

FLOOD¹⁰

SUMMARY

The Hazard: Flooding is the uncontrolled release of impounded water resulting that can affect life and property. Flooding can be caused by excessive precipitation causing rivers and lakes to overflow their banks, tidal floods, or flash floods caused by intensive short bursts of precipitation in areas that cannot absorb or retain the water.¹

Previous Occurrences: Flooding occurs nearly annually along the Duckabush River and the Hoh River in eastern and western Washington, respectively. The last winter storm prior to publication that resulted in flooding occurred in December 2007.

Probability of Future Events: High – The probability of severe winter storms in Jefferson County is 100%. Jefferson County’s climate does not normally get the severe cold resulting in blizzards, therefore, winter storms contain a lot of rain that often causes flooding.

Natural Hazard Risk Rating: The average natural hazard risk rating for avalanches for all districts in Jefferson County was estimated at 19.9, which is right on the boundary for moderate risk.

HAZARD IDENTIFICATION AND VULNERABILITY ASSESSMENT

Frequency of Flooding in Jefferson County—Of all the hazards that affect Jefferson County, floods are the most common and cause the most property damage. Flooding occurs nearly annually along the Duckabush River and the Hoh River in eastern and western Washington, respectively. The last winter storm prior to publication that resulted in flooding occurred in December 2007. The probability of severe rain-producing winter storms in Jefferson County is high at 100%. Jefferson County’s climate does not normally get the severe cold resulting in blizzards, therefore, winter storms contain a lot of rain that often causes flooding.

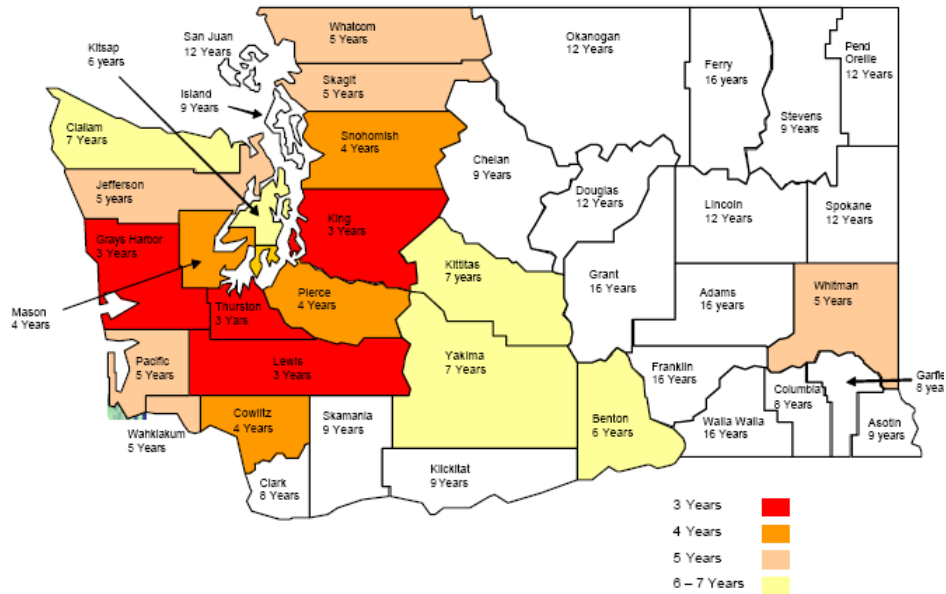
There are basically three types of floods possible in Jefferson County.

- **River building floods:** River building floods are caused by heavy, prolonged rain, melting snow, or both.
- **Tidal floods:** Tidal floods occur when high tides, strong winds, heavy swell, and low atmospheric pressure combine to produce flooding.
- **Flash floods:** Although possible, flash floods are not as common in Jefferson County as they are in Eastern Washington. Flash floods are characterized by a very rapid quick rise of the water level in a small river, stream or dry wash.

FLOODING THREATS Floods on the rivers of Eastern Jefferson County, specifically the Duckabush, Dosewallips, and both the Big and Little Quilcene Rivers, generally are a combination of two types—the river building floods influenced twice each day from the tidal floods. These rivers are short rivers with steep sided banks. Tidal changes from Hood Canal combined with increased runoff from the Olympics have produced a history of frequent flooding.

Jefferson County has had ten Presidential declarations for floods since December 1962. Records show the Duckabush River has flooded nearly 30 times between 1938 and 2003. The last Presidential declaration that included Jefferson County for flooding as a contributing cause occurred in December 2007. Occurring principally during the winter months, flooding has inflicted loss of life and property, damage to infrastructure and has been the cause for suspension of economic activity in communities near the Big and Little Quilcene, Duckabush, and Dosewallips Rivers in Eastern Jefferson County.

