Section D. NATURAL RESOURCES, NATURAL DISASTERS AND HAZARDS ELEMENT

The topics in the Natural Resources, Natural Disasters and Hazards Section are factors in local land use planning that relate to Statewide planning goals:

Goal 5: Open Space, Scenic and Historic Areas, and Natural Resources
Goal 6: Air, Water, and Land Resources Quality
Goal 7: Areas Subject to Natural Disasters and Hazards

Oregon faces a number of natural hazards with the potential to cause loss of life, injuries and substantial property damage. A natural disaster occurs when a natural hazard event interacts with a vulnerable human system. Natural hazards are those natural events which may result in a threat to human life, or which endanger property. Although termed "natural" hazards, it is important to note that such occurrences are often induced by people, and by definition, would not exist if not for the presence actions of people.

It is not always possible to predict exactly when a natural disaster will occur or the extent to which they may impact the community. However, communities can minimize losses from disaster events through deliberate planning and mitigation. A report submitted to Congress by the National Institute of Building Science's Multi-hazard Mitigation Council (MMC) highlights that for every dollar spent on mitigation society could expect an average savings of $4.[1]

Protection of the environment is important to the quality of life in Shady Cove and therefore the City adopts these goals:

- Use natural resources wisely.
- Preserve to the highest extent possible:
    - Air Quality,
    - Water Quality,
    - Historical Sites,
    - Scenic and Open Areas, and
    - Fish and Wildlife Habitat.
- Protect life and property from stream flooding.
- Protect life and property from wildfire.

Additional hazards may be from stream bank erosion, high groundwater and ponding and slope erosion. To a lesser extent Shady Cove may also be subject to earthquakes. Minimizing risk is an essential focus of public safety planning.

SETTING

Shady Cove is situated along the Rogue River from about river mile 144 to 147. The elevation of Shady Cove ranges from about 1,350 feet at the south end of the city to 1,860 feet at the eastern portion of the City. The elevation is 1,406 feet at the Rogue River Bridge in Shady Cove. The majority of the city is flat to gently sloping with the steepest

[1] National Institute of Building Science's Multi-hazard Mitigation Council. "Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities" 2005.

areas found in the northwest and west portions of the city, along Rogue River Drive, and along Old Ferry Road above Indian Creek.

Undeveloped areas of Shady Cove are vegetated with cottonwoods, oaks and pine.

While once a hub for the agricultural and ranching areas to the south and up Trail and Elk Creeks, and the site of a sawmill for processing commercial timber from the higher elevations to the north, Shady Cove is now largely a retirement community and a gateway to the Upper Rogue recreational areas of the Rogue River, Lost Creek Lake, Diamond Lake, and Crater Lake.

AIR QUALITY

Illegal burning threatens the air quality goal of Shady Cove.

Air Quality in the Shady Cove area is regulated by both the State and Federal Department of Environmental Quality (DEQ) standards. DEQ controls open burning to preserve air quality. Shady Cove is more than 10 miles from the Medford-Ashland Air Quality Maintenance Area where air quality is more stringent. Questions about the open burning program can be made to the Oregon DEQ representative in Medford at 541-776-6010 (221 Stewart Avenue, Suite 201, Medford, OR 97501). Call 541-776-7007 *before* burning to determine if open burning is permissible that day to maintain air quality standards.

WATER AREAS AND WETLANDS

Water bodies within the Shady Cove Urban Growth Boundary (UGB) are the Rogue River from about river mile 144 to river mile 147, Long Branch Creek, which flows into the Rogue River at the southwest edge of the UGB, and Indian Creek, which flows into the Rogue River just downstream from the Rogue River Bridge in Shady Cove. Rogue River, Indian Creek and Long Branch Creek are Class 1 streams. There are other seasonal and unnamed creeks within the Shady Cove UGB that cause drainage problems during storm events. All rivers and creeks within Shady Cove have associated riparian fringes that have been designated as protected areas with appropriate vegetation, these areas lend shade for the fish habitat of these water bodies, and provide protected corridors for wildlife.

WATER QUALITY

SURFACE WATER

The quality of surface water of the Rogue River is high. The Shady Cove Wastewater Treatment Plant, located downstream of Shady Cove, was constructed in 1979 in response to failing septic systems. Today all housing within Shady Cove is required to connect to the City sewer system.

A Surface Water Treatment Rule took effect in 1990 regulating runoff to ensure surface water and public water systems (downstream) do not become contaminated.

GROUND WATER

There are more than 1,000 private wells and about 20 privately owned water systems providing water to homes and businesses in Shady Cove. Some wells have gone dry and many are low producing wells that require residents to bring in bulk water supplies.

The Jackson County Health Department (JCHD) regulates public water systems including commercial businesses in Shady Cove. There has been no comprehensive study of ground water in Shady Cove. Many wells in Shady Cove were drilled prior to the time of registration of wells. JCHD is aware of problems with minerals (high levels of manganese, iron and sulfur), contamination by petroleum products, bacterial contamination, and inadequate well yields that have required treatment. Well drilling has caused constraints on property development in Shady Cove, particularly within the commercial business zone as a business serving food would need to have their water line be 50 feet from a sewer line (100 feet if the line is pressurized), and 100 feet from a drain field or underground storage tank. Few commercial properties can meet those criteria. Commercial business growth is inhibited by the lack of a citywide water system.

The City of Shady Cove relies primarily on private wells and neighborhood water systems for water. A private water system, Shady Cove Water Works (SCWW) was originally constructed to serve the White Oaks Housing Development on the west side of Shady Cove, and initially served only six or seven properties. Negotiations for the purchase of SCWW began in November 2013 and the sale to Hiland Water, Inc. (Hiland), of Newberg, Oregon, was finalized in June 2014. Initial expansion of SCWW was to the Shady Cove Mobile Home Park, the Edgewater Inn, and several properties on Oak Ridge, Chaparral and Riverview.

