3.3 RISK ASSESSMENT: FLOOD

DESCRIPTION

Flooding is the partial or complete inundation of normally dry land. Types of flooding experienced in Idaho are numerous and include: riverine flooding, flash floods, alluvial fan flooding, ice/debris jam flooding, levee/dam/canal breaks, stormwater, and mudflows (especially after a wildfire). Flooding has produced the most property damaging and costly disasters in Idaho, and significant events have occurred regularly throughout the history of the State. There is often no sharp distinction between the various types of 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.

Source: BHS

Riverine Flooding. Overbank flooding of rivers and streams is the most common type of flood event. 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. Riverine floodplains range from narrow, confined channels in the steep valleys of hilly and mountainous areas to the 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 may 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 National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) defines the flood stage for river forecast points in the State of Idaho. Flood stage is the river height or flow volume which poses a definite hazard to life or property. Roads, infrastructure, and property near a river may 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 1% annual chance event.

The Idaho rivers that have historically presented the greatest flooding risks include (in no specific order): Boise (below Boise River Reservoir System), Owyhee; Payette, Saint Joseph, Saint Maries, Snake River, Palisades to American Falls, Snake River, Owyhee confluence to Hells Canyon, Weiser, Portneuf; Wood, Clearwater, Bear, Kootenai, Moyie, Priest, and South Fork of the Coeur d'Alene.

Flash Floods. These 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 fan flooding is most prevalent in the arid Western States. Alluvial fans are made of sediments that are deposited where a stream or river leaves a defined channel and enters a broader and flatter floodplain. These deposits are fan-shaped on account of the coarse- and fine-grain material that the stream or river deposits. As the flow path spreads out, conveyance is reduced and active erosion, sedimentation, deposition and unpredictable flow paths inundate the low-lying areas. Alluvial fans are especially dangerous and convey high flood risk. When the stream or river repeatedly deposits sediment into its floodway and channel bed, the conveyance capacity of the channel is quickly exceeded resulting in overbank flooding, erosion and the formation of a new channel. Alluvial fans are also dangerous because the stream or river channel will slowly erode the soft sediments and meander outside of the mapped 1% annual chance flood zone. FEMA designates Zone AO as the 1% annual chance flood zone for shallow flooding, sheet flow, or areas with high flood velocities on alluvial fans. 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.

An excerpt from "Alluvial Fans: Hazards and Management" (FEMA 165, February 1989)

It must be stressed that any development activity sustained on the active portion of an alluvial fan disrupts and alters the natural flood processes which perpetuate its formation, and subjects any structure situated on the fan to predictable, erratic hazards during flood events. Furthermore, any new construction can redirect flood and debris flow to adjacent properties and thereby increase flood hazards in other areas. A comprehensive approach is therefore needed to manage development on fan areas such that the entire fan's natural flood processes and resulting hazards are taken into account. The development and implementation of a comprehensive approach is best handled on the local government level through planning, zoning and building permit processes. Through these processes, future development can be planned and its effects on flood hazards adequately addressed.

A comprehensive or master planning approach to managing growth on an alluvial fan considers fan conditions from apex to tow while guiding future development in a coordinated manner. The keystone of this planning process is the community's selection of flood/debris hazard management tools. The choice of tools will depend upon the nature and location of the hazards, and the location, timing, size and density of existing and future development. These tools can be structural or nonstructural. The fan management plan may be incorporated as a separate element within the community's existing comprehensive plan, or stand alone as a separate document. The planning process incorporates the following steps:

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 extends 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 floodplain, 1% annual chance floodplain, and Special Flood Hazard Area [SFHA]). This area is determined using historical data indicating that in any given year there is a 1% 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. Major floods have historically occurred in Idaho every one to two years and are considered the most serious and costly natural hazard affecting the State. From 1956 to 2012, there were 17 Federal and 36 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%, or 1 in 100, probability that water levels will exceed this magnitude. Base floods can occur in any year, even successive ones.

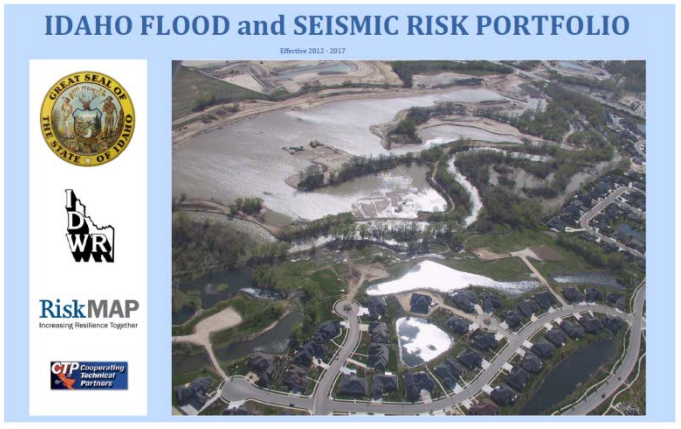
The floodplain is the area that normally carries water adjacent to the channel. Like 'disaster', this term has two meanings, practical and regulatory. In practical terms, a floodplain is the area inundated by floodwaters and this area changes based on the magnitude of the flood event. Where the surface of the land is relatively undisturbed by human activities, 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 natural flooding 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 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 Idaho Department of Water Resources (IDWR) recently released an updated version of its Idaho Flood and Seismic Risk Portfolio (IFSRP). Within this document, IDWR does a good job at attempting to prioritize the flood risk ranking for hydrologic unit code (HUC8) watersheds (sub-basins) across the State. These rankings were predicated on the following criteria: population, property, and professional judgment. The Idaho Silver Jackets core team was asked to provide the professional judgment, as all participating agencies were provided an opportunity to rank their 'Top 10' watersheds of focus, from the point of view of each agency's vision statement.



The resulting combined list of those Top 10 watersheds across the State is provided below, along with excerpts from the IFSRP[1] document. Map 3.3.M at the end of this section, highlights those watersheds. Readers are recommended to refer to the IFSRP for additional mapping, statistics, and information pertaining to these watersheds.

[1] Idaho Flood and Seismic Risk Portfolio. 2012. Idaho Department of Water Resources.

Lower Boise - 17050114 (1)

The Lower Boise Sub-Basin is home to hundreds of thousands of people who live in or near the Boise River floodplain. The floodplain data is not readily available from the Federal Emergency

Management Agency (FEMA). The Digital Flood Insurance Rate Map (DFIRM) excludes the main flooding source: the Boise River; and the map covers only a small area, including Meridian and Kuna, but excludes Boise, Eagle, Garden City, and all other cities. This lack of flood data should be addressed in the most populous sub-basin, with 574,339 people, and funding is necessary to remedy this problem.

Spring flooding is a significant threat to properties and people located along the Boise River. While the Lucky Peak, Arrow Rock and Anderson Ranch dams upstream of this basin provide flood control and storage capacity for the Boise River and its tributaries, variable spring snowmelt patterns makes it difficult to predict runoff levels and the dams often release high volumes of water that flood areas along the river. The Idaho Department of Water Resources (IDWR) classifies dams according to their downstream damage potential. With a combined reservoir volume of 1015.6 KAF, each of the three dams upstream of the Boise watershed is attributed with the highest damage classification. Beyond these three, there are 9 significant and 10 high risk dams within the Boise sub-basin. Hundreds of thousands of people living downstream of the reservoirs are at risk of annual flooding. Flooding of the Boise River could breach many of the other dams located throughout the watershed causing great damage to people and property. Without a readily available DFIRM from FEMA, it is more difficult for individuals and organizations to understand flood risks.

Upper Snake-Rock - 17040212 (2)

The Upper Snake-Rock Sub-Basin is home to tens of thousands of people, of which very few live in or near the Snake River floodplain.

Flooding within the Upper Snake-Rock Sub-Basin could affect life and property, especially along the highly incised Snake River canyon, of which exists relatively few residents and property. Effected properties can include residential, commercial, and agricultural lands along the river. No bankfull flow values were available for this, or any other gage station near the city of Twin Falls, and so only annual peak flows are available in the below plot. Besides flow values, another flood hazard includes a potential dam breach at Milner Dam in an adjacent sub-basin, which would flow into this sub-basin, and flood the Snake River Canyon. The Milner storage volume is 36.3 KAF, and the dam has a High downstream damage classification. Tributaries are a notable problem to the area, specifically Rock and Clover Creek.

Payette – 17050122 (3)

The Payette Sub-Basin is home to hundreds of people who live in or near the Payette River floodplain.

Flooding within the Payette Sub-Basin could affect life and property, especially the cities of Emmett, Horseshoe Bend, New Plymouth, and Payette that have 16,235 residents, combined[2]. Affected

properties can include residential, commercial, and agricultural lands along the river. Flood hazards can include high stream flows that exceed bankfull discharge. At the USGS gage near the city of Horseshoe Bend, this discharge is 12,700 cfs, and annual peak flow events exceed bankfull discharge. Another flood hazard includes a potential dam breach at Black Canyon Reservoir with a storage volume of 29.8 KAF. The dam has a High downstream damage classification.

South Fork Coeur d'Alene – 17010302 (4)

Seven communities in this sub-basin are along the South Fork Coeur d'Alene River.

Source: ThinkStock.com

The South Fork Coeur d'Alene Lake Sub-Basin has considerable risk to human life and property. There are three multiple loss communities (Pinehurst, Wallace, Kellogg) in this sub-basin. At the USGS gage near Kellogg, the bankfull discharge of the SF Coeur d'Alene River is 1,940 cfs. Annual peak flows have exceeded 2,000 cfs many times in the past. There are 9 dams considered by IDWR to be of High or Significant risk; Lucky Friday Pond No. 4 and Osburn dam being the largest. Many of these dams are located in populated areas and all are a flooding risk to residential and farmland downstream.

Weiser – 17050124 (5)

The Weiser Sub-Basin is largely privately owned with population and development concentrated along the Weiser River and the towns of Weiser (pop. 5507), Midvale (pop. 171), Council (pop. 839), and Cambridge (pop. 328). The primary river system in this sub-basin is the Weiser River. There are several reservoirs in the sub-basin including Lost Valley Reservoir and Crane Creek Reservoir.

The majority of the development in this sub-basin is agricultural, mostly along the Weiser River with some on Mann Creek and the Little Weiser. Flood hazards can include seasonal high stream flows that exceed bankfull discharge. At the USGS gage near the city of Weiser, this discharge is 9720 cfs, and annual peak flow events exceed bankfull discharge. The Weiser River exceeded its banks in 2011 resulting in the closure of Hwy. 95.

In this sub-basin, there are 19 dams considered by IDWR to be of High or Significant risk. The majority of the at-risk dams in this basin are a flooding risk to residential and farmland development downstream. Of the 73 dams in the IDWR database listed in this sub-basin, none are on the Weiser River.

St. Joe – 17010304 (6)

The St. Joe Sub-Basin is home to residents of St. Maries and spans much of Shoshone and Benewah County. The St. Joe and St. Maries Rivers make up the major water system within the basin.

There are two repetitive loss properties as a result of flooding from the St. Joe River. Flood hazards from the St. Joe River include seasonal high stream flows that exceed bankfull discharge. At the USGS gage at the town of Calder, this discharge is 15,500 cfs. Annual peak flow events frequently occur that exceed bankfull discharge. Flows will increase at places further downstream like the town of St. Maries. Ice jams have also compounded flooding concerns along the St. Joe River in the past. In this sub-basin, there are no flood control structures to regulate the strong waters of the St. Joe.

Big Wood – 17040219 (7)

The Big Wood Sub-Basin is home to thousands of people that live in or near to the Big Wood River floodplain. The populated areas within the Big Wood boundaries include Sun Valley, Ketchum, Hailey, and Bellevue.

Flooding within the Big Wood Sub-Basin could greatly disrupt life and property to Blaine County. Much of the population in the sub-basin lives along the Big Wood River. Annual precipitation in this region is between 16 to 30 inches per year. At the USGS streamgage in Hailey, the Big Wood river bankfull discharge is 2,290 cfs. A potential flood risk occurred recently when high streamflows exceeded 7,000 cfs. There are eight dams in the sub-basin categorized as posing a high to significant risk of flooding. The dams are along tributaries to the Big Wood and Malad Rivers. The largest dams are the Magic Reservoir Dam and the Trail Creek Dam, which is within the city limits of Sun Valley.

Lower Kootenai – 17010104 (8)

The Lower Kootenai is home to most of the residents of Boundary County including the communities of Bonners Ferry (pop. 2543) and Moyie Springs (pop. 718).

The Kootenai River is the major water system in the area. USGS stream gages at Leonia represent high stream flows. There is a high risk dam at McArthur Reservoir, south of Bonner's Ferry. Land along the banks of the river is used for agriculture and rural development.