Frequency of Major Flood Occurrence, 1956 to Present



Eastern Jefferson County has short, steep rivers that rise quickly and recede quickly. The flood plains are alluvial in nature and are greatly affected by tidal action. Southern winds tend to hold water against the shores compounding the effects. Most floods are short term; however the potential for extreme damage is possible.

In Western Jefferson County, floods on the Hoh, Clearwater, Bogachiel, and Quinault Rivers have damaged roads and bridges, eroded both public and private properties, and have caused interruptions in transportation and economic activities. Rivers in Western Jefferson County are highly erosive to the low riverbanks of the flood plains. Many acres of farm and timberland disappear annually. Road and bridge washouts on Highway 101 in the “West End” have been common over the last several years. Rising waters on the Hoh have necessitated sandbagging and other emergency measures for members of the Hoh Tribe residing on reservation lands at the end of the Lower Hoh Road. Figure FL-1 shows the FEMA 100 and 500 year flood zones in Jefferson County. Figure FL-2 shows the FEMA 100 and 500 year flood zones for the City of Port Townsend.

REPETITIVE LOSS PROPERTIES Only a small percentage of the homes in mapped flood plains are insured against flood loss. Many homeowners who live in flood plains carry fire insurance; however they do not carry flood insurance. Only about 20 to 30 percent of the homes in floodplains have insurance for flood losses. In 2006, there were 132 NFIP policies in force in

unincorporated Jefferson County; as of July 2009, there were 151 policies in force. There are 46 policies in force in the City of Port Townsend.

As of 2009, Jefferson County and the City of Port Townsend have one repetitive loss property each. Based on current valuations from the County Assessor, the two residential properties have buildings at risk valued at \$373,845. One of the residences is built within 150' of a small river, while the other is 100' from the Puget Sound shoreline. Since there is only one property in each jurisdiction that has had repetitive loss claims, to be more specific about location would violate Federal Disclosure Regulations.

Uninsured homeowners face greater financial liability than they realize. During a typical 30-year mortgage period, a home in a mapped floodplain has 26 percent chance of damage by a 100-year flood event. The same structure only has about a 1 percent chance of damage by fire.

Both the City of Port Townsend and Jefferson County are policy holders in good standing with NFIP. That being said, the most noticeable repetitive loss issues due to flooding have been with the Brinnon Fire Department (BFD) and Hoh Tribe of Indians. For years, one of the BFD unmanned stations was regularly flooded in the winter. The department was finally able to arrange funding to physically move that station out of the hazard zone.

The Hoh Tribe of Indians has their administrative center in the flood plain of the Hoh River, which floods regularly. They have built a permanent sandbag wall around the center and stockpiled sufficient bags to close the entrance in an emergency. After years of negotiations with the U.S. Parks Department and some local landowners, in 2009 the tribe was able to secure land that is outside the flood zone. They immediately started the process of building a new administrative / public safety center and a community shelter on the newly acquired land.

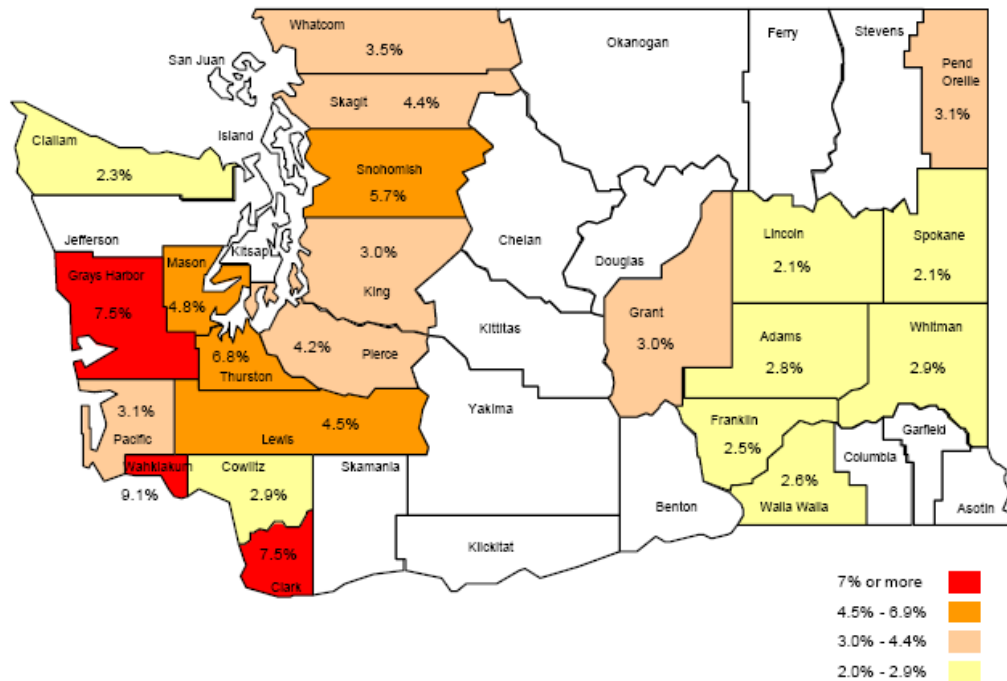
Jefferson County incurs repetitive damage in the hundreds of thousands of dollars each year due to water saturated hills sliding and undercutting or taking out sections of road in the rural hilly portion of the county. One solution has been to cede some of the roads to the adjacent Olympic National Park so that the federal government, with its larger resources, can address the problem.

