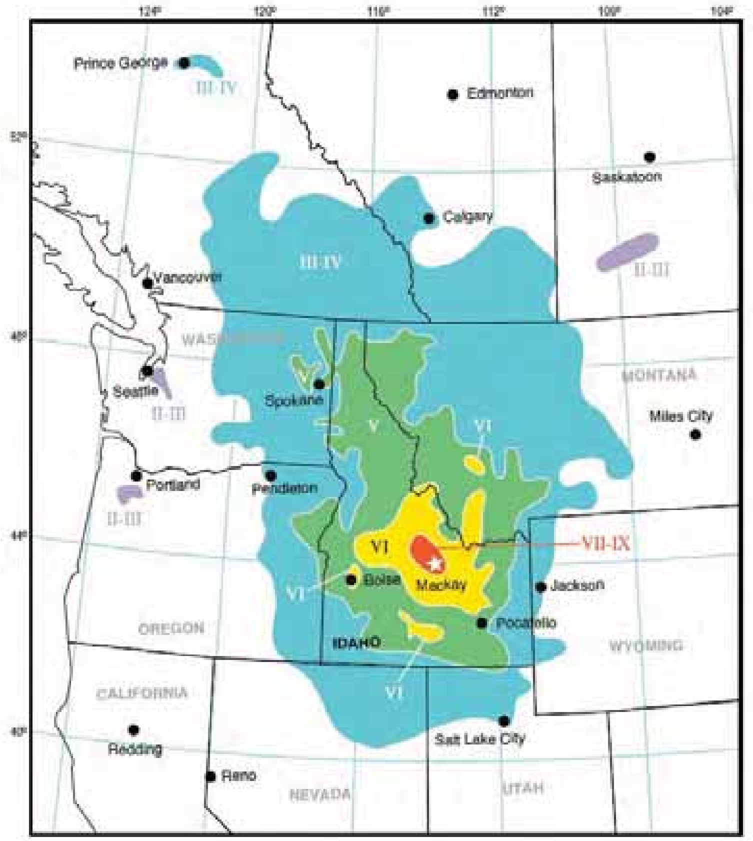
In Idaho, Intensity VII was experienced in the areas of Big Springs, Island Park, and Henry's Lake. Big Springs increased its flow 15 percent and became rusty red colored, and wells in the Island Park area remained muddy for weeks. A man was knocked down at Edward's Lodge, and guests at Mack's Inn experienced hysteria. There was considerable damage to buildings in the Henry's Lake area. Trees swayed violently, breaking some roots, and cars jumped up and down. Chimneys fell, and a 7-foot-thick rock-and-concrete dock cracked.

Borah Peak, 1983

The Borah Peak earthquake (October 28, 1983) was the largest ever recorded in Idaho, both in magnitude and in the amount of property damage, ($26,569,487 in 2007 dollars). With a magnitude of 6.9, it was among the largest earthquakes to hit the State since the 1959 Hebgen Lake event. The epicenter was in the Barton Flats area, approximately 10 miles northwest of Mackay and 30 miles southeast of Challis. There have been a number of California earthquakes larger than this: 1999 Hector Mine (7.1), 1992 Landers (7.3), 1992 Cape Mendocino (7.2), 1989 Loma Prieta (6.9), and 1980 Humboldt (7.2).

The maximum observed intensity was IX (based on surface faulting), and the earthquake was felt in an area of over 330,000 square miles. Four aftershocks of Magnitude 5.5 or greater were recorded within 1 year, and numerous more have occurred to date. Map 3-12 shows the shaking in MM Intensity scale units.

The event caused two deaths in Challis (both school age children) and several minor injuries. There was an estimated $12.5 million in damage in the Challis-Mackay area, affecting sewer and water systems, roads, other public facilities, and personal property. The facilities of an irrigation company and a fish hatchery also experienced extensive damage.



Map 3-12: Borah Peak Intensity / Source: United States Geological Survey

Although damage occurred as far away as Boise, the most severe property damage occurred in the towns of Challis and Mackay. Eleven commercial buildings, 39 private houses, and one school sustained major damage, and 200 houses sustained minor to moderate damage. Most of the damaged commercial buildings were of masonry construction, including brick, concrete block, or stone. The majority of the residential chimneys were cracked or twisted, or collapsed.

Significant ground displacement produced a 20-mile-long zone of fresh scarps and ground breakage in the Lost River Range. Displacement along the fault ranged from less than 1.5 feet to 9 feet.

Other geologic effects included landslides and rock falls, flow changes in springs, and fluctuations in water levels. A temporary lake was formed by the rising water table south of Dickey, and widespread flooding occurred in the Warm Springs Creek area.

The event resulted in State and Federal disaster declarations (designated *DR-697*). The declaration provided Public Assistance and Individual Assistance for Custer County, Individual Assistance for Butte County, and aid to schools in Butte and Gooding Counties.

Valley County Earthquake Swarm, 2005

Between September and December 2005, thousands of small, very shallow earthquakes occurred near the community of Alpha in Valley County. These events, five with magnitudes as high as 4, were centered about 16 kilometers south of Cascade, in the vicinity of Clear Creek. The Idaho Geological Survey and BHS arranged for the deployment of a temporary seismic array to study the swarm. However, a seismologist from Boise State University reported a year later that, in his opinion, the swarm was incorrectly mapped due to "poor seismographic coverage." (Cite: Jim Zollweg, "The 2005 Alpha, Idaho Earthquake Swarm: A Preliminary Report," March 31, 2006.)

Although little damage was reported, many of the events were felt locally. Most of the Alpha swarm appears to have occurred along a previously unidentified fault that separates Long Valley to the north from Round Valley to the south. The latest of the five events may have been triggered by stress released from the other earthquakes. This event occurred several kilometers northwest of the others and was consistent with normal faulting on the Long Valley fault, one of the major Quaternary faults in Idaho.

Wells, Nevada Earthquake, 2008

The Wells, Nevada earthquake was felt in southern Idaho, and significant shaking was reported. On February 21, 2008, the northern Nevada town of Wells was struck by a 6.0 Magnitude earthquake resulting from a seismic event on a previously unmapped fault. Half of the non-residential buildings in Wells were damaged, and 10 of those sustained severe damage. The event appeared to occur almost instantaneously and caused nearly $9 million in damages. The community of Wells was severely disrupted for months and, due mostly to the lack of a presidential declaration and subsequent Federal aid, most of the heavily damaged buildings in the older part of town remain in ruins. The circumstances of this event could easily be replayed in many areas of Idaho.

Yellowstone Earthquake Swarm, 2010

In January and again in April 2010, a swarm of earthquakes occurred about 10 miles northwest of the Old Faithful area on the northwestern edge of the Yellowstone Caldera. Swarms have occurred in this area several times over the past 30 years; however, this swarm became the second largest ever recorded at Yellowstone –both longer (in time) and including more earthquakes than the December 2008-January 2009 swarm. As of September 2010, earthquake activity had returned to near background levels. To complicate matters, the plate beneath Yellowstone Lake ceased its tilting motion. Seismologists are uncertain as to whether or not this is a good thing. Damage from prehistoric caldera events was massive, and a similar event in this day and age would be cataclysmic.

Because of recent Hollywood depictions of a Yellowstone super-volcano and despite the location of Yellowstone in neighboring Wyoming, a comment regarding geological and seismic potentials is warranted. Regarding a super-volcano event, the USGS states in its Open-File Report 2007-1071, "the probability of a forth large caldera-forming event at Yellowstone can be considered to be less than 1 in a million..." The relatively greater hazards are hydrothermal explosions of which 26 have occurred in the past 30 years.

Future Occurrence

Currently, there are no realistic methods to predict earthquakes. According to the Idaho State seismologist, no studies, past or present, could create anything more than the general probabilities currently available. The past rate of occurrence is a modest predictor of future occurrence. One possible exception would be increased volcanic activity related to the Yellowstone hotspot. If that occurs, seismic activity would also be likely to increase. Nonetheless, the assessment of seismic risk is significantly impaired by 1) a lack of fault characterization data for Idaho's mapped faults, 2) limited NEHRP soil and liquefaction susceptibility maps, and 3) extremely limited seismic monitoring throughout Idaho.

Environmental Impacts

The environmental impacts of earthquakes are highly dependent on the location of the quake. For example, in mountainous regions, earthquakes and aftershocks can cause landslides and land deformation and result in infrastructure damage. Microwave communication towers could be knocked out of alignment. In areas of human development, damaged infrastructure such as sewage systems and pipelines can result in large releases of harmful substances into the environment. Quickly and successfully eliminating waste and debris after an earthquake will lower the amount of resulting disease and contamination to the environment. The failure of dams, levees, and canals after an earthquake could cause a rapid and possibly catastrophic flood event.

Development Trend Impacts

Some counties in the Northeast and Southeast, such as Jefferson, Teton, and Bonneville, have high growth rates and face significant seismic threat. In such areas, it can be predicted that an increased amount of housing stock and developed area will be at risk. However, seismic codes may mitigate the potential loss of life, injuries, and property damage.

Seismic building codes increase building integrity and help ensure the future safety of communities. These codes are designed to protect lives, but not to ensure that buildings are undamaged or usable after an earthquake. Seismic codes are intended to protect people inside buildings by preventing collapse and allowing safe evacuation. Structures built according to the current code should be undamaged in minor earthquakes, resist moderate earthquakes without significant structural damage, and resist severe earthquakes without collapse. In Idaho, seismic codes made substantial improvements in construction as early as the mid-1970s. Buildings constructed prior to this time may be seismically unsafe. However, buildings constructed in the 1980s would not be as seismically safe as buildings constructed under today's seismic codes. To keep up with the current state of the art in seismic design, building codes are revised every three years to incorporate new knowledge.

Critical Infrastructure and State Facility Impacts

Due to the lack of information in the database for State facilities, other than identifying general locations (see Map 3-13 at the end of this section), it is not possible to describe specific additional impacts to State facilities and infrastructure. Per the HAZUS analysis (explained below), the number of governmental structures that would be damaged is presented in Table 3-12. Unfortunately, these data do not differentiate between all government and State government buildings. An action related to this issue in the new Mitigation Strategy will be to collect data on additional State facilities to do a structure-by-structure analysis.

Table 3-12: HAZUS Expected Government Building Damage (Structure Count)

Event	None	Slight	Moderate	Extensive	Complete
Boise 7.0	925	58	79	60	42
Idaho Falls 7.0	1,105	19	20	13	8

Table 3-12: HAZUS Expected Government Building Damage (Structure Count)					
Soda Springs 6.9	1,153	7	4	1	0

Vulnerability Assessment

Statewide Analysis

All of Idaho's counties have either a low, moderate, or high seismic hazard, and 38 counties contain areas of high to severe hazard. The majority of the State's population is concentrated in areas of high seismic risk, either along faults that define the margins of mountain ranges or in seismically active mountainous areas. Moreover, seismic hazard assessments in Idaho are made more complicated because most of Idaho's earthquakes are not associated with known faults. As such, lifelines (e.g., utilities and transportation routes) and critical facilities (e.g., dams, government, military, and research installations) are at risk in varying degrees that are not easily classified, due mainly to inadequate seismic monitoring. It is important to note the difference between hazard and risk in this plan. To use an example, the eastern Idaho town of Driggs is in a high seismic hazard zone as shown by the USGS 2008 Probabilistic Seismic Hazard map. This is due to its proximity to major active faults and the amount of recorded seismicity near it. Boise, on the other hand, has a lower seismic hazard as shown on the same map. It is farther from major high-slip rate faults and lacks much recorded seismicity. However, Boise may have a higher risk from earthquakes because it has a much higher population and more structures and critical infrastructure than does Driggs.

HAZUS Analysis

Because a single earthquake will not result in statewide damage, the most appropriate risk assessment methodology was to conduct scenario modeling using FEMA's HAZUS-MH MR4 loss estimation software. The HAZUS tool is very useful in mitigation planning, because it provides an acceptable means of forecasting earthquake damage, loss of function of infrastructure, and casualties, among many other factors. There are three levels of HAZUS, from Level 1, which uses the default FEMA-derived datasets and damage functions, to Level 3, which uses independently compiled, incredibly huge, and accurately verified structure and infrastructure inventories. It is important to note that areas around Idaho Falls include the Idaho National Laboratory (INL), a Federal nuclear installation with several classified facilities. The data for that area is not included in the loss estimate presented below. The technical writer for this plan, Michael Baker Corporation, ran these HAZUS Level 1 analyses in mid-2010.

Three counties in the State were processed using HAZUS, and a statewide HAZUS study region was created for each. The three hazard scenarios that were analyzed included:

- 7.0-magnitude event in the City of Boise
- 6.9-magnitude event in the City of Idaho Falls
- 7.0-magnitude event in the City of Soda Springs

All standard analyses were performed for each HAZUS scenario, and the Global Summary Reports are summarized in Table 3-13. The datasets used in this analysis are available to the public. The HAZUS study region was exported to a HAZUS-standard .hpr file and delivered to BHS along with all Global Summary Reports.

The data summarized for each county included:

- Expected building damage (number of structures)
- Expected 'complete' building damage (number of structures)
- Expected essential facilities damaged (number of structures)
- Expected building loss estimates ($)
- Expected business interruption Loss Estimate ($)

Table 3-13: HAZUS Summary Reporting

Scenario	Expected Building Damage (# of Structures)	Expected 'Complete' Building Damage (# of Structures)	Expected Essential Facilities Damaged (# of Structures)	Expected Building Loss Estimates ($ Millions)	Expected Business Interruption Loss Estimate ($ Millions)
Boise 7.0	7,4469	3,288	1,135	2,714.27	843.62
Idaho Falls 6.9	3,1151	1,549	1,154	1,152.47	341.21
Soda Springs 7.0	4,347	25	1,177	36.19	9.93

Based on the HAZUS scenarios, a significant – but realistic - earthquake event would result in damages exceeding $1.5 billion plus the inestimable damage to the Idaho National Laboratory.

Compilation of Local Hazard Mitigation Plans

All 47 of the State's local hazard mitigation plans were analyzed for use in the State's hazard mitigation plan update. Certain sections of the plans were then collected into a central database that allowed for further analysis. These data were summarized, and some of those results are provided below.

Map 3-15, at the end of this section, highlights the five local plans that identified earthquake as one of their significant hazards. For these jurisdictions that would be considered the most vulnerable to this hazard (based on their own prioritization), Table 3-14 summarizes the number of structures impacted by the earthquake hazard and the corresponding loss estimate.

Table 3-14: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Earthquake as a Significant Hazard			
Local Plan Name	**Earthquake Ranked as Significant**	**Structures in Hazard Area**	**Loss Estimate**
Ada			
Adams			
Bannock			
Bear Lake			
Benewah			
Bingham			
Blaine			
Boise			
Bonner			
Bonneville			
Boundary			
Butte			
Camas			
Canyon			
Caribou	X		
Cassia			
Clark			
Clearwater			
Custer			
Duck Valley Reservation			
Elmore			
Franklin	X	3,000	$690,000,000
Fremont			
Gem			
Gooding			
Idaho			
Jefferson			
Jerome			
Kootenai			
Latah			
Lemhi			
Lewis			
Lincoln			

Table 3-14: Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Earthquake as a Significant Hazard

Local Plan Name	Earthquake Ranked as Significant	Structures in Hazard Area	Loss Estimate
Madison			
Minidoka			
Nez Perce			
Nez Perce Tribe			
Oneida	X	34	$3,230,000
Owyhee			
Payette			
Power			
Shoshone			
Shoshone-Bannock Tribe	X		
Teton	X	170	$5,090,000
Twin Falls			
Valley			
Washington			

Consequence Analysis Scenario

Another way vulnerability was assessed was by conducting a consequence scenario that analyzed a hypothetical hazard event. The Executive Committee met on June 4, 2010, to analyze a number of hazard scenarios. All participants summarized their thoughts in a two-page survey. The first page of the survey asked the committee to score (from 0 to 5, 5 being the direst) the short-term (0-6 month) and long-term (6+ months) consequences of each particular scenario as it pertained to the following systems:

- The public
- First responders
- Continuity of operations
- Property, facilities, and infrastructure
- Economic conditions
- Public confidence in government
- The environment

For the earthquake hazard, the scenario focused on a 6.9-magnitude event in Soda Springs. Figure 3-8 summarizes the results of the survey. The committee determined that the short-term impact of this earthquake event was greater than its long-term effects. The public, first responders, and economic conditions stood out as being the systems most affected.

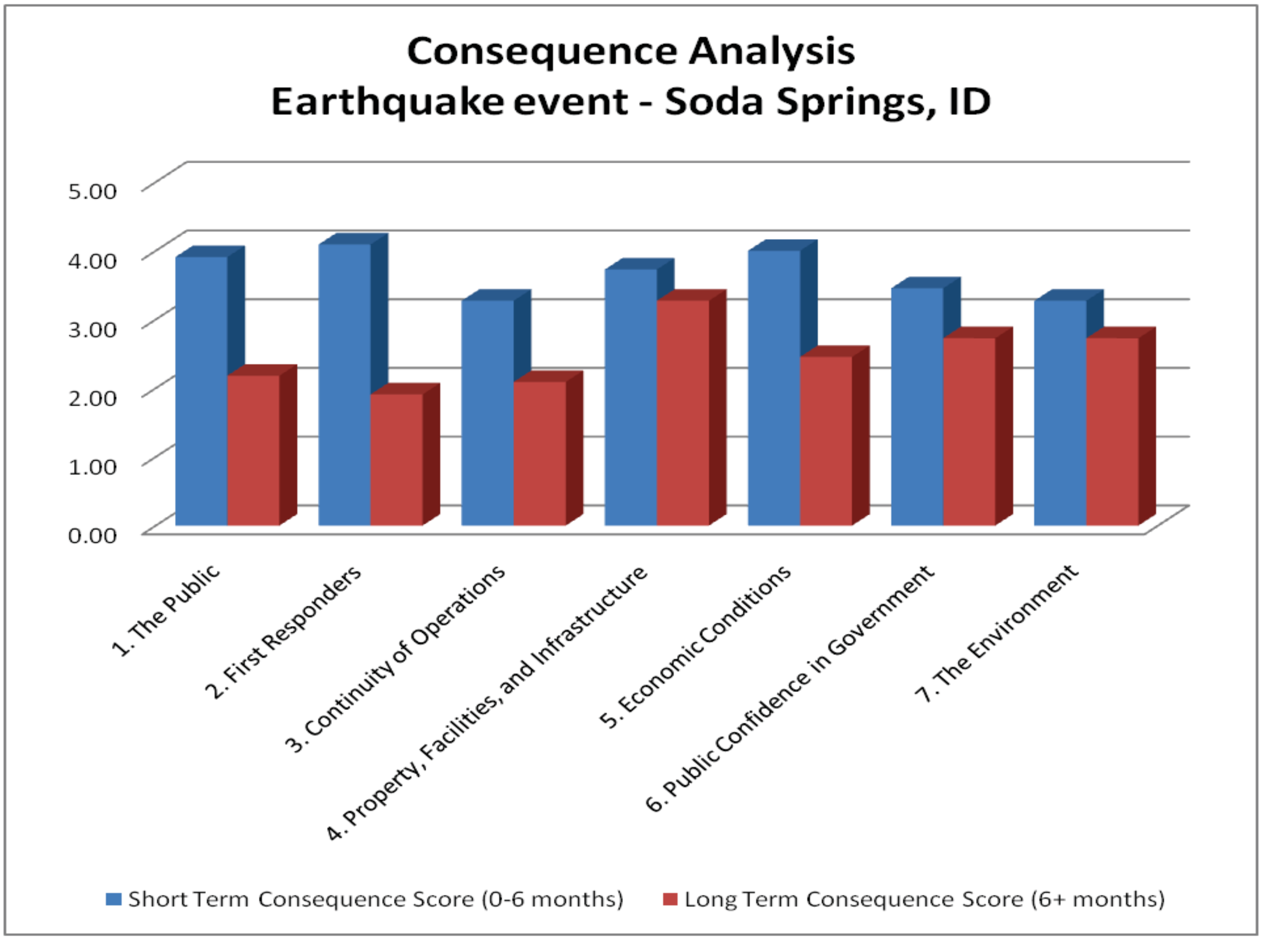


Figure 3-8: Consequence Analysis Earthquake

Mitigation Rationale

While few local plans prioritize earthquake as a major hazard, the significant economic impact of an earthquake makes mitigation a priority. The 6.9-magnitude scenario in Idaho Falls, for example, resulted in $1.5 billion in damages, which would be truly catastrophic. A considerable number of public and private commercial buildings are pre-code structures, constructed of both reinforced and unreinforced masonry. Much of Idaho's housing stock in suburban and rural communities was built prior to the 1970s, before building codes were in force. Additionally, rural Idaho communities do not have the resources to respond to widespread damage that might be caused by a catastrophic earthquake. Earthquakes are one of the State's least predictable and most poorly understood hazards.

General Mitigation Approaches

Information/Outreach and Public Education

Much mitigation work (such as home retrofitting and non-structural falling hazard reduction) is dependent on the actions of property owners and residents. Hazard awareness and education programs must lay the groundwork of knowledge that leads to this work.

BHS funds cooperative projects with the Idaho Geological Survey (IGS) on an annual basis. These projects have included summer field workshops for Idaho's earth science teachers, the development of NEHERP soil classification and liquefaction susceptibility maps, and the development of public education materials on geologic hazards. This outreach is funded using a variety of grant programs, including the Earthquake Hazard Reduction Grant, Emergency Management Performance Grant, and Pre-disaster Mitigation Planning funds. The earth science teacher workshops have been held for the past 20 years, facilitated by the IGS. The focus of the workshops is on the science of natural hazards, hazard mitigation strategies, disaster preparedness for schools, and the enhancement of science teaching. As a result of the workshops, teachers are improving the study of seismic safety in their schools, and the next generation of decision makers in Idaho is growing up better educated to seismic risks and other natural hazards. The facilitators of the workshops are constantly seeking new audiences. The booklet mentioned above, "Putting Down Roots in Earthquake Country", was published using mitigation grant monies by BHS, with considerable input and valuable advice from the IGS, and was widely distributed in eastern Idaho. The booklet was especially well received by educators in many parts of the State. It will be distributed at every opportunity, through every possible venue.

Infrastructure

New public facilities and other infrastructure must be built to earthquake-resistant standards. The large stock of buildings constructed before 1992 is more problematic. Changes in occupancy, such as occurs when old buildings are converted to restaurants, shops, and apartments, provide opportunities for seismic retrofits. Extensive work is expensive, though, and hard to justify to building owners. Lifelines and critical facilities should not be concentrated in high-risk areas. Mitigation projects will be identified in separate categories, as follows:

- Public infrastructure
- State/county facilities
- Private infrastructure

Regulatory

Enacting building codes, dam design requirements, and other regulatory measures is necessary to ensure that structures have earthquake-resistant construction. Areas of known extreme hazard, such as fill soils and known faults, can be designated and zoned for open space or similar non-vulnerable uses. BHS adopts the Western States Seismic Policy Council (WSSPC) Policy Recommendation 07-4 wherein WSSPC not only endorses adoption and enforcement of International Existing Building Code, the International Building Code, and the International Residential Code, but also discourages modification and amendments that weaken these codes. Further BHS adopts the additional policy of encouraging including of NEHRP provisions which include purpose, education, incentives, lifelines, and public and private sectors.

The State could also provide incentives (e.g., tax relief) for proper owners to retrofit their homes and other properties. Insurance is typically very expensive, and coverage is generally not required by lending institutions.

In addition, BHS adopts WSSPC Policy Recommendation 06-1: Developing Earthquake Risk-Reduction Strategies stated here:

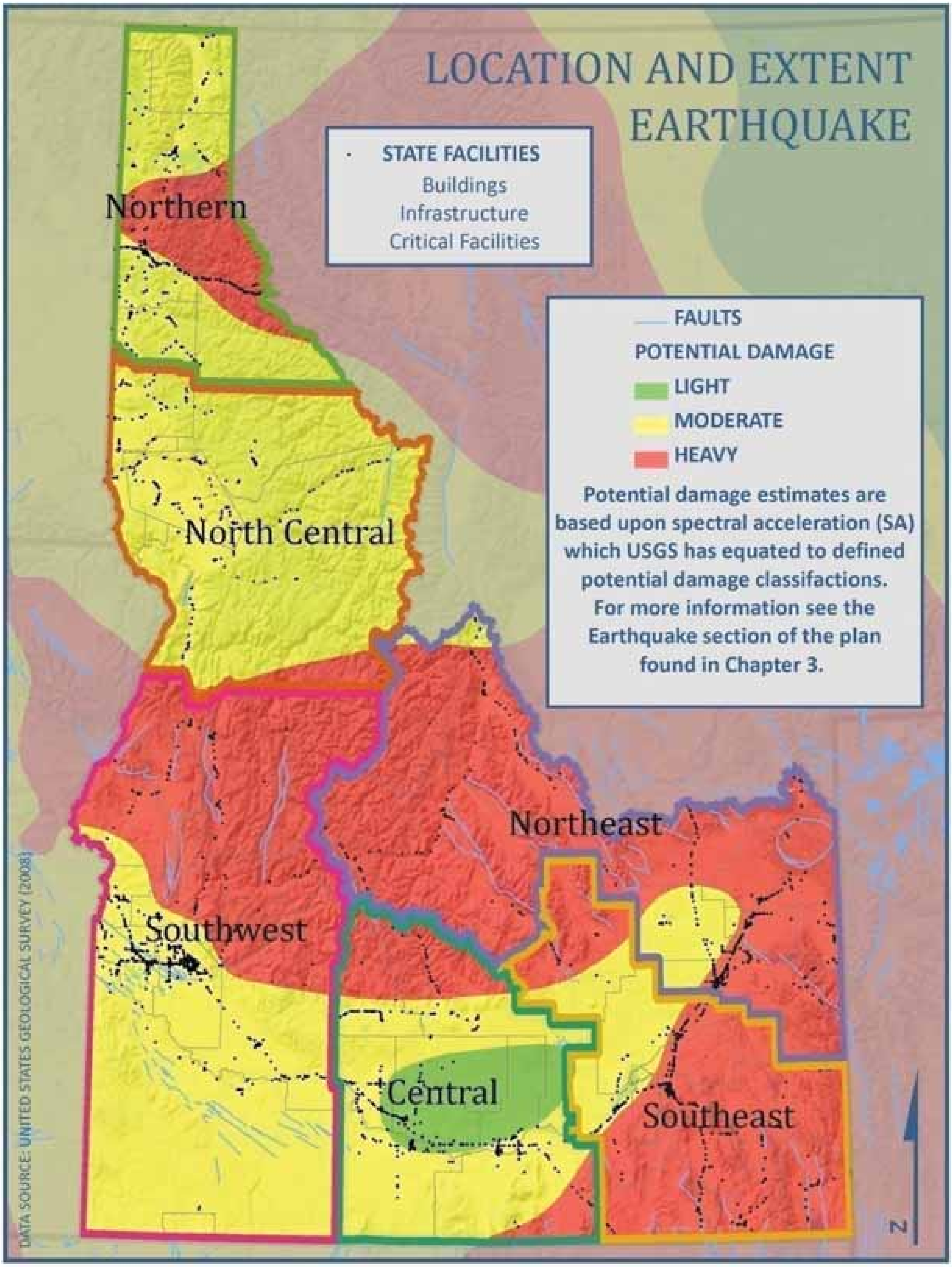
WSSPC strongly encourages the development of long-term, comprehensive statewide and community - level earthquake risk-reduction strategies as part of an all-hazards plan to reduce injury, loss of life, property damage, and economic disruption from earthquakes.

WSSPC believes comprehensive statewide and local plans and strategies should include the following elements:

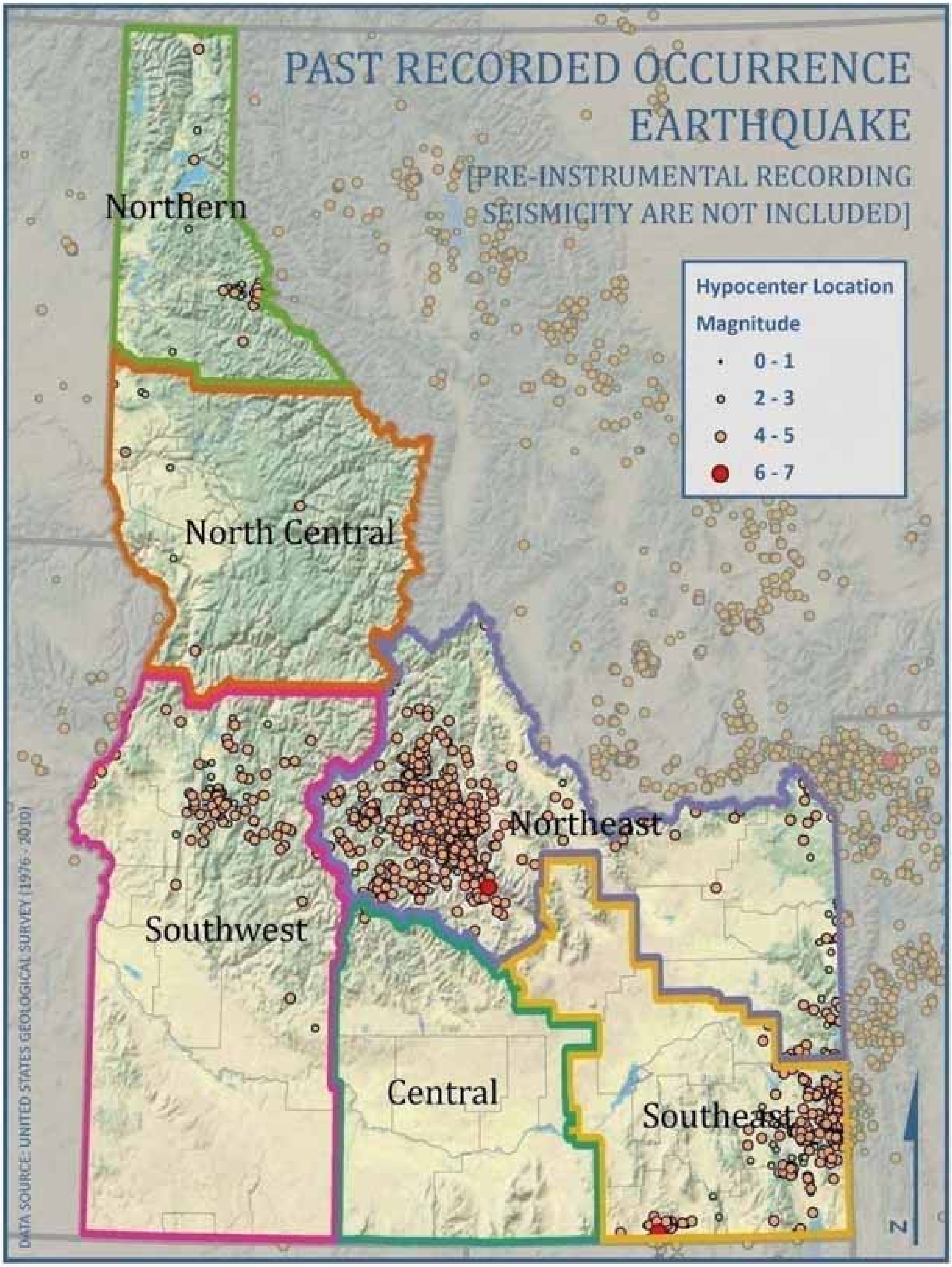
- Assessment of all seismic hazards to quantify and define the risk to communities;
- Implementation of land-use and development policies to reduce exposure to earthquake hazards;
- Adoption of enforcement of the International Building Codes for the seismic design, inspection, and construction of new buildings and structures;
- Adoption of International Existing Building Code for the maintenance and retrofit of seismically "at risk" structures;
- Development and implementation of retrofit, redevelopment, grant and abatement programs to help strengthen existing structures, where necessary;
- Support of [ongoing] public-education efforts and public/private partnerships to raise awareness of seismically induced threats and build constituent support for earthquake hazard reduction programs.

Mapping/Analysis/Planning

An accurate understanding of a hazard is the first step towards successful mitigation. To fully understand a hazard and the risk that it poses, the ability to accurately assess vulnerability is vital. After vulnerability is determined, potential losses can be assessed. This vulnerability and loss information can greatly enhance mitigation planning efforts, but it is not readily available at this time. Appendix F of this Plan provides details regarding a HAZUS CDMS-compliant geodatabase that is being designed and will be implemented as part of this Plan update. This database will allow for the proper collection of facility and infrastructure data in a GIS platform, which can then be analyzed to assist with vulnerability and loss estimations.

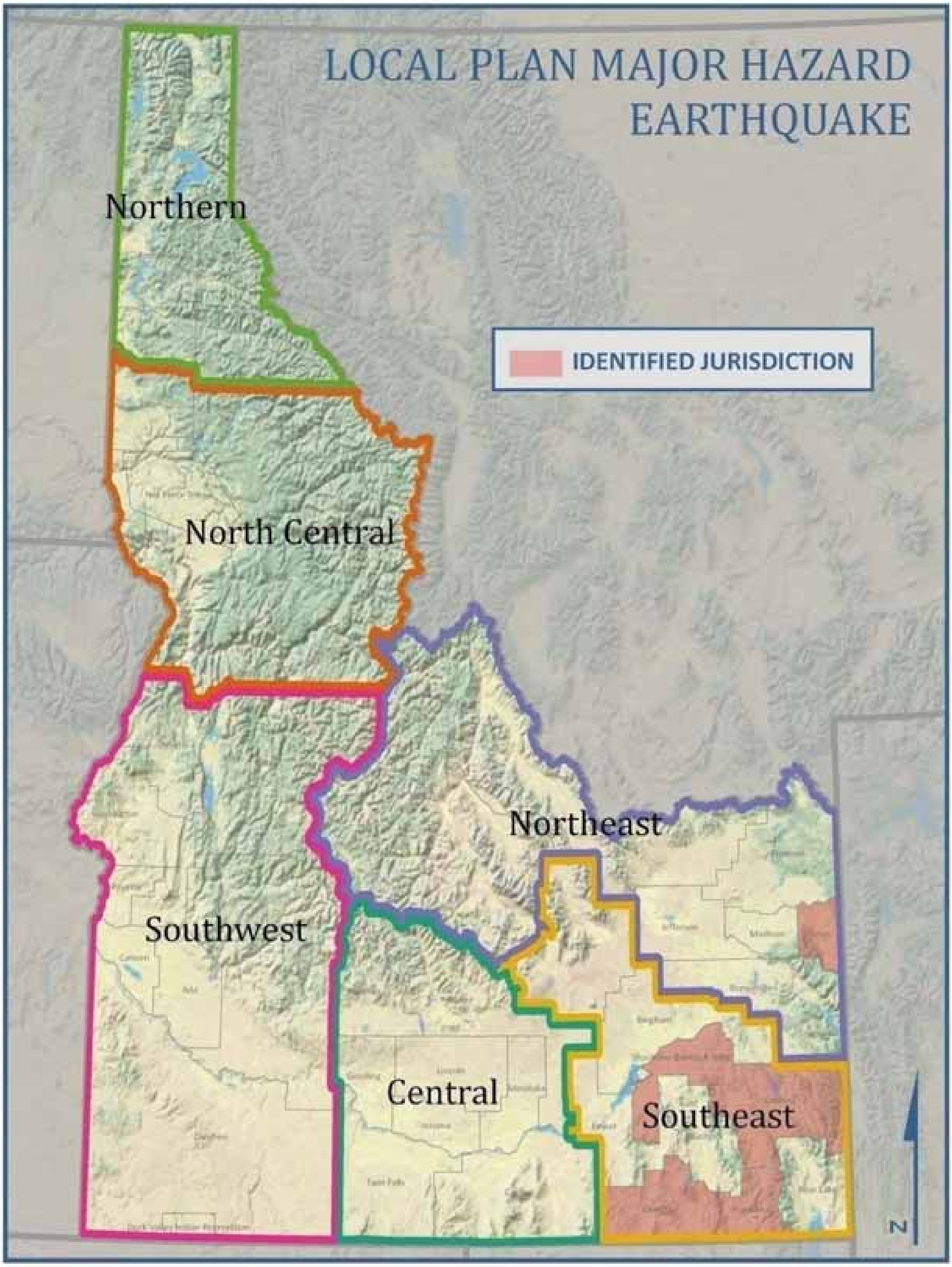


Map 3-13: Seismic Hazard Map showing State Facilities



Map 3-14: Past Earthquake Occurrences

(Note: Pre-instrumental recording seismicity are not included)



Map 3-15: Earthquake Identified as Local Plan Major Hazard

RISK ASSESSMENT: AVALANCHE

Hazard Description

An avalanche is a slope failure composed of a mass of rapidly moving, fluidized snow that slides down a mountainside. The flow can be composed of ice, water, soil, rock, and trees. The amount of damage depends on the type of avalanche, the composition and consistency of the material contained in the avalanche, the velocity and force of the flow, and the avalanche path.

Soldier Avalanche, January 29, 2010. Crown of avalanche that resulted in a fatality. Estimated to be 300 ft wide and 2-3 ft deep, running on facets near the ground / Source: BHS

The slope failure associated with an avalanche is caused by several factors, but primarily by large accumulations of snow on a steep slope. Avalanches occur on slopes averaging 25 to 50 degrees, and the majority are on slopes between 30 and 40 degrees. They are triggered by natural seismic or climatic factors such as earthquakes, thermal changes, and blizzards, or by human activities.

The most common types of avalanches are loose-snow and slab avalanches. A **loose-snow avalanche** is composed of dry, fresh snow deposits that accumulate as an unstable mass atop a stable snow and slick ice sub-layer. A loose-snow avalanche releases when the sheer force of its mass overcomes the underlying resistant forces of the cohesive layer.

A **slab avalanche** generally is composed of a thick, cohesive snowpack deposited or accumulated on top of a light, cohesion-less snow layer or slick ice sub-layer. At the starting surface or top of the slab, a deep fracture develops in the slab of well-bonded, cohesive snow. A slab avalanche release is usually triggered by turbulence or impulse waves. Release also occurs when the internal cohesive strength of the slab layer is greater than the bonding at the base and lateral slab boundaries. As a release occurs, the slab accelerates, gaining mass and speed as it travels down the avalanche path.

An **avalanche path** is determined by the physical limitations of the boundaries of the local terrain and man-made features. An avalanche may follow a path along a channelized or confined terrain, similar to debris flows or streams, before spreading onto alluvial fans or gentle slopes. The avalanche path itself varies in width as it transitions along the path, depending on the confinement of the terrain and the velocity of flow. An avalanche path is described as having three specific transition zones:

- The **Starting Zone** is typically located near the top of the ridge, bowl, or canyon, with steep slopes of 25 to 50 degrees;

- The **Track Zone** is the reach with mild slopes of 15 to 30 degrees and the area where the avalanche will achieve maximum velocity and considerable mass; and
- The **Runout Zone** is the area of gentler slopes (5 to 15 degrees) located at the base of the path, where the avalanche decelerates and massive snow and debris deposition occurs.

When avalanche material is deposited in the Runout Zone, it tends to harden quickly. Even very light avalanches of powdery, dry snow can form concrete-like masses after being “worked” by the mechanical forces involved in the slide. Victims are rarely able to extract themselves from even very shallow burials.

Location, Extent, and Magnitude

Avalanche activity is considered to be localized in the State and is most likely to occur in areas that have an avalanche starting zone slope of 25 to 50 degrees.

Avalanches can close transportation routes in mountainous areas, although damage and loss of life are rare. The 9-mile section of Highway 21 between Grandjean Junction and Banner Summit, called Canyon Creek, has 54 avalanche chutes and experiences about 90 percent of the highway-impacting avalanches in the State. Other transportation routes impacted by avalanches include Teton Pass on Highway 33/ WYO 22 in Teton County, and Highway 75 between Stanley and Salmon. No other critical infrastructure at risk in the State appears to be significant.

Several classification systems are used throughout the world in rating hazards and conditions associated with avalanches. In the United States, a five-level scale is used to classify the size of an avalanche, as shown in Table 3-15.

Table 3-15: United States Classification for Avalanche Size

Size	Destructive Potential
1	Sluff or snow that slides less than 50m (150 feet) of slope distance
2	Small, relative to path
3	Medium, relative to path
4	Large, relative to path
5	Major or maximum, relative to path

Source: www.avalanche.org

The avalanche danger presented in Table 3-16 is used by regional avalanche forecast centers in the United States. The scale was designed to facilitate communication between forecasters and the public. The categories represent the probability of avalanche activity and recommend travel precautions. As of 2010, the United States and Canada adopted and use this avalanche danger scale.

Table 3-16: North American Avalanche Danger Scale (2010)

What	Why	Where	What to do
Danger Level (Color)	**Avalanche Probability / Triggers**	**Degree and 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 run-outs.

Source: www.avalanche.org

Property damage associated with avalanches is a function of several factors. Large external lateral loads can cause significant damage to structures and fatalities. Table 3-17 indicates the estimated potential damage for a given range of impact pressures.

Table 3-17: Avalanche Impact Pressures Related to Damage

Impact Pressure		Potential Damages
kPa	**lbs/ft2**	
2-4	40-80	Break windows
3-6	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	1000-2000	Destroy mature forests
>300	>6000	Move large boulders

Source: www.avalanche.org

Past Occurrence

Avalanches are unique to mountainous terrain. In the 19th and early 20th century, mining and transportation-related activities (e.g., railroad construction and travel) accounted for a majority of the damages and casualties from avalanche events. Few individuals not engaged in these activities found themselves in hazardous locations. Subsequent reductions in backcountry mining activity and improvements in transportation-related avalanche safety led to a decline in avalanche damages and casualties.

In the latter half of the 20th century, the mountainous backcountry began to be visited in the winter again, this time by recreational users. These users, including skiers, snowboarders, hikers, and snowmobilers, now account for nearly all avalanche casualties. The vast majority of these occur outside of avalanche-patrolled and controlled areas. In almost all cases, avalanche victims or their parties trigger the slides that catch them.

The Colorado Avalanche Information Center reported 68 fatalities in Idaho from 1950 through 2006. Snowmobiling is currently the leading cause of avalanche fatalities in Idaho. Idaho State Parks reports eight snowmobiler fatalities from the winter of 1997/98 winter through the winter of 2000/2001. Backcountry snowshoeing and cross country skiing also involve serious avalanche risk. Slab avalanches account for almost all avalanche fatalities.

It is impossible to determine how many avalanches of all sizes occur in the State each year. Small avalanches occur throughout the winter and spring with no damage; however, in 2004, a large avalanche buried two individuals and their home near the Soldier Ski Resort in Camas County. The area was known by locals to be prone to avalanches, but this information may not have been provided to those who lost their lives in the slide. Typically, avalanche activity that does not result in serious injury, death, or significant property damage is not reported. There have been no State or Presidential Disaster declarations arising from avalanches.

The U.S. Avalanche Accidents Database contains a comprehensive listing of recorded avalanche activity resulting in losses for the State of Idaho. Table 3-18 summarizes recorded losses from 1998 through July 2010. Map 3-16, at the end of this section, also highlights past major avalanche events.

Table 3-18: Idaho Avalanche Accidents (1998-July 2010)

DATE	PLACE	FATALITIES	ACTIVITY	SUMMARY
02/09/1999	Town of Hailey	0	Other	3 houses damaged by avalanche
02/10/1999	Hailey	0	Other	Park damaged, deer herd killed
02/20/1999	Portneuf Range Caribou National Forest	0	Ski	1 skier caught and injured
01/22/2000	Clark Lake, near Lionhead Peak	0	Snowmobile	1 snowmobiler caught, buried and severely injured
01/28/2000	Smokey Mountains, near Sun Valley	0	Ski	1 skier caught, totally buried, recovered with beacon
02/19/2000	St. Charles Canyon, near Bear Lake	1	Snowmobile	2 snowmobilers caught, 1 buried and killed
03/19/2000	Selkirk Mountains, west of Bonners Ferry	1	Snowmobile	1 snowmobiler caught and killed
03/12/2002	Grove Creek, near Victor	1	Snowmobile	1 snowmobiler caught, buried, and killed
03/22/2002	East Fork of Targhee Creek	1	Snowmobile	1 snowmobiler caught, buried, and killed (wearing a transceiver)
12/14/2002	Central Idaho	0	Ski	2 backcountry skiers caught and buried in separate accidents

Table 3-18: Idaho Avalanche Accidents (1998-July 2010)				
DATE	**PLACE**	**FATALITIES**	**ACTIVITY**	**SUMMARY**
12/19/2002	Steve Baugh Bowl, Jedediah Smith Wilderness	0	Ski	1 skier caught, buried, and rescued with transceiver
12/28/2002	Trinity Mountain area, west of Fairfield	1	Snowmobile	2 snowmobilers caught and buried, 1 killed
01/04/2003	Darby Canyon	0	Snowmobile	1 snowmobiler caught, carried, and injured
02/22/2003	Echo Bowl near Priest Lake	1	Snowmobile	5 snowmobilers caught, 1 buried and killed
02/22/2003	Near Keokee Lake, NW of Schweitzer Mountain Resort	1	Ski	1 backcountry skier caught buried and killed
01/02/2004	Soldier Mountain, near Soldier Mountain Ski Resort	2	Other	House struck by an avalanche, 2 people buried and killed
02/28/2004	Apollo Creek, approx. 15mi NW of Ketchum	1	Snowmobile	Snowmobiler caught, buried, and killed
03/07/2004	Jeru Peak, approx. 20mi N of Sandpoint	1	Snowmobile	Snowmobiler caught, buried, and killed
01/16/2005	Lake Steven Area	2	Snowboard	2 snowboarders, caught, buried, and killed
03/25/2005	Galena Summit	0	Ski	1 backcountry skier caught and seriously injured
03/30/2005	Fisher Creek drainage near Slab Butte	0	Snowmobile	1 snowmobiler caught and buried. Rescued with beacon.
04/01/2005	Brodie Gulch, Baker Creek near Ketchum	1	Snowmobile	Snowmobiler caught, buried, and killed
07/02/2005	Castle Peak, White Cloud Mountains	1	Snowboard	Snowboarder caught, buried, and killed

Table 3-18: Idaho Avalanche Accidents (1998-July 2010)				
DATE	**PLACE**	**FATALITIES**	**ACTIVITY**	**SUMMARY**
03/01/2006	Mountains near Antelope Creek	1	Snowmobile	Snowmobiler caught, buried, and killed
04/02/2006	Mountains outside Spencer	1	Snowmobile	2 snowmobilers caught, 1 killed
04/08/2006	Patriot Bowl, W of Trinity Mountain Lookout	1	Snowmobile	Snowmobiler caught, buried, and killed
04/29/2006	Backcountry near Lookout Pass	1	Ski	1 skier caught, buried, and killed
02/17/2007	Palisades Peak Area	1	Snowmobile	3 snowmobilers caught, 2 partially buried, 1 buried and killed
03/10/2007	Apollo Creek in the Baker Creek drainage	0	Snowmobile	1 snowmobiler caught, buried, and injured
02/08/2008	Garden Valley	1	Other	House struck by avalanche. Roof cave in, killed 1
03/16/2008	Sheep Mountain on the North Fork Clearwater River	1	Snowmobile	4 snowmobilers caught, 2 buried, 1 killed
02/24/2009	Trinity Mountains near Featherville	0	Snowmobile	1 snowmobiler caught, buried, and rescued
02/27/2009	Trapper Creek, N of Priest Lake	1	Snowmobile	1 snowmobiler caught, buried, and injured
03/01/2009	Duck Lake area, N of Brundage Mountain ski area	0	Snowmobile	1 snowmobiler caught, carried, and seriously injured
03/06/2009	Black Lee Drainage, 7mi NE of McCall	0	Ski	4 skiers caught, 2 buried, 1 injured
03/06/2009	Gladiator Ridge, 20mi NW of Sun Valley	1	Ski	1 skier caught, buried, and killed, 1 seriously injured

Table 3-18: Idaho Avalanche Accidents (1998-July 2010)				
DATE	**PLACE**	**FATALITIES**	**ACTIVITY**	**SUMMARY**
04/05/2009	Norton Creek, 20m W of Ketchum	1	Snowmobile	Snowmobiler caught, buried, and killed
12/18/2009	Rock Lake, W of Cascade	1	Snowmobile	2 snowmobilers caught, 1 buried and killed, 1 fully buried and rescued
01/22/2010	Sun Valley Ski Resort, off trail run in bounds	1	Ski	1 skier caught, buried, and killed
01/28/2010	Boardman Pass, Soldier Mountains W of Fairfield	1	Snowmobile	Snowmobiler caught, buried, and killed
01/30/2010	Garns Mountain in the Big Hole Range, W of Driggs	1	Snowmobile	Snowmobiler caught, buried, and killed
03/13/2010	North of Schweitzer Ski Area, Idaho Panhandle	1	Snowmobile	Snowmobiler caught, buried, and killed
03/30/2010	Near Brundage Mountain	2	Snowmobile	3 snowmobilers caught, 2 buried and killed
Total Events: 43		**Total Fatalities: 32**		
Source: www.avalanche.org				

According to the Colorado Avalanche Information Center (CAIC), from 1950 through 2009, there have been 68 recorded fatalities (32 since 1998) from avalanches in the State of Idaho. Recent historical levels of avalanche events may be expected to continue. Based on the recorded fatalities due to avalanche in the State, Idaho will continue to be rated as having a moderate severity of avalanche hazard relative to other States.

Future Occurrence

The geophysical processes that contribute to avalanches during a particular year are statistically independent of past events. Avalanche occurrence is not directly attributed to a specific major meteorological event, such as the 1-percent-annual-chance or 100-year snowfall. It is more commonly a result of a combination of weather and snow pack conditions. Unfortunately, the short period of recorded and observed avalanches and associated conditions that contribute to the risk make it difficult to develop return periods for avalanche-prone areas in Idaho. However, like other similar natural processes, a return period and probability of future occurrence can be developed from the available historical records.

It can reasonably be assumed, based on recorded observations from 1998 through July 2010, that an avalanche has occurred once every 0.28 years.

[(Current Year) 2010] subtracted by [(Historical Year) 1998] = 12 Years on Record

[(Years on Record) 12] divided by [(Number of Historical Events) 43] = 0.279

Based on the historical probability, there is a 100-percent chance that an avalanche will occur any given year in Idaho.

Currently, there are three avalanche centers (Coeur d'Alene, McCall, and Sun Valley) in the State that make observations and collect data regarding this hazard.

Environmental Impacts

Avalanches have minor environmental impacts compared to most other hazards. Large amounts of debris are often carried by avalanches and can be left in freshly scoured gullies. Trees may be broken due to the excessive force of the onrushing snow. Temporary dams can form, blocking the flow of rivers and streams and remaining as a threat to the downstream natural and built environment. Accumulated debris could potentially cover historic and archeological resources. It is unlikely that the continued existence of rare species or vegetative communities would be jeopardized by avalanches, because of the localized nature of the hazard.

Development Trend Impacts

Avalanches begin in areas that have slopes of 25 to 50 degrees, which are usually too steep for high-density development. However, because avalanches reach maximum velocity in the track zone and maximum deposition in the runout zone, where slopes range from 5 to 30 degrees, such areas could support higher density development. It is important to note that land in these zones would have to lie directly beneath areas that would be characterized as a starting zone. Development of new or expansion of existing ski resorts could place structures in these areas of greatest risk. Analysis of the historical data indicates relatively little property damage (five houses destroyed in 59 years of record) and does not indicate that as more development is occurring, more houses are destroyed. The increasing trend in loss of life suggests that more people are found in areas prone to avalanche occurrences but that the victims were only using these areas for recreation.

Overall, any development within known or suspected avalanche areas will increase the hazard somewhat, because it will also increase the use of the exposed areas. Even when infrastructure and buildings are specifically designed for avalanche forces, there remains the small risk that persons outside are exposed if an avalanche occurs. The City of Ketchum, located in Blaine County, commissioned a study to identify the areas where avalanche potential exists. As a result, the city established an avalanche zone overlay district, where special regulations and restrictions apply.

Critical Infrastructure and State Facility Impacts

Major highways and railways would be the State assets most impacted by an avalanche event. Likewise, power lines and pipelines and access to each are vulnerable.

Vulnerability Assessment

No specific, statewide vulnerability assessment exists for the avalanche hazard. From a general perspective, a hazard arises whenever property or human activity lies in the path of a potential avalanche. The sliding snow or ice mass in an avalanche moves at high velocities. It can shear trees; completely cover entire communities and highway routes, and level buildings. The primary threat is loss of life for backcountry skiers, snowboarders, hikers, climbers, and snowmobilers. The trend from 1940 to the present shows an increase in recreation-related accidents. Avalanches kill and injure through burial and mechanical impact. Two-thirds of avalanche fatalities are due to suffocation; the majority of the rest are due to trauma (especially to the head and neck). Even small slides can carry victims over cliffs or into narrow gullies where deep burial is possible. North American statistics suggest that a completely buried victim has a 50-percent chance of survival if rescued within 30 minutes, with a rapid decline thereafter. Less than one-third of the completely buried victims are recovered alive.

The risk of avalanche loss is greatest on the flatter slope of the runout zone, which is more conducive to development, transportation routes, and infrastructure. Exposure to the hazard has risen due to growth in winter recreational activities and resort facilities, mountain residences, highways, and telecommunication lines.

Compilation of Local Hazard Mitigation Plans

Forty-seven local mitigation plans were analyzed to determine the major hazards in each jurisdiction. The hazard of avalanche was not ranked as such by any jurisdiction.

Loss Estimation

No specific, statewide loss estimation exists for the hazard of avalanche. Historical avalanche loss records tend to be more related to loss of life and injury than to property damage. An analysis of historical data from 1950 to 2009 indicates that 1.15 lives have been lost annually from avalanches. However, these data show a trend towards increasing loss of life in more recent years. From 1998 to 2009, an average of 2.9 lives have been lost annually.

From a general perspective, avalanches damage and destroy public, commercial, and private property and forest lands and result in costs for restoration, maintenance, and post de facto litigation. Property damage typically occurs on transportation facilities, such as highways and railroads. 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.

Direct costs can be defined as the cost of maintenance, restoration, or replacement due to damage of property or structures within the boundaries of a specific avalanche. All other costs from avalanches are indirect and include (1) reduced real estate values in areas threatened by avalanches, (2) loss of productivity of forest lands, (3) loss of industrial productivity as a result of damage to land, facilities, or interruption of services, (4) loss of tax revenues on properties devalued as a result of avalanches, (5) loss of access to recreation lands and facilities, (7) cost of lost human productivity due to injury and death, and (8) the cost of litigation as a consequence of avalanches. Some of these indirect costs are difficult to measure and tend to be ignored. As a result, most estimates of avalanche costs are far too conservative. If rigorously determined, indirect costs probably exceed direct costs.

Compilation of Local Hazard Mitigation Plans

Since none of the local mitigation plans ranked avalanche as a major hazard, these data were not aggregated and it is assumed that loss estimates would be low.

Mitigation Rationale

Avalanches are not considered a major natural hazard, because they impact relatively small areas of Idaho. Compared with other hazards, avalanches have localized impacts and individually do not affect large numbers of people. However, the total number of deaths attributable to avalanches each year is exceeded only by those associated with floods, lightning, tornadoes, and extreme heat.

The reoccurrence of avalanches at the same topographic site(s) means that mapping offers a route to hazard mitigation, if only through the qualitative recognition, and avoidance, of susceptible sites. Remote sensing has been used for many years to produce preliminary maps of landslide tracks, as many avalanche tracks also function as landslide gullies during the spring and summer. With the continued development of GIS, hazard-zoning maps can be improved and updated to provide local communities with the data necessary to adopt loss-reduction measures.

Recent avalanche mitigation approaches have included avalanche hazard zoning, evacuation, artificial release, and avalanche-control structures. Artificial release is the most common measure used in the United States. Where other methods are ineffective or cannot be used, control structures may be installed.

General Mitigation Approaches

Mitigation of avalanches is established, generally, in the Idaho Disaster Preparedness Act of 1975 as amended (Idaho State Code Chapter 10, Title 46) and, more specifically, in the Governor's Executive Order, 2000-04. The Executive Order also assigns the Idaho Transportation Department the responsibility for providing engineering support to State mitigation activities relative to avalanches.

Avalanche hazard can be mitigated in three ways:

- Terrain modification
- Snow-cover modification
- Human behavior modification

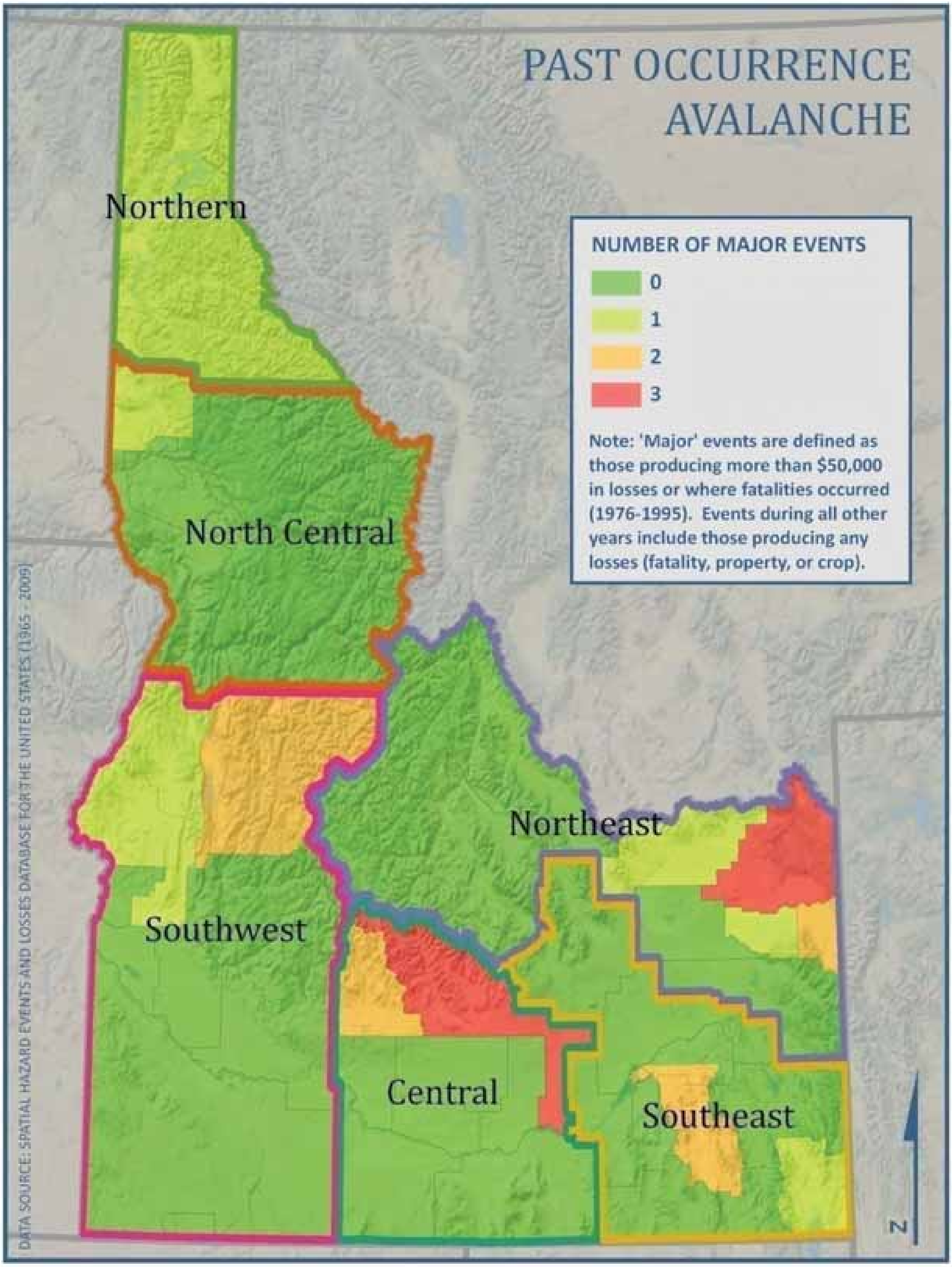
Terrain modification involves changing the ground surface or building structures in the release zone and/or track to prevent the release or stop the natural run of an avalanche. Possible mitigation techniques include: retention, redistribution, and retarding/catchment structures and reforestation.

- Retention structures, which prevent an avalanche release, include snow rakes, snow bridges, and nets. These structures are generally limited to areas with limited snow packs and may create negative aesthetic impacts.
- Redistribution structures, snow fences and similar techniques, reduce snow drifting and control the buildup of large snow loads.
- Retarding/catchment structures stop, divert, confine, or slow slides. These include ditches, terraces, dams, and mounds constructed on the ground surface. Some have been effectively carved into existing, stable snowpacks to mitigate slides of later snow accumulations.
- Reforestation provides a natural form of protection. Many of the above structures can be simulated with vegetation.

Snow-cover modification involves modifying the snow pack, either through stabilization or controlled releases, to prevent releases or minimize the volume of snow included in an avalanche. Stabilization can be accomplished through compaction, which may be performed by grooming equipment. This technique is most effective early in the season. Controlled release of potential avalanche slopes is the most common technique for reducing the avalanche hazard. Slopes are generally triggered through the use of explosives delivered by hand, aerial bombing (primarily by helicopters), and artillery (the predominant method of avalanche control in the U.S.).

Human behavior modification involves rendering avalanches harmless by keeping people out of their paths. It can also reduce the number of avalanche occurrences by eliminating potential triggers (people). Techniques include the closure of recreational areas and relocation of residences and businesses from hazardous areas.

Public education and outreach programs are essential for bringing avalanche information to the attention of the general public. Any hazard-reduction program depends on public understanding and support. Therefore, education on avalanche matters, oriented primarily toward those who live, work, or vacation in Idaho’s mountainous regions, may be undertaken by individuals, agencies, schools, nonprofit organizations, and special-interest groups. Special attention should be given to snowmobile dealerships and user associations, Nordic ski shops, and backcountry equipment suppliers.



Map 3-16: Past Avalanche Occurrence

RISK ASSESSMENT: DAM / LEVEE / CANAL FAILURE

Description

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams typically are constructed of earth, rock, concrete, or mine tailings. A dam failure is the collapse, breach, or other failure resulting in downstream flooding.

A dam impounds water in the upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of 1 foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

American Falls Dam, Power County, Idaho / Source: BHS

Dam failures typically occur when the spillway capacity is inadequate and excess flow overtops the dam, or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if this internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-laden water that rushes downstream, damaging or destroying everything in its path.

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which cause most failures;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway;
- Landslides into reservoirs, which cause surges that result in overtopping;
- High winds, which can cause significant wave action and result in substantial erosion; and
- Earthquakes, which typically cause longitudinal cracks at the tops of embankments that weaken the entire structure.

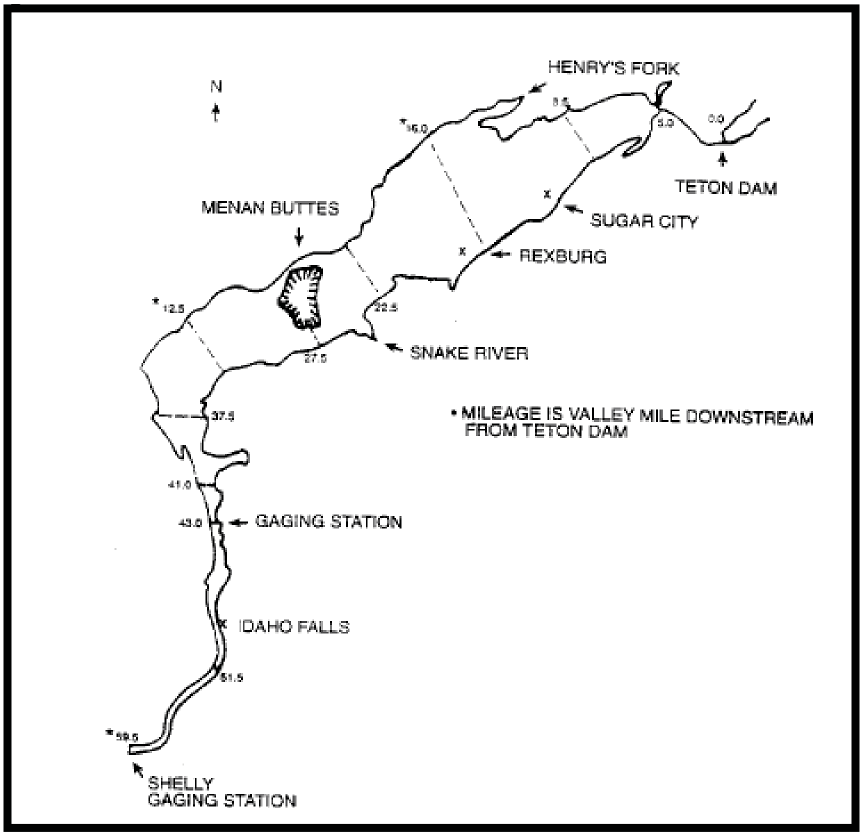
Location, Extent, and Magnitude

Dams and levees are considered to be localized in the State and are most likely to affect pre-determined inundation areas downstream and areas immediately around the dam or levee. Map 3-18, at the end of this section, shows the location of the structures inventoried in Idaho.

Assessing the hazard that a dam or levee poses to downstream areas can be divided into three analyses: (1) analysis of an uncontrolled release of the reservoir, (2) analysis of the inundation from the uncontrolled release, and (3) analysis of the consequence of the release. In other words, a dam fails, the failure causes flooding downstream, and the flooding has negative impacts on people or property. Each of these analyses includes substantial uncertainty. Legitimate estimates of discharge from a breach can differ by over 200 percent. The discharge from a dam breach is usually several times the 1-percent-annual-chance flood; therefore, typical flood studies are of limited use in estimating the extent of flooding.