Prior to the purchase of SCWW by Hiland, Hiland acquired the Northridge Water System in October 2013 that consisted of approximately 75 homes, two wells and a 30,000 gallon reservoir. In November 2013, Hiland also acquired the Whispering Pines Water System with 21 homes/properties and an additional 10,000 gallon reservoir.

During the summer of 2014 Hiland increased the water treatment plant's filtering capacity, installed telemetry between the reservoir and water treatment plant and began work on a booster station for the east side of the city. Since November 2014 Hiland has increased the service area with the Housing Authority of Jackson County grant that allowed a water line extension. This extension provided two more fire hydrants on Cleveland and allowed connections for Northridge and Whispering Pines housing developments. During the winter of 2014 and spring of 2015 Hiland acquired the River Run Water System, the Evening Shade Water System and connected a new line for service to approximately 30 homes on the east side of Shady Cove.

As of September 2015, Hiland Water, Inc. provides clean water in Shady Cove to approximately 250 residential customers and the Edgewater Inn. Hiland is open to expansion which would provide service to more neighborhoods and businesses bringing affordable, reliable water to more areas of Shady Cove.

TOPOGRAPHY

Terrain in most of the UGB of Shady Cove is flat to gently sloping with steeper areas (slopes up to 40 percent or more) found on the northeastern and eastern edges of the City. GIS (geographic information system) maps indicate approximately 240 acres (14 percent of the total Shady Cove UGB) have slopes at 25 percent or greater. These steeper slopes are an obvious constraint on density because of the increased cost of development, and the land needs to be divided properly in order to avoid access problems for emergency

vehicles. Slopes within the Shady Cove UGB have not otherwise been identified as a natural hazard.

The total difference within Shady Cove is about 500 feet, from 1,350 feet along the Rogue River at the southern end to about 1,860 feet along the eastern edge of the City and UGB. The majority of businesses and residences are located between elevations 1,380 feet and 1,520 feet.

MINERAL AND AGGREGATE RESOURCES

While sand and gravel deposits build up in the Rogue River and its floodplain within Shady Cove, in particular river wash deposits in several gravel bars, there are no active aggregate sites within the Shady Cove UGB. Sand, gravel, and quarry (basalt, andesite and shale) sites are available on Long Branch Creek and Indian Creek within a few miles of the vicinity Shady Cove. While the quarries operate outside of the Shady Cove UGB, haul routes still run through residential areas of the City.

OPEN SPACE

The major open space area in Shady Cove is the Rogue River. Much of the oak woodlands with open grassy areas underneath have been developed, but some remain within the western portion of the Shady Cove UGB.

Only two formally designated parks lie within Shady Cove: Aunt Caroline's Park, a city park, and the Rogue Regional County Park. Open space occurs on the school property, the airstrip on the western side of Shady Cove, the undeveloped properties at the south edge of the City, and vacant lots scattered throughout the City.

HISTORIC AND CULTURAL SITES

There are few historical structures in the City of Shady Cove or within the Shady Cove UGB. Most buildings in Shady Cove are not more than 50 years old, the age at which the historical significance of structures begins to be recognized. With the history of flood events in Shady Cove it is not surprising there is a lack of historic structures.

The oldest neighborhood development in Shady Cove is the Cove neighborhood at the bend in the Rogue River upriver from the Shady Cove Bridge over the Rogue River. The oldest homes in this area were built as seasonal cabins in the 1920s, but only a few of the old cabins remain and those that do have been modified since being built.

Historic sites in Shady Cove:

- The Johnson-Drexler family cemetery (private) south of the Rogue River Bridge on the west side of Highway 62;
- The old ferry crossing which dates from 1877 to 1922. The site of the historic ferry crossing was on the west bank of the Rogue River north of Cleveland Street; and
- The J. Blass House and its stone cellar house are each inventoried. These structures sit just outside the Shady Cove UGB on Old Ferry Road (1305 Old Ferry Road) and about 200 feet south of the old historic ferry crossing site. Blass was the ferry master from early in the 20th century until 1922 when the ferry was

discontinued at the construction of the first Rogue River Bridge in Shady Cove was completed.

- The Caroline Drexler house at 2400 Indian Creek Road [no longer exists].

An archaeological assessment of the area proposed for the wastewater treatment plant was compiled in November 1976 as part of the facilities plan prior to construction. The area had been used by the Upland & Lowland Takelma and Molalla Indians, although apparently not for permanent settlements. Sites with artifacts on the banks of the Rogue River were identified in 1976 while inventorying for a proposed project. The significance of these sites remains to be evaluated for possible designation as sites needing protection.

The Planning Commission will function as the Historic Review Board for Shady Cove until such time as the City Council determines that a separate body is more appropriate for this function.

FISH AND WILDLIFE HABITAT

The main stem of the Rogue River is important to the maintenance of anadromous fish (steelhead, Chinook salmon, Coho salmon, and sea-run cutthroat trout) in the Rogue River Basin. Indian Creek and Long Branch Creek are important tributaries of the Rogue River for their influence on downstream fish habitat.

Healthy fish habitat includes clean, cold and flowing water. And temperature is one of the most important environmental influences on salmon and steelhead. Stream temperature controls the metabolism of the fish and influences the abundance or lack of food for the fish.

Riparian protection along all waterways was begun in earnest in 1994 throughout Oregon. Over the past 20 years riparian protection has been voluntary on private lands with varying degrees of success. With increased development in the Shady Cove area the native trees and shrubs that had helped shade the pools where fish rested disappeared. Without the shade along the stream banks stream temperatures can rise to impede fish migration and can rise to lethal levels. What seems cold to us as we wade in the Rogue River can be just marginal for the fish or not even adequate and their aquatic food supplies.