Jefferson County developed the “Jefferson County Flood Damage Prevention Ordinance, No 18-1120-95” to better regulate and direct development in flood plain areas. It regulates planning, construction, operation, maintenance and improvements in these areas for both public and private endeavors. The ordinance helps ensure that work is properly planned, constructed, operated and maintained to avoid adversely influencing the regimen of the stream. It provides a sound basis for planning to ensure the security of life, health, and property damage by floodwaters in floodplain areas.

CONCLUSION

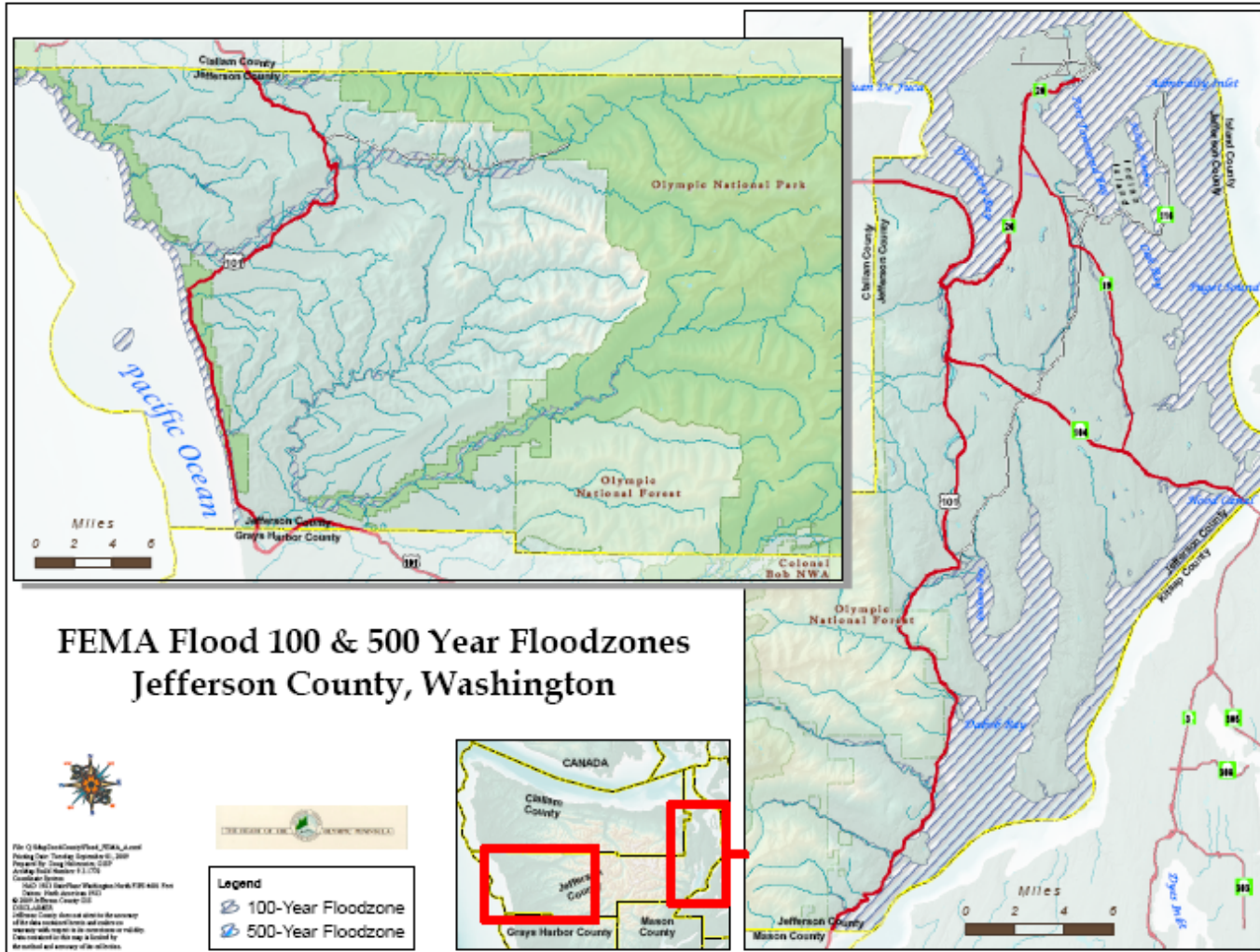
As shown in the map below, Jefferson County has less than 2% of its land in the floodplain. Consequently, the county is considered a low risk and low vulnerability for flood hazard.²⁹