Dam failure inundation studies require specialized hydraulic modeling software. Determining the impact of flooding is also difficult to accomplish, especially for estimating loss of life. Loss of life is a function of the time of day, warning time, awareness of those affected, and particular failure scenarios. Many dam safety agencies have used “population at risk”, a more quantifiable measurement of the impact to human life, rather than “loss of life”. The population at risk is the number of people in structures within the inundation area, who would be subject to significant personal danger if they took no action to evacuate. The impacts of a dam failure are contingent on many factors and, therefore, cannot be concisely described. However, case studies based on the characteristics of dams that have failed in the past can provide valuable information for future planning.

The Teton Dam, a 300-foot-high earthen dam with a 3,000-foot-long crest and 250,000 acre-feet of stored water, failed on June 5, 1976. This failure caused significant damages to the downstream Teton-Snake River Valley, with the inundation of an area as much as 9 miles wide and as far as 16 miles downstream of the dam (see Map 3-17).



Map 3-17: Teton Dam Inundation Area (Shelly Gaging Station is approximately 60 miles downstream of Teton Dam) / Source: BHS

A study conducted by the National Weather Service explained that the Teton Dam failure had an approximate peak value of 2,183,000 cfs, a peak period of 1.43 hours, and a total duration of significant outflow of about 6 hours. This peak discharge was about 30 times greater than the flood of record at Idaho Falls.

Dams greater than or equal to 10 feet high or reservoirs with a storage capacity greater than or equal to 50 acre-feet are regulated by the Idaho Department of Water Resources Dam Safety Program. Each dam inspected by Idaho Water Resources has a classification for both size and risk.

- Large – 40 feet high or more, or with a storage capacity of more than 4,000 acre-feet of water. *104 dams are currently listed as large*.

- Intermediate – between 20 and 40 feet high or with a storage capacity of 100 to 4,000 acre-feet of water. *198 dams are currently listed as intermediate*.

- Small – 20 feet high or less, with a storage capacity of less than 100 acre-feet of water. *244 dams are currently listed as small*.

The hazard rating that is used by the Dam Safety Program to classify dams and reservoirs is based on a three-tier system consisting of Low, Significant, and High hazard categories. It is important to note that the hazard classification assigned to any particular structure is based solely on the potential consequences to downstream life and property based on a failure of the dam and sudden release of water. “Hazard” is not to be used synonymously with the term "Risk", as they are not the same. Risk also incorporates the probability of failure; thus risk is equal to the probability of occurrence multiplied by the consequences that would result from a dam failure.

- High Hazard – A high-hazard rating does not imply or otherwise suggest that a dam suffers from an increased risk of failure. It simply means that if failure were to occur, the resulting consequences likely would be the direct loss of human life and extensive property damage. For this reason, all high-hazard dams must be properly designed, and at all times responsibly maintained and safely operated, because the consequences of failure are much too great. The Department of Water Resources considers the inundation of residential structures with floodwater from a dam break to a depth greater than or equal to 2 feet to be a sufficient reason for assigning a high hazard rating. *There are 91 dams currently listed as having a high hazard*.

- Significant Hazard – Dams with a significant hazard are structures whose failure would result in significant damage to developed downstream property and infrastructure or indirectly cause the loss of human life. An example of the latter would be people killed or injured in an automobile crash after a roadway is washed out by flooding from a dam failure. *There are 136 dams currently listed as having a significant hazard*.

- Low Hazard – Low hazard dams typically are located in sparsely populated areas that would be largely unaffected by a breach of the dam. Although the dam and appurtenant works may be totally destroyed, damages to downstream property would be restricted to undeveloped land, with minimal impacts to existing infrastructure. *There are 340 dams currently listed as having a low hazard*.

A majority of Idaho, with its average of 12 inches of rainfall per year, was developed through the Reclamation projects of the early 1900s. These projects included dams to collect water and provide flood control, and canals to deliver water to the agricultural areas. The presence of the canals is generally disregarded by the general public, despite the fact that a large number of canals crisscross the State. New community development has encroached on the areas adjacent to the canals. In Ada County, a considerable number of housing developments are situated downstream of large-capacity canals. The proximity to these high-flow, man-made floodways creates a significant risk to life, safety, and property. Because of widespread ownership issues, such as private canals and irrigation districts, data for canal failure events is not readily obtainable. The Silver Jackets technical advisory group has expressed strong interest in monitoring this issue, and BHS anticipates further discussions regarding this hazard.

Past Occurrence

Dam failure is infrequent but can have significant consequences. Idaho has experienced two major dam failures in recent history: Teton Dam (1976) and Kirby Dam (1991). There have also been a number of "near-miss" incidents, where disaster was averted; these are not discussed here.

Teton Dam Failure – 1976: On June 5, 1976, Teton Dam in Fremont County failed. An estimated 80 billion gallons of water were released from the reservoir into the Upper Snake River Valley. Devastating flooding occurred in Wilford, Sugar City, Rexburg, and Roberts; significant flooding occurred in Idaho Falls and Blackfoot.

At the time of its failure, Teton Dam was brand new and stood 305 feet high, with a crest length of 3,100 feet and a base width of 1,700 feet. The dam was a zoned earth-fill structure with a volume of approximately ten million cubic yards. The floodwaters threatened American Falls Dam downstream on the Snake River. Dam managers opened the outlet works on American Falls full bore, to empty the Reservoir and to save American Falls Dam and the string of dams farther down the Snake River.

On June 6, President Gerald Ford declared Bingham, Bonneville, Fremont, Madison, and Jefferson Counties a Federal disaster area. Eleven deaths were attributed to the dam failure and subsequent flood. Estimates of monetary damages ranged as high as $2 billion; the Federal government eventually paid over $300 million in claims.

Teton Dam Failure, June 1976. During the first filling of the reservoir, the dam burst when the water was 270ft deep. It drained in less than 6 hours, setting off more than 200 landslides in the canyon below, taking 11 lives, and causing millions of dollars in property damage. / Source: www.damsafety.org

Kirby Dam Failure – 1991: During the summer of 1990, it became apparent that the old log crib structure of the Kirby Dam near Atlanta had become unsound and was in jeopardy of failing. The possibility of failure was of special concern due to the large quantity of mine runoff and tailings that had collected behind the dam over the years. A strategy to stabilize the dam was developed by the Idaho Department of Water Resources and the U.S. Forest Service but was unsuccessful. On May 26, 1991, Kirby Dam collapsed, cutting off electrical power and blocking the primary access bridge to Atlanta. Contaminated sediments (containing arsenic, mercury, and cadmium) were released into the Middle Fork of the Boise River.

Future Occurrence

Many of the previously described causes for dam failure cannot be controlled by humans. Therefore, the possibility that a dam will fail is high, given the right circumstances. However, the probability of future occurrences of failure for regulated dams has been reduced by proactive preventative actions on the part of the Idaho Department of Water Resources Dam Safety Program. Idaho's Dam Safety Program oversees the regulation and safety of high-hazard dams and reservoirs throughout the State in order to protect the health, safety, and welfare of its citizens and their property.

This program is required to assure proper planning, design review, construction review, maintenance monitoring, and supervision of regulated dams and reservoirs. The Department currently regulates nearly 600 water storage dams and more than 20 mine tailings impoundment structures located throughout the State. Dam Safety Program personnel regularly inspect existing projects according to the potential consequences that the dam's failure would present to downstream life and property. The frequency of individual dam inspections depends on the project's physical condition, method of construction, maintenance record, age, hazard rating, and size and storage capacity. However, all statutory-sized dams must be inspected by the Department at least every 5 years. This plan acknowledges that aging infrastructure and deferred maintenance increases a dam's risk with each passing year.

Environmental Impacts

Dam or levee failures can have a greater environmental impact than that associated with a normal flood event. The soil loss from erosion and scouring would be significantly greater, because of a large amount of fast-moving water affecting a small area. Large amounts of sediment from erosion can alter the landscape and change the ecosystem. In addition, hazardous materials are carried away from flooded properties and distributed throughout the floodplain. Industrial and agricultural chemicals and wastes, solid wastes, raw sewage, and common household chemicals comprise the majority of hazardous materials spread by floodwaters along the flood zone, polluting the environment and contaminating everything they come in contact with, including the community's water supply.

Development Trend Impacts

The flood protection afforded by dams throughout Idaho has allowed the development of lands immediately downstream of these structures. The same can be said of development in areas where levee structures provide protection from certain flooding events. This development pattern will continue for the foreseeable future unless proper mitigation measures are taken. Public awareness measures, such as notices on final plats and public education on dam safety, are proactive mitigation measures that should be implemented by local communities. Also, Emergency Action Plans that establish potential dam failure inundation limits, notification procedures, and thresholds are prepared for response to potential dam related disaster events.

Critical Infrastructure and State Facility Impacts

Of the 3,528 State facilities reported, 329 are within the inundation areas of the following dam inundation zones:

- American Falls Dam Failure
- Ashton Inundation
- Oneida Dam Failure
- Daniels Inundation
- Deep Creek Inundation
- Foster Reservoir Inundation
- Glendale Reservoir Inundation
- Grassy Lake Inundation
- Williams Lake Inundation
- Island Park Inundation
- Mackay Inundation
- Magic Dam Failure
- Palisades Dam Failure
- Ririe Dam Failure
- Wilson Reservoir Inundation
- Wood Dam Failure

Vulnerability Assessment

As dams continue to age, the likelihood of failure increases. Undesirable woody vegetation on the embankment, deteriorated concrete, inoperable gates, and corroded outlet pipes become problems. Since dam failures are often exacerbated by flooding, the probably of dam failures can be associated with projected flood frequencies.

Property and populations downstream from any dam are vulnerable to harm from dam failure. However, communities downstream of high-hazard dams and large canals should pay particular attention to inspection and maintenance activities that keep their communities safe. Without these activities and oversight from the Idaho Department of Water Resources, the vulnerability increases significantly. The statewide possibility of a dam failure should remain low if dam maintenance is continued. Additionally, the warning plans in place for designated high-hazard dams will continue to decrease the danger for residents in potential risk areas.

Compilation of Local Hazard Mitigation Plans

Three local plans (Bonneville County, Custer County, and Fremont County) ranked dam and levee failure as one of their major hazards (see Map 3-19 at the end of this section). Detailed information related to local vulnerability may be found in those local hazard mitigation plans.

Loss Estimation

From a statewide perspective, losses from a potential dam or levee or canal failure are difficult to quantify. Based on the historical record, a dam failure with the magnitude of the Teton Dam occurrence would cause estimated losses of approximately $2 billion. However, the Teton Dam failure did not impact major population centers or cause a cascade effect (where downstream dams and levees failed). Smaller dam/levee failures usually result in crop, livestock, and local infrastructure losses (bridge collapses, etc.), possibly affecting buildings and people. Large dam/levee failures have a significantly greater potential impact on the loss of life.

Compilation of Local Hazard Mitigation Plans

The local mitigation plan roll-up estimates that losses for a levee or dam failure event could reach the millions, depending on where it occurs. Of the three counties that ranked dam/levee failure as a major hazard, only two provided loss estimations (Bonneville County - $795,240,000.00, and Custer County - $15,131,352.00).

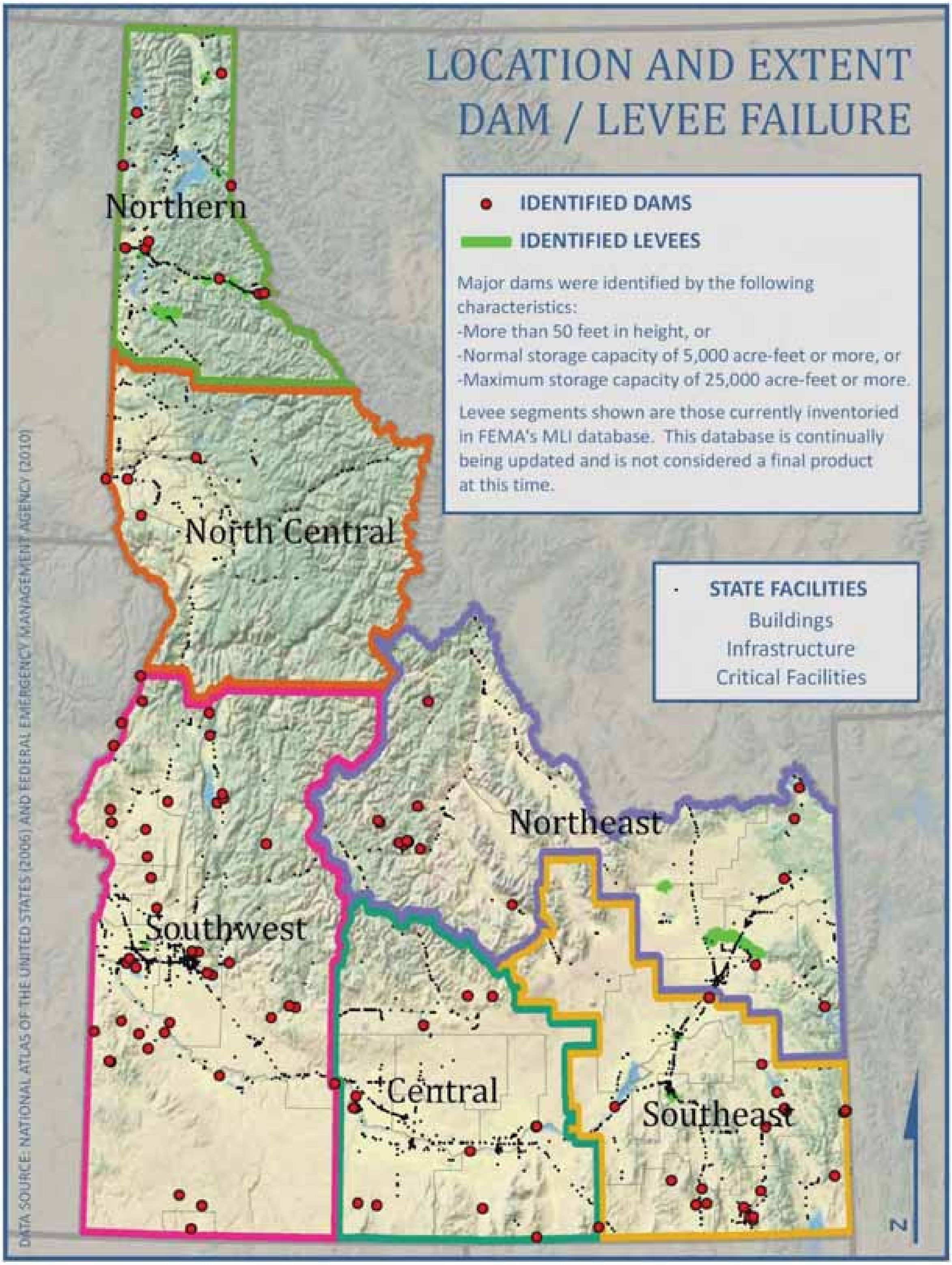
Mitigation Rationale

The primary rationale for mitigating dam and levee failure hazards is the potential loss of life and economic loss. These hazards result from the failure of manmade water impoundment structures, which often results in catastrophic downgrade flooding. Dam safety and dam construction, although improving, remains imperfect, and the necessity for hazard mitigation remains.

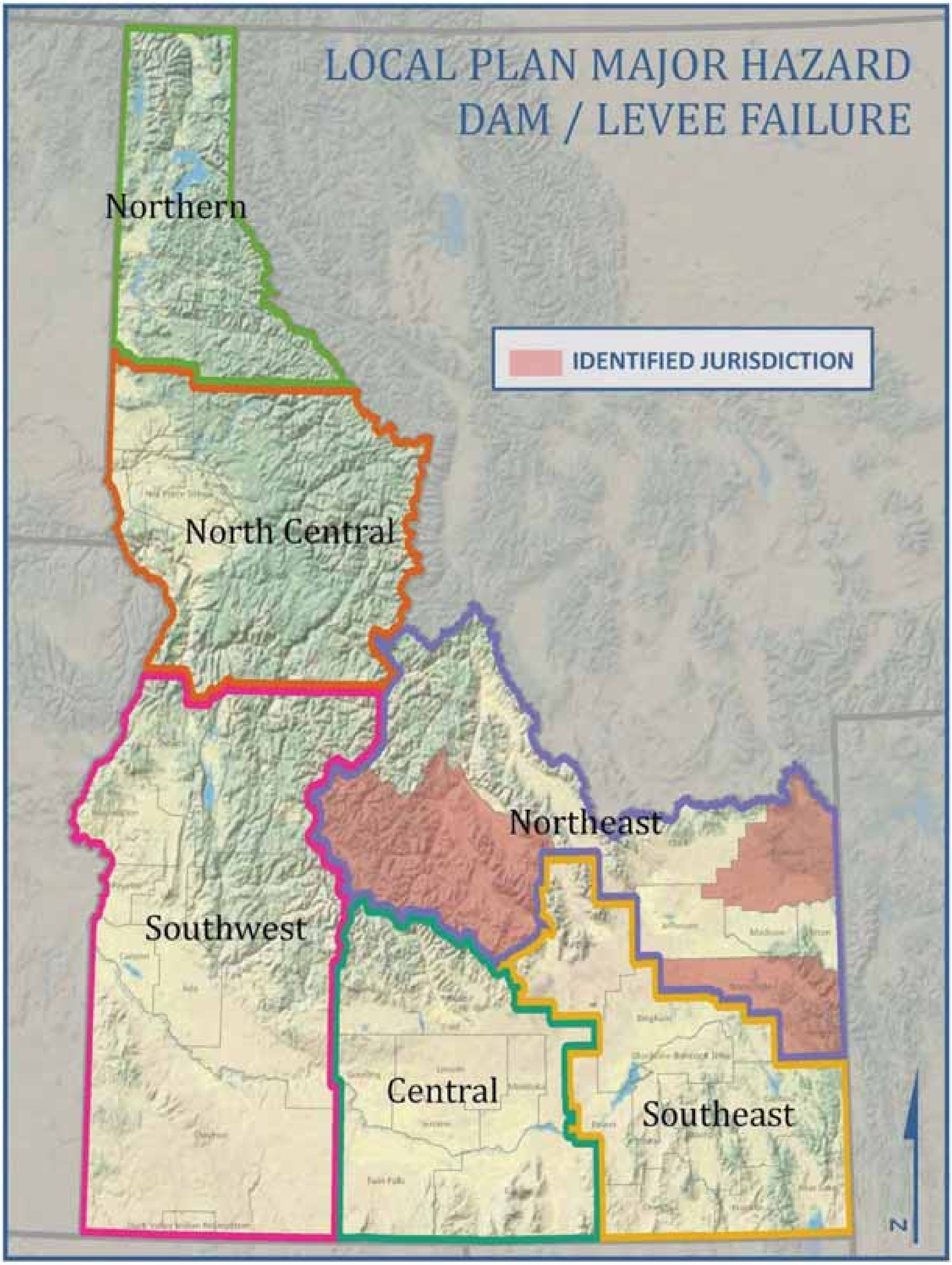
General Mitigation Approaches

The mitigation of hazards associated with dam failure differs depending on whether the hazard is associated with a new or existing dam. New dams can be designed to meet stringent safety criteria, including the passage of extreme flood discharges and resistivity to earthquakes. Land downstream of new dams can be zoned or otherwise regulated to limit new construction and exposure.

Recent flood events have brought to light concerns regarding levees and dikes in Idaho. For various reasons, confusion and misconceptions exist regarding levees and dikes. Moreover, Idaho residents and elected officials, both new and old, maintain false assumptions regarding the ownership and maintenance of levees and dikes. Addressing the hazards associated with existing dams often is problematic, especially when the ownership cannot be determined. The primary mechanism is the development of Emergency Action Plans focused on evacuating people and closing roads. In some cases, high-hazard dams that are deemed unsafe because of disrepair, poor maintenance, or changed design standards, can be retrofitted. In extreme cases, removing a dam may be the most efficient and cost-effective approach to mitigating imminent danger and damage.



Map 3-18: Dam / Levee Locations and Extents



Map 3-19: Dam / Levee Failure Identified as Local Plan Major Hazard

RISK ASSESSMENT: DROUGHT

Description

Drought is an expected phase in the climactic cycle of almost any geographical region, including the State of Idaho. Objective, quantitative definitions for drought exist, but most authorities agree that, because of the many factors contributing to it and because its onset and relief are slow and indistinct, none is entirely satisfactory. According to the National Drought Mitigation Center (NDMC), drought "originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector". What is clear is that a condition perceived as "drought" in a given location is the result of a significant decrease in water supply relative to what is "normal" in that area. There are four generally accepted, operational definitions of drought (NDMC, 2006):

Meteorological drought is usually an expression of precipitation's departure from "normal" over some period of time. These definitions are usually region-specific, and presumably based on a thorough understanding of regional climatology. The variety of meteorological definitions from different countries at different times illustrates why it is folly to apply a definition of drought developed in one part of the world to another:

- United States (1942): less than 2.5 mm of rainfall in 48 hours
- Great Britain (1936): 15 consecutive days with daily precipitation totals of less than 0.25 mm
- Libya (1964): annual rainfall less than 180 mm
- India (1960): actual seasonal rainfall deficient by more than twice the mean deviation
- Bali (1964): a period of 6 days without rain

Meteorological measurements are the first indicators of drought.

Agricultural drought occurs when there isn't enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought happens after meteorological drought but before hydrological drought. Agriculture is usually the first economic sector to be affected by drought.

Hydrological drought refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow and as lake, reservoir, and groundwater levels. There is a time lag between lack of rain and less water in streams, rivers, lakes, and reservoirs, so hydrological measurements are not the earliest indicators of drought. When precipitation is reduced or deficient over an extended period of time, this shortage will be reflected in declining surface and subsurface water levels.

Socioeconomic drought occurs when physical water shortage starts to affect people, individually and collectively. Or, in more abstract terms, most socioeconomic definitions of drought associate it with the supply and demand of an economic good.

It should be noted that water supply is not only controlled by precipitation (amount, frequency, and intensity), but also by other factors including evaporation (which is increased by higher than normal heat and winds), transpiration, and human use.

Drought in Idaho is generally associated with a sustained period of low winter snowfall. This results from a temporary, yet significant, change in the large-scale weather patterns in the western U.S. The limited snow packs result in reduced stream flows and groundwater recharge. Idaho's system of reservoirs and natural storage can buffer the effects of minor events over a few years, but a series of dry winters (or an especially pronounced single low snowfall event) will result in a shortage of available water. Extended periods of above-average temperatures during the spring and summer can increase the impacts of low snow packs.

Location, Extent, and Magnitude

Drought can have the broadest effect of all of Idaho's hazards, sometimes affecting all regions of the State simultaneously. Although deaths and injuries are rarely direct results, drought can have significant impacts on the economic, environmental, and social well-being of the State (also see "Environmental Impacts" later in this section).

Idaho's arid climate predisposes it to periodic drought. Some areas of the State, however, have a greater potential for drought than the others. The Idaho Department of Water Resources (IDWR) reports that, based on analyses of historical stream flow records, southeastern Idaho and the upper portions of the Snake River Plain appear to have the highest probability for persistent, severe stream flow deficits.

Several indices are used to measure how precipitation rates are different from historical norms. Government officials likely consult multiple indices before making decisions regarding declarations and the availability of funding. The Palmer Drought Severity Index is widely used by the U.S. Department of Agriculture for assessing large areas.

Areas with many microclimates, such as mountainous portions of Idaho, can be better served by applying a Surface Water Supply Index (SWSI), which takes such factors as snowpack into consideration. NRCS has worked with individual irrigation districts and water masters to determine the SWSI threshold where shortages of the irrigation agriculture water supply start to occur.

SWSI is based on frequency analysis and is adapted to a particular river basin. Approximately 25 years of record are required for datasets in the SWSI. In Idaho, SWSI values range from -4.1 (extremely dry) to +4.1 (extremely wet), with zero representing average water supply conditions (Idaho NRCS, 2010). When the SWSI value is less than -1.2, water supply shortages may be expected.

The NDMC is now also using a new index: the Standardized Precipitation Index, which can identify emerging droughts farther in advance than the Palmer Index. (NDMC, 2006). The dissemination of information on the current status and predictions of drought is addressed below, under "Future Occurrence."

Past Occurrence

The IDWR reports that meteorological drought conditions (a period of low precipitation) existed in the State approximately 30 percent of the time from 1931 to 1982. Principal drought in Idaho, indicated by stream flow records, occurred during 1929-41, 1944-45, 1959-61, 1977, 1987-93, and 2001-2005.

Table 3-19 lists the droughts recorded by the IDWR since 2000 and those reported by FEMA (Presidential Disaster declarations) or the Spatial Hazard Events and Losses Database for the United States (SHELDUS) online database produced by the Hazards and Vulnerability Research Institute. Map 3-20, at the end of this section, shows where major drought events have occurred. State drought emergency declarations are made on a county-by-county basis by the IDWR and must be approved by the Governor. IDWR drought declarations apply only to the administrative processing of applications for temporary changes of water rights.[2] They do not apply to issues such as financial or disaster support. Water right changes made under the provisions of these State declarations expire at the end of the current year, unless extended or terminated by the IDWR Director. From the start of 2000 through May 2010, there were State drought emergency declarations in Idaho counties every year except 2006 and 2009.

Table 3-19: Drought Events in Idaho Counties (1977-mid-2010)

Year	Counties Affected	State Drought Emergency Declaration	Part of Federal Disaster Declaration?
1977	Adams, Bear Lake, Blaine, Camas, Caribou, Elmore, Idaho, Lincoln, Washington	Unknown	Yes (DR 3040)
1988[1]	Ada, Adams, Bannock, Bear Lake, Benewah, Bingham, Blaine, Boise, Bonner, Bonneville, Boundary, Butte, Camas, Canyon, Caribou, Cassia, Clark, Clearwater, Custer, Elmore, Franklin, Fremont, Gem, Gooding, Idaho, Jefferson, Jerome, Kootenai, Latah, Lemhi, Lewis, Lincoln, Madison, Minidoka, Nez Perce, Oneida, Owyhee, Payette, Power, Shoshone, Teton, Twin Falls, Valley, Washington	Unknown	No
1991[1]	Ada, Bannock, Bear Lake, Bingham, Blaine, Boise, Bonneville, Butte, Camas, Canyon, Caribou, Cassia, Elmore, Franklin, Gem, Gooding, Jefferson, Jerome, Lincoln, Madison, Minidoka, Oneida, Owyhee, Payette, Power, Teton, Twin Falls	Unknown	No
1992[1]	Ada, Adams, Bannock, Bear Lake, Benewah, Bingham, Blaine, Boise, Bonner, Bonneville, Boundary, Butte, Camas, Canyon, Caribou, Cassia, Clark, Clearwater,	Unknown	No

[2] Such changes to the use of water rights consist of transfers to change the point of diversion, place, and purpose of use of valid existing water rights or temporary exchanges of water authorized to be diverted under water rights, as provided in Idaho code (Idaho Statute 42-222A).

Table 3-19: Drought Events in Idaho Counties (1977-mid-2010)			
Year	Counties Affected	State Drought Emergency Declaration	Part of Federal Disaster Declaration?
	Custer, Elmore, Franklin, Gem, Gooding, Idaho, Jefferson, Jerome, Kootenai, Latah, Lemhi, Lewis, Lincoln, Madison, Minidoka, Nez Perce, Oneida, Owyhee, Payette, Power, Shoshone, Teton, Twin Falls, Valley, Washington		
2000[2]	Custer, Blaine, Butte, Lemhi, Lincoln	Yes	No
2001[2]	Ada, Adams, Bannock, Bear Lake, Bingham, Blaine, Boise, Bonneville, Butte, Canyon, Caribou, Cassia, Clarke, Custer, Elmore, Fremont, Gooding, Jefferson, Jerome, Lemhi, Lincoln, Madison, Oneida, Owyhee, Payette, Power, Teton, Twin Falls, Salmon Track within Twin Falls, Washington	Yes	No
2002[3]	Butte, Blaine, Bonneville, Clark, Fremont, Bingham, Custer, Lincoln, Madison, Power, Bannock County, Jefferson, Elmore, Gooding, Oneida, Caribou, Bear Lake	Yes	No
2003[3]	Bonneville, Teton, Lemhi, Jefferson, Bear Lake, Owyhee, Cassia, Madison, Blaine, Oneida, Caribou, Bannock, Bingham, Butte, Clark, Custer, Fremont, Lincoln, Power	Yes	No
2004[3]	Minidoka, Bear Lake, Jerome, Cassia, Elmore, Twin Falls, Franklin, Teton, Oneida, Jefferson, Bingham, Power, Madison, Bonneville, Bannock, Gooding, Blaine, Lemhi, Custer, Fremont, Caribou, Lincoln, Clark, Butte	Yes	No
2005[3]	Lincoln, Ada, Jerome, Gooding, Lemhi, Jefferson, Blaine, Caribou, Twin Falls, Elmore, Clark, Bannock, Power, Fremont, Madison, Canyon, Bingham, Bonneville, Custer, Butte	Yes	No

Table 3-19: Drought Events in Idaho Counties (1977-mid-2010)			
Year	Counties Affected	State Drought Emergency Declaration	Part of Federal Disaster Declaration?
2007[3]	Lewis, Clearwater, Adams, Owyhee, City of Pierce, Oneida, Minidoka, Caribou, Bonneville, Bannock, Bingham, Jefferson, Lincoln, Madison, Teton, Blaine, Fremont, Lemhi, Clark, Custer, Butte	Yes	No
2008[3]	Lewis, Nez Perce, Custer, Butte	Yes	No
2010 (to June)[3]	Franklin, Clark, Lincoln, Blaine, Butte, Custer, Teton, Fremont	Yes	No
Source: [1] Hazards & Vulnerability Research Institute, 2009 (SHELDUS); [2] IDWR, 2010a; [3] IDWR, 2010b.			

The most prolonged drought in Idaho was during the 1930s. For most of the State, this drought lasted for 11 years (1929-41), despite greater than average stream flows in 1932 and 1938. In northern Idaho, the drought was interrupted by greater than average stream flows from 1932 until 1937, but then resumed until 1946. Southern and central Idaho experienced a mild drought from 1959 to 1961. During the early 1960s, several areas in the State also experienced water shortages.

Of all the statewide drought emergency declarations, only one was also a Federal disaster: 1977, the worst single year on record. This event was part of a more widespread water shortage faced by the United States. In Idaho, a lack of winter snowfall resulted in the lowest runoff of record at most gages in the State. Ski resorts were closed for much of the ski season. Irrigation ditches were closed well before the end of the growing season, and crop yields were below normal. Domestic wells in the Big and Little Wood River basins became dry early in April 1977, and many shallow wells in six western Idaho counties became dry in June.

Stream flows were below normal from 1979 to 1981. From 1987 through 1992, water supplies were much below normal throughout the State. In southwestern and central Idaho, this six-year drought was more severe than the 1930s drought. Low winter snowpack and prolonged periods of greater than average temperatures resulted in unseasonable early snow melt, high water demands, and the lowest stream flows since 1977. In 1987, the water supply ranged from 10 to 50 percent below normal in many areas of the State. According to the National Oceanographic and Atmospheric Agency (NOAA) National Climactic Data Center (NCDC), much of the State of Idaho most recently experienced moderate to extreme drought conditions from the years 2000 through 2005.

Future Occurrence

Despite its long agricultural history, Idaho is correctly classified as an arid area with periods of drought. Although defined as "abnormally" dry weather, drought is a normal part of Idaho's climate and can be expected to reoccur periodically. Since the 1920s, and possibly before, the State has dealt with drought conditions for at least one year each decade and usually for more prolonged periods. Southeastern Idaho and the upper portions of the Snake River Plain are most susceptible to persistent, severe stream flow deficit conditions.

Environmental Impacts

The impacts to vegetation and wildlife can include death from dehydration and the spread of invasive species or disease because of stressed conditions. However, drought is a natural part of the environment in Idaho, and native species are likely to be adapted to surviving periodic drought conditions. It is unlikely that drought would jeopardize the existence of rare species or vegetative communities. Environmental impacts are more likely at the interface of the human and natural world. The loss of crops or livestock due to drought can have far-reaching economic effects (detailed more under "Vulnerability"). Wind and water erosion can alter the visual landscape, and dust can damage property. Water-based recreational resources are affected by drought conditions. Indirect impacts from drought arise from wildfire, which may have additional effects on the landscape and sensitive resources such as historic or archeological sites; wildfire is discussed in another section of this Plan.

Development Trend Impacts

Drought affects the entire State, but particularly southeastern Idaho and the upper portions of the Snake River Plain. These areas of highest risk include 12 of the 16 major cities in the State and some of the largest population growth areas. This trend poses the threat of increasing potential losses, since a larger population equates to a higher risk of increased losses. Drought conditions and development are interrelated – as water is drawn down from increased rates of use, drought can occur more readily than from lack of precipitation alone. A substantial impact from drought in Idaho is stress on the utilities that rely on hydroelectric power, which could result in increases in power costs to citizens. Planning for power sources is an important part of development. Another impact to consider is how drought could negatively affect the State's agricultural economy. Drought can also lead to reduced quality of living conditions and poverty. Mitigating the effects of drought is a significant consideration in planning for future water use.

Critical Infrastructure and State Facility Impacts

Critical facilities are less at risk than private, noncritical facilities. An indirect impact of drought is wildfire, which may have a greater effect on critical and State facilities.

Vulnerability Assessment

IDWR produced the Idaho Drought Plan, revised in 2001, "to provide current and historical information, guidance and a framework for managing water shortage situations in Idaho." The efforts put forth to assemble the plan and the historical information contained therein are indicative of the State's awareness of its vulnerabilities. The State is vulnerable to drought because it is already in an arid region of the country. However, the southeastern and upper Snake River Plain counties have the highest probability for persistent stream flow deficits.

Idaho's dependence on resource-based industries also make the State economically vulnerable to drought. Losses ripple through the economy and may result in serious long-term consequences. Economic impacts may include:

- Losses from crop, dairy and livestock, timber, and fishery production and associated businesses.
- Losses from recreation providers and associated businesses.
- Losses related to the increased costs resulting from increased energy demand and from shortages caused by reduced hydroelectric generation capacity.
- Revenue losses for Federal, State, and local governments from a reduced tax base and for financial institutions from defaults and postponed payments.
- Losses from impaired navigability of streams, rivers, and canals.
- Long-term loss of economic growth and development.

Compilation of Local Hazard Mitigation Plans

One local plan, that of Twin Falls, ranked drought as one of its region's major hazards (see Map 3-19 at the end of this section). Gooding County also reported drought as a major hazard that could be considered to tie with severe weather and floods for the second most damaging hazard after wildfire, based on its risk matrix. However, Gooding County devoted many more mitigation strategies to the other top-ranking hazards than to drought. Detailed information related to local vulnerabilities may be found in local hazard mitigation plans.

Loss Estimation

No specific, statewide loss estimation exists for the hazard of drought. Historical drought losses tend to be related to temporary and permanent losses of property, particularly agricultural damages, rather than loss of life.

Critical facilities are less at risk than private, noncritical facilities. Transportation facilities do not tend to be impacted by drought. One risk associated with drought is the increased occurrence of wildfire, which is addressed in its own section of this Plan. Another indirect loss from drought is increased hydropower costs.

Compilation of Local Hazard Mitigation Plans

One local plan, that of Twin Falls, ranked drought as one of its region's major hazards. In the Twin Falls plan, the loss was reported to be "major sheltering effort or major business and economic loss." Gooding County also reported Drought as a major hazard that could be considered to tie with severe weather and floods for the second most damaging hazard after wildfire. However, Gooding County devoted many more mitigation strategies to the other top-ranking hazards than to drought. Detailed information related to local loss estimates may be found in local hazard mitigation plans.

Mitigation Rationale

As detailed above, drought is a major natural hazard in the State with respect to its economic impact and land area extent. With respect to number of deaths, drought is not a major hazard. Mitigation for this hazard focuses on individual preparedness. The Idaho Department of Water Resources has a drought plan that can assist with mitigation planning for this hazard.

Policy Framework

Mitigation of drought is established, generally, in the Idaho Disaster Preparedness Act of 1975 as amended (Idaho State Code Chapter 10, Title 46) and, more specifically, in the Governor's Executive Order, 2000-04. The Executive Order also assigns the following responsibilities:

- Department of Agriculture – Primary support agency for mitigation activities pertaining to agricultural issues.
- Department of Commerce – Primary support agency for mitigation activities pertaining to economic injury/losses that result from disasters.
- Department of Water Resources – Develops drought mitigation programs in concert with BHS.

The Idaho Drought Plan (IDWR, 2001) provides historical information, guidance, and a framework for managing water shortage situations in Idaho. The information presented in the Idaho Drought Plan outlines and describes technical issues and documents activities accomplished during recent water shortages. It is also designed as a resource and educational tool to be used during future water shortages.

The Idaho State Water Plan, prepared by the Idaho Water Resource Board with assistance from IDWR, establishes the statewide water policy plan and component plans for individual basins or other geographic designations. These plans may be reviewed and re-evaluated on a periodic basis and may address drought issues if warranted.

The issue of whether to formally declare a drought statewide is both controversial and important. Most public agencies approach formal declaration with caution. Formal designations may not bring additional Federal support or minimize economic impacts and they can have a serious economic impact on tourism, agriculture, financing and many other related industries. Unless a water shortage situation is of extreme magnitude, the safest approach is to let county and local governments determine their own response. There is an existing and effective network of public agencies, water system managers, and experts who can assess their particular needs. If necessary, additional technical assistance can be provided by the Idaho Water Supply Committee.

Existing Mitigation Planning Programs

State Government

Drought-related resource management is intimately intertwined with general water supply management. Consequently, drought mitigation is to a large degree an extension of normal water management procedures.

The Idaho Department of Water Resources serves as the lead State agency in coordinating drought-related activities. IDWR has two major responsibilities related to drought:

- Administration of all water rights.
- Inventory, monitoring, and planning of the State's water resources.

IDWR analyzes water supply data early in the water year to determine the probability of shortages. If a drought becomes likely, the interagency Water Supply Committee, chaired by IDWR, coordinates the State's drought-related activities. Idaho's Water Supply Committee was created as an action element of the Idaho Drought Plan first prepared in 1990, when Idaho was in a period of sustained drought. The committee, composed of State, Federal, and private agency representatives, performs a number of tasks:

- Compiles drought-related data;
- Coordinates State agency actions;
- Provides public information; and
- Promotes water and energy conservation.

At the end of the 1992 water year, the Idaho Water Resource Board offered financial assistance in the form of one-time cost-share grants to assist regional entities in establishing winter cloud seeding projects. Projects were initiated in the Upper Snake, Bear, and Boise River basins during the winter of 1992-93. Subsequently, the legislature gave IDWR authority to coordinate weather modification projects designed to increase water supplies. The legislature also approved funding for IDWR to provide financial assistance to local or regional entities that are funding winter-season weather modification programs.

The Water Quality Division of the Department of Environmental Quality has oversight for the safety of drinking water, groundwater protection, non-point and point source pollution, and municipal facilities construction. By maintaining the public water supply in good quality, shortages are mitigated. The Division contracts with the seven health districts for oversight of small community and non-community drinking water systems, addressing source protection and safe delivery for more than 2,080 community and non-community water systems statewide. The Division also administers State and Federal construction grants programs intended to provide financial assistance to Idaho communities needing new wastewater treatment systems or improvements to existing systems in order to protect public health and comply with water quality standards.

In 2010, IDWR partnered with the NDMC and the USDA Risk Management Agency (RMA) to sponsor a workshop on the Vegetation Drought Response Index (VegDRI) and the more experimental product, Vegetation Outlook (VegOut). The workshop helped inform the agricultural community about new means to prevent losses from drought.

Federal Government

The Bureau of Reclamation modifies its resource management and technical functions to reduce the adverse impacts of periodic water shortages. Drought mitigation is possible through four mechanisms:

- Project Sizing – projects are designed to limit the impact of water shortages.
- Water Conservation and Efficiency Improvement – conservation and efficiency measures are incorporated into new projects and retrofitted into older projects; assistance is available to other agencies.
- Technical Assistance in Water Conservation Planning – Technical assistance is provided for the development and implementation of water conservation plans.
- Project (Dam) Operations – Projects are operated, to the extent feasible and permitted by law, to use the water resource in an efficient manner.

The NRCS monitors and reports the snow pack in the western United States. This information is used to make volumetric stream flow forecasts for major rivers in the State (in conjunction with the NWS). This early warning allows for water-use adjustments and possible avoidance of a drought situation. The Water Resources Division of the USGS also collects, interprets, and disseminates hydrologic information.

NOAA, with the U.S. Department of Agriculture and the NDMC in Lincoln, Nebraska, issues a weekly drought assessment called the U.S. Drought Monitor and a monthly assessment called the U.S. Seasonal Drought Outlook. Examples are provided in Figures 3-9 and 3-10, below. These represent compilations of drought indicators and field reports.

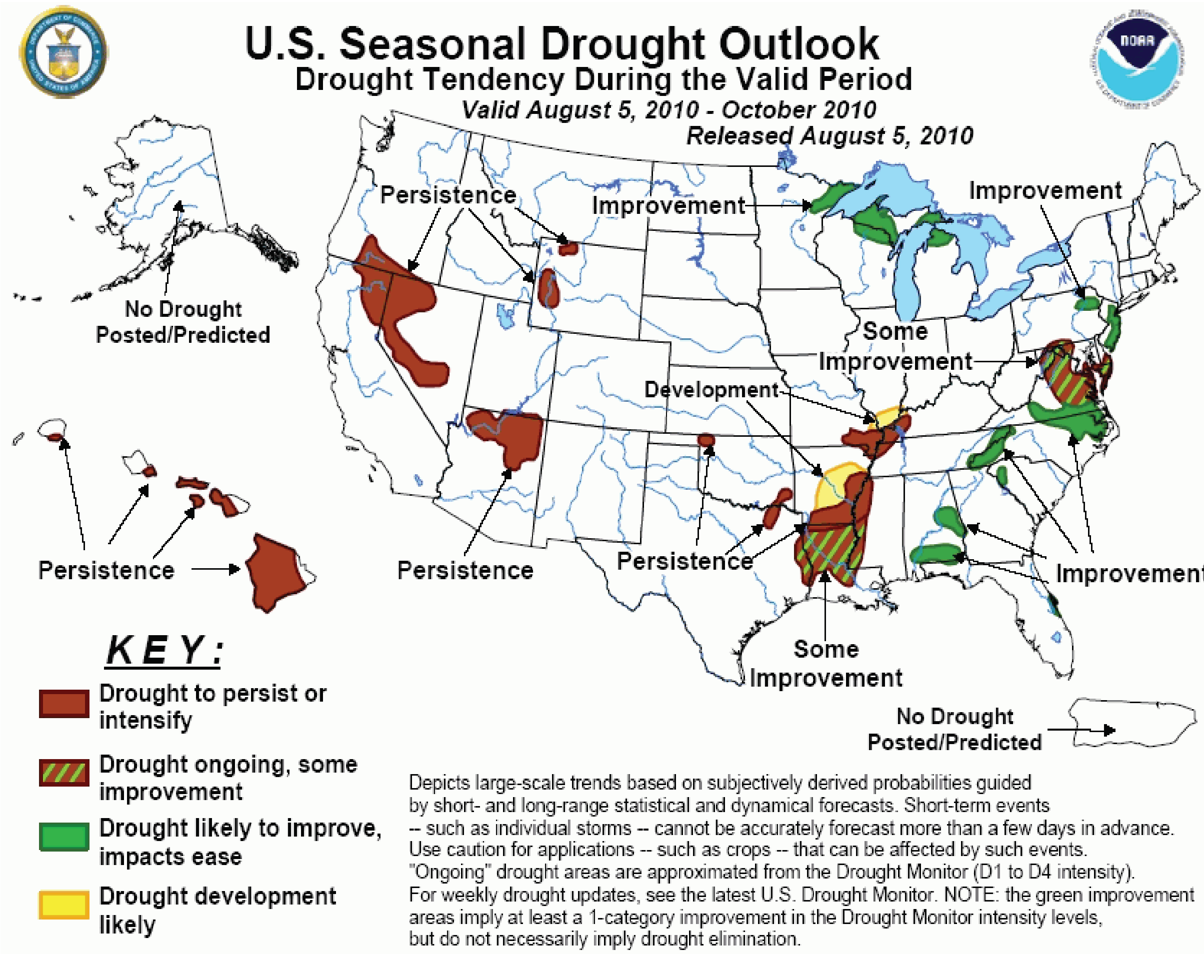


Figure 3-9: Example of "U.S. Seasonal Drought Outlook" from the National Weather Service, Climate Prediction Center (2010) / Source: National Oceanic and Atmospheric Administration

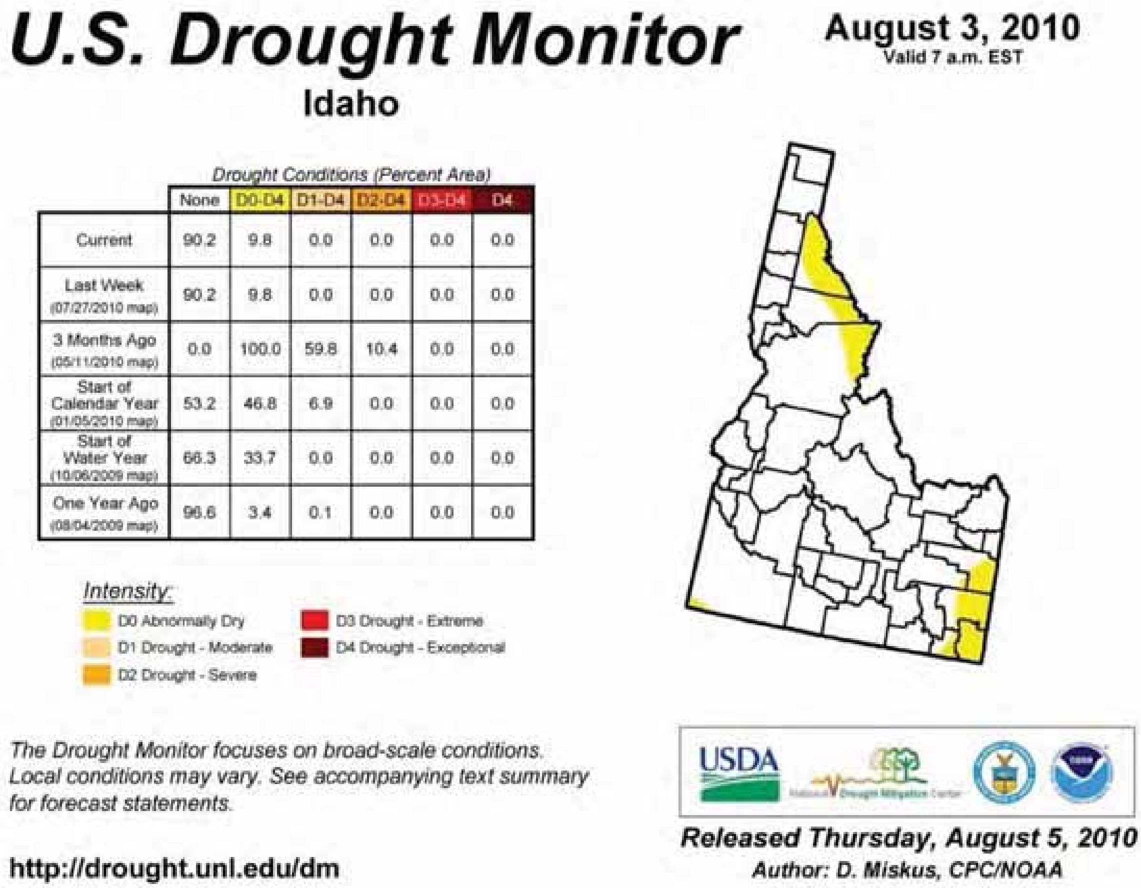


Figure 3-10: Example of "U.S. Drought Monitor: Idaho" / Source: National Drought Mitigation Center (2010)

The Idaho branch of USDA's NRCS is working with IDWR and BHS on drought monitoring and proactively predicting drought. It is also working with the USDA's Risk Management Agency to improve crop insurance participation in order to reduce costs.

General Mitigation Approaches

Hazard Management

Hazard management of drought involves the long-term reduction of the probable gap between water supply and demand. Supply can be addressed through the development of storage and delivery capacity (construction of reservoirs and associated facilities), improved operation of existing facilities, and weather modification. Demand can be addressed through various forms of conservation.

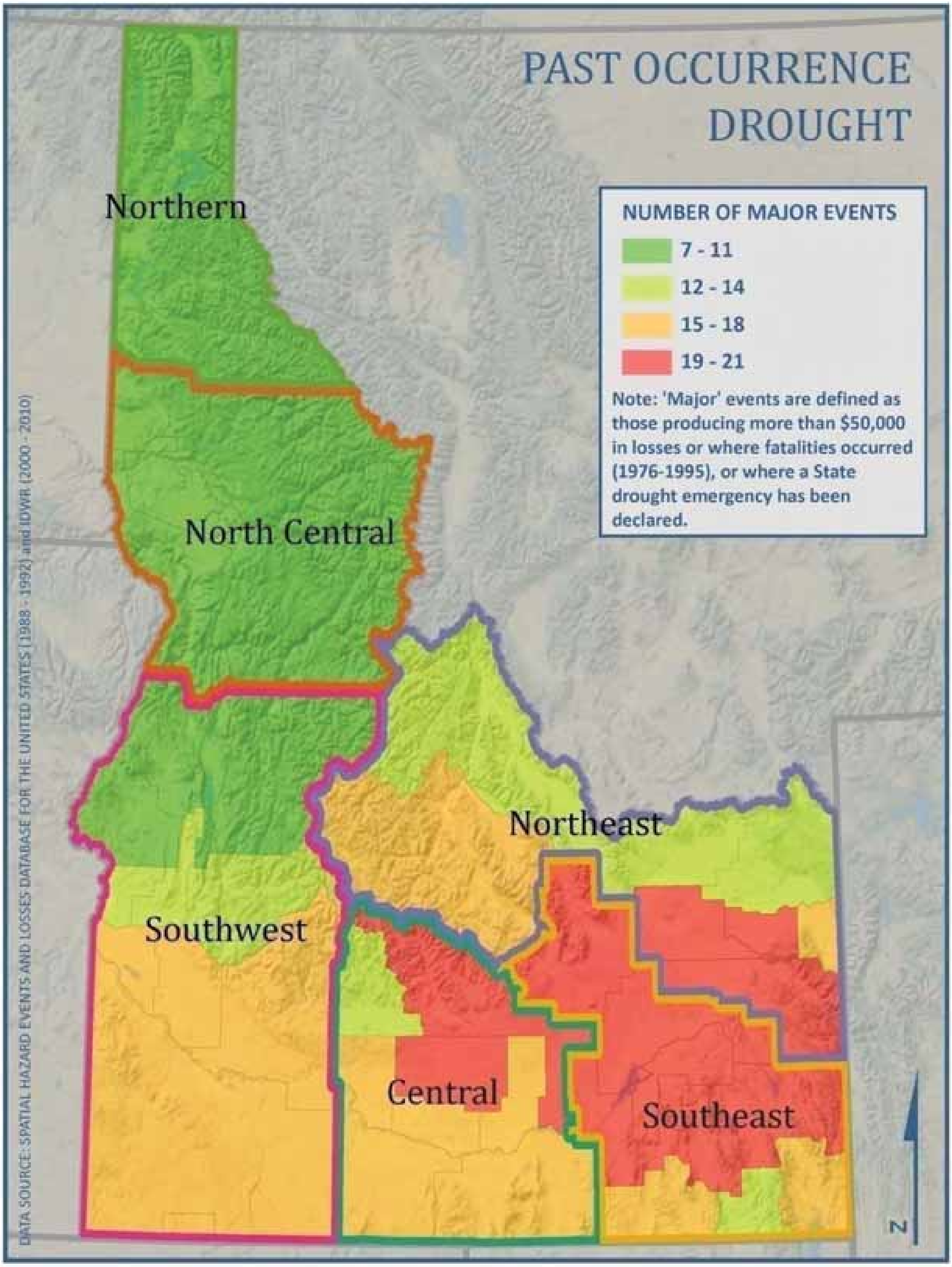
Weather modification is designed to increase the amounts of moisture realized from storms. Any weather modification program with the goal of increasing basin-wide winter snow packs should be a multiyear commitment. Analyses indicate that a 5- to 20-percent seasonal precipitation increase can be achieved for climatic situations such as those in Idaho.

Water conservation efforts may include:

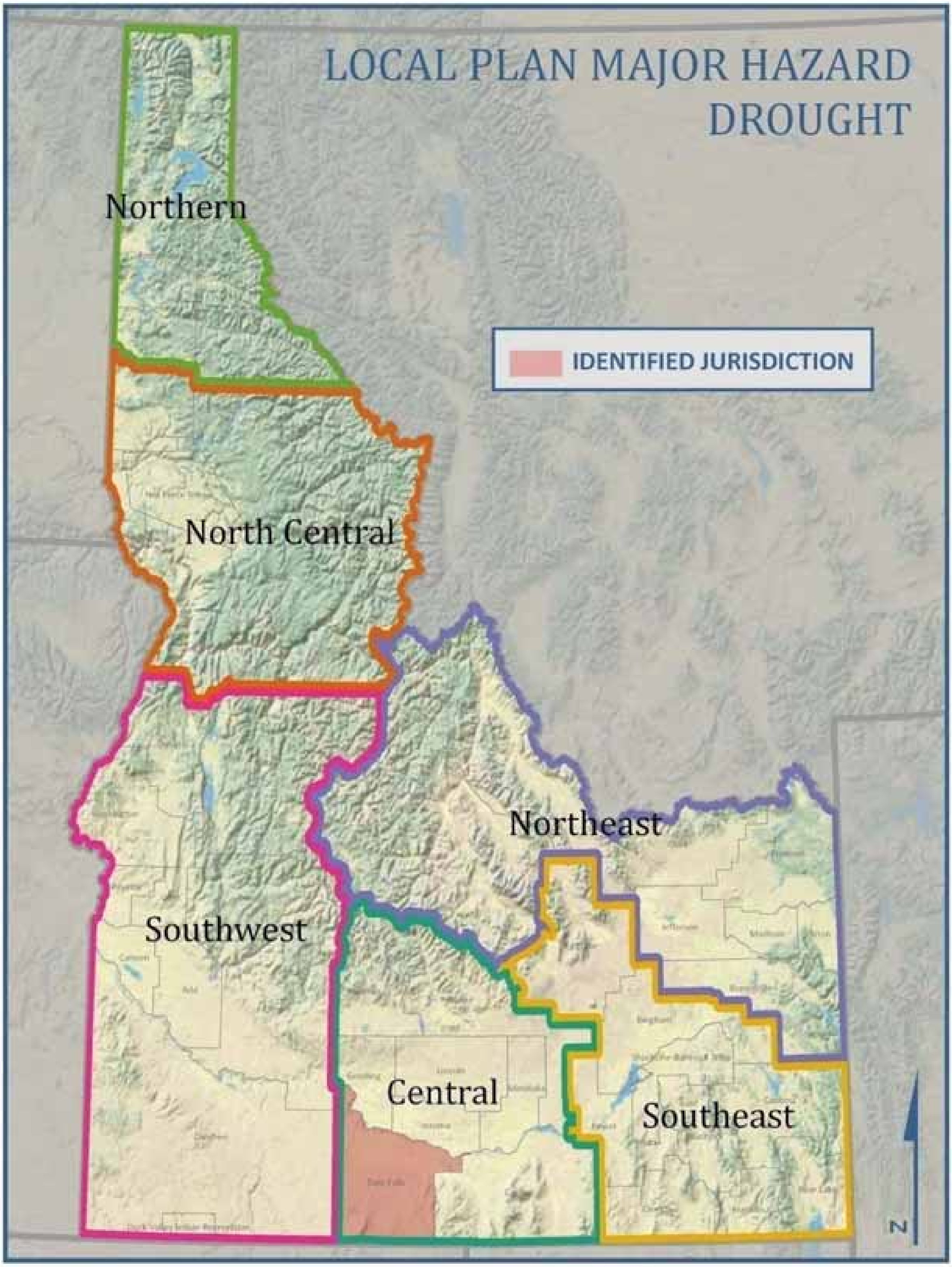
- Administering conjunctive use of surface and ground water;
- Implementing water quality management and wastewater reuse;
- Reducing water conveyance losses; and
- Reducing consumptive use by changing the type of water application system or incremental pricing for water use.

Information/Outreach and Public Education

Drought-related educational efforts geared towards conservation both increase the effective water supply (by reducing demand) and build "drought resistance" by demonstrating how to withstand the effects of a prolonged drought. Drought-education materials should be designed to help residents and businesses learn methods of water conservation and instill these methods in their everyday lifestyles. Early information is vitally important to the agricultural community, allowing farmers to make important seed ordering and planting decisions.



Map 3-20: Past Drought Occurrences



Map 3-21: Drought Identified as Local Plan Major Hazard

RISK ASSESSMENT: HAZARDOUS MATERIALS

Description

Substances that, because of their chemical or physical characteristics, are hazardous to humans and living organisms, property, and the environment, are regulated by the U.S. Environmental Protection Agency (EPA) and, when transported in commerce, by the U.S. Department of Transportation (DOT).

The EPA chooses to specifically list substances as hazardous and extremely hazardous, rather than providing objective definitions. Hazardous substances, as listed, are generally materials that, if released into the environment, tend to persist for long periods and pose long-term health hazards for living organisms. Extremely hazardous substances, while also generally toxic materials, represent acute health hazards that, when released, are immediately dangerous to the lives of humans and animals and cause serious damage to the environment. When facilities have these materials in quantities at or above the threshold planning quantity (TPQ), they must submit "Tier II" information to appropriate State and/or local agencies to facilitate emergency planning.

DOT regulations provide the following definition for the term "hazardous material":

> *Hazardous material* means a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under section 5103 of Federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of this chapter.

Preparation for Hazardous Materials Handling in Ada County / Source: www.accem.org/hazmatprep.html

When a substance meets the DOT definition of a hazardous material, it must be transported in accordance with safety regulations providing for appropriate packaging, communication of hazards, and proper shipping controls.

In addition to EPA and DOT regulations, the National Fire Protection Association (NFPA) develops codes and standards for the safe storage and use of hazardous materials. These codes and standards are generally adopted locally and include the use of the NFPA 704 standard for communication of chemical hazards in terms of health, fire, instability (previously called "reactivity"), and other special hazards (such as water reactivity and oxidizer characteristics). Diamond-shaped NFPA 704 signs ranking the health, fire and instability hazards on a numerical scale from zero (least) to four (greatest) along with any special hazards, are usually required to be posted on chemical storage buildings, tanks, and other facilities. Similar NFPA 704 labels may also be required for individual containers stored and/or used inside facilities.

While it is defined somewhat differently by various organizations, the term "hazardous material" may be generally understood to encompass substances that have the capability to harm humans and other living organisms, property, and/or the environment. No universally accepted, objective definition of the term "hazardous material event" has been developed either. A useful working definition, however, might be framed as: any actual or threatened uncontrolled release of a hazardous material, its hazardous reaction products, or the energy released by its reactions that poses a significant risk to human life and health, property and/or the environment.

Location, Extent, and Magnitude

Because hazardous materials are so widely used, stored and transported, a hazardous material event could take place almost anywhere. Moreover, many hazardous materials are used, stored and transported in very large quantities, so the impacts of an event may be widespread and powerful. Hazardous material incidents usually occur on major highways and railways. Map 3-22, at the end of this section, shows the number of Tier II storage facilities per county. There is no magnitude rating for hazardous material incidents at present.

Past Occurrence

The Pipeline and Hazardous Materials Safety Administration tracks hazardous material releases through its nationwide database. Regulations in 49 CFR 171.15 and 171.16 govern situations where hazardous materials are released and the resulting required notifications and reporting. Unless they are properly reported, it is difficult to identify and track past hazardous materials releases. Table 3-20 (below) and Map 3-23 (at the end of this section) summarize all such events in Idaho from 1997 through 2010.

Table 3-20: Hazardous Materials incidents in Idaho (1997 - 2010)

Year	Incidents	Hospitalized	Non-Hospitalized	Fatalities	Damages ($)
1997	28	0	1	0	$433,483.00
1998	27	0	0	0	$10,537.00
1999	29	0	1	0	$168,844.00
2000	34	0	1	0	$23,400.00
2001	31	0	0	0	$323,251.00
2002	36	0	0	0	$2,214,153.00
2003	42	0	0	0	$1,938,812.00
2004	29	0	1	0	$329,499.00
2005	36	0	0	0	$542,085.00
2006	67	0	1	0	$701,146.00
2007	78	0	1	0	$76,416.00
2008	68	0	13	0	$134,199.00
2009	42	0	0	0	$1,049,750.00
2010	25	0	0	0	$8,250.00
Totals	572	0	19	0	$7,953,825.00

Source: https://hazmatonline.phmsa.dot.gov

Future Occurrence

The events that can produce a hazardous materials release vary greatly; therefore, future releases are statistically independent of past events. The fact that all releases have a human component makes prediction difficult. Unfortunately, the short period of recorded and observed historical data that contribute to the risk make it difficult to develop return periods for hazardous material release areas in Idaho. However, like any other type of event, a return period and probability of future occurrence can be developed from the historical records that are available.

It can reasonably be assumed, based on observations recorded from 1997 through 2010, that a hazardous materials release has occurred once every 0.02 years.

[(Current Year) 2010] subtracted by [(Historical Year) 1997] = 14 Years on Record

[(Years on Record) 14] divided by [(Number of Historical Events) 572] = 0.02

Based on historical probability, there is a 100-percent chance that a hazardous materials release will occur in any given year in Idaho.

Environmental Impacts

Hazardous materials incidents can have obvious, direct environmental impact as well as long-term, insidious environmental damage. Water pollution is an immediate concern for direct human consumption, recreation, crop irrigation, and fish and wildlife consumption. Depending on the material, pollutants can bioaccumulate to differing degrees, affecting animals high on the food chain long after a spill. Hazardous material incidents would not likely affect geology, but could significantly impact soils and farmlands, requiring expensive remediation. Unless a spill is directly adjacent, hazardous materials incidents are unlikely to affect or archeological sites.

Development Trend Impacts

There are no land-use regulations that restrict building around industrial facilities or along transportation routes. As the population increases, development will also continue to increase in these areas, thereby exposing a greater number of individuals to the risk of a hazardous materials release. Increased development will lead to increased vulnerability and potential losses.

Critical Infrastructure and State Facility Impacts

Major highways and railways are frequently used to transport hazardous materials. Hazardous materials could affect water treatment facilities. Map 3-22 at the end of this section shows the location of State facilities in relation to the location and extent of the hazardous material hazard.

Vulnerability Assessment

The risk of hazardous materials incidents in Idaho can be expected to remain at historical levels with small, incremental increases in proportion to statewide increases in population and economic activity. Transportation incident risk might also be expected to be influenced to some extent by population and economic activity increases in surrounding States.

Serious hazardous materials incidents – those causing hospitalizations, deaths, and large-scale economic loss and environmental damage – are generally the result of a series of improbable events involving large quantities of material and are, thus, relatively rare and difficult to predict. Tier II reporting reveals the location and identity of large quantities of hazardous materials in storage and use. More than 800 Idaho facilities submitted Tier II reports in 2006. In addition, the Idaho National Laboratory (INL) site in southeastern Idaho routinely stores, uses, and ships high-activity radioactive materials. Hazard mitigation for the INL is addressed in separate INL and county plans. The presence of large shipments of hazardous materials is essentially a constant on rail lines and highways.

Compilation of Local Hazard Mitigation Plans

Forty-seven local mitigation plans were analyzed to determine the major hazards in each jurisdiction. Map 3-24 shows the 15 counties that ranked hazardous materials as that type of hazard.

Loss Estimation

No specific, statewide loss estimation exists for the hazard of hazardous materials. Historical losses tend to be related to property damages more than to loss of life and injury. The historical data in Table 3-19 indicate that yearly property damage totals averaged $568,130. Damages per recorded event averaged $13,905. Although the data trends seem to show an increase in the number of releases per year, the property damages per release do not show any particular trend.

From a general perspective, hazardous material releases damage and destroy public, commercial, and private property and natural resources. The resulting costs are for the restoration, maintenance, remediation, response, and post de facto litigation. Property damage routinely occurs on transportation facilities such as highways and railroads. Road closures are not uncommon. The economic costs of these disruptions can be significant, especially in areas with limited access options.

Direct costs can be defined as the cost of materials, carrier damage, property damage, response cost, and remediation/cleanup cost for a specific release. All other costs from hazardous material releases are indirect and include (1) loss of industrial productivity as a result of damage to land, facilities, or interruption of services, (2) loss of access to recreation lands and facilities, (3) cost of lost human productivity due to injury and death, (4) damages to ecosystems, and (5) the cost of litigation as a consequence of the release. Some of these indirect costs are difficult to measure and tend to be ignored. As a result, most estimates of loss are far too conservative.

Compilation of Local Hazard Mitigation Plans

The local mitigation plan roll-up estimates that losses for a hazardous materials event could reach billions of dollars, depending on where and when it occurs. Out of the 15 localities that ranked hazardous materials as a major hazard, only two counties provided actual loss estimations. (Kootenai County - $1,962,866,099.00, Nez Perce Tribe - $7,502,700.00; most counties estimated losses in the $10,000-$20,000 range.)