Clearwater – 17060306 (9)

The Clearwater Sub-Basin is home to thousands of people who live in or near the Clearwater River floodplain, as well as its tributaries, which include the Potlatch, Lapwai Creek, and Lawyers Creek. A majority of the land and inhabited properties in this basin belong to the Nez Perce Tribe.

The largest flood event would be a dam breach at the Dworshak reservoir upstream of this sub-basin. The volume of the reservoir is 3,453 KAF. A population of 164,208 lives in adjacent sub-basins, downstream of the reservoir that would be affected by a catastrophic dam breach including the cities of Clarkston, Richland, Pasco, and Kennewick. The Idaho Department of Water Resources (IDWR) classifies

dams according to their downstream damage potential, and the Dworshak dam is attributed with the highest damage classification. Other risks include regular flooding of properties along the tributaries of the Clearwater River.

American Falls – 17040206 (10)

The American Falls Sub-Basin is home to thousands of people, with the majority living near the main flooding source: the Snake River. The cities of Blackfoot, American Falls, and Shelley are the largest cities.

This sub-basin is susceptible to flash flooding due to its minimal slope and significant rural agricultural and urban development along the Snake River. Flood hazards can include seasonal high stream flows that exceed bankfull discharge. At the USGS gage near the city of Blackfoot, this discharge is 19,200 cfs, and annual peak flow events exceed bankfull discharge. In this sub-basin, there are three dams considered by IDWR to be of High or Significant risk; Gem State Dam, Simplot Effluent Irrigation (EI) Dam, & American Falls Dam. Gem State and Simplot EI dams are a flooding risk to residential development and farmland downstream. The City of Shelley is within five miles downstream of the Gem State Dam and the Simplot EI dam is on the outskirts of the City of Chubbuck.

PAST OCCURRENCE

Past Occurrences of disasters in Idaho, as determined by the U.S. Geological Survey and the Federal Emergency Management Agency, are listed in the following Tables 3.3.A and 3.3.B. Table 3.3.A lists the major riverine flood events and declared Flood Disasters, while Table 3.3.B lists all State Disaster Declarations that involved flooding. Map 3.3.N, at the end of this section, shows the location of past major flood occurrences, summarized by county. Additional details regarding the events are provided below.

TABLE 3.3.A: 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

TABLE 3.3.A: Major Riverine Flood Events and/or Flood Disaster Declarations	
YEAR	**Area Affected / Type of Event**
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
2010	Northern Severe Storms and Flooding
2011	Northern Idaho Flooding, Landslides, and Mudslides
Source: 2007 State Hazard Mitigation Plan and Federal Emergency Management Agency	

Panhandle Floods – 1933. In 1933, warm rain on low-elevation snow led to flooding in the Panhandle region, 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. Despite USACE levee construction in 1942, additional flooding in this area occurred in 1946, 1948, 1976, and 1996.

Boise Floods – 1959. Wildfires in 1959 lead to dramatic flooding and mudslides around the Boise area. The United States Department of Agriculture produced a film showing the resulting mitigation efforts, which has recently been posted online (http://www.youtube.com/watch?v=D2JKOgsrU2M).

Winter Floods – 1964. 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.

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

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. Relief totaled $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, two churches were damaged and one was destroyed. 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.

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

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. Relief totaled $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 from a levee break 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. Relief totaled $11,365,667 in public assistance, $8,054 in individual assistance, $251,054 from the NRCS, and $1,691,458 in hazard mitigation grants.

Source: ThinkStock.com

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.

Nez Perce – 2005. A number of storms hit Nez Perce County and a portion of the Nez Perce Indian Reservation from May 6th-20th. On July 6, the President issued a Federal Disaster Declaration (DR-1592). Approximately $1.7 million in damages to infrastructure was assessed and a few individual homes were affected.

Winter Flooding – 2006. From December 30th, 2005 through January 4th, 2006 a severe winter storm and flooding impacted Owyhee County. Presidential Disaster Declaration (DR-1630) was issued on February 28th.

Panhandle Flooding – 2008. Extensive flooding impacted portions of Kootenai and Shoshone counties from May 15th through June 9th. Over $1 million dollars of bridge and road damages occurred. The President signed the Disaster Declaration (DR-1781) on July 31.

Northern Severe Flooding – 2010. Severe storms and associated flooding impacted a large portion of the State between June 2nd-10th. On July 27th, the President signed off on a Disaster Declaration (DR-1927). Counties impacted included: Adams, Gem, Idaho, Lewis, Payette, Valley, and Washington. Preliminary damage estimates included over $5 million to roads and bridges.

Northern Idaho Flooding – 2011. Flooding, landslides, and mudslides impacted a large portion of the State between March 31st and April 11th. On May 20th, the President signed off on a Disaster Declaration (DR-1987). Counties impacted included: Bonner, Clearwater, Idaho, Nez Perce, and Shoshone in addition to the Nez Perce Tribe. Preliminary damage estimates to infrastructure totaled $4.6 million.

TABLE 3.3.B: Flood Related State Disaster Declarations 1976-2013			
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

TABLE 3.3.B: Flood Related State Disaster Declarations 1976-2013			
Year	Month	Federal	Counties Affected
	May		Payette
	June		Boundary, Kootenai, Latah, Shoshone
1996-1997	November - January	X	Adams, Benewah, Boise, Bonner, Boundary, Clearwater, Elmore, Gem, Idaho, 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
2011	January-February		Shoshone
	March-April	X	Clearwater, Idaho, Nez Perce
			Statewide (specifically Bingham, Jefferson, Madison)
2012	July		Boundary
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 not well recorded because they are relatively small and do little damage. 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.

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 clean out 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.

Source: ThinkStock.com

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 area and the soil is not as water repellent as it was right after the fire.

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.

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 19th. 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.

Minor flooding, due to inadequate urban drainage systems, 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 often resulted in highly localized precipitation concentrations that overwhelmed the urban drainage systems. Pocatello has constructed an aqueduct that carries stormwater to settling ponds to mitigate flooding, and the ponds also serve as a natural expansion area for riverine flooding.

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.

FUTURE OCCURRENCE

Reported flood events of significance over the last 50+ 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 36

major flood events (State Declarations) since 1956, this type of event has occurred once every 1.55 years from 1956 through 2012.

[(Current Year) 2012] subtracted by [(Historical Year) 1956] = 56 Years on Record

[(Years on Record) 56] divided by [(Number of Historical Events) 36] = 1.55

From the historical frequency, we can calculate that there is a 64.28-percent chance of this type of event occurring each year in the State.

RELATIONSHIPS TO OTHER HAZARDS

Floods can influence other hazards, both natural and human-caused. Flood events can lead to failures of dams, levees, or canals. Landslides are also often-times caused by flood. Conversely, a flood event could help to lessen the hazards of both wildfire and drought, if only for a short time period. All of the human-caused hazard events covered in this Plan could be influenced in some way or another by a flood event. Flood impacts on infrastructure and facilities could initiate a hazardous material or radiological release, or a cyber disruption. Standing water left after a flood event could increase the susceptibility for a pandemic event to occur.

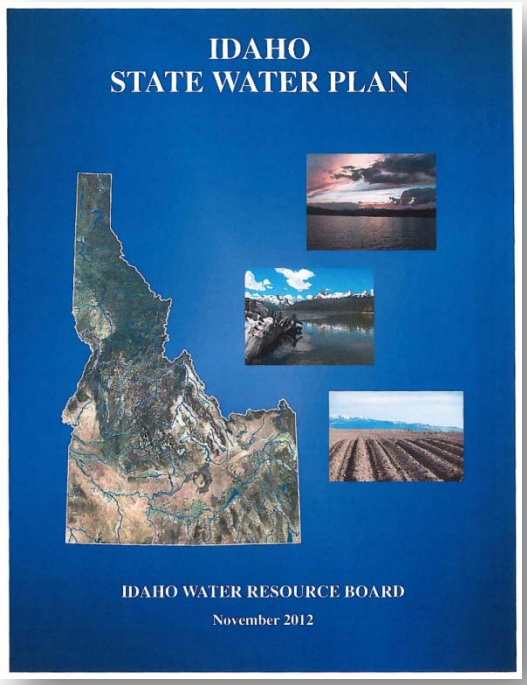
ENVIRONMENTAL IMPACTS

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 that lead to 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 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.

IDWR's 2012 update to the State Water Plan discusses the topics of water management and future development, information that could prove useful when discussing and assessing the hazard of flooding.

CRITICAL INFRASTRUCTURE AND STATE FACILITY IMPACTS

Any State facilities or infrastructure located in or near floodplains would be possibly impacted by a flood event. Additionally, flooding has the ability to inundate roadways which could block or restrict access to and from certain areas and facilities in the State.

As part of the 2010 Plan update, one action that the State identified was the need to collect improved and up-to-date State-owned facility and infrastructure data in a geospatial format. As of the writing of the 2013 Plan update, this action is still considered in progress, although great strides have been made. The State Chief Information Officer (CIO) is currently working towards the realization of a State-owned facilities and infrastructure geodatabase. This remains a top priority of the Information Technology Resource Management Council's Geospatial Committee (Executive Order No. 2010-07 and Idaho Statute 67-5745). This on-going process has been slowed by recent budget shortfalls in addition to inconsistent data holdings across many of the State's Agencies. Once available, this database will enable for a more in-depth review of State-owned facilities and infrastructure, as it relates to both vulnerabilities to hazards and the associated loss estimations. This database will compliment ongoing projects through

IDWR, ICRMP, and RiskMAP among others. All of these databases are essential in furthering risk assessment and loss avoidance analysis.

VULNERABILITY ASSESSMENT AND LOSS ESTIMATION

Statewide Analysis

As part of this Plan update, BHS has compiled a statewide 1% annual chance flood event GIS dataset. This flood hazard information includes all digital FIRMs presently available (see Map 3.3.O at the end of this chapter). Where coverage gaps existed, the floodplains generated as part of the Hazus analysis (detailed below) were utilized. Using this data layer, vulnerability analysis was performed on the ICRMP locally-owned facilities data. Table 3.3.C below presents the results of that analysis, showing those facilities that would be impacted by the base flood. This table, summarized at the BHS Regional level, includes counts of structures considered to be vulnerable to the threat of flood, in addition to the associated building values and building content values. Map 3.3.P at the end of this chapter presents this same information, although it is difficult to visually present both floodplains and structure-related information on a State-wide map. Additional details regarding the ICRMP data can be found in the introductory section of this chapter, Section 3.0.

The analysis below shows that all BHS Regions, except the Southeast, have local jurisdictionally-owned structures in the 1% annual chance flood event floodplain. The most vulnerable region is the Southwest, with 7.8% of the facilities in these high hazard zones. Statewide, those structures in the areas most vulnerable to flood equate to 6.4% of the overall inventory, which is approximately $248 million in combined building values.

TABLE 3.3.C	In 1% Annual Chance Flood Area			Statewide		
	Number of Facilities	Building Value ($M)	Building & Contents Value ($M)	Number of Facilities	Building Value ($M)	Building & Contents Value ($M)
Central	87	$34	$41	1,570	$815	$972
North Central	47	$28	$33	756	$248	$289
Northeast	31	$8	$9	994	$474	$580
Northern	105	$36	$43	1,334	$669	$850
Southeast	74	$32	$45	1,270	$381	$488
Southwest	198	$61	$77	2,513	$1,090	$1,310
TOTALS	**542**	**$199**	**$248**	**8,437**	**$3,677**	**$4,489**

Hazus Analysis

As part of the 2013 Plan update, loss estimations for all 44 counties in the State were performed utilizing FEMA's Hazus 2.1 software. A similar effort was performed as part of the 2010 Plan update, but at that time it was only possible to conduct what is termed Level 1 analysis. Level 1 analysis means that all data inputs into the Hazus model come from national-level data that is provided with the software. For the 2013 Update, Level 2 analysis was able to be conducted statewide. Level 2 analysis means that improved, locally-derived data inputs are utilized instead of the national-level data. The fact that these local data sets are improved, from both a spatial and attribute standpoint, should lead to more refined and accurate loss estimation results. The Hazus tool is very useful in mitigation planning, because it provides an acceptable means of forecasting flood damage and loss of infrastructure, among many other factors.

The Level 2 data inputs were provided by Idaho's Department of Water Resources (IDWR). IDWR's data included a Hazus-compliant Comprehensive Data Management System (CDMS) geodatabase that contained improved statewide structure and infrastructure data. Data enhancements that allowed for improved vulnerability and loss estimations included both spatial and attribute updates. Facility and infrastructure data included: essential facilities, high potential loss facilities, rail, transportation, and utilities.

For each county assessment, both the 1% (100 year) and 4% (25 year) annual chance flood events scenarios were analyzed. As mentioned previously in this chapter, the 1% event is what is commonly used to identify what is commonly referred to as the base flood or regulatory floodplain. The 4% event was also included to demonstrate that flood damages will occur from more frequent, less severe events. This also closely equates to the standard 30-year mortgage, which may provide for data that an average homeowner can better relate to.