The State of Oregon (ODEQ) is responsible for creating direction and guidelines to help all areas of Oregon to meet the 1972 Federal Clean Water Act. All cities, Shady Cove included, must meet TMDL (Total Maximum Daily Load) standards for maintaining Oregon water quality. A TMDL is the calculated pollutant (heat, or temperature) amount that a waterbody can receive and still meet Oregon water quality standards. Riparian protection is one of the most effective ways to comply with the standards.

Wherever possible, stands of native vegetation should be maintained for wildlife habitat. In 1987 there were 142 species of native wildflowers inventoried in the Shady Cove area. An annual Wildflower Show is held in Shady Cove displaying these native plants in bloom.

The area outside the Shady Cove UGB is designated in the Jackson County Comprehensive Plan by Oregon Department of Fish and Wildlife as “especially sensitive” deer and elk habitat. This designation establishes a minimum parcel size to be 160 acres.

ENERGY RESOURCES

There are no major energy sources in Shady Cove. Hydroelectric power plants are prohibited by State statute on the Rogue River in the Shady Cove area. On a small scale at the household level, other renewable energy sources are used, primarily wood burning for home heating and solar heating of water or for space heating where there are favorable exposures and trees do not block the solar panels.

SCENIC RESOURCES

Since the last update of the Shady Cove Comprehensive Plan, Highway 62 from Shady Cove to the junction with Highway 230 above Union Creek has been designated part of the Rogue-Umpqua National Scenic Byway. The Oregon Department of Transportation (ODOT) maintains the standards for the byway.

The Sky Lakes Wilderness, Rogue-Umpqua Divide Wilderness, and Crater Lake National Park are all recreational areas to the northeast, northwest, and north, respectively, of Shady Cove that serves as a recreational gateway to these areas.

AREAS SUBJECT TO NATURAL DISASTERS AND HAZARDS
(STATE PLANNING GOAL 7)

The development of the Jackson County Integrated Fire Plan (JaCIFP) began in January of 2005, building on an active foundation of wildfire protection work in Jackson County. Although past efforts have been successful, the county recognized an overwhelming need for increased coordination among wildfire management agencies and a need for a greater understanding of and responsibility for wildfire safety among residents of Jackson County. Since the creation of the National Fire Plan in 2000 and passage of the Healthy Forests Restoration Act in 2003, communities have an increased opportunity to participate in federal agency wildfire fuels management planning, to receive funding for fuels management on private lands, and to be active participants in reducing wildfire risk throughout the county.

The Jackson County Natural Hazard Mitigation Plan was accepted by the Federal Emergency Management Agency (FEMA) and then approved by the Jackson County Commissioners on January 31, 2006. The plan "includes resources and information that will assist county residents, public and private sector organizations and other interested people in participating in natural hazard mitigation activities."[2]

The Oregon Office of Emergency management is responsible for maintaining current risk assessments.[3]

Emergency events can disrupt vehicular traffic making local and/or regional evacuations difficult. Hazards such as localized flooding can render roads unusable. Likewise, a severe winter storm has the potential to disrupt daily driving routines for thousands of people.

---

[2] Jackson County Natural Hazard Mitigation Plan (http://www.jackson,or,us/Oage.asp?NavID=1514)
[3] For current scores see http://www.oregonshowcase.org. Oregon Military Department – Office of Emergency management http://www.oregon.gov/OMD/OEM.

In Shady Cove there is little infrastructure available to use as emergency shelters or evacuation points for the community. People rely on the Shady Cove School, the Upper Rogue Community Center and the Jackson County Fire District 4 fire station in Shady Cove in emergencies. The Shady Cove Middle School is the newest of these structures and was designed and built in 2002 to the building standards at that time. However, none of these locations have been specifically seismically retrofitted and may likely be rendered unusable following a substantial earthquake.

Businesses in Shady Cove may be particularly sensitive to any temporary decreases in demand following even a moderate natural hazard event.

In the event of wildfire, floods, earthquakes, or other types of destructive natural disasters, residents are more likely to demand construction services and health care services. The demand for tertiary economic services provided by the retail trade and accommodation and food service sectors may decrease. These businesses should create a plan to remain economically solvent through a natural hazard event.

FIRE

Jackson County Fire District 4 providing emergency response serves Shady Cove and the surrounding Upper Rogue area. For wildland fire the Oregon Department of Forestry provides protection.

The increasing impact of wildfires on forests[4] and the loss of life and property to wildfires each year in this country is a cause of concern to Jackson County commissioners. Recent catastrophic disasters in the United States, such as Hurricane Katrina, are exposing unprepared governments and citizens. With lessons learned from these disasters, the Jackson County Integrated Fire Plan creates opportunities for citizens and agencies to increase preparedness for wildfire and other emergencies. The Jackson County Integrated Fire Plan Mission Statement reflects the need for increased preparedness and coordination:

> *"Reduce the risk of wildfire to life, property and natural resources in Jackson County by coordinating public agencies, community organizations, private landowners, and the public to increase their awareness of and responsibility for fire issues."*
> *-JaCIFP Mission Statement*

The natural hazards mitigation plan includes seven goals that can be implemented or coordinated to help residents become less susceptible to a natural disaster. The key to implementing the seven goals is a five-year action plan. The seven goals are related to:

1. Property protection
2. Education and outreach
3. Prevention
4. Partnership and coordination
5. Structural projects
6. Natural resource protection
7. Emergency services

[4] Agee, J. K. 1993. Fire Ecology of Pacific Northwest Forests. Island Press, Washington, DC. 493 p.