Mitigation Rationale

Because hazardous materials are so widely used, stored and transported, a hazardous material event could take place in almost anywhere. Further, many hazardous materials are used, stored and transported in very large quantities, so that the impacts of an event may be widespread and powerful. For example, a 1947 Texas City, Texas, explosion of a ship carrying ammonium nitrate killed at least 581 people, injured or disabled more than 8,000, and caused property damage estimated in the hundreds of millions of dollars. Regulations and safety practices make such large-scale events unlikely, but smaller incidents may have severe impacts such as the following.

- Human deaths, injuries, and permanent disabilities
- Livestock/animal deaths
- Destruction of vegetation and crops
- Property damage and destruction
- Pollution of groundwater, drinking water supplies, and the environment
- Contamination of foodstuffs, property, land and structures
- Temporary or long-term closure of transportation routes and/or facilities
- Loss of business and industrial productivity
- Utility outages
- Clean-up and restoration costs
- Losses and inconvenience due to evacuation
- Loss of valuable chemical product

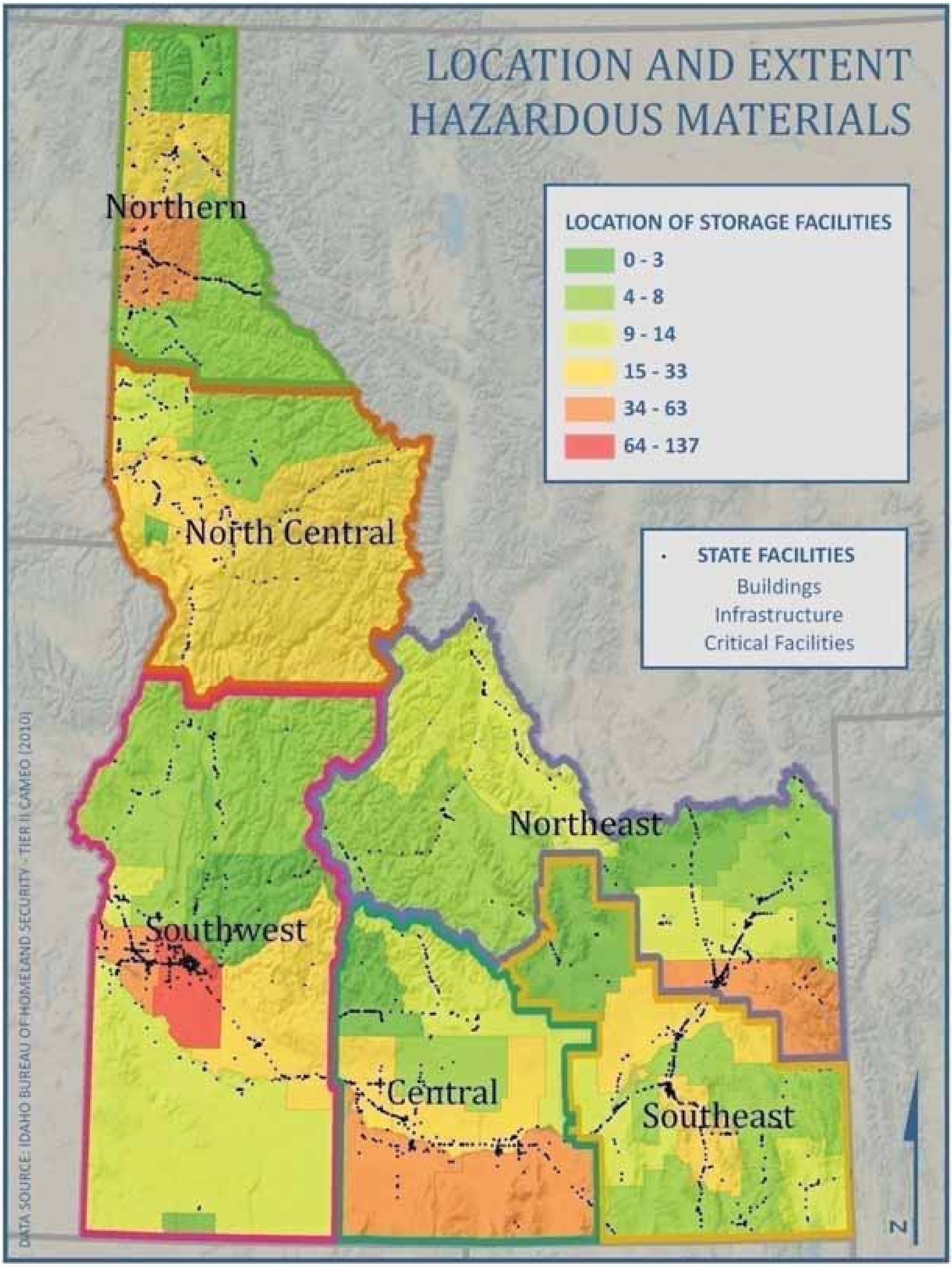
General Mitigation Approaches

Education is very important when it comes to hazardous material mitigation. Workers must receive proper training in the use, safety, and regulations regarding hazardous materials. 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 chemical products and methods for properly disposing of these products. In addition, numerous regulations and codes have been created to address containment, hazard communication, and controls.

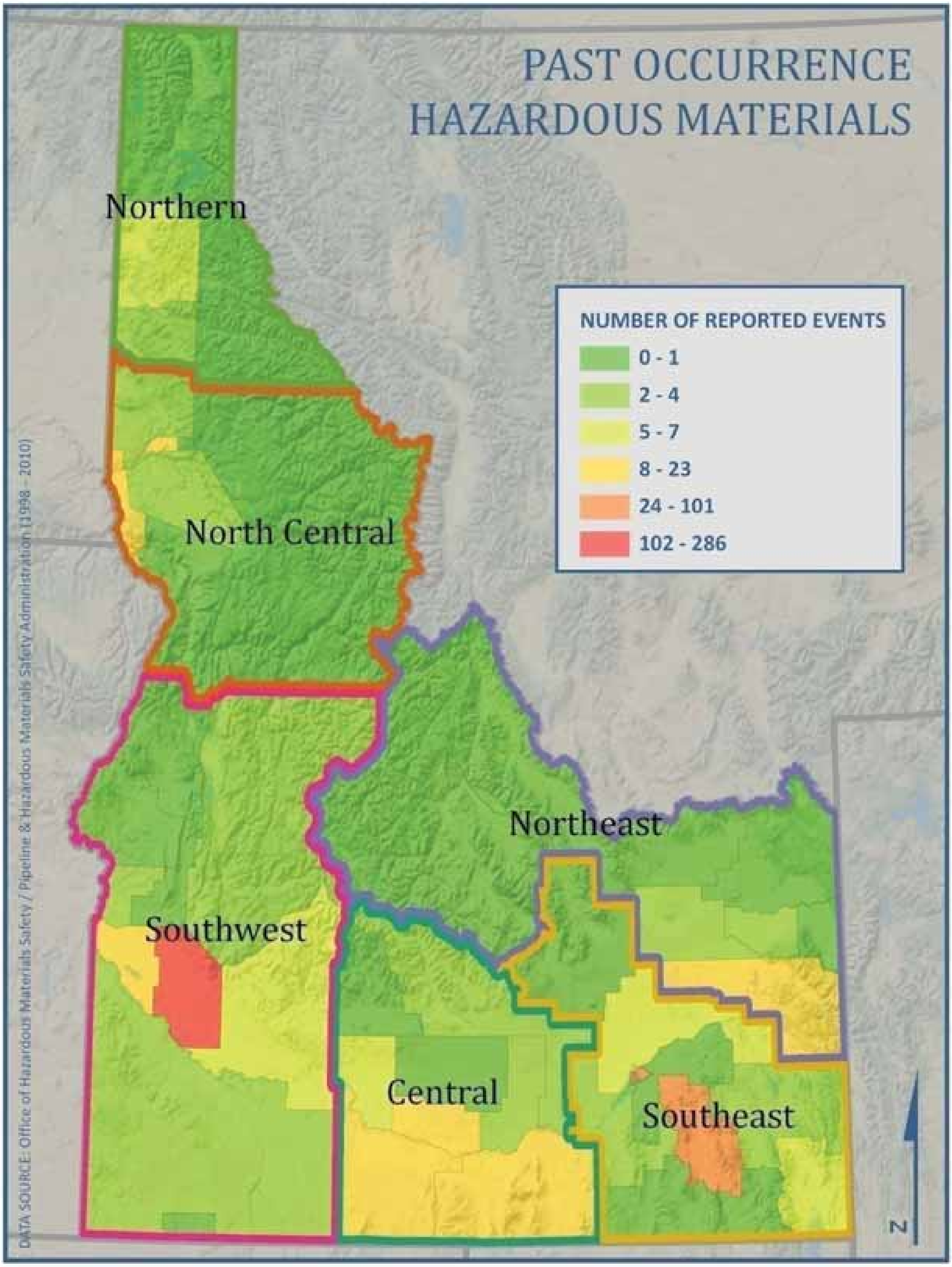
Hazardous materials are best managed through suitable containment. When hazardous materials are properly contained, they are unlikely to cause harm. The design of containers for transportation and storage should be based on chemical and physical characteristics, the degree of hazard offered by the product, and (to some extent) on economic considerations. Most regulations and codes require containers to resist the most severe stresses that may reasonably be expected during normal handling, storage, and use.

Hazard communication is also an import regulatory measure. Where required by USDOT regulations, hazard communication information is provided in the form of container markings and labels, vehicle placarding, and shipping paper entries. Facilities are required to identify chemical hazards in buildings, tanks, and other storage facilities using the NFPA 704 system.

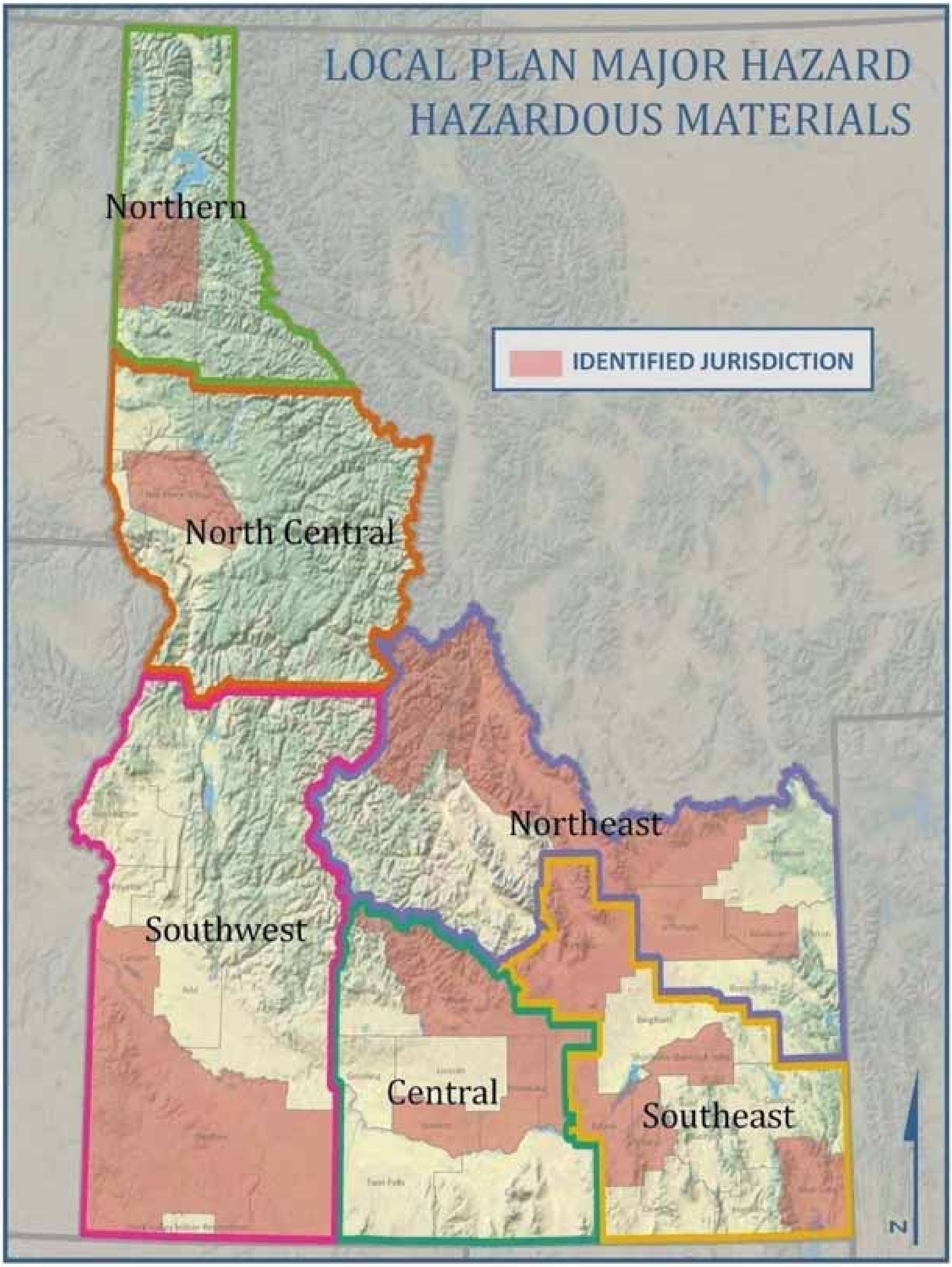
USDOT regulations impose certain controls on the types of chemicals that may be shipped together, how they must be loaded and secured on vehicles, levels of allowable radiation exposure and radiological contamination and, for certain high-level radioactive shipments, highway routing. Codes and zoning requirements may also address allowable locations for chemical storage and use.



Map 3-22: Hazardous Materials Location and Extent



Map 3-23: Past Occurrences of Hazardous Materials Events



Map 3-24: Hazardous Materials Identified as Local Plan Major Hazard

RISK ASSESSMENT: LANDSLIDE

Description

Landslides may be classified by both type of movement and material. An understanding of the types of landslides that occur is fundamental to assessing the landslide hazard and evaluating potential mitigation measures. The following list is a simplified differentiation based on the type of movement.

U.S. Highway 95 Bonners Ferry Landslide, 1998 / Source: www.landslidetechnology.com/landslides/bonnersferry.htm

Falls: Free falls of soil and rock with local rolling, bouncing, or sliding.

Slides: Lateral and downslope movement of partially intact masses.

Flows: Viscous flows of completely fragmented material, saturated with water.

Landslides can also be differentiated based the type of material involved.

Rock: Bedrock

Debris: Predominantly coarse material.

Earth: Predominantly fine material.

Together, movement and material produce a composite classification scheme. For example, a free fall of bedrock is referred to as a "rock fall," while a viscous flow of predominantly fine material is referred to as an "earth flow." The wettest flows are referred to as "mud flows." These events may be very difficult to distinguish from heavily debris-laden flash floods and functionally are essentially the same.

Factors Contributing to Landslides

Natural Factors: Natural factors contributing to landslides include slope morphology (shape), slope material (soil), bedrock geology, vegetation, and climate. Generally, the steeper a slope is, the more prone it is to landslides (except when the slope is so steep that loose material does not accumulate). A study of landslides in central Idaho has shown that most slides occurred on slopes of about 30 degrees and that landslides were rare on slopes steeper than 41 degrees. The general shape of a slope also influences the likelihood of a landslide. On a concave slope (e.g., hollow, swale, gully), water and debris tend to concentrate, making landslides more likely. Conversely, on a convex slope (e.g., ridge, nose), water and debris are less likely to accumulate.

The slope surface materials and their underlying geology also determine landslide risk. A landslide event is generally dependent on a material weakness. For example, if an impermeable layer exists, subsurface water will accumulate there, leading to reduced slope strength and a potential failure plane. The underlying and adjacent geology often influence the risk of landslides by controlling the movement of groundwater.

Vegetation contributes to slope stability in two ways. First, roots increase the shear strength of the slope material. Second, vegetation removes water from the hill slope by evapotranspiration. Therefore, burned watersheds are particularly vulnerable to landslides.

The climate of a region determines the frequency and magnitude of precipitation events. The amount of precipitation in Northern Idaho is higher than the statewide average. This, along with the topography of the region, increases the likelihood of landslides in this part of the State. The size and timing of precipitation events also has a great impact on landslide risk. They influence the processes of rock weathering (important in influencing soil depth and strength), the type of vegetation that occupies the hill slopes, and the fire regime of the region. Most wildfires occur in mid- to late summer, the same season that severe thunderstorms are most likely to contribute to landslides. Further, the transition into fall often sees higher precipitation amounts that can impact recently burned areas. This was a major concern in the Sun Valley area following the 2007 fire season.

Human Activities: Some human activities and land uses can increase the potential for landslides. These include road construction, timber harvesting, grazing, mining, and long-term fire suppression. Such activities can contribute to slope instability by changing infiltration rates and groundwater movement, removing vegetation, and/or over-steepening slopes. In a study of 700 landslides in the Payette River drainage, less than 3 percent of observed recent landslides occurred on undisturbed sites; the rest were associated with forest disturbances including wildfire, timber harvesting, and roads.

Irrigation and others ways that additional water is introduced (e.g., sprinklers, injection wells, and even septic systems) may also contribute to local slope instability. This may be critical along the Snake River canyon in Bonneville, Jerome, and Twin Falls Counties and near urban centers. In July 2006, a landslide in Washington County, Idaho, is thought to have been caused, at least partially, by the presence of irrigation water. This landslide damaged one home and blocked the irrigation canal, depriving a large area of irrigation water. A State Disaster Proclamation was issued for this landslide. Placing roads on steep slopes has been widely identified as the single human activity most likely to increase the landslide hazard on a site. Roads increase the amount of bare soil and, if constructed across steep slopes, result in a portion of the road fill being steeper in gradient than the natural slope. Road construction on slopes also diverts groundwater to the surface, where it is concentrated and can obtain a higher flow velocity. Mining activities can have similar impacts.

Landslide Triggers

An unstable slope will remain in place and intact until a landslide is triggered. Typical triggering events include (alone or in combination): water, seismic activity, volcanic eruptions, and the rapid erosion of the slope toe material (e.g., by stream down-cutting or road excavation). The most frequent landslide-triggering mechanism is water from intense rainfall, rapid snowmelt, or human-introduced sources.

A common cause of failure is the infiltration of water into the slope, which usually leads to an increase in ground stresses and a reduction of the soil's strength. Late spring and early summer comprise “slide season", particularly after days and weeks of greater than normal precipitation. When water accumulates on the surface as runoff, a flow may be triggered. Flows in mountainous terrain are a year-round threat and may be triggered by a heavy, brief rainfall during summer thunderstorms.

Seismic activity and volcanic eruptions, due to their infrequent natures, play a relative minor role in triggering landslides in Idaho. However, these events can affect a large area and may trigger numerous unstable slopes. Floods are often accompanied by numerous landslides due to toe cutting and the introduction of large amounts of water.

Landslide-related Damages

Landslides threaten residences, businesses, transportation corridors, fuel and energy lines, and communication facilities. Landslides range from very small to massive, and they may affect only a single property or slope or an entire drainage area. A landslide event may be composed of a single discrete landslide or numerous landslides over an entire region. Landslide hazards may be classified as "onsite" and "offsite." Onsite hazards correspond to landslides that originate on or near the development site. These are typically the slower moving and spatially limited falls and slides. Offsite hazards begin on slopes away from the development and travel great distances or cover large extents. These are typically flows or, in some cases, massive slides. Both onsite and offsite landslides may impact lives, property, and the environment.

A possible secondary hazard in Idaho is a "seiche," a damaging wave triggered by landslide into lakes. Seiches, similar in effect to tsunamis, can damage or destroy shorefront property, docks, and boats. Seiches are uncommon but do occur. They damaged docks and some boats around Lake Pend Oreille (at Bayview and Sand Point) in 1946 and 1963. A seiche triggered by the 1959 Hebgen Lake earthquake caused water to slosh over the top of the dam, resulting in cracks and erosion. Another secondary hazard is when landslides and debris flows block culverts and other flow routes, creating drainage and flooding hazards.

While landslide events are undoubtedly costly, losses in Idaho are difficult to estimate because of landslide frequency and the fact that many smaller events are handled locally or privately, without State involvement. For example, ongoing landslide problems magnify the challenges of maintaining U.S. 95, the primary north-south link in the Panhandle region. It is often impossible to redirect traffic on this heavily traveled road, as alternate routes do not exist, and detours in steep terrain are difficult or impossible to construct. Landslides here disrupt emergency functions and commerce, as well as personal lives. Some of these impacts can be quantitatively measured (e.g., lost business) while others, such as the disruption of families, is impossible to quantify.

Location, Extent, and Magnitude

Landslide activity is considered to be localized in the State. The USGS is currently updating its research on hazardous landslide processes, including their mechanisms, recurrence, distribution, and probability (http://landslides.usgs.gov/research/).

The United States' landslide hazard was mapped in the past by the USGS. This mapping is referenced below and shown on Map 3-25, at the end of this section.

In compiling the original map, the authors considered landslides to be any downward and outward movement of earth materials on a slope. Not included in the compilation were talus deposits, deposits resulting from ancient landslides not related to present slopes, large gravitational thrust sheets, solifluction deposits, snow avalanches, and debris deposited by flows that contribute to alluvial fans in arid regions. Individual landslides could not be shown at this scale. The map was prepared by evaluating formations or groups of formations shown on the geologic map of the United States (King and Beikman, 1974) as being of high, medium, or low susceptibility to landsliding and classified the formations as having high, medium, or low landslide incidence (number of landslides). Susceptibility to landsliding was defined as the probable degree of response of the areal rocks and soils to natural or artificial cutting or loading of slopes or to anomalously high precipitation. High, medium, and low susceptibility are delimited by the percentages given below for classifying the incidence of landsliding. Susceptibility is not indicated where lower than incidence. The effect on slope stability caused by earthquakes was not evaluated, although many catastrophic landslides have been generated by ground shaking during earthquakes. Areas susceptible to ground failure under static conditions would probably also be susceptible to failure during earthquakes.

In areas of continental glaciation, additional data were used to identify surficial deposits that are susceptible to slope movement. The map units were classified into three incidence categories according to the percentage of the area involved in landslide processes. Area involved in landsliding incidence >15% High; 1.5-15% Medium; <1.5% Low. Published data were used whenever possible for the original map. In many places, the percentage of a formation involved in landsliding, as shown on large-scale published maps, was determined by counting squares of a superimposed grid. Formations shown on the large-scale maps were then correlated with geologic units on the geologic map of the United States. Aerial photography, newspaper accounts, fieldwork, and other published data were used in other areas. For many parts of the country, however, particularly for parts of the Western United States, information on landslides and their relation to geologic conditions is sparse. Data from the relatively small number of geologic maps and reports that give detailed information on slope stability in scattered places, were therefore extrapolated as accurately as possible into adjacent areas. Although both slope angle and precipitation influence slope stability, full weight was not given to these factors in preparing the original map. At that time no slope map or detailed precipitation map existed at a suitable scale for the entire United States.

The susceptibility categories are largely subjective because insufficient data were available for precise determinations. Where source maps show slope movement for one part of a geologic unit but not for others, it is generally unknown whether the absence of recorded landslides indicates a difference in natural conditions or simply a scarcity of information on landslides for those parts of the unit. Generally, the authors

assumed that anomalous precipitation or changes in existing conditions can initiate landslide movement in rocks and soils that have numerous landslides in parts of their outcrop areas. Because the map is highly generalized, owing to the small scale and the scarcity of precise landslide information for much of the country, it is unsuitable for local planning or actual site selection.
(Source: http://landslides.usgs.gov/learning/nationalmap/)

At this time there is no magnitude scale for landslides.

Past Occurrence

Idaho's geology, landscape, climate, soils, and other factors are locally conducive to landslide activity, and numerous landslides occur each year in Idaho. Many of these, though, are small events without well-documented impacts. The Idaho Geological Survey has identified and plotted over 3,000 major landslides in the State. Landslides are also included on local and regional geologic maps and other geologic sources.

Significant landslide events (those resulting in disasters) are rarer, but several have been recorded in the State (see Table 3-21 below). Prior to 1976, major events had a significant impact on transportation, communities, and natural resources in 1919, 1934, 1948, 1964, 1968, and 1974. At the end of this section, Map 3-26 shows counties that have experienced a major landslide event.

Table 3-21: Landslide State and Federal Disaster Declarations

Year	Month	Federal	Counties Affected
1982	July		Boise
1986	February		Boise
1986	March		Boise, Elmore, Lewis, Nez Perce, Owyhee
1991	April		Bonner
1996	November	X	Adams, Benewah, Boise, Bonner, Boundary
1997	January		Clearwater, Elmore, Gem, Idaho, Kootenai, Latah, Nez Perce, Owyhee, Payette, Shoshone, Washington
1997	March	X	Benewah, Bonner, Boundary, Kootenai
1997	June*		Shoshone
1998	May		Lemhi, Nez Perce, Washington
1998	October		Boundary
2000	June**		Kootenai

** Additional counties in the southeastern portion of the State were added to the declaration at a later date but damage there was related to flooding only. ** This event occurred in January but was not declared until June.*

Source: Spatial Hazards Events and Losses Database of the United States

Federally Declared Disasters

Northern and Central Idaho, 1996-1997: During late December 1996, above-normal snowfall in Northern and Central Idaho was quickly followed by significant amounts of warm rain. The melting snow and heavy rains overwhelmed rivers and their tributaries, leading to widespread landslides and severe flooding, mainly in the West-Central region of the State. Large sections of the highway system were damaged or destroyed, isolating several communities for days. Six deaths and three serious injuries were attributed to this disaster.

Massive landslides and floods occurred in the Payette, Weiser, and Little Salmon river basins, causing extensive damage to structures, roads, and bridges. Boise County in particular experienced substantial landslide damage. Numerous soil failures on saturated faces of hillsides resulted in major landslides and mud flows. Numerous small landslides obstructed culverts, flowed over roads, and caused undercutting on the downhill side. Numerous debris flows throughout Western Idaho caused extensive damage. Deposits left by these flows were several feet deep and up to 300 feet wide, and they overwhelmed the 1- to 3-foot culverts designed to pass rainfall runoff. Several gulches had significant slides that overwhelmed structures built on the alluvial fans of debris flow. A massive debris flow that hit the community of Lower Banks flowed down from an area burned over in 1992. The slide deposited mud, rocks, and debris at the base of the slope and expanded to cover the whole community. Most buildings (residential and business) appeared to be damaged or destroyed. Buildings were moved from their foundations and submerged in mud up to two-thirds of the buildings' height. Many public facilities were damaged or destroyed.

From Horseshoe Bend to Banks, access to U.S. Highway 55 was restricted for one week. Several slides occurred in a half-mile section near Banks, with the largest estimated at 100,000 cubic yards.

Highways 17 and 21 were closed by landslides, isolating the communities of Lowman and Garden Valley. On Old Idaho 17 there were miles of highway with landslides every 200-500 feet. U.S. 95 experienced 11 washouts that isolated residents for days, and McCall was isolated and suffered economic hardship due to the disruption of its winter recreation activities. Local roads and forest access were likewise affected. Mudslides destroyed much of the 6,000-mile road system in the Boise National Forest, threatening fisheries and access to popular recreation areas in the spring.

On January 4, 1997, the President declared a major disaster (designated as DR-1154) in the State of Idaho; 18 counties were declared eligible for Federal assistance. As of February 1, 2001, this funding included $19,404,105 in public assistance, $39,988 in individual assistance, $125,937 from the NRCS, $576,314 from the U.S. Army Corps of Engineers, and $5,593,892 in hazard mitigation grants. Much of the impact of these landslides occurred on virtually unpopulated public and private lands managed by the Forest Service, Bureau of Land Management, Idaho Department of Lands, and Boise Cascade Corporation.

In addition to infrastructure damage (e.g., forest roads), the impact included a large input of sediment and woody debris into stream channels. The increased sediment in the stream channels affected fish habitat. Based on past studies, it is suspected that road construction played a large role in the origin of these slides. Recent wildfires may also have played a role in the extent and severity of the landslide by reducing root strength, reducing transpiration by plants, and increasing runoff due to reduced infiltration.

Northern Idaho, 1997: In early March 1997, northern Idaho received 12 to 18 inches of snow on top of an existing snow pack that exceeded 150 to 170 percent of the average. A subsequent rainstorm caused 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 a Federal Disaster declaration (DR-1177) on June 13, 1997, for Boundary, Bonner, Benewah, Kootenai, and Shoshone Counties.

State Disasters

Bonner County, 1991: The damaging event that occurred near Sandpoint in April 1991 illustrates the somewhat confusing continuum between flash floods and debris flows. Although classified in the State declaration as a flash flood, the high debris load makes it somewhat indistinguishable from a debris flow. The torrents blew out large sections of the road leading to 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 was several hundred thousand dollars.

Boundary County, 1998: On October 19, 1998, a mudslide covered Highway 95, 1 mile north of Bonner's Ferry. Additional sliding the next day caused extensive damage to the State highway, a county road, and 1,000 feet of Union Pacific Railroad tracks. The blockage kept emergency medical and fire services from half the county. Truck traffic was rerouted 112 miles around the slide, and up to five trains were stranded each day. The Governor declared a disaster (due to economic impact).

Nez Perce County, 1998: A landslide that began on May 4, 1998, blocked Snake River Avenue in Lewiston, restricting access to some businesses. A second slide on May 13 destroyed a mobile home and caused an additional road closure. The Lewiston Elks Temple was also threatened by ongoing slide activity in the vicinity. Total public costs for this event are estimated at just under $4.5 million; approximately $4 million for Idaho Transportation Department and $485,000 for Nez Perce County.

Kootenai County, 2000: A major landslide on January 30, 2000, blocked the only access road to Ravens Point (near Bayview). A second rockslide two days later exacerbated the problem. Access to 75 homes was cut off. Kootenai and Bonner counties, Timber Lakes Fire District, and Lakes Highway District provided essential services. Residents shared personal resources and maintained communication through a specially designed Web page. A 65-passenger ferry was leased for travel to and from Bayview. Governor Kempthorne and the Legislature authorized up to $725,400 for BHS to reimburse local agencies. The NRCS provided much-needed Federal assistance in stabilizing the banks above the lake and removing road blockage. The State paid the non-Federal match required by NRCS. The request for a Presidential disaster declaration was not approved.

Other Landslide Events

Kootenai County, 2006: On January 15, 2006, a landslide was caused by construction on U.S. Highway 95, north of Worley. It resulted in approximately $7,500 in damages to the project.

Twin Falls County, 1999+: The Bluegill Landslide (near Buhl on Salmon Falls Creek, 5 to 10 miles from its confluence with the Snake River) was identified during the summer of 1999, when local rock climbers noted changes in the bedrock cliffs, an unusual amount of rock fall, and fractures opening up on the trail.

Subsequently, a 12-acre block of canyon rim composed of basalt and sediments began sliding into Salmon Falls Creek. This ongoing slide activity may threaten irrigation pumping stations and generate flood risks to upstream and downstream development. The slide is still active and moving.

Gooding County, 1993: On July 24, 1993, approximately 100 acres of ground failed and slid into the Snake River just south of Bliss. The river was temporarily dammed, and a new set of rapids was created. The access road on the south side of the river was destroyed. The initial slide and subsequent erosion of the toe introduced a large amount of sediment into the river. The landslide site shows extensive evidence of earlier activity.

Hagerman Fossil Beds National Monument, 1979+: A series of major landslides has struck the plateau along the Snake River located in Hagerman Fossil Beds National Monument since 1979. These large slope failures have occurred approximately every two years, and typically affect areas ranging from 300 to 800 feet wide and up to 1,000 feet long. The 1987 event destroyed a $1 million irrigation pumping facility and nearly killed two workers.

Future Occurrence

The geophysical processes that contribute to landslides during a particular year are statistically independent of past events. Unfortunately, the short period of recorded and observed landslides and associated conditions that contribute to the risk make it difficult to develop return periods for landslide-prone areas in Idaho. Landslide occurrence is not directly attributed to a specific major meteorological event, such as the 1-percent-annual-chance or 100-year snowfall; though rainfall events are one known cause of events.

Environmental Impacts

Landslides have minor environmental impacts compared to several other hazards discussed in this document, but more than avalanches, which have the buffering effects of snow cover. Impacts to the natural environment due to landslides are generally localized in nature. The impacts do not tend to travel beyond the confines of the event, as compared to the potential effects from hazardous material leaks or volcanic ashfall. An exception to this would be seiche effects in a lake due to landslide, where bank vegetation and other resources could be impacted relatively far from the initial event.

Landslides can cover vegetative communities, destroying habitat; however, it is unlikely that the continued existence of rare species or vegetative communities would be jeopardized by landslide, because of the localized nature of the hazard. There is potential for unique historic and archeological resources to be damaged or lost. With respect to geology and soils, landslides can change topography and remove topsoil, but farmland soils are not usually located in the steeper areas where landslides are more common. Landslides have the potential to alter floodplains and drainage patterns. Also, debris can form dams, causing flooding upstream and disrupting the aquatic habitat.

Development Trend Impacts

Analysis of historical data indicates relatively little damage to structures and does not indicate that development causes more structures to be destroyed by landslides. Past events have impacted transportation corridors, often limiting access to communities for a short time. This needs to be taken into account as development occurs, and possible mitigation measures should be considered. Overall, any development within known or suspected landslide areas will increase the hazard somewhat.

Critical Infrastructure and State Facility Impacts

Major highways and railways would be the State assets most impacted by a landslide event. Generally, State facilities are not located in known landslide paths; although a wildfire event could expose new areas to this hazard. Such potential damage, while significant, cannot be forecasted. Map 3-25 at the end of this section shows the location of State facilities as they relate to the location and extent of the landslide hazard.

Vulnerability Assessment

Landslides are essentially localized events. Establishing the likelihood and potential magnitude of events at specific sites requires detailed site analysis and can be a time-consuming and expensive process. It is therefore extremely difficult to generate a statewide projection of future landslide activity and disasters. Some generalizations may be made, however, and geologists and planners can identify zones of potential landslide hazard based on geology, topography, and climate through broad-brush analyses. The geology of the central, western, and Panhandle regions of the State lends itself to landslide-prone terrain. Large and damaging landslides may be expected to continue to occur. Most landslide-prone areas have steep slopes of significant length. Although these characteristics are often associated with the mountainous areas of the State, occurrences may be found throughout the State. Even in the relatively flat Snake River Plain and Owyhee County regions, numerous landslides occur along the near-vertical walls of deeply incised river canyons.

Any landslides are associated with precipitation events and/or saturated soils. Throughout the State, these conditions may be expected to occur in the winter (heavy rain storms), spring (during snow melt), or summer (significant thunderstorms). In the evaluation of local sites, the conditions that lead to landslides are generally understood and predictable. The factors contributing to landslides described above (natural factors, human activities, and landslide triggers) should all be considered when evaluating hazards.

Additionally, significant damage often occurs in areas that show evidence of past landslides. An evaluation of past activity can be a powerful projection tool. Landslides may be expected to occur throughout the State, where local conditions are favorable. However, these events generally only have disastrous consequences when they occur in populated areas or intersect infrastructure such as highways. Consequently, the mountainous areas of the State are most at risk from future landslide activity. In these areas, a considerable number of communities, transportation systems, and supporting infrastructure are located in steep canyons and alluvial fans close to rivers. Development of forest and mineral resources has also resulted in the construction of roads in steep and potentially unstable terrain. Recent population growth has caused development to occur more frequently in hazardous areas. This trend is expected to continue in the near future.

Compilation of Local Hazard Mitigation Plans

Forty-seven local mitigation plans were analyzed to determine the major hazards in each jurisdiction. Six counties ranked landslides as such: Ada, Boise, Bonner, Boundary, Clearwater, and Nez Perce (see Map 3-27).

Loss Estimation

No specific, statewide loss estimation exists for the hazard of landslide. Historical losses tend to be related to infrastructure damages more than to loss of life and injuries.

From a general perspective, landslides damage and destroy public, commercial, and private property. The resulting costs are for debris removal, stabilizations, restoration, maintenance, response, and post de facto litigation. Road and railroad closures are not uncommon. The economic costs of these disruptions can be significant, especially in areas with limited access options.

Direct costs can be defined as the cost of debris removal, stabilization, and response for a specific landslide event. All other costs are indirect and include (1) loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services, (2) loss of access to communities and facilities, , and (3) the cost of litigation as a consequence of the release. Some of these indirect costs are difficult to measure and tend to be ignored. As a result, most estimates of loss are far too conservative.

Compilation of Local Hazard Mitigation Plans

Out of the six localities that ranked landslides as a major hazard, only two provided loss estimates. Bonner County provided an estimate of $3,375,622,000, and Ada County provided an estimate of $301,003,300.

Mitigation Rationale

"Landslide" is the general term for the movement of a soil and/or rock mass down a slope. It covers a variety of processes and landforms derived from those processes. In general, the term "landslide" is employed in this document for situations involving any of these processes. Although all landslides may pose serious hazards, one type is of particular interest. This type is a "flow," including debris flows, which is often difficult to distinguish from a flash flood and possesses similar destructive potential and rapid onset. Debris flows generally occur during periods of intense rainfall or rapid snowmelt. They usually start on steep hillsides as shallow slides that liquefy and accelerate. The consistency of debris flows ranges from watery mud to thick, rocky mud that can carry large items such as boulders, trees, and cars. Material can be accumulated as a slide grows, and flows from converging drainage may join together. When the flows reach canyon mouths or flatter ground, debris can spread over a broad area, sometimes accumulating in thick deposits.

General Mitigation Approaches

Landslides are site-specific hazards that may be influenced by offsite conditions (e.g., inappropriately channeled runoff) and may have large-scale consequences (e.g., the disruption of transportation routes or contamination of water sources). Mitigation must balance the need for localized action with the potential of regional benefits. The State may need to take a role in what is otherwise perceived as a local issue.

As with all hazards, the preferred method of mitigation is to separate human development and population from hazard-prone areas. When this is not possible or practical, a variety of measures may be employed to reduce the potential impact of events on property and lives. Some landslide hazards cannot be mitigated or are too costly to mitigate and, therefore, are best avoided. Other landslide-prone areas are easily mitigated and need not influence land use significantly as long as the hazard is identified. Because of this, general landslide hazard information should be utilized in developing local master plans and zoning ordinances, so that land use can take landslide hazards into account.

Hazard Management

There are two basic approaches of hazard management: diversion of debris and landslide/slope stabilization. The choice of mitigation approach should be based on a thorough investigation of the site in order to evaluate all pertinent characteristics of a potential landslide site.

Diversion of Debris: This mitigation activity involves redirecting the debris from its run-out path to avoid damage to existing development.

Landslide/Slope Stabilization: This mitigation to stabilize a landslide or an unstable slope area may involve any one or more of three strategies:

- Drainage control: conveyance of surface and shallow groundwater away from the site.
- Regrading of the hazard area: removing soil from the slope in order to reduce the weight of the slide mass and lower slope gradient, both of which will increase slope stability.
- Mechanically restraining slope movement: vegetation or armoring of slope surfaces or construction of retaining walls.

Information/Outreach and Public Education

Many property owners and residents are unfamiliar with the landslide hazard associated with their property and homes. Relatively small steps in home construction and landscaping can play a large role in hazard reduction. As with all natural hazards, public information and education is the first line of defense, not only increasing people's knowledge of the problem but also gaining higher compliance with regulatory and voluntary mitigation measures.

Infrastructure

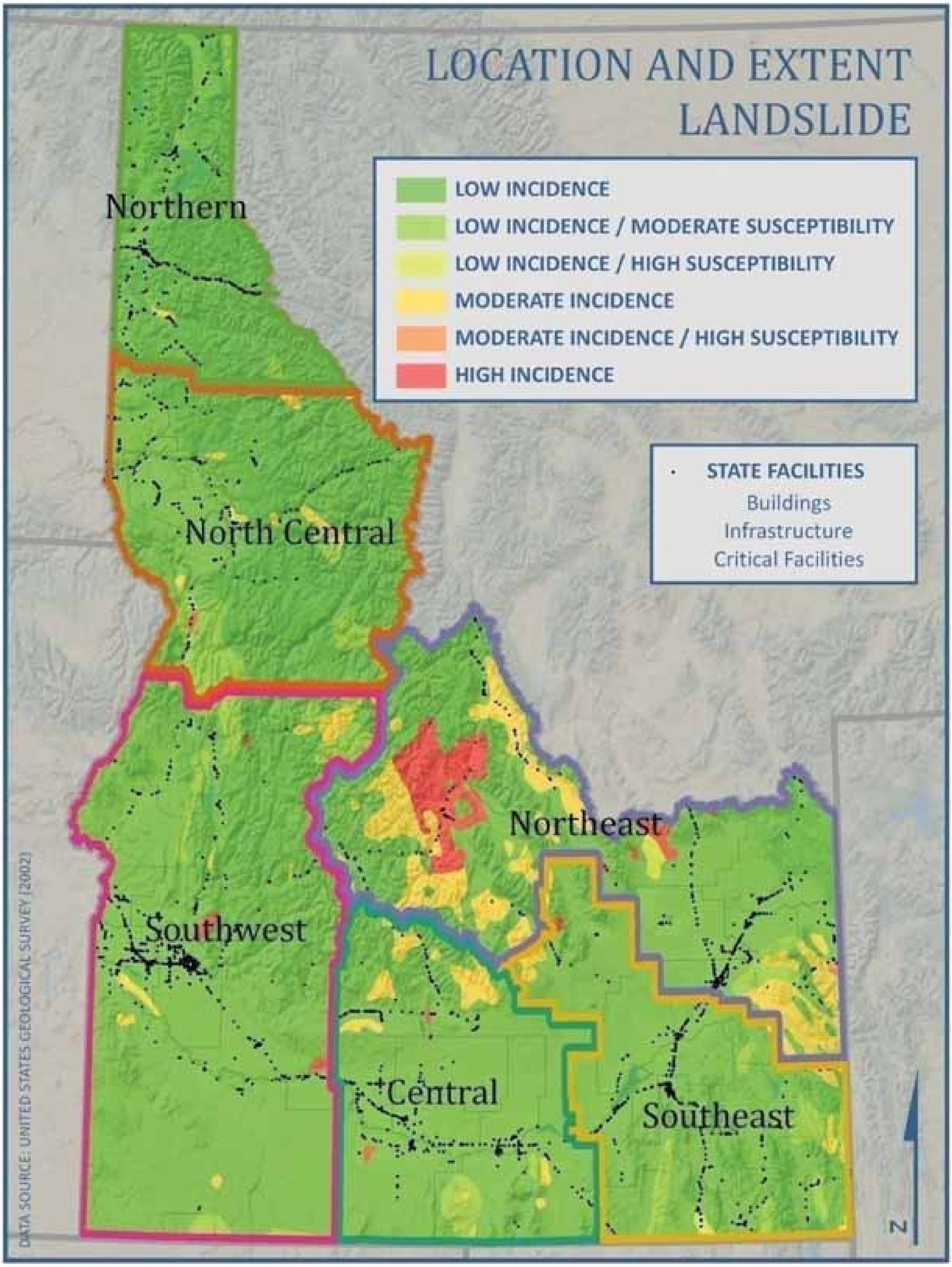
Infrastructure should be constructed so as to avoid landslide hazard areas. Where infrastructure elements (e.g., roads) and public facilities are at direct risk from landslides, steps should be taken to mitigate the hazard (through debris diversion of slope stabilization) or provide for functional backups.

Regulatory

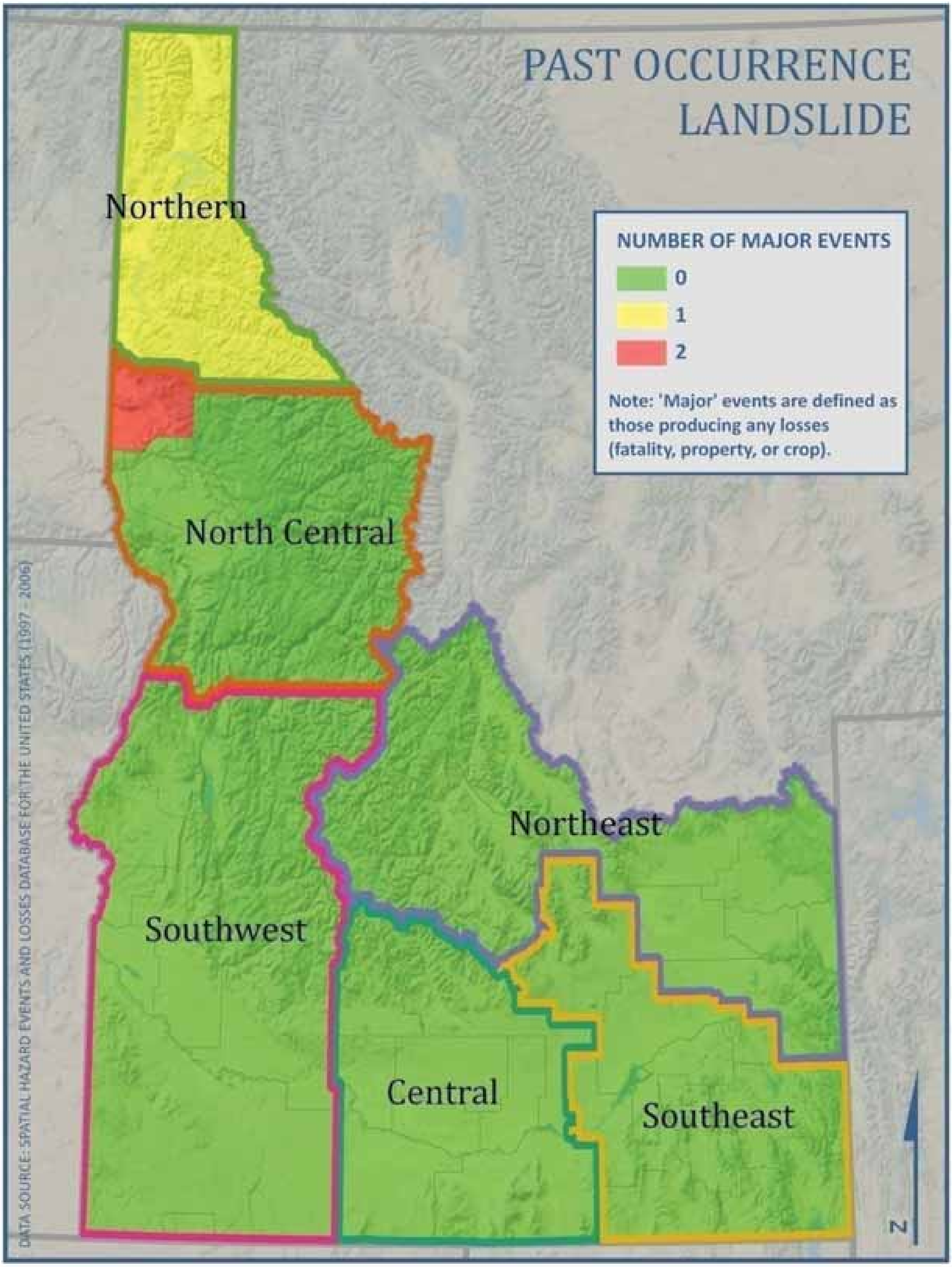
The generally preferred method of landslide mitigation is avoidance of hazard areas. Mitigation by avoidance involves a designation of landslide hazard area buffers and building setbacks or, in more extreme cases, may involve the total restriction of use or occupation within the hazard area. In addition to restricting new development from hazardous areas, regulations can require that landscaping and construction activities do not contribute to slope instability. This step can help minimize the impact on existing development and avoid increasing the extent of hazard areas. When landslide regulations are developed, the first step is to identify potentially hazardous areas. Geotechnical investigations performed by qualified engineering geologists and engineers are required to address hazards and recommend appropriate action prior to development in “potentially hazardous areas.”

Mapping / Analysis / Planning

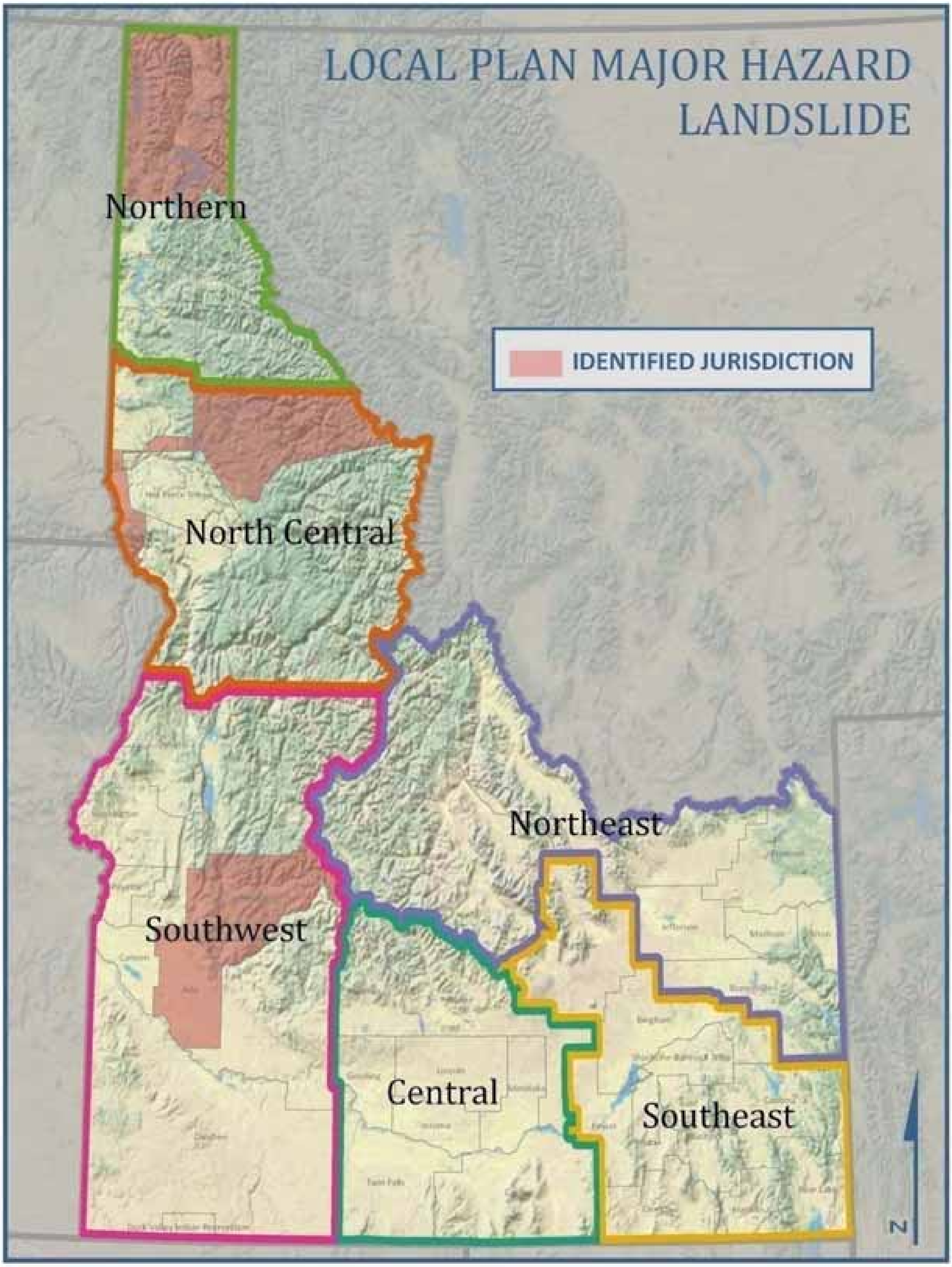
An accurate understanding of a hazard is the first step toward successful mitigation. To fully understand a hazard and the risk that it poses, the ability to accurately assess vulnerability is vital. After vulnerability is determined, it is possible to assess potential losses. Vulnerability and loss information can greatly enhance mitigation planning efforts, but these data are not readily available at this time. Appendix F of this Plan provides details regarding a HAZUS CDMS-compliant geodatabase that is being designed as part of this Plan update. This database will allow for the proper collection of facility and infrastructure data in a GIS platform, which can then be analyzed to assist with vulnerability and loss estimations.



Map 3-25: Landslide Location and Extent



Map 3-26: Landslide Past Occurrence



Map 3-27: Landslide Identified as Local Plan Major Hazard

RISK ASSESSMENT: LIGHTNING

Description

Lightning is almost invariably associated with thunderstorms. Three factors are necessary for the formation of thunderstorms:

- **Moisture**
- **Unstable Air** – relatively warm air that can rise rapidly
- **Lift** – created by advancing cold or warm fronts, strong breezes, or mountains

Thunderstorms typically follow a distinct lifecycle. In the Developing Stage, towering cumulus clouds form, indicating rising air. The moist air mass is lifted by terrain features or atmospheric conditions and destabilized by rapidly circulating air currents. There is usually little to no rain during this stage and only occasionally lightning. In the Mature Stage, the storm may take on a black or dark green appearance. This is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes, and lasts an average of 10 to 20 minutes but may persist much longer. Finally, in the Dissipating Stage, rainfall decreases in intensity and bursts of strong winds may occur. Lightning remains a danger during this stage. Thunderstorms may occur singly, in clusters or in lines. Thus, it is possible for several thunderstorms to affect one location in the course of a few hours. Some of the most severe weather occurs when a single thunderstorm affects one location for an extended time. Thunderstorms are most likely to happen in the spring and summer months and during the afternoon and evening hours. They can, however, occur year-round and at all hours.

Lightning in Rigby, ID / Source: www.kidk.com/younews/7522747.html

The NWS defines a thunderstorm as "a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder." Thunderstorms are produced when "unstable" atmospheric conditions exist, wherein warm, moist air is at the surface and cold, dry air is aloft. When, by some mechanism, a parcel of warm, moist air is forced upward, it will continue to rise because it is less dense than the cold, dry air above it. As it rises, moisture begins to condense, forming the tall cumulonimbus thunderstorm cloud. As the warm air rises, cold air is forced downward, and both strong updrafts and strong downdrafts coexist. A number of thunderstorm types are defined, including the following:

Dry Thunderstorm: Generally a high-based thunderstorm when lightning is observed, but little if any precipitation reaches the ground. Most of the rain produced by the thunderstorm evaporates into relatively dry air beneath the storm cell. May also be referred to as "dry lightning".

Pulse Severe Thunderstorms: Single-cell thunderstorms, which produce brief periods of severe weather (¾-inch hail, wind gusts in excess of 58 miles an hour, or a tornado).

Severe Thunderstorm: A thunderstorm that produces a tornado, winds of at least 58 mph (50 knots), and/or at least ¾-inch hail. Structural wind damage may imply the occurrence of a severe thunderstorm. A thunderstorm wind equal to or greater than 40 mph (35 knots) and/or hail of at least ½ inch is defined as approaching severe.

Supercell Thunderstorm: Potentially the most dangerous of the convective storm types. Storms possessing this structure have been observed to generate the vast majority of long-lived strong and violent (F2-F5) tornadoes, as well as downburst damage and large hail. It is defined as a thunderstorm consisting of one quasi-steady to rotating updraft, which may exist for several hours.

Lightning is defined by the NWS as “a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud.” A lightning discharge may be over 5 miles in length, generate temperatures over 50,000°F, and carry 50,000 volts of electrical potential. Lightning is most often associated with thunderstorm clouds, but lightning can strike as far as 5 to 10 miles from a storm. The vigorous movement of air within a thunderstorm results in a buildup of electrical charge. This charge is released in a sudden discharge, the lightning “bolt” familiar to most. The average discharge of lightning carries enough electricity to light a 100-watt light bulb for more than 3 months. Sound waves caused by the rapid heating and cooling of air near the lightning are heard as thunder.

Lightning may strike in a number of distinct ways:

Direct Strike: The most dangerous; the person or structure is a direct path for lightning to seek ground.

Side Strike: Similar to a direct strike, but lightning diverts to an alternate path from the initial ground point.

Conducted Strike: The electrical current may be carried some distance from the initial ground point if the lightning strikes electrically conductive material (including electrical and electronic equipment).

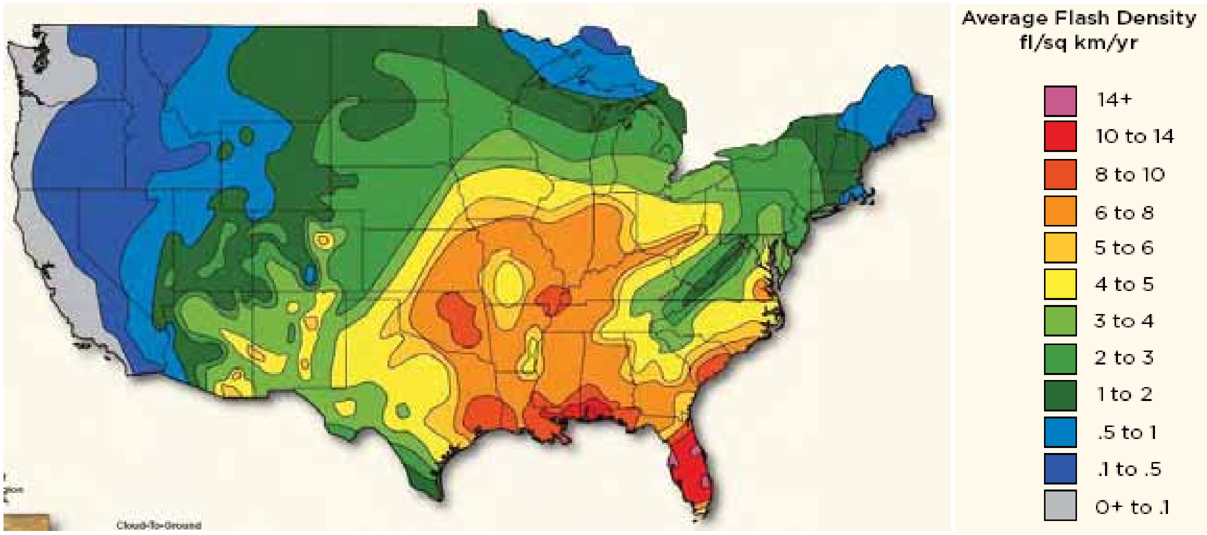
Other: The lightning strike may induce secondary discharges by altering the electrical potential between adjacent structures, through the earth’s surface, or in electrical equipment.

Location, Extent, and Magnitude

Lightning strikes can occur almost anywhere. Lightning is more likely to strike tall trees, mountaintops, and tall buildings. Currently, no classification system exists for lightning magnitude.

Past Occurrence

Cloud-to-ground lightning strikes occur with much less frequency in the northwestern U.S. than in other parts of the country (Map 3-29 below). The National Lightning Detection Network reported an average of 81,633 strikes per year in Idaho from 1996 to 2008 (about one per square mile), while Florida received an average of 1,447,914 strikes per year (25.3 per square mile) during the same period.



Map 3-28: Flash Density Map /

Source: www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf

Except when significant forest or range fires are ignited, lightning generally does not result in disasters. From 1959 to 1994, NOAA reported 20 deaths, 67 injuries, and 305 damage reports in Idaho. Six fatalities and 26 injuries were reported from 1995 through 2009. The extent of the damages is unknown, and both injuries and damage are likely to have been under-reported, possibly significantly.

The National Climatic Data Center contains a comprehensive listing of recorded lightning activity resulting in loss for the State of Idaho. Table 3-22 summarizes recorded losses from 1993 through 2009. At the end of this section, Map 3-30 also presents major past events, summarized at the county level.

Table 3-22: Idaho Lightning Events (1993 - 2009)

Date	Location	Death	Injury	Property Damage	Critical Damage
4/4/1993	Canyon	0	0	$0.00	$0.00
5/20/1993	Ada	0	0	$5,000.00	$0.00
5/25/1993	Idaho	0	0	$0.00	$0.00
5/28/1993	Idaho	0	0	$0.00	$0.00
5/28/1993	Idaho	0	0	$0.00	$0.00
8/4/1993	Canyon	0	0	$0.00	$0.00
8/4/1993	Adams, Boise, Elmore, Valley, and Washington	0	0	$0.00	$0.00
8/4/1993	Cassia	0	0	$0.00	$0.00
8/7/1993	Canyon	0	0	$5,000.00	$0.00
8/7/1993	Boise	0	0	$0.00	$0.00
8/10/1993	Cassia	0	0	$0.00	$0.00
8/11/1993	Cassia	0	0	$50,000.00	$0.00

Table 3-22: Idaho Lightning Events (1993 - 2009)					
Date	Location	Death	Injury	Property Damage	Critical Damage
8/15/1993	Ada	0	0	$50,000.00	$0.00
9/5/1993	Bannock	0	0	$50,000.00	$0.00
2/17/1994	Owyhee	0	0	$5,000.00	$0.00
5/4/1994	Minidoka	0	0	$5,000.00	$0.00
5/27/1994	Canyon	0	0	$50,000.00	$0.00
10/5/1994	Power	0	0	$50,000.00	$0.00
11/1/1994	Bonner	0	0	$50,000.00	$0.00
6/10/1995	Payette	0	0	$50,000.00	$0.00
6/18/1995	Castleford	0	1	$0.00	$0.00
7/6/1995	Idaho Falls	0	0	$500,000.00	$0.00
7/22/1995	Idaho Falls	0	0	$5,000.00	$0.00
7/22/1995	Bonneville	0	0	$5,000.00	$0.00
7/28/1995	Kuna	2	0	$50,000.00	$0.00
7/28/1995	Glenns Ferry	0	0	$50,000.00	$0.00
7/29/1995	McCall	1	12	$5,000.00	$0.00
8/4/1995	Pocatello	0	0	$50,000.00	$0.00
8/6/1995	Trinity Lakes	0	0	$50,000.00	$0.00
8/17/1995	Ammon	0	0	$500,000.00	$0.00
8/21/1995	Jerome	0	0	$50,000.00	$0.00
8/21/1995	Nr Se Dietrich	0	0	$5,000.00	$50,000.00
9/3/1995	Soda Springs	0	0	$0.00	$0.00
9/3/1995	Boise	0	0	$50,000.00	$0.00
9/4/1995	Fairfield	0	0	$50,000.00	$0.00
9/7/1995	Post Falls	0	0	$50,000.00	$0.00
11/16/1995	CJ Strike Reservoir	0	0	$5,000.00	$0.00
12/16/1995	CJ Strike Reservoir	0	0	$5,000.00	$0.00
5/14/1996	Caldwell	0	0	$15,000.00	$0.00
5/16/1996	Pocatello	0	0	$0.00	$0.00
5/17/1996	Moscow	0	0	$0.00	$0.00
6/7/1996	Jerome County	0	0	$0.00	$0.00
6/14/1996	Oakley	0	0	$0.00	$0.00
6/21/1996	Ashton	0	0	$0.00	$0.00
7/16/1996	Rexburg	0	0	$0.00	$0.00
7/16/1996	Rexburg	0	0	$0.00	$0.00
7/17/1996	Burley	1	1	$0.00	$0.00
7/29/1996	Pocatello	0	0	$0.00	$0.00
6/17/1997	Pocatello	0	0	$1,000,000.00	$0.00
6/30/1997	Melba	1	0	$0.00	$0.00
7/15/1997	Bellevue	0	0	$0.00	$0.00

Table 3-22: Idaho Lightning Events (1993 - 2009)					
Date	Location	Death	Injury	Property Damage	Critical Damage
7/21/1997	Lewiston	0	0	$0.00	$0.00
7/31/1997	Boise	0	0	$0.00	$0.00
8/2/1997	Chubbuck	0	0	$0.00	$0.00
9/11/1997	Blackfoot	0	0	$1,000.00	$0.00
4/23/1998	Marysville	0	0	$1,000.00	$0.00
6/25/1998	Leadore	0	2	$0.00	$0.00
7/3/1998	Cascade	0	2	$0.00	$0.00
7/30/1998	Springfield	0	0	$0.00	$0.00
7/30/1998	Pocatello	0	0	$0.00	$0.00
7/31/1998	Blackfoot	0	0	$0.00	$0.00
8/31/1998	Ft Hall	0	0	$0.00	$0.00
9/7/1998	Boise	0	0	$10,000.00	$0.00
9/30/1998	Inkom	0	3	$0.00	$0.00
9/30/1998	Chubbuck	0	0	$0.00	$0.00
5/3/1999	Boise	0	0	$0.00	$0.00
5/29/1999	Pocatello	0	0	$10,000.00	$0.00
7/18/1999	Driggs	0	0	$21,000.00	$0.00
8/27/1999	Pocatello	0	0	$0.00	$0.00
8/18/2000	Rexburg	0	0	$20,000.00	$0.00
9/17/2000	Chesterfield	0	0	$150,000.00	$0.00
7/7/2002	Caldwell	1	2	$0.00	$0.00
8/30/2002	Oldtown	0	2	$0.00	$0.00
8/22/2003	Whitney	0	1	$0.00	$0.00
8/22/2003	Moreland	0	0	$1,000.00	$0.00
6/28/2004	Idaho Falls	0	0	$5,000.00	$0.00
5/29/2005	Burley	0	0	$10,000.00	$0.00
5/19/2006	Hayden	0	0	$10,000.00	$0.00
7/5/2006	Coeur D'Alene	0	0	$15,000.00	$0.00
6/4/2007	Coeur D'Alene	0	0	$30,000.00	$0.00
8/18/2008	Pinehurst	0	0	$2,000.00	$0.00
6/5/2009	Idaho Falls	0	0	$13,000.00	$0.00
Totals:		6	26	$3,114,000.00	$50,000.00
Source: www.ncdc.gov					

Future Occurrence

The general weather patterns of the last several decades are expected to continue. Historical rates of injury are also expected to continue. An increasing dependence on electronics may lead to an increase in the amount and extent of property damage resulting from lightning strikes.