All standard analyses were performed for each Hazus scenario, and the Global Summary Reports are summarized below in Table 3.3.D. 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 ($ Millions)
- Expected Business Interruption Loss Estimate ($ Millions)

Maps 3.3.Q and 3.3.S, at the end of this section, shows the expected number of buildings that would be damaged per county by the 4% and 1% annual chance flood events, respectively. Maps 3.3.R and 3.3.T also show the estimated total building losses for those same respective events. All of this information is available in a GIS format at the census block level for use in localized review and analysis.

These maps all show that expected damages and losses are highest in the Boise area, which is the most populated area of the State. This is true for both the 4% and 1% annual chance flood events. When looking specifically at the 4% event maps, the north and north central regions of the state appear to be at the next highest risk for flood damages and losses. The 1% event maps show a somewhat similar trend, as can be expected. However, the overall relative range of losses seems to be less severe for the panhandle region than when looking at the 4% estimates.

TABLE 3.3.D: Hazus 2.1 Level 2 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	3652	785	25	878.38	6.99	4673	896	30	1103.01	10.13
Adams	10	1	0	5.37	0.01	12	2	0	6.18	0.01
Bannock	246	10	4	48.93	0.15	314	22	5	59.52	0.18
Bear Lake	15	0	2	6.27	0.17	16	0	2	7.15	0.17
Benewah	80	21	1	19.21	0.01	87	19	1	24.63	0.02
Bingham	116	4	2	18.58	0.04	129	4	2	22.31	0.06
Blaine	286	3	1	62.69	0.14	308	5	0	71.20	0.16
Boise	121	34	7	29.16	0.11	135	43	9	33.76	0.13
Bonner	380	115	4	106.95	0.48	85	8	1	30.40	0.18
Bonneville	63	4	1	44.91	0.30	134	16	1	74.97	0.50
Boundary	0	0	1	4.28	0.04	0	0	1	5.42	0.03
Butte	5	0	0	1.53	0.04	6	0	0	1.81	0.05
Camas	2	0	2	1.28	0.01	2	0	0	1.15	0.01
Canyon	3101	503	176	746.02	4.46	14643	2073	471	2705.01	10.78
Caribou	37	11	1	11.75	0.25	34	10	1	11.08	0.25
Cassia	130	18	4	42.38	0.22	183	25	4	59.28	0.34
Clark	2	0	2	1.00	0.01	5	1	2	1.46	0.01
Clearwater	111	71	1	29.36	0.08	126	72	1	36.23	0.13
Custer	36	3	0	14.47	0.03	35	3	0	14.78	0.02
Elmore	92	0	7	21.98	0.11	141	1	14	34.25	0.18
Franklin	11	0	0	7.83	0.00	12	0	0	9.00	0.00
Fremont	31	0	1	10.80	0.20	37	0	1	12.05	0.22
Gem	354	34	9	60.26	0.34	402	44	9	65.48	0.40

TABLE 3.3.D: Hazus 2.1 Level 2 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)
Gooding	253	0	17	48.44	0.28	294	1	20	59.45	0.36
Idaho	239	117	4	47.33	0.11	259	128	7	52.35	0.12
Jefferson	91	10	0	22.79	0.03	115	15	0	28.61	0.04
Jerome	0	0	0	0.01		0	0	0	0.01	
Kootenai	798	164	3	218.18	0.75	999	213	6	256.62	0.85
Latah	111	18	4	48.41	0.28	154	25	6	60.48	0.34
Lemhi	22	1	1	9.44	0.06	26	1	1	11.61	0.05
Lewis	11	3	0	3.15	0.00	13	3	0	3.55	0.00
Lincoln	42	3	5	11.26	0.06	62	7	5	14.86	0.06
Madison	8	1	0	4.08	0.03	12	1	0	4.60	0.03
Minidoka	102	14	1	28.28	0.08	111	6	2	31.36	0.09
Nez Perce	226	93	13	336.48	3.14	227	112	14	356.66	3.19
Oneida	1	0	0	1.26	0.02	1	0	0	2.04	0.03
Owyhee	326	129	11	81.06	0.35	511	164	13	112.39	0.41
Payette	75	10	0	16.59	0.02	94	15	0	21.11	0.02
Power	0	0	1	1.88	0.04	0	0	1	2.12	0.08
Shoshone	365	59	11	95.51	0.45	431	71	13	113.22	0.51
Teton	12	1	0	6.79	0.04	25	3	0	10.35	0.06
Twin Falls	34	6	0	24.74	0.18	54	9	0	30.25	0.21
Valley	29	0	0	16.63	0.04	33	2	0	18.00	0.04
Washington	43	1	5	21.91	0.11	61	3	4	28.12	0.14

Additionally, analysis was conducted to compare the 2010 Level 1 loss estimations to the 2013 Level 2 loss estimations. Below, Table 3.3.E shows the results of this comparison for selected loss estimations for the 1% annual chance flood event. Increases since 2010 are colored with green text and decreases are colored with red text.

TABLE 3.3.E: Hazus Loss Estimation Comparative Summary (2013 vs. 2010)

	Expected Building Damage (# of Structures)			Expected Building Loss Estimates ($ Millions)			Expected Business Interruption Loss Estimate ($ Millions)		
County Name	2010	2013	% Change Since 2010	2010	2013	% Change Since 2010	2010	2013	% Change Since 2010
Ada	5,109	4,673	-9%	1,116.39	1,103.01	-1%	36.2	10.13	-72%
Adams	13	12	-8%	6.52	6.18	-5%	0.02	0.01	-50%
Bannock	372	314	-16%	61.31	59.52	-3%	0.59	0.18	-69%
Bear Lake	16	16	0%	7.47	7.15	-4%	0.24	0.17	-29%
Benewah	123	87	-29%	25.53	24.63	-4%	0.09	0.02	-78%
Bingham	155	129	-17%	22.43	22.31	-1%	0.2	0.06	-70%
Blaine	395	308	-22%	74.75	71.20	-5%	0.38	0.16	-58%
Boise	176	135	-23%	35.09	33.76	-4%	0.18	0.13	-28%
Bonner	127	85	-33%	32.16	30.40	-5%	0.19	0.18	-5%
Bonneville	153	134	-12%	70.35	74.97	7%	0.75	0.50	-33%
Boundary	1	0	-100%	5.91	5.42	-8%	0.1	0.03	-70%
Butte	7	6	-14%	2.07	1.81	-13%	0.01	0.05	400%
Camas	2	2	0%	1.26	1.15	-9%	0.02	0.01	-50%
Canyon	14,653	14,643	0%	2,728.28	2,705.01	-1%	20.57	10.78	-48%
Caribou	34	34	0%	11.58	11.08	-4%	0.44	0.25	-43%
Cassia	225	183	-19%	60.75	59.28	-2%	0.75	0.34	-55%
Clark	5	5	0%	1.6	1.46	-9%	0.06	0.01	-83%
Clearwater	142	126	-11%	37.27	36.23	-3%	0.75	0.13	-83%
Custer	48	35	-27%	15.74	14.78	-6%	0.1	0.02	-80%
Elmore	149	141	-5%	33.72	34.25	2%	0.36	0.18	-50%
Franklin	13	12	-8%	9.53	9.00	-6%	0.04	0.00	-100%
Fremont	49	37	-24%	12.65	12.05	-5%	0.07	0.22	214%
Gem	478	402	-16%	66.84	65.48	-2%	0.98	0.40	-59%
Gooding	349	294	-16%	59.33	59.45	0%	0.92	0.36	-61%
Idaho	131	259	98%	53.47	52.35	-2%	0.35	0.12	-66%
Jefferson	100	115	15%	29.29	28.61	-2%	0.13	0.04	-69%
Jerome	0	0	-	0.03	0.01	-67%	0	0	-
Kootenai	786	999	27%	260.81	256.62	-2%	2	0.85	-58%

TABLE 3.3.E: Hazus Loss Estimation Comparative Summary (2013 vs. 2010)									
	Expected Building Damage (# of Structures)			Expected Building Loss Estimates ($ Millions)			Expected Business Interruption Loss Estimate ($ Millions)		
County Name	2010	2013	% Change Since 2010	2010	2013	% Change Since 2010	2010	2013	% Change Since 2010
Latah	129	154	19%	62.05	60.48	-3%	0.77	0.34	-56%
Lemhi	25	26	4%	12.39	11.61	-6%	0.11	0.05	-55%
Lewis	10	13	30%	3.72	3.55	-5%	0.01	0.00	-100%
Lincoln	55	62	13%	15.43	14.86	-4%	0.14	0.06	-57%
Madison	12	12	0%	4.8	4.60	-4%	0.04	0.03	-25%
Minidoka	112	111	-1%	32.03	31.36	-2%	0.26	0.09	-65%
Nez Perce	227	227	0%	358.32	356.66	0%	5.89	3.19	-46%
Oneida	1	1	0%	2.24	2.04	-9%	0.03	0.03	0%
Owyhee	511	511	0%	133.75	112.39	-16%	1.38	0.41	-70%
Payette	94	94	0%	21.91	21.11	-4%	0.07	0.02	-71%
Power	0	0	-	2.39	2.12	-11%	0.02	0.08	300%
Shoshone	431	431	0%	115.19	113.22	-2%	1.09	0.51	-53%
Teton	26	25	-4%	10.96	10.35	-6%	0.08	0.06	-25%
Twin Falls	56	54	-4%	31.63	30.25	-4%	0.49	0.21	-57%
Valley	33	33	0%	18.96	18.00	-5%	0.13	0.04	-69%
Washington	63	61	-3%	29.18	28.12	-4%	0.39	0.14	-64%
Total	**25,596**	**25,001**	**-2%**	**5,697.08**	**5,607.89**	**-2%**	**77.39**	**30.59**	**-60%**

Overall what stands out most is that a majority of the loss estimations decreased between the 2010 Level 1 analysis and the 2013 Level 2 analysis. However, in looking at the last row, which sums up the results on a statewide basis, the overall change for both expected buildings damaged and building loss estimates only decreased by 2%. On the surface from a statewide perspective, this could lead one to believe there really isn't a huge difference between the two iterations of analysis. Of course, rather dramatic changes can be seen for some individual counties. In addition, the overall business interruption loss estimates decreased by 60% statewide.

There does not seem to be a single answer to the question of how the particular Level 2 data inputs utilized in 2013 impacted the Hazus results. It should be noted that in addition to the Level 2 data used,

the above analysis is comparing the loss estimations from 2 different versions of the Hazus software (spanning 3 software updates). This in itself could be driving some of this change. It is difficult to prove this point, but the large changes seen in the expected business interruption losses could be the result of changes to the behind-the-scenes algorithms and assumptions inherent to Hazus. What is clear is that continual analysis is needed to try and better understand the results of the Hazus loss estimations, especially as it relates to utilizing Level 2 data inputs.

The 2013 CDMS data provided by IDWR is still a work in progress. There are numerous data fields that are still utilizing the default Level 1 data values. Future updates to this data may lead to additional improvements in the Hazus loss estimations. Additionally, it should be noted that the 2010 Census information is not yet incorporated into the Hazus 2.1 Flood module. When this information is able to be updated in Hazus, improved loss estimations will result.

In 2010, a small Hazus Level 1 vs. 2 comparison was performed in 2 counties. The improved Level 2 data inputs in these cases were the FEMA digital FIRM data. The main trend observed was that the Level 2 results estimated greater losses in areas of higher risk. Likewise, the Level 2 results estimated reduced losses in areas of lesser risk (see 2010 Plan for additional background). Overall, that comparison seemed to support the assumption that Level 2 analysis utilizing FIRM data inputs produced more accurate loss estimations, both from a perceived risk as well as a spatial point of view.

Prior to future Hazus analysis, the subject of Level 2 data inputs and analysis should again be revisited to ensure that any efforts applied prove beneficial to the end intent and results. It would seem that although improved building and infrastructure inputs are beneficial for Hazus analysis, perhaps the Level 1 inventory data is adequate for the purpose it serves? It should be remembered that while the Level 2 facility and infrastructure data sets used in 2013 are still only partially updated with local information, the resulting analysis is far more accurate. An assessment of the Hazus loss estimations that would be derived from a fully updated dataset is needed in the future to determine the end benefits of these types of Level 2 data inputs. [It should be noted that this improved building and infrastructure data will allow for numerous additional and improved risk assessments for both flood and all other hazards. This discussion above concerning the merits of that data is solely focused on Hazus.]