The County Hazard Risk Analysis rating for wildfire in Jackson County is 150 out of 240.[5]

STATE OF OREGON POLICIES

Oregon Forestland-Urban Interface Fire Protection Act (SB 360)

The Oregon Forestland-Urban Fire Protection Act of 1997 (SB 360) is intended to facilitate the development of an effective Wildland-Urban Interface (WUI) protection system in Oregon by:

- Establishing policies regarding WUI protection;
- Defining the WUI in Oregon and establishing a process and system for classifying the interface;
- Establishing fuel-reduction standards for WUI property owners so they can manage or minimize fire hazards and risks; and
- Providing the means for establishing adequate, integrated fire protections systems in WUI areas, including education and prevention efforts.

SB 360 has been implemented in Jackson County.

PROBABILITY

The natural ignition (lightning) of forest fires is primarily a function of weather, fuel and topography. Human-caused fires add another dimension to probability.

Wildfire has always been a part of the ecosystems of the forests and woodlands surrounding Shady Cove. Table D-1 displays some of the most devastating wildfires since 1987.

There is a high probability that the Shady Cove area will experience a fire. Fire frequency occurs with one incident likely within a 10 to 35 year period.[6]

Table D-1. Significant Wildfires in Southern Oregon.

Year	Name of Fire	County	Acres Burned	Remarks
1987	Bland Mountain	Douglas	10,300	Near Canyonville; 2 structures lost; started by debris burning
1987	Silver	Josephine & Curry	96,540	Lightning fire.
1992	East Evans Creek	Jackson	10,136	4 structures lost; $8.2 million in damages; lightning fire.
	Indian Creek Fire	Jackson		This fire was on the edge of Shady Cove.
1994	Hull Mountain	Jackson	8,000	1 life and 44 structures lost. Arson fire.
1994	Sprignett Butte	Jackson	1,631	Arson fire.
2000	Antioch Road	Jackson	376	

[5] Scores current as of November 2008. For current scores see http://www.oregonshowcase.org. Oregon Military Department – Office of Emergency management http://www.oregon.gov/OMD/OEM.
[6] Oregon Emergency Management, November 2008. County Hazard Analysis Scores.

Year	Name of Fire	County	Acres Burned	Remarks
2002	Squires Peak/ Wall Creek	Jackson	3,125	6 structures lost; $2 million in damages; lightning fire.
2002	Timbered Rock	Jackson	27,111	Lightning fire.
2002	Biscuit	Josephine, Curry	499,965	Estimated to be one of Oregon's largest fires in recorded history, the Biscuit Fire encompassed most of the Kalmiopsis Wilderness; 14 structures lost; $150 million in damages; lightning fire.
2003	Cove Road	Jackson	700	Three miles east of Ashland
2008	Doubleday	Jackson	1,244	Threatened Butte Falls; lightning fire.

Source: Brian Ballou, August 2002, A Short History of Oregon Wildfires, Oregon Department of Forestry, unpublished; and Oregon Emergency Management, State Natural Hazard Mitigation Plan, 2003, Wildland/Urban Interface chapter and State Interagency Hazard Mitigation Team (2006). The State of Oregon of Natural Hazards Mitigation Plan.

VULNERABILITY

Shady Cove is considered a community in the urban/wildland interface and thereby has a high wildfire hazard. Fire has always been a natural component of the natural landscape of this area. However, it is important that property owners maintain their property so as to mitigate risk to minimize damage and property loss and therefore reducing their vulnerability to wildfire.

A detailed community inventory of factors that affect vulnerability is important in assessing risk specific to Shady Cove. The Firewise[7] program gives property owners the information needed to assess their property in regards to fire safety. The Oregon Department of Forestry foresters and Jackson County Fire District 4 firefighters can assess properties for fire safety and suggest mitigation measures to reduce the vulnerability of residents to fire effects.

FLOOD

The County Hazard Risk Analysis rating for flooding risk in Jackson County is 150 out of 240.[8]

Dam failures can occur at any time, but fortunately most failures result in minor damage and pose little or no risk to life safety. However, the potential for severe damage and fatalities does exist, and the National Inventory of Dams (NID) has developed a listing of High Threat Potential Hazard dams for the nation. Of the 76 dams in Jackson County, 12 pose a high threat.[9]

A number of large floods have been recorded in Jackson County, many of which were very destructive. Recurrence is virtually assured, especially in urbanized areas. The Rogue River, Indian Creek and a number of unnamed creeks flows through Shady Cove.

[7] www.firewise.org

[8] Scores current as of November 2008. For current scores see http://www.oregonshowcase.org. Oregon Military Department – Office of Emergency management http://www.oregon.gov/OMD/OEM.

[9] Oregon Department of Energy, National Inventory of Dams (NID), Atlas of Oregon.

Portions of Shady Cove, particularly the west central area of the city have drainage issues related to shallow soils to bedrock and ephemeral stream patterns.

Table D-2. Significant Floods in Oregon.