Environmental Impacts

Lightning strikes themselves have unsubstantial environmental impacts. Isolated, small-scale environmental impacts include damaged or killed trees and damage to historic structures. Far more substantial are indirect impacts from the ignition of wildfire that can result from lightning. Lightning season coincides with dry season. Major concerns are “dry thunderstorms” or “dry lightning storms”, which can produce lightning and high winds with no rain to extinguish or mitigate resulting fires. Environmental impacts due to wildfire are addressed in another section of this Plan.

Development Trend Impacts

Any new development could be affected by lightning. This new development would equate to an increase in vulnerability and in potential losses, although historical data seems to show that these increased losses would be minimal. However, when the lightning strike results in a wildfire, this pattern would not hold true. The wildfire section in this chapter provides more detail on this issue.

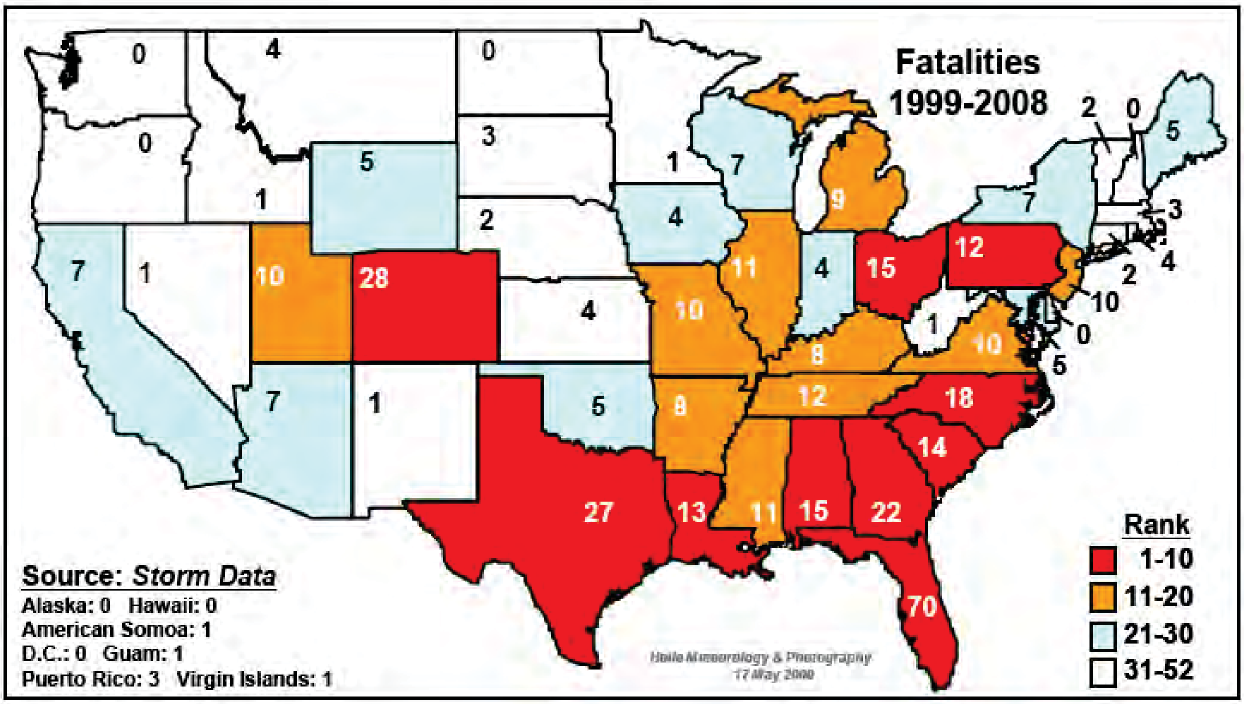
Critical Infrastructure and State Facility Impacts

All infrastructure and State facilities could be at risk, although there are a number of mitigation measures that could help to lessen the impact to critical infrastructure and State facilities.

Vulnerability Assessment

While Idaho experiences thousands of strikes annually, lightning poses a minimal hazard to most individuals, especially when compared to other States (See Map 3-29 below). There were, however, 26 fatalities due to lightning in Idaho from 1959 through 2009. In addition, the National Weather Service provided the following historical fatality, injury, and damage report rates for Idaho based on data from 1959 to 2009:

- Deaths per million of the population, per year – 0.50
- Injuries per million of the population, per year – 2.23
- Damage reports per million of the population, per year – 10.17



Map 3-29: Lightning Strike Fatalities in the U.S. (1999-2008) /

Source: www.lightningsafety.noaa.gov/stats/99-08_deaths_by_state.pdf

Communication, utilities, and most critical facilities with electronic equipment employ techniques to minimize the impact to their operation. The general weather patterns of the last several decades are expected to continue. This will result in the continuance of spring and summer, afternoon and evening occurrences of lightning throughout Idaho. Historical rates of injury are also expected to continue. The increasing dependence on electronic equipment and its utilization in all aspects of daily life may lead to an increase in the amount and extent of property damage resulting from lightning strikes.

Lightning is also a major contributor to the ignition of wildland fires in the State. Of particular concern are “dry thunderstorms” or “dry lightning storms” (defined above), where lightning strikes are accompanied by high winds but with no rain to extinguish or mitigate resulting fires.

Compilation of Local Hazard Mitigation Plans

Forty-seven local mitigation plans were analyzed to determine the major hazards in each jurisdiction. Lightning was not ranked as such by any jurisdiction.

Loss Estimation

No specific, statewide loss estimation exists for the hazard of lightning. Historical losses tend to be reported with the wildfire events that are triggered by the lightning.

Compilation of Local Hazard Mitigation Plans

Since the local mitigation plans didn't rank lightning as a major hazard, the data were not aggregated and it is assumed that loss estimates would be low. Many of the local mitigation plans grouped lightning with severe weather.

Mitigation Rationale

Lightning is the second most deadly weather phenomenon in the U.S., led only by floods. On average, 60 to 70 deaths per year are attributed to lightning nationally. In Idaho, the average is less than one per year. Individuals struck by lightning are subject to severe injuries or death. Studies report that 20 percent of strike victims die, and 70 percent of the survivors suffer serious long-term aftereffects. Injuries that do not require hospitalization likely go unreported. Over 90 percent of incidents involve only a single victim, and only 1 percent involves more than two victims.

Typical injuries include external burns, numbness/parasthesias, severe headaches, dizziness, stiffness in joints, loss of strength/weakness, hearing loss, muscle spasms, chronic fatigue, and coordination problems. Typical physiological injuries include memory deficits and loss, depression, attention deficits, sleep disturbance, fear of crowds, and storm phobia.

The majority of lightning victims are children and young men engaged in recreation or work. Most lightning deaths and injuries occur when people are caught outdoors, most often in the summer months and during the afternoon and early evening. People under or near tall trees, in or on water, or on or near hill or mountain tops are particularly at risk.

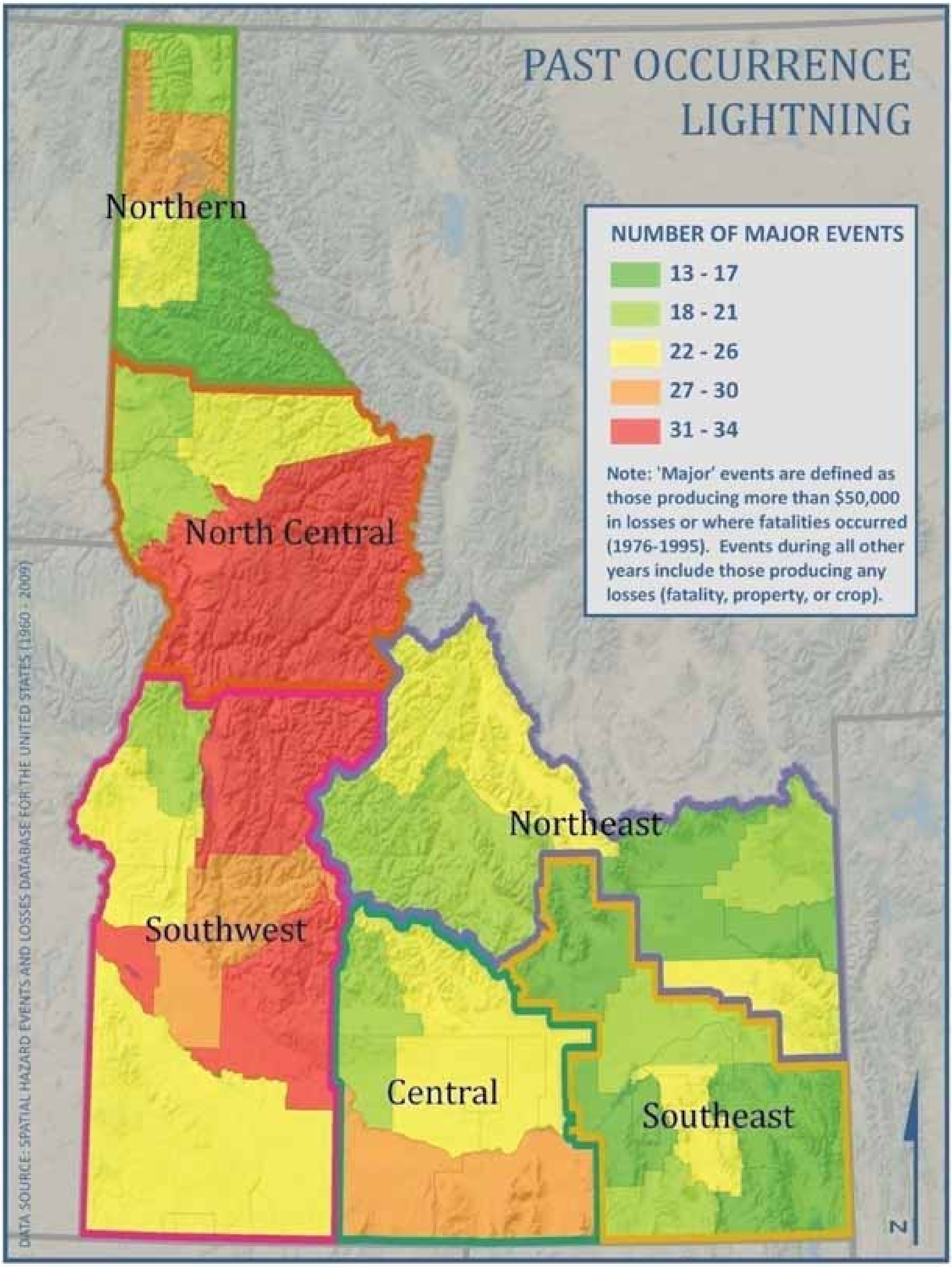
Property damage resulting from lightning strikes includes mechanical impacts to trees and structures, the ignition of flammable materials (natural and manmade), and disruption of electrical and electronic equipment. Forest fires are a common outcome in Idaho, as the lightning season coincides with the dry season. The magnitude of economic losses is difficult to estimate. Government figures suggest annual national costs at around $30 million, but some researchers find evidence that losses may be in the billions of dollars.

General Mitigation Approaches

Mitigation of lightning is established, generally, in the Idaho Disaster Preparedness Act of 1975 as amended (Idaho State Code Chapter 10, Title 46) and, more specifically, in the Governor's Executive Order, 2000-04. No agency is specifically assigned responsibility for lightning-related mitigation, but the BHS is assigned general responsibility for coordinating mitigation for all hazards.

Aside from the NOAA/NWS Storm Ready program, there are no lightning-specific mitigation programs in Idaho. Some education is conducted by land management agencies, which provide educational materials for recreational users. The NWS, NOAA, Underwriters Laboratories, Lightning Safety Alliance Corporation, and Lightning Protection Institute also collaborate to provide general educational programs for parents, coaches, and athletes through the Storm Ready Program (among others). Storm Ready is a community severe weather preparedness program. Communities subscribe to the program and benefit by receiving preferred CRS ratings, public awareness support, and grant application support. The Storm Ready program takes a strong hazard mitigation approach, and all local hazard mitigation programs are encouraged to subscribe and actively participate (http://www.stormready.noaa.gov/com-maps/id-com.htm).

Updating building codes and practices can be a useful mitigation tool. Jurisdictions may adopt building safety codes such as NFPA-780 Standard for the Installation of Lightning Protection Systems (1997). Additional incentives may be provided by requiring the insurance industry to promote lightning-safe practices. Electronic equipment in particular can be safeguarded through commonly available tools (e.g., grounded outlets and surge protectors).



Map 3-30: Lightning Past Occurrence

RISK ASSESSMENT: SEVERE STORMS

Description

A severe storm is an atmospheric disturbance that results in one or more of the following phenomena: strong winds and large hail, thunderstorms, tornadoes, rain, snow, or other mixed precipitation. Of the 22 Presidential Disaster declarations in Idaho since 1970, six have been attributed to "storms" or "severe storms" at least in part. Of the six Federal disasters in Idaho that have been attributed to a "storm," five have occurred during winter months. Several damaging elements of severe storms are detailed as their own hazard elsewhere in this document (flooding, dam/levee failure, lightning, and winds/tornadoes). The following section deals primarily with winter storms and secondarily with thunderstorms and hail.

Winter Storms

Winter storms range widely in size, duration, and intensity. These storms may impact a single community or a multi-State area. They may last hours or days. The severity of storms can range from a small amount of dry snow to a large, blanketed area of wet snow and ice. Generally, winter storms are characterized by low temperatures and blowing snow.

A severe winter storm is defined as one that drops 4 or more inches of snow during a 12-hour period, or 6 or more inches during a 24-hour span. A blizzard is a winter storm with winds exceeding 35 miles per hour and temperatures of 20°F or lower. Strong winds can lower the effective temperature through "wind chill." An ice storm occurs when cold rain freezes immediately on contact with the ground, structures, and vegetation.

The principal hazards associated with severe winter storms are:

- Snow and/or ice accumulation
- Extreme cold
- Significant reduction of visibility

In Idaho, the NWS criteria (National Weather Service – Pocatello, Idaho) for issuing winter storm and accompanying hazardous condition notifications to the public are:

Winter Storm Watch: Potential exists for a blizzard, heavy snowfall, ice storm, and/or strong winds within the next 72 hrs;

Blizzard Warning: Winds of at least 35mph and falling/drifting snow frequently reduce visibility to less than ¼ mile, for 2 hours or more;

Heavy Snow Warning: (Valleys) 6 inches or more snowfall in 24 hours; (Mountains) 9 inches or more snowfall in 24 hours;

Ice Storm Warning: Ice accumulations of at least ¼ inch are expected over the next 24 hours;

Sleet Warning: Sleet accumulations of at least ¾ inch are expected over the next 24 hours;

Winter Storm Warning: Heavy snow in combination with wind, freezing rain, or wind chill is occurring or expected;

Blowing/Drifting Snow Advisory: Occurring or imminent blowing/drifting snow will cause significant travel problems;

Freezing Rain/Drizzle Advisory: Occurring or imminent freezing rain/drizzle may lead to life-threatening circumstances;

Snow Advisory: (Snake Plain Only) 3 to 5 inches of snow accumulation expected in the next 24 hours;

Winter Weather Advisory: (Snake Plain Only) A combination of snow, wind, freezing rain, etc. that will create inconvenience but not reach warning criteria, is expected; and

Avalanche Warning: (issued by avalanche centers) snow pack conditions indicate the potential for significant avalanches.

Thunderstorm – Hail

The NWS definition of "hail" is showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud. Hail is a product of thunderstorms and their dynamic internal winds. Air cycles vertically through the storm mass, known as a "cell." At the earth's surface, air is warmed and rises through the cell. As it reaches the higher atmosphere (cells can rise tens of thousands of feet above the surface), it cools and drops back to the surface, replacing warm air rising from the base of the cell. This ongoing cycle captures and carries water droplets up to a height where freezing occurs. The resultant ice particles grow during each up-and-down cycle within the storm cell, until, too heavy to be carried by the rising air, they fall to the ground as hail. Hail is produced in a wide range of sizes and falls in varied quantities. Hail of ¾ inch or greater diameter is sufficient to classify a thunderstorm as "severe."

Location, Extent, and Magnitude

Past disasters have been focused in the western and northern portions of the State, but severe winter storms are possible throughout Idaho. Table 3-23 presents the winter storm hazard ranking for Idaho's 44 counties, according to BHS.

Table 3-23: Winter Storm Risk Impact and Probability for Counties in Idaho

Impact/Probability	Low	Medium	High
Low			
Medium		Ada Bannock Bear Lake Bingham Bonneville Butte Cassia Franklin Jefferson Owyhee Shoshone Twin Falls	
High		Minidoka	Adams Benewah Blaine Boise Bonner Boundary Caribou Camas Canyon Clark Clearwater Custer Elmore Fremont Gem Gooding Idaho Jerome Latah Lemhi Lewis Lincoln Madison Nez Perce Oneida Payette Power Teton Valley Washington

Notes: Definitions for Probability: High = Situated in winter storm patterns, severity and duration of storms, proximity to higher elevations, Medium = Situated in less severe storm patterns, lower elevations, shorter duration of storms, Low = Normally mild winter seasons, infrequent winter storms

Definitions for Impact: High = Population congestion and concentration, transportation corridors and power delivery significantly disrupted, agricultural operations hampered or damaged, susceptibility to hardships caused by cold, excessive snow and wind, vulnerable population, Medium = More dispersed population, transportation corridors more easily maintained, population acclimatized towards and experienced in severe weather, Low = Population adapted to severe winter weather, transportation corridors regularly maintained, situated in milder climate patterns.

Source: Idaho Bureau of Homeland Security

Aspects of a snowstorm's magnitude can be measured in inches of snow accumulation and wind speeds; the magnitude of hailstorms can be measured by the diameter of the average hail particle. Specific size thresholds for defining certain kinds of storms are listed above under "Description."

For winter storm disaster declarations, a county must have experienced a record or near-record snowfall (or meet FEMA's contiguous county criteria). A record snowfall is defined by FEMA as one that meets or exceeds the highest record snowfall within a county over a 1-, 2-, 3-day or longer period of time, as published by the NCDC. A near-record snowfall means a snowfall that approaches, but does not meet or exceed, the historical record snowfall within a county as published by the NCDC; FEMA generally considers snowfall within 10 percent of the record amount to be a near-record snowfall.

Past Occurrence

Map 3-31, at the end of this section, shows the locations of past major severe storms, summarized at the county level.

Winter Storms

Table 3-24, below, lists the State Disaster declarations that resulted from severe winter storms from 1972 to 2006.

Table 3-24: Winter Storm Disaster Declarations, 1972-2010

Date	Counties Listed in Declaration	Federal Disaster ID
March 1972	*[unknown]*	DR 324 "Idaho Severe Storms, Snowmelt, Flooding"
January 1974	*[unknown]*	DR 415 "Idaho Severe Storms, Extensive Flooding"
January 1989	Bonner, Clark	N/A
January 1993	Jerome	N/A
January 1994	Elmore	N/A
February 1996	Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, Shoshone	DR 1102 "Idaho Storms/Flooding"
November 1996 - January 1997	Adams, Benewah, Boise, Bonner, Boundary, Clearwater, Elmore, Gem, Idaho, Kootenai, Latah, Nez Perce, Owyhee, Payette, Shoshone, Valley, Washington	DR 1154 "Idaho Severe Storms/Flooding"
February 2006	Owyhee	DR 1630 "Idaho Severe Storms and Flooding"

Source: Federal Emergency Management Agency

March 1972: Federal disaster declared for severe storms and associated snowmelt and flooding conditions in Idaho.

January 1974: Federal disaster declared for severe storms and associated extensive flooding in Idaho.

Clark County, 1989: Severe winds and blizzard conditions kept ranchers from reaching livestock.

Northern Idaho, 1996: The third week of January brought large amounts of low-elevation snow, especially in the Panhandle region, where stations measured an additional 10 inches of snow. By the end of January, sites in the north had as much as 2½ feet of snow on the ground.

During the last week of January, temperatures dropped below 0, and highs remained in the single digits, causing ice to form on many rivers. Subsequent warming led to extensive flooding throughout the region.

On February 11, 1996, the President declared a major disaster in the State of Idaho (designated DR-1102). Ten counties and the Nez Perce Indian reservation were declared eligible for assistance. As of February 1, 2001, this assistance included $22,635,325 in public assistance, $71,639 in individual assistance, $301,081 from the NRCS, and $5,022,353 in hazard mitigation grants. Although much of this damage derived from flooding, the preceding storm clearly contributed to the disaster.

Northern Idaho, November 1996 – January 1997: In the last months of 1996, significant early season storms caused extensive damage and subsequently led to severe landslides and flooding throughout Northern Idaho. By many measures, this was a significant series of storms. Mountain snow packs were holding more than 150 percent of their normal water content. Snowfall in areas of the Panhandle counties sometimes exceeded the design loads of buildings.

During November 16-21, 2 to 3 feet of snow were dumped in the Bonners Ferry area, collapsing roofs of businesses, schools, and homes. On November 19, freezing rain produced 1 inch of ice in Kootenai, Clearwater, and Idaho Counties. Strong winds and the ice toppled numerous trees and power lines. Power outages lasted for weeks. Additional above-normal snowfall fell in late December throughout Northern and Central Idaho. Subsequent warm rains produced heavy runoff that overwhelmed rivers and led to flooding and widespread landslides.

On January 4, 1997, the President declared a major disaster (DR-1154) in 18 counties, making them eligible for Federal assistance. As of February 1, 2001, assistance included $19,404,105 in public assistance, $39,988 in individual assistance, $125,937 from the NRCS, $576,314 from the U.S. Army Corps of Engineers, and $5,593,892 in hazard mitigation grants.

Owyhee County, 2006: A Federal disaster was declared for a storm that hit Owyhee County between December 30, 2005, and January 4, 2006.

Thunderstorms/Hail
Hail falls in various locations throughout the State every year. Significant events are most common in summer. For example, in June 1996, golf-ball-sized hail was reported in Bonneville County. According to NCDC data, an August 1997 storm caused a $1 million of property damage in Bannock County, and a July 1998 storm caused $5 million in crop damage in Latah County. No State or Federal Disaster declarations or any deaths been reported as the result of hail damage in the State.

Future Occurrence

Winter Storms
Three climactic factors combine to produce winter storms:

Cold Air: below-freezing temperatures in the clouds and near the ground are necessary to make snow and/or ice.

Moisture: forms clouds and precipitation; air blowing across a body of water, such as a large lake or the ocean, is an excellent source of moisture.

Lift: something to raise the moist air to form the clouds and cause precipitation. An example of lift is warm air colliding with cold air and being forced to rise over the cold dome. The boundary between the warm and cold air masses is called a front. Another example of lift is air flowing up a mountainside.

In the northwest, including Idaho, winter storms are often caused by strong storms from the North Pacific crossing the coast from California to Washington. The vast Pacific provides an unlimited source of moisture for storms. If the air is cold enough, snow falls over Washington and Oregon and sometimes even in California. As the moisture rises into the mountains, heavy snow closes the mountain passes and can cause avalanches. The cold air from the north has to filter through mountain canyons into the basins and valleys to the south. If the cold air is deep enough, it can spill over the mountain ridge. As the air funnels through canyons and over ridges, wind speeds can reach 100 mph, damaging roofs and taking down power and telephone lines. The combination of these winds with snow results in a blizzard.

The occurrence of severe winter storms is, to a large part, dependent on broad climatic trends. These trends are difficult to forecast and the assumptions underlying the projection of future vents are subject to intense debate. The relatively high frequency of these events in the 1990s may reflect a change in the overall pattern, or it may be only a minor deviation from the norm.

It is consequently difficult to generate any hard estimates of future storm frequency or intensity. It is reasonable to suspect, however, that the relatively moderate climate of Idaho will continue to limit the number and severity of winter storms within historical ranges.

Although past disasters have been focused in the western and northern portions of the State, severe winter storms are possible throughout Idaho. All of the State is rated by FEMA as subject to “moderate snowfall” or “heavy snowfall”. As population growth and development continues, the possibility of significant damage will increase.

Thunderstorm/Hail

Severe thunderstorms are most likely in Idaho during the spring and summer months. The probability of severe thunderstorms is increased if strong upper-level winds are present in conjunction with a moist and unstable atmosphere. Such conditions are most likely in association with the passage of a cold front from west to east across the State, with warm, moist air ahead of the front. Strong areas of upper-level low pressure over the Pacific Northwest can also create favorable conditions for severe thunderstorms in Idaho. Other weather patterns favorable for severe thunderstorm formation include monsoon moisture from the desert southwest working its way northward into Idaho. This weather pattern is usually associated with an unstable atmosphere conducive to the formation of thunderstorms in mid-summer. Hail damage can be expected to continue at historical levels.

Environmental Impacts

Impacts of a winter storm on vegetation and wildlife can include death, depending on the timing of the storm (i.e., late in the spring after blooms or early in the fall, prior to leaf fall). However, it is unlikely that severe storms would jeopardize the existence of rare species or vegetative communities throughout the State. The loss of crops or livestock due to hail can have far-reaching economic effects (detailed more under "Vulnerability"). Damage to trees from hail or heavy snowfall can have a relatively short-term alteration of the visual landscape, but the long-term recovery of natural resources from these effects is likely. Both hail and heavy snowfall can damage historic structures, particularly roofs, requiring restoration activities. Severe winter storms and hail are unlikely to impact geology and soils. Direct impacts from severe winter storms can include a downturn in recreational activities due to dangerous conditions and damaged infrastructure, but indirect impacts can include improved winter recreation from increased snowfall. Indirect effects of heavy snowfall can also include a higher risk of flooding, but the improved water supplies would decrease the risk of drought and improve agriculture and water-based recreation after the winter.

Development Trend Impacts

The threat of severe storms, particularly the effects of winter storms, has undoubtedly impacted development in Idaho. This is especially true for utilities and transportation facilities, which typically suffer the greatest losses from these events. Hail can have a devastating impact on crops, although the timing of the storm in relation to the maturity of the crop greatly influences the amount of damage. Severe cold temperatures late in the spring or early in the fall can also have devastating effects on crop production. As long as development trends continue to focus on mitigation measures as they relate to severe storms, increased development may not correlate to an increase in potential losses.

Critical Infrastructure and State Facility Impacts

No critical or State facilities in Idaho are completely safe from threat of severe storms. Threats include loss of power and productivity from damages to utilities and transportation corridors to these places of work. Heavy snows can directly impact these facilities by causing roof failures or falling trees and limbs.

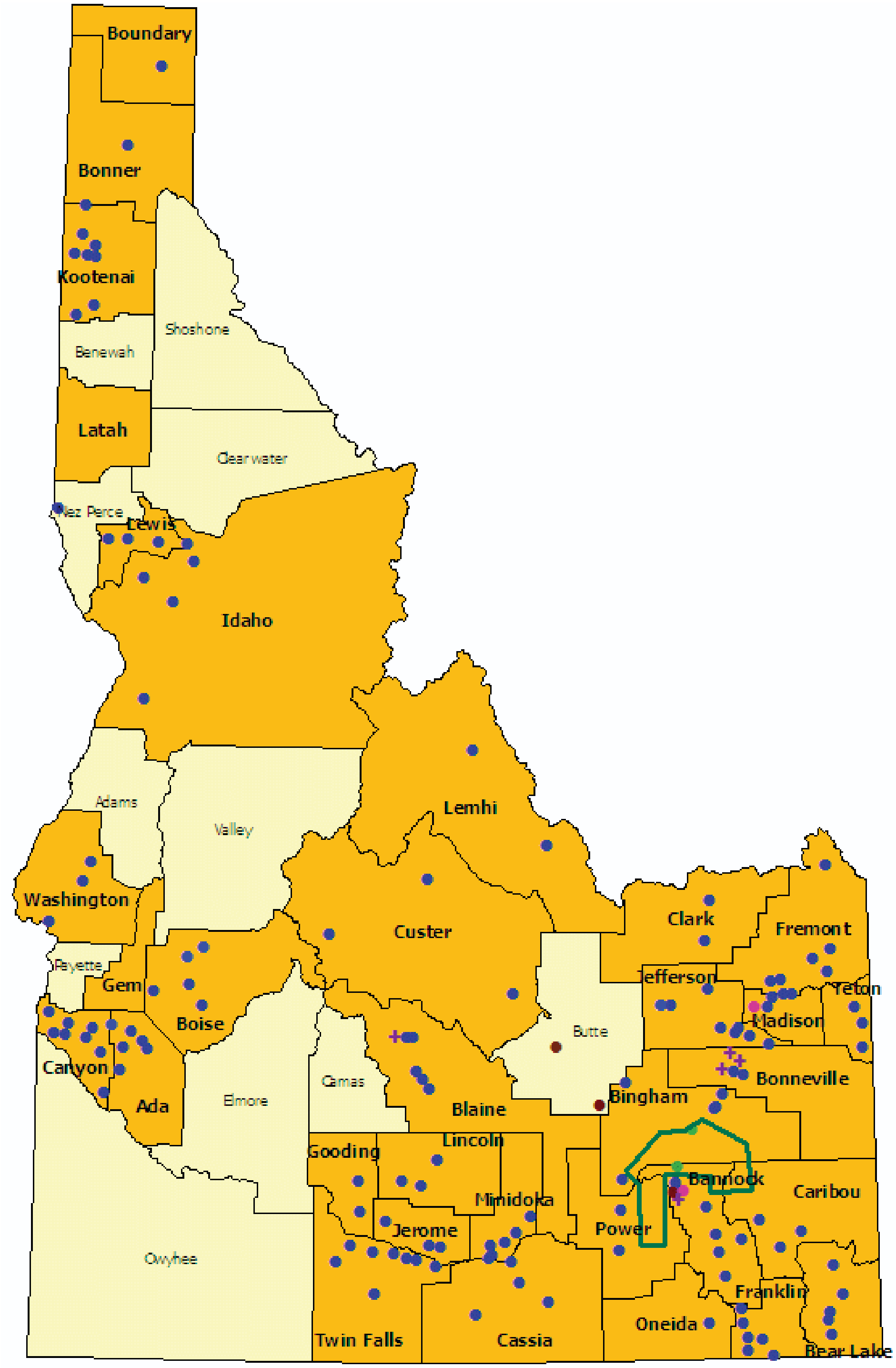
Vulnerability Assessment

Severe storms can be particularly difficult to mitigate for and recover from because of their varied and widespread nature. The rural nature and difficult terrain found in much of the State can make repairs particularly challenging for utility and transportation resources. As stated previously, the western and northern counties are particularly vulnerable to severe storms. Peak snowfalls and the coldest temperatures tend to occur in the higher elevations. There are low-elevation locations in Idaho that do not experience a single month with a mean temperature below freezing.

According to NCDC data, 31 deaths have been caused by snowstorms since 1992 (18 years); however, no one storm had more than two deaths attributed to it.

An area may be less vulnerable if it participates in the NWS "StormReady" Program. There are presently 34 counties, 133 communities, and three government sites that have StormReady status (http://www.stormready.noaa.gov/com-maps/id-com.htm). These numbers have increased from those reported in the 2007 State Plan. In addition, since 2007, one Indian Nation, two universities, and five supporting entities (e.g., an airport or news broadcaster) have StormReady status. Map 3-32 illustrates the number and location of jurisdictions that have attained StormReady status.

Winter storm, Worley, ID 2008, Union Pacific freight train immobilized by snow / Source: BHS



Map 3-32: Idaho Storm Ready Status. Gold Shading: StormReady County; Blue Dot: StormReady Community; Green Outline: StormReady Indian Nation; Purple Dot: StormReady University; Purple +: StormReady Supporter (e.g., airport or news broadcaster).

Source: NOAA Stormready website (February 2010): www.stormready.noaa.gov/com-maps/id-com.htm

Compilation of Local Hazard Mitigation Plans

The 47 local mitigation plans produced throughout Idaho were analyzed to determine the major hazards in each jurisdiction. A majority, 35 jurisdictions, indicated that severe storms were a major hazard: Adams, Bannock, Bear Lake, Benewah, Bingham, Blaine, Boise, Bonner, Boundary, Butte, Camas, Canyon, Caribou, Cassia, Clark, Clearwater, Custer, Duck Valley Reservation, Elmore, Franklin, Fremont, Gem, Gooding, Idaho, Jerome, Lemhi, Lincoln, Madison, Minidoka, Oneida, Owyhee, Power, Shoshone, Teton, and Twin Falls (see Map 3-33 at the end of this section).

Loss Estimation

No specific, statewide loss estimation exists for the hazard of severe storms. Historical losses are sometimes reported with the resulting flooding or avalanche events that are triggered by severe storms. However, severe storms can also have losses reported uniquely as their own event.

From a general perspective, severe storms damage and destroy public, commercial, and private property, including livestock, structures, and infrastructure. Additional costs can stem from snow/debris removal, maintenance, and response. Road and railroad closures are not uncommon. The economic costs of these disruptions can be significant, especially in areas with limited access options.

Compilation of Local Hazard Mitigation Plans

The 47 local mitigation plans produced throughout Idaho were analyzed to determine the major hazards in each jurisdiction. A majority, 35 jurisdictions, identified severe storms as such. Table 3-25 summarizes the loss estimates for winter storms from these 35 local plans.

Table 3-25: Loss Estimates from Local Plans Finding Severe Storms to be a Top Hazard

Jurisdiction	Loss Estimate for Severe Storms	Note on Methodology
Adams Co.	Not indicated	
Bannock Co.	$1,000,000s	Historical Average
Bear Lake Co.	Not indicated	
Benewah Co.	Not indicated	
Bingham Co.	Not indicated	
Blaine Co.	Not indicated	
Boise Co.	Not indicated	
Bonner Co.	$ 4,585,672,000	Other than Historical Average or % Geographic Area
Boundary Co.	Not indicated	

Table 3-25: Loss Estimates from Local Plans Finding Severe Storms to be a Top Hazard		
Jurisdiction	**Loss Estimate for Severe Storms**	**Note on Methodology**
Butte Co.	$ 1,000,000s	Historical Average
Camas Co.	Not indicated	
Canyon Co.	Not indicated	
Caribou Co.	Not indicated	
Cassia Co.	$ 1,000,000s	Historical Average
Clark County	$ 1,000,000s	Historical Average
Clearwater Co.	Not indicated	
Custer Co.	$1,000,000s	Historical Average
Duck Valley Indian Reservation	$ 72,325,766	Other than Historical Average or % Geographic Area
Elmore Co.	Not indicated	
Franklin Co.	$ 1,000,000s	Historical Average
Fremont Co.	$ 1,000,000s	Other than Historical Average or % Geographic Area
Gem Co.	Not indicated	
Gooding Co.	Not indicated	
Idaho Co.	Not indicated	
Jerome Co.	$ 1,000,000s	Historical Average
Lemhi Co.	$ 100,000s	Historical Average
Lincoln Co.	Not indicated	
Madison Co.	$ 100,000s	Historical Average
Minidoka Co.	$ 100,000s	Historical Average

Table 3-25: Loss Estimates from Local Plans Finding Severe Storms to be a Top Hazard		
Jurisdiction	**Loss Estimate for Severe Storms**	**Note on Methodology**
Oneida Co.	$ 100,000s	Historical Average
Owyhee Co.	Not indicated	
Power Co.	$ 100,000s	Historical Average
Shoshone Co.	$ 771,830,042	Total Improvement Values
Teton Co.	$ 100,000s	Historical Average
Twin Falls Co.	"Sheltering Requiring Neighboring Counties' Help or Major Business Interruption"	Historical Average

Mitigation Rationale

Winter storms have been the cause for five Presidential disaster declarations since 1972 (28 years), which is the same as the number of wildfire disaster declarations. Damaging storms can result in casualties and extensive property damage, including impairment of economic activity throughout the State. However, considering that a large part of the damages from winter storms are due to flooding, as indicated in their FEMA names (see Table 3-22 above), and the fact that many of the damages are small, compared to potential damages from earthquakes or large wildfires, mitigation for winter storms above and beyond that for flooding does not merit the attention given to the top three hazards in this State Plan. Nonetheless, BHS has concluded from several regional and county workshops that local emergency managers consider power outages during severe snowstorms to be a significant and probable hazard.

General Mitigation Approaches

Policy Framework

Mitigation of severe storms hazards is established, generally, in the Idaho Disaster Preparedness Act of 1975 as amended (Idaho State Code Chapter 10, Title 46) and, more specifically, in the Governor's Executive Order, 2000-04. No agency is specifically assigned responsibility for storm-related mitigation, but the BHS is assigned the general responsibility for coordinating mitigation for all hazards.

Local Government

Mitigation of severe storms begins with local governments adopting building codes that protect facilities and homes. Facilities and buildings are to be built, per the IBC, to withstand basic wind speeds of a 90-mph, 3-second gust. This may be higher in special regions along the Montana border. See the Idaho State Climate Services (http://snow.cals.uidaho.edu/index.html) for information. Snow loads are also determined by the IBC, and historical snow loads for individual counties can be found at the Idaho State Climate Services. For additional information, see the State Division of Building Safety recommendations at http://dbs.idaho.gov/building/loads.html.

An additional important action taken by local communities is participation in the NWS "Storm Ready" Program. See Map 3-32, above, for the status of participation in this program throughout the State.

Hazard Management

Structures in winter storm hazard areas should be designed and built to withstand the projected snow (and ice) loads. Non-occupancy buildings, such as greenhouses and storage sheds, which are not subject to building codes, should be given special attention. High-cost or difficult-to-replace property should not be stored outside in high-risk areas.

Critical facilities in areas of high storm hazard should be designed and managed to withstand likely storm impacts such as power outages, personnel shortages, and property damage.

Information/Outreach and Public Education

Residents and property owners should be informed of storm hazards and educated in safety and mitigation techniques.

Infrastructure

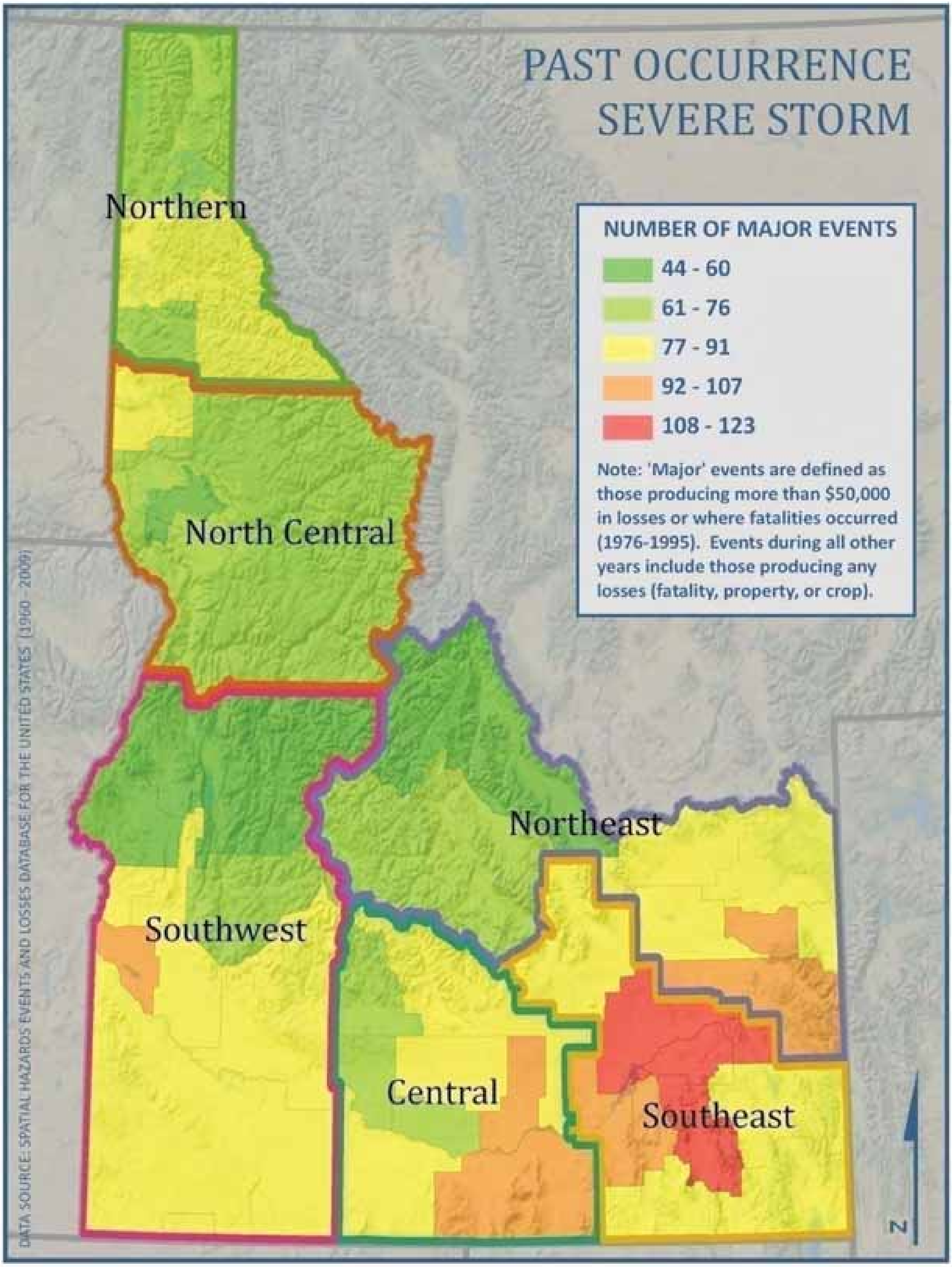
Snow fencing and related technologies should be constructed in areas where important highways are at risk of blockage during storm events. Utility lines should be placed underground where feasible. Aboveground utility lines should be kept free of potentially damaging vegetation.

Regulatory

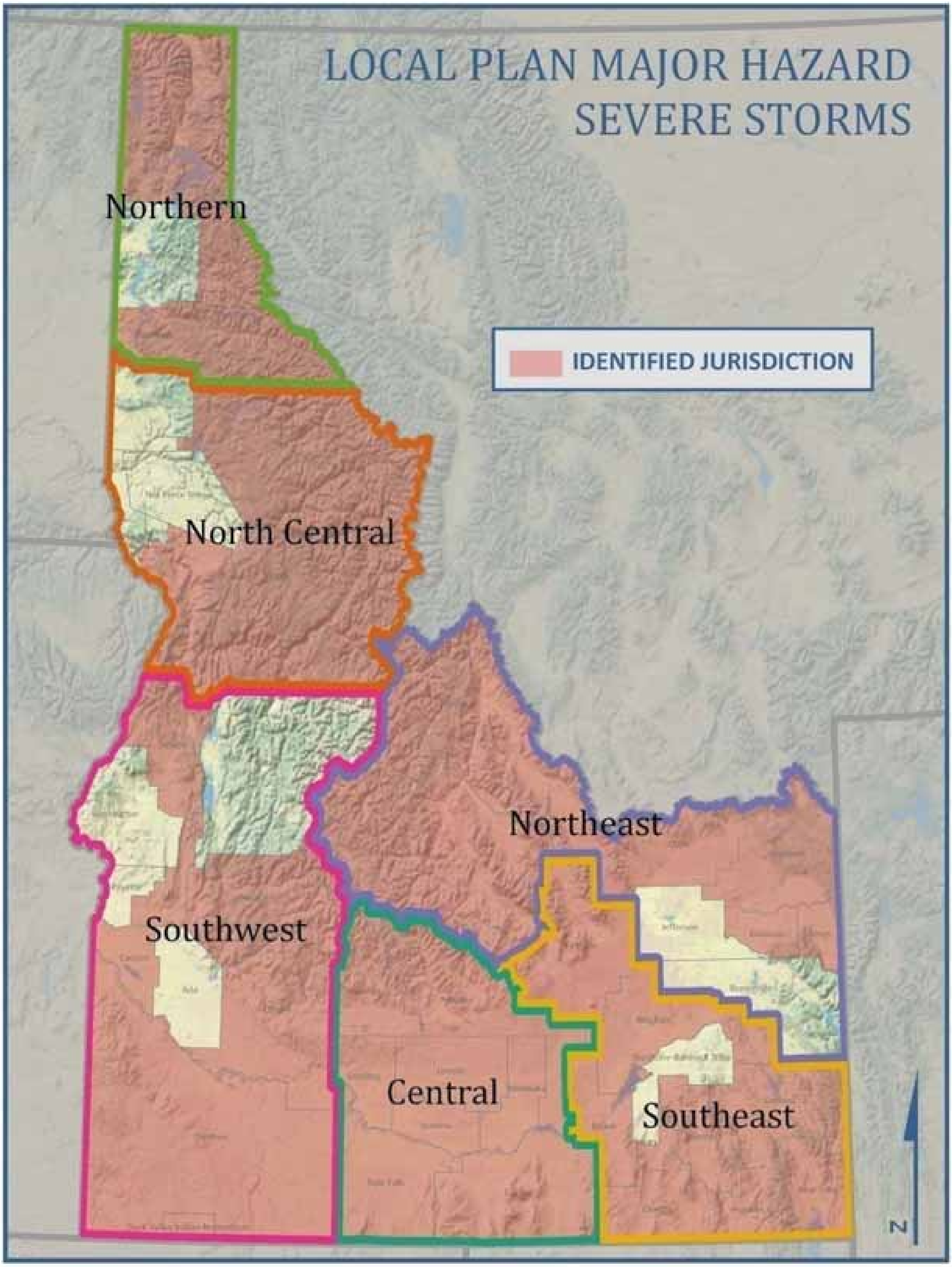
Adoption and enforcement of appropriate building codes and construction standards can significantly reduce damages caused by severe storms.

Mapping / Analysis / Planning

An accurate understanding of a hazard is the first step towards successful mitigation. To fully understand a hazard and the risk that it poses, the ability to accurately assess vulnerability is vital. After vulnerability is determined, it is then possible to assess potential losses. Vulnerability and loss information can greatly enhance mitigation planning efforts, but these data are not readily available at this time. Appendix F of this Plan provides details regarding a HAZUS CDMS-compliant geodatabase that is being designed as part of this Plan update. This database will allow for the proper collection of facility and infrastructure data in a GIS platform, which can then be analyzed to assist with vulnerability and loss estimations.



Map 3-31: Sever Storm Past Occurrence



Map 3-33: Severe Storm Identified as Local Plan Major Hazard

RISK ASSESSMENT: VOLCANIC ERUPTIONS

Description

Volcanic hazards may be divided into two categories based on the range of their impact from the eruptive center or active vent. Proximal hazards have an impact limited to a distance of 30 miles or less from the active vent. Distal hazards have an impact far beyond the active vent.

Not all volcanic activity will result in all of the hazards listed here. The nature of the lava (rhyolitic or basaltic)[3], the history of eruptions at the site, the presence of groundwater, and other factors influence the size, character, and duration of the eruption and the resultant hazards.

East Butte, a rhyolitic volcanic dome, lies on the eastern Snake River Plain in southern Idaho / Source: Scott Hughes, Idaho State University

Proximal Hazards

Lava Flows are pouring or oozing collections of lava extruded from vents. These flows can destroy all structures in their paths and start forest fires, but they advance relatively slowly, so they seldom endanger people. Lava flows damage or destroy everything in their paths by burying, crushing, or burning. Large areas of productive and/or developable lands may be lost to lava flows. They can also generate additional hazards by damming or diverting streams.

Pyroclastic Flows are avalanches of hot ash, rock fragments, and gas that move down the sides of a volcano during explosive eruptions or lava dome collapses. These flows can be as hot as 1,500^{o}F and move at speeds of up to 100 to 150 miles per hour. They are capable of knocking down and incinerating everything in their paths. Such flows tend to follow valleys and are generally restricted to the immediate vicinity of the volcano. Lower-density pyroclastic flows, called pyroclastic surges, can easily overflow ridges hundreds of feet high.

[3] Rhyolitic lava tends to result from explosive events, and basaltic lava tends to result from non-explosive events and has a lower viscosity (i.e., is more fluid) than rhyolitic lava.

Lahars and Debris Avalanches: Lahars are mud or debris flows, composed mostly of eruptive materials, on the flanks of a volcano. These flows can travel at speeds of 20 to 40 miles per hour and cover long distances. Debris avalanches are rapid downhill movements of rock, snow, and/or ice. They range from small movements of loose debris on the surface of a volcano to massive collapses of the entire summit or side of a volcano. Debris avalanches on volcano slopes are triggered when eruptions, heavy rainfall, or large earthquakes cause these materials to break free and move downhill.

Volcanic Gases: Volcanoes emit a number of potentially toxic gases, both during and between eruptions. The majority of the gas is water vapor (steam), derived from recent precipitation and groundwater. Other common volcanic gases include carbon dioxide, sulfur dioxide, hydrogen sulfide, hydrogen, and fluorine.

Toxic gases can have both short-term effects and long-term effects on human lives and the natural environment. Carbon dioxide is heavier than air and can be trapped in low areas in concentrations that are deadly to people and animals. Sulfur dioxide is a respiratory poison and also reacts with atmospheric water to create acid rain, causing corrosion and harming vegetation. Hydrogen sulfide is a highly toxic respiratory poison. Fluorine is a highly toxic respiratory poison and can be absorbed onto volcanic ash particles that later fall to the ground, poisoning livestock grazing on ash-coated grass and also contaminating domestic water supplies.

Tephra is solid and molten rock fragments, ranging in size from large "bombs" (from fist-sized to over 3 feet in diameter) to fine dust. The largest rock fragments usually fall back to the ground within 2 miles of the vent. Tephra deposits can pose a risk to lives and structures if they accumulate in a thickness sufficient to collapse roofs. More commonly, they reduce visibility and clog vehicle air filters, posing a hazard on highways. Deposits can topple or short-circuit electric transformers and power lines and clog other infrastructure (such as water and sewage treatment facilities). Tephra clouds also commonly generate lightning that can interfere with electrical and communication systems and start fires. The fine material is extremely slippery, hampering driving and walking, and can damage the lungs of small infants, the elderly, and those with respiratory problems.

Distal Hazards

Eruption Columns and Clouds are created when small fragments (less than about 0.1 inch across) of volcanic glass, minerals, and rock are released during explosive eruptions and rise high into the air. Eruption columns can grow rapidly and reach more than 12 miles above a volcano, forming an eruption cloud. Large eruption clouds can extend hundreds of miles downwind, resulting in falling ash over enormous areas; the wind carries the smallest ash particles the farthest. The volcanic ash in the cloud can pose a serious hazard to aviation; engines of jet aircraft have suddenly failed after flying through clouds of even thinly dispersed material. Recent volcanic eruptions in Iceland caused tens of millions of dollars in losses to European counties due to travel restrictions, airline cancellations, and lost tourism.

Ashfall: As an eruption cloud drifts downwind from the volcano, the material that falls from the cloud typically becomes smaller in size and forms a thinner layer. Though called "ash," volcanic ash is not the product of combustion, like the soft fluffy material created by burning wood, leaves, or paper. Volcanic ash is hard, does not dissolve in water, is extremely abrasive and mildly corrosive, and conducts electricity when wet. Damages from ashfall are similar to those from tephra (ash being a form of tephra). Communities far from the actual eruption may be seriously disrupted by ashfall. The volcanic ash in an eruption cloud can pose a serious hazard to aviation; engines of jet aircraft have suddenly failed after flying through clouds of even thinly dispersed material. The weight of ashfall can collapse buildings.

Location, Extent, and Magnitude

According to the USGS, three active and potentially active areas of volcanic activity are most likely to have direct effects on Idaho: the Snake River Plain, particularly the "Craters of the Moon" area in south-central Idaho; the Yellowstone Caldera, which overlaps Idaho, Wyoming, and Montana; and the Cascade Mountains to the west (see Map 3-36 at the end of this section). The Snake River Plain and the Yellowstone Caldera have not had eruptions within the past 2,000 years, but Yellowstone is being particularly closely watched because of seismicity and ground deformation in recent decades.

There are more than a dozen potentially active volcanoes in the Cascade Mountains (see Map 3-34). The composite volcanoes are the most likely to have a far-reaching impact, as they tend to erupt more explosively and over longer periods of time (tens to hundreds of thousands of years) than other types of volcanoes found in the Cascades. Mount St. Helens and Mount Shasta are examples of composite volcanoes in the Cascade Mountains.

Map 3-34: Active and potentially active volcanoes of the Cascade Range to the west of Idaho, excluding Canada. All but Mount Adams, Mount Jefferson, Mount McLaughlin, and Crater Lake have been active within the past 2,000 years / Source: Cascades Volcano Observatory (1992)

The Volcanic Explosivity Index (VEI) is one way to describe the relative size of explosive volcanic eruptions (see Figure 3-11, below). Scores range from 0 to 8, with each number representing an increase in magnitude from the previous number by a factor of approximately ten. Several factors are taken into consideration to determine the magnitude, including the volume of erupted pyroclastic material (for example, ashfall, pyroclastic flows, and other ejecta), height of eruption column, duration in hours, and qualitative descriptions. VEI does not necessarily relate to the amount of sulphur dioxide injected to the atmosphere, which is critical in determining the climatic impacts of an eruption.

Large explosive eruptions occur much less frequently than small ones. Data from the Global Volcanism Program of the Smithsonian Institution demonstrate that “through 1994, the record of volcanic eruptions in the past 10,000 years . . . shows that there have been four eruptions with a VEI of 7, 39 of VEI 6, 84 of VEI 5, 278 of VEI 4, 868 of VEI 3, and 3,477 explosive eruptions of VEI 2”.

If a large eruption of a composite volcano in the Cascade Mountains were to occur, Idaho would likely experience distal impacts. Effects from the 1980 Mount St. Helens eruption can serve as an example of potential effects from future volcanic eruptions in the northwest region. This eruption measured at 5 on the VEI scale. As shown in Map 3-35, roughly half of Idaho experienced ashfall from this event, and portions of the State experienced some of the event's highest concentrations of ashfall.

Past Occurrence

The only significant volcanic event in Idaho during recorded history was ashfall from the eruption of Mount St. Helens in 1980 (detailed below). The area has seen extensive volcanic activity in the more distant past, however.

Within the Snake River Plain, the Craters of the Moon lava field had extensive flows up to 2,000 years ago, and the Boise area experienced large lava flows 1 million years ago. The Gem Valley area in southeastern Idaho has also been volcanically active; the last eruptive activity occurred about 30,000 years ago.

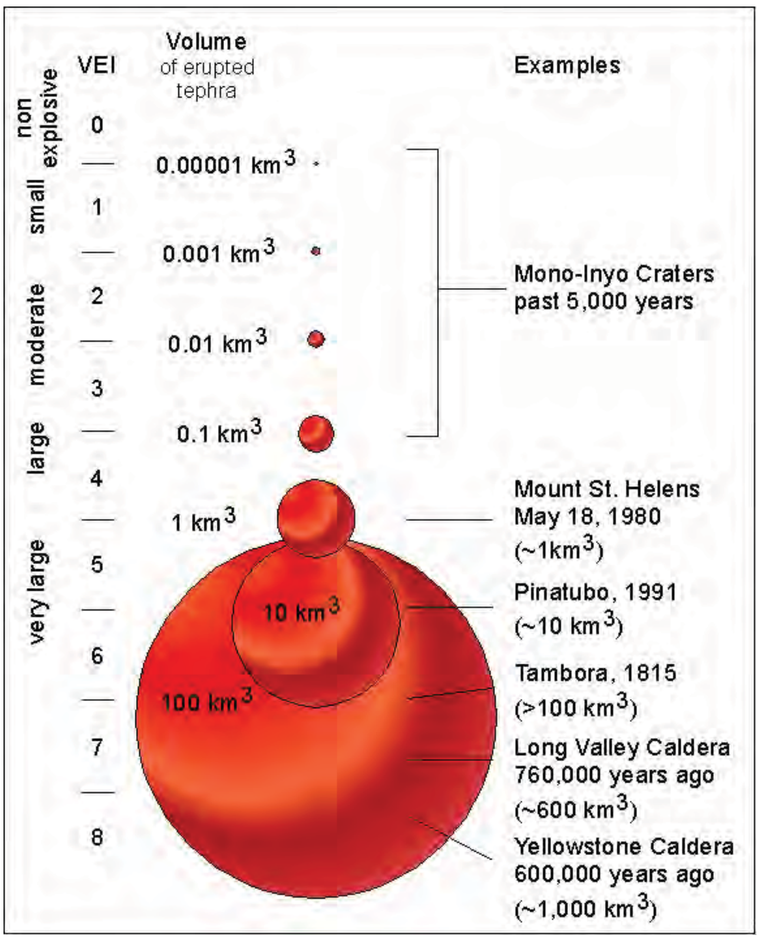


Figure 3-11: Volumes of several past explosive eruptions and the corresponding Volcanic Explosivity Index (VEI) / Source: USGS Volcanic Hazards Program (2010)

In the Yellowstone region, major explosive eruptions occurred 2, 1.3, and 0.6 million years ago. The most recent eruptions, 75,000-150,000 years ago, produced thick lava flows. With respect to Cascadian eruptions, an average of two eruptions occur per century - the most recent were at Mount St. Helens, Washington (1980-86), and Lassen Peak, California (1914-17). Although not the case with this most recent eruption at Lassen Peak, Rockland Ash from an eruption at Lassen 600,000 years ago can be found in southern Idaho.

Mount St. Helens: On May 18, 1980, Mount St. Helens, Washington, erupted, killing 57 people and causing over 1 billion dollars of damage in the Northwest. The eruption followed two months of earthquakes and minor eruptions, and this warning allowed most people in the proximal hazard area to evacuate prior to the eruption.

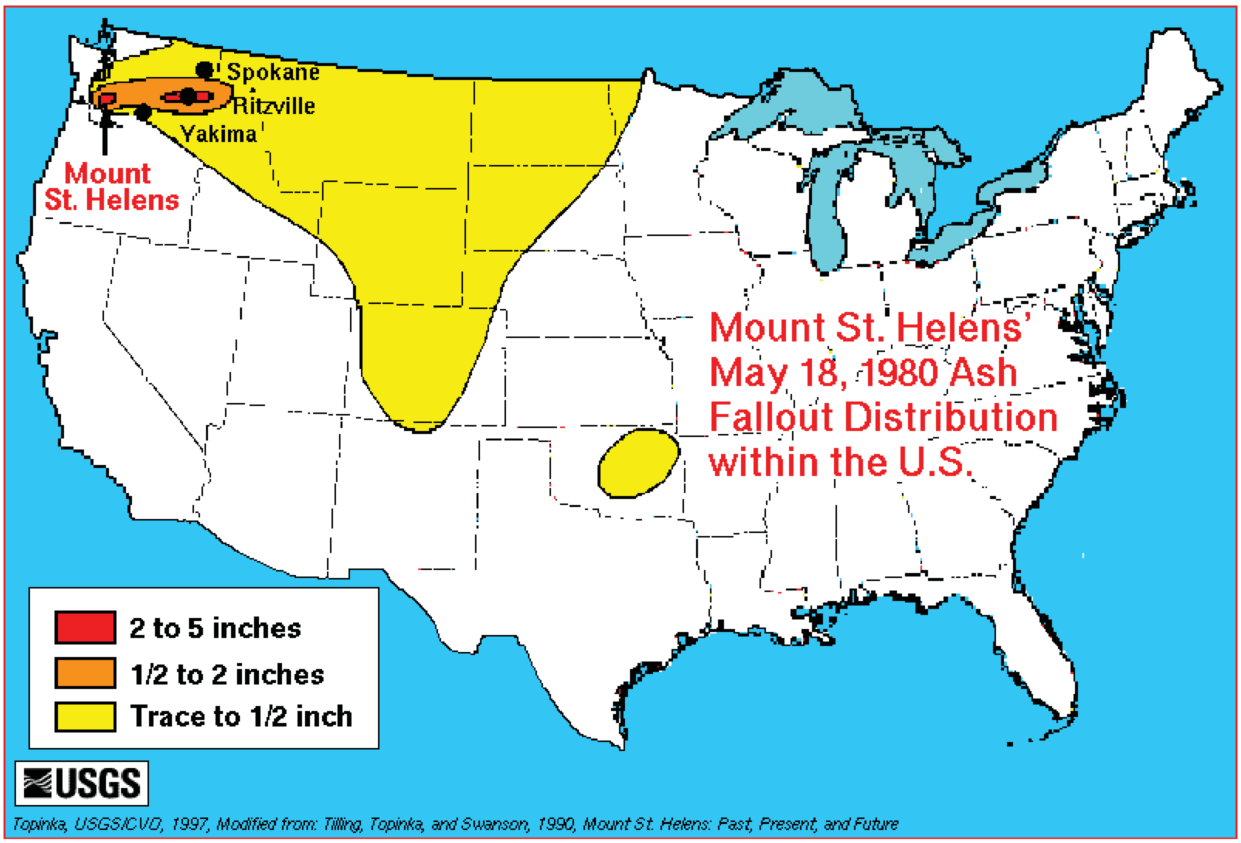


Figure 3-35: Generalized map shows the distribution of ash fallout within the United States, from May 18, 1980 eruption / Source: Cascades Volcano Observatory (1997)

Ashfall from the 1980 eruption of Mount St. Helens impacted northern Idaho, covering roads, affecting crops, machinery and vehicles, and creating health issues. The damage resulted in a Presidential disaster declaration that included Benewah, Bonner, Boundary, Clearwater, Kootenai, Latah, and Nez Perce Counties.

Future Occurrence

Idaho faces two likely future volcanic hazard scenarios: distal hazards from volcanic activity in the Cascades, and proximal as well as distal hazards from the Yellowstone Caldera.

Volcanic eruptions generally occur only after significant warning. Volcano monitoring can detect and measure changes caused by magma movement beneath the volcano. This movement will typically lead to swarms of earthquakes, swelling or subsidence of a volcano's summit or flanks, or release of volcanic gases from the ground and vents. Monitoring can project volcanic activity within a time frame of days to months. Longer-term hazard projection is more difficult and is generally dependent on analyses of past activity.

The USGS operates five volcanic observatories, including one in the Yellowstone region and one in the Cascades region. These observatories maintain websites and issue warnings as well as weekly updates on volcanic activity. Recently (2010), the Yellowstone Volcano Observatory developed protocols for a geologic hazards response in the Yellowstone region. The report states, "Within the next few decades, large and moderate earthquakes and hydrothermal explosions are certain to occur. Volcanic eruptions are less likely, but are ultimately inevitable in this active volcanic region." Similarly, the Cascades Volcano Observatory produces hazard assessments for the multitude of volcanoes in the Cascades.

Projected Idaho Events

Yellowstone Caldera: The hydrothermal features of the Yellowstone National Park area are fueled by the large magma plume (the "hotspot") that lies below the region. These features are volcanic activity, although not of a generally hazardous nature. The high levels of seismic activity and active deformation of the surface in the area also indicate the volcanic potential of Yellowstone. However, if one were to use past eruptions as a guide, the yearly probability of another catastrophic eruption within Yellowstone is 1 in 730,000 (the average of the years between past events). A more likely type of volcanic eruption from Yellowstone (averaging every 16,000 years in the past) is a basaltic eruption along the margins, including the basin of Island Park, Idaho. The principle hazard from such an event would be coverage of an area of several square kilometers by lava, one to a few tens of meters thick.

Snake River Plain: Most past volcanic activity in the Snake River Plain was confined to "volcanic rift zones," linear areas of cracks in the earth's crust. Volcanic activity in this area has been characterized by eruptions of basaltic lavas resulting in extensive lava flows. These flows resulted from eight distinct eruptive periods with an average recurrence interval of 2,000 years. As the most recent flows in the area occurred approximately 2,000 years ago, extrapolation suggests that activity may resume in the not too distant future; however, there has not been recent evidence of activity.

Cascades: Ten volcanoes (or volcanic centers) within the Cascade Mountains have been active within the last 2,000 years; an additional four are regarded as potentially active. As the eruption of Mount St. Helens demonstrated in 1980, activity in this region can have significant impact over a wide area, including Idaho. According to the U.S. Geological Survey, portions of Idaho have a 1:1,000-1:5,000 annual probability of receiving 1 centimeter or more of ashfall from any major Cascade volcano; there is a less than 1:10,000 probability of 10 centimeters or more.

Environmental Impacts

In areas of the State where proximal volcanic hazard exists, a volcanic eruption could cause dramatic environmental effects. Vegetative communities, wildlife, historic and archeological sites, farms, and parks could be buried, crushed and burned by a lava flow. Volcanic eruption would affect geology and soils in areas of Idaho proximal to the event. Long-term effects could include forced changes in land-use patterns. Throughout the State, distal volcanic hazards could reduce air quality, damage historic resources (e.g., ashfall on old roofs), clog streams, and have health impacts on fish and wildlife.

Development Trend Impacts

Because volcanic eruptions tend to be far apart in time, it is unlikely that the threat of their effects will be considered in overall development trends. When an eruption does occur, economic activity can be stymied even far from the center of activity, as evidenced from the disruption to flight schedules in the wake of the 2010 Iceland volcanic eruption. If an eruption occurs within Idaho, developable land can be lost to lava flows, as in the Craters of the Moon volcanic field.

Critical Infrastructure and State Facility Impacts

All infrastructure and State facilities could be at risk of ashfall from a major eruption. Critical facilities near Island Park are at greater risk than other areas of the State for lava flow.

Vulnerability Assessment

No specific, statewide vulnerability assessment exists for the volcano hazard.

Compilation of Local Hazard Mitigation Plans

Forty-seven local mitigation plans were analyzed to determine the major hazards in each jurisdiction. Volcanic eruptions were not ranked as a major hazard by any jurisdiction. Detailed information related to local vulnerability may be found in local hazard mitigation plans.