From the limited Level 2 versus Level 1 analysis conducted in 2010, other Level 2 inputs may be more important when trying to refine Hazus flood loss estimates. The accuracy (size, location, and depth) of the floodplain seems, naturally, to be a major influence on the resulting loss estimations. Therefore, utilizing improved terrain data or FIRM floodplains/depth grids may result in a larger refinement to the resulting Hazus loss estimates.

Finally, as mentioned above, updated Census information (coupled with the underlying demographic and inventory data) will have an impact in helping to better refine future Hazus loss estimations. As was seen in the 2013 earthquake Hazus analysis and write-up in this Plan, the ability to utilize the latest

Census data would likely result in improved loss estimates. BHS should continue to increase its assessment capability including better data for Hazus Level 2 analysis across the board.

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 3.3.U, at the end of this section, highlights the 24 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. Collectively from a local viewpoint, flood ranks as the State's 3rd highest hazard.

Since the 2010 Plan update, 2 jurisdictions (Ada and Bannock Counties) have removed flooding as one of their top-three hazards. No jurisdictions with updated plans chose to add flooding.

TABLE 3.3.F: 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			
Adams			
Bannock			
Bear Lake			
Benewah	X	498	$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			
Custer			
Duck Valley	X	20	$1,726,962

TABLE 3.3.F: 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**
Reservation			
Elmore	X	499	$81,900,000
Franklin			
Fremont	X	2,447 (parcels)	$127,637,480
Gem	X	1.381	$105,558,000
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	n/a	n/a
Lemhi			
Lewis	X	345	n/a
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	343	n/a
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	n/a
Washington	X	615	n/a

Consequence Analysis Scenario

Another way vulnerability was assessed was by conducting a consequence scenario that analyzed a hypothetical hazard event. The Flood Technical Advisory Group (TAG) met on October 11, 2012 to

analyze a flooding scenario involving the washout of a 25 foot section of the New York Canal in Boise. The event discussed occurred in the summer at 10:00 PM.

The Flood TAG walked through this group exercise, where they scored, from 0 (no consequences) to 5 (most severe consequences]), the short-term (0-6 month) and long-term (6+ months) consequences of the 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

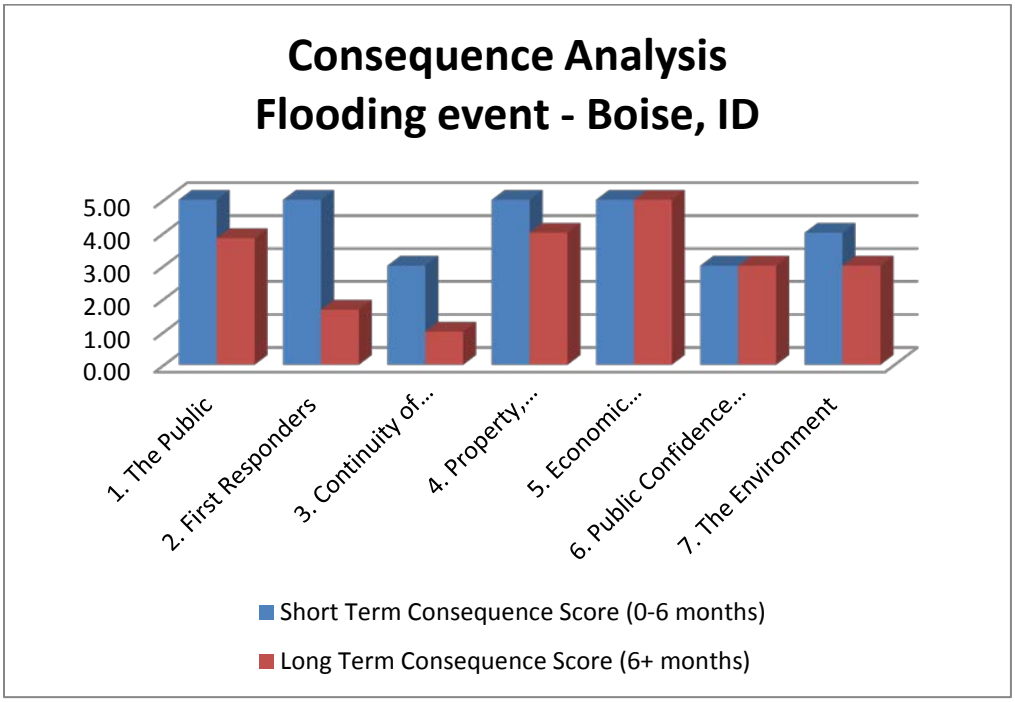


Figure 3.3.G: Consequence Analysis Flood (2013)

The chart above (Figure 3.3.G) presents the results of the exercise. Looking at the short-term consequences of this flood event, the TAG felt that the most severe consequences would be felt by the public, first responders, the built environment, and the economy. From a long-term standpoint, the three systems suffering the most severe consequences (in decreasing order) include the economy, the

built environment, and the public. Overall, what stands out is that the short-term impacts of this type of flood event are greater than for the long-term, with the exception of economic conditions.

Some observations of the group to note included:

- The scenario in question would impact a major transportation corridor and would affect emergency response as the area in question would then become quite isolated.
- Depending on reaction times, water flow from the breach could last 5 – 45 minutes.
- This type of event could pose some jurisdictional challenges and would result in updates to various agency plans/procedures.

In addition to the ranking exercise, the TAG discussed additional questions pertaining to the scenario, including:

- Would the season and timing of when the event occurred alter any of these consequences?
- What other hazards could be triggered by this initial event?
- Would any regional impacts result from this event?
- Have any changes since the last plan update altered any these consequences?

Some of the comments and discussions that were raised included:

- This type of hypothetical event could be exacerbated if it occurred in the spring, but would be lessened in the winter.
- The entire region would be dramatically affected from this event. The price of goods would skyrocket and tourism and jobs would relocate. This event could indirectly help other economies/locals.
- Recent trainings and exercises have improved the capabilities to respond and recover from this event. Public preparedness and awareness has increased as other recent major events occurred, coupled with improvements in technology and social media.
- Recent fuel reduction activities have helped mitigate smaller-type events, but an event of this scale would not see the benefit of these actions.

The results of a similar exercise conducted as part of the 2010 Plan update are included below in Figure 3.3.H. Overall, similar trends were observed for the various systems, with the exception of the long-term rankings, which were rated higher overall in 2013. The 2010 exercises seemed to determine that the short-term impacts were greater than the long-term effects.

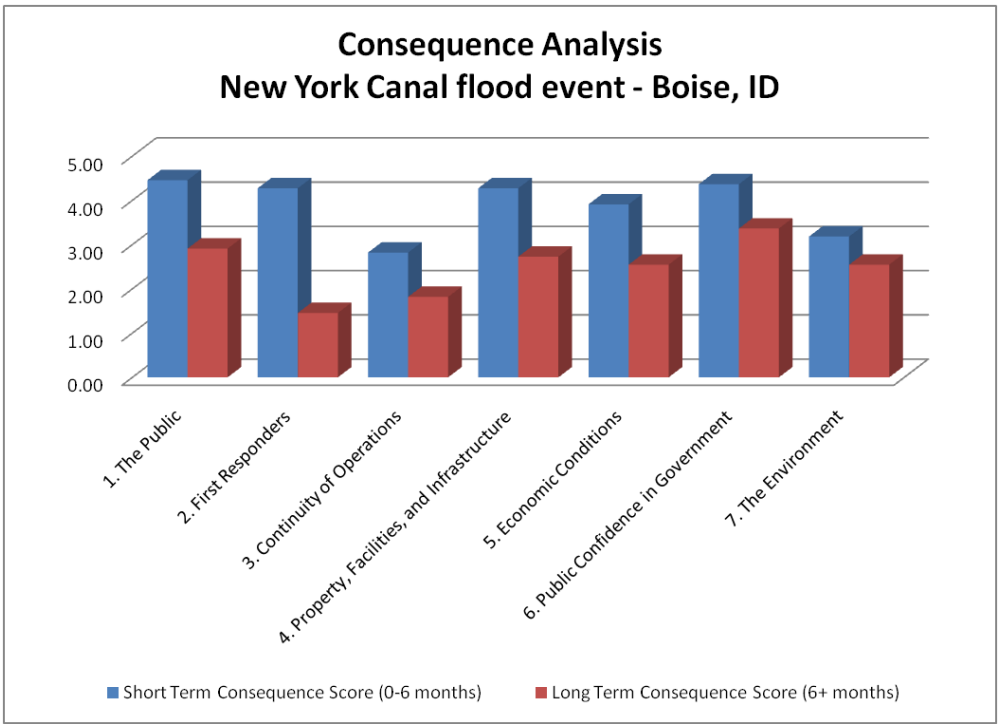


Figure 3.3.H: Consequence Analysis Flood (2010)

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 flood-prone 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 represent the greatest risks to life and property due to the rapid onset, the potentially high velocity of water, and the debris load carried by floodwaters. Flash floods resulting 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 happen somewhere in Idaho almost every year and 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 motorists oftentimes 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 approaches to implementing these mitigation solutions include:

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

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.

National Flood Insurance Program (NFIP)

The National Flood Insurance Program (NFIP) is a federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

Participation in the NFIP is based on an agreement between a local government and the Federal Government that states if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to construction and other ground disturbing activities in mapped Special Flood Hazard Areas (SFHA), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The SFHA has been defined using topographic and hydrologic information and sometimes engineering studies, to identify what area would be inundated in a 1% annual chance flood event. In this type of event, there is a 1% chance each and every year that a flood of that magnitude could occur or be exceeded.

Cities and counties in the NFIP have adopted an ordinance that meets or exceeds the minimum requirements of the flood damage reduction program. The ordinance explains requirements for floodplain development permits, construction standards, and other pertinent information for floodplain management.

Homeowners insurance does not cover flood damage. A private insurance agent can write an NFIP policy or a property owner can buy coverage directly through the NFIP. Flood insurance can be purchased for any property even if it is not shown in an SFHA on a Flood Insurance Rate Map (FIRM). An insurance policy is rated based on typical insurance variables such as amount of coverage for the

structure and contents and specifically on the mapped flood zone and the type of construction, especially the foundation. Only buildings and structures, not land, are protected by an NFIP policy.

Lenders have a federal mandate, the "mandatory purchase requirement," that says if a loan for a property is federally insured or is made by federally insured institutions and the structure is in a SFHA, flood insurance will be required.

The NFIP in Idaho

There were 175 Idaho communities in the NFIP as of December 2012. All but two counties, Camas and Owyhee, are enrolled. The 133 cities include the largest, Boise, to some of the smallest cities like Tensed in northern Idaho. Table 3.3.I below shows the four counties and cities with the greatest number of flood insurance policies. The statewide total of more than 7,000 policies provides coverage for more than $1.57 billion for homes, businesses, and public buildings.

Number of Flood Insurance Policies, Top Four Counties

	Community Name	No. Policies	Total Premium	Total Coverage
ADA	**ADA COUNTY**	320	$178,099	$79,277,300
	BOISE, CITY OF	818	$557,281	$223,418,200
	EAGLE, CITY OF	328	$194,101	$110,247,500
	GARDEN CITY, CITY OF	503	$330,511	$132,065,300
	KUNA, CITY OF	3	$2,624	$767,000
	MERIDIAN, CITY OF	121	$89,704	$27,564,400
	STAR, CITY OF	43	$35,114	$8,242,100
	TOTAL	2136	$1,387,434	$581,581,800
SHOSHONE	**SHOSHONE COUNTY**	138	$90,359	$18,908,000
	KELLOGG, CITY OF	411	$185,392	$59,153,600
	MULLAN, CITY OF	9	$5,243	$1,000,700
	OSBURN, CITY OF	21	$16,122	$2,284,700
	PINEHURST, CITY OF	94	$57,831	$12,523,100
	SMELTERVILLE, CITY OF	51	$32,144	$6,353,600
	WALLACE, CITY OF	20	$24,813	$2,833,800
	WARDNER, CITY OF	0	$0	$0
	TOTAL	744	$411,904	$103,057,500
CANYON	**CANYON COUNTY**	289	$154,677	$63,668,400
	CALDWELL, CITY OF	17	$7,495	$3,641,500
	MIDDLETON, CITY OF	94	$58,555	$15,187,700
	NAMPA, CITY OF	171	$89,725	$31,267,800
	NOTUS, CITY OF	1	$2,061	$395,200
	PARMA, CITY OF	15	$14,455	$2,656,000
	STAR, CITY OF	43	$35,114	$8,242,100
	SODA SPRINGS, CITY OF	1	$1,383	$170,300
	TOTAL	631	$363,465	$125,229,000
BLAINE	**BLAINE COUNTY**	239	$189,361	$74,758,600
	BELLEVUE, CITY OF	26	$13,478	$7,075,000
	CAREY, CITY OF	2	$472	$238,000
	HAILEY, CITY OF	118	$68,303	$29,884,000
	KETCHUM, CITY OF	204	$131,830	$51,146,700
	SUN VALLEY, CITY OF	25	$17,969	$9,813,400
	TOTAL	1245	$784,878	$298,144,700
STATE OF IDAHO TOTAL		7,046	$4,767,827	$1,575,023,500

TABLE 3.3.I: Top Idaho Counties for Flood Insurance Policies

Flooding occurs somewhere in Idaho almost every year. The number of claims and claim amounts since 1978 for properties with NFIP coverage are shown in Table 3.3.J below for the top four counties. Loss estimates are not known for uninsured properties. Maps 3.3.V and 3.3.W at the end of this section summarize the number of NFIP policies and claims, respectively, per county.