Counties with 2 Percent or More of Land Area in Floodplain



Jefferson County is also not considered at high risk or having a high vulnerability to floods because most of the County’s critical assets are not in flood zones. Nevertheless, there are pockets of vulnerability in riverine flood zones, and where industry is concentrated in Port Townsend Bay, that need to be considered because of the potential for flood in those limited areas.

Figure FL-1: FEMA 100-year and 500-year Flood Zones in Jefferson County



HEAT WAVE (EXTENDED) ¹¹

SUMMARY

The Hazard¹: Approximately 175 Americans die from the effects of heat and solar radiation in a normal year. The National Weather Service defines a heat wave as a “prolonged excessive heat/humidity episode” in which its Heat Index (HI) is expected to exceed 105° for at least two consecutive days.

Impacts and Effects:

- Potential deaths due to HRI
- Increase in illness and accidents due to HRI
- Potential illness and death of commercial livestock as well as domestic pets
- Adverse impact on agriculture, especially dry land farms and grazing lands
- Increased danger of fires
- Imposition of water conservation measures
- Shortages of water for firefighting
- Increased prices for local produce
- Economic impact due to loss of sales from people sheltering from heat instead of being out in the community
- Economic impact of lost work-time due to HRI

Previous Occurrences: There have been three outdoor-work heat related deaths in Washington during the years 2005 and 2006.

Probability of Future Events: Moderate – Climatic changes may be impacting the frequency and duration of extended heat events on the Olympic Peninsula.

Natural Hazard Risk Rating: The average natural hazard risk rating for heat wave for all districts in Jefferson County was estimated at 13.65, which would be considered low, approaching moderate.

Definition

Approximately 175 Americans die from the effects of heat and solar radiation in a normal year. The National Weather Service (NWS) defines a heat wave as a “prolonged excessive heat/humidity episode” in which its Heat Index (HI) is expected to exceed 105° for at least two consecutive days.

Heat related illness is a well known, recognized hazard in the outdoor work environment, as well as a threat to the day-to-day functioning of people without the means of sheltering from the heat. Heat Related Illnesses (HRI) include heat fatigue, heat rash, fainting, heart cramps, heat exhaustion, and heat stroke. Aside from these disorders, heat poses an additional threat of injuries due to accidents caused by heat related fatigue, dizziness, and disorientation.

The Heat Index devised by the NWS gives an accurate measure of how hot it really feels when the relative humidity is added to the actual air temperature. Since HI values were predicated on shady, light wind conditions, exposure to full sunshine can increase values by 15 degrees.

Possible heat related disorders are:

Heat Index 130° or higher: Heat stroke/sunstroke highly likely with continued exposure.

Heat Index 105° - 130°: Sunstroke, heat cramps or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.

Heat Index 90° - 105°: Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.

Heat Index 80° - 90°: Fatigue possible with prolonged exposure and/or physical activity.

HISTORY OF HEAT WAVES IN JEFFERSON COUNTY

The National Weather Service tracks heat waves by reporting stations, of which Seattle is the closest to Jefferson County. The following incidents were gleaned from local news sources and histories of Jefferson County.

August 2008 – Three days in which heat alerts were issued by the National Weather Service.

2006 – Multiple heat waves of 3-4 days each in June, July, August, and culminating in September during Seattle's Bumbershoot festival.