Loss Estimation

No specific, statewide loss estimation exists for this hazard.

Compilation of Local Hazard Mitigation Plans

Because no local mitigation plans ranked volcanic eruptions as a major hazard, these data were not aggregated, and it is assumed that annual loss estimates would be low. Detailed information related to local loss estimates may be found in local hazard mitigation plans.

Mitigation Rationale

Volcanic eruption has a relatively low probability (compared with other hazards) in any given year. Additionally, the most likely event, a volcanic eruption in the Cascade Mountains, is expected to only produce moderate impacts within Idaho.

While improbable, the potential for severe damages resulting from a major event in Idaho is real. The geologic history of Idaho and the region has a significant component of volcanic activity. Consequently, the State is well advised to undertake mitigation planning.

General Mitigation Approaches

Given the low probability and unique nature of these events, volcanic eruptions pose a special problem for emergency management personnel. Some special characteristics that influence emergency response and mitigation include:

- Eruptions generally have many precursors, but these potential warnings are often ambiguous (i.e., we can often forecast activity generally, but rarely precisely).
- There is a large range in the magnitude/frequency relation for eruptions (i.e., there is no way to easily anticipate the scale of the impending eruption).
- The scale of eruptions may far surpass any other hazard.
- Some of the hazards associated with an eruption can be fast moving.
- The impacts from volcanic eruptions can be very long lasting – centuries or more.

Volcanic eruptions are outside of most people's realm of experience; consequently, the public has a minimal appreciation of the hazards.

Hazard Management

As eruptive activity rarely comes without significant warning, mitigation efforts in likely proximal hazard zones should ensure that critical or high-investment development is not sited in high-risk areas. This will reduce the potential overall disaster cost without unnecessarily constraining land use.

Information/Outreach and Public Education

Because of the infrequent nature of volcanic activity in the State, the public's appreciation of the hazards is limited. Information regarding distal hazards should be made available to citizens and property owners through the State. Information on proximal hazards should be prepared and readily available if an event does become likely.

Implementing the new Yellowstone Volcano Observatory protocols (2010) and providing information on the USGS Volcano Hazards Program (http://volcanoes.usgs.gov/) could reduce losses due to volcanoes.

Infrastructure

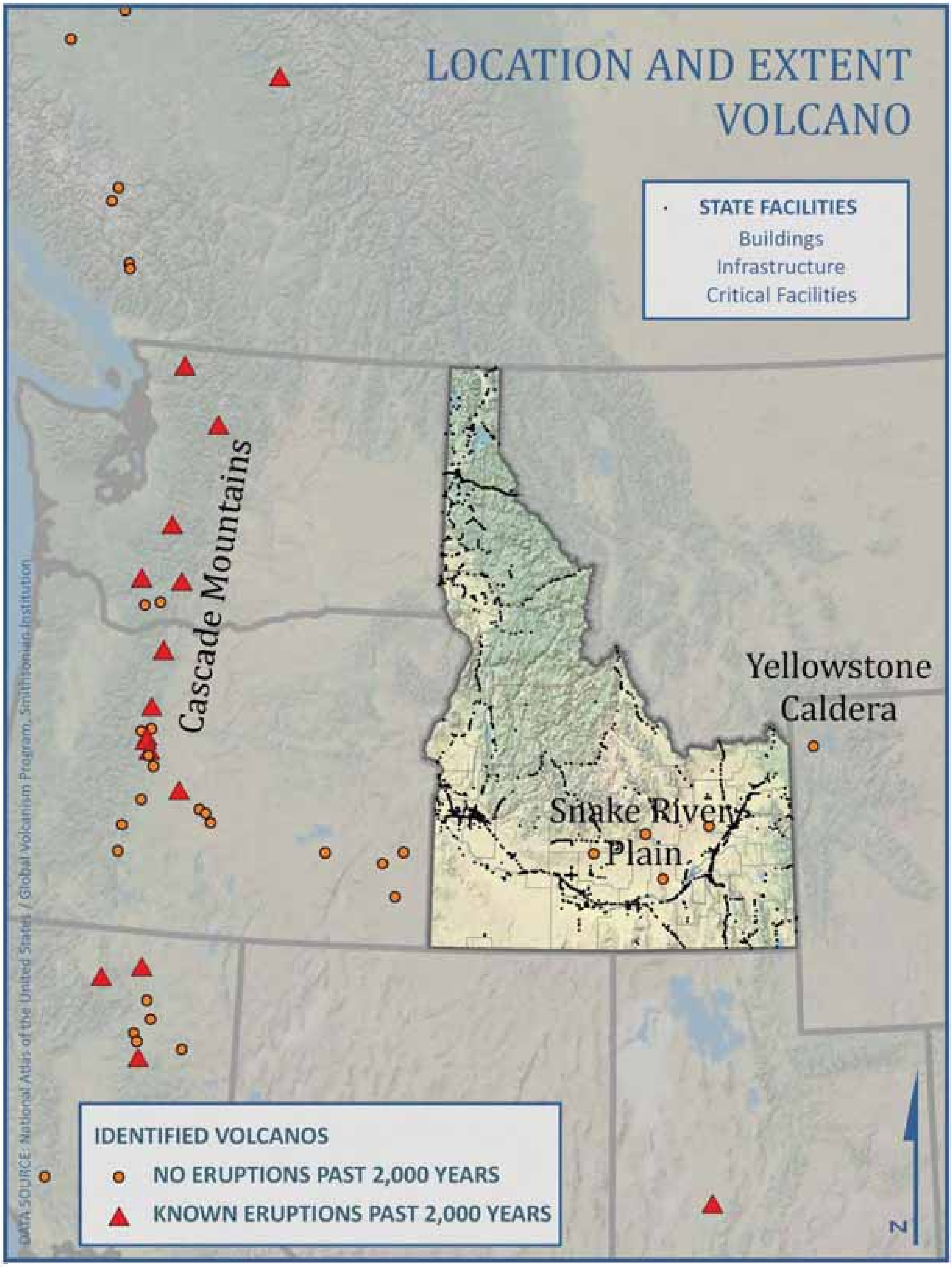
Infrastructure should not be sited in probable proximal hazard zones if feasible alternatives exist.

Regulatory

Building codes should ensure that new development can withstand probable ashfall loads. Land-use regulations can mandate the siting considerations discussed under Hazard Management.

Mapping / Analysis / Planning

An accurate understanding of a hazard is the first step towards successful mitigation. To fully understand a hazard and the risk that it poses, the ability to accurately assess vulnerability is vital. After vulnerability is determined, it is then possible to assess potential losses. Vulnerability and loss information can greatly enhance mitigation planning efforts, but these data are not readily available at this time. Appendix F of this plan provides details regarding a HAZUS CDMS-compliant geodatabase that is being designed as part of this Plan update. This database will allow for the proper collection of facility and infrastructure data in a GIS platform, which can then be analyzed to assist with vulnerability and loss estimations.



Map 3-36: Volcano Locations and Extent

RISK ASSESSMENT: WIND/TORNADOES

Description

The term "straight-line winds" is used to distinguish common, non-rotating winds from tornado-related winds. Straight-line winds are responsible for most thunderstorm wind damage, with wind speeds in excess of 100 miles per hour on occasion. A "downburst," a small area of rapidly descending air beneath a thunderstorm, is a particularly damaging type of straight-line wind. Downbursts can have wind velocities equal to that of a strong tornado and can be extremely dangerous to aviation and cause significant damage to some buildings.

A tornado is a violently rotating column (a vortex) of air that bridges between thunderclouds and the earth. A funnel-shaped cloud, spinning like a top, is commonly generated. Wind speeds within the vortex range from 40 to over 300 miles per hour. The tornado itself can move across the ground at up to 70 miles per hour. Damage is generally confined to a narrow path (approximately one-quarter mile), but the tornado may travel over and devastate a large distance (typically up to 10 miles, but 200-mile tracks have been reported). Multiple tornadoes may occur during a single storm, resulting in highly destructive events.

Tornado in Boise, ID / Source: www.kboi2.com/weather/blog/44562952.html

Tornado intensity is measured on the Fujita Scale (see Table 3-24, below). This table also describes characteristic damages.

Straight-line winds of concern are "high winds," defined by the NWS as "sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration." High wind advisories, watches, and warnings are issued by the NWS according to the following criteria:

High Wind Advisory is issued by the NWS when wind speeds may pose a hazard. The criteria for this advisory vary from State to State. In Idaho, the criterion is the potential for sustained winds at 30-39 mph or gusts of 45-57 mph, covering a significant part of at least one zone, and lasting several hours.

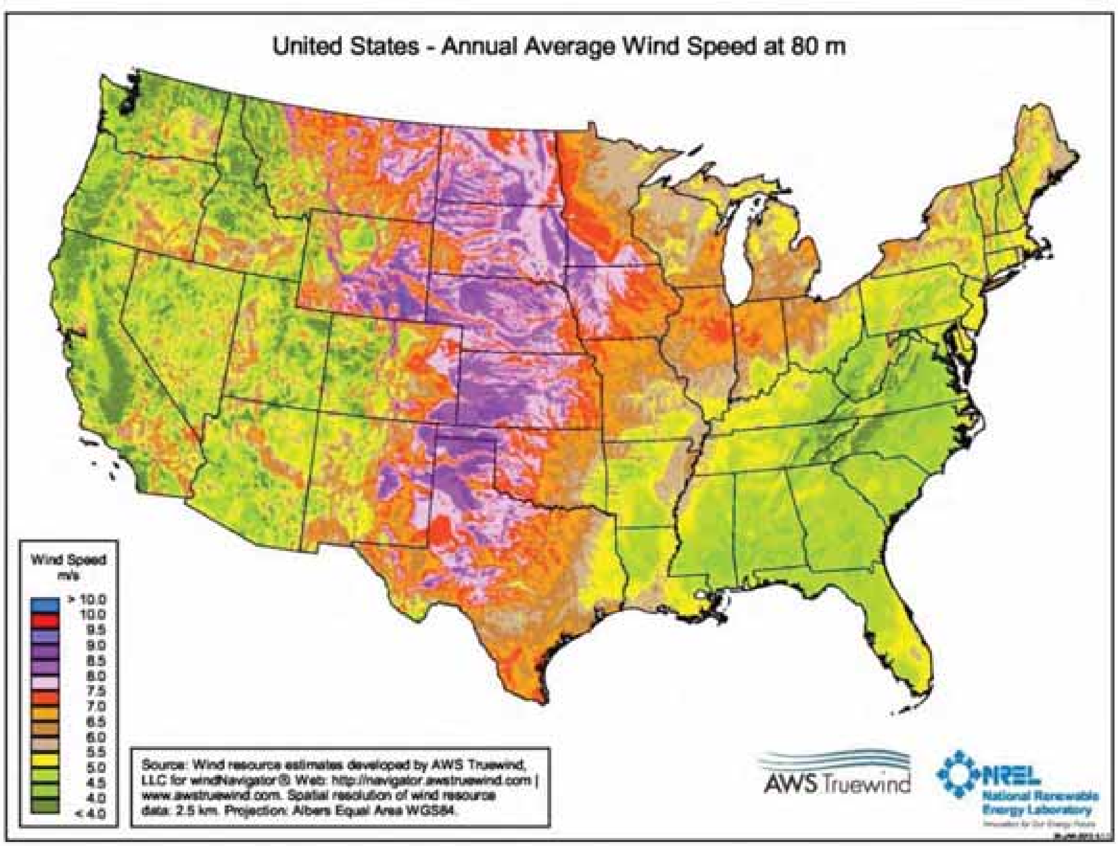
High Wind Watch is issued by the NWS when there is the potential of high wind speeds developing that may pose a hazard or be life threatening. The criteria for this watch vary from State to State. In Idaho, the criterion is the potential for sustained winds at 30-39 mph or gusts of 45-57 mph, covering a significant part of at least one zone, and lasting several hours.

High Wind Warning is issued by the NWS when high wind speeds may pose a hazard or be life threatening. The criterion for this warning varies from State to State. In Idaho, the criterion is the potential for sustained winds greater or equal to 35 knots (kts) lasting at least 1 hour, or gusts of 50 kts for any time.

Like tornadoes, strong straight-line winds are generated by thunderstorms and can cause similar damage. Straight-line wind speeds can approach 150 mph, equivalent to those in an F3 tornado. Two categories of straight-line winds are “downbursts” and “derechoes.” A downburst is a small area of rapidly descending rain and rain-cooled air beneath a thunderstorm. The winds produced from a downburst often travel in one direction, and the worst damage is usually on the forward side of the downburst. Derechoes are created by the merging of many thunderstorm cells into a cluster or solid line extending for many miles. The width of such a storm can range from 20 to 65 miles, and the length can reach 100 miles or more. In extreme cases, these storms can create maximum wind gusts of 150 mph and are also capable of producing small tornadoes. Damaging straight-line winds are much more common than tornadoes, and their damage is often incorrectly attributed to tornadoes. Derechoes are not common in Idaho, averaging less than one per year, while downbursts associated with straight-line winds occur more frequently.

Location, Extent, and Magnitude

Straight-line winds can be encountered anywhere storms form. The events that present the most risk are often the result of thunderstorms. Map 3-37 shows the annual average wind speeds across the United States. Tornadoes can also occur anywhere thunderstorms form. Although no data currently exist to help identify regions of particular risk, records of past wind and tornado events provide useful information in this regard.



Map 3-37: United States Average Wind Speed / Source: Wind Powering America

Tornado intensity is measured using the Fujita Scale, which is detailed in Table 3-26.

Table 3-26: Tornado Intensity (Fujita Scale)

Level	Wind Speed	Description
F0	40-72 mph	Damage to chimneys, branches broken off
F1	73-112 mph	Surface peeled off roof, mobile homes pushed off foundations or overturned
F2	113-157 mph	Roofs torn off frame houses, mobile homes demolished, trees snapped or uprooted
F3	158-206 mph	Roof and some walls torn off, most trees uprooted, heavy cars lifted off ground
F4	207-260 mph	Well-constructed houses leveled, cars thrown and large missiles generated
F5	261-318 mph	Strong frame houses carried considerable distance, steel reinforced structures badly damaged

Source:www.tornadoproject.com

Past Occurrence

On average, there are about two tornadoes per year in the State of Idaho. The NOAA recorded 64 tornadoes between 1959 and 1988; all were F3 or less, and no deaths were reported. Map 3-38, at the end of this section, shows the breakdown by county for past major tornado events.

On June 11, 1993, a tornado traveled 10 miles south to southeast of Pocatello, ending in the Town of Inkom. The tornado uprooted several trees, knocked down a grain elevator, overturned a truck, and knocked down several outbuildings. This event resulted in a State Disaster declaration for Bannock County.

In April 1995, a series of tornadoes touched down in central Bingham County, causing damage to mobile homes, highway signs, and recreational equipment.

On June 4, 2006, a tornado struck the community of Bear in Adams County, resulting in extensive tree damage. Because downed trees and debris caused elevated wildfire risk and blocked roads, a State Disaster declaration was issued. The tornado path was 12 miles long and over half a mile wide along portions of its track. One serious injury occurred during this tornado, which was rated F2. In addition, The Tornado Project website lists the following Idaho tornado events that caused death or injury:

June 7, 1936, 12:30 p.m., two dead
A tornado hit north of Reubens in Nez Perce County. A house and a barn were nearly leveled.

April 26, 1940, 4:00 p.m., two 2 injured
The widely visible funnel hit five farms west of Gooding. Three homes were destroyed.

April 7, 1978, 2:20 p.m., one injured
Hit the edge of Idaho Falls in Bonneville County. Nine homes and 23 businesses had roof damage.

August 19, 1978, 1:50 p.m., one injured
A poorly formed tornado did minor damage in Sandpoint, Bonner County; a woman was struck by a tree.

June 5, 1987, 11:30 a.m., three injured
A funnel cloud briefly touched down at a street fair in Pinehurst, Shoshone County.

June 11, 1993, 3:40 p.m., two injured
The funnel "skipped" to the northeast from south of Pocatello to Inkom in Bannock County.

April 25, 1995, 11:38 a.m., one injured
Mobile homes were damage by a weak tornado near Blackfoot in Bingham County.

July 10, 1998, 4:00 p.m., one injured
A manufactured home was flipped over by an F0 tornado at Oreana in Owyhee County.

February 14, 2000, 3:47 p.m., one injured

June 4, 2006, one injured

Significant straight-line wind events have been recorded in the Lowman area (large-scale forest damage in the 1970s) and the Payette and Weiser area (in the 1990s). Map 3-39, at the end of this section, shows the breakdown by county for past major wind events.

Future Occurrence

The meteorological processes that produce wind and tornado events are statistically independent of past events. As with other similar natural processes, a return period and probability of future occurrence can be developed from the historical records that are available.

It can reasonably be assumed, based on recorded observations from 1954 through 2009, that a tornado has occurred once every 0.29 years.

[(Current Year) 2009] subtracted by [(Historical Year) 1954] = 55 Years on Record

[(Years on Record) 55] divided by [(Number of Historical Events) 187] = 0.29

Based on historical probability, there is a 100-percent chance that a tornado will occur any given year in Idaho.

It can reasonably be assumed, based on recorded observations from 1960 through 2009, that a tornado has occurred once every 0.01 years.

[(Current Year) 2009] subtracted by [(Historical Year) 1960] = 49 Years on Record

[(Years on Record) 49] divided by [(Number of Historical Events) 3362] = 0.01

Based on historical probability, there is a 100-percent chance that a tornado will occur any given year in Idaho.

Environmental Impacts

Impacts to vegetation and wildlife from tornadoes and high winds can include damage and death; however, it is unlikely that such events would jeopardize the existence of rare species or vegetative communities throughout the State. The loss of crops or livestock can have far-reaching economic effects. Tree blow-downs can alter the visual landscape and dramatically change the local vegetation. Fallen trees can create dams, causing flooding upstream and disruption of aquatic habitats. Tornadoes and high winds can damage historic structures, particularly roofs, requiring restoration activities. Tornadoes and high winds are unlikely to impact geologic features; however, soils and farmlands could be impacted, particularly in dry seasons. Blowing dust can impact vegetation and structures. Tornadoes and high winds can temporarily halt recreational activities and damage parks.

Development Trend Impacts

The threat of wind and tornado events does not appear to have affected the occurrence of development in Idaho. Any new development could be affected by these hazards and will increase the State's vulnerability and potential losses for an event.

Critical Infrastructure and State Facility Impacts

No critical or State facilities in Idaho are completely free of the threat of wind or tornados. Threats include loss of power and productivity from damages to utilities and the means of transportation to these places of work. Wind and tornado events can directly affect these facilities through damage to roofs/structures or falling trees and limbs.

Vulnerability Assessment

Based on past events, tornadoes can be expected to occur infrequently, averaging two to three events per year. Most Idaho tornadoes are considered "moderate," with winds less than 113 miles an hour. A few have had winds up to 130 miles an hour – "significant."

Tornadoes in Idaho have usually occurred from March to October, with the majority occurring in June. The majority also occur during the afternoon; between 12:00 and 6:00 p.m. Tornadoes are most often reported in the Magic and Upper Snake River valleys.

Compilation of Local Hazard Mitigation Plans

Forty-seven local mitigation plans were analyzed to determine the major hazards in each jurisdiction. Of those, eight localities ranked wind and tornadoes as major hazards (see Map 3-40, at the end of this section). It is generally noted that while several of the local plans indicated that high wind events occur regularly, they are not considered to be significant. BHS recognizes that these events occur with strong regularity and that almost all damage occurs on private property and does not directly affect county operations or State-level emergency management.

Loss Estimation

No specific, statewide loss estimation exists for the wind or tornado hazard. Historical losses tend to be related to property damage and loss of life and injury.

From a general perspective, winds and tornados damage and destroy public, commercial, and private property. The resulting costs are for debris removal, maintenance, and response. The economic costs of these disruptions can be significant, especially in areas with limited access options.

Direct costs can be defined as the cost of debris removal, property damage, and response for a specific wind or tornado event. All other costs are indirect and include loss of industrial and commercial productivity as a result of damage to infrastructure, facilities, or interruption of services. As a result, most estimates of loss are far too conservative.

Compilation of Local Hazard Mitigation Plans

Bonner County was the only local plan that provided loss estimation data. The county estimated that $4,585,672,000 in damage could be caused by a tornado event.

Mitigation Rationale

Two types of significant wind hazards are possible in Idaho, straight-line winds and tornadoes. Both are generally associated with severe thunderstorms.

Lesser, similar wind events (such as "dust devils") may occur during small storms and even during clear weather, but they generally do no damage. Strong winds are also often associated with dramatic atmospheric pressure differentials across weather fronts. These winds may be accelerated by terrain features such as canyons and mountain passes, where they can reach high speeds. Although they may contribute to the overall impact of a storm, they are rarely damaging by themselves.

Tornadoes often cause injury and death. There are, on average, about 60 tornado-related deaths per year in the United States. Severe property damage is also caused by tornadoes, with average annual losses estimated at around $1.1 billion nationally. Buildings with large surface areas and those that are not structurally sound are most susceptible to tornado damage. Nearly 40 percent of all tornado fatalities take place in mobile homes. Automobiles and other vehicles, including train equipment and aircraft, are vulnerable to tornado damage. Loss of utilities (primarily due to fallen trees) is common following tornadoes and, depending on circumstances, communities might be deprived of almost any kind of goods and services including food, water, and medical care. Crop and livestock loss is also possible, as is loss of timber production.

The impacts of straight-line winds are virtually the same as those from tornadoes with similar wind speeds. The damage is distinguishable from that of a tornado only in that the debris is generally deposited in nearly parallel rows. Downbursts are particularly hazardous to aircraft in flight. One report (http://www.colorado.edu/hazards/awards/paper-competition/walker_grad.pdf) covering the 18-year period from 1986 through 2003 attributed 153 deaths and 2,605 injuries to derechoes (a type of straight-line wind) nationally. This report also estimated the economic loss from a single derechoes event on May 31, 1998, which struck the States of Michigan, Minnesota, and Wisconsin at nearly $0.5 billion. In the areas around Twin Falls County (U.S. Highway 93) and Cassia County (U.S. I-84), anecdotal information indicates that there have been fatalities along both of these corridors attributable to straight-line winds.

General Mitigation Approaches

Hazard Management

Structures in wind-hazard areas should be designed and built to withstand the projected wind speeds. Wind-resistant construction techniques include proper anchoring of walls to foundations, use of hurricane straps and clips to hold the roof of a structure to its walls, and lateral roof and wall bracing. Manufactured and mobile homes, in particular, need anchoring. Structural retrofitting of existing structures can reduce damages; particular concern should be given to the roof, windows, doors, and anchoring to the ground or foundation. In areas of very high hazard, hardened "safe roofs" can be constructed for shelter during events.

Nonstructural retrofitting can also be effective at reducing damages (and will mitigate seismic hazards). Examples of nonstructural retrofitting include anchoring loose objects (potential missiles) and water heaters, removing trees from the immediate vicinity of the house, securely anchoring outbuildings and other outdoor objects, and installing plastic film on windows and doors to minimize the impact of shattering glass. Other nonstructural methods might include both natural vegetation and engineered windbreaks, which would serve in all seasons (i.e., snow fences).

Information/Outreach and Public Education

In areas that have not seen recent wind events, the hazard may be seriously undervalued. Many residents and property owners may be unaware that their lives and properties are in high-risk areas. Residents and property owners should be informed of known wind hazards and educated in mitigation techniques. Manufactured and mobile homes is high-risk areas should be specifically targeted by education efforts.

Infrastructure

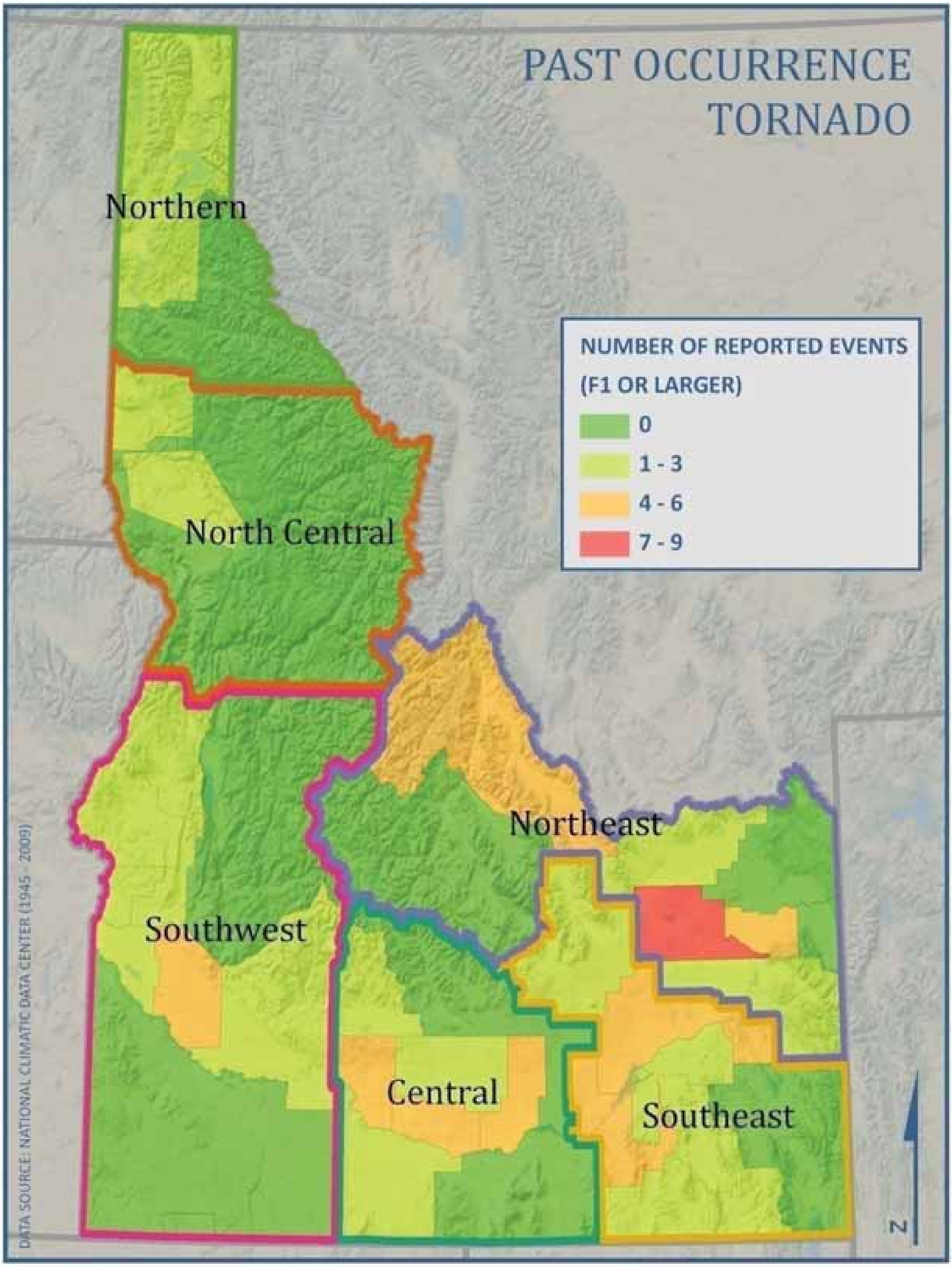
Wind-susceptible critical facilities should not be placed in high-risk areas.

Regulatory

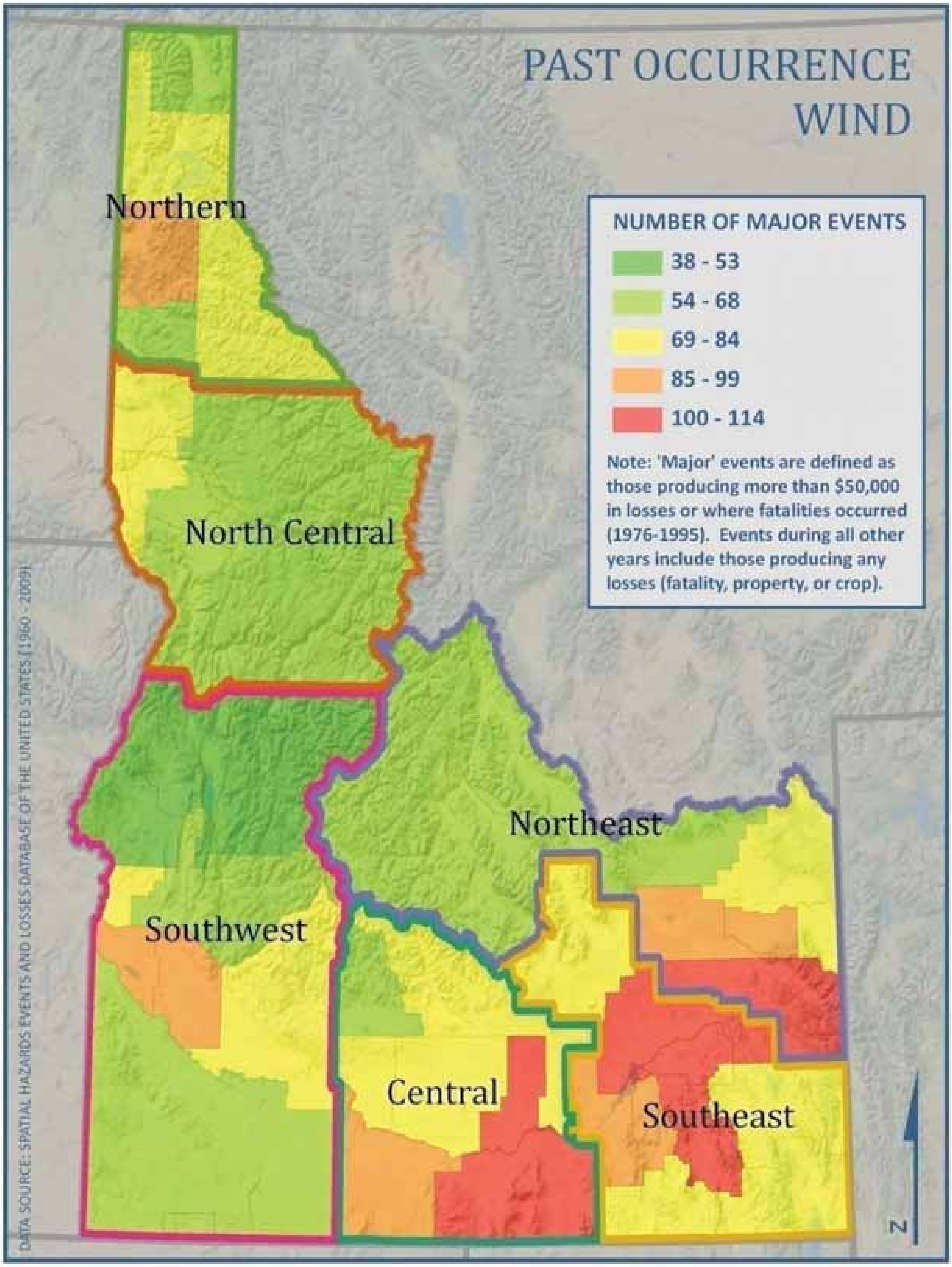
Adoption and enforcement of wind-resistant building codes and construction standards can significantly reduce damages caused by high winds. Manufactured and mobile homes should be restricted, or sufficient anchoring should be required, in very high-risk areas.

Mapping / Analysis / Planning

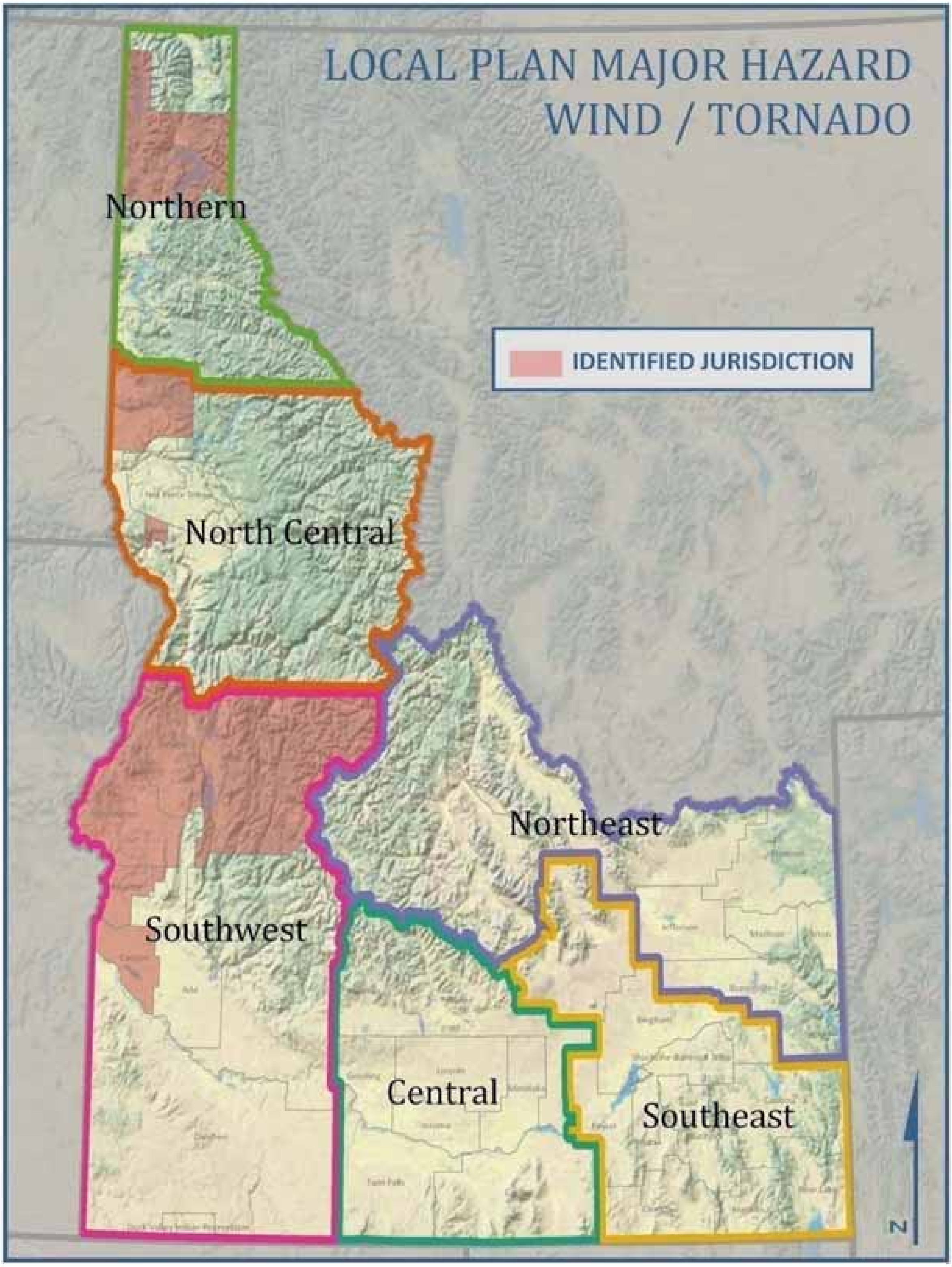
An accurate understanding of a hazard is the first step towards successful mitigation. To fully understand a hazard and the risk that it poses, the ability to accurately assess vulnerability is vital. After vulnerability is determined, it is then possible to assess potential losses. Vulnerability and loss information can greatly enhance mitigation planning efforts, but these data are not readily available at this time. Appendix F of this plan provides details regarding a HAZUS CDMS-compliant geodatabase that is being designed as part of this Plan update. This database will allow for the proper collection of facility and infrastructure data in a GIS platform, which can then be analyzed to assist with vulnerability and loss estimations.



Map 3-38: Past Tornado Occurrence



Map 3-39: Past Wind Occurrence



Map 3-40: Wind / Tornadoes Identified as Local Plan Major Hazard

CHAPTER 4 - POLICIES, PROGRAMS, AND CAPABILITIES

STATEWIDE HAZARD MITIGATION POLICY AND PROGRAM ASSESSMENT

Idaho's hazard mitigation efforts do not lie strictly within one law, policy, agency, or program. Rather, an array of laws, policies, and programs exist to lessen the effects of hazards on Idahoans. Table 4-1 provides a comprehensive list of these, as well as an analysis of whether a point of integration with the mitigation plan is possible, and whether the capability has changed. Overall, it is felt that State capabilities relating to hazard mitigation have either remained steady or increased. While Idaho (and the country) has had to deal with a recession and budget constraints, that is offset to some degree by the increased knowledge and capabilities of existing staff involved in hazard mitigation activities and increased collaboration among mitigation practitioners. Especially helpful in this regard is the establishment of the three technical working groups related to the three primary hazards in Idaho.

Analysis of State Policies Related to Development in Hazard-Prone Areas

Overall, Idaho's policies related to development in hazard-prone areas is best characterized as a patchwork quilt with a heavy emphasis on personal responsibility and an acknowledgement of the home rule authority of Idaho communities.

State and Local Building Codes. Idaho's building code largely reflects the International codes, with provisions for wind, seismic, and snow loading hazards. However, communities are not required to adopt the building code. The only structures required to be reviewed under the building code are modular buildings, schools, and State buildings. Also, one- and two-family dwellings are exempted from installing mandatory fire sprinkler systems, which could be argued makes those structures less resilient to the hazard of wildfire. Building codes are important in hazard-prone areas, because they ensure that new construction and improved existing construction are more resilient to local hazards and/or improve life safety functions.

Subdivision Regulations. Subdivision regulations form part of the process utilized by local governments to carry out the requirements of their comprehensive plans and zoning ordinances. Subdivision enabling authority in Idaho is deferential to local governments to the point that local governments have the authority to define the term subdivision as they would like to. State enabling authority does not contain standards or requirements that would be considered to exceed those commonly found elsewhere, nor are subdivision regulations mandated. Subdivision regulations are important in hazard-prone areas, since they can specify requirements for the layout and location of infrastructure, lots, and other facilities as land is developed.

Comprehensive Plans and Zoning. Title 67, Chapter 65, which is Idaho's local land use enabling authority, includes a stated, specific purpose of local land use regulation: "to protect life and property in areas subject to natural hazards and disasters." Tools to do this include *comprehensive planning* and *zoning*.

Consistent with Idaho law, a comprehensive plan provides the policy basis for a community's zoning ordinance, which contains the specific standards and requirements and processes for making land use and development decisions. In Idaho, a comprehensive plan is required to include a section on hazards (67-6508(g)):

> *The plan with maps, charts, and reports shall be based on the following components as they may apply to land use regulations and actions unless the plan specifies reasons why a particular component is unneeded …*
>
> *Hazardous Areas -- An analysis of known hazards as may result from susceptibility to surface ruptures from faulting, ground shaking, ground failure, landslides or mudslides; avalanche hazards resulting from development in the known or probable path of snowslides and avalanches, and floodplain hazards*.

As part of comprehensive planning, a future land use map is prepared to indicate suitable projected land uses for the jurisdiction. The implementation tool to realize the vision of the comprehensive plan is the zoning ordinance. Zoning protects the rights of property owners while promoting the general welfare of the community. By dividing land into categories according to use, and setting regulations for these categories, a zoning ordinance can govern private land use and segregate incompatible uses. The purpose of zoning is to locate particular land uses where they are most appropriate, considering public utilities, road access, and the established development pattern.

According to the Building Sustainable Communities Initiative (University of Idaho) website, 90 of 189 communities and counties in Idaho have a comprehensive plan. Comprehensive planning and zoning are very important in hazard-prone areas, as they are tools that can establish suitable land uses, especially for hazards with a geographic extent (i.e., floodplains).

Floodplain Zoning. Idaho communities are authorized to adopt floodplain zoning to regulate any mapped or unmapped flood hazard area. Additionally, enabling authority allows Idaho communities to adopt standards that exceed the minimum standards of the National Flood Insurance Program (NFIP). However, in March 2010, the Idaho Legislature passed House bill 556, which changes Idaho's floodplain zoning enabling authority to exempt the operation, maintenance, cleaning, or repair of any of any canal ditch, irrigation, drainage or diversion structure from floodplain zoning. This bill was signed into law on March 29, 2010. Floodplain zoning is important in flood hazard areas, not only to provide appropriate development standards but to enable communities to participate in the NFIP and therefore be eligible for flood insurance and flood mitigation programs.

The recent law change appears to conflict with the Federal minimum regulatory standards for communities participating in the NFIP and could endanger community participation in the program.

Table 4-1. Summary of Laws, Regulations, Policies, Programs Related to Hazard Mitigation in Idaho

Item	Description	(L)Law (R)Regulation (Po)Policy (Pr)Program	(Pre) Disaster (Post) Disaster (Both)	Effect on Hazard Mit.? +, -, or neutral	Can be a point of integration with mitigation plan/data? Y or N. How?	Capability Change over Past 3 Years? +, -, or no change
Idaho Disaster Preparedness Act of 1975	State law that was put into place to: • create a Bureau of Homeland Security (BHS) • prevent and reduce damage, injury, and loss of life and property resulting from natural or manmade catastrophes • prepare assistance for prompt and efficient search, rescue, and care • provide for rapid restoration and rehabilitation • prescribe the roles of government in prevention, preparation, and response to disaster • authorize and encourage cooperation in disaster prevention, preparation, and response • provide for coordination of activities • provide a disaster management system • provide for payment of obligations and expenses incurred by the State of Idaho through the BHS	L	Both	+	N. Law doesn't provide information or receive information.	No Change
Idaho Bureau of Homeland Security (IBHS) – Mitigation Section	The Bureau's Hazard Mitigation Section supports proactive measures to reduce or eliminate future losses related to natural hazards such as earthquakes, floods, and wildfires. Support is provided to local government, State agencies, and the citizens of Idaho in several ways. The Bureau's Mitigation Section is responsible for the following: • Risk and Vulnerability Analysis • Mitigation Planning • Administration of FEMA's Mitigation Grant	PR	Both	+	Y. The IBHS is the lead organization responsible for promoting, encouraging, and facilitating hazard mitigation. IBHS serves as repository and as a clearinghouse for the counties when applying for FEMA-funded mitigation programs. IBHS as a State entity has the ability to work with other departments and initiatives within the State of Idaho to promote integration of other planning mechanisms into the State Hazard Mitigation Plan.	+ Change

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	Programs • Coordination of natural hazards risk reduction projects					
Idaho Department of Lands (IDL) – Fire Management Program	• Goal is to conserve and protect 6million acres of private, State and Federal forestlands by preventing and/or suppressing all unwanted fire; to enhance forest management on State endowment lands by utilizing fire as a management tool; to help local communities better cope with wildfire in the wildland/urban interface. • IDL has wildland fire protection responsibilities in two Geographic Area Coordination Centers (GACCs). The GACCs provide support to wildland fire agencies for large fire management and mobilization of firefighting resources. Lands to the north of the Salmon River fall in the Northern Rockies Geographic Area, while lands to the south of the Salmon River are in the Eastern Great Basin Geographic Area.	PR	Post	+	Y. IDL has the ability to assist counties with their County Wildfire Protection Plans and their associated countywide working groups, dissemination of information, and oversight and prioritization of grant assistance programs in order to facilitate the implementation of the National Fire Plan in Idaho. Areas of concern from the National Fire Plan can be incorporated in the State Hazard Mitigation Plan in both the Risk Assessment and Mitigation Strategy. Both IDL and IBHS have the ability to work together to incorporate actions and develop strategies to reduce the risk of wildland fire.	+ Change
Division of Building Safety-Building Bureau	To promote the health, safety, and welfare of Idaho's citizens through effective administration of the Bureau's building safety laws in partnership with involved State agencies, school districts, local jurisdictions, architects, engineers, and the manufactured building industry.	PR	Both	+	Y. The Building Bureau has the ability to administer and enforce building safety laws. By working with other State agencies, school districts, local jurisdictions, architects, engineers, and the manufactured building industry, they can assist in making sure buildings are more resistant to flooding, wind, and snow load disasters.	+ Change
Idaho Department of Water Resources (IDWR) –Dam Safety	The Department currently regulates nearly 600 water storage dams and more than 20 mine tailings impoundment structures located throughout the State. Dam Safety Program personnel perform regular	PR	Both	+	Y. Dam Safety Program can incorporate data obtained from inspections to assist with assessing risk. They can obtain inundation mapping and also assist counties with applying for grants to obtain	+ Change

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Program	inspections of existing projects according to the potential consequences that a dam failure and sudden release of water would present to downstream life and property.				funding for inundation mapping and emergency action plans.	
IDWR – Floodplain Management Program	The IDWR floodplain manager coordinates the National Flood Insurance Program (NFIP) in Idaho. Management involves reviewing city ordinances created to deal with floodplain problems, and assisting communities to adopt floodplain ordinances and qualify for the NFIP, which makes it possible for citizens to qualify for FEMA flood insurance. The IDWR floodplain manager also helps communities plan for floods, conducts training of floodplain protection, and reviews work done within floodplains to ensure that it will not cause an increase in flood levels if flooding occurs.	PR	Both	+	Y. IDWR floodplain manager has the ability to assist with integrating county flood data into the State Plan and suggest appropriate mitigation actions that can be incorporated into individual county hazard mitigation plans, and get rolled up into the State plan as well. The floodplain manager also has the ability to suggest more stringent floodplain ordinances and regulations to limit future development in the floodplain and thus prevent an increase in flood risk.	+Change
State Executive Order	The IBHS is directed by Governor Executive Order to establish and maintain the Idaho Emergency Operations Center for directing the coordination of emergency and disaster operations.	PO	Both	+	Y. The IBHS, being responsible for the State Mitigation Plan and the Emergency Operations Center, has the ability to incorporate some of the functionality of the center into the Plan. Also, when a disaster occurs, the IBHS has the ability to see if the Plan requires modifications.	+Change
Idaho Code Title 46, Chapter 10, Section 22 – Floodplain Zoning Ordinances	Subject to the availability of adequate mapping and data to properly identify the floodplains, if any, within their jurisdiction, each local government is encouraged to adopt a floodplain map and floodplain management ordinance that identify these floodplains and require, at a minimum, that any development in a floodplain must be constructed at a flood protection elevation and/or have adequate floodproofing.	L	Both	+	N. Law doesn't provide information or receive information.	No Change

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Title 46, Chapter 10, Section 8 – The Governor and Disaster Emergencies	Under this act, the Governor may issue executive orders, proclamations and amend or rescind them. Executive orders and proclamations have the force and effect of law.	L	Both	+	Y. During a disaster event, the Governor could issue proclamations such as requiring evacuation or closing major roadways during a snow event to prevent any unnecessary accidents or loss of life.	Title 46, Chapter 10, Section 8 – The Governor and Disaster Emergencies
Title 46, Chapter 10, Section 6 – Powers and Duties of Bureau Chief	In all matters of disaster services, the adjutant general shall represent the Governor and shall, on behalf of the Governor, coordinate the activities of all of the State agencies in disaster services. The Bureau shall have a coordinating officer and other professional, technical, secretarial and clerical employees necessary for the performance of its functions.	L	Both	+	N. Law doesn't provide information or receive information.	Title 46, Chapter 10, Section 6 – Powers and Duties of Bureau Chief
Title 46, Chapter 10, Section 23 – Enforcement and Sanctions	(1) Development constructed or maintained in violation of any local floodplain management ordinance that conforms to the provisions of this chapter is hereby declared to be a public nuisance, and the creation thereof may be enjoined and the maintenance thereof may be abated by action of the State, any local unit of government of the State or any citizen thereof. (2) If, after the effective date of this chapter, a local government allows any development in a floodplain below the flood protection elevation without adequate floodproofing, that development shall not, in the event of a disaster emergency involving flooding in that floodplain, be eligible to receive any matching funds from the State for any Federal disaster assistance program which may be available as a result of said flooding in that floodplain.	L	Both	+	Y. Could be expanded so that development in any identified hazardous area, whether through floodplain mapping or other identification of hazards, will not be eligible to receive matching funds during a disaster event. Those who choose to develop in susceptible areas must rely on some type of insurance. Expanding this law will better reinforce the portion of the Hazard Mitigation Plan that identifies areas unsuitable for future development.	Title 46, Chapter 10, Section 23 – Enforcement and Sanctions

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Title 46, Chapter 10, Section 8 – The Governor and Disaster Emergencies	Under this act, the Governor may issue executive orders, proclamations and amend or rescind them. Executive orders and proclamations have the force and effect of law.	L	Both	+	Y. During a disaster event, the Governor could issue proclamations such as requiring evacuation or closing major roadways during a snow event to prevent any unnecessary accidents or loss of life.	+ Change
Title 46, Chapter 10, Section 6 – Powers and Duties of Bureau Chief	In all matters of disaster services, the adjutant general shall represent the Governor and shall, on behalf of the Governor, coordinate the activities of all of the State agencies in disaster services. The Bureau shall have a coordinating officer and other professional, technical, secretarial and clerical employees necessary for the performance of its functions.	L	Both	+	N. Law doesn't provide information or receive information.	+ Change
Title 46, Chapter 10, Section 23 – Enforcement and Sanctions	(1) Development constructed or maintained in violation of any local floodplain management ordinance that conforms to the provisions of this chapter is hereby declared to be a public nuisance, and the creation thereof may be enjoined and the maintenance thereof may be abated by action of the State, any local unit of government of the State or any citizen thereof. (2) If, after the effective date of this chapter, a local government allows any development in a floodplain below the flood protection elevation without adequate floodproofing, that development shall not, in the event of a disaster emergency involving flooding in that floodplain, be eligible to receive any matching funds from the State for any Federal disaster assistance program which may be available as a result of said flooding in that floodplain.	L	Both	+	Y. Could be expanded so that development in any identified hazardous area, whether through floodplain mapping or other identification of hazards, will not be eligible to receive matching funds during a disaster event. Those who choose to develop in susceptible areas must rely on some type of insurance. Expanding this law will better reinforce the portion of the Hazard Mitigation Plan that identifies areas unsuitable for future development.	+ Change

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Title 39, Chapter 41, Building Code Act	It is the intent of the legislature to: (a) Promote the health, safety and welfare of the occupants or users of buildings and structures subject to this chapter; (b) Require minimum performance standards and requirements for construction and construction materials, consistent with accepted standards of engineering, fire safety, life safety and accessibility for those with disabilities; (c) Establish, for jurisdictions enforcing building codes pursuant to this chapter, minimum standards and requirements in terms of performance, energy efficiency, effect upon construction costs and consistency with nationally accepted standards; (d) Permit the use of modern technical methods, devices and improvements; and (e) Clarify and establish roles of the various jurisdictions subject to this chapter.	L	Both	+	Y. Through the identification of hazards and a vulnerability analysis within the Hazard Mitigation Plan, it may be determined that the building code act needs to be revised to: • Require more stringent performance standards • Identify suitable materials to be used when building in areas prone to high winds and flooding • Identify which modern technical methods are acceptable • Better clarify roles and issue more regulatory power to various jurisdictions	+Change
Title 46, Chapter 10, Section 8 – The Governor and Disaster Emergencies	Under this act, the Governor may issue executive orders, proclamations and amend or rescind them. Executive orders and proclamations have the force and effect of law.	L	Both	+	Y. During a disaster event, the Governor could issue proclamations such as requiring evacuation or closing major roadways during a snow event to prevent any unnecessary accidents or loss of life.	+ Change
Title 46, Chapter 10, Section 6 – Powers and Duties of Bureau Chief	In all matters of disaster services, the adjutant general shall represent the Governor and shall, on behalf of the Governor, coordinate the activities of all of the State agencies in disaster services. The Bureau shall have a coordinating officer and other professional, technical, secretarial and clerical employees necessary for the performance of its functions.	L	Both	+	N. Law doesn't provide information or receive information.	+ Change

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State Water Plan	The Idaho State Water Plan was adopted by the Idaho Water Resource Board to guide the development, management, and use of the State's water and related resources. The plan recognizes past actions, addresses present conflicts and opportunities, and seeks to ensure that future water resource uses will complement and supplement State goals directed toward serving the citizens of Idaho. The plan is a dynamic document, subject to change to reflect citizens' desires and to be responsive to new opportunities and needs.	R	Both	+	Y. The Idaho Water Resource Board has the ability facilitate, monitor, and implement the State Water Plan. The resource board involves various State agencies. Some of these agencies are also involved with the State Hazard Mitigation Plan. Coordinating efforts will save, time, and money. Areas of concern from the resource board can be incorporated into the State Hazard Mitigation Plan in both the Risk Assessment and Mitigation Strategy. Also, actions developed by the resource board can be incorporated to reduce the risk of flooding and drought	+ Change
State Drought Plan	The Idaho Drought Plan stresses involvement from local and county officials and encourages these officials to prepare triggers for response and a demand reduction program for implementation during droughts. Even drought declarations, and subsequent responses, are made at the local level, except in cases of extreme drought. The Idaho Drought Plan was written in 1990 and revised in 1995. The lead agency for the plan is the IDWR. The IDWR monitors water supplies around the State and, as potential water supply problems develop, alerts the Governor's office and organizes a water supply committee. This committee is chaired by the IDWR and contains members from the university, State and Federal agencies, and the private sector. As conditions continue to deteriorate, the water supply committee organizes subcommittees to address impacts in various sectors.	R	Both	+	Y. IDWR has the ability to facilitate, monitor, and implement the State Water Plan. IDWR's areas of concern and research on drought can be incorporated in the State Hazard Mitigation Plan in both the Risk Assessment and Mitigation Strategy. Also, actions developed by the IDWR for drought can be incorporated to reduce the risk.	+ Change

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Idaho Silver Jackets	The Silver Jackets Program is the State-level implementation of the U.S. Army Corps of Engineers National Flood Risk Management Program. The core member agencies will establish a continuous inter-governmental collaborative team working with other State and Federal Agencies to: • Provide assistance in identifying and prioritizing actions to reduce the threat, vulnerability and consequences of flooding in the State of Idaho; • Facilitate strategic planning and implementation of life-cycle mitigation, response and recovery actions to reduce the threat, vulnerability and consequences of flooding in the State of Idaho; • Create or supplement a process to collaboratively identify issues and implement or recommend solutions; • Identify and implement ways to leverage available resources and information between agencies; • Increase and improve flood risk communication and outreach; • Promote wise stewardship of the taxpayers' investments; • Develop more comprehensive State flood risk management policies and strategies; and • Develop advanced hydrologic predictive services to reduce loss of life and property	PR	Both	+	Y. The goals that the Silver Jackets have correspond with many of the Hazard Mitigation Plan goals. Teaming with the Silver Jackets will help coordinate efforts and save time and money. Included in the Silver Jacket goals are to: • Ensure continuous collaboration for flood mitigation, response and recovery activities before, during and after flooding. • Provide a forum for examining all types of solutions for flood risk management, including both non-structural and structural solutions. • Learn about partner agency programs, identifying limitations and opportunities, and combine programs to create integrated, comprehensive and sustainable solutions. • Create a multi-agency technical resource for State and local agencies. • Provide assistance in implementing high priority actions identified in the State's mitigation plans. • Improve flood risk communication and outreach, present a unified intergovernmental message, and better educate and advise our mutual customers. • Identify and facilitate improvements to existing programs, policies and processes.	+ Change

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	damage from flooding.				• Identify other collaboration opportunities to combine resources and identify gaps in order to minimize duplication of effort. • Catalog and share information on past and future flood projects and initiatives. • Prioritize current and future flood risk mitigation initiatives, individually and collectively. • Improve flood hazard mapping and risk analysis and linkages to advanced hydrologic prediction models.	
Community Development Block Grant (CDBG) Program	The CDBG program provides grants and technical assistance to federally designated and non-designated jurisdictions 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. At least 70% of the project must benefit low- and moderate-income persons.	PR	Both	+	CDBG money can be used as matching funds for the FEMA HMA grant programs. The FEMA HMA grant programs assist with accomplishing most flood-related hazard mitigation projects.	No Change
Idaho Department of Environmental Quality (DEQ)	DEQ's Surface Water Program routinely measures and assesses the levels of pollutants in surface waters, such as rivers and streams. The program develops analytical tools, provides guidance for stream and river water quality evaluations, monitors protocols and schedules, and writes and submits federally required reports. Regional office staff perform on-the-groundwater quality testing and data collection When water quality fails to meet State standards, regional office staff work with communities, industry,	PR	Both	+	Planning data obtained from DEQ's reports could be incorporated into various hazard profiles, such as flooding and hazardous materials. DEQ has the knowledgeable staff and equipment available to assess an area in the event that hazard materials were released into water. DEQ has many grant funding capabilities and could assist local governments with projects to lessen the risk from flooding and water contamination.	+ Change

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	and citizen groups to develop water quality improvement plans known as total maximum daily loads (TMDLs). These plans outline the actions needed to restore impaired water bodies to a healthy, fishable, swimmable condition. Surface Water staff coordinate the overall TMDL program; regional office staff develop and write the individual TMDLs.					
Idaho Bureau of Land Management (BLM) – Communities at Risk and Partnership funds	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.	PR	Both	+	The grant funding available with this program would assist in completing mitigation actions identified for wildland fire. Combing efforts with the State Fire Plan working group would ensure consistency and could potentially complete projects for both planning mechanisms.	+ Change
Title 22, Chapter 27, Section 18 – Idaho State Soil and Water Conservation Commission	There is hereby established and created in the Department of Agriculture of the State of Idaho the Idaho State Soil and Water Conservation Commission, which shall perform all functions conferred upon it by this chapter and shall be a nonregulatory agency. The commission shall consist of five members appointed by the Governor. In appointing commission members, the Governor shall give consideration to geographic representation. Commission members shall be chosen with due regard to their demonstrated expertise including, but not limited to, knowledge of and interest in water quality and other natural resource issues, production agriculture, banking or other similar financial experience, or experience as a county commissioner.	L	Both	+	This law created the State of Idaho Soil and Water Conservation Commission, which is involved in carbon sequestration and groundwater issues and drafted the Idaho Agricultural Pollution Abatement Plan. The commission is responsible for the Resource Conservation and Rangeland Development Loan Program (RCRDP) and provides conservation improvement grants. Having the Soil and Water Commission included in Hazard Mitigation meetings would assist in incorporating their agricultural plan into the State Hazard Mitigation Plan, where applicable, and assist with obtaining funding for environmental projects related to hazard mitigation.	+ Change
State Fire	The State Fire Assistance Program provides financial	PR	Both	+	Funding from this program can help communities	+ Change

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Assistance Program	and technical support directly to States, to enhance firefighting capacity, support community-based hazard mitigation, and expand outreach and education concerning fire prevention to homeowners and communities. The program requires a 50-50 match by the State. The delivery system is through the State Forester. As a result of the National Fire Plan and the Healthy Forest Restoration Act, the hazardous fuels reduction component is a major part of the State Fire Assistance Program. The hazardous fuels application and selection process is managed by the Western States Fire Managers. The hazardous fuels component, along with most other fuels mitigation funds provided by Federal agencies and the State, is coordinated through a collaborative interagency effort.				obtain the money and technical resources needed to complete mitigation projects related to fire hazards and forest pollution.	
IDL and Resource Conservation and Development (RC&D) – Community Forestry Program	The Community Forestry Program provides technology transfer and 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 on public and private lands. The IDL partners with the nine RC&D councils to provide technical assistance to communities throughout the State. Cooperative agreements with the RC&D provide for the contracting of three Community Forestry Assistants. These specialists offer timely local assistance to cities and organizations in	PR	Both	+	Program provides funding and technical assistance to obtain resources needed to complete mitigation projects related to the State Hazard Mitigation Plan. The nine RC&D districts could also be charged with providing more localized data and input that could potentially be rolled up into the State Plan.	+ Change

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	their respective geographic areas at no charge.					
Title 67, Chapter 65, Section 8 – Planning Duties	It shall be the duty of the planning or planning and zoning commission to conduct a comprehensive planning process designed to prepare, implement, and review and update a comprehensive plan, hereafter referred to as the plan. The plan shall include all land within the jurisdiction of the governing board. The plan shall consider previous and existing conditions, trends, desirable goals and objectives, or desirable future situations for each planning component. The plan, with maps, charts, and reports, shall be based on the following components as they may apply to land use regulations and actions, unless the plan specifies reasons why a particular component is unneeded.	L	Both	+	This legislation provides for comprehensive land use planning, which can be incorporated into the hazard mitigation plan at both the State and local level. Having the two planning mechanisms being consistent will enable State and local government to know where development should not occur and in which areas it can occur with little or no hazard risk.	+Change
Pacific Northwest Regional Water Quality Program	The Pacific Northwest Region Water Quality Program builds on the strengths of the Extension Water Quality Programs at the four Land Grant Universities throughout the Northwest. These States -- Alaska, Idaho, Oregon, and Washington -- correspond to EPA Region 10. 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	PR	Both	+	For the State of Idaho, the University of Idaho is the lead entity involved with the Pacific Northwest Regional Water Program. The program entity does not have any grant funding ability but is able to assist with technical support. With budget constraints, it would be mutually beneficial to have students take part in hazard mitigation planning. They could assist with GIS and mapping capabilities and perform research functions necessary for updating the risk assessment portion of the Plan. They may also be able to complete mitigation projects as a group that will not only help accomplish tasks associated with the Plan but provide them with experience required for their school coursework.	+ Change

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	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 by placing a University Liaison within the offices of EPA Region 10. This organization only provides technical service on a watershed-to-watershed basis. No grant funding is available.					
Title 70 – Watercourses/ Port Districts	Legislation enacted to create the Coeur D'Alene River and Lake Commission (previously created commission groups for the Snake River and Boise River necessary improvements).	L	Both	Neutral	As it stands, the legislative act is neutral. However, if, as part of updating the Hazard Mitigation Plan, the risk assessment deemed a river completely unfit due to previous development and other unnatural changes to the water course, legislation could be enacted to create and fund a commission until the watercourse is restored.	+ Change
Bonneville Power Administration (BPA): Integrated Fish and Wildlife Program	Environmental values are an important part of our Pacific Northwest heritage. So, too, is the low-cost and clean energy produced by Federal hydroelectric facilities located throughout the Columbia River Basin. BPA and its partners operating the Federal Columbia River Power System are working diligently to protect and enhance our environmental, fish, and wildlife values, and ensure these qualities for future generations. BPA partners with the Northwest Power and	PR	Both	+	The BPA's program provides funding to acquire and restore land to its natural habitat. This could be helpful, since some mitigation projects involving flood hazards require land to be acquired and returned either to its natural state or as permanent open space.	+ Change

Table 4-1. Summary of Laws, Regulations, Policies, Programs Related to Hazard Mitigation in Idaho

Item	Description	(L)Law (R)Regulation (Po)Policy (Pr)Program	(Pre) Disaster (Post) Disaster (Both)	Effect on Hazard Mit.? +, -, or neutral	Can be a point of integration with mitigation plan/data? Y or N. How?	Capability Change over Past 3 Years? +, -, or no change
	Conservation Council, the Columbia Basin Fish and Wildlife Authority, Columbia Basin Tribes, and other Federal, State, and private organizations. BPA provides funding for conservation easements, habit acquisitions and protections, and other conservation and restoration projects.					
Idaho Fish and Wildlife Foundation Funding Program	The Idaho Fish and Wildlife Foundation is an organization 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. 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.	PR	Both	+	The Idaho Fish and Wildlife Foundation has a funding program in place that could assist with completing mitigation action items. The organization has members that represent all regions of the State, which could be helpful with hazard mitigation outreach and education.	+ Change
Title 31, Chapter 48, Section 1 – Emergency Communications Act, and Section 16 – Emergency Communications Commission	The legislature recognizes that providing consolidated emergency communications systems is vital in enhancing the public health, safety, and welfare of the residents of the State of Idaho. The legislature further finds that there is an obvious need for providing a means to finance the initiation, maintenance, operation, enhancement and governance of consolidated emergency communications systems. The Commission was formed to maintain operability, research, and evaluate possible upgrades in the communication system, seeking out funding for potential upgrades, and has the ability to contract out to experts, agents, employees, or consultants for the purposes of the chapter.	L	Both	+	Incoming funding under this legislative act goes directly to 911 and other emergency response communication programs. Funds from this act could be used in the future to purchase a Reverse 911 System. The Reverse 911 system allows the County 911 Center to rapidly notify residents and businesses by telephone. In the event of an emergency, an operator in the 911 Center can identify the affected neighborhood or region of the County and record a message that describes the situation and recommends the protective actions residents should take. The Reverse 911 system will automatically call all listed telephone numbers within that geographic area and deliver the	+ Change

Table 4-1. Summary of Laws, Regulations, Policies, Programs Related to Hazard Mitigation in Idaho

Item	Description	(L)Law (R)Regulation (Po)Policy (Pr)Program	(Pre) Disaster (Post) Disaster (Both)	Effect on Hazard Mit.? +, -, or neutral	Can be a point of integration with mitigation plan/data? Y or N. How?	Capability Change over Past 3 Years? +, -, or no change
					recorded message. If phone lines are busy, the system will attempt to redial those numbers a predetermined number of times to make contact. If an answering machine picks up the call, the emergency message will be left on the machine.	
Title 47, Chapter 17	It is the purpose of this act to provide for the reclamation of abandoned mines on State and Federal lands and on certain private lands, thereby protecting human health, safety and welfare; conserving natural resources; aiding in the protection of wildlife, aquatic resources, and domestic animals; and reducing soil erosion.	L	Both	+	By reclaiming previously mined lands, voids that were created can be properly filled to an appropriate degree. Mapping and other data acquired during the reclamation process would assist with hazard mitigation. Having this data in a GIS system would allow individuals to know that, due to the previous disturbance, the area may not be conducive to development and the reclaimed land should remain open space.	+ Change
The Steele-Reese Foundation Grant Program	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	PR	Both	+	The Steele-Reese Foundation has a funding program in place that could assist with completing mitigation action items, such as stream restoration. This program assists with maintaining the land's rural integrity.	+ Change

Table 4-1. Summary of Laws, Regulations, Policies, Programs Related to Hazard Mitigation in Idaho

Item	Description	(L)Law (R)Regulation (Po)Policy (Pr)Program	(Pre) Disaster (Post) Disaster (Both)	Effect on Hazard Mit.? +, -, or neutral	Can be a point of integration with mitigation plan/data? Y or N. How?	Capability Change over Past 3 Years? +, -, or no change
	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.					