Date	Location	Characteristics	Type of Flood
Nov 1909	Rogue River (and other rivers in Oregon)	Widespread flooding in Pacific Northwest.	
Feb 1927	Rogue River (and other rivers in Oregon)	Widespread flooding in Pacific Northwest	
Mar 1931	Western Oregon	Wet, mild weather. Bridges and homes destroyed	Rain on snow
Dec 1945	Rogue River (and other rivers in Oregon)	Numerous deaths and major property damage	
Oct 1950	Southwest Oregon	Severe flooding; six fatalities; bridges and roads destroyed.	Rain on snow
Dec 1955	Rogue River (and other rivers in Oregon)	Numerous deaths and major property damage	
Jan 1962	Western Oregon	Heavy rain (3" – 4" in Rogue Valley); great loss of farmland.	Rain on snow
Dec 1964/ Jan 1965	Western Oregon	Infamous '64 flood that has become an Oregon benchmark. Record flows on Rogue River.	Rain on snow
Jan 1972	Western Oregon	Record flows	Rain on snow
Jan 1974	Western Oregon	Series of storms with mild temperatures; large snowmelt with rapid runoff.	Rain on snow
Nov/ Dec 1977	Western Oregon		Rain on snow
Jan 1986	Entire State	Significant flooding in western Oregon attributable to warm, intense rain.	Rain on snow
Jan 1990	Western Oregon	Significant flooding in western Oregon	Rain on snow
Feb 1996	Nearly Oregon-wide	$280 million in damage	
Nov 1996	Entire State	Tropical air mass with intense rain; landslides; power outages (FEMA-1149-DR-OR)	Rain on snow
Dec 1996/ Jan 1997	Entire State	Mild temperatures continue. FEMA declaration (FEMA-1160-DR-OR). $12 million in damages in Jackson County alone.	Rain on snow
Dec 2005	Southwest Oregon counties	$2.84 million in damages (estimated).	
June 2006	Jackson County	Heavy rain brought flash flooding to Jacksonville, but no significant damages reported.	Riverine
Aug 2007	Jackson County	Heavy rains caused flash flooding near Ashland, no major damages reported.	Riverine

Source: Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Hazards & Vulnerability Research Institute (2007). The Spatial Hazard Events and Losses Database for the United States, Version 5.1 [Online database]. Columbia, SC: University of South Carolina. Available from http://www.sheldus.org; and

National Climatic Data Center, Storm Events.

Everyone, not just Federal agencies, must comply with the Endangered Species Act (ESA). Implementing the provisions of the National Flood Insurance Program (NFIP) and complying with ESA are not mutually exclusive actions. Communities can preserve an endangered species while at the same time reducing risk to life and property from flooding. Under current (2009) NFIP regulations, 44CFR 60.3(a)(2), a community must ensure that all necessary permits have been received from Federal, State, and local agencies before a floodplain development permit is issued.

In 2008 the City of Shady Cove adopted resolution 08-17 affirming its intention to fully comply with National Flood Insurance Program (NFIP) requirements.

PROBABILITY

The Federal Emergency Management Agency (FEMA) has mapped most flood-prone streams in Oregon. The maps depict the 1% flood (100-year) upon which the National Flood Insurance Program is based. All of Jackson County has Flood Insurance Rate Maps (FIRM). The FIRM maps for the Shady Cove area were issued May 3, 2011.

Significant flooding affecting the Shady Cove area occurs approximately every 10 to 15 years, and flood losses continue to be high.

The risk of Lost Creek Dam failure is 1 in 10,000 (0.0001) in any one year.[10]

VULNERABILITY

All development within the floodplain is subject to review by FEMA standards and award of an elevation certificate. This action is to minimize flood damages to structures built within the floodplain within Shady Cove.

FLOODPLAIN

Shady Cove lies within the floodplain of the Rogue River and historically the City has experienced severe flood events. Completion in 1977 of the Lost Creek Dam and Reservoir (Lost Creek Lake) helped to reduce the risk of severe flood events. The upper extent of the floodplain level for a 100-year flood was remapped in 2011 following re-evaluation.

A dam on Elk Creek, upriver from Shady Cove and a tributary of the Rogue River, was abandoned and notched to allow fish free passage around the remaining unfinished dam structure. Army Corps of Engineers, the agency responsible for the dam projects and property, could not guarantee absolute protection from flood hazards for Shady Cove even if Elk Creek Dam had been finished.

FLOOD INSURANCE STUDY AND PROGRAM

The City of Shady Cove participates in the Federal Emergency Management Agency (FEMA) Flood Insurance Program. A Flood Insurance Study was conducted in March

[10] Army Corps of Engineers presentation to Shady Cove City Council 9/3/2015.

1980 to investigate the severity of flood hazards in Shady Cove. The boundary of the 100-year floodplain and the floodway were defined following that study and were redefined and re-set in 2011. The 100-year floodplain is defined as the area that has a one percent chance of being flooded in any given year. The floodway is the stream channel, plus any adjacent floodplain areas, that must be kept free of encroachment so that a 100-year flood can pass without increases in flood heights greater than one foot.

The City has adopted, and revised as required, its floodplain regulations that are administered by the City Engineer or City Planner. The floodplain regulations are necessary to qualify for the FEMA Flood Insurance Program. These regulations prohibit the placement of buildings in the floodway and restrict the location and elevation of buildings in the 100-year floodplain in order to protect life and property and minimize flood damage. The floodway and 100-year floodplain in Shady Cove are shown on Floodway Maps and Flood Insurance Rate Maps (FIRM). Current copies of these maps are on file at Shady Cove City Hall.

DROUGHT

The County Hazard Risk Analysis rating for drought in Jackson County is 173 out of 240 (high).[11]

Droughts are not uncommon in the State of Oregon and can occur in both summer and winter months. Droughts appear to be cyclic, and can have a profound effect on the State's economy, particularly the hydropower and agriculture sectors. The environmental consequences also are far-reaching, including insect infestations in Oregon forests and reduced stream flows to support endangered fish species. Drought also jeopardizes the quantity and quality of well water in Shady Cove.

Severe drought conditions have preceded large wildland fires in Oregon.

In 2014 the Jackson County Commissioners requested the Governor declare a state of emergency for Jackson County due to drought conditions. The State has addressed drought emergencies through the Oregon Drought Council. This interagency (state/federal) council meets to discuss forecasts and to advise the Governor as the need arises. Significant droughts are depicted in Table D-3.

Table D-3. Significant Droughts in Oregon.