2002-2003- Two of the driest summers on record—one of five driest winters in past 100 years. **Port Townsend Paper Corporation curtailed some operations**, and fishing was halted on rivers on the Olympic Peninsula

Mar 2001-Dec 2001 - On March 14, 2001, Gov. Gary Locke authorized the Department of Ecology to declare a statewide drought emergency; Washington was the first Northwest state to make such a declaration, which remained in effect until December 31, 2001.¹²

HAZARD ASSESSMENT AND VULNERABILITY ASSESSMENT

During the period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died. During the period from 1994 through 2007, three people died directly as a result of heat exposure. None have been recorded in Jefferson County.

The geography of Jefferson County mitigates its exposure to extreme heat because it is heavily wooded, surrounded by significant waterways (the Strait of Juan de Fuca and Puget Sound), and is protected by the Olympic Mountains. Even so, the moderate conditions deter people from purchasing air conditioners, and nearly 40% of the population is over 50-years old. Even though extremely high temperatures are generally of short duration in Jefferson County, the high proportion of vulnerable populations, including the elderly, small children, and chronic invalids, dictate that local governmental, emergency, and public health officials are sensitive to heat conditions and take appropriate preventive measures.

CONCLUSION

Due to its favorable location and geography, Jefferson County has a low probability of experiencing significant heat wave related issues. Nevertheless, Washington’s Department of Labor and Industries (L&I) has issued a rule for employers having one or more employees performing work outdoors to:

- Establish and implement written procedures to prevent the occurrence of HRI;
- Provide and make accessible enough drinking water when hazards are present;
- Have formalized procedures in place to respond to employees showing signs of HRI; and
- Provide effective HRI prevention training to all employees.

The NWS will initiate alert procedures when the HI is expected to exceed 105°- 110°F (depending on local climate) for at least two consecutive days. The procedures are:

- Include HI values in zone and city forecasts.
- Issue Special Weather Statements and/or Public Information Statements presenting a detailed discussion of
 - Extent of the hazard including HI values
 - Who is most at risk
 - Safety rules for reducing the risk.
- Assist state/local health officials in preparing Civil Emergency Messages in severe heat waves. Meteorological information from Special Weather Statements will be included as well as more detailed medical information, advice, and names and telephone numbers of health officials.
- Release to the media and over NOAA’s own Weather Radio all of the above information.

Jefferson County and the City of Port Townsend are in compliance with the L&I rule, and local civil, public health, and emergency management authorities are cognizant of the issues and prepared to issue warnings and to react to stress indicators within the population.

LANDSLIDES¹³

SUMMARY

The Hazard: Landslide is the sliding movement of masses of loosened rock and soil down a hillside or slope. Landslide causes depend on rock type, precipitation, seismic shaking, land development and zoning practices, soil composition, moisture, and slope steepness.

Impacts and Effects:

- Loss of life
- Loss of homes and businesses
- Loss of public buildings
- Damage or complete loss of bridges
- Interruption of the transportation infrastructure
- Damage and interruption to utilities
- Destruction by covering of clam and oyster beds
- Damage to critical transportation infrastructure
- Damage or loss of recreation facilities
- Loss of jobs due to damaged equipment and facilities
- River and streams seek new channels affecting property values and economic development opportunities
- Damage to salmon habitat and salmon stream restoration projects

Previous Occurrences: Winter storms in December 2007 resulted in multiple landslides, one of which moved a house off its foundation in the Brinnon area. In January of 2009, a massive landslide in adjoining Clallam County severely damaged State Route 112 for a length of 500 feet, and resulting in its closure for weeks before it was safe enough for crews to get close enough to fully assess the damage.

Probability of Future Events: High – Jefferson County experiences multiple winter storms each year that have the potential to saturate soils and precipitate landslides in the hilly topography of the county.

Natural Hazard Risk Rating: The average natural hazard risk rating for landslides for all districts in Jefferson County was estimated at 20.5, which would be considered moderate.

Definition

Landslide is the sliding movement of masses of loosened rock and soil down a hillside or slope. Landslide causes depend on rock type, precipitation, seismic shaking, land development and zoning practices, soil composition, moisture, and slope steepness.

History of Landslides in Jefferson County

Landslides are a common hazard in Jefferson County. Most recent records indicate that earth movement is associated with inclement weather, such as heavy rains, saturated ground and strong winds that loosen tree roots. Slides have been a problem over the years on the road between Port Hadlock and Port

Ludlow. During the storm of January 1997, slides occurred along Discovery Bay, Cape George, Mats Mats, Paradise Bay, Shine, South Point, Coyle, Quilcene Bay, and Brinnon in the eastern part of the county. In the western part of the county, slides occurred in the Hoh, Clearwater, and Quinault River drainage areas. Evidence indicates that large land movements have occurred from past earthquakes such as the sunken forest off Point Wilson along the South Whidbey Fault. In more recent history, a landslide along Highway 20 at Eaglemount in the 1970s took out the road to Discovery Bay, covered the railroad tracks, and caused a derailment of rail cars carrying hazardous materials.