Insurance Claims

	Community Name	No. Policies	Total Claims Since 1978	Total Paid Since 1978
SHOSHONE	**SHOSHONE COUNTY**	138	10	$30,153
	KELLOGG, CITY OF	411	1	$0
	MULLAN, CITY OF	9	1	$0
	OSBURN, CITY OF	21	7	$147,624
	PINEHURST, CITY OF	94	104	$771,790
	SMELTERVILLE, CITY OF	51	0	$0
	WALLACE, CITY OF	20	1	$0
	WARDNER, CITY OF	0	2	$9,543
	TOTAL	744	126	$959,110
BLAINE	**BLAINE COUNTY**	239	2	$0
	BELLEVUE, CITY OF	26	43	$137,358
	CAREY, CITY OF	2	0	$0
	HAILEY, CITY OF	118	31	$275,589
	KETCHUM, CITY OF	204	39	$144,389
	SUN VALLEY, CITY OF	25	4	$66,118
	TOTAL	614	119	$623,454
KOOTENAI	**KOOTENAI COUNTY**	283	65	$519,730
	DALTON GARDENS, CITY OF	1	0	$0
	FERNAN LAKE, CITY OF	4	1	$4,227
	HARRISON, CITY OF	0	3	$39,335
	HAYDEN LAKE, CITY OF	1	0	$0
	HAYDEN, CITY OF	2	0	$0
	COEUR D'ALENE, CITY OF	40	5	$35,333
	POST FALLS, CITY OF	11	0	$0
	RATHDRUM, CITY OF	20	0	$0
	SPIRIT LAKE, CITY OF	6	0	$0
	TOTAL	368	74	$598,625
ADA	**ADA COUNTY**	320	16	$39,916
	BOISE, CITY OF	818	41	$95,745
	EAGLE, CITY OF	328	2	$19,227
	GARDEN CITY, CITY OF	503	11	$25,660
	KUNA, CITY OF	3	0	$0
	MERIDIAN, CITY OF	121	1	$23,747
	STAR, CITY OF	43	0	$0
	TOTAL	2136	71	$204,295
STATE OF IDAHO TOTAL		7,046	712	$5,549,573

TABLE 3.3.J

Properties that have flooded are tracked in the NFIP. The NFIP definition of a Repetitive Loss (RL) Structure is one for which two or more flood insurance claims of more than $1,000 have been paid within any rolling 10-year period since January 1, 1978. Table 3.3.K shows the location of insured repetitive loss properties in Idaho. The strategy of the Repetitive Loss Program is to mitigate these properties by elevating them or removing them from the flood hazard area. It is unknown how many of these structures have been mitigated and how many repetitive loss properties are not insured by the NFIP.

TABLE 3.3.K: Repetitive Loss Structures

Community	Number of RL Structures
Shoshone County	12
Benewah County	9
Kootenai County	8
Jefferson County	4
Garden City	2
Blaine County	2
Hailey	2
Moscow	2

A Severe Repetitive Loss (SRL) structure is defined as a residential property that is covered under an NFIP flood insurance policy and:

a) That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
b) (b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

As of the writing of this Plan update, Idaho only has a single SRL property that is located in Shoshone County.

The Community Rating System

The NFIP's Community Rating System (CRS) recognizes community efforts beyond the minimum federal standards by reducing premiums for the community's property owners. The CRS is similar to, but separate from, the private insurance industry's programs that grade communities on the effectiveness of their fire suppression and building code enforcement. A community must apply to the CRS program. The basic minimum requirement is to maintain elevation certificates. Activities that earn CRS credits must be documented.

CRS discounts on flood insurance premiums range from 5% up to 45%. The discounts are based on a community's classification, which is based on the number of points earned in 18 public information and floodplain management activities. All communities start at a Class 10, which offers no discount. The highest is a Class 1, where citizens receive a 45% discount on flood insurance premiums.

Table 3.3.L lists the 22 current CRS communities in Idaho and their associated class and policy discount.

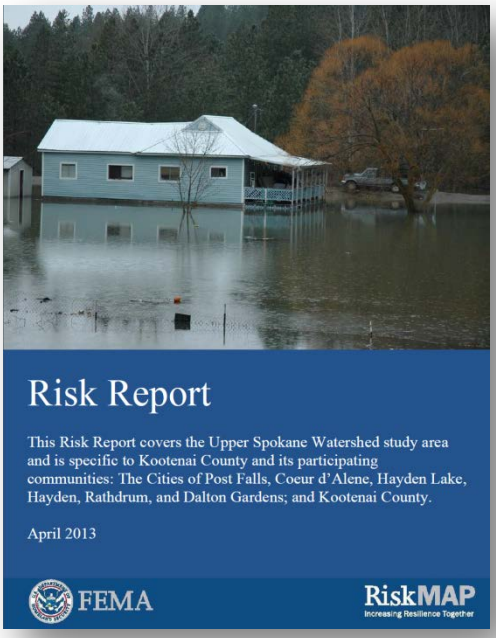
TABLE 3.3.L: Idaho CRS Communities

Community Name	County	Class Rating	Policy Discount
Ada County	Ada County	7	15%
Boise, City of	Ada County	6	20%
Eagle, City of	Ada County	6	20%
Garden City, City of	Ada County	9	5%
Bannock County	Bannock County	8	10%
Pocatello, City of	Bannock County	8	10%
Blaine County	Blaine County	8	10%
Hailey, City of	Blaine County	7	10%
Ketchum, City of	Blaine County	6	20%
Sun Valley	Blaine County	8	10%
Bonner County	Bonner County	8	10%
Caribou County	Caribou County	9	5%
Elmore County	Elmore County	9	5%
Mountain Home, City of	Elmore County	8	10%
Gem County	Gem County	9	5%
Moscow, City of	Latah County	7	15%
Kootenai County	Kootenai County	6	20%
Nez Perce County	Nez Perce County	9	5%
Kellogg, City of	Shoshone County	8	10%
Shoshone County	Shoshone County	7	15%
Twin Falls, City of	Twin Falls County	8	10%
Valley County	Valley County	7	15%
Total Communities	**22**		

Mapping/Analysis/Planning

As part of FEMA's on-going Risk MAP program, the Upper Spokane Watershed and Kootenai County were selected to be the focus of some newly created FEMA products and corresponding analysis and stakeholder meetings. Two non-regulatory products, a Discovery and Risk Report, were produced for the watershed and county, respectively.

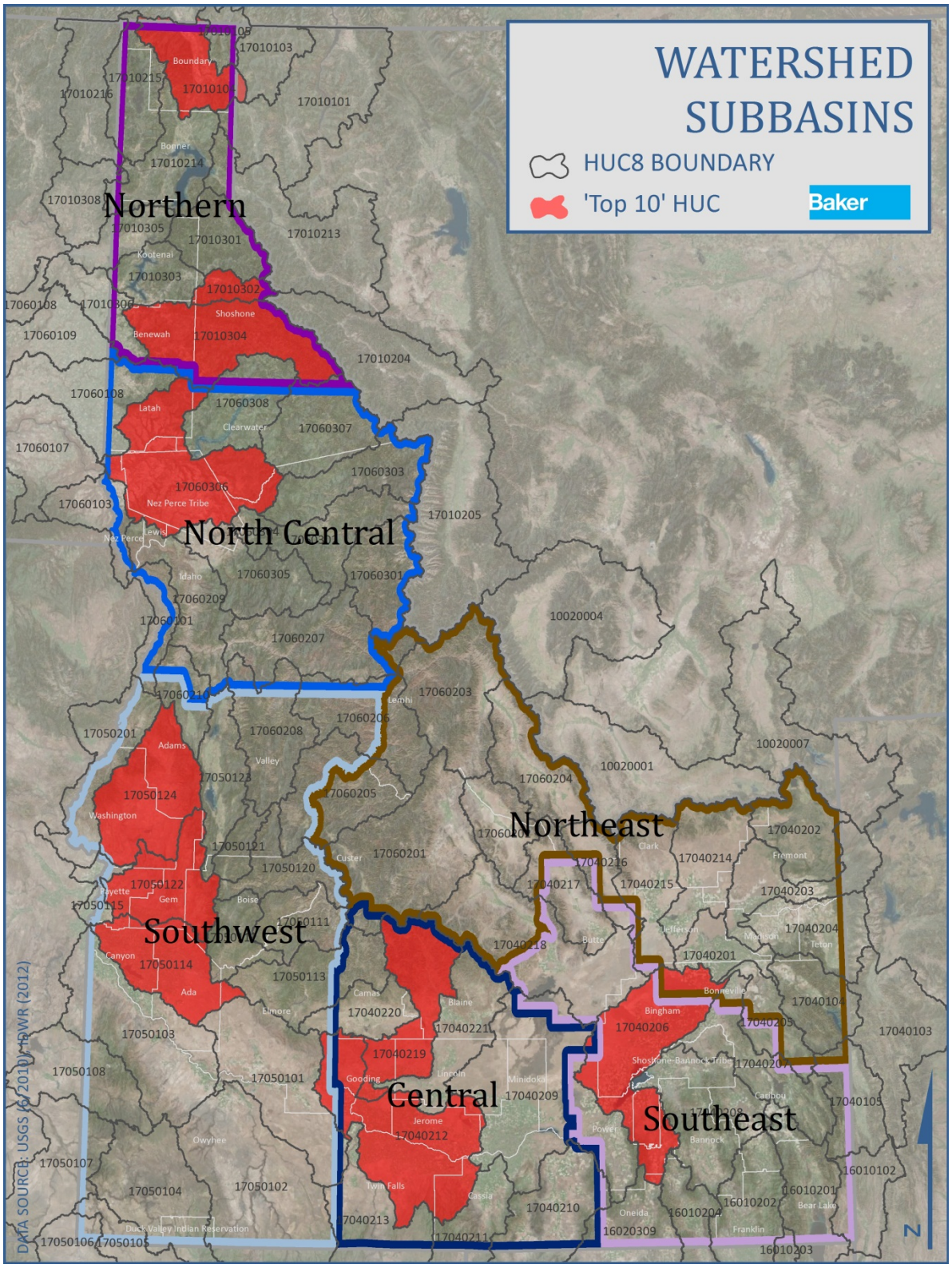
The Discovery process, and the resulting report and map, is comprised of 4 phases. The first phase focused on data collection from all possible sources to help inform and guide future phases. Phase 2 involved review of all data and follow up communications with locals to begin to identify possible areas of mitigation action. The third phase included a series of meetings to bring together all watershed stakeholders to continue to refine possible mitigation projects and flood study needs. The fourth and final phase concluded with the creation of the final Discovery Report and Map, which documents the agreed upon desired flood study areas and mitigation project locations. Should additional Risk Map projects be selected to occur in the area, the report and map will be the foundation for defining the future project scope.