Date	Description
1904-1905	A statewide drought period of about 18 months.
1917-1931	A very dry period throughout Oregon punctuated by brief wet spells in 1920-21 and 1927.
1939-1941	A three-year intense drought in Oregon.
1976-1981	Intense drought in western Oregon; 1976-77 single driest year of the century.
1985-1997	Generally a dry period, capped by statewide droughts in 1992 and 1994.
2000-2001	Klamath drought intensifies; Low snowpack in mountains worsens conditions.

[11] Scores current as of November 2008. For current scores see http://www.oregonshowcase.org. Oregon Military Department – Office of Emergency management http://www.oregon.gov/OMD/OEM.

Source: Taylor, George H., and Ray Hatton, 1999, *The Oregon Weather Book*.

Oregon's drought history reveals many short-term and a few long-term events. The average recurrence interval for severe droughts in Oregon is somewhere between 8 and 12 years.

EARTHQUAKE

The County Hazard Risk Analysis rates the seismic risk in Jackson County as 200 out of 240.[12]

The geographical position of Jackson County makes it susceptible to earthquakes from four sources: (1) the off-shore Cascadia Fault Zone, (2) deep intra-plate events within the subducting Juan de Fuca plate, (3) shallow crustal events within the North American Plate, (4) earthquakes associated with renewed volcanic activity.

Jackson County has experienced no historic earthquakes of any significance that were centered in the region. However, the region has been shaken historically by crustal and intra-plate earthquakes and prehistorically by subduction zone earthquakes centered outside the area. All considered, there is good reason to believe that the most devastating future earthquakes would probably originate along shallow crustal faults in the region and along the Cascadia Fault Zone. The most recent, the Klamath Falls earthquake in 1993 was felt in Jackson County, but no damage was reported.

Table D-4. Significant Earthquakes Affecting Southern Oregon.

Date	Location	Magnitude	Remarks
November, 1873	Brookings area	7.3	Chimneys fell at Port Orford, Grants Pass and Jacksonville. No aftershocks. Origin probably Gorda block of the Juan de Fuca plate. Intraplate event.
September, 1993	Klamath Falls	5.9 to 6.0	Two earthquakes causing two deaths and extensive damage, $7.5 million in damage to homes, commercial and government buildings. Crustal event (FEMA-1004-DR-OR)

Source: Ivan Wong and Jacqueline D. J. Bolt, November 1995, "A Look Back at Oregon's Earthquake History, 1841-1994", *Oregon Geology*, pp. 125-139.

Scientists estimate the chance in the next 50 years of a great subduction zone earthquake is between 10 and 20 percent, assuming that the recurrence is on the order of 400 +/-200 years. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1,000 years. The last Cascadia Subduction Zone event occurred approximately 300 years ago.

The City of Shady Cove is located within the Seismic Hazard Design Zone as published in the International Building Code (IBC) and adopted by the State of Oregon as a minimum design criteria standard for new construction. Shady Cove is within Category D2.

[12] Scores current as of November 2008. For current scores see http://www.oregonshowcase.org. Oregon Military Department – Office of Emergency management http://www.oregon.gov/OMD/OEM.

Buildings and structures, and all parts thereof, shall be constructed to safely support all seismic loads as prescribed by the IBC.[13]

PROBABILITY

Establishing a probability for crustal earthquakes is more difficult given the lack of historic events in the region. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable.

The probability that Jackson County will experience earthquakes is moderate, meaning that an earthquake is likely to occur within a 35 to 75 year period.

VULNERABILITY

Jackson County is especially vulnerable to earthquake hazards because much of the area is susceptible to earthquake-induced landslides, liquefaction, and/or ground shaking.

Most bridges in Jackson County have not been seismically retrofitted, creating significant risk to the commuting population and would dramatically impact any evacuation efforts during disasters.

A strong earthquake could affect major infrastructure in Shady Cove, rendering services and access limited or lost. Major infrastructure that is vulnerable is the Rogue River Bridge on Hwy 62, Lost Creek Dam upriver from Shady Cove, the Jackson County Fire District 4 fire station in Shady Cove, Shady Cove City Hall, the Shady Cove Post Office, the Upper Rogue Community Center, the Jackson County Library Shady Cove Branch and the Shady Cove School. Catastrophic loss of the Lost Creek Dam structure would present a flooding problem to Shady Cove that would inundate nearly the entire area of the city. The Army Corps of Engineers has an inundation map for reference.

VOLCANIC

Shady Cove is close to several prominent volcanic peaks, one of which is a National Park (Crater Lake). The other volcanic peaks include Mt. Bailey and Mt. Thielsen to the north and Mt. McLoughlin to the southeast. Of the three, Crater Lake may pose the greatest risk. It is a caldera and the remnant of a mountain (Mt. Mazama) that had been nearly 12,000 ft. in elevation. The massive eruption, which produced the caldera, took place about 7,700 years ago (fairly recent in geological time). The long history at Mt. Mazama strongly suggests that this volcanic center will be active in the future.[14]

The County Hazard Risk Analysis rates the volcanic hazard in Jackson County as 64 out of 240.[15]

PROBABILITY

The average recurrence of volcanic activity interval in the Crater Lake area is about 10,000 years. The annual probability of an eruption is about one in 10,000; the 30-year probability

---

[13] http://publiccodes.cyberregs.com/bc/2009/icod_bc_2009_16_par164.htm

[14] United States Geologic Survey (USGS) Open File Report 97-487, p.7.

[15] Scores current as of November 2008. For current scores see http://www.oregonshowcase.org. Oregon Military Department – Office of Emergency management http://www.oregon.gov/OMD/OEM.

is about 1 chance in 330.[16] The probability of a volcanic event is summarized in Table D-5 below for Jackson County.