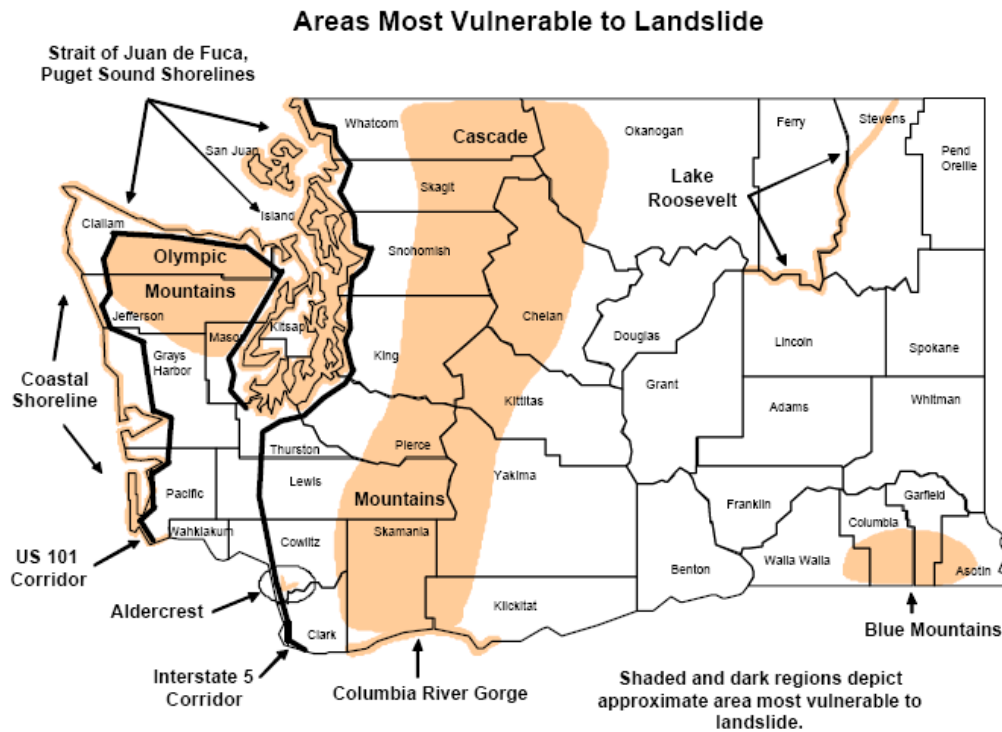
Highway 101 has been washed out numerous times where the Hoh and the Bogachiel Rivers have undercut the hillside after heavy rains and snowpack melts. With the addition of water from the rain and runoff, these rivers have had a long history of eroding their banks causing the slopes to slide. The typical scenario is that heavy storms cause rivers and creeks to overflow and undercut nearby roads. The roads then give way, often destabilizing the land above the road, and causing larger landslides.

In December 2007, landslides from heavy rains moved a house off its foundation in Brinnon. At the same time, over 1000 feet of the Hoh Road in west Jefferson County were damaged, resulting in its closure for six months. The Hoh Road is a significant access-way to the Hoh Rain Forest in the Olympic National Park.

In November 2009, the Dosewallips Road, which runs parallel to the Dosewallips River near Brinnon, experienced a landslide that took out a section of road and required a local disaster declaration to effect emergency repairs.

Hazard Assessment and Vulnerability Assessment

The map below shows that Jefferson County is considered among the counties that are most vulnerable to landslides.⁴ This is because of the significant Pacific Coastline, the Olympic Mountains, and the Puget lowlands that are part of our geography.



In addition to the shoreline conditions, Jefferson County is plagued by the stealth landslides of roads being undercut by rivers overflowing their banks, particularly along the Dosewallips and the Hoh Rivers. These are stealth landslides because they only make the local news, and are not significant enough for emergency declarations. Even so, Jefferson County Public Works averages \$750,000 per year on projects to rebuild sections of road lost to landslides during the rainy season.