Table 4-1. Summary of Laws, Regulations, Policies, Programs Related to Hazard Mitigation in Idaho

Item	Description	(L)Law (R)Regulation (Po)Policy (Pr)Program	(Pre) Disaster (Post) Disaster (Both)	Effect on Hazard Mit.? +, -, or neutral	Can be a point of integration with mitigation plan/data? Y or N. How?	Capability Change over Past 3 Years? +, -, or no change
The Wilburforce Foundation Grant Program	Wilburforce Foundation protects wildlife habitat 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.	PR	Both	+	The Wilburforce Foundation provides funding to mitigate threats to wildlife and improve ecological resilience, which may involve acquiring and restoring land back to its natural habitat. This could be helpful for flood-related mitigation projects that require land to be acquired and either returned to its natural state or kept as permanent open space. This also may result in acquiring land to prevent habitat disruption caused by development. The Wilburforce Foundation also assists in funding for environmental education. This could incorporate mitigation outreach and education components.	+ Change
Local Option Swine Facilities Act	Prohibits the siting of swine facilities in known hazard areas.	L	Pre	+	This legislation provides a certain degree of zoning, which can be incorporated into the hazard mitigation plan at both the State and local level.	No Change

IDAHO STATE MITIGATION PROGRAM CAPABILITY ASSESSMENT

The Idaho Bureau of Homeland Security (BHS) is a Division of the Idaho Military Division. The services provided by the BHS facilitate emergency management in Idaho and assist neighboring States. More importantly, the BHS is the central point of coordination within the State for all hazard preparedness, response, recovery, and mitigation. Idaho BHS coordinates all situation and damage assessment operations in a disaster area. The agency routinely cooperates with Federal, State, and local governments to maintain and develop disaster preparedness, response, recovery, and mitigation plans. Idaho BHS establishes and maintains a State Emergency Operations Center (EOC) to provide coordination and public information during emergencies and disasters. It is the State coordinating agency responsible for the administration of Federal disaster assistance programs under the Robert T. Stafford Act, Public Law 93-288, which requires mitigation recommendations and implementation as a condition of Federal financial assistance.

Currently, the IBHS Mitigation Program has the following responsibilities:

- Risk and vulnerability analysis
- Mitigation planning
- Administration of FEMA's mitigation grant programs
- Coordination of natural hazards risk reduction projects

Its current staffing level is two full-time employees (FTEs) and support, which includes:

- State Hazard Mitigation Officer (SHMO): David Jackson
- State Hazard Mitigation Planner: Mark Stephensen
- State Hazard Mitigation Section Support Staff:
    - Alicia Martin-Cowger, Mitigation Program Assistant (temp)

Overall, the hazard mitigation management capabilities of the State have improved since the last plan was approved. While the staff resources have not increased, the program staff are more experienced, and communities seem to better accept hazard mitigation concepts, as evidenced by the growing numbers of mitigation grant applications. However, the current funding environment is challenging at both the State and local level.

Program Management Capability (S and E)

Since hazard mitigation is a Federal-State-local partnership, States have a responsibility for maintaining their competency in managing and implementing a robust State hazard mitigation program. Hopefully, this program will effectively administer FEMA mitigation programs and also assist in the administration or promotion of mitigation programs that are offered by different entities. For example, many local mitigation plans identify structural flood control as a possible mitigation measure. A competent State mitigation program would not only be aware of possible USACE programs that could be utilized, but could facilitate getting the project underway.

The State Hazard Mitigation Program Manager / State Hazard Mitigation Officer is responsible for administering these programs. In administering the mitigation grant programs, BHS staff does the following:

- Develops/distributes grant guidance, funding criteria, and application forms.
  - BHS may limit eligibility for sub-applicants. For HMGP, first-round sub-applicants will be limited to counties identified in a Presidential Declaration.
  - For the Hazard Mitigation Grant Program (HMGP), BHS may limit the number of applications allowed per eligible sub-applicant and the maximum project budget/grant award based on the projected funding available for the disaster. BHS will also establish criteria for ranking and prioritizing HMGP applications.
  - For other mitigation programs, FEMA will publish the number of applications and maximum Federal grant award in annual program guidance.

- For HMGP, makes recommendations to the Bureau Director on the scope of the program for the Governor's request for Federal assistance - Presidential disaster declaration. This may include:
  - Statewide or county-specific application of the HMGP.
  - A list of communities, jurisdictions, and agencies with an approved local hazard mitigation plan.
  - A list of communities, jurisdictions, and agencies with a local hazard mitigation plan under development, under review, or pending approval.
  - A review of the entities in the disaster-impacted areas that have approved plans and those without approved plans at the time of the event.
  - Solicit qualified mitigation planning or project proposals from eligible sub-applicants.
  - Provide technical assistance to eligible sub-applicants as resources permit. This may include sub-applicant briefings on program-specific issues, application development and/or benefit-cost training and technical support, engineering to support project development, site visits to validate potential mitigation measures, and review of draft applications prior to the formal submittal of program applications.
  - Prioritize projects for funding: convene, as needed, the Mitigation Grant Review Committee to review, evaluate, prioritize and recommend projects for funding.

- For PDM, FMA, RFC, SRL: BHS staff reviews applications for compliance with published program guidance and prioritizes, as necessary, using established criteria.
  - A list of communities, jurisdictions, and agencies with an approved local hazard mitigation plan.
  - A list of communities, jurisdictions, and agencies with a local hazard mitigation plan under development, under review, or anticipating approval by FEMA prior to the application deadline.
  - Solicit qualified mitigation planning or project proposals from eligible sub-applicants.
  - Provide technical assistance to eligible sub-applicants as resources permit. This may include sub-applicant briefings on program-specific issues, application development

and/or benefit-cost training and technical support, engineering to support project development, site visits to validate potential mitigation measures, and review of draft applications prior to formal submittal of program applications.
    - Prioritize projects for funding: convene, as needed, the Mitigation Grant Review Committee to review, evaluate, prioritize and recommend projects for funding.
- Forward funding recommendations to FEMA for final approval.
- Withdraw projects from consideration, if necessary.
- Develop grant agreements, formally notify successful grant/sub-grant applicants and administer distribution of funds to sub-applicants.
- Submit quarterly and final reports to FEMA.
- Monitor sub-grantee performance.
- Conduct final project inspection and arrange for a final engineering inspection, as necessary.

The Governor's Authorized Representative (GAR) oversees mitigation program expenditures. The State Hazard Mitigation Program Manager / State Hazard Mitigation Officer is responsible for the daily operations and technical aspects of the program, hazard mitigation planning, and administering the hazard mitigation grant programs noted in this document and the State of Idaho All-Hazard Mitigation Plan.

The GAR will designate the State Hazard Mitigation Officer to:

- Coordinate activities of the State Hazard Mitigation Team.
- Incorporate the findings and recommendations required by Section 322 into a Hazard Mitigation Plan Annex.
- Coordinate with State, local, and Federal agencies.
- Provide technical assistance to grant sub-applicants.
- Manage the HMGP (including selecting projects, administering funds, and final closing of projects).
- Maintain State HMGP Project and Disaster Files.

For disaster declarations, the State Hazard Mitigation Program Manager is designated the State Hazard Mitigation Officer under 44 CFR 206.433(c), identified as such on the Bureau's organizational chart and confirmed by name in the Federal-State Agreement.

The organizational structure for HMGP administration will be flexible and capable of expansion and contraction as the need dictates. Program management may require the following positions, reporting to the State Hazard Mitigation Officer:

- HMGP Administrators
- Appropriate staff to assist the State Hazard Mitigation Officer in periodic tasks requiring special kinds of expertise to accomplish Sections 404 and other State needs in hazard mitigation. This includes access to professional engineering staff to complete project inspections

- Clerical support not available from State agencies will be hired on a contract or as temporary hires

In situations where expertise is required beyond that available within the State Hazard Mitigation Team, the State Hazard Mitigation Officer identifies those needs and requests the needed staff through the GAR, specifying the kind of staff, the kind of tasks, the likely source of the needed expertise, and the time commitment. The GAR then contacts and asks the recommended agencies for such assistance.

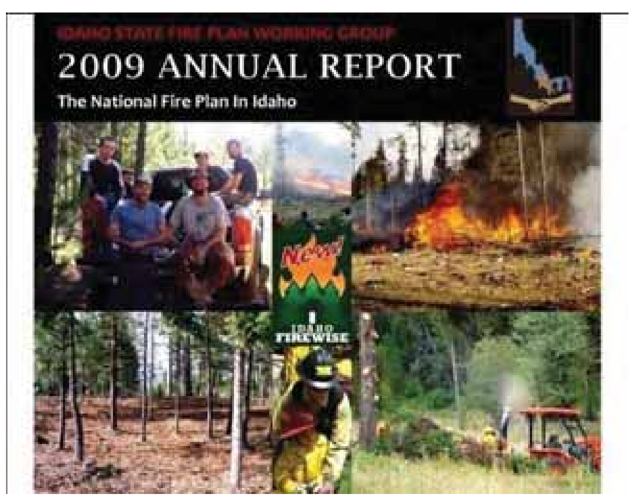
Monitoring Progress of Mitigation Activities

A key capability in managing mitigation programs is to monitor the progress of mitigation activities occurring in the State. The following paragraphs describe these project monitoring activities.

Ongoing Hazard Mitigation Assistance (HMA) project monitoring. The IBHS Mitigation Section is required to monitor HMA-funded projects on a quarterly basis – both financially and programmatically. Agencies (State, local, and Tribal) that have received HMA funds are required to make quarterly reports of progress. This frequency of monitoring allows IBHS to ensure that projects are within the approved scopes of work and on budget. Mitigation Section staff perform field monitoring in accordance with the appropriate administrative plan.

HMA project closeouts. Agencies (State, local, and Tribal) are required to submit a closeout report at the conclusion of any grant-funded project. At that time, the Mitigation Section staff schedules a closeout meeting/inspection and then reviews all documentation to ensure that the project is appropriately completed. Detailed closeout procedures are identified in the appropriate Administrative Plan for the mitigation grant program.

Monitoring of Fire Plan mitigation activities. As indicated elsewhere in this Plan, the ISFPWG is charged with assisting counties with their Wildfire Protection Plans and associated countywide working groups in order to facilitate implementation of the National Fire Plan. In doing this, the ISFPWG develops an annual report on the progress in meeting fire plan goals. The Idaho SHMO is a member of the ISFPWG, so not only is progress made public through the Annual Report, but the BHS Mitigation Section staff participate as well.



One deficiency identified in the current monitoring process is that mitigation success stories are not written up and submitted to FEMA and for use by the State. This will be a focus of monitoring in the upcoming three years.

Support of Local Hazard Mitigation Programs

IBHS considers supporting local hazard mitigation programs a top priority. While FTEs work directly in the Mitigation Section, IBHS employs six field coordinators with whom the Mitigation Section coordinates closely. The concept of the field coordinator support is to have a State staff resource who works closely with local emergency managers and other officials on an array of emergency management issues. Field coordinators can act as an extension of the Mitigation Section, especially in times of high staff resource demand.

As an example of the mitigation planning and project support that has been provided, from 2008 to 2010, the State has:

- ✓ Conducted briefings for the annual Unified HMA grant programs. In 2009, seven regional applicant briefings were held to provide additional information and tips for developing mitigation project applications.
- ✓ Developed a HMA project “tip sheet” to assist communities in developing competitive and eligible HMA project applications.
- ✓ Conducted briefings on the HMGP after federally declared disasters.
- ✓ Made presentations on local mitigation issues at the council, commissioner, and other public meetings, as needed or at the request of communities interested in mitigation planning or projects.
- ✓ Maximized all available funding from Technical Assistance, HMGP, and Pre-Disaster Mitigation (PDM) grants for mitigation plan development and updates.
- ✓ Conducted mitigation planning workshops, both regionally and in individual counties.

Currently, the State of Idaho does not have a dedicated funding capability for mitigation. In the past, the State assisted with local match requirements for federally funded projects. However, that option is at the discretion of the Governor.

Local Hazard Mitigation Planning Assistance

IBHS has been successful in encouraging compliance with FEMA’s requirements for local jurisdictions to develop hazard mitigation plans. In the past three years, all 44 counties and three Tribal nations have developed and adopted local hazard mitigation plans. As the first mitigation plans are expiring, the Mitigation Section will need to adjust to meet the needs of local jurisdictions in updating their plans. Specifically, the Mitigation Section provides the following mitigation planning assistance:

- Reviews local plans and provides comments to the community before forwarding them to FEMA Region X for review.
- Holds mitigation planning workshops, both for individual counties and regionally
- Encourages HAZUS use and training.
- Facilitates ATC 20 and FEMA 154 damage assessment trainings (data can be useful for planning and mitigation project development).
- Participates in and facilitates technical working groups.

Local mitigation plans are required to be reviewed by the IBHS Mitigation Section before they are forwarded to FEMA. No more than 10 business days after draft plans are submitted to the IBHS Mitigation Planner, comments are provided to the local jurisdiction. After revisions are made, the plan is resubmitted to IBHS. After its review and approval, IBHS forwards the plan to FEMA Region X with review comments and recommendations. Tribal plans are also reviewed upon request.

Local Hazard Mitigation Project Development Assistance

The IBHS Mitigation Section provides the following project development assistance:

- Conducts briefings for all Unified HMA programs (including HMGP).
- Reviews and/or conducts benefit-cost analyses for local mitigation project applications.
- Holds BCA training for local jurisdictions.
- Will perform onsite inspections and nonengineering consultations for project development.

Prioritizing Local Assistance (Planning and Non-Planning Grants)

As required by 44 CFR 206.435, IBHS reviews all applications submitted by eligible jurisdictions for completeness and to ensure they meet State and Federal eligibility criteria. Additionally, IBHS staff review the benefit-cost analysis submitted with the application or conduct their own based upon information provided by the sub-applicant for the project. While not a scored element of the State's process, the benefit-cost analysis ensures that only cost-effective projects are reviewed and submitted to FEMA for funding.

IBHS may convene a Mitigation Grant Review Committee when the number of applications exceeds the funding amount available. Currently, this applies to communities and local jurisdictions that receive planning and project grants under available mitigation funding programs and for non-planning grants. The Mitigation Grant Review Committee normally consists of at least five members; this includes, at a minimum, the following:

- Two individuals from the IBHS, normally the Mitigation and Recovery Section Manager (MRSM) and the State Hazard Mitigation Program Manager (SHMPM).
- One designee from a State agency that deals with issues related to the particular type or nature of the disaster (example: a Department of Water Resources representative for floods, a Department of Lands representative for wildfire, a Geologic Survey representative for geologic hazards, or a Division of Building Safety representative for structural mitigation).
- Two individuals representing local government, either located outside of the declared disaster area or from a community not applying for HMGP funds.

IBHS seeks local committee members that have experience in public works, engineering, land-use planning, disaster grant administration, or other related experience. The committee also consults experts from State, local, and Federal agencies. IBHS may ask the Idaho Association of Counties or the Association of Idaho Cities to provide names of potential local committee members.

Committee members serve without compensation but will be reimbursed for authorized expenses incurred in the performance of their duties, in accordance with Idaho State Travel Regulations, as existing or hereafter amended.

Eligibility Screening. The committee reviews and prioritizes the grant applications that pass the initial eligibility screening. The initial eligibility screening is based on both FEMA and State criteria, which include:

Federal Criteria:

- Solve the problem it is intended to address;
- Be located in a community participating in good standing in the National Flood Insurance Program;
- Meet all applicable Federal, State, and local permit requirements, and not contribute to or encourage development in the floodplain, wetlands, or other hazardous areas, and support environmental justice (Federal Executive Orders 11988, 11990 and 12898); and
- Be cost effective in that it:
    - Addresses a problem that has been repetitive or that poses a significant risk if left unsolved.
    - Will not cost more than the anticipated value of the reduction in both damages and subsequent negative impacts to the area, if future disasters occur (demonstrate a benefit-to-cost ratio of 1:1 or greater).
    - Has been determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options.
    - Contributes, to the extent practicable, to a permanent or long-term solution of the problem it is intended to address.
    - Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.

State Criteria**:**

- Support the goals and objectives of the community's adopted/approved local hazard mitigation plan.
- Protect lives and reduce public risk.
- Reduce the level of disaster vulnerability in existing structures.
- Reduce the number of vulnerable structures through acquisition, relocation, flood proofing, or seismic retrofitting.
- Avoid inappropriate future development in areas known to be vulnerable to future disasters.
- Solve a problem independently, or function as a beneficial part of an overall solution with assurance that the whole project will be completed.
- Provide a cooperative, inter-jurisdictional solution to reduce future disaster damage.
- Provide a long-term mitigation solution.
- Address emerging hazard damage issues (urban stormwater, trees in power right-of-ways, new earthquake faults, etc.).
- Restore or protect natural resources, recreation, open spaces, and other environmental values.
- Develop and implement comprehensive programs, standards, and regulations that reduce disaster damage.
- Increase public awareness of natural hazards, preventive measures, and emergency responses to disasters.

- Upon completion, have affordable operation and maintenance costs

Ranking and prioritization of eligible projects. After eligibility screening, projects are ranked and a recommendation for funding is developed, based on the following criteria:

- Combined ordinal application score(s) determined by the Mitigation Grant Review Committee using the evaluation system mentioned above.
- Available funding.
- Goals and objectives in the State of Idaho All-Hazard Mitigation Plan, November 2010.
- Geographical mix.
- Previous mitigation program participation and results.
- Current mitigation program participation. At its discretion, BHS may limit sub-applicants to three active projects at any one time, depending upon the demonstrated capability of the sub-applicant to administer previous and existing projects.

The review committee develops and provides to the Director for the IBHS a prioritized list of projects to recommend to FEMA for approval and funding. IBHS then formally notifies sub-applicants of the results of the committee ranking and review process and of their recommended, or non-recommended, status. Sub-applicants not recommended for funding may appeal this decision under specific criteria.

Currently, there is no preference for planning projects over “bricks and mortar” projects.

LOCAL MITIGATION PROGRAM CAPABILITY ASSESSMENT

One large component of the 2010 plan update involved the analysis of all 47 local (county and Tribal) mitigation plans currently approved by FEMA. To enable an accurate and timely analysis of these plans, a database was designed to store specific details, information, and data sets. Once this database was created, all of the plans were reviewed, and the relevant information was compiled into this master database.

One area that this database focused on was local mitigation strategies. This included summarizing a number of local plan elements, such as:

- Mitigation actions
- Mitigation action categories (prevention, property protection, natural resource protection, education/outreach, emergency services, and structural)
- Mitigation action focus (new buildings/structures, existing buildings/structures, critical facilities, infrastructure, and NFIP participation)
- Completed mitigation actions
- Self-defined mitigation capability
- Reasons for deferring or not completing action items

One way in which local capability effectiveness was gauged was by analyzing the number of completed actions that were documented in the local plans. Table 4-2 shows each local plan's action items, broken down by mitigation focus. Where data were available, the number of completed mitigation actions is shown in parentheses. For the handful of local plans that were able to document completed actions, the results varied. The percentage of completed actions, compared to the overall number, was fairly high for two (Benewah - 42 percent, Nez Perce - 43 percent) and very low for the other two (Bingham - 2 percent, Kootenai - 10 percent). Overall, this indicates that these local communities have a need for increased mitigation capability. However, it should be noted that some of these results could stem from the fact that the local plans simply do not provide enough detail relating to previous action items. Also, many communities are just now updating their initial plans and have not yet added data related to completed mitigation actions.

Table 4-2: Local Plan Mitigation Action Focus (and Completed Actions)					
Local Plan Name	**New Buildings / Structures**	**Existing Buildings / Structures**	**Critical Facilities**	**Infrastructure**	**NFIP Participation**
Ada	6	9	10	28	1
Adams	5	16	13	8	1
Bannock	3	8	8	16	1
Bear Lake	2	11	9	6	2
Benewah	3(2)	0	16 (6)	6 (2)	1 (1)
Bingham	5	6	22 (1)	16	10
Blaine	2	7	38	30	9
Boise	3	4	11	7	2
Bonner	10	9	31	40	5
Bonneville	3	5	10	22	0
Boundary	1	7	12	2	0
Butte	3	8	15	19	2
Camas	6	1	4	8	3
Canyon	1	1	8	13	1
Caribou	2	5	15	2	1
Cassia	4	5	12	20	8
Clark	4	5	20	14	2
Clearwater	0	2	3	3	0
Custer	3	11	33	21	3
Duck Valley Reservation	3	5	13	11	1
Elmore	6	23	16	15	1
Franklin	3	9	9	15	5

Table 4-2: Local Plan Mitigation Action Focus (and Completed Actions)					
Local Plan Name	**New Buildings / Structures**	**Existing Buildings / Structures**	**Critical Facilities**	**Infrastructure**	**NFIP Participation**
Fremont	2	11	31	14	4
Gem	6	13	8	7	1
Gooding	4	7	5	9	1
Idaho	2	12	14	16	0
Jefferson	1	8	6	5	1
Jerome	6	12	5	7	4
Kootenai	19 (5)	44 (1)	29 (7)	31	1
Latah	2	3	2	6	1
Lemhi	4	11	4	22	2
Lewis	2	3	1	4	1
Lincoln	5	11	8	7	1
Madison	3	10	8	8	4
Minidoka	1	6	8	6	3
Nez Perce	3 (1)	6 (2)	9 (8)	12 (2)	0
Nez Perce Tribe	1	1	1	2	1
Oneida	5	9	9	12	1
Owyhee	7	13	9	12	1
Payette	4	4	4	9	1
Power	5	8	4	9	0
Shoshone	16	58	1	37	8
Shoshone-Bannock Tribe	2	6	3	5	0
Teton	5	11	14	18	3

Table 4-2: Local Plan Mitigation Action Focus (and Completed Actions)					
Local Plan Name	New Buildings / Structures	Existing Buildings / Structures	Critical Facilities	Infrastructure	NFIP Participation
Twin Falls	4	4	8	6	1
Valley	3	5	3	4	1
Washington	2	3	1	6	1

Three local plans also explained why mitigation actions were delayed or not completed. These explanations provided possible reasons for the low number of completed actions. Funding constraints were pointed out as a large reason for this apparent lack of action. Changes in staffing were also mentioned as factors in delayed actions. In addition, some actions were ongoing but not yet complete. A final reason was that past actions did not align with the localities' overall goals and objectives, a point that the State also made during this Plan update. In the future, focusing on this factor may help increase local capability. Ensuring that local plans form actions that are tied to their goals may help to focus the available resources, thus resulting in more completed mitigation actions.

Only three local plans specifically addressed their own mitigation capability (self assessment). Of those, two rated themselves as having a moderate capability, while the third rated itself at having a low capability.

Another analysis of the local mitigation capabilities, policies, and programs involved classifying all local actions into one of the six main action categories (prevention, property protection, natural resource protection, education/outreach, emergency services, and structural). Maps 4-1 and 4-2, at the end of this section, show these data at the local and IBHS regional levels. Table 4-3 shows this same information at the regional and State levels. Overall, it is interesting to see the similarities in the breakdown of mitigation action categories. By comparing the number and types of mitigation actions, it can be clearly seen that all six regions focused more on prevention than any other category (the North Central region had prevention and emergency services shown as being equal). The second highest ranked action category was not as clearly defined, with property protection and emergency services being ranked very similarly. Natural resource protection was the least used type of mitigation action across the State.

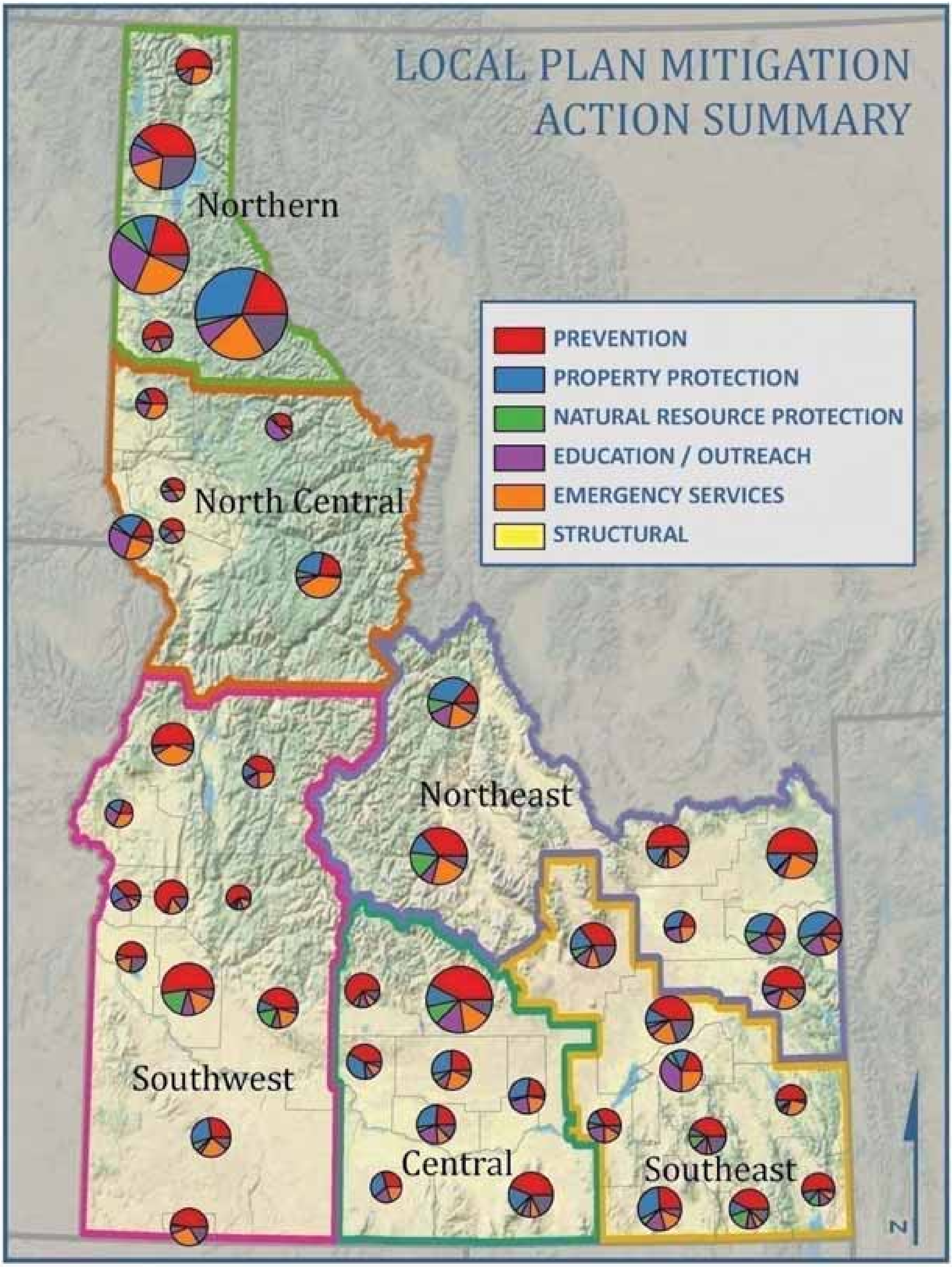
Table 4-3: Local Plan Mitigation Action Categories (Summarized by Region)						
	Prevention	**Property Protection**	**Natural Resource Protection**	**Education / Outreach**	**Emergency Services**	**Structural**
Central	38%	20%	5%	14%	14%	9%
North Central	26%	17%	4%	23%	26%	2%
Northeast	32%	22%	7%	13%	18%	8%
Northern	28%	16%	4%	15%	22%	15%
Southeast	38%	14%	7%	14%	16%	12%
Southwest	46%	9%	7%	10%	21%	8%
Statewide	*35%*	*17%*	*6%*	*14%*	*19%*	*10%*

All local actions were also classified into one of five focus areas: new buildings/structures, existing buildings/structures, critical facilities, infrastructure, and NFIP participation. Maps 4-3 and 4-4, at the end of this section, show these data at the local and IBHS regional levels. Table 4-4 shows this same information at the regional and State levels. Overall, it is surprising how similar the breakdown across these five focus areas is between regions and between individual regions and the State as a whole. Infrastructure and critical facility-focused mitigation actions tended to be the most popular.

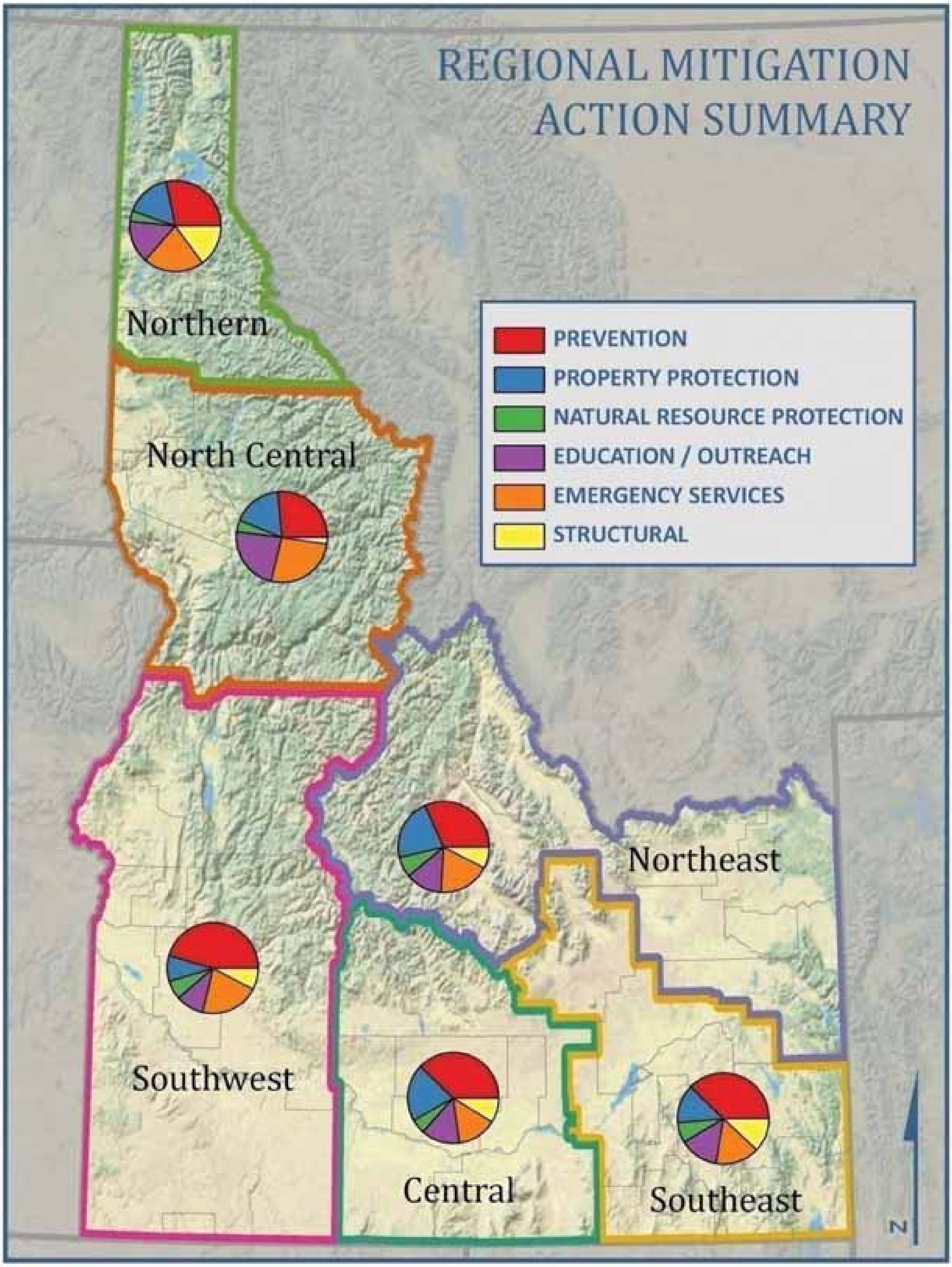
Table 4-4 also illustrates a significant statistic: the average NFIP participation across the State is 5 percent. IBHS recognizes that more effort is needed to increase participation. Three areas for additional education have been identified: individual homeowners, insurance agents, and financial institutions. The possibility remains that, despite a number of Federal disclosure requirements, many federally insured and noninsured financial institutions have loans in their portfolios that are at a higher risk than they realize. Further, IBHS is engaged with the Idaho Counties Risk Management Pool (ICRMP) in both county and facility mapping and is seeking to increase Statewide NFIP participation.

Table 4-4: Local Mitigation Action Focus (Summarized by Region)

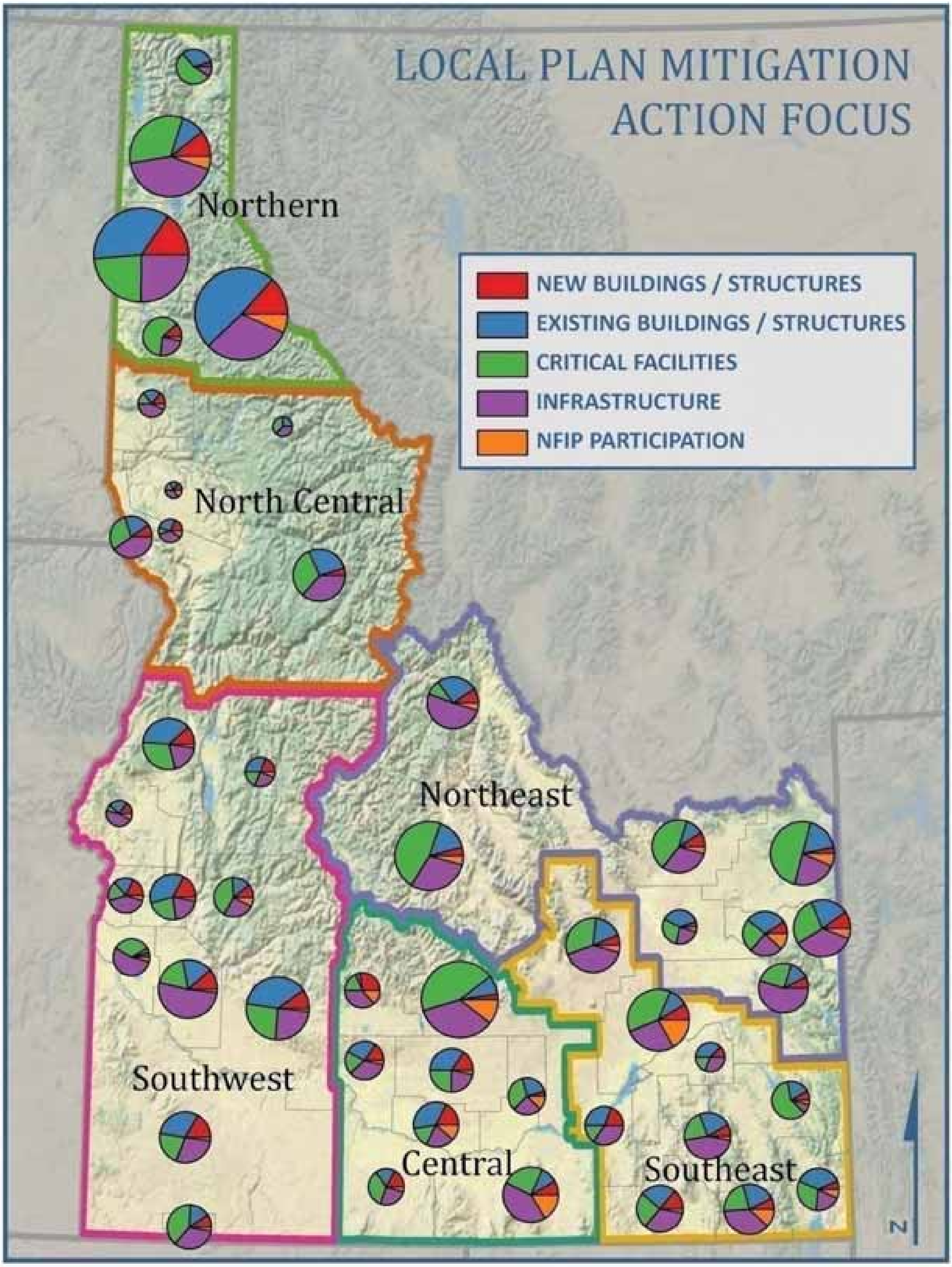
	New Buildings / Structures	Existing Buildings / Structures	Critical Facilities	Infrastructure	NFIP Participation
Central	11%	18%	30%	31%	10%
North Central	9%	24%	27%	38%	3%
Northeast	7%	20%	34%	34%	5%
Northern	13%	30%	23%	30%	4%
Southeast	9%	21%	31%	32%	7%
Southwest	13%	27%	25%	32%	3%
Statewide	*10%*	*24%*	*28%*	*32%*	*5%*



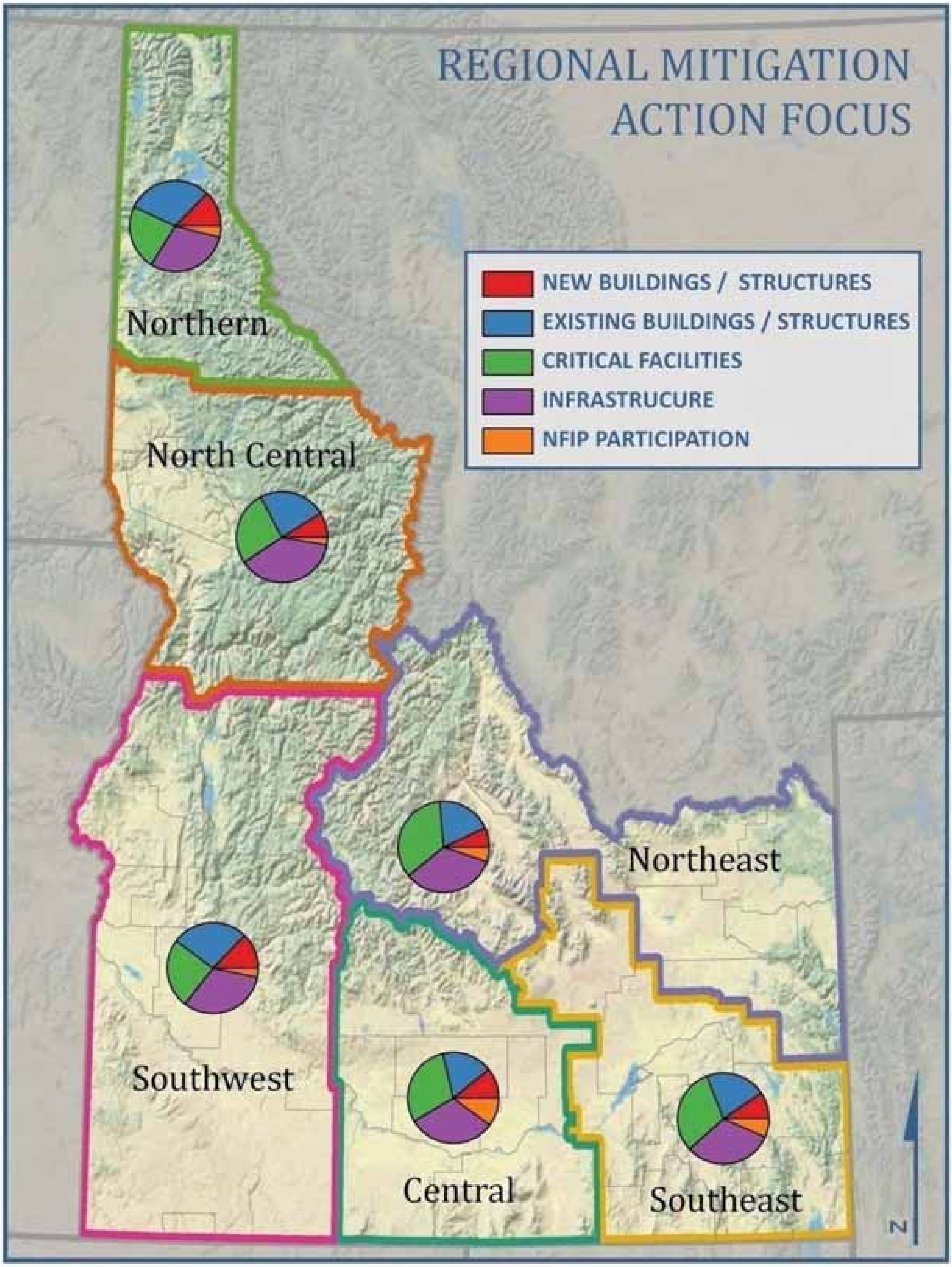
Map 4-1: Local Plan Mitigation Action Categories



Map 4-2: Local Plan Mitigation Action Categories, by Region



Map 4-3: Local Plan Mitigation Action Focus



Map 4-4: Local Plan Mitigation Action Focus, by Region

HAZARD MITIGATION ASSISTANCE PROGRAMS

Listed below are known sources of mitigation assistance for States, communities, and individuals in Idaho. It usually comes in the form of financial, technical, or education/outreach assistance.

Idaho Mitigation Resources

Name: Flood Mitigation Assistance (FMA) Program

Program Description / Activities Funded:

As stated in FEMA's *Hazard Mitigation Assistance Unified Guidance* (June 1, 2010), "The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP)."

Those eligible to apply for assistance include State-level agencies, federally recognized Indian Tribal governments, and local communities (to include State-recognized Indian Tribes, authorized Indian Tribal organizations, and Alaska Native villages). Private individuals and private non-profit (PNP) organizations are not eligible sub-applicants. However, a relevant State agency or local government may apply to the applicant for assistance to mitigate private or PNP structures.

Project grants are available for:

- Acquisition, structure demolition, or structure relocation, with the property deed restricted for open space uses in perpetuity;
- Elevation of structures;
- Dry floodproofing of nonresidential structures; and,
- Minor structural flood-control activities.

All properties must be insured at the time of application, and a local Flood Mitigation Plan meeting 44 CFR Part 78.5 is required prior to award as a condition of receiving project grants.

Source: FEMA	**Type: Financial Assistance**
Cost Sharing:	Matching requirements are up to 75% Federal, minimum 25% non-Federal match required. Of the total non-Federal share, not more than one-half may be provided from in-kind contributions.
Application Timeframe:	Changes with fiscal year
Amount Available:	Funds are allocated to each State based on the total number of NFIP insurance policies and the total number of repetitive loss properties within the State. States may apply for funding in excess of their allocations; additional funds are awarded on a competitive basis pending the availability of funds.

For More Information: Visit FEMA's Website at
http://www.fema.gov/government/grant/hma/index.shtm

Federal Emergency Management Agency
Federal Regional Center
130 - 228th Street, Southwest
Bothell, WA 98021-8627

Name: Flood Mitigation Assistance (FMA) Program		
(425) 487-4600		
Name: Repetitive Flood Claims (RFC) Program		
Program Description / Activities Funded: As stated in FEMA's *Hazard Mitigation Assistance Unified Guidance (June 1, 2009)*, "The RFC program is authorized by Section 1323 of the NFIA, 42 U.S.C. 4030 with the goal of reducing flood damages to individual properties for which one or more claim payments for losses have been made under flood insurance coverage and that will result in the greatest savings to the National Flood Insurance Fund (NFIF) in the shortest period of time." The eligibility is same as for FMA, but only for those States or communities that cannot meet the requirements of the FMA program for either cost sharing or the capacity to manage the activities. Project grants are available for: • Acquisition, structure demolition, or structure relocation, with the property deed restricted for open space uses in perpetuity. All properties must be insured at the time of application. A State/Tribal Standard or enhanced hazard mitigation plan approved by FEMA in accordance with 44 CFR 201 is required by the application deadline. Application Requirements: eligibility and completeness review; mitigation planning requirement; technical review, including a benefit cost analysis, for project and property ranking; and environmental and historic preservation reviews		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	Matching requirements are up to 100% Federal (no non-Federal match requirement).	
Application Timeframe:	Changes with fiscal year	
Amount Available:	Varies	
For More Information: Visit FEMA's Website at http://www.fema.gov/government/grant/hma/index.shtm Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600		

Name: Severe Repetitive Loss (SRL) Program
Program Description / Activities Funded: As stated in FEMA's *Hazard Mitigation Assistance Unified Guidance (June 1, 2009)*, "The SRL program is authorized by Section 1361A of the NFIA, 42 U.S.C. 4102a, with the goal of reducing flood damages to residential properties that have experienced severe repetitive losses under flood insurance coverage

Name: Severe Repetitive Loss (SRL) Program		
and that will result in the greatest savings to the NFIF in the shortest period of time." Those eligible to apply for assistance include State-level agencies, federally recognized Indian Tribal governments, and local communities (to include State-recognized Indian Tribes, authorized Indian Tribal organizations, and Alaska Native villages). Private individuals and PNP organizations are not eligible sub-applicants. However, a relevant State agency or local government may apply to the applicant for assistance to mitigate private or PNP structures. Project grants are available for flood mitigation activities such as: • Acquisition, structure demolition, or structure relocation, with the property deed restricted for open space uses in perpetuity; • Elevation of structures; • Dry floodproofing of historic structures; • Minor physical localized flood-control projects; and, • Mitigation reconstruction (demolition and rebuilding of structures). All properties must be insured at the time of application. A State/Tribal standard or enhanced hazard mitigation plan approved by FEMA in accordance with 44 CFR 201 is required by application deadline. Application Requirements: eligibility and completeness review; mitigation planning requirement; technical review, including a benefit cost analysis and engineering feasibility, for project and property ranking; and environmental and historic preservation reviews		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	Matching requirements are up to 75% Federal, minimum 25% non-Federal match required.	
Application Timeframe:	Changes with fiscal year	
Amount Available:	Varies	
For More Information: Visit FEMA's Website at http://www.fema.gov/government/grant/hma/index.shtm Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600		

Name: Pre-Disaster Mitigation (PDM) Program
Program Description / Activities Funded: As stated in FEMA's *Hazard Mitigation Assistance Unified Guidance (June 1, 2009)*, "The PDM program is authorized by Section 203 of the Stafford Act, 42 U.S.C. 5133. The PDM program is designed to assist States, Territories, Indian Tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding from future disasters." As part of

Name: Pre-Disaster Mitigation (PDM) Program

the annual Congressional appropriations process, State allocations and Congressionally directed funds (also known as earmarks) have occurred at varying levels. In FY10, $100 million was appropriated by Congress for the PDM program, with a base allocation of $500,000 per State.

Those eligible include State-level agencies including State institutions (e.g., State hospital or university); federally recognized Indian Tribal governments; local governments, including State-recognized Indian Tribes, authorized Indian Tribal organizations, and Alaska Native villages; public colleges and universities; and Indian Tribal colleges and universities. Private non-profit organizations and private colleges and universities are not eligible sub-applicants; however, an eligible, relevant State agency or local government may apply to the applicant as the sub-applicant for assistance to benefit the private entity.

Project grants are available for:

- Voluntary acquisition of real property (i.e., structures and land, where necessary) for open space conversion;
- Relocation of public or private structures;
- Elevation of existing public or private structures to avoid flooding;
- Structural and nonstructural retrofitting (e.g., storm shutters, hurricane clips, bracing systems) of existing public or private structures to meet/exceed applicable building codes;
- Construction of safe rooms (tornado and severe wind shelters) for public and private structures that meet requirements in FEMA 320 and FEMA 361;
- Hydrologic and hydraulic studies/analyses, engineering studies, and drainage studies for the purpose of project design and feasibility determination directly related to the proposed project;
- Vegetation management for natural dune restoration, wildfire, or snow avalanche;
- Protective measures for utilities (e.g., electricity, gas); water and sanitary sewer systems and/or infrastructure (e.g., roads and bridges);
- Stormwater management projects (e.g., culverts, retention basins) to reduce or eliminate long-term risk from flood hazards; and
- Localized flood-control projects (certain ring levees, bank stabilization, or floodwall systems) that are designed specifically to protect critical facilities and that do not constitute a section of a larger flood-control system.

Planning grants are available for:

- New plan development
- Plan upgrades
- Comprehensive plan revisions

In order to receive project grants, all applicants MUST have a FEMA-approved State/Tribal standard or enhanced hazard mitigation plan in accordance with 44 CFR Part 201 by the application deadline. In addition, all sub-applicants MUST have a FEMA-approved hazard mitigation plan in accordance with 44 CFR 201 to be eligible to receive project grant funding under the PDM program. PDM planning grants will continue to be available to applicants and sub-applicants that do not have a FEMA-approved hazard mitigation plan to enable them to meet the planning requirements.

Application Requirements - Eligibility and completeness review, including applicant/sub-applicant

Name: Pre-Disaster Mitigation (PDM) Program		
eligibility, benefit cost analysis, and mitigation planning requirements National Ranking – FEMA will score all eligible planning and project sub-applications on the basis of predetermined, objective, quantitative factors to calculate a National Ranking Score.		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	Matching requirements are up to 75% Federal, minimum 25% non-Federal match required. Small, impoverished communities may be eligible for up to a 90% Federal cost-share.	
Application Timeframe:	Changes with fiscal year (issued on a competitive basis)	
Amount Available:	FY10 was $500,000 per State, but amount can vary	
For More Information: Visit FEMA's Website at http://www.fema.gov/government/grant/hma/index.shtm Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600		

Name: Hazard Mitigation Grant Program (HMGP)
Program Description / Activities Funded: As stated in FEMA's *Hazard Mitigation Assistance Unified Guidance (June 1, 2010)*, "HMGP is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, United States Code (U.S.C.) 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. " Typical HMGP projects include: • Elevation of homes above the floodplain • Debris basins, retention ponds • Stream bank stabilization • Pumps, floodgates, floodwalls • Strengthening old masonry buildings against earthquakes • Securing light fixtures and HVAC in schools • Acquisition and relocation Applicants must have a FEMA-approved local mitigation plan in accordance with 44 CFR 201.6 and 206.434(b) to be eligible to receive project grant funding under the HMGP. All activities submitted for consideration must be consistent with the Grantee's State/Tribal standard or enhanced hazard mitigation plan and the applicant's Tribal/local/university hazard mitigation plan for the jurisdiction in which the activity is located.

Name: Hazard Mitigation Grant Program (HMGP)		
The primary responsibility for selecting and administering mitigation activities resides with the State. The State sets mitigation priorities and selects project applications that are developed and submitted by local jurisdictions. Although individuals may not apply directly to the State for assistance, local governments may sponsor an application on their behalf. After its eligibility review, the State forwards applications consistent with State mitigation planning objectives to FEMA for review and approval. Application requirements - eligibility and completeness review, including benefit-cost analysis, engineering feasibility and mitigation planning requirements, environmental and historic preservation reviews		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	HMGP grant funds may be used to pay up to 75% of the eligible project costs. The non-Federal match does not need to be cash; in-kind services or materials may be used.	
Application Timeframe:	Initiated after disaster declaration. The deadline is 12 months after the disaster declaration is issued.	
Amount Available:	The amount of HMGP funding available to the applicant is based upon the estimated total Federal assistance to be provided by FEMA for disaster recovery under the Presidential major disaster declaration.	
For More Information: Visit FEMA's Website at http://www.fema.gov/government/grant/hma/index.shtm Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600		

Name: National Flood Insurance Program (NFIP)		
Program Description / Activities Funded: 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 a 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 mitigate RL and SRL 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.		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	N/A	

Name: National Flood Insurance Program (NFIP)	
Application Timeframe:	Communities can sign up to become a member of the NFIP or CRS program at any time.
Amount Available:	CRS program provides varied discounts to flood insurance premium rates.
For More Information: Visit FEMA's Website at http://www.fema.gov/business/nfip/ **Federal Emergency Management Agency** Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600	

Name: Public Assistance (PA) Program	
Program Description / Activities Funded: 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 IBHS. Examples of such applications include the PA Program. According to the FEMA website, "Through the PA Program, FEMA provides assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain PNP organizations. Section 406 of the Stafford Act provides a funding source for cost-effective hazard mitigation measures that would reduce or eliminate the threat of future damage to a facility damaged during the disaster. 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. Upgrades required to meet applicable codes and standards are not 'mitigation measures' because these measures are part of eligible restoration work."	
Source: FEMA	**Type: Financial Assistance**
Cost Sharing:	25% match; State determines how the cost share will be split up between sub-grantees (eligible applicants)
Application Timeframe:	Process begins once disaster declaration is issued
Amount Available:	Varies
For More Information: Visit FEMA's Website at http://www.fema.gov/government/grant/pa/index.shtm Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600	

Name: Emergency Management Performance Grants (EMPG)

Name: Emergency Management Performance Grants (EMPG)		
Program Description / Activities Funded: According to the FEMA website, EMPG "provides funding to assist State and local governments with sustaining and enhancing all-hazards emergency management capabilities. Emergency management must be able to coordinate in the context of natural and human-made hazards, as well as technological events, that threaten the security of the homeland and the safety and well-being of citizens. An all-hazards approach to preparedness, including the development of a comprehensive program of planning, training, and exercises, sets the stage for an effective and consistent response to any threatened or actual disaster or emergency, regardless of the cause." 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.		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	EMPG has a 50 percent Federal and 50 percent State cost-share requirement.	
Application Timeframe:	Changes with fiscal year	
Amount Available:	Varies from fiscal year to fiscal year	
For More Information: Visit FEMA's Website at http://www.fema.gov/government/grant/empg/index.shtm Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600		

Name: Community Assistance Program – State Support Services Element (CAP-SSSE)
Program Description / Activities Funded: According to the FEMA website, the CAP-SSSE program "provides funding to States to provide technical assistance to communities in the NFIP and to evaluate community performance in implementing NFIP floodplain management activities. In this way, CAP-SSSE helps to: • Ensure that the flood loss reduction goals of the NFIP are met, • Build State and community floodplain management expertise and capability, and • Leverage State knowledge and expertise in working with their communities." Examples of some fundable activities are: • Performance Measurement/Five-Year Plan Updates • State Model Ordinance Research and Development • Ordinance Assistance • Tracking and Reporting Floodplain Management Data • Community Assistance Visits and Community Assistance Contacts • Outreach, Workshops, and Other Training • General Technical Assistance • Mapping Assistance

Name: Community Assistance Program – State Support Services Element (CAP-SSSE)		
• Coordination with Other State Programs and Agencies • Assistance to Communities in Responding to Disasters		
Source: FEMA		**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	There is a 25 percent non-Federal match for all States receiving CAP-SSSE funds.	
Application Timeframe:	Changes with fiscal year	
Amount Available:	Varies from fiscal year to fiscal year	
For More Information: Visit FEMA's Website at http://www.fema.gov/plan/prevent/floodplain/fema_cap-ssse.shtm Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600		

Name: Community Disaster Loan Program		
Program Description / Activities Funded: The program provides direct loans to local governments to offset the loss of tax or other revenues as a result of a major disaster. The loans are to be directly used to maintain local governmental functions such as police and fire protection, or water and sewer services. Loans are not to exceed 25 percent of the local government's annual operating budget for the fiscal year in which the major disaster occurs, up to a maximum of $5 million. Eligibility: Any local government or other eligible jurisdiction in a designated disaster area that has demonstrated a substantial tax loss and a need for financial assistance to perform its governmental functions. Application: The State's Governor requests a Presidential declaration of an emergency or disaster through the FEMA Regional Director. An applicant should consult the office or official designated as the single point of contact in the State for more information on the process the State requires in applying for assistance. Upon declaration of a major disaster, one may apply for assistance through the Governor's authorized representative.		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	No cost-sharing requirements	
Application Timeframe:	Initiated when a disaster is declared	
Amount Available:	Loans are not to exceed 25 percent of the local government's annual operating budget for the fiscal year in which the major disaster occurs, up to a maximum of $5 million.	

Name: Community Disaster Loan Program
For More Information: Federal Emergency Management Agency Public Assistance Branch, Recovery Division 500 C Street SW. Washington, DC 20472 http://www.fema.gov/government/grant/fs_cdl.shtm

Name: Individuals and Households Program (IHP)		
Program Description / Activities Funded: 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. Registration can be done in the following ways: • Telephone. Call the toll-free number, 1-800-621-FEMA (3362) • Speech- or hearing-impaired callers can use the TTY number, 1-800-462-7585 • Internet. Go to www.DisasterAssistance.gov When registering, applicants will need to provide the following information: • Name and Social Security number • Address of the damaged property • Current address and telephone number • Insurance information • Total household annual income • A bank routing and account number for direct deposit • A description of your losses caused by the disaster		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	None	
Application Timeframe:	Initiated when a disaster is declared	
Amount Available:	Varies	
For More Information: Visit FEMA's Website at http://www.fema.gov/media/fact_sheets/individual-assistance.shtm Applicants with questions about disaster assistance can call the Helpline: 1-800-621-FEMA Speech- or hearing-impaired callers can use the TTY number 1-800-462-7585		

Name: Environmental Planning and Historic Preservation (EHP) Program
Program Description / Activities Funded:

Name: Environmental Planning and Historic Preservation (EHP) Program		
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. It is FEMA's policy to act with care to ensure that its disaster response and recovery, mitigation and preparedness responsibilities are carried out in a manner consistent with all Federal environmental and historic preservation policies and laws. FEMA uses all practical means and measures to protect, restore and enhance the quality of the environment, to avoid or minimize adverse impacts to the environment, and to attain the objectives of: • Using the environment without degradation or undesirable and unintended consequences; • Preserving historic, cultural and natural aspects of national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice; • Achieving a balance between resource use and development within the sustained carrying capacity of the ecosystem involved; and • Enhancing the quality of renewable resources and working toward the maximum attainable recycling of depletable resources.		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	Contact FEMA Representative	
Application Timeframe:	Changes with fiscal year	
Amount Available:	Changes with fiscal year	
For More Information: Visit FEMA's Website at http://www.fema.gov/plan/ehp/		

Name: Flood Plain Management Services (FPMS) Program
Program Description / Activities Funded: 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. Activities under the USACE FPMS Program are described below: **General Technical Services** Flood- and floodplain-related data are obtained or developed and interpreted. Topics include flood formation and timing, flood depth or stage, floodwater velocity, extent of flooding, duration of flooding, flood frequency, obstruction to flood flows, "regulatory floodways," natural and cultural resource values of note, and flood loss potentials before and after employment of floodplain management measures. **General Planning Assistance** Planning assistance and guidance is provided for implementing or meeting requirements of floodplain regulations; flood warning and flood emergency preparedness; hurricane evacuation planning; floodproofing measures (e.g., elevation, closures and seals, and anchorage); permanent evacuation and

Name: Flood Plain Management Services (FPMS) Program		
relocation; the NFIP; and Executive Order 11988. The USACE assists in all aspects of floodplain management planning. This can range from helping a community identify the future of the floodplain and related problems (of both the flood modifying and occupancy modifying varieties). Included are the possible impacts of off-floodplain land-use changes to the physical, socio-economic, and environmental conditions of the floodplain. **Guides, Pamphlets, and Supporting Studies** The program includes studies to improve methods and procedures for flood damage prevention and abatement and preparation of guides and pamphlets on topics such as floodproofing, floodplain regulations, floodplain occupancy, economics of floodplain regulations, and important natural floodplain values. Guides and pamphlets are prepared for use by State and local governments, private citizens, and Federal agencies in planning and in taking action to reduce flood damages or damage potentials as part of a floodplain management program.		
Source: U.S. Army Corps of Engineers		**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	None. State and local governments can receive technical assistance free of charge. (Program services are also offered to non-water resource Federal agencies and to the private sector on a 100% cost recovery basis. For most of these requests, payment is required before services are provided.)	
Application Timeframe:	Requests are funded in the order in which they are received, subject to the availability of funds.	
Amount Available:	Changes with fiscal year and is also dependent upon services requested.	
For More Information: US Army Corps of Engineers Walla Walla District Headquarters 201 North Third Avenue Walla Walla, WA 99362-1876 cenww-pa@usace.army.mil		

Name: Planning Assistance to States Program
Program Description / Activities Funded: 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. Funding: The Planning Assistance to States program is funded annually by Congress. Federal allotments for each State or Tribe from the nationwide appropriation are limited to $500,000 annually, but typically are much less. Individual studies, of which there may be more than one per State or Tribe per year, generally cost $25,000 to $75,000. These studies are cost shared on a 50-percent Federal – 50-percent non-Federal basis. The needed planning assistance is determined by the individual States and Tribes. Every year, each

Name: Planning Assistance to States Program			
State and Indian Tribe can request USACE studies under the program, and the USACE accommodates as many studies as possible within the funding allotment. Typical studies are only planning level of detail; they do not include detailed designs for project construction. The studies generally involve the analysis of existing data for planning purposes using standard engineering techniques, although some data collection is often necessary. Most studies become the basis for State or Tribal and local planning decisions. Types of studies conducted in recent years under the program include the following: • Water Supply and Demand Studies • Water Quality Studies • Environmental Conservation/Restoration Studies • Wetlands Evaluation Studies • Dam Safety/Failure Studies • Flood Damage Reduction Studies • Flood Plain Management Studies • Coastal Zone Management/Protection Studies • Harbor/Port Studies How to Request Assistance: State, local government and Tribal officials who are interested in obtaining planning assistance under this program can contact the appropriate USACE office for details. Alternatively, interested parties can contact the appropriate State or Tribal Planning Assistance to States coordinator to request assistance. In either case, the USACE will coordinate all requests for assistance with the State or Tribal Planning Assistance to States coordinator to ensure that studies are initiated on State or Tribal prioritized needs.			
Source: U.S. Army Corps of Engineers		**Type:**	**Technical Assistance** **Financial Assistance**
Cost Sharing:	These studies are cost shared on a 50-percent Federal – 50-percent non-Federal basis.		
Application Timeframe:	Changes with fiscal year		
Amount Available:	Varies from fiscal year to fiscal year, but is limited to $500,000		
For More Information: U.S. Army Corps of Engineers Walla Walla District Headquarters 201 North Third Avenue Walla Walla, WA 99362-1876 cenww-pa@usace.army.mil			

Name: Continuing Authorities Program			
Program Description / Activities Funded: 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, flood control projects, and snagging and clearing for flood control.			
Source: U.S. Army Corps of Engineers		**Type:**	**Technical Assistance**
Cost Sharing:	Varies based on project, although most require a 35% match		
Application Timeframe:	Submittals are accepted year round but preferred by April, so the project could potentially be included in the next year's funding.		
Amount Available:	Varies from fiscal year to fiscal year and by project		
For More Information: U.S. Army Corps of Engineers Walla Walla District Headquarters 201 North Third Avenue Walla Walla, WA 99362-1876 cenww-pa@usace.army.mil			

Name: Inspection of Completed Works Program			
Program Description / Activities Funded: 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.			
Source: U.S. Army Corps of Engineers		**Type:**	**Technical Assistance**
Cost Sharing:	Contact USACE Representative		
Application Timeframe:	Contact USACE Representative		
Amount Available:	Changes with fiscal year		
For More Information: U.S. Army Corps of Engineers Walla Walla District Headquarters 201 North Third Avenue Walla Walla, WA 99362-1876 cenww-pa@usace.army.mil			

Name: Rehabilitation and Inspection Program		
Program Description / Activities Funded: 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.		
Source: U.S. Army Corps of Engineers		**Type: Technical Assistance**
Cost Sharing:	Contact USACE Representative	
Application Timeframe:	Contact USACE Representative	
Amount Available:	Changes with fiscal year	
For More Information: U.S. Army Corps of Engineers Walla Walla District Headquarters 201 North Third Avenue Walla Walla, WA 99362-1876 cenww-pa@usace.army.mil		

Name: Community Development Block Grant (CDBG) Program		
Program Description / Activities Funded: 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.		
Source: U.S. Department Of Housing and Urban Development (HUD)		**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	Contact Representative	
Application Timeframe:	Contact Representative	
Amount Available:	Up to $500,000	
For More Information: U.S. Department Of Housing and Urban Development Boise Field Office Plaza IV, Suite 220 800 Park Boulevard Boise, Idaho 83712-7743 Phone: 208-334-1990 Fax: 208-334-9648 and Email: ID_Webmanager@hud.gov		

Name: Department of Homeland Security Grant (HSGP) Program	
Program Description / Activities Funded: The HSGP consists of five sub-programs: the State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), Operation Stonegarden (OPSG), Metropolitan Medical Response System (MMRS), and Citizen Corps Program (CCP). 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. MMRS supports the integration of emergency management, health, and medical systems for a coordinated response to mass casualty incidents caused by any hazard. Finally, the CCP is intended to bring community and government leaders to coordinate community involvement in preparedness, planning, mitigation, response, and recovery.	
Source: Department of Homeland Security (DHS)	**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	(Optional)
Application Timeframe:	Varies from fiscal year to fiscal year
Amount Available:	Varies from fiscal year to fiscal year and depends on which sub-program the grant application is for.
For More Information: • For additional program-specific information, please contact the Centralized Scheduling and Information Desk (CSID) help line at (800) 368-6498 or askcsid@dhs.gov. CSID hours of operation are from 8:00 a.m. to 6:00 p.m. EDT, Monday through Friday. • For financial-related questions, including pre-and post-award administration and technical assistance, please contact the FEMA Call Center at (866) 927-5646 or via e-mail at ASK-GMD@dhs.gov.	