Table D-5. Probability of Volcano-Related Hazards in Jackson County.

Volcano Related Hazards	Probability of Occurrence	Remarks
Tephra (volcanic ash) (annual probability of 1/2 inch or more accumulation from eruptions throughout the Cascades Range)	1 in 5,000 to 1 in 10,000	OFR 97-513
Lahar		Source: Crater Lake; OFR 97-487
Lava flow	No risk	OFR 97-487
Debris flow / avalanche		Source: Crater Lake; OFR 97-487
Pyroclastic flow		Source: Crater Lake; OFR 97-487

Source: USGS Open File Reports 97-487 and 97-513.

The probability that Shady Cove will experience volcanic activity is low, with one incident likely within a 75 to 100 year period.[17]

VULNERABILITY

Jackson County overall has a low vulnerability rating for volcano-related hazards, meaning that a relatively small number of the population of the County would be affected.[18] Should there be an occurrence of volcanic action Shady Cove would be one of the most vulnerable populations within Jackson County.

WINDSTORMS

Extreme winds (other than tornadoes) are experienced in Jackson County. The most persistent high winds occur along the Oregon Coast and the Columbia River Gorge; consequently these areas have special building code standards. A historic overview of significant windstorms in Oregon is listed in Table D-6.

Table D-6. Significant Windstorms in Oregon.

Date	Affected Area	Characteristics
Apr 1931	Western Oregon	Unofficial wind speeds reported at 78 mph. Damage to fruit orchards and timber.
Nov 10-11, 1951	Statewide	Widespread damage; transmission and utility lines affected; wind speeds 40-60 mph with gusts to 75-80 mph.
Dec 1951	Statewide	Wind speed 60 mph recorded in Willamette Valley with 75 mph gusts. Damage to buildings and utility lines.

[16] USGS Open File Report 97-487, p.13.
[17] Oregon Emergency Management, November 2008, County Hazard Analysis Scores.
[18] Oregon Emergency Management, November 2008, County Hazard Analysis Scores.

Date	Affected Area	Characteristics
Dec 1955	Statewide	Wind speeds 55-65 mph with 69 mph gusts. Considerable damage to buildings and utility lines.
Nov 1958	Statewide	Wind speeds at 51 mph with 71 mph gusts. Every major highway blocked by fallen trees.
Oct 1962	Statewide	Columbus Day Storm; Oregon's most destructive storm to date. Winds recorded at 116 mph in Willamette Valley. Estimated 84 homes destroyed, with 5,000 homes severely damaged. Total damage estimated at $170 million ($1.3 billion in 2014 dollars).
Mar 1971	Most of Oregon	Greatest damage suffered in Willamette Valley. Homes and power lines destroyed by falling trees.
Nov 1981	Most of Oregon	Highest winds recorded since the Columbus Day Storm of 1962. Wind speed recorded at 71 mph in Salem. Marinas, airports and bridges severely damaged.
Jan 1990	Statewide	Heavy rain with winds exceeding 75 mph. One fatality. Significant damage.
Dec 1995	Statewide	This event followed the path of the Columbus Day Storm of 1962. Wind speeds recorded at 62 mph in Willamette Valley. Damage to trees and homes. Hwy 62 above Prospect (north of Shady Cove) closed by falling trees.
Nov 1997	Western Oregon	Wind speed recorded at 52 mph in Willamette Valley. Trees uprooted. Considerable damage to small airports.
Feb 2002	Western Oregon	Many downed power lines and falling trees; damage to buildings. Estimated damage costs of $6.14 million statewide.
Feb 2004	Jackson County	Heavy winds caused $4,000 in reported damages.
Jul 2007	Jackson & Josephine Counties	Severe thunderstorms with winds up to 60 mph cause trees to fall damaging vehicles and buildings. $100,000 in reported damage in Jackson County. Lightning struck a steeple of a church in Josephine County causing $60,000 in damages.

Source: Taylor, George H., and Ray Hatton. (1999), the Oregon Weather Book, p. 151-175, Hazard Mitigation Team Survey Report, Severe Windstorms in Western Oregon, February 7, 2002 (FEMA-1405-DR-OE); Hazards & Vulnerability Research Institute (2007). The Spatial Hazard Events and Losses Database for the United States, Version 5.1 [Online database]. Columbia, SC: Univ. of South Carolina. Available from http://www,sheldus.org; and National Climatic Data Center, Storm Events.

The County Hazard Risk Analysis did not rate the windstorm hazard in Jackson County.[19]

PROBABILITY

The recurrence interval of a windstorm on the magnitude of the Columbus Day Storm (1962) is about 100 years; a windstorm on the order of the February 2002 event has a 10 to 12 year recurrence period. The probability of windstorms in Jackson County was not analyzed.

[19] Scores current as of November 2008. For current scores see http://www.oregonshowcase.org. Oregon Military Department – Office of Emergency management http://www.oregon.gov/OMD/OEM.

VULNERABILITY

The vulnerability of Jackson County to windstorm effects was not evaluated by the Oregon Emergency Management office.

WINTERSTORMS

Severe winter weather is characterized by extreme cold, snow, ice, and sleet. Although such conditions are expected in the Cascade Mountains, they are considered to be unusual for Shady Cove and much of the valley areas of Jackson County. Usually severe weather conditions do not last long in Shady Cove, and this is cause for many people to relegate winter-preparedness to a low priority. A historic summary of extreme winter conditions in southwest Oregon is shown in Table D-7.

Table D-7. Significant Winterstorms in Oregon.