Slides in Jefferson County range in size from thin masses of soil of a few yards deep to deep seated bedrock slides many yards wide. Slides are commonly categorized by the “form of initial failure”, but they may travel in a variety of forms along their paths. The travel rate may change in velocity from a few inches per month to many feet per second depending on the slope, material, and water content. The recognition of ancient dormant slide masses is important because landslides can be reactivated by earthquakes or unusually wet winters. Sinkholes can develop unexpectedly and cause damage to roadways and private property.

As the county continues to grow and the desire of people to have a home with a view, an increasing number of structures are built on top of or below slopes subject to land sliding. Land is not stable indefinitely. People often believe that if a bluff has remained stable for the last 50 years, it will remain so for the next 50 years regardless of the development or maintenance around it. As trees are removed to make way for new homes, the nature of erosion and water absorption makes the slopes and bluff in these areas a dynamic and changing environment.

Characteristics that may be indicative of a landslide hazard area:

- Bluff retreat caused by sloughing of bluff sediments, resulting in a vertical bluff face with little vegetation
- Pre-existing landslide area

- Tension or ground cracks along or near the edge of the top of a bluff
- Structural damage caused by settling and cracking of building foundations and separation of steps from the main structure
- Toppling, bowed or jack-sawed trees
- Gullying and surface erosion
- Mid-slope ground water seepage from a bluff face

Land stability cannot be absolutely predicted with current technology. An unequivocal predictor of landslide vulnerability is the occurrence of previous landslides in the same area. The best design and construction measures are still vulnerable to slope failure. The amount of protection, usually correlated to cost, is proportional to the level of risk reduction. Debris and vegetation management is integral to preventing landslide damages. Corrective measures help, but still leave the property vulnerable to risk.

CONCLUSION

Jefferson County's significant coastline, Olympic Mountains, and network of roads that parallel rivers make it a high risk for landslides and high vulnerability to the cost of repairing the damage.

Some landslide hazards can be mitigated by engineering, design, or construction so that risks are acceptable. When technology cannot reduce the risk to acceptable levels, building in hazardous areas should be avoided. Ordinances identifying geological hazards must be rigorously applied.

The least expensive and most effective landslide loss reduction measure is by avoidance. The next most economical solution is mitigation using qualified expertise with an investigation report review process. The most costly is repair of landslide damages.

PUBLIC HEALTH EMERGENCY¹⁴

SUMMARY

The Hazard: Public Health Emergencies can be food or water contamination or medical emergencies such as diseases, epidemics, or a pandemic that have the potential to affect people and animals over a significant area. Water emergencies are discussed in the sections on man-made hazards.

Impacts and Effects:

- Potential deaths due to toxins or illness
- Increase in illness
- Potential illness and death of commercial livestock as well as domestic pets
- Increased stress on local health care system and providers
- Demands made on local health care system beyond capacity to respond
- Disruption of local commerce
- Spot shortages of food, supplies due to commerce disruption
- Economic impact due to loss of sales from people sheltering in place
- Economic impact of lost work-time due to illness

Previous Occurrences: In 2008, national recalls of pet foods due to melamine contamination and peanut butter products due to salmonella affected Jefferson County to a small extent. In 2007, public health authorities tracked customers who purchased particular produce from a local food store when it was discovered that the employee stocking the produce had Hepatitis-C.

Probability of Future Events: High – There is a high probability of viral diseases being introduced into the area due to the large number of visitors to this tourism destination, or due to national events introducing things into the distribution systems.

Definition^{15, 16}

Public Health Emergencies can be food or water contamination or medical emergencies such as diseases, epidemics, or pandemic.

Disease – Unhealthy condition of the body or mind. A corresponding condition of plants.

Epidemic – A widespread occurrence of a disease in a community at a particular time.

Outbreak – Limited area in occurrence of a disease in a community at a particular time.

Pandemic – Prevalent over a whole country or the world; Universal; Widespread

Influenza – a viral disease in which the infected person is feverish, has muscle soreness, headaches, and a general malaise. It can impair breathing function, and be fatal to vulnerable people.

Seasonal Influenza – Usually affects 5-10% of the population.

Avian Influenza – Variations of the H5N1 virus that spread across bird populations and have been able to cross species into humans in some areas of Asia and Africa. As of October 2006, 256 human cases have been confirmed with 151 deaths. None have been in the United States.

Pandemic Flu – Pandemic influenza causes illness in as much as 25-30% of the population, and has had death rates as high as 2.5% in 1918. There is concern among scientists that the avian flu could mutate and start a new global influenza pandemic.