Name: Small Business Administration (SBA) Disaster Loan Programs	
Program Description / Activities Funded: 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.	
Source: Small Business Administration	**Type: Financial Assistance**
Cost Sharing:	Not Applicable
Application Timeframe:	The application timeframe typically begins once a declaration is made. The deadline is usually 60 days after a declared declaration. The timeframe may change depending upon the disaster. It is best to contact the SBA for more detailed information. This is for physical damage only.
Amount Available:	Varies on a case-by-case basis

Name: Small Business Administration (SBA) Disaster Loan Programs
For More Information: SBA Field Operations Center - West Mailing address: P.O. Box 419004 Sacramento, CA 95841-9004 Phone (916) 735-1500 Toll-Free (800) 488-5323 or 1-800-659-2955 TTY (916) 735-1683 Hours of Operation: 8 am to 5 pm Monday through Friday

Name: National Earthquake Hazards Reduction Program (NEHRP)
Program Description / Activities Funded: 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. IBHS administers this program in Idaho. • State and local agencies and organizations interested in holding a NETAP course in their locality should contact the earthquake program manager at their FEMA Regional Office (FEMA Headquarters and Regional Earthquake Contacts, http://www.fema.gov/plan/prevent/earthquake/hq_regions.shtm) for information. NETAP can often cover the cost of providing course materials for students and a highly qualified onsite instructor. • Some of the NETAP courses are based upon specific FEMA earthquake publications, and FEMA also maintains an online training tool for State earthquake program personnel. Visit Earthquake Publications and Tools—Training (http://www.fema.gov/plan/prevent/earthquake/training_pubs.shtm) to review and access these resources. **Other tools available are :** • FEMA also creates tools that facilitate and promote the use of earthquake risk-reduction measures. The most prominent example is the HAZUS earthquake model, part of the Hazards U.S. Multi-Hazard (HAZUS-MH) software system. The earthquake model, which FEMA first released in 1997 and has since continually refined, employs sophisticated risk-assessment methodologies to estimate potential earthquake damage and losses. HAZUS estimates inform and stimulate preparedness and response planning and training, and help States and localities assess the need for and potential benefits of specific risk-reduction strategies such as seismic rehabilitation of existing buildings. • http://www.quakesmart.org/

Name: National Earthquake Hazards Reduction Program (NEHRP)		
Source: FEMA		**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	Varies	
Application Timeframe:	Changes with fiscal year	
Amount Available:	Changes with fiscal year	
Notes: EMPG, HMGP, and PDM grants can also be used with earthquake mitigation project efforts.		
For More Information: Ms. Tamra Biasco Federal Emergency Management Agency Federal Regional Center 130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4645 tamra.biasco@dhs.gov		

Name: Drought Assistance Programs

Program Description / Activities Funded:
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. The most common assistance programs are listed below:

- Emergency Food Assistance Program
  USDA provides emergency food assistance to States that are in crisis. USDA purchases, processes, and packages the food, then ships it to the individual States.
- Emergency Food Safety Information
  Disasters can jeopardize the safety of food due to unfavorable conditions. USDA provides information on how to determine if food is safe and how to keep it safe in cases of emergency. This helps to minimize the risk of foodborne illness in emergency situations.
- Federal Disaster Assistance Information
  USDA helps to keep the public prepared when disaster strikes with safety alerts, preparedness lists, and disaster prevention information.
- Food Aid Programs
  USDA helps provide the U.S. agricultural commodities that feed millions of hungry people in needy countries through its direct donations and concession programs.
- Emergency Loan Assistance
  USDA provides emergency loans to help producers recover from losses due to natural disasters or quarantine.
- Emergency Watershed Protection Program
  USDA safeguards lives and property from floods, droughts, and the erosion on any watershed, when natural occurrences cause a sudden impairment of the watershed.
- Noninsured Crop Disaster Assistance Program
  USDA provides financial assistance to producers of non-insurable crops when natural disasters cause low yields, loss of inventory, or prevented planting.

Name: Drought Assistance Programs			
• Crop Disaster Program Facts USDA offers facts and information on crop disasters. • Crop Insurance Policies USDA offers crop insurance policies as a risk management option for agricultural producers.			
Source: United States Department of Agriculture (USDA)		**Type:**	**Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	Is dependent upon the program selected		
Application Timeframe:	Varies according to disaster and fiscal year		
Amount Available:	Varies according to disaster and fiscal year		
For More 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: State Dam Safety Program (DSP)
Program Description / Activities Funded: 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

Name: State Dam Safety Program (DSP)		
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. Additionally, water system improvement funds are authorized under the Revolving Development Account and the Water Management Account, administered by the Idaho Water Resource Board. Interested organizations and communities can contact the IDWR for additional information on these accounts. Funding for this program is initially obtained at the Federal level, and the State delegates the funding that is made available. Funding amounts will vary from fiscal year to fiscal year.		
Source: Idaho Department of Water Resources		**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	Contact Representative	
Application Timeframe:	Contact Representative	
Amount Available:	Most funding is awarded to Inundation Mapping Initiatives	
For More 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: Water Quality Improvement Projects
Program Description / Activities Funded: 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. • Drinking Water Construction Loans: DEQ's Drinking Water Construction Loan Fund provides below-market-rate interest loans to help repair or build new drinking water facilities. Eligible facilities include water supply, treatment, storage, and distribution facilities. Loans of up to 100% of project costs may be awarded for project design and/or construction. • Drinking Water Planning Grants: DEQ's Drinking Water Planning Grant Program assists eligible public drinking water systems for facility planning projects designed to ensure safe and adequate supplies of drinking water. Grants awarded under this program may be used to

Name: Water Quality Improvement Projects

develop engineering reports identifying the most cost-effective, environmentally sound method of upgrading a public drinking water system to achieve and maintain compliance with State and Federal standards. Grants cover up to 50% of eligible planning costs, with a matching share funded by local sources.

- Nonpoint Source Management Section 319 Subgrants: Section 319 of the Clean Water Act established a grant program under which States, territories, and Tribes may receive funds to support a wide variety of nonpoint source pollution management activities. DEQ is the State agency responsible for administering this grant program in Idaho. A successful grant must focus on improving the water quality of lakes, streams, rivers, and aquifers. Funds may be used to address a variety of nonpoint source management and prevention activities in the areas of agriculture, urban storm water runoff, transportation, silviculture/forestry, mining, groundwater activities, and hydrologic and habitat modification and related activities.

- Source Water Protection Grants: DEQ's Source Water Protection Grants provide funding for projects to protect sources of public drinking water. Projects can take either a local or regional approach. Local projects will concentrate on protecting a specific community public water supply system, while regional protection activities will cover multiple systems and communities.

  Types of projects that are eligible for funding include those associated with source water protection measures. Operations and maintenance of the system and water treatment are not eligible activities. Community involvement and education is a central theme in these grants, and projects will be expected to provide long-term benefits to drinking water quality, quantity, awareness, and/or security.

- Wastewater Construction Loans
  The Water Pollution Control State Revolving Loan Fund provides below-market-rate interest loans to help build new or repair existing wastewater treatment facilities. Eligible facilities include treatment plants, interceptor sewers, and collector sewers.

  Loans of up to 100% of project costs may be awarded for project design and/or construction. Loans also may be awarded to address nonpoint source pollution control activities such as effluent trading, upgrading or replacing individual septic tanks, restoring wetlands, treating and controlling storm water, and dealing with agricultural runoff. These loans must be fully repaid within 20 years of project completion.

- Wastewater Planning Grants
  DEQ's Wastewater Planning Grant Program provides financial assistance to eligible entities in Idaho planning to upgrade municipal or non-profit wastewater facilities. Grants awarded under this program must be used entirely to prepare facility plans that identify the most cost effective, environmentally sound methods to upgrade eligible wastewater systems to achieve and maintain compliance with State and Federal standards. Grants cover up to 50% of eligible planning costs, with the grantee providing a matching share from local sources.

Source: Idaho Department of Environmental Quality	**Type: Financial Assistance**
Cost Sharing:	Varies upon program

Name: Water Quality Improvement Projects	
Application Timeframe:	Applications are encouraged to be submitted prior to the end of the fiscal year.
Amount Available:	Changes with fiscal year. Generally, Wastewater and Drinking Water Planning Grants are $250,000.
For More 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	
Program Description / Activities Funded: This grant program is the primary source of funding used to conduct hazardous fuels treatments on private lands in Idaho. The ISFPWG 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)	
Source: Idaho State Fire Plan Working Group (ISFPWG)	**Type: Financial Assistance**
Cost Sharing:	10% minimum required.
Application Timeframe:	Applications are due in August or September.
Amount Available:	Maximum award amount is $300,000.
For More Information: General ISFPWG 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 ISFPWG: Craig Glazier, Idaho National Fire Plan Coordinator Idaho Department of Lands/USDA Forest Service Phone:(208) 666-8646	

Name: Bureau of Land Management (BLM) Communities at Risk (Community Assistance) Program
Program Description / Activities Funded: 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

Name: Bureau of Land Management (BLM) Communities at Risk (Community Assistance) Program		
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		
Source: U.S. Bureau of Land Management		**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	None	
Application Timeframe:	Awards are made throughout the year. However, a large number of awards are made prior to the end of the Federal fiscal year (September 30)	
Amount Available:	Amounts vary significantly based upon the nature of the award, between a few thousand and several hundred thousand dollars.	
For More Information: Jon Skinner, Idaho Fire Mitigation Specialist Bureau of Land Management, Idaho State Office (208) 373-3854		

Name: U.S. Forest Service/ Idaho Department of Lands (USFS/IDL)Community Fire Protection (formerly "Steven's Funds") and BLM Partnership Funds		
Program Description / Activities Funded: 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)		
Source: USFS/IDL		**Type: Financial Assistance**
Cost Sharing:	None	
Application Timeframe:	Applications are available in early spring and are due in May.	
Amount Available:	Awards can be for any amount but average at or below $50,000.	
For More Information: Idaho Department of Lands grant programs: Kurt Naccarato, Hazardous Fuels Treatment Program Manager Idaho Department of Lands (208) 666-8653 www.fireplan.gov		

Name: FEMA: Firefighter Assistance Grants
Program Description / Activities Funded: 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.

Name: FEMA: Firefighter Assistance Grants		
Eligible Recipients: fire departments at all levels.		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	10% non-Federal match required.	
Application Timeframe:	Online applications are accepted in early March until early April. Awards are made throughout the summer and fall.	
Amount Available:	Amounts vary significantly based on the nature of the award. The largest awards are usually for firefighting vehicles and digital radio conversions, which may cost over $1 million. In 2008, Idaho's fire protection organizations received more than $4 million from this program.	
For More Information: Fire department personnel who have questions regarding the AFG Grants can reach FEMA's Grants Programs Directorate AFG program staff at 1-866-274-0960 or by e-mail at firegrants@dhs.gov. Firefighter Assistance Grants website: http://www.firegrantsupport.com/		

Name: Rural Fire Assistance (RFA) Program		
Program Description / Activities Funded: 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.		
Source: BLM		**Type: Financial Assistance**
Cost Sharing:	10% in additional wildland equipment or "in kind" services.	
Application Timeframe:	RFA Pre-Applications are due in the fall.	
Amount Available:	Up to $20,000. Most awards are for $5,000 or less.	
Notes: 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.		
For More Information: BLM Rural Fire Assistance Program (RFA): Jon Skinner, Rural Fire Assistance Coordinator Bureau of Land Management, Idaho State Office (208) 373-3854		

Name: Volunteer Fire Assistance (VFA) Program			
Program Description / Activities Funded: Rural firefighting resources are often the first line of defense in meeting expanded protection needs for wildland-urban interface fires. Of the more than 35,000 local fire agencies nationwide, 75% are volunteers. They provide nearly 80% of the initial attack on wildland fires in the United States. These departments provide, at no cost, wildfire and emergency protection service to 43% of the population, at an estimated value of $36 billion per year. The U.S. Forest Service has programs to help these crucial volunteers through their State Foresters. 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.			
Source: USFS/IDL		**Type: Financial Assistance**	
Cost Sharing:	10% Hard Match (cash)		
Application Timeframe:	Applications are due at the beginning of May. Applications are prioritized by the Idaho State Fire Plan Working Group in June.		
Amount Available:	Up to $20,000. Most awards are for $5,000 or less.		
For More Information: Idaho Department of Lands grant programs: Kurt Naccarato, Hazardous Fuels Treatment Program Manager Idaho Department of Lands (208) 666-8653 VFA Program Website: http://www.fs.fed.us/fire/partners/vfa/			

Name: Forest Legacy Program (FLP)
Program Description / Activities Funded: The FLP, a Federal program in partnership with States, supports State efforts to protect environmentally sensitive forest lands. Designed to encourage the protection of privately owned forest lands, FLP is an entirely voluntary program. To maximize the public benefits it achieves, the program focuses on the acquisition of partial interests in privately owned forest lands. FLP helps States develop and carry out their forest conservation plans. It encourages and supports the acquisition of conservation easements, legally binding agreements transferring a negotiated set of property rights from one party to another, without removing the property from private ownership. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect other values. The FLP complements private, Federal and State programs focusing on conservation in two ways. First, FLP directly supports property acquisition. Additionally, FLP supports efforts to acquire donated

Name: Forest Legacy Program (FLP)		
conservation easements. FLP-funded acquisitions serve public purposes identified by participating States and agreed to by the landowner. Participation in the FLP is limited to private forest landowners. To qualify, landowners are required to prepare a multiple resource management plan as part of the conservation easement acquisition. The USDA's Forest Service administers the FLP in cooperation with State partners. The State grant option allows States a greater role in implementing the program. FLP also encourages partnerships with local governments and land trusts, recognizing the important contributions landowners, communities, and private organizations make to conservation efforts. Goals of the program are to protect wildlife, habitat, biodiversity and threatened and endangered species, and to promote and restore water quality, wetlands, and riparian buffers and encourage recreation.		
Source: USDA/USFS		**Type: Financial Assistance**
Cost Sharing:	At least 25% coming from private, State or local sources	
Application Timeframe:	Generally due in June but may vary year to year. Contact USDA Representative.	
Amount Available:	Varies upon project and fiscal year	
For More Information: USDA Forest Service 1400 Independence Ave. SW Washington, D.C. 20078-5500 (202) 205-8333 or Dee Sessions Stewardship/Forest Land Enhancement Program/Legacy/Forest Resource Management/Cooperative Watershed/CostShare Phone: 801-625-5189 Email: dsessions@fs.fed.us		

Name: State Fire Assistance Program
Program Description / Activities Funded: The State Fire Assistance Program provides financial and technical support directly to States, to enhance firefighting capacity, support community-based hazard mitigation, and expand outreach and education to homeowners and communities concerning fire prevention. The program requires a 50-50 match by the State. The delivery system is through the State Forester. As a result of the National Fire Plan and the Healthy Forest Restoration Act, the hazardous fuels reduction component is a major part of the State Fire Assistance Program. The hazardous fuels application and selection process is managed by the Western States Fire Managers. The hazardous fuels component, along with most other fuels mitigation funds provided by Federal agencies and the State, is coordinated through a collaborative interagency effort.

Name: State Fire Assistance Program		
Some benefits include: • Complements Federal firefighting forces to optimize fire protection across ownerships • Complements hazardous mitigation efforts across ownerships to reduce risks to communities • Enhances the capability and capacity (training, equipment, preparedness, and education) of local fire protection entities • Engages communities and homeowner to be able to recognize interface fire hazards, and provides them with opportunities to develop local solutions • Provides a fire protection training link to volunteer fire departments Opportunities for National Forests and Grasslands: • Coordinate fire prevention, pre-suppression, hazard mitigation and suppression activities with State Foresters and local cooperators • Provide training opportunities for local fire departments to assist each other in wildland suppression activities • Helps local communities and cooperators to identify opportunities to work with each other, especially in the wildland-urban interface		
Source: USFS		**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	Contact USFS representative for details	
Application Timeframe:	Changes with fiscal year	
Amount Available:	Varies with project and fiscal year	
For More Information: Dee Sessions Stewardship/Forest Land Enhancement Program/Legacy/Forest Resource Management/Cooperative Watershed/CostShare Phone: 801-625-5189 Email: dsessions@fs.fed.us or Cathy Scofield Coop Fire - Idaho, North Dakota, and Montana Phone: 406-329-3409 cscofield@fs.fed.us		

Name: Federal Excess Personal Property Program
Program Description / Activities Funded: 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. The benefits of the program include: • Enhances State and local fire protection capabilities by providing important equipment at a

Name: Federal Excess Personal Property Program		
fraction of the cost of purchasing new or used • Complements the State Fire Assistance Program and the Volunteer Fire Assistance Program to improve the efficiency and effectiveness of fire protection across ownerships Opportunities for National Forests and Grasslands • Forest Service personnel can assist by identifying excess property that may be used by State and local fire organizations, and by encouraging local fire departments to pursue needed equipment through this program.		
Source: USFS		**Type: Technical Assistance**
Cost Sharing:	Contact USFS representative for details	
Application Timeframe:	Contact USFS representative for details	
Amount Available:	Contact USFS representative for details	
For More Information: Dee Sessions Stewardship/Forest Land Enhancement Program/Legacy/Forest Resource Management/Cooperative Watershed/CostShare Phone: 801-625-5189 Email: dsessions@fs.fed.us or Cathy Scofield Coop Fire - Idaho, N. Dakota, and Montana Phone: 406-329-3409 cscofield@fs.fed.us		

Name: Forest Stewardship Program (FSP)
Program Description / Activities Funded: Approximately 45% of all forestland in the United States, or 354 million acres, is under nonindustrial private ownership. This contributes significantly to America's clean water and air, wildlife habitat, recreational resources, and timber supplies. Authorized by the Cooperative Forestry Assistance Act of 1978, 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. **Landowner Participation** 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.

Name: Forest Stewardship Program (FSP)			
Rural Forestry Assistance The FSP also assists State forestry agencies with a variety of programs to further support planning and management efforts by nonindustrial private forest owners, including tree improvement and seedling production, and landowner education programs. The Rural Forestry Assistance component of the FSP also provides for tree planting and timber stand improvement projects on non-Federal forest land, the development of discrete, resource-targeted management prescriptions, or practice plans for landowners.			
Source: USFS		**Type:**	**Technical Assistance** **Financial Assistance**
Cost Sharing:	None		
Application Timeframe:	Changes with fiscal year		
Amount Available:	Changes with fiscal year		
For More Information: Dee Sessions Stewardship/Forest Land Enhancement Program/Legacy/Forest Resource Management/Cooperative Watershed/CostShare Phone: 801-625-5189 Email: dsessions@fs.fed.us For more information on how this program is managed nationally, contact Karl R. DallaRosa, Program Manager at kdallarosa@fs.fed.us.			

Name: Community Forestry Program			
Program Description / Activities Funded: 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. The Idaho Department of Lands partners with the nine Resource Conservation and Development (RC&D) Councils to provide technical assistance to communities throughout the State. Cooperative agreements with the RC&D provide for the contracting of three Community Forestry Assistants. These specialists offer timely local assistance to cities and organizations in their respective geographic areas at no charge.			
Source: IDL/RC&D		**Type:**	**Technical Assistance** **Financial Assistance** **Education/Outreach**
Cost Sharing:	None		
Application Timeframe:	Contact Representative for more information		
Amount Available:	Contact Representative for more information		
For More Information: Joyce Jowdy Phone: 208-666-8622			

Name: Community Forestry Program		
Fax: 208-769-1524 Email: jjowdy@idl.idaho.gov Website: http://www.idl.idaho.gov/bureau/community_forestry/home/index.htm		
Name: Rural Housing Programs		
Program Description / Activities Funded: 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. • Section 502 Direct Program: Loans for up to 100% of the value of the home are made directly to low- and very low-income persons to help them purchase a modest new or existing home, using a payment assistance subsidy to reduce the homeowners' payments. Some government-owned properties are eligible under this program. • Section 502 Guaranteed Program: The Federal government agrees to guarantee a home loan, thus allowing lending institutions to help buyers while incurring little risk. • Section 504 Loan and Grant Program: Loans for repairs are available for very-low-income rural homeowners. Loans are at 1-percent interest and allow up to 20 years for repayment. Grants are available to owners 62 years of age or older. • Section 515 Multi-family Housing Program: Subsidized loans for the construction and subsequent improvement of multifamily housing in rural communities are provided to housing authorities, individuals, nonprofit or limited-profit corporations, and limited partnerships. The housing units can be rented to very low-income, low-income, and moderate-income persons, including the elderly. • Section 538 Guaranteed Rural Rental Housing Program: The Federal government agrees to guarantee loans made through approved lenders to build or acquire apartments for moderate-income tenants.		
Source: USDA		**Type: Financial Assistance**
Cost Sharing:	None	
Application Timeframe:	Contact Housing Program Director	
Amount Available:	Contact Housing Program Director	
For More 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: Reimbursement for Firefighting on Federal Property		
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.		
Source: U.S. Fire Administration		**Type: Financial Assistance**
Cost Sharing:	None	
Application Timeframe:	Contact U.S. Fire Administration	
Amount Available:	Contact U.S. Fire Administration	
For More 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. U.S. Fire Administration- General Contact Information: 16825 South Seton Avenue Emmitsburg, MD 21727 Phone: (301) 447-1000 Fax: (301) 447-1346 Admissions Fax: (301) 447-1441		

Name: Fire Management Assistance Grant Program		
Program Description / Activities Funded: 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. The Fire Management Assistance Grant Program (FMAGP) provides a 75% Federal cost share, and the State pays the remaining 25% for actual costs. Before a grant can be awarded, a State must demonstrate that total eligible costs for the declared fire meet or exceed either the individual fire cost threshold - which applies to single fires, or the cumulative fire cost threshold, which recognizes numerous smaller fires burning throughout a State. Eligible firefighting costs may include expenses for field camps; equipment use, repair and replacement; tools, materials and supplies; and mobilization and demobilization activities.		
Source: FEMA		**Type: Financial Assistance**
Cost Sharing:	25%	
Application Timeframe:	Dependant on Declaration	
Amount Available:	Changes with Fiscal Year and disaster	
For More Information: Federal Emergency Management Agency Federal Regional Center		

Name: Fire Management Assistance Grant Program
130 - 228th Street, Southwest Bothell, WA 98021-8627 (425) 487-4600

<table>
<tr><td colspan="4">Name:
Pacific Northwest Region Water Quality Program</td></tr>
<tr><td colspan="4">Program Description / Activities Funded:
The Pacific Northwest Region Water Quality Program builds on the strengths of the Extension Water Quality Programs at the four Land Grant Universities throughout the Northwest. These States -- Alaska, Idaho, Oregon, and Washington -- correspond to EPA Region 10.

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.

This organization only provides technical service on a watershed-to-watershed basis. No grant funding is available.</td></tr>
<tr><td colspan="2">Source: Pacific Northwest Regional Water Program</td><td colspan="2">Type: Technical Assistance</td></tr>
<tr><td>Cost Sharing:</td><td colspan="3">N/A</td></tr>
<tr><td>Application Timeframe:</td><td colspan="3">N/A</td></tr>
<tr><td>Amount Available:</td><td colspan="3">N/A</td></tr>
<tr><td colspan="4">For More 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</td></tr>
</table>

Name: USDA Farm Service Agency's (FSA) Emergency Conservation Program (ECP)
Program Description / Activities Funded:

Name: USDA Farm Service Agency's (FSA) Emergency Conservation Program (ECP)		
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. **Program Administration** ECP is administered by State and county FSA committees. Subject to availability of funds, locally elected county committees are authorized to implement ECP for all disasters except drought, which is authorized at the national office of FSA. **Land Eligibility** 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. Conservation problems existing prior to the applicable disaster are ineligible for ECP assistance. Technical assistance may be provided by USDA's Natural Resources Conservation Service.		
Source: USDA Farm Service Agency's (FSA)		**Type: Technical Assistance Financial Assistance**
Cost Sharing:	ECP program participants receive cost-share assistance of up to 75% of the cost to implement approved emergency conservation practices, as determined by county FSA committees.	
Application Timeframe:	Should check with local county FSA offices regarding ECP sign-up periods, which are set by county FSA committees.	
Amount Available:	Individual or cumulative requests for cost-sharing of $50,000 or less per person, per disaster are approved at the county committee level. Cost-sharing from $50,001 to $100,000 is approved at the State committee level. Cost-sharing over $100,000 must be approved by FSA's national office.	
For More Information: More information on ECP is available at FSA offices and on FSA's website at http://disaster.fsa.usda.gov. USDA/FSA Idaho State FSA 9173 West Barnes Drive Boise, ID 83709-1573 Phone: 208-378-5650 Fax: 208-378-5678		

Name: The Conservation Reserve Program (CRP)

Name: The Conservation Reserve Program (CRP)

Program Description / Activities Funded:
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.

Benefits
CRP protects millions of acres of American topsoil from erosion and is designed to safeguard the Nation's natural resources. By reducing water runoff and sedimentation, CRP protects groundwater and helps improve the condition of lakes, rivers, ponds, and streams. Acreage enrolled in the CRP is planted to resource-conserving vegetative covers, making the program a major contributor to increased wildlife populations in many parts of the country.

CRP Administration
FSA administers CRP, while technical support functions are provided by:
- USDA's Natural Resource Conservation Service (NCRCS);
- USDA's Cooperative State Research, Education, and Extension Service;
- State forestry agencies;
- Local soil and water conservation districts; and
- Private sector providers of technical assistance.

CRP General Sign-up
Producers can offer land for CRP general enrollment only during designated sign-up periods. For information on upcoming sign-ups, contact the local FSA office. To find your local office, visit FSA's Web site at http://offices.sc.egov.usda.gov/locator/app?state=us&agency=fsa.

CRP Continuous Sign-up
Environmentally desirable land devoted to certain conservation practices may be enrolled at any time under CRP continuous sign-up. Certain eligibility requirements still apply, but offers are not subject to competitive bidding. Additional information on CRP continuous sign-up is available in the FSA fact sheet "Conservation Reserve Program Continuous Sign-up."

Eligible Producers
To be eligible for CRP enrollment, a producer must have owned or operated the land for at least 12 months prior to close of the CRP sign-up period, unless:
- The new owner acquired the land due to the previous owner's death;
- The ownership change occurred due to foreclosure, where the owner exercised a timely right or redemption in accordance with State law; or
- The circumstances of the acquisition present adequate assurance to FSA that the new owner did not acquire the land for the purpose of placing it in CRP.

Eligible Land
To be eligible for placement in CRP, land must be either: cropland (including field margins) that is planted or considered planted to an agricultural commodity for 4 of the previous 6 crop years, and

<table>
<tr><td colspan="3">Name: The Conservation Reserve Program (CRP)</td></tr>
<tr><td colspan="3">which is physically and legally capable of being planted in a normal manner to an agricultural commodity; or certain marginal pastureland that is suitable for use as a riparian buffer or for similar water quality purposes.

Additional Cropland Requirements
In addition to the eligible land requirements, cropland must meet one of the following criteria:
• Have a weighted average erosion index of 8 or higher;
• Be expiring CRP acreage; or
• Be located in a national or State CRP conservation priority area.

Ranking CRP Offers
Offers for CRP contracts are ranked according to the Environmental Benefits Index (EBI). FSA collects data for each of the EBI factors based on the relative environmental benefits for the land offered. Each eligible offer is ranked in comparison to all other offers, and selections are made from that ranking. FSA uses the following EBI factors to assess the environmental benefits for the land offered:
• Wildlife habitat benefits resulting from vegetative covers on contract acreage;
• Water quality benefits from reduced erosion, runoff, and leaching;
• On-farm benefits from reduced erosion;
• Benefits that will likely endure beyond the contract period;
• Air quality benefits from reduced wind erosion; and
• Cost</td></tr>
<tr><td colspan="2">Source: USDA Farm Service Agency's (FSA)</td><td>Type: Technical Assistance
Financial Assistance
Education/Outreach</td></tr>
<tr><td>Cost Sharing:</td><td colspan="2">The cost-share assistance can be an amount not more than 50% of the participants' costs in establishing approved practices.</td></tr>
<tr><td>Application Timeframe:</td><td colspan="2">CRP sign up is announced annually by the Secretary and Continuous can sign up at any time.</td></tr>
<tr><td>Amount Available:</td><td colspan="2">Varies upon project and fiscal year funding availability</td></tr>
<tr><td colspan="3">For More Information:
USDA/FSA
Idaho State FSA
9173 West Barnes Drive
Boise, ID 83709-1573
Phone: 208-378-5650
Fax: 208-378-5678</td></tr>
</table>

<table>
<tr><td>Name: USDA Farm Service Agency’s (FSA) Tree Assistance Program (TAP)</td></tr>
<tr><td>Program Description / Activities Funded:
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.</td></tr>
</table>

Name: USDA Farm Service Agency's (FSA) Tree Assistance Program (TAP)			
Eligible Tree Types Eligible trees, bushes and vines are those from which an annual crop is produced for commercial purposes. Nursery trees include ornamental, fruit, nut and Christmas trees produced for commercial sale. Trees used for pulp or timber are ineligible. **Eligible Producers** To qualify for TAP, orchardists and nursery tree growers must: • Suffer qualifying tree, bush or vine losses in excess of 15% (adjusted for normal mortality) from an eligible natural disaster for the individual stand; • Have owned the eligible trees, bushes and vines when the natural disaster occurred; however, eligible growers are not required to own the land on which eligible trees, bushes and vines are planted; • Replace eligible trees, bushes and vines within 12 months of the date the application is approved. **Risk Management Purchase Requirement** Orchardists and nursery tree growers must have obtained a policy or plan of insurance for all crops through either the Federal Crop Insurance Act or FSA's Noninsured Crop Disaster Assistance Program (NAP). There are limited exceptions to this rule. Eligible producers who meet the definition of "Socially Disadvantaged," "Limited Resource," or "Beginning Farmer or Rancher" do not have to meet this requirement. **Adjusted Gross Income (AGI)** For the 2009 and subsequent program years, producers or legal entities whose average nonfarm AGI exceeds $500,000 are not eligible. For the 2008 program year, producers are not eligible if their average AGI is $2.5 million or greater, unless 75 percent or more of their AGI is from agriculture.			
Source: USDA/FSA		**Type:**	**Technical Assistance** **Financial Assistance**
Cost Sharing:	Varies		
Application Timeframe:	Contact USDA/FSA Representative		
Amount Available:	Contact USDA/FSA Representative		
For More 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
Program Description / Activities Funded:

Name: USDA Water and Waste Disposal Programs

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:

- Water and Waste Disposal Loans and Grants
- Emergency Community Water Assistance Grants
- Technical Assistance and Training Grants
- Solid Waste Management Grants

RUS provides loans, guaranteed loans, and grants for water, sewer, storm water, and solid waste disposal facilities in cities and towns up to 10,000 people and rural areas with no population limits.

Who May Receive Assistance?
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.

Applicants must:

- Be unable to obtain needed funds from commercial sources at reasonable rates and terms.
- Have the legal capacity to borrow and to repay loans, to pledge security for loans, and to operate and maintain the facilities.
- Propose facilities that are consistent with any development plans of the State, multijurisdictional area, counties, or municipalities where the project is to be located. All facilities must comply with Federal, State, and local laws, including those involving zoning regulations, health and sanitation standards, and water pollution control.

Grants may be provided, when necessary, to reduce user costs to a reasonable level. They may cover a maximum of 75% of eligible facility development costs. Loan guarantees may be available for up to 90% of any eligible loss incurred by the lender. Lenders pay a 1% guarantee fee, which may be passed on to the loan recipient.

Direct loans and/or grants have been set aside for:

- Communities along the U.S.-Mexico border designated as "colonias."
- Areas designated Empowerment Zones/Enterprise Communities and Rural Economic Area Partnership Zones.
- Certain projects where at least 50%of the users of the facility/project are Native Americans.
- Rural Alaskan villages.
- Water emergencies and disaster relief.

Loan and grant funds may be used to:

- Construct, repair, modify, expand, or otherwise improve water supply and distribution systems and waste collection and treatment systems, including storm drainage and solid waste disposal facilities. Certain other costs related to development of the facility may also be covered.

Name: USDA Water and Waste Disposal Programs			
• Needed land, water sources, and water rights. • Pay costs such as legal and engineering fees, when necessary, to develop the facilities. **Emergency Community Water Assistance Grants** may be available to rural communities when disaster strikes. Congress may appropriate funds for the program after a flood, earthquake, or other disaster, if Federal assistance is warranted. **Who May Receive Assistance?** • Applicants must demonstrate that a significant decline in the quantity or quality of water occurred within 2 years of the date the application was filed with RUS. • Public bodies and nonprofit corporations serving rural areas, including cities or towns whose population does not exceed 10,000 people, may be eligible. Public bodies include Indian Tribes on Federal and State reservations and other federally recognized Indian Tribal groups. **How May Grant Funds be Used?** 1. Extend, repair, or perform significant maintenance on existing water systems; construct new water lines, wells or other sources of water, reservoirs, and treatment plants; replace equipment; and pay costs associated with connection or tap fees. 2. Pay related expenses, such as legal and engineering fees and environmental impact analyses, or acquire rights associated with developing sources of, treating, storing, or distributing water. 3. Compliance with the requirements of the Federal Water Pollution Control Act (33 U.S.C. l et seq.) or with the Safe Drinking Water Act, when noncompliance is directly related to a recent decline in the quality of potable water.			
Source: USDA/FSA		**Type:**	**Technical Assistance** **Financial Assistance**
Cost Sharing:	Varies		
Application Timeframe:	Applications may be filed with the USDA Rural Development office serving the applicant's area. Detailed information and applications are available through USDA Rural Development State, Local, and Area Offices. State Office locations and telephone numbers may be obtained from the office of the Assistant Administrator, Water and Waste, at (202) 720-9583. They are also available on the Internet.		
Amount Available:	Varies		
For More Information: USDA/FSA Idaho State FSA 9173 West Barnes Drive Boise, ID 83709-1573 Phone: 208-378-5650 Fax: 208-378-5678			

Name: Internal Revenue Service (IRS)Casualty Loss-Special Disaster Provisions
Program Description / Activities Funded:

Name: Internal Revenue Service (IRS)Casualty Loss-Special Disaster Provisions		
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.		
Source: IRS		**Type:** Technical Assistance Financial Assistance
Cost Sharing:	N/A	
Application Timeframe:	Initiated when a disaster declaration is available	
Amount Available:	N/A (The main priority is service to either obtain an extension with taxes or receive a refund more quickly, and assistance with itemizing items destroyed during a disaster.)	
For More Information: http://www.irs.gov/businesses/small/article/0,,id=156138,00.html Area offices: Boise 550 West Fort St. Boise, ID 83724 Phone: (208) 387-2847 Coeur D'Alene 1221 Ironwood Dr. Coeur D'Alene, ID 83814 Phone: (208) 676-8798 Idaho Falls 1820 East 17th St. Idaho Falls, ID 83404 Phone: (208) 523-8041 Pocatello 611 Wilson Ave. Pocatello, ID 83201 Phone: (208) 236-6795		

Name: Bonneville Power Administration: Integrated Fish and Wildlife Program
Program Description / Activities Funded:

Name: Bonneville Power Administration: Integrated Fish and Wildlife Program		
Environmental values are an important part of our Pacific Northwest heritage. So, too, is the low-cost and clean energy produced by Federal hydroelectric facilities throughout the Columbia River Basin. BPA and its partners operating the Federal Columbia River Power System (FCRPS) are working to protect and enhance our environmental, fish, and wildlife values, and ensure these qualities for future generations. BPA partners with the Northwest Power and Conservation Council, the Columbia Basin Fish and Wildlife Authority, Columbia Basin Tribes, and other Federal, State, and private organizations. BPA provides funding for conservation easements, habit acquisitions and protections, and other conservation and restoration projects.		
Source: Bonneville Power Administration		**Type: Financial Assistance**
Cost Sharing:	Contact Bonneville Power Administration	
Application Timeframe:	Contact Bonneville Power Administration	
Amount Available:	Contact Bonneville Power Administration	
For More Information: 905 Northeast 11th Ave. Portland, OR 97232 503-230-5136 and 1-800-282-3713 (Toll Free) Integrated Fish & Wildlife Program: Bill Maslen, Director Environmental Services: Jim Kehoe, Manager - Environmental Planning & Analysis		

Name: National Oceanic Atmospheric Restoration Center Grants	
Program Description / Activities Funded: 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. Large-scale regional restoration projects conducted under the Coastal Wetlands Planning, Protection, and Restoration Act reduce coastal erosion and reverse wetlands loss in Louisiana, where tens of thousands of acres of wetlands are lost through subsidence, erosion, and die-offs each year. • The Community-based Restoration Program applies a novel, grass-roots approach to restoration and is designed to actively engage communities in on-the-ground restoration of local habitats. • NOAA's Damage Assessment, Remediation and Restoration Program works to restore marine resources that have been injured due oil spills, toxic releases, or ship groundings. • NOAA's Great Lakes Habitat Restoration Program works to restore coastal and near-shore habitats in the Great Lakes. • Finding ways to address Invasive Species is another NOAA priority, as these nuisance plants and critters continue to take over our aquatic habitats. • The Restoration Science Program advances emerging restoration technology, science, and cost-effective practices.	
Source: NOAA	**Type: Technical Assistance**

Name: National Oceanic Atmospheric Restoration Center Grants	
	Financial Assistance
Cost Sharing:	Varies
Application Timeframe:	Varies
Amount Available:	Varies from $10,000 to $1,000,000, depending upon scale of project
For More 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: Idaho Fish & Wildlife Foundation	
Program Description / Activities Funded: 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.	
Source: Idaho Fish & Wildlife Foundation	**Type: Technical Assistance Financial Assistance Education/Outreach**
Cost Sharing:	1:1 match
Application Timeframe:	Initiated in November, after the Board issues a notice about funding opportunities
Amount Available:	$2,000-$5,000
For More Information: For more information, call (208)334-2648 or email ifwf@idfg.idaho.gov.	

Name: U.S. Department of Housing and Urban Development (HUD) Programs
Program Description / Activities Funded: 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

<table>
<tr><td colspan="3">Name: U.S. Department of Housing and Urban Development (HUD) Programs</td></tr>
<tr><td colspan="3">• HUD/FHA Section 203(k) Rehabilitation Mortgage Insurance Program
• HUD Disaster Recovery Grants
Additional grant information can be found at HUDs website and at Grants.gov</td></tr>
<tr><td colspan="2">Source: HUD</td><td>Type: Technical Assistance
Financial Assistance
Education/Outreach</td></tr>
<tr><td>Cost Sharing:</td><td colspan="2">HUD generally awards noncompetitive, nonrecurring Disaster Recovery grants by a formula that considers disaster recovery needs unmet by other Federal disaster assistance programs.</td></tr>
<tr><td>Application Timeframe:</td><td colspan="2">General Home services applications can be processed all year round. The disaster-related application process begins after a disaster declaration has been issued.</td></tr>
<tr><td>Amount Available:</td><td colspan="2">Varies. Loan programs are based on credit and amount being requested.</td></tr>
<tr><td colspan="3">For More Information:
HUD Boise Field Office
Plaza IV, Suite 220
800 Park Boulevard
Boise, Idaho 83712-7743
Phone: (208) 334-1990
Fax: (208) 334-9648</td></tr>
</table>

<table>
<tr><td>Name: Department of Transportation/Federal Highway Administration (FHWA) Emergency Relief Program</td></tr>
<tr><td>Program Description / Activities Funded:
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.

The applicability of the ER program to a natural disaster is based on the extent and intensity of the disaster. Damage to highways must be severe, occur over a wide area, and result in unusually high expenses to the highway agency. Applicability of ER to a catastrophic failure due to an external cause is based on the criteria that the failure was not the result of an inherent flaw in the facility but was sudden, caused a disastrous impact on transportation services, and resulted in unusually high expenses to the highway agency.

What Are Federal-aid Highways?
The State highway agencies, working with local officials, have established the functional classification of all public roads, ranging from high service level arterials to lower service local streets. Federal-aid highways are all the public roads not functionally classified as either local or rural minor collectors. As a result, Federal-aid highways include the more important State, county, and city roads. Based on the</td></tr>
</table>

Name: Department of Transportation/Federal Highway Administration (FHWA) Emergency Relief Program	
functional classifications, about one-quarter of the overall public road mileage has been designated as Federal-aid highways. **What Is Serious Damage?** Serious damage is major or unusual damage to a highway which severely impairs the safety or usefulness of the highway or results in road closures. Serious damage must be beyond the scope of work usually done by highway agencies in repairing damage normally expected from seasonal or occasionally different natural conditions. As a general rule, the estimated cost for repairs from a disaster or catastrophic failure in a State must require at least $700,000 in ER funding before the FHWA will consider approving the disaster or catastrophic failure as eligible for funding under the ER program. **What Types of Repairs Are Eligible for Funding?** ER funds can be used for "emergency repairs" and "permanent repairs." Emergency repairs are those made during and immediately following a disaster to restore essential traffic, to minimize the extent of damage, or to protect the remaining facilities. Typical examples are: • establishing emergency detours • removing slides and debris • providing temporary bridges or ferry service • regrading of roadway embankments and surfaces • placing rip-rap to prevent further scour Permanent repairs are those undertaken, normally after emergency repairs have been completed, to restore the highway to its pre-disaster condition. These would include: • restoring pavement surfaces • reconstructing damaged bridges and culverts • replacing signs, guardrail, fences, and other highway appurtenances	
Source: Department of Transportation/FHWA	**Type: Financial Assistance**
Cost Sharing:	Approved ER funds are available at the pro-rata share that would normally apply to the Federal-aid facility damaged. For Interstate highways, the Federal share is 90%. For all other highways, the Federal share is 80%. Emergency repair work to restore essential travel, minimize the extent of damage, or protect the remaining facilities, accomplished in the first 180 days after the disaster occurs, may be reimbursed at 100% Federal share.
Application Timeframe:	Individual States are responsible for requesting ER funds to assist in the cost of necessary repair of Federal-aid highways damaged by natural disasters or catastrophic failures. A notice of intent to request ER funds, filed by the State Department of Transportation with the FHWA Division Office located in the State, will initiate the ER application process.
Amount Available:	$100 million in annual authorization
For More Information: FHWA Idaho Division Office 3050 Lakeharbor Lane, #126 Boise, ID 83703	

Name: Department of Transportation/Federal Highway Administration (FHWA) Emergency Relief Program
FHWA Office Phone : (208) 334-1843

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

Program Description / Activities Funded:
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

Eligible Parties include:

- City or other political subdivision of a State, including a special-purpose unit of a State or local government engaged in economic or infrastructure development activities, or a consortium of political subdivisions;
- State;
- Institution of higher education or consortium of institutions of higher education;
- Public or private non-profit organization or association, including a community or faith-based non-profit organization, acting in cooperation with officials of a political subdivision of a State;
- District Organization;
- Indian Tribe or a consortium of Indian Tribes; or
- Private individual or for-profit organization, but only for training, research and technical assistance investments.

Source: Department of Commerce/Economic Development Authority	**Type: Technical Assistance Financial Assistance**
Cost Sharing:	Contact Representative
Application Timeframe:	Contact Representative
Amount Available:	Varies upon grant program

For More Information:
Economic Development Authority

Name: Department of Commerce/Economic Development Authority (EDA)
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: The Steele-Reese Foundation Grant Program		
Program Description / Activities Funded: 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.		
Source: The Steele-Reese Foundation		**Type: Financial Assistance**
Cost Sharing:	None	
Application Timeframe:	Applications can be submitted at any time, but those submitted after March 1 will be considered for the next fiscal year.	
Amount Available:	Grants generally vary in size from $5,000 to (rarely) over $150,000	
For More Information: Linda Tracy Western Program Director The Steele-Reese Foundation PO Box 8311 Missoula, MT 59807-8311 E-mail: linda@steele-reese.org		

Name: The Steele-Reese Foundation Grant Program
Phone: (406) 207-7984 Fax: (207) 470-3872

<table>
<tr><th colspan="3">Name: The Wilburforce Foundation Grant Program</th></tr>
<tr><td colspan="3">Program Description / Activities Funded:
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.</td></tr>
<tr><td colspan="2">Source: The Wilburforce Foundation</td><td>Type: Financial Assistance</td></tr>
<tr><td>Cost Sharing:</td><td colspan="2">None</td></tr>
<tr><td>Application Timeframe:</td><td colspan="2">Varies upon program applying to and geographic region.</td></tr>
<tr><td>Amount Available:</td><td colspan="2">Varies</td></tr>
<tr><td colspan="3">For More Information:
Wilburforce Foundation
3601 Fremont Ave N, #304
Seattle, WA 98103-8753
Phone: 206-632-2325
Fax: 206-632-2326
Email: grants@wilburforce.org</td></tr>
</table>

State Funding Capability

The State of Idaho does not have a dedicated funding capability for mitigation. In the past, the State assisted with local match requirements for federally funded projects. However, that option is at the discretion of the Governor.

APPENDIX A: REFERENCES

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APPENDIX B: AUTHORITIES, ASSURANCES, AND ADOPTION

Authorities

The authority to adopt the 2010 Idaho State Hazard Mitigation Plan (SHMP) is provided in Idaho Code, Title 46, Chapter 10. Other related authorities include:

Federal

- Public Law 93-288, as amended, *Robert T. Stafford Disaster Relief and Emergency Assistance Act*
- Public Law 93-234, as amended, *Flood Disaster Protection Act of 1973*
- FEMA Regulations at 44 CFR 9, *Floodplain Management*
- FEMA Regulations at 44 CFR 10, *National Environmental Policy Act*
- FEMA Regulations at 44 CFR 13, *Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments*
- FEMA Regulations at 44 CFR 206, Subparts M and N
- Executive Order 11988, *Floodplain Management*
- Executive Order 11990, *Protection of Wetlands*
- Executive Order 12612, *Federalism*
- Executive Order 12699, *Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction*
- *Hazard Mitigation Assistance Unified Guidance*

State

- Idaho Code 4610 et seq., *Disaster Preparedness Act of 1975, as amended*
- *Governor's Executive Order 2006-10*

Assurances and Compliance with Federal Regulations

The Idaho SHMP meets the standard requirements of Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, 42 United States Code Sections 5121 and following (commonly referred to as the Stafford Act - Public Law 93-288).

This plan is also intended to meet the requirements of Section 322 of the Stafford Act, which require that States, as a condition of receiving Federal disaster mitigation funds, have a mitigation plan in place that describes the planning process for identifying hazards, risk and vulnerabilities; identifies and prioritizes mitigation actions; encourages the development of local mitigation; and provides technical support for these efforts. In addition, the Act requires local and Tribal governments to have mitigation plans as a condition of receiving disaster mitigation funds.

Federal regulations at 44 CFR 201.4(c)(7) indicate that the SHMP must include assurances that the State will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with CFR 13.11(c). The State will amend its plan whenever necessary to reflect change in State or Federal laws and statutes, as required in CFR 13.11(d).

Through the development and enforcement of this plan, the State of Idaho will comply with all provisions in 44 CFR 13, as well as Subchapter B – Insurance and Mitigation, Subchapter D – Disaster Assistance, and Subchapter F – Preparedness. Additionally, the assurances listed below are provided as documentation that the State or any subsequent sub-grantee (recipients) that receive Federal grant funds will comply with all applicable Federal statutes and regulations. The State will amend the plan whenever necessary to reflect changes in Federal statutes and regulations or material changes in State law, organization, policy or State agency operations.

To the extent the following provisions apply to the award of assistance:

1) Recipient possesses legal authority to enter into agreements and to execute the proposed programs;
2) Recipient's governing body has duly adopted or passed as an official act a resolution, motion or similar action authorizing the execution of hazard mitigation agreements, including all understandings and assurances contained therein, and directing and authorizing the Recipient's chief administrative officer or designee to act in connection with any application and to provide such additional information as may be required;
3) No member of or delegate to the Congress of the United States, and no Resident Commissioner, shall be admitted to any share or part of any agreement or to any benefit to arise from the same. No member, officer, or employee of the Recipient or its designees or agents, no member of the governing body of the locality in which the program is situated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the program during his tenure or for one year thereafter, shall have any interest direct or indirect, in any contract or subcontract, or the proceeds thereof, for work to be performed in connection with the program assisted under this plan. The Recipient shall incorporate or cause to be incorporated, in all such contracts or subcontracts, a provision prohibiting such interest pursuant to the purpose state above;
4) Recipient will comply with:
    i) Contract Work Hours and Safety Standards Act of 1962, 40 USC 327 et seq., requiring that mechanics and laborers (including watchmen and guards) employed on federally assisted contracts be paid wages of not less than one and one-half times their basic wage rates for all hours worked in excess of forty hours in a work week; and
    ii) Federal Fair Labor Standards Act, 29 USC Section 201 et seq., requiring that covered employees be paid at least the minimum prescribed wage, and also that they be paid one and one-half times their basic wage rates for all hours worked in excess of the prescribed work-week.
5) Recipient will comply with:
    i) Title VI of the Civil Rights Act of 1964 (P.L. 88-352), and the regulations issued pursuant thereto, which provides that no person in the United States shall on the

grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Recipient receives Federal financial assistance and will immediately take any measures necessary to effectuate this assurance. If any real property or structure thereon is provided or improved with the aid of Federal financial assistance extended to the Recipient, this assurance shall obligate the Recipient, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the Federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits;

ii) Any prohibition against discrimination on the basis of age under the Age Discrimination Act of 1975, as amended (42 U.S.C.: 6101-6107), which prohibits discrimination on the basis of age or with respect to otherwise qualified handicapped individuals as provided in Section 504 of the Rehabilitation Act of 1973;

iii) Executive Order 11246 as amended by Executive Orders 11375 and 12086, and the regulations issued pursuant thereto, which provide that no person shall be discriminated against on the basis of race, color, religion, sex or national origin in all phases of employment during the performance of Federal or federally assisted construction contracts; affirmative action to insure fair treatment in employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff/termination, rates of pay or other forms of compensation; and election for training and apprenticeship;

6) The Recipient agrees to comply with the Americans With Disabilities Act (Public Law 101-336, 42 USC Section 12101 et seq.), where applicable, which prohibits discrimination by public and private entities on the basis of disability in the areas of employment, public accommodations, transportation, State and local government services, and in telecommunications;
7) Recipient will comply with Title IX of the Education Amendments of 1972, as amended (20 USC: 1681-1683 and 1685-1686), which prohibits discrimination on the basis of sex;
8) Recipient will comply with the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970, (42 USC 4521-45-94) relating to nondiscrimination on the basis of alcohol abuse or alcoholism;
9) Recipient will comply with 523 and 527 of the Public Health Service Act of 1912 (42 USC 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records;
10) Recipient will comply with Title VIII of the Civil Rights Act of 1968, 42 USC 2000c and 42 3601-3619, as amended, relating to non-discrimination in the sale, rental, or financing of housing, and Title VI of the Civil Rights Act of 1964 (P.L. 88-352), which prohibits discrimination on the basis of race, color or nation origin;
11) Recipient will comply with the Intergovernmental Personnel Act of 1970, 42USC 4728-4763;

12) Recipient will comply with the Rehabilitation Act of 1973, Section 504, 29 USC 794, regarding non-discrimination;
13) Recipient will establish safeguards to prohibit employees from using positions for a purpose that is, or gives the appearance of, being motivated by a desire for private gain for themselves or others, particularly those with whom they have family, business, or other ties pursuant to Section 112.313 and Section 112.3135, FS;
14) Recipient will comply with the Anti-Kickback Act of 1986, 41 USC Section 51 which outlaws and prescribes penalties for "kickbacks" of wages in federally financed or assisted construction activities;
15) Recipient will comply with the Hatch Act (18 USC 594, 598, 600-605), which limits the political activities of employees;
16) Recipient will comply with the flood insurance purchase and other requirements of the Flood Disaster Protection Act of 1973 as amended, 42 USC 4002-4107, including requirements regarding the purchase of flood insurance in communities where such insurance is available as a condition for the receipt of any Federal financial assistance for construction or acquisition purposes for use in any area having special flood hazards. The phrase "Federal financial assistance" includes any form of loan, grant, guaranty, insurance payment, rebate, subsidy, disaster assistance loan or grant, or any other form of direct or indirect Federal assistance;
17) Recipient will require every building or facility (other than a privately owned residential structure) designed, constructed, or altered with funds provided under a grant agreement to comply with the "Uniform Federal Accessibility Standards," (AS) which is Appendix A to 41 CFR Section 101-19.6 for general type buildings and Appendix A to 24 CFR 40 for residential structures. The Recipient will be responsible for conducting inspections to ensure compliance with these specifications by the contractor;
18) Recipient will, in connection with its performance of environmental assessments under the National Environmental Policy Act of 1969, comply with Section 106 of the National Historic Preservation Act of 1966 (USC 470), Executive Order 11593, 24 CFR 800, and the Preservation of Archaeological and Historical Data Act of 1966 (16 USC 469a-1, et seq.) by:
    i) Consulting with SHPO to identify properties listed in or eligible for inclusion in the *National Register* of Historic Places that are subject to adverse effects (see 36 CFR Section 800.8) by the proposed activity; and
    ii) Complying with all requirements established by the State to avoid or mitigate adverse effects upon such properties.
    iii) Notifying FEMA and the State if any project may affect a historic property. When any of Recipient's projects funded under a grant agreement may affect a historic property, as defined in 36 CFR 800. (2)(e), FEMA may require Recipient to review the eligible scope of work in consultation with SHPO and suggest methods of repair or construction that will conform with the recommended approaches set out in the Secretary of Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings 1992 (Standards), the Secretary of the Interior's Guidelines for Archeological Documentation (Guidelines) (48 Federal Register 44734- 37), or any

other applicable Secretary of Interior standards. If FEMA determines that the eligible scope of work will not conform with the Standards, Recipient agrees to participate in consultations to develop, and, after execution by all parties, to abide by, a written agreement that establishes mitigation and recondition measures, including but not limited to, impacts to archeological sites, and the salvage, storage, and reuse of any significant architectural features that may otherwise be demolished.

iv) Notifying FEMA and the State if any project funded under a grant agreement will involve ground disturbing activities, including, but not limited to: subsurface disturbance; removal of trees; excavation for footings and foundations; and installation of utilities (such as water, sewer, storm drains, electrical, gas, leach lines and septic tanks) except where these activities are restricted solely to areas previously disturbed by the installation, replacement or maintenance of such utilities. FEMA will request the SHPO's opinion on the potential that archeological properties may be present and be affected by such activities. The SHPO will advise Recipient on any feasible steps to be accomplished to avoid any *National Register* eligible archeological property or will make recommendations for the development of a treatment plan for the recovery of archeological data from the property. If Recipient is unable to avoid the archeological property, it will develop, in consultation with the SHPO, a treatment plan consistent with the Guidelines and take into account the Advisory Council on Historic Preservation (Council) publication "Treatment of Archeological Properties". Recipient shall forward information regarding the treatment plan to FEMA, the SHPO and the Council for review. If the SHPO and the Council do not object within 15 calendar days of receipt of the treatment plan, FEMA may direct Recipient to implement the treatment plan. If either the Council or the SHPO object, Recipient shall not proceed with the project until the objection is resolved.

v) Notifying the State and FEMA as soon as practicable: (a) of any changes in the approved scope of work for a *National Register* eligible or listed property; (b) of all changes to a project that may result in a supplemental DSR or modify an HMGP project for a *National Register* eligible or listed property; (c) if it appears that a project funded under a grant agreement will affect a previously unidentified property that may be eligible for inclusion in the *National Register* or affect a known historic property in an unanticipated manner. Recipient acknowledges that FEMA may require Recipient to stop construction in the vicinity of the discovery of a previously unidentified property that may be eligible for inclusion in the *National Register* or upon learning that construction may affect a known historic property in an unanticipated manner. Recipient further acknowledges that FEMA may require Recipient to take all reasonable measures to avoid or minimize harm to such property until FEMA concludes consultation with the SHPO. Recipient also acknowledges that FEMA will require, and Recipient shall comply with, modifications to the project scope of work necessary to implement recommendations to address the project and the property.

vi) Acknowledging that, unless FEMA specifically stipulates otherwise, it shall not receive funding for projects when, with intent to avoid the requirements of the PA or the NHPA, Recipient intentionally and significantly adversely affects a historic property, or having the legal power to prevent it, allowed such significant adverse affect to occur.

19) Recipient will assist the awarding agency in assuring compliance with the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 270;
20) Recipient will assist the awarding agency in assuring compliance with the Preservation of Archeological and Historical Preservation Act of 1966, 16 U.S.C. 469a, et seq;
21) Recipient will comply with the requirements of Titles II and III of the Uniform Relocation Assistance and Property Acquisition Policies Act of 1970, 42 U.S.C. 4621-4638, which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally assisted programs;
22) Recipient will assure project consistency with the approved State program developed under the Coastal Zone Management Act of 1972, 16 U.S.C. 1451-1464; and
23) With respect to demolition activities, recipient will:

i) Create and make available documentation sufficient to demonstrate that the Recipient and its demolition contractor have sufficient manpower and equipment to comply with the obligations as outlined in a grant agreement.

ii) Return the property to its natural state as though no improvements had ever been contained thereon.

iii) Furnish documentation of all qualified personnel, licenses and all equipment necessary to inspect buildings located in Recipient's jurisdiction to detect the presence of asbestos and lead in accordance with requirements of the U.S. Environmental Protection Agency, State of Idaho, and the County Health Agency.

iv) Provide documentation of the inspection results for each structure to

v) indicate:

   i. Safety Hazards Present
   ii. Health Hazards Present
   iii. Hazardous Materials Present

vi) Provide supervision over contractors or employees employed by Recipient to remove asbestos and lead from demolished or otherwise applicable structures.

vii) Leave the demolished site clean, level and free of debris.

viii) Notify the department promptly of any unusual existing condition which hampers the contractors work.

ix) Obtain all required permits.

x) Provide addresses and marked maps for each site where water wells and septic tanks are to be closed, along with the number of wells and septic tanks located on each site. Provide documentation of closures.

xi) Comply with mandatory standards and policies relating to energy efficiency that are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163).

xii) Comply with all applicable standards, orders, or requirements issued under Section 112 and 306 of the Clean Air Act (42 U.S.C. 1857 (h), Section 508 of the Clean Water Act (33 U.S. 1368), Executive Order 11738, and the U.S. Environmental Protection Agency regulations (40 CFR 15 and 61). This clause shall be added to any subcontracts.

xiii) Provide documentation of public notices for demolition activities.

24) Recipient will comply with Lead-Based Paint Poison Prevention Act (42 U.S.C.: 4821 et seq.), which prohibits the use of lead based paint in construction of rehabilitation or residential structures;
25) Recipient will comply with the Energy Policy and Conservation Act (P.L. 94- 163; 42 U.S.C. 6201-6422), and the provisions of the State Energy Conservation Plan adopted pursuant thereto;
26) Recipient will comply with the Laboratory Animal Welfare Act of 1966, 7 U.S.C. 2131-2159, pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by an award of assistance under this agreement;
27) Recipient will comply with the Clean Air Act of 1955, as amended, 42 U.S.C. 7401-7642;
28) Recipient will comply with the Clean Water Act of 1977, as amended, 42 U.S.C. 7419-7626;
29) Recipient will comply with the Endangered Species Act of 1973, 16 U.S.C. 1531-1544;
30) Recipient will comply with environmental standards which may be prescribed pursuant to the National Environmental Policy Act of 1969, 42 U.S.C. 4321- 4347;
31) Recipient will comply with the environmental standards that may be prescribed pursuant to the Safe Drinking Water Act of 1974, 42 U.S.C. 300f-300j, regarding the protection of underground water sources;
32) Recipient will comply with the Wild and Scenic Rivers Act of 1968, 16 U.S.C. 1271-1287, related to protecting components or potential components of the national wild and scenic rivers system;
33) Recipient will comply with the following Executive Orders: EO 11514 (NEPA); EO 11738 (violating facilities); EO 11988 (Floodplain Management); EO 11990 (Wetlands); and EO 12898 (Environmental Justice);
34) Recipient will comply with the Coastal Barrier Resources Act of 1977, 16 U.S.C. 3510;
35) Recipient will comply with the Fish and Wildlife Coordination Act of 1958; 16 U.S.C. 661-666.

Adoption

State of Idaho Hazard Mitigation Plan

Statement of Adoption

Pursuant to 44 CFR 201.4, for Idaho to continue to be eligible for Federal disaster assistance and hazard mitigation funding, the State of Idaho Bureau of Homeland Security (IBHS) is required to update the State of Idaho Hazard Mitigation Plan (SHMP) every three years. The SHMP was initially approved by FEMA and published by the IBHS in November, 2003 and was last updated on November 2, 2007.

The SHMP is a comprehensive description of the State's commitment to reduce or eliminate the impacts of events caused by natural and human-caused hazards and is a federal requirement under the Disaster Mitigation Act of 2000 for the State of to receive federal funds for disaster recovery and hazard mitigation. The SHMP is coordinated and maintained by the IBHS, but is the culmination of input and recommendations from numerous stakeholders from locals, state and federal government agencies, private sector organizations and residents of Idaho.

The authority to adopt the 2010 SHMP is provided in Title 46, Chapter 10, Idaho Code. In adopting the SHMP, the State of Idaho agrees to comply with all applicable state and federal statutes and regulations, as stipulated in previously documented assurances and will continue to maintain and update the plan as federal regulations require. The SHMP has been updated to reflect emerging hazard conditions and risks, new or revised state and federal laws, programs and capabilities as well as a more robust mitigation strategy.

The 2010 Idaho State Hazard Mitigation Plan is hereby adopted.

C.L. "Butch" Otter
Governor, State of Idaho

11/1/10
Date

State of Idaho Hazard Mitigation Plan

Statement of Adoption

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The 2010 Idaho State Hazard Mitigation Plan is hereby adopted.

29 OCT 10

Brigadier General William H. Shawver
Director, Idaho Bureau of Homeland Security

Date

State of Idaho Hazard Mitigation Plan

Statement of Adoption

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The 2010 Idaho State Hazard Mitigation Plan is hereby adopted.

Gary Sayler

1 Nov 2010

Major General Gary L. Sayler
Adjutant General, Idaho Military Division

Date

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

FEMA

November 1, 2010

Brigadier General William H. Shawver
Director, Idaho Bureau of Homeland Security
Military Division
4040 Guard Street, Building 600
Boise, Idaho 83705-5004

Dear General Shawver:

Congratulations, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the 2010 update to the ***State of Idaho Hazard Mitigation Plan*** as a Standard State Plan, in accordance with 44 CFR Part 201. The State of Idaho continues to be eligible for Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) non-emergency programs through November 2, 2013. To continue eligibility, the plan must be reviewed, revised as appropriate and re-submitted for approval within three years from the date of this letter.

As a result of the Disaster Mitigation Action of 2000, States and Tribes are required to develop and maintain hazard mitigation plans compliant with FEMA standards as a condition for receiving non-emergency Stafford Act assistance. For local entities and Tribes who conduct their emergency management activities and programs through the State, a FEMA-approved local plan is required for hazard mitigation project grant eligibility. Applicable Stafford Act assistance includes Public Assistance (Categories C-G), Fire Management Assistance, Hazard Mitigation Grant Program, and Pre-Disaster Mitigation grants.

FEMA's approval of your updated plan as a Standard State Plan provides the State of Idaho continued availability of various Stafford Act programs. All requests for assistance, however, will be evaluated individually according to the specific eligibility and other requirements of the particular programs. For example, a mitigation action identified in the approved plan may or may not meet the eligibility requirements for HMGP funding. FEMA's program specialists are available to answer any questions regarding specific program requirements and eligibility.

We look forward to continuing a productive relationship between FEMA Region 10 and the State of Idaho. Please contact our Regional Mitigation Planning Manager, Kristen Meyers, at (425) 487-4543, or our Mitigation Division Director, Mark Carey, at (425) 487-4687 with any questions or for further assistance.

Sincerely,

Kenneth D. Murphy
Regional Administrator

cc: Dave Jackson, Idaho Military Division

BH:bb

www.fema.gov

APPENDIX C: SUMMARY OF UPDATES AND 2007 PLAN INFORMATION

Summary of Updates

For the 2010 SHMP update, the Idaho Bureau of Homeland Security (IBHS) took a step back from the current plan to see how it could be enhanced through reorganization as well as through the addition of more information and updated data. A new approach for updating the Plan in 2010 included the use of technical working groups to improve how the plan addresses Idaho's top three hazards (wildfires, floods, and earthquakes). Each of the technical working groups reviewed the 2007 Plan and, from their expert perspective, provided feedback on how to improve it. Details regarding the meetings and coordination that took place in order to develop and achieve the update goals are provided in Appendix D. The following section provides detail on the differences between the 2007 Plan and the 2010 Plan that resulted from this planning process.

Because of the reorganization of the Plan, it would be difficult to describe how each section of the plan was reviewed separately. In summary, the technical working groups reviewed the entire Plan, focusing on information in Chapters 2, 3, or 4, as appropriate for their areas of expertise. Information that was in those chapters in the 2007 Plan was consolidated into Chapter 3 in the 2010 Plan. Many decisions concerning Chapters 2, 3, or 4 from the 2007 Plan affected other sections of the Plan, such as the new HAZUS analysis and the review of mitigation actions. The IBHS updated sections related to mitigation programs and capabilities based on how the program operated in the past, improvements that should be made, and the potential for change.

Table C-1 indicates whether or not each section of the 2007 SHMP was revised as part of the update process.