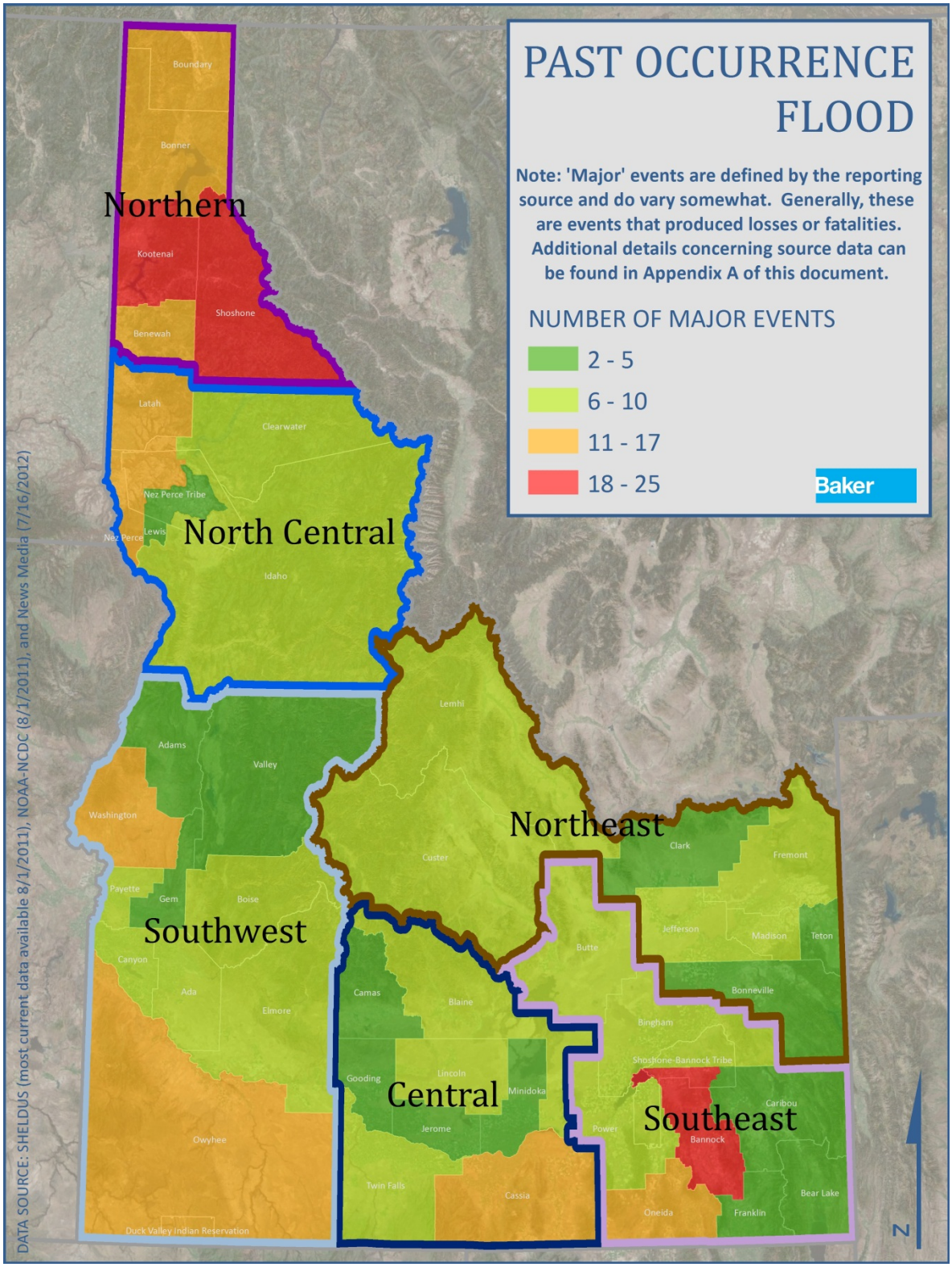
The Risk Report provides non-regulatory information to help jurisdictions and stakeholders better understand their risk. This improved risk understanding can then aid in improved communication of those risks to local businesses and citizens, with the end goal of driving mitigation actions to reduce that risk.

As described above, 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 if a state inventory of facilities and infrastructure is available.

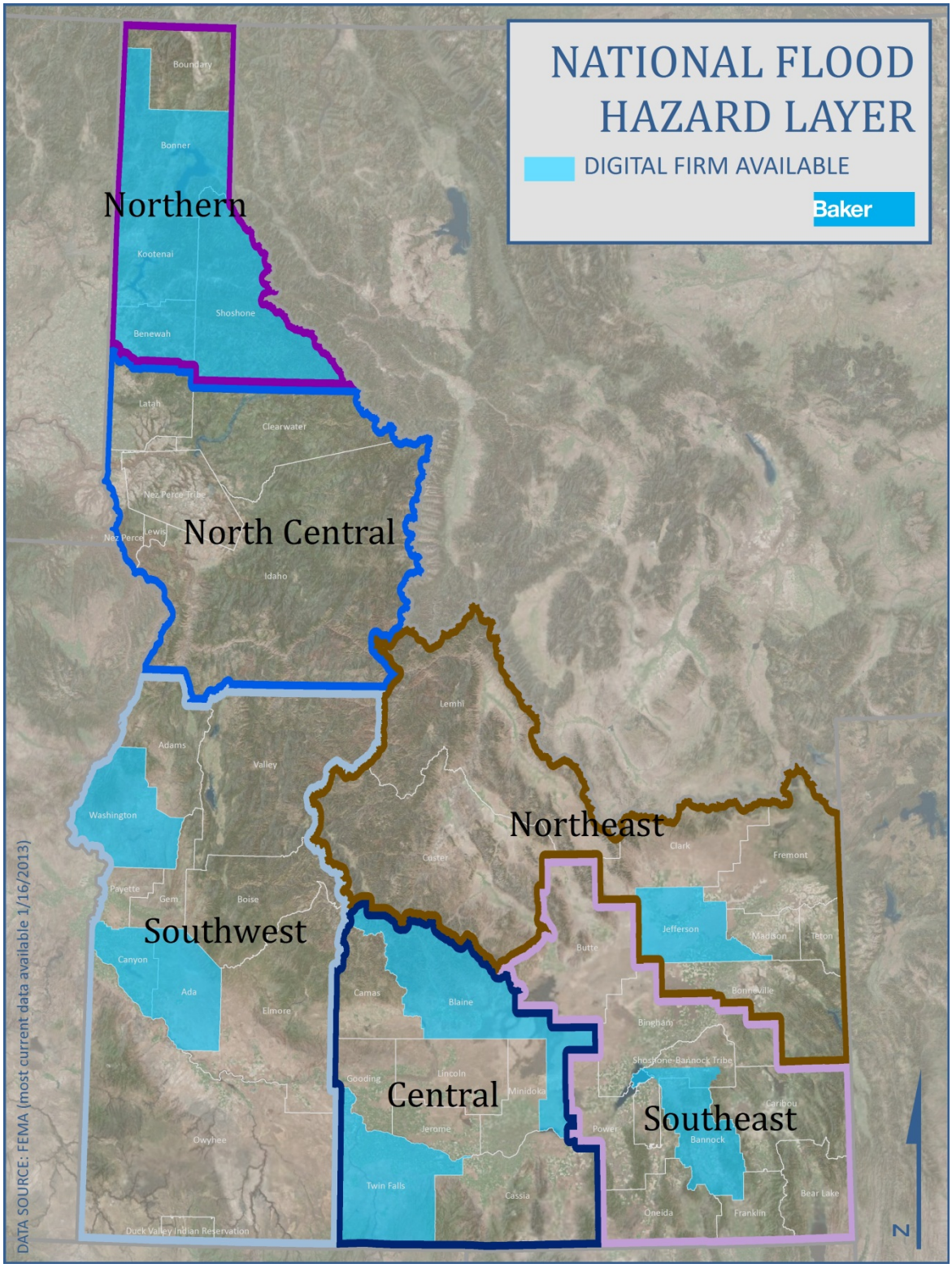
At the time of the 2013 Plan update, major advances in the availability of various data inputs allowed for an improved vulnerability and loss assessment to be performed. Continued refinement of both vulnerability and inventory data will enable for continued refinements in the risk assessment process.