Date	Affected Area	Characteristics
Dec 1861	Statewide	First snow of the year covered the entire Pacific Northwest. Snowfall varied between 1 and 3 feet.
Jan 1916	Statewide	Two snow storms, each totaling 5 inches or more.
Jan 1932	SW Oregon mountains	Crater Lake record snowfall up to this date: 879 inches (73.25 feet)!
Jan-Feb 1937	Statewide	Heavy snow throughout the state.
Jan 1950	Statewide	Heaviest snowfall since 1890. Many highway closures. Considerable property damage.
Jan 1951	Crater Lake	New annual record snowfall at Crater Lake.
Jan 1956	Western Oregon	Packs snow became ice. Many vehicle accidents throughout the region.
Mar 1960	Statewide	Snowfall: 3-12 inches, depending on location.
Jan 1969	Statewide	Three to $4 million in property damage reported statewide.
Jan 1980	Statewide	A series of storms brings snow, ice, wind and freezing rain. Six fatalities reported.
Feb 1985	Statewide	Western valley received 2-4 inches of snow; massive power failures (tree limbs broke power lines).
Dec 2013	Statewide	Record cold temperatures.

Source: Taylor, George H., and Ray Hatton. (1999), the Oregon Weather Book, p. 118-122.

PROBABILITY

Severe winterstorms occur about every four years. The probability of a winterstorm affecting this area is high with one incident likely within a 10 to 35 year period.[20]

[20] Oregon Emergency Management, November 2008, County Hazard Analysis Scores.

VULNERABILITY

The vulnerability of Jackson County to winterstorm effects is based on the perceptions of area emergency managers. The vulnerability of Jackson County to winterstorms is high, with at least 10% of the population affected with a major incident.[21]

OREGON STATEWIDE LAND USE PLANNING GOAL 7

The intent of Oregon Statewide Land Use Planning Goal 7 for areas subject to Natural Hazards, such as the Shady Cove area, is to protect people and property from natural hazards. Goal 7 directs local governments to adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards. Goal 7 also indicates that new hazard inventory information provided by federal and state agencies shall be reviewed by the Oregon Department of Land Conservation and Development (DLCD) in consultation with affected state and local government representatives. After such consultation, the DLCD shall notify local governments if the new hazard information requires a local response. Local governments shall respond to new inventory information on natural hazards within 36 months after being notified by the DLCD, unless extended by the Department.[22] In relationship with the Oregon Department of Forestry, as new data is identified, and particularly high hazard areas identified through Senate Bill 360, local governments will need to address the provisions of Goal 7.

Shady Cove is an Oregon community at risk for wildfire.

The financial and social costs of wildfires impact lives and property, as well as the negative short and long-term economic and environmental consequences they cause.

Life safety enhancement and cost savings may be realized by appropriate mitigation measures, starting with coordinated fire protection planning by local, state, tribes, federal agencies, the private sector, and community organizations. Additionally, and often over-looked, is the role that individual WUI property owners should play in this coordinated effort.

Wildfire suppression costs escalate dramatically when agencies must adjust suppression tactics because of the presence of structures. Additionally, the associated costs of structural protection also rise significantly, especially when there is a need to mobilize personnel and equipment from across the state. Costs may also be incurred by non-fire agencies in order to provide or support evacuations, traffic control, security, public information, and other needed support services during WUI fire incidents. These other agency costs vary widely and have not been well documented.

The number of people living in Oregon's WUI areas is increasing. When people move into these areas, the number of wildfires have escalated dramatically. Many people arriving from urban settings expect a level of fire protection similar to what they had prior to moving. The reality is many WUI homes are located in portions of the state with limited capacity structural protection and sometimes no fire protection whatsoever. While Oregon's Emergency Conflagration Act helps protect WUI communities who've depleted their local resources when threatened by an advancing wildfire, the escalating number of

[21] Oregon Emergency Management, November 2008, County Hazard Analysis Scores.
[22] http://www.lcd.state.or.us/goalpdfs/goal 07.pdf

fires has led to the recognition that citizens in high fire risk communities need to provide mitigation and an appropriate level of local fire protection.

Oregon's seller disclosure requires a statement of whether or not property is classified as forestland - urban interface. Oregon is developing many educational efforts under Firewise, through the Oregon Forestland Urban Interface Fire Protection Act, through the Office of State Fire Marshal and Keep Oregon Green.

Some neighborhoods in Shady Cove have committed to the Firewise program to mitigate the fire risks to their neighborhood. The Firewise program[23] is embraced by the Oregon Department of Forestry as a method to assist property owners to meet the intention of Senate Bill 360 for the protection of property.

While many homes already exist in wildland urban interface areas, increasing construction in vulnerable areas also increases risk for vulnerable populations. The initial role of land use, such as Oregon's Goal 4 and Goal 7 play critical roles and guidance to development in these areas. Life safety enhancement and cost saving mitigation measures include Community Wildfire Protection Plans (CWPP), coordinated fire protection planning and coordination by local, state, tribal, federal agencies, the private sector, and community organizations. The role of individual WUI property owners is key in this coordinated effort. Many local communities use their CWPP as their wildland fire chapter in their FEMA Natural Hazards Mitigation Plan.

Overabundant, dense forest fuels, particularly on public lands, are a focus of mitigation discussion. The Healthy Forest Restoration Act is focused on reducing overly dense vegetation and trees to create fuel breaks, provide funding and guidance to reduce or eliminate hazardous fuels in National Forests, improve forest fire fighting, and research new methods to reduce the impact of invasive insects. Oregon's efforts in and near WUI areas are a massive task, but are resulting in improvements. Not only does it take many years, sustaining the work requires a substantial, ongoing financial commitment. Progress is often challenging because fuel mitigation methods are not universally accepted and are often controversial. However, recurring WUI fires continue to bring the issue into public focus as well as unite communities and stakeholders in a common set of values.

[23] http://www.firewise.org