Table C-1: Summary of Differences Between Versions of the Idaho SHMP

2007 Section Name	Section(s) in 2010 SHMP where similar information is found	Changes in Updated Section(s)
Adoption signature pages.	Appendix B: Authorities, Assurances, and Adoption	• Materials related to plan adoption were moved from the front of the document to new appendix.
Chapter 1: Executive Summary	Executive Summary, Chapter 1: Hazard Summary and Mitigation Strategy, Chapter 2: State of Idaho Profile, and Appendix C: Summary of Updates and 2007 Plan Information	• Executive Summary section was reorganized to summarize the Plan and no longer contains information that is not detailed in elsewhere in the SHMP. • Idaho profile information was placed in a separate chapter (Chapter 2) and expanded to include a review of natural environment, land use, development trends, critical infrastructure, and State facilities.

Table C-1: Summary of Differences Between Versions of the Idaho SHMP		
2007 Section Name	**Section(s) in 2010 SHMP where similar information is found**	**Changes in Updated Section(s)**
		• A summary of updates was moved to a new appendix.
Chapters 2-5: Flood, Wildland Fire, Earthquake, and Other Hazards	Chapter 3: Hazards in Idaho[1], and Appendix G: Mitigation Action Plan and Prioritization	• All hazard Risk Assessments were grouped into a single chapter. • "Wildland Fire" now called "Wildfire." • "Dam/Levee Failure" hazard added. • Standardization of subsections for each hazard. • Roll-up of information from local plans. • HAZUS-MH4 analyses included. • Detailed consequence analysis for top three hazards. • Preliminary database shell for State facilities/infrastructure. • Recommended Mitigation Actions removed and included as Appendix G.
Chapter 6: Planning Process	Chapter 1: Hazard Summary and Mitigation Strategy Chapter 4: Policies, Programs, and Capabilities and Appendix D: Planning Process and Maintenance	• Capability assessment and funding program information was placed in a separate section (Chapter 4). • Descriptions of programs were extracted and included in new chapter (Chapter 4) • Mitigation Actions portion was extracted and included with new chapter (Chapter 1)
Appendix 1.1: State of Idaho Mitigation Actions	Appendix G: Mitigation Action Plan and Prioritization	• Moved section to front of Plan. Includes summary of mitigation actions for 2007-2010. • Significantly changed nature and quantity of mitigation actions, focusing them on items that are within the State's span of control. • Updated mitigation goals and objectives.
Appendix 2.1: State of Idaho Stream Gauges	--	• Not included in the 2010 update.
Appendix 3.1: Review of Community Wildfire Protection Plans	--	• Not included in the 2010 update.
Appendix 3.2: Hazardous Fuels Treatment and Planning Funding	--	• Not included in the 2010 update.

Table C-1: Summary of Differences Between Versions of the Idaho SHMP		
2007 Section Name	**Section(s) in 2010 SHMP where similar information is found**	**Changes in Updated Section(s)**
Appendix 3.3: National Fire Plan Progress	--	• Not included in the 2010 update.
--	Appendix A: References	• Full citations for references included in Appendix A.
--	Appendix B: Authorities, Assurances, and Adoption	• Moved from beginning of document to Appendix B.
--	Appendix C: Summary of Updates and 2007 Plan Information	• New assessment conducted for this Plan.
--	Appendix E: Enhanced Plan Capability Assessment	• New assessment conducted for this Plan.
--	Appendix F: HAZUS Capability Assessment	• New analysis conducted for this Plan.
Notes: [1] Updates are detailed at the beginning of Chapter 3; "--" indicates that this section was not included in the other version of the SHMP.		

APPENDIX D: PLANNING PROCESS & PLAN MAINTENANCE

Planning Process

Introduction

Development of the 2010 State Plan Update has involved coordination between the Idaho Bureau of Homeland Security (IBHS); local, State, and Federal agencies; and the public in order to address and incorporate: 1) new FEMA requirements for Plan updates, 2) updated data on hazard events and mitigation efforts in Idaho, and 3) diverse and changing concerns reflected in the local plans of the 47 counties and Tribal governments that comprise the State. This update required a multilayered planning process that employed a variety of forums and techniques. The following sections detail the planning process in the years since 2007, describe who was involved, key decisions and milestones, and the integration of other planning programs.

The Planning Team

Planning Executive Committee

IBHS used a Planning Executive Committee comprising IBHS and other agency representatives to assist IBHS in the SHMP Update. This committee included the following individuals from six different agencies:

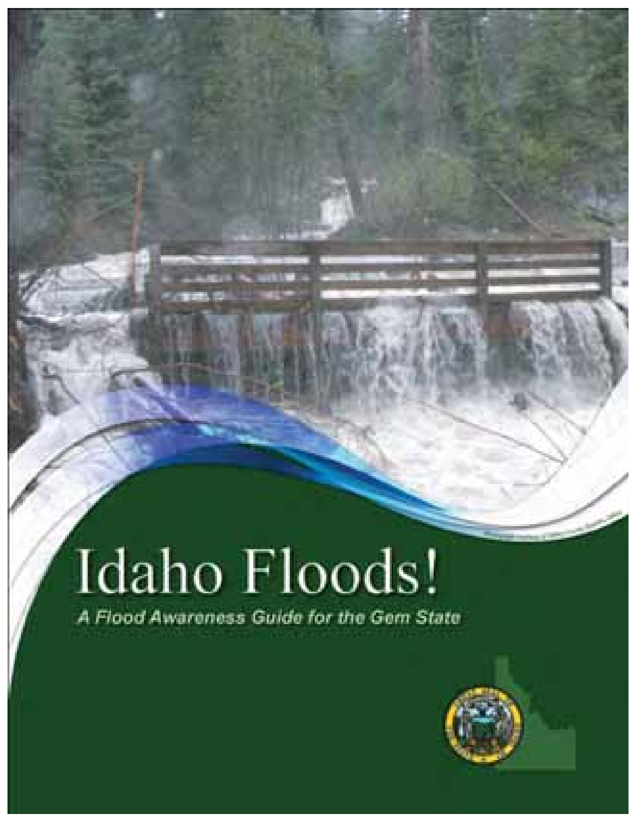
- Bill Hatch, Idaho Division of Building Safety, State Building Safety Specialist
- Bill Phillips, Idaho Geological Survey, Research Geologist
- David Jackson, IBHS, State Hazard Mitigation Officer
- Ellen Berggren, U.S. Army Corps of Engineers (USACE)
- Heidi Novich, IBHS, CCP
- Julie Sendra, IBHS, GIS Manager
- Mark Stephensen, IBHS, Project Manager
- Mary McGown, Idaho Department of Water Resources (IDWR), State Floodplain Coordinator
- Steve Kimble, Idaho Department of Lands, State Fire Plan Specialist

The Executive Committee participated in several exercises, including evaluating the 2007 Plan, a Consequence Analysis exercise, and a Mitigation Solutions Workshop. The Executive Committee provided overall guidance and direction on the 2010 Plan update.

Technical Working Groups

For the top three hazards in the State (flood, wildfire, and earthquake), technical working groups were used to provide expertise and detail beyond the scope of the Planning Executive Committee. The working groups assisted in updating the risk assessment and formulating mitigation strategies for their hazards. The working groups will also champion the implementation of the mitigation strategies after the Plan is adopted (see "Plan Maintenance" at the end of this appendix). For all three of the key hazards, Idaho already benefitted from organized, multi-agency groups that could fill the role of technical working groups in the Idaho SHMP Update effort. The pre-existing groups already had track records for maintaining a regular meeting schedule and could focus their attention on their topic of expertise and not have to grapple with edits to the entire SHMP. The technical working group concept also allowed proper coordination and integration with other statewide planning efforts (Idaho Implementation Strategy for National Fire Plan, Silver Jackets Implementation Plan) because members were involved in both efforts.

For Flood, IBHS turned to the Idaho Silver Jackets Team, which is the State-level implementation of the USACE's National Flood Risk Management Program (NFRMP). The Idaho chapter of the Silver Jackets was established by a USACE charter in the summer of 2009 (NFRMP, 2009). The group holds meetings at least on a quarterly basis, but it has met nearly every month in the year since its charter. Meeting minutes are posted publically at http://www.nfrmp.us/state/factIdaho.cfm. As described in their charter, the group's vision is to "serve as a catalyst in developing comprehensive and sustainable solutions to flood hazard issues, including mitigation planning, flood hazard mapping, risk reduction activities, and response and recovery planning." As explained in a USACE news release (USACE, 2010), "Silver Jackets team members with different areas of expertise provide one-stop information to State and local government to help them identify solutions to flood hazards. In addition, Silver Jackets educate the public about flood risks, so communities can better understand flood-related problems and assistance programs." This allows for integration with FEMA's mitigation programs and initiatives.



Many projects conducted by the Silver Jackets helped to inform the SHMP development. For example, the Silver jackets keep track of Digital Flood Insurance Rate Map (DFIRM) studies; in their March 2010 meeting, they planned to compare DFIRM cross sections with HAZUS runs to identify potential focus areas for an enhanced study of the Coeur d'Alene River basin, where there have been recurring flooding issues. Most recently, the group has published 'Idaho Floods! A Flood Awareness Guide for the Gem State'. This 44-page booklet outlines the flood hazard in Idaho, provides information on the NFIP program, and explains to citizens what to do before, during, and after a flood event. The guide is being widely distributed and can be found on the BHS website [http://bhs.idaho.gov/Pages/Preparedness/Hazards/NaturalHazards/Flood.aspx].

Membership in the Idaho Silver Jackets varies based on available resources and team focus; however, the core member agencies involved at all times include USACE, FEMA, IDWR, IBHS, and National Oceanic Atmospheric Administration National Weather Service (NOAA/NWS). For coordinating with IBHS on the

SHMP update project specifically, the Idaho Silver Jackets have a designated lead, BHS employee Mark Stephensen, who acted as a liaison between the planning team groups.

For Wildfire, the working group consisted of a pre-existing team that already focused on the hazard of wildfire in the State: the Idaho State Fire Plan Working Group (ISFPWG). This group, formed in 2002, is charged with assisting counties and tribes with their local Wildfire Protection Plans and their associated local working groups, disseminating information, and providing oversight to facilitate the implementation of the National Fire Plan in Idaho (Idaho State Fire Plan Working Group, 2010).

The group holds three meetings per year (winter, spring and fall) and posts meeting minutes publically through their website: http://www.idahofireplan.org/. Currently, as posted on the website, the group consists of the following members, representing a variety of Federal, State, and local agencies:

- Craig Glazier, Idaho National Fire Plan Coordinator
- Brian Shiplett, Idaho Department of Lands
- David Jackson, IBHS
- Mark Larson, Idaho State Fire Marshal
- Jerry Miller, Idaho Department of Commerce
- Jeff Handel, Idaho Department of Parks and Recreation
- Tom Hemker, Idaho Department of Fish and Game
- Bonnie Butler, Idaho Governor's Office
- Tim Droegmiller, Nez Perce Tribe
- Tom Pakootas, Coeur d'Alene Tribe
- Brian Briggs, Shoshone-Bannock Tribes
- Brett Ingles, Resource Conservation and Development Councils (RC&Ds)
- Dean Ellis, Idaho Fire Chiefs Association
- David Hasz, Idaho Emergency Managers Association
- Dr. Robert Cope and Joe Daniels, Idaho Association of Counties
- Len Diaz, USDI Bureau of Indian Affairs
- Jon Skinner, USDI Bureau of Land Management
- Kelly Woods, USDI Fish & Wildlife Service
- Tod Johnson, USDI National Park Service
- Gary Brown, USDA Forest Service

For Earthquake, another pre-existing group was used by IBHS as the technical working group: the Seismic Advisory Committee. The Idaho Seismic Advisory Committee is a multidiscipline, interagency group that has been meeting since September 2007. In early 2010, the Committee incorporated the SHMP update as part of its agenda. The Seismic Advisory Committee was organized by IBHS to develop and implement statewide earthquake preparedness and mitigation efforts. It is composed of members representing Idaho's local, State and Federal agencies, professional engineers, and universities.

Membership in spring 2010 included the following people:

- Bill Phillips, Idaho Geological Survey
- Mike Woodworth, P.E., Idaho Geotechnical Engineers Association
- Sarah McClendon, P.E., Structural Engineers Association of Idaho
- Bill Hatch and Jack Rayne, Idaho Division of Building Safety
- Richard Link, U.S. Bureau of Reclamation
- John Falk, State Dam Safety Engineer, IDWR
- Bryan Smith, Idaho DOT
- Greg Adams, Idaho Emergency Management Association
- Matt Haney and Kasper VanWijk, Boise State University Geosciences Department
- Rob Clayton, BYU-Idaho Department of Geology
- Dave Jackson, Mark Stephensen, and Heidi Novich, IBHS

The Planning Process

Since 2007, the technical working groups have discussed the SHMP and coordinated with IBHS on how best to update and enhance the Plan. In the spring of 2010, IBHS hired a consultant, the Michael Baker Corporation (Baker), to update data, coordinate meetings, disseminate information among stakeholders including the public, and edit or amend the Idaho SHMP as appropriate.

Through input from the working groups and Baker's own research, an update to the Risk Assessment section of the SHMP was completed in the summer of 2010 and subsequently reviewed by the Planning Executive Committee and technical working groups. In September 2010, three Open House Forums were held throughout the State to invite additional agency and public feedback.

A complete draft of the Idaho SHMP Update was provided to FEMA in October 2010. Also at this time, the draft plan was posted on the project website for other interested parties to comment. FEMA's review comments were addressed, and public comments were considered and addressed as appropriate. The final SHMP Update was adopted by the State in November 2010. Final FEMA approval was issued thereafter, also in November.

The planning process itself has been improved since the 2007 SHMP. IBHS is working more directly with technical work groups, who better understand their role in the SHMP update process. The risk assessment that is informing the mitigation planning now includes HAZUS-MH4 analysis and detailed consequence analyses.

All of the agency and public coordination efforts have resulted in many updates and enhancements to the 2007 Idaho SHMP. Other than minor rewording, these differences are listed in Appendix C, section by section. The following sections detail planning process elements for the 2010 SHMP update.

Project Kickoff and 2007 Plan Evaluation Meeting

On February 10, 2010, the Planning Executive Committee held a kickoff meeting. The primary purpose of this meeting was to evaluate the 2007 Plan, discuss desired changes for the 2010 update, and finalize the planning process.

Key decisions coming out of this first meeting included:

- Ensuring that the update would allow the State to meet the mitigation component of the Emergency Management Accreditation Program (EMAP).
- Organizing the risk assessment by Region (approximately four- or five-county areas), which would match how some other State programs are organized.
- Increasing the analysis of potential impacts to critical structures.
- Coordination with the technical working groups for Flood, Wildfire, and Earthquake to focus discussion among hazard specialists and bring results back to the Executive Committee.
- Schedules for milestones and future meetings.

Local Mitigation Plan Roll-Up

All local plans were collected; where only the paper versions of the plans were available, they were converted to electronic copies. A database was then developed to capture key information for the purpose of further analysis. This included risk assessment information (what were the top hazards identified in local plans, what were the estimated losses and vulnerability – where available, what were the categories of mitigation strategies, and what, if any statements were made regarding local capability). These data were aggregated and analyzed to be reported in the 2010 SHMP.

Risk Assessment Update

The risk assessment update included several steps: review and confirmation of major hazards; update and collection of hazard profile information; data search and incorporation of any risk and vulnerability assessments that had been completed since 2007; level 1 and 2 HAZUS runs for flood and earthquake; building a CDMS-compatible database shell to be used in the future for State-owned and critical facilities.

Risk Assessment Review and Consequence Analysis Meeting

This meeting by the Executive Committee on June 4, 2010, included other agency representatives that are stakeholders in the hazard mitigation process, including representatives from technical working groups. Eleven people signed in at the meeting. The process for hazard mitigation planning and the status of the risk assessment were reviewed with the agency representatives. Also, meeting attendees participated in two exercises to improve understanding: a Consequence Analysis Exercise, and a State Policy / Programs / Actions Related to Hazard Mitigation Exercise**.** The Consequence Analysis Exercise focused on three scenario events – one each for flood, earthquake and wildfire, the three major hazards identified in the plan. The results of these exercises can be found in Chapter 3, under the *Vulnerability Analysis and Loss Estimation* subsection.

Technical Working Groups Meetings

Flood

In August 2009, the Idaho Silver Jackets hosted a Listening Session to introduce their program to other flood hazard stakeholders. As part of that forum, the Silver Jackets reviewed and solicited comments on the Flood Hazard chapter of the SHMP. This meeting was attended by Federal and State agencies, local governments, and non-profit organizations, though it was not advertised as open to the public. Input from the Listening Session was used to develop roles and responsibilities related to flood mitigation in the State.

At the March 2010 meeting of the Silver Jackets, progress on the SHMP was discussed and a representative from Baker attended on behalf of IBHS. The Silver Jacket's project lead, Mark Stephensen, requested that other team members provide him with comments on the 2007 SHMP by the end of April 2010. Several recommendations came out of this review. For example, the Silver Jackets identified the SHMP as an opportunity for addressing flood risk at remediated Superfund sites in the Coeur d'Alene River basin (April 2010 Meeting Minutes). Members of the flood technical working group provided comments on the 2007 SHMP risk assessment.

Wildfire

In their spring 2010 meeting, the ISFPWG discussed the 2007 SHMP and the update process. Also, a history of the organization was provided and the group discussed the 2010 State Fire Plan goals and actions and how those fit into or were at least compatible with the SHMP goals and actions. They also discussed the outreach campaign on the 100th anniversary of the great 1910 fire and a presentation on by Idaho Firewise. ISFPWG members were asked to provide comments on the 2007 SHMP risk assessment for wildfire.

Earthquake

In early March 2010, the Seismic Technical Working Group held a series of meetings, called "mitigation listening sessions," for the exchange of information between experts and local officials. There were 42 attendees on the sign-in sheet for March 4, and 60 attendees signed in on March 11. Attendees were given the assignment of reviewing the 2007 SHMP earthquake chapter, which was made available on the update project website on March 16. Technical working group members could view this section of the Plan and use the posted email address for providing feedback to Baker, IBHS's consultant.

Capability Analysis

In addition to reviewing the State's capability to undertake mitigation, several other analyses were completed specifically:

- Local capability was assessed by identifying and rolling up relevant local plan information (i.e., self assessments of capability)
- A State mitigation program HAZUS capability analysis was performed by interviewing FEMA Regional and enhanced plan State staff about HAZUS capabilities and competencies. These data were compared to Idaho's current capability, and recommendations were made.
- An Enhanced Plan State capability analysis compared the State's capabilities to the FEMA enhanced mitigation plan criteria. Other aspects of enhanced plan status were analyzed, and recommendations were made.

Mitigation Strategy Update

On September 2, 2010, the Planning Executive Committee held an all-day Mitigation Solutions Workshop. First, participants reviewed the 2007 Mitigation Strategy Goals and Actions. The four goals in the 2007 plan were reviewed and revised to six goals in the 2010 plan. The two additional goals pertained to agency coordination and the collection and development of data to improve vulnerability and risk assessments. Also, the number of objectives were expanded from four to seven. The group discussed local mitigation plans and actions identified in them. An analysis of the local mitigation actions was presented, and the committee determined that the goals and objectives were consistent with the actions. An ongoing issue with local mitigation action plans was noted: the presence of numerous preparedness and response-type activities in addition to mitigation activities.

The 2007 actions were reviewed; however, this exercise was cut short. It became apparent that the numerous actions (137) were a mix of local projects and those under the sphere of influence of the State or participating State agencies. Additionally, some projects were not well defined, and the Executive Committee had trouble noting progress. Generally, the Committee observed that not much progress had been made on the 2007 actions, and much of this had to do with actions not being related to what the State or participating agencies had the power to do.

For the 2010 Mitigation Action Plan, new actions were developed and the Executive Committee focused on actions that were SMART – Specific, Measurable, Attainable, Realistic, and Timely. Ultimately, the group developed 21 actions. It was felt that measurable progress, if not successful attainment, could be made on these actions in the next three years. To evaluate these actions, three factors were identified – cost-effectiveness, technical feasibility, and environmental soundness. Each factor was given a ranking of 1 to 3 "plusses". There are no negative scores, because each action was fully discussed and revised during the meeting, before it was officially considered to be included. Thus, it was felt that all of the actions had positive benefits. One way the group prioritized projects was to add up all of the plusses for each action. These were tallied and included in the action plan. During the planning period, the "prioritization" using the plusses will help guide those responsible for implementing the action, as well as those responsible for monitoring the plan's implementation. Because the focus of this update was to identify actions that were SMART, the prioritization does not preclude efforts to complete the identified actions; rather, it is useful in determining how each action might be weak (e.g., not cost effective) and inform those responsible for implementing potential issues.

The Executive Committee felt that the 2010 Mitigation Strategy reflects the actions and projects identified in local plans in the goals and objectives of the 2010 State Plan. An analysis of the local actions examine their classifications. A ground rule of the exercise was that no actions could be proposed that did not link back to the goals and objectives. Each action ties back to at least one goal and one objective.

Preparation of Draft Plan

The draft plan incorporated the aforementioned results of meetings, analyses, surveys, and other information. Draft plan sections were posted on the SHMP update website (see additional information below on the website) for public and other stakeholder comment.

Preparation and Adoption of Final Plan

The final draft was prepared after receipt of FEMA Region X comments and was promulgated November 1, 2010.

Public and Stakeholder Outreach

Prior to the assembly of detailed data updates and re-writes of plan sections, IBHS informed the public of the upcoming SHMP update project. IBHS met with the technical working groups, each of which had publically accessed websites. IBHS's spring 2010 newsletter included a full-page article devoted to announcing the SHMP update.

Stakeholder participation was largely generated from the technical working groups. As indicated earlier in this appendix, various Federal, State, and local agencies were represented, as were Indian Tribal Nations. Organizations such as the Idaho Fire Chief's Association, Idaho Emergency Managers Association, Idaho Geotechnical Engineers Association and University representatives participated through the technical working groups.

Mitigation Plan Update Open Houses

After revisions to the plan were underway, IBHS hosted three open house forums to provide opportunities for the exchange of information to benefit the planning process. The advantage of the open house format is that it provides an opportunity to disseminate an array of data, shortens "presentations," and allows participants to interact and receive specific information. The open houses held in Idaho had three stations:

Idaho Bureau of Homeland Security News Release
For immediate release, September 1, 2010
Contact: Robert Feeley, (208) 422-3033

Idaho Bureau of Homeland Security to hold Public Input Forums for State of Idaho Hazard Mitigation Plan Revision

The Idaho Bureau of Homeland Security's Mitigation section is in the process of updating the State's Hazard Mitigation Plan and would like to provide interested parties the opportunity to provide comments and learn more about this effort. A series of three Agency and Public Input Forums have been scheduled in Coeur d' Alene, Idaho Falls, and Boise.

Hazard mitigation is any long term or permanent solution to reduce the risk of life and property to known hazards. A hazard mitigation plan is developed to identify potential hazards affecting the state, profile those hazards to determine how vulnerable the state's citizens and infrastructure are to those hazards, review the state's and local capability to implement mitigation, and develop a long term mitigation action plan. In addition to ensuring that the state remains eligible for hazard mitigation funding, a hazard mitigation plan is useful in providing state and local leaders as well as citizens a blueprint for reducing risk and making Idaho communities more resilient to hazards.

"Common sense tells us that it is better to be prepared for a disaster and to eliminate or reduce the loss of life or damage to property than to merely make our response better. This way, vulnerabilities can be identified and steps can be taken to reduce the impact of the disaster events before they occur. It is never a matter of if a disaster occurs, but when a disaster occurs," said BHS Director Brig. Gen. Bill Shawver.

The Forums will provide information on the updated Risk Assessment and Mitigation Strategy as well as information on FEMA's Hazard Mitigation Assistance programs. Open Houses are scheduled from 10AM until 2PM. Those unable to attend the Open House will find information on the mitigation plan update as well as a survey form to provide feedback on the project webpage: http://www.idahoshmpupdate.com/

Agency and Public Input Forum Schedule and Locations:

September 7, 10:00 AM – 2:00 PM
Ameritel Inn, 333 Ironwood, Coeur d' Alene

September 9, 10:00 AM – 2:00 PM
Shilo Inn, 780 Lindsey Blvd., Idaho Falls

September 10, 10:00 AM – 2:00 PM
Holiday Inn Airport
3300 Vista Ave, Boise

1. **Risk Assessment**, where maps rolling up local risk assessment data were provided, as well as a laptop where attendees could look at specific areas.
2. **Mitigation Strategy,** where the draft 2010 goals, objectives, and actions were provided. Attendees had the opportunity to provide additional ideas on flip charts and rank their preferences by using a dot voting method.
3. **HMA Programs,** where information could be obtained on mitigation grant programs including HMGP, PDM, RFC, SRL, and FMA.

A short PowerPoint presentation was given once per hour. Attendees could view the presentation, visit the stations, and leave at their convenience. Finally, attendees were asked to complete a survey and drop it off as they were leaving. A press release was issued to announce the three forums, and local emergency managers were encouraged to publicize them. The three Open Houses took place between September 7 and 10, 2010, in Boise, Coeur d'Alene, and Idaho Falls.

SHMP Project Website

Throughout the planning process, coordination and dissemination of information was facilitated through the use of a project website: http://www.idahoshmpupdate.com. It is anticipated that this website will continue to function after the plan update, or elements will be transferred to the IBHS website, so continued input can be obtained.

The Project website and various printed announcements for the project referred readers to this specific project website. The Planning Executive Committee and technical working group members, as well as other interested parties, could access meeting agendas, minutes, and draft documents for review through the website. Sections of the website included:

- Home - the introductory page for the project website.
- About the Project - includes an overview of the SHMP update process.
- What is Hazard Mitigation? - provides background explaining Hazard Mitigation.
- Announcements - stores project-related announcements.
- Resource Center - houses documents pertaining to the project.
- Calendar - displays upcoming meetings, events, and milestones.
- Technical Working Groups - serves as a resource for the technical working groups

- Gallery - displays photographs that pertain to the Plan Update.

Website analytics from February 19 through September 19, 2010, indicate the following:

- 169 visits
- 653 page views
- 5 minutes, 20 seconds average time on site
- 143 unique visitors from the continental United States and Alaska
- 51 percent of traffic was direct (directly accessed the page), 30 percent was from referring sites, and 19 percent was from search engines.

Public and Stakeholder Survey

On the website's home page, viewers who were also Idaho residents were given the opportunity to take a "Hazard Mitigation Survey." Examples of questions included:

- "Have you ever been in or experienced a disaster in Idaho?"
- "What threat do you think is the highest threat to your home and/or community?"
- "What is the most effective way for you to receive information on how you can make your home or community safer from hazards?"

As of October 18, 2010, four surveys had been completed.

Plan Maintenance

Section 201.4(c) requires that the SHMP be reviewed, revised, and submitted for approval to the Regional Administrator of the FEMA every three years. The regulations require a plan maintenance process that includes an established method and schedule for monitoring, evaluating and updating the plan. The Idaho Bureau of Homeland Security – Mitigation Section is the agency primarily responsible for the plan maintenance, but it will utilize the review and comments from other entities as part of the maintenance process.

The Idaho SHMP is a living document and will be reviewed and potentially updated constantly. The plan will be revised if the conditions under which the plan was developed change, such as new or revised State policies, a major disaster, or the availability of funding. This section describes how the SHMP will be monitored, evaluated, and updated.

Evaluation of 2007 Plan Maintenance and Project Monitoring Processes

During the review of the 2007 Plan, the IBHS determined ways in which the maintenance plan had not been working for the State and established a goal of improving maintenance for the next SHMP update. The 2010 SHMP Update has been approved and has been enhanced in the ways described in the previous section. However, mitigation actions have not been implemented in the ways laid out in the 2007 SHMP. To address this shortcoming, a key improvement to the 2010 SHMP has been the involvement of the technical working groups. The working groups will champion the implementation of the mitigation strategies. This will improve Plan maintenance because the technical working groups already have track records for maintaining a regular meeting schedule and can focus their efforts on their own topic of expertise (not having to contend with the entire SHMP).

To monitor the implementation of the SHMP's goals, objectives, actions, and mitigation projects in general, the IBHS Mitigation Section has developed an annual report for internal reporting purposes only. This report was focused on mitigation projects funded by FEMA's Unified HMA programs (as it is a requirement of the grant agreements that such projects be monitored on a quarterly basis). The Executive Committee agreed that an annual report seemed to be the correct frequency, and a commitment was made to improve the monitoring and evaluation processes. The method in the 2010 Plan was changed to provide more specificity as to what should be in the annual report and also include the ISFPWG annual report, an annual document successfully documenting mitigation actions through the National Fire Plan.

Plan Monitoring

The IBHS Mitigation Section will develop an annual mitigation report. This report will use data provided by the three technical working groups in the late fall of each year and will be produced by February of the following year. The report will focus on the following:

- Progress on achieving the goals in the current SHMP
- Progress on implementing the actions identified in the current SHMP, including initiation, status and completion of such actions
- Progress on implementing other mitigation actions outside of the SHMP

- Progress on implementing mitigation projects funded through FEMA's Unified HMA Program
- Report from the SHMP Executive Committee on the evaluation of the plan (see subsection below)
- Report on disasters declared in the past year and an overview of the mitigation strategy for the disaster

In addition, the ISFPWG generates an annual report on the National Fire Plan in Idaho implementation, where progress on wildfire mitigation actions is noted and success stories are relayed. Both the ISFPWG Annual Report and the IBHS Mitigation Section Annual Report should offer a robust snapshot of mitigation activity in Idaho.

Since the technical working groups meet throughout the year, they, as well as the IBHS Mitigation Section, will monitor activities.

Plan Evaluation

The SHMP Executive Committee will meet annually in the fall to evaluate the SHMP. The Executive Committee will evaluate the Plan based on the following criteria:

- How much progress has been made on mitigation actions and projects
- Implementation problems (technical, political, legal, and financial)
- Relevancy of goals, objectives, and actions and whether they need to be discontinued or changed
- Level of involvement by the public and other agencies
- Accuracy and precision of the risk assessments, availability of new data, and whether such data needs to be reflected in the plan immediately

After each major disaster in Idaho declared by the President, the IBHS Mitigation Section will incorporate an action for the disaster in the Mitigation Strategy, to evaluate and assess whether the SHMP addresses the reality resulting from the disaster (i.e., does the risk assessment need updated, are the goals/objectives/actions are still relevant). This evaluation will be provided to the Executive Committee.

Plan Update

Every three years, as required by 44 CFR 201.4, the State Hazard Mitigation Officer (SHMO) is responsible for submitting the revised SHMP to the FEMA Regional Administrator and for facilitating the adoption of the plan by the State. The SHMO uses the FEMA Standard State Hazard Mitigation Plan Review Crosswalk as a tool for updates, and submits the revised Plan with the completed crosswalk to FEMA.

IBHS will revise the Plan more frequently if the conditions under which the Plan was developed materially change through new or revised State policy, a major disaster, or availability of funding. Future updates of the SHMP will involve the technical working groups and their recommendations.

The method to update the Plan is for recommended updates be vetted through the Executive Committee and technical working groups (as applicable). Recommended updates will then be provided to the IBHS Mitigation Section for consideration. Upon acceptance, the IBHS Mitigation Section will develop the draft updates, circulate draft updates for review to the Executive Committee and technical working groups, incorporate review comments, and forward the draft plan for final State approval.

Local Plan Coordination and Linkage. As part of the SHMP update, local plans will be assessed, focusing on three areas: risk assessment, mitigation strategy, and local capability. As part of this update, a database "rolling-up" local plan data was developed and the local plan data were analyzed to ensure that the State mitigation goals and objectives are compatible with local actions and to undertake a comparative analysis of the State risk assessment versus local risk assessments. These data will be updated and incorporated into the 2013 SHMP.

APPENDIX E: ENHANCED PLAN CAPABILITY ASSESSMENT

Introduction

The Standard State Mitigation Planning criteria under the Stafford Act establish a framework for the development of a statewide mitigation program. Ideally this program will be well integrated with other planning and disaster recovery mechanisms. The intended outcome of the planning process is the development and successful implementation of a robust State Hazard Mitigation Plan. To be effective, this plan must also be thoroughly integrated with local planning processes and strategies.

For Enhanced State mitigation planning, the Stafford Act criteria focus on two distinct areas, upgrades to the physical plan, and the satisfactory demonstration of a state's capability to administer their hazard mitigation program in accordance with FEMA standards. Enhanced Plan status offers several benefits to states. First is the eligibility for additional post-disaster hazard mitigation funds under the HMGP. While states with Standard Mitigation Plans receive up to 15% of disaster costs for hazard mitigation, an Enhanced Plan state can receive up to 20% of costs. Additionally, there is the possibility that an Enhanced Plan state could become a "Managing State" or "Delegated State" if FEMA decides to reintroduce such a program. If that occurs, then the Enhanced State would be given greater leeway to manage their mitigation program with little involvement from FEMA.

Benchmarking

Benchmarking is the process of measuring an organization's internal operations, then identifying, understanding, and adapting outside practices considered to be best-in-class. Benchmarking also involves the systematic assessment of potential vulnerabilities, and the identification of lessons learned from both outside and within the organization.

For this process, we have gathered and evaluated the experiences of three other Enhanced Plan State programs. We are then closing with a state self-evaluation.

State of Maryland Enhanced Plan Experience

In August 2005 the State of Maryland was awarded Enhanced Plan Status. For the plan 2008 update, the Maryland Emergency Management Agency did not peruse renewal of their Enhanced Plan. Several factors contributed to this decision, but the primary issue was chronic understaffing of the State's mitigation program. At the time of the update, only one of the three state hazard mitigation positions were filled, and a long term hiring freeze was in effect.

During the update process, conversations with FEMA revealed that the State would likely be ineligible for Enhanced Plan renewal. The reduction of mitigation staff by 2/3, and the subsequent reduction in state capability meant that the State could no longer meet the Enhanced Plan requirements of 44CFR, Section 201.5.

Without Enhanced Plan status, the State lost approximately $3.5 million in Hazard Mitigation Grant Program funds from the 2009-2010 severe snow disasters.

State of Ohio Enhanced Plan Experience

A statewide plan was approved by FEMA as a Standard Plan in January 2005 and later upgraded to an Enhanced Plan in May 2005. The Ohio Emergency Management Agency (Ohio EMA) submitted a Standard Plan update in 2008 after internal assessment of capability and preliminary discussions with FEMA Region. Ohio EMA intended to submit an Enhanced Plan to FEMA later in 2008, as there were some additional appendices and tasks to complete. One of those tasks was the SHARPP mitigation information management system and portal. One of the intended uses of SHARPP was to enhance the State's ability to meet Enhanced Plan criteria. This is to be done by:

- Having functionality to remind subgrantees of upcoming deadlines for plan updates and quarterly report reminders and having better mechanisms to track milestones and deadlines to meet 44 CFR §201.5(b)(2)(iii)(A-D).
- Establishing a mechanism to automatically calculate losses avoided through annualized losses avoided (not on a per event basis) to meet 44 CFR 201.5(b)(2)(iv).
- Enabling the state to show effective use of mitigation grant programs by visually showing the widespread distribution of funds and projects through web based interface to meet §201.5(b)(3).

SHARPP development was not initiated until 2010 and is anticipated to be completed in 2011. A loss of experienced staff and a significant number of declared disasters resulted in a project backlog. From 2005-2007, much time was spent building staff capacity, capability, and catching up. Between January 2004 and August 2006, there were six Federal disaster declarations which triggered HMGP creating a significant resource demand on staff. As a consequence, the quality of applications for mitigation projects; meeting grants timeframes for applications, extensions, quarterly reports, etc.; did not meet the criteria established by FEMA for Enhanced Plan Status. Thus, the decision was made to not apply for Enhanced Plan status in 2008 and instead focused on the 2011 submittal. It is intended that Enhanced Plan status will be re-established in 2011.

Without Enhanced Plan status, the State lost approximately $2,100,000 in HMGP funds due to Tropical Depression Ike in 2008.

State of Washington Enhanced Plan Experience

Washington State was the first state in the nation to have an Enhanced Plan in place. It was approved by FEMA in mid 2004. For the 2007 update the Enhanced Plan status lapsed temporarily. This was due to a transition between State Hazard Mitigation Officers and a shortage of staff. However, the revised Enhanced Plan was submitted and approved by FEMA within a matter of months. Washington State successfully updated their Enhanced Plan for the 2010 approval cycle.

The State had very few open pre- or post-disaster grants during the 2007 update cycle, which helped them to regain Enhanced Status during this period of transition. Since their grants management workload was relatively light, the State was able to meet most program management performance criteria by documenting previous performance that had occurred when capacity was greater. For the

2010 update, the State had regained and exceeded their previous capacity, and they were able to update their Enhanced Plan with few issues.

Summary of Existing Capability

The information below was captured to demonstrates the state's capability to effectively manage the HMGP and other mitigation grant programs. The questions in the table below are in direct reference to the enhanced state multi-hazard mitigation plan program information worksheet. The scores are on a scale from 1-5 with "1" being *strongly disagree* and "5" being *strongly agree*.

Question #1	Score	Response
Does the State submit grant applications within the period established in the notice of funds availability of statutory guidelines?	**4**	*Would have been a "5" due to FMA deadlines shifting. Also, HMGP has been slow due to retention of in-house resources and overall program sophistication and capability.*

Question #2	Score	Response
Does the State request for extensions (application period and performance extensions) in a timely manner with justifiable documentation?	**3**	*No issues with application periods but the State needs to work and realize that it needs to be more attentive to the performance extensions. Having a staff of 2, the attentiveness of submitting extensions on time can be a challenge.*

Question #3	Score	Response
Are project applications packages fully developed and complete (i.e. no additional information or correction to the Statement of Work, Budget Narrative, Budget Worksheets, etc.)?	**3**	*An area that the State realizes needs work. Generally the project applications require minor tweaks, but it does happen frequently. Program sophistication continues to improve as well as in-house processes.*

Question #4	Score	Response
Does the State submit grant applications that meet program eligibility requirements?	4	*One example from this year is that the State submitted an ineligible application, as a strategic point, that referenced a seismic project's benefit-cost analysis that, based on the data, should not have resulted in a ratio of below 1.0 and was a great project.*

Question #5	Score	Response
Does the State possess the capability to work with an applicant to identify potential environmental issues and NEPA requirements?	4	*As a result of project information submissions to address the full spectrum of federal environmental authorities (per NEPA), some processes go back and forth and can be time consuming. The State also realizes that it does not engage some Federal authorities to cross check project sites for environmental impacts.*

Question #6	Score	Response
Has the State established a process for requesting necessary assistance with environmental review?	4	*To support the ranking of environmental reviews, the State will contract with the appropriate firm to engage any major environmental issues. The State would like to potentially setup some programmatic agreements with state and federal authorities.*

Question #7	Score	Response
Does the State take initiative to complete BCAs with minimal technical assistance from FEMA (i.e. BC Helpline)? NOTE: Assistance may be necessary, but instances should be few in number.	5	*The State has a process in place to contract out BCAs. The benefit of this is a 3rd party interest as the contractor remains non-biased towards projects.*

Question #8	Score	Response
Has the State established a process for requesting necessary assistance with BCAs?	5	*The State has a process in place to contract out BCAs. The benefit of this is a 3rd party interest as the contractor remains non-biased towards projects.*

Question #9	Score	Response
Is all relevant BC information submitted with original project applications? And, are the values used in BCAs documented in the project applications and obtained from credible sources?	5	*The contractor provides a methodology justification and provides all relevant supporting documentation for the BCA.*

Question #10	Score	Response
Do the BCAs that are submitted adhere to FEMA's applicable policies and methodologies (i.e. does the State use and promote the use of the FEMA BCA software?)	4	*Aside from the previous response of submitting a BCA for a seismic project that did not meet the minimum ratio of 1.0 as a result, the State does promote the use of the FEMA BCA software and does adhere to all applicable regulations.*

Question #11	Score	Response
Does the State submit complete quarterly progress reports? Within agreed upon due dates?	5	*For the past 2 years, the State has completed and submitted quarterly reports on time. The only shortcoming with quarterly reports is acquiring the report data from the local project managers.*

Question #12	Score	Response
Does the State submit complete quarterly financial reports? Within agreed upon due dates?	5	*Currently, BHS has a process in place where the Financial Branch completed and submits these reports.*

Question #13	Score	Response
Does the State monitor the sub-grantee's performance against the identified project milestones and completion date?	**3**	*The State has a new in-house process that has greatly improved this aspect of grants management. The State does realize that it needs to improve project monitoring but due to a staff of 2, budgeting the time to monitor on a scheduled basis is certainly a challenge.*

Question #14	Score	Response
Does the State complete all post-award activities within 90 days from the performance period end date?	**3**	*The State recognizes that this area does need work and are improving in-house processes.*

Recommendations for Improved Capability

1. **Develop a strategic plan for adequate staffing during "normal" times.** A state mitigation program that would be considered "Enhanced" will have trained staff in the following general skill areas: program management, budgeting, project cost estimating, mitigation science, mitigation planning, grants administration, GIS (HAZUS), emergency management, and natural resource management.

2. **Ensure staff are adequately trained in key knowledge areas.** Areas where FEMA has focused on maintaining capability (as expressed in the FEMA cross-walk) are benefit-cost analysis, financial/grants management, and environment-historic preservation. Also, it is important that staff are cross-trained so there is some redundancy. Relatively speaking, state mitigation program have few staff resulting in staff members having unique skill sets. For the purposes of continuity and capacity, it is recommended that each skill area minimally have a primary and secondary staff person responsible for this knowledge.

3. **Have a strategy for staff augmentation as a result of a large disaster or multiple events.** Lack of capacity was a factor in both Ohio and Maryland and can result in a state not being able to meet specific measurement areas evaluated by FEMA such as quarterly reports being turned in on time. This strategy could include plans for hiring temporary or contract staff, or possibly hiring outside contractors to assist. Also, it is important to identify staff needs in the Mitigation Strategy that is developed in a Joint Field Office as part of a Federal Declaration as FEMA may have resources to supplement state staff.

4. **Discuss precise evaluation thresholds with FEMA Region before applying for Enhanced Plan status**. For the past two years, FEMA has had a working group looking into issues related to Enhanced Plan status. However, it is evident from this working group and 2011 presentation by

them at the HMA Summit that Regions are not consistent or in agreement on interpretation of evaluation criteria. For example, for Question #12 in the Self Assessment, does the question mean that a state must have 100% of quarterly reports in 100% on time for the three year period? Or the standard 90%? Regardless of Regional variations, it is important to understand precisely what FEMA means when it is evaluating the state against its criteria.

5. **Use a disaster event to build staff capability and address specific plan elements related to enhanced plans.** The Mitigation Strategy that must be developed after every Federal disaster declaration is an opportunity to build staff capability. Usually FEMA can field deploy training in key knowledge areas (BCA, EHP). Also, resources can be acquired to address items that are also Enhanced Plan criteria. For example, an activity in a Mitigation Strategy that also addresses an element on the Enhanced Plan cross-walk is to conduct post event loss avoidance studies in communities where previous mitigation projects have been completed.

6. **Ensure a timely kick-off to the HMGP application process**. While it may seem improbable, multiple events can and will occur in the same year. Initiating the HMPG application process and having capacity to assist with application development, review, and award is critical. Otherwise, there is significant risk of falling behind on grant deadlines and reports. The event's Mitigation Strategy can indicate this as a priority and there may be assistance available from FEMA.

APPENDIX F: HAZUS CAPABILITY ASSESSMENT

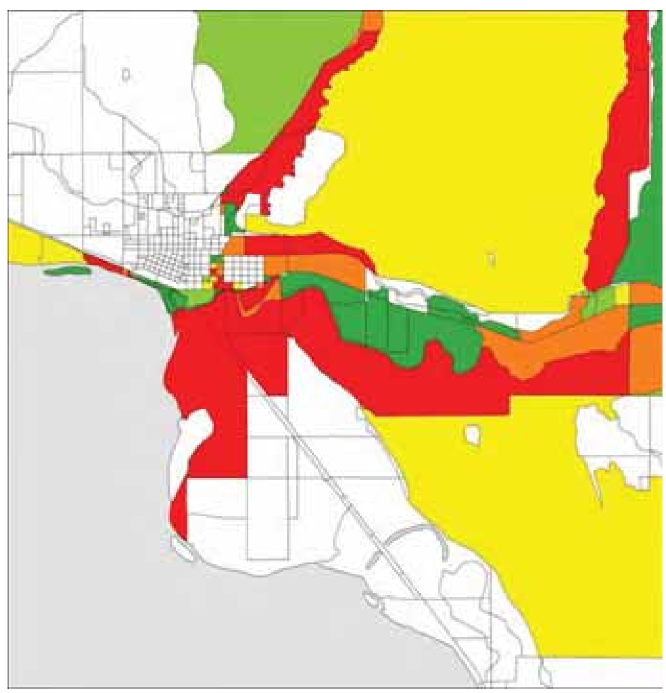
Introduction

The State of Idaho requested that, as part of their 2010 State Hazard Mitigation Plan Update, a Hazus Capability Assessment be performed. Specifically, the state wanted to evaluate current state capabilities to conduct or support a statewide Hazus Level 2 analysis for 100-year flooding and earthquakes, including an inventory of available data sets for such analysis. In addition, recommendations were requested for data compilation and operational improvements to support increased Hazus capabilities.

Hazus-MH (Hazards U.S. – Multi-Hazard) is a freely-available geographic information systems (GIS)-based tool that was created and is still maintained by the United States Federal Emergency Management Agency (FEMA). Hazus-MH uses a powerful risk assessment methodology for analyzing potential losses from floods, hurricane winds, and earthquakes. It is designed to help communities prevent losses to life and property.

Hazus-MH enables a community to leverage current scientific and engineering knowledge, coupled with the latest GIS technology, to produce loss estimates. These estimates can include losses due to physical damage, economic loss, and social impacts. Hazus-MH can be performed both before and after a disaster occurs, which enables a community to:

- IDENTIFY vulnerable areas in relation to a particular hazard
- ASSESS preparedness to endure a particular disaster
- ESTIMATE its potential losses from a particular hazard event
- DECIDE how best to allocate resources during response and recovery
- PRIORITIZE mitigation measures to reduce future losses



Washington County Level 2 Hazus Flood Analysis - Total Losses Estimated During 1% Annual Chance Flood Event (100 year)

One major benefit provided by Hazus-MH is that it allows a community to perform various levels of analysis, based upon their available capabilities. A 'Level 1' analysis makes use of the more than 200 publically available inventory layers that are included with the Hazus-MH software. A 'Level 2' analysis allows a user to supplement the default data sets with more robust and accurate local data. The more local data sets that a community can incorporate into the tool, the more accurate and useful the resulting loss estimates will become. Two examples of existing and potential uses of HAZUS use are provided below:

Example 1. Existing Use - Earthquake scenario Hazus run for Idaho Falls. As part of the 2010 state hazard mitigation plan update, a scenario earthquake event was conducted for Idaho Falls. The event selected to analyze was a magnitude 7.0 earthquake, similar to the magnitude 6.9 event that occurred at Borah Peak in 1983. The resulting loss estimate report documented: 1,549 buildings completely damaged, 27,320 truckloads of debris generated, $213 million dollars of commercial building losses, and $3 billion dollars of railway damages. These results were used to update the state plan, provide data to help educate the counties affected, and will be used in future training exercises.

Example 2. Potential use - Flooding scenario Hazus run for Ada County. Perform a Level 2 critical infrastructure analysis for a flood event in Ada county. Improved Level 2 analysis was made possible by the proposed BHS Mitigation Portal. Ada County used the Portal to upload local critical infrastructure data sets into the recently created CDMS shell. This local data was a tremendous improvement over the national-level data that Hazus uses for Level 1 analysis and resulted in a more accurate loss estimation and analysis. Unfortunately, the county didn't currently have the capability to perform the Hazus runs, so they requested assistance from BHS. BHS was able to handle this request with their Hazus lead who was recently hired. In the months that followed, BHS was also able to improve the Hazus capability of Ada County through a training session provided by FEMA Region X and ongoing technical support from BHS's Hazus lead.

Along with enhancing the data sets that Hazus-MH performs its analysis on, another capability that must not be overlooked is the level of Hazus experience and support that exists within an organization. These two items are integral to note when attempting assess a state's Hazus capability.

This Hazus Capability Assessment for the State of Idaho is broken down into three main sections. The first deals with attempting to 'benchmark' what in fact a Hazus capable state is. The second section details what the existing capability currently is. This assessment concludes with a section detailing recommendations on how the State of Idaho can work towards improving their Hazus capabilities.

Benchmarking

Although Hazus's first module (earthquake) was rolled out to the public in 1997, the user base for HAZUS is still relatively small. What this means is that there are currently no common definitions for what constitutes a HAZUS capable state. In an attempt to better define this definition of being 'Hazus capable', a number of current users and experts were interviewed.

Interviews were conducted with HAZUS users across both the FEMA Regional level and at the state level. The general consensus to the main question of what specifically defines a HAZUS capable state was surprisingly simple and to the point.

To be considered as HAZUS capable, a state should:

- Have devoted staff with adequate training and experience as it relates to Hazus-MH

- Have a strong and active group of HAZUS users within the state
- Have the resources to help provide HAZUS technical support to local communities

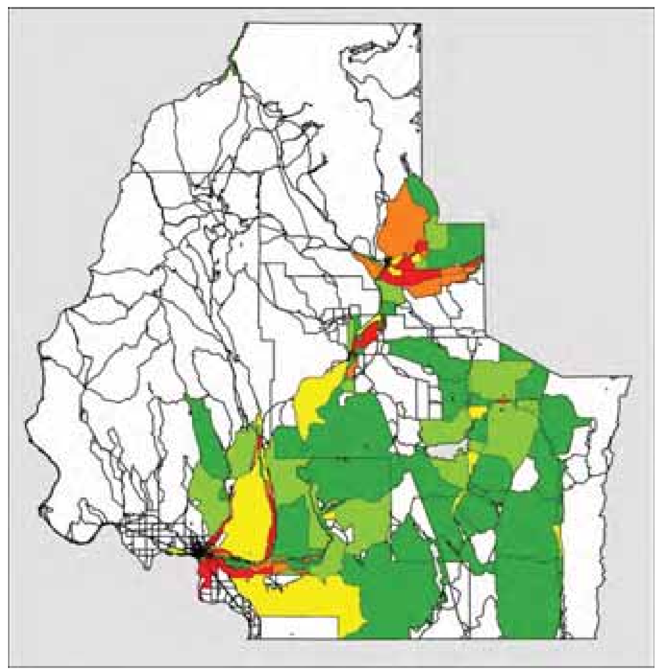
Although these points may sound over simplistic, they do fall in line with the comment made above,that Hazus use across much of the nation is still in its relative infancy. Therefore, in order to foster and grow that capability, mechanisms must be in place to ensure that a user community is in place and has the resources and support that it requires. In order for this to occur,the state must first ensure that it has the proper staffing and that resources are available to be able to serve the role of a technical resource at the state level.

Summary of Existing Capability

It is necessary to document what the existing State Hazus capabilities are in order to be able to recommend improvements for enhancing that capability. To collect this information, a combination of interviews and surveys were conducted with the State of Idaho. GIS data sets were also provided by the state for analysis. The results are summarized below:

What is the state's current staffing capabilities in regards to Hazus?

IDWR has one staff (Ryan McDaniel) who will achieve Hazus Professional certification in July and is currently creating/gathering data for a statewide essential facilities data set. BHS has 2 staff (Mark Stephensen, David Jackson) that have attended one Hazus course. One former staff (Julie Sendra) was a Certified Hazus Professional and Practitioner with 6 years of Hazus experience.



Washington County Level 2 Hazus Flood Analysis - Total Losses Estimated During 1% Annual Chance Flood Event (100 year)

What is a summary of the current Hazus projects that the state has run in the past?

Prior to the 2010 State Hazard Mitigation Plan update, the state had performed a handful of Level 2 Hazus runs, utilizing a combination of improved elevation, hydrologic, and DFIRM data. The state also performed Level 1 flood runs for another 10+ areas and Level 1 earthquake runs for six (6) areas.

As part of the 2010 update, the state was provided Level 1 flood runs for every county in the state and three (3) Level 1 earthquake runs. Level 2 Hazus analysis was also performed for two (2) counties, utilizing DFIRM data.

How has the state used the resulting Hazus loss estimation results in the past?

BHS has used these estimations for planning and public education purposes.

How would the state like to use the resulting Hazus loss estimation results in the future?

BHS recognizes the purpose of HAZUS as a loss estimation tool and will both continue and increase its use in mitigation planning, forecasting, and emergency management. So much so, that BHS is seeking to increase HAZUS training to county, city, and state agency personnel so the use of this tool will migrate into local hazard mitigation plans. BHS would also like to make use of Hazus as it works towards State Enhanced Mitigation Plan status.

What particular types of Level 2 analysis does the state want to perform in the future?

BHS is seeking to run HAZUS Level 2 runs in areas with both high seismic and flooding threats. Data collection and validation is currently under way in several of these areas. BHS wants to enhance both its ability to assess its levels of risk and vulnerability and prioritize mitigation actions.

What data sets are currently available to the state that could be leveraged for use in Hazus?

Date includes building specific, DFIRM, state infrastructure, LiDAR, soil liquefaction, and hazard-specific inventories of building stock. A majority of this data will require additional processing prior to use within Hazus.

What data sets could the state identify as being beneficial for Level 2 analysis, but which are not yet available?

This would include city and county building stock inventories, updated census data, and enhanced soil liquefaction data for the balance of those counties subject to high seismic threats.

Are there any other strengths / limitations that pertain to the State's Hazus capabilities?

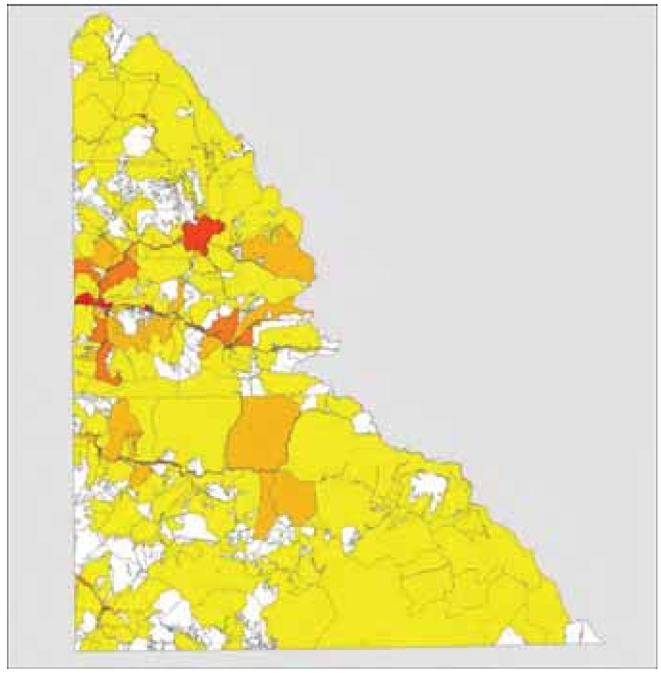
BHS is currently engaged in obtaining enhanced soil liquefaction maps for 16 counties located in the highest seismic risk areas. Further, BHS is taking advantage of new sources of grant funding for LiDAR collection, the aforementioned soil liquefaction data, and hazard-specific building stock inventories.

The recent State Hazard Mitigation Plan update served as an opportunity to perform Hazus analysis for the entire state and to take advantage of the resulting loss estimations for use in the plan document. The CDMS (Comprehensive Data Management System) compliant database that was designed as part of the plan update will also benefit the state going forward as local data is collected and used for Level 2 analysis.

Are there any tools or processes that could help improve the State's Hazus capabilities in the future?

Establishment of and prioritization for updated census data and the previously mentioned soil and flood map updates within the State Hazard Mitigation Plan (SHMP) currently under revision. It is recognized that the plan must include these HAZUS capability improvements in its goals, objectives, and strategies.

Further, the plan maintenance and review should carefully document progress towards Hazus capability improvement.



Shoshone County Level 2 Hazus Flood Analysis - Building Losses Estimated During 1% Annual Chance Flood Event (100 year)

What is the current status of existing and active HAZUS user groups within the State of Idaho?

Previously, the State of Idaho was encompassed by the Rocky Mountain Hazus User Group (RMHUG). This user group supports users across a large geographic region that includes the states of: Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming. Monthly conference calls occur where users present recent Hazus-related projects, receive updates from the National Hazus User Group, and discuss upcoming software updates and releases. Recently, an Idaho Hazus User Group (IDHUG) was formed. At the time of this writing, the group had met twice (December 2010 and May 2011). Details about the group and meeting minutes are posted to their website. December's minutes note that IDHUG members plan to participate in the RMHUG calls as well as their own. For more information on both groups, see their websites - IDHUG (http://www.usehazus.com/idhug) & RMHUG (http://www.usehazus.com/rmhug/).

Recommendations for Improved Capability

In order to reach the desired capability to conduct or support a statewide Hazus Level 2 analysis for the hazards of flooding and earthquakes, a number of actions have been proposed for the State of Idaho to consider. These actions have been grouped by subject and are broken down into specific tasks. This was intentionally done to highlight the fact that all of these actions do not have to be the responsibility of a single person or group.

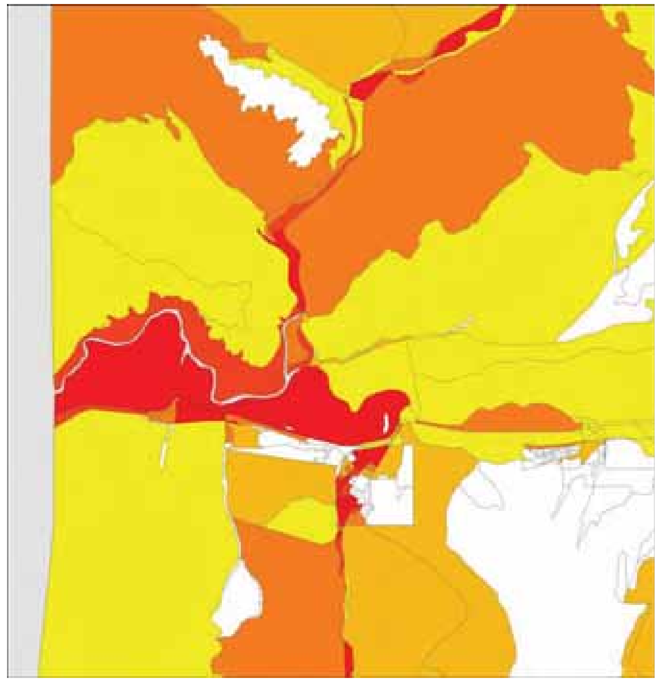
The collection of inventory data sets is by far the most costly activity. As with most states that are working towards an increased Hazus capability, it is easy to become overwhelmed with this task. Therefore, it is important to focus on elements that are most critical for the particular analysis that is important to the state. As Hazus has the ability to produce a plethora of reports and maps, it is important to recognize from the start which are of relevance to the state and its communities and users.

Listed below are primary actions that the State of Idaho should consider as it works to enhance its HAZUS capability:

- Staffing / Operational

  - Identify primary staff that will focus entirely on Hazus and auxiliary staff that will be available to serve a support or backup role. For Hazus capabilities to exist and evolve, it is necessary to ensure that at least a single full time staff member is devoted to the cause. The role of additional support staff is important in times of disaster when the primary staff is not available or during times of staff turnover.
  - Identify existing staff availability for assignment to the above roles and consider the ability to hire additional staff.
  - Ensure that these new roles are clearly defined within the state's organizational structure.
  - Ensure staff are trained on how to interpret the risk assessment data that Hazus produces. It is important to understand and leverage the Hazus outputs, as this loss estimation data is the main reason to improve Hazus capability in the first place.
  - Provide dedicated Hazus machine(s), as analysis is data intensive and needs to be run independently of other user activities.
    - Specs: 2.2 GHz dual core or higher, 2 GB of higher of memory/RAM, Microsoft Windows XP SP3 or Windows 7, ESRI ArcGIS 9.3.1 or newer with Spatial Analyst extension
- Training (attending and conducting)
  - Request hands-on training from FEMA Region X and ensure that all primary and auxiliary Hazus staff participate. During the interviews for this assessment, the Region X staff noted that they would be interested in setting up trainings for the state.
  - Ensure primary staff (and auxiliary staff, if possible) are permitted to attend hands-on training at FEMA's Emergency Management Institute.
  - Schedule follow-up trainings to be held regularly for all staff annually.
  - Organize a state Hazus conference / training seminar.
- Outreach
  - Communities
    - Determine the user base and its capabilities within local communities.
    - Organize training sessions to promote existing local capacity.
    - Organize informative training sessions, presentations, and case studies to expose the benefits of Hazus and to initiate additional local capacity. The planned BHS Mitigation Portal could help support this action.
    - Publicize IDHUG to help grow user community.
    - Survey communities to determine the desired Hazus outputs; reports, data, and maps.
  - Colleges and Universities
    - Determine the user base and its capabilities within local colleges and universities.
    - Organize collaborative training and research opportunities for interested schools. IGS is involved closely with the University of Idaho and may serve as a

good school to begin discussions with. Reaching out to involve multiple schools is suggested.
        - Publicize IDHUG to help grow user community.
    - Inter-Agency
        - Schedule regular workshops, presentations, and exercises to expose BHS staff to Hazus.
        - Ensure Hazus analysis is published and that data and maps are made easily available within BHS. The planned BHS Mitigation Portal could help support this action.



Shoshone County Level 2 Hazus Flood Analysis - Building Losses Estimated During 1% Annual Chance Flood Event (100 year)

        - Publicize IDHUG to help grow user community.
    - Intra-State
        - Organize workshops or participate in cross-agency training sessions to expose other State agencies to HAZUS.
        - Organize workshops or participate in cross-agency training sessions to expose other Federal agencies and Non-Governmental organizations to HAZUS. It is possible other agencies could benefit and help to improve state capability.
    - Public
        - Risk communication to the public utilizing Hazus analysis.
- Data Collection and Maintenance- It should be noted that as part of this capability assessment, a CDMS compliant database was designed and created for the state. CDMS is the software that allows users to load local data sets into Hazus to allow for improved Level 2 analysis. The database and accompanying user guide will help to simplify data collection and storage.
    - <u>Determine and prioritize data sets that the state would like to focus on collecting (primary data sets).</u>
        - Develop more detailed data sets for structures, people, and characteristics that contribute to a community's risk. In HAZUS, these include general building stock, essential facilities, high potential loss facilities, transportation systems, utility systems, facilities storing hazardous materials, demographics, agricultural products, vehicles, and user-defined facilities. Focus on elements that are most critical for the analysis you wish to run as collection of inventory is the most

costly part of performing a study. The uncertainty of loss estimates increase with a less detailed inventory.

- Collaborate with local communities to compile any existing primary data sets. It is vital to attempt to leverage any existing data sets. Often times the data is available, but not in the correct format or not containing all required attribute information. In these cases, work with the communities to see if they are able to help to fill in the remaining data gaps. It has been noted during some of the interviews that simply obtaining the correct latitude and longitude of certain structures can dramatically improved Hazus's loss estimates. This is the best opportunity to minimize data collection costs.
- Collaborate with other state agencies to compile any exiting primary data sets.
  - Coordinate with IDWR to obtain FEMA DFIRM data for use in the FIT (Flooding Information Tool) extension of Hazus. FIT's intent is similar to CDMS in that it is another route to load more refined local data sets into Hazus.
  - Collaborate with the Cadastral Technical Working Group to ensure the Parcel Data Exchange standard meets the needs of CDMS
- Provide communities with guidance and training relating to the collection of primary data sets.
- Leverage Local Hazard Mitigation Plan update process.
  - Require local Hazus analysis be performed as part of the Local Mitigation Plan update process.
  - Require critical facility and/or building stock data as part of update process.
- Research available federal, national, and commercial primary data sets.
- Contact FEMA regarding the availability of past and future Hazus analysis
- Implementation of a Hazus Portal to serve as a central repository and website for all things Hazus. This portal could store past Hazus analysis and act as a repository for the state's CDMS database. It could also serve as an informative website that presents: case studies, a Hazus overview, and online trainings and presentations. The planned BHS Mitigation Portal could help support this action.

- Hazus Analysis
  - Perform analysis to support update of state mitigation plan
  - Support response and recovery activities for an event. This would include supporting operations at the EOC as an event is unfolding, such as providing potential scenario event information based on projected flood crests or earthquake analysis based on preliminary magnitude and location data.
  - Perform analysis to support local mitigation planning and analysis

Below is a recommended staffing table broken down by the primary activities that would be performed.

Primary Activities	Min (in FTE)	Max (in FTE)
Training	.1	.3
Outreach	.2	.5
Data Collection and Maintenance	.4	1
HAZUS Analysis	.3	.5

Primary Hazus Staff Job Requirements: Hazus Specialist will work with Hazus and related software and programs. 8-10 years of experience in the Geographic Information Systems (GIS) field, with a B.S. from an accredited college or university. GISP (GIS Professional) certification a plus. 2-4 minimum years of direct Hazus experience, Hazus certification optional but desired. Background in emergency management or related field a plus. Must be willing to travel across Idaho for data gathering activities, outreach, and training.

Daily duties would include:

- Performing Hazus runs in support of EOC operations and in support of state and local hazard mitigation plan updates
- Collecting, editing, and compiling CDMS compliant datasets for incorporation into the State's master Hazus database
- Providing technical support to other Hazus users
- Instructing others in use of Hazus software and general GIS use and analysis
- Organize and perform outreach activities to promote Hazus use and understanding throughout the state
- Ad-hoc GIS requests in support of BHS

A special thanks is offered to those who made themselves available for interviews:

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