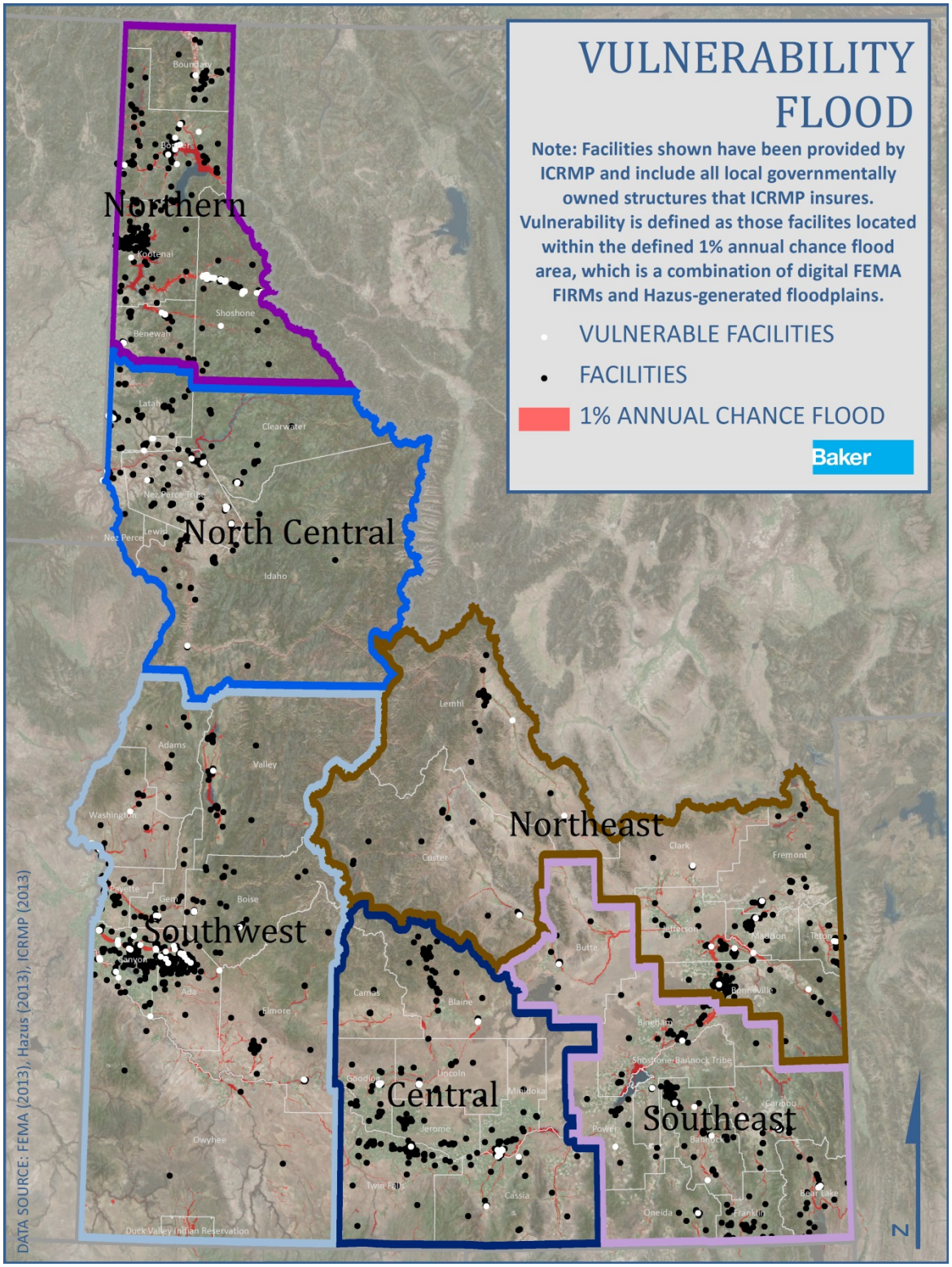
Map 3.3.M: 'Top 10' Watersheds



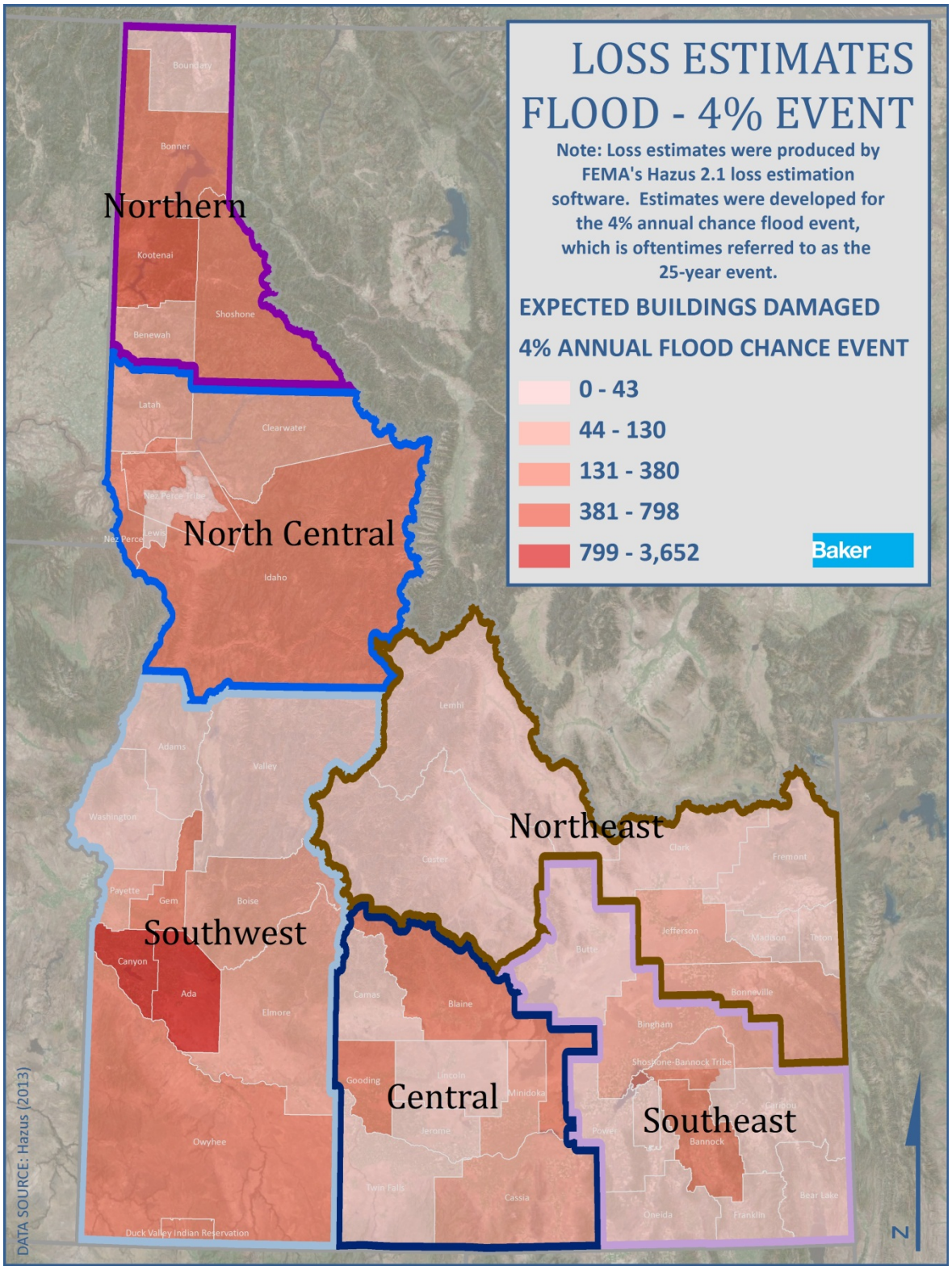
Map 3.3.N: Flood Past Occurrence



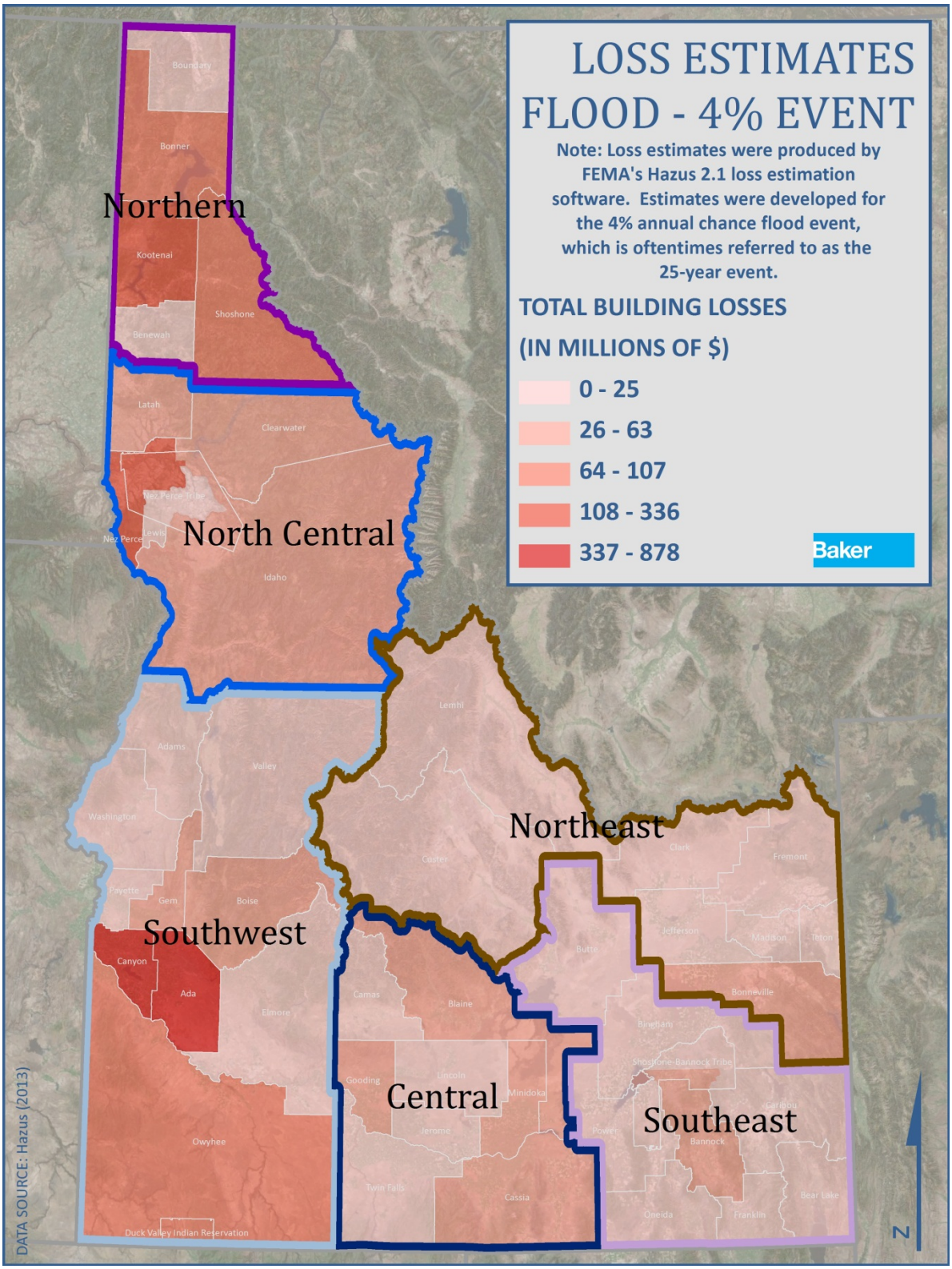
Map 3.3.O: FEMA Digital FIRM Availability



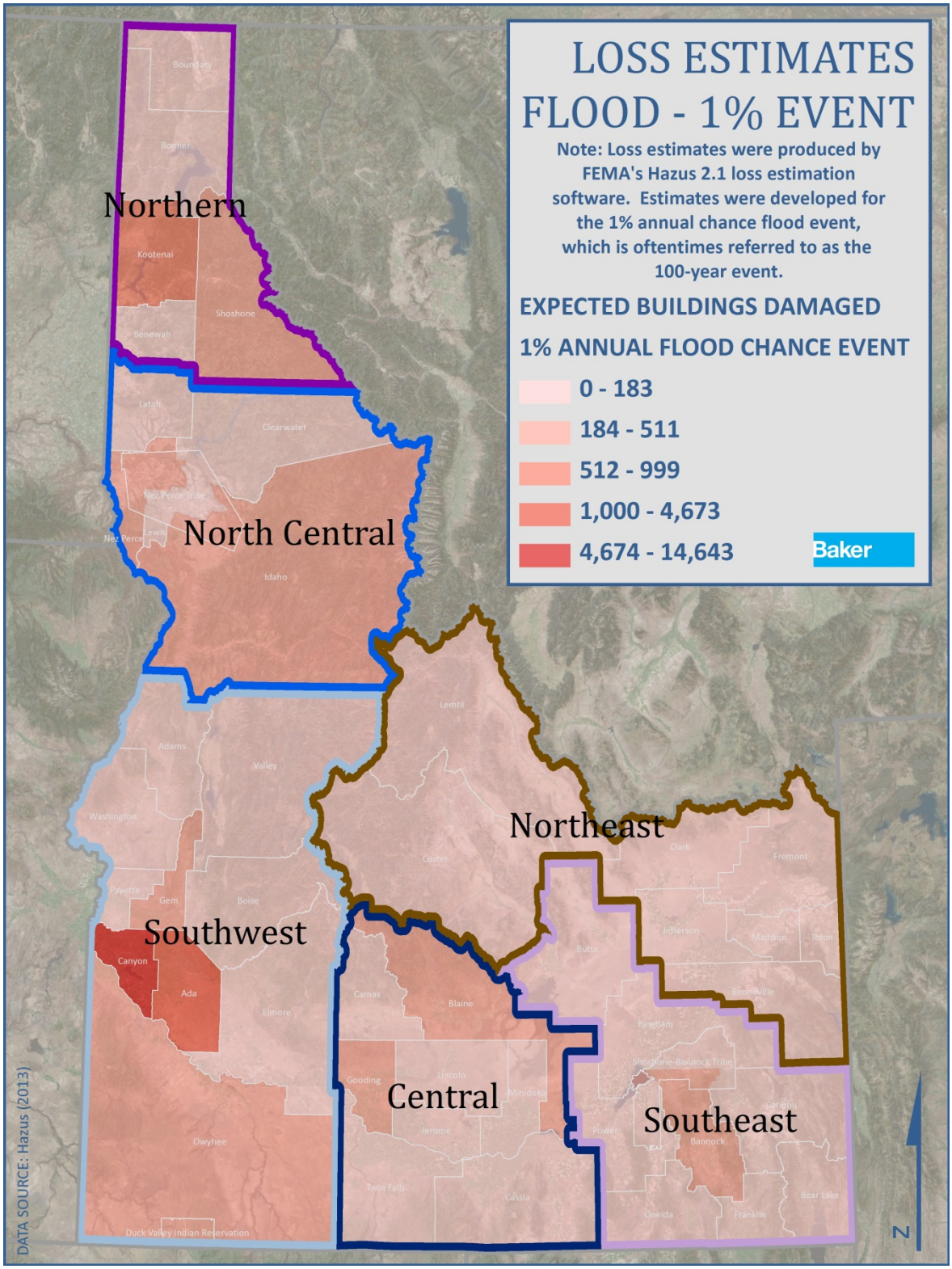
Map 3.3.P: Flood Vulnerability



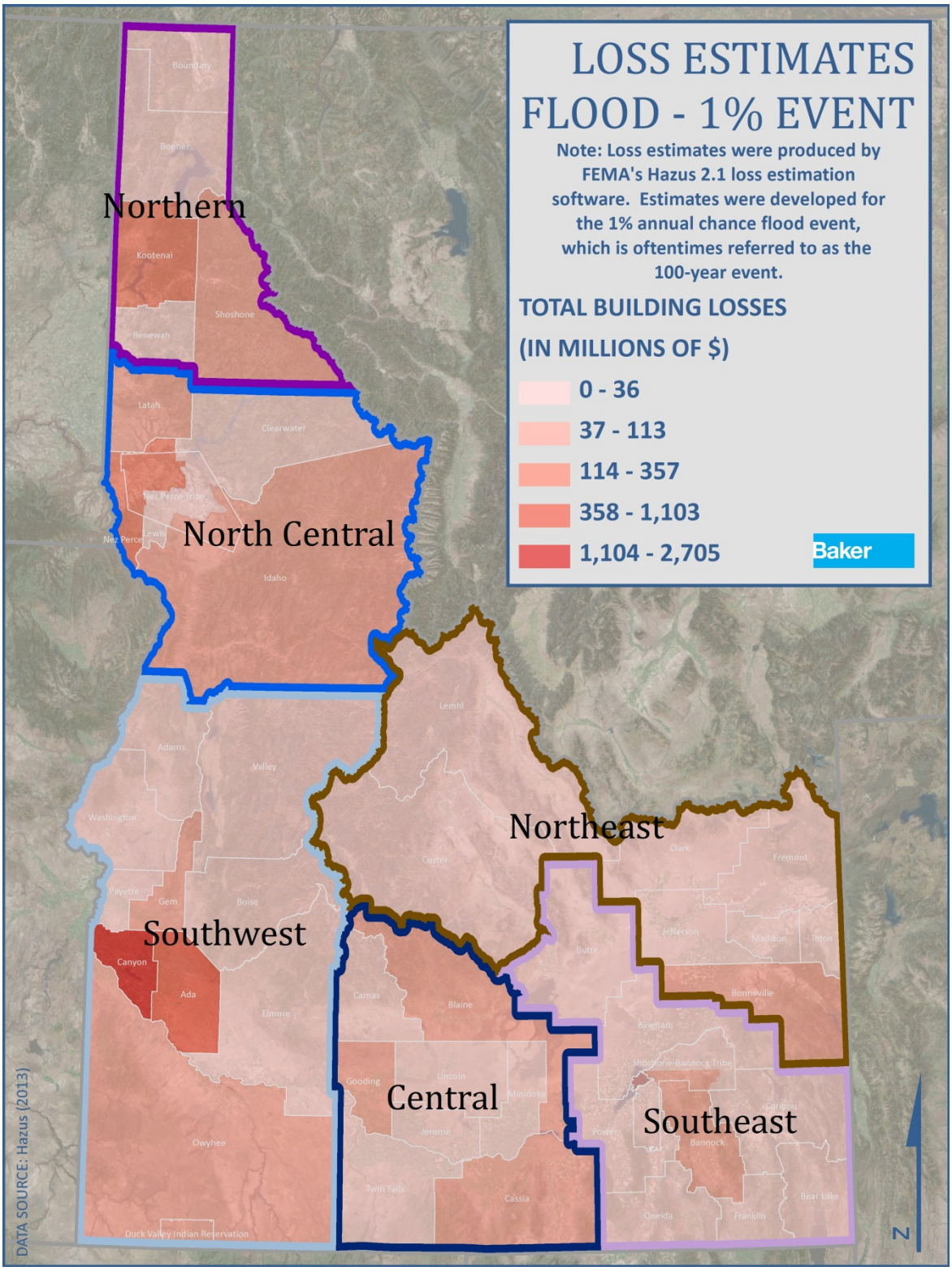
Map 3.3.Q: Estimated Buildings Damaged by 4% Event



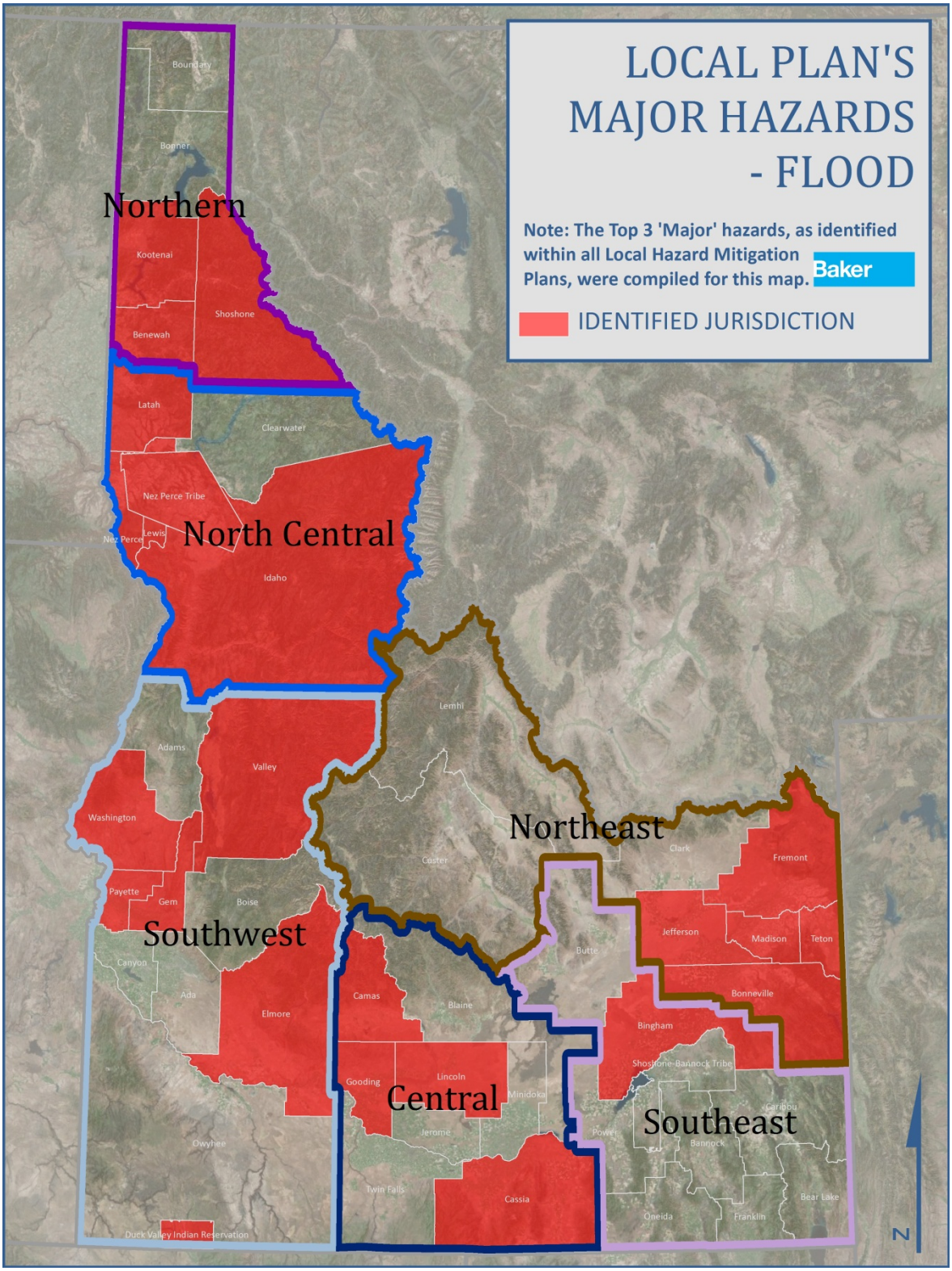
Map 3.3.R: Estimated Building Losses ($M) by 4% Event



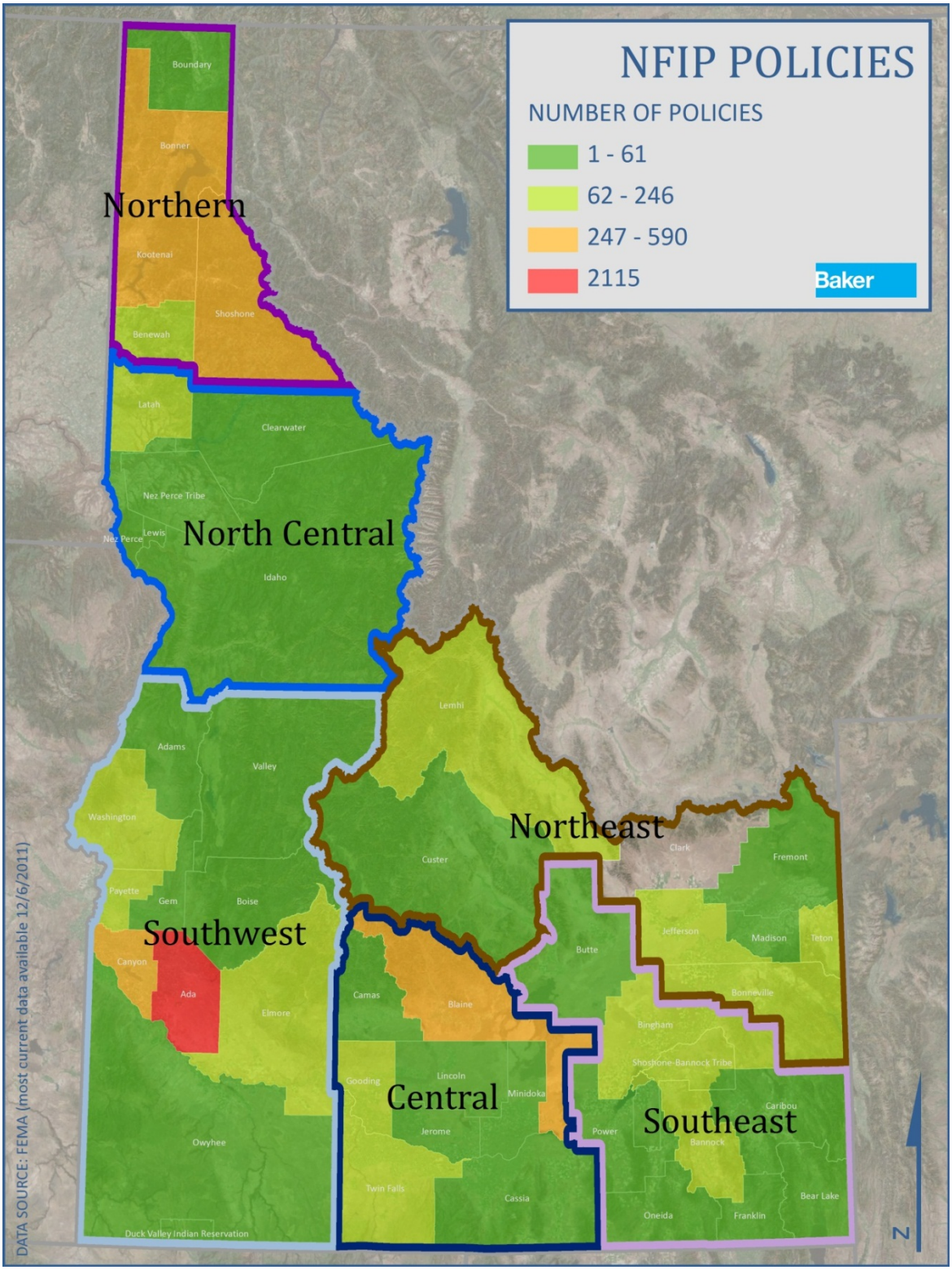
Map 3.3.S: Estimated Buildings Damaged by 1% Event



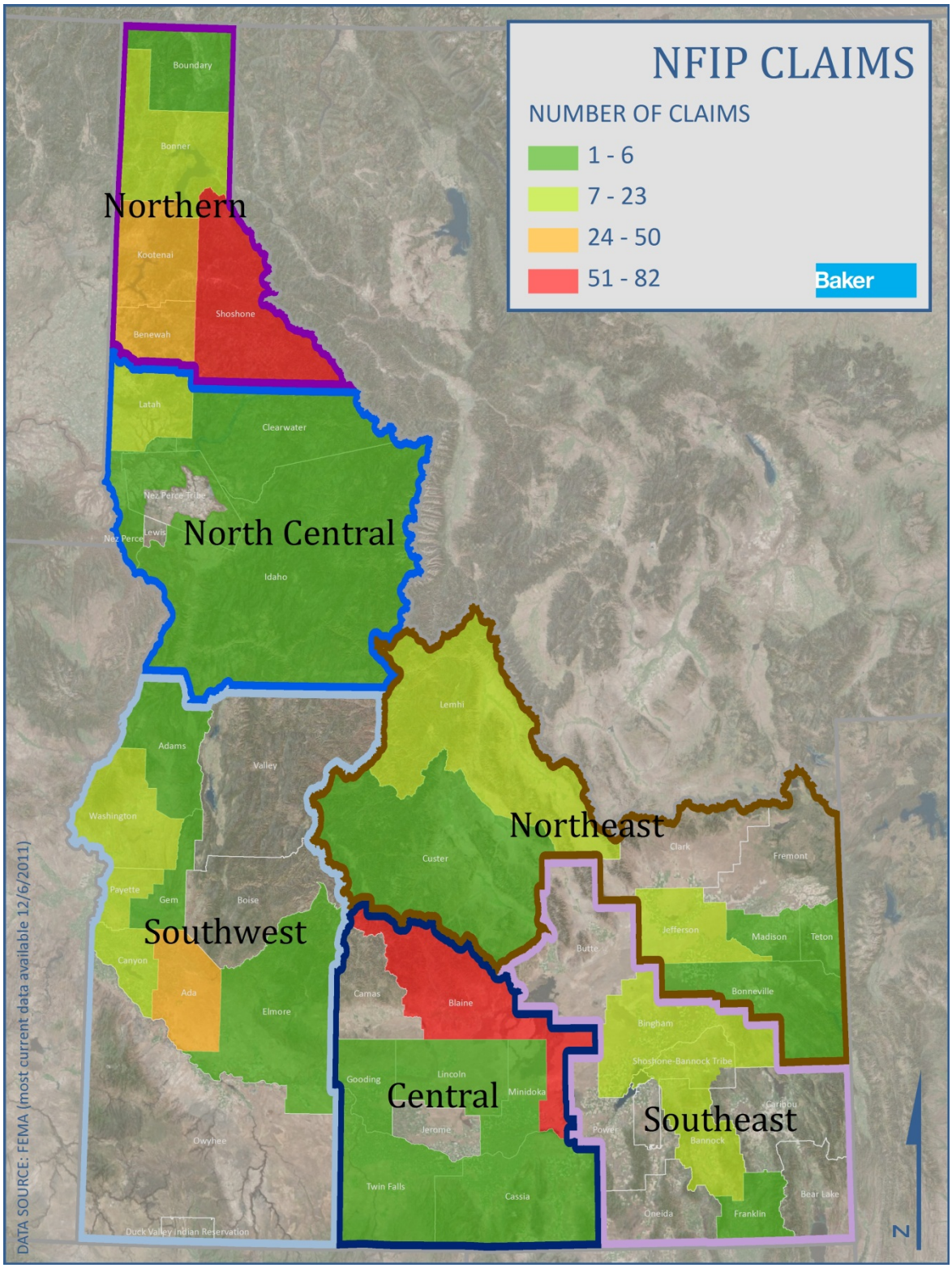
Map 3.3.T: Estimated Building Losses ($M) by 1% Event



Map 3.3.U: Flood Identified as Local Plan Major Hazard



Map 3.3.V: NFIP Policies per County



Map 3.3.W: NFIP Claims per County

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