History of Public Health Emergencies in Jefferson County^{17, 18}

1859 – The bark *What Cheer* cleared Portland in December 1859 infested with smallpox. Numerous crew members died in sight of Protection Island of the Jefferson County coast. According to Indian legends, an Ozette village of 400 people was decimated, the Makah suffered heavy losses, and Indian villages at Port Discovery and Port Townsend were stricken by smallpox, including the household of Chetzemoka

1892 – Fear of a leper among the Port Townsend Chinese population served as a catalyst to establish the Diamond Point Quarantine Station in 1893.

1900 – Outbreak of bubonic plague was contained by confining victims at the Diamond Point Quarantine Station.

1913 – The Diamond Point Quarantine Station was used to house lepers until 1926.

1918 – Influenza epidemic causes many deaths in Jefferson County.

2006 – Anderson Lake, Gibbs Lake, and Teal Lake quarantined because of toxic Blue/Green algae.

2007 – Jefferson County health authorities identified and contacted customers of a Port Townsend food store who purchased produce handled by an employee who had contracted Hepatitis-C while on vacation in the New England area.

2008 – Recall of products made with peanut butter paste from a Georgia peanut processor whose facility was found to be contaminated with salmonella. Over 500 illnesses and multiple deaths nation-wide attributed to the salmonella in products made with the paste.

Hazard Assessment and Vulnerability Assessment

Hazard Profile

Jefferson County faces the same public health hazards as the rest of the country in the sense that it has national food chains within the county that bring in produce and products from around the world. What follows is a representative list of types of food contamination and disease risks that occur in this area:

Blue-Green Algae¹⁹: Jefferson County lakes have periodically seen moderate blooms of toxic blue-green algae. During such blooms, lakes are quarantined and users are warned not to drink lake water, swim in the lake, or consume fish from the lake. The algae (genera *Anabaena*, *Microcystis*, and *Aphanizomenon*) produce toxins that cause liver damage or nerve impairment. Small children, people with liver problems, and pets are most at risk.

E coli⁶: *Escherichia coli* O157:H57 is a bacterial infection causing bloody stool and abdominal cramps. It usually resolves without specific treatment in 5-10 days unless there are complications. Treatment with antibiotics can actually cause complications. Two to seven percent of cases develop complications. Washington has experience outbreaks in campsites, contaminated swimming areas, and occasionally in restaurants due to undercooked foods.

Hantavirus²⁰: Carried by deer mice, this virus is passed to humans when they breathe in the aerosolized virus. It can cause hemorrhagic fevers, renal syndrome, and Hantavirus (cardio-) pulmonary syndrome (HPS). HPS is potentially deadly. One to five cases are reported every year in Washington. Auto

mechanics are particularly concerned because they often do repairs on vehicles in which rodents have been in the engine compartment, and left droppings and dust.

Lyme Disease²¹: Lyme disease is a tick-borne disease in which local deer populations support populations of deer ticks. Early manifestations are fever, headache, fatigue, depression, and a “bulls-eye” skin rash. If treatment is early, the infection can be eliminated. If late or untreated, manifestations of the disease can involve the heart, joints, and nervous system, and be disabling. Approximately fifteen cases are reported in Washington each year.

Red Tide: Local bays, such as Discovery Bay and Oak Bay, are periodically contaminated by a “red tide” that infects shellfish and produces a marine biotoxin that can cause paralytic shellfish poisoning (PSP) in people eating the shellfish. In 2006, nearly the entire coastline of Jefferson County was closed to recreational harvesting of shellfish. Commercial shellfish are tested separately, and commercial harvesters have been affected by closures of their commercial shellfish farms from time to time, too.

Salmonella: In 2008, products made from a peanut butter paste were recalled due to salmonella contamination. Across the nation, there were multiple deaths and over 500 made ill from contaminated products. Local grocery chains and food co-ops pulled product from their shelves and advised customers to return products made with the paste.

Toxic contaminants: The melamine contamination of pet food was a significant event in Port Townsend. Being a small city, such events make the front page of local news and become personalized because people you know are affected.

West Nile Virus²²: West Nile Virus can cause asymptomatic infections, West Nile Fever, and encephalitis. It mainly infects birds, but can infect humans, horses, dogs, cats, bats, chipmunks, skunks, squirrels, and domestic rabbits. The main source of human infection is through the bite of an infected mosquito. In 2008, there were 3 humans, 41 horses, 24 birds, and 57 mosquitoes identified as infected in Washington.

Vulnerability

Washington State has a significant number of statutes and administrative rules giving authorities the capability to deal with public health emergencies:

RCW 70.05.060	Authority of Local Board of Health and Local Health Officer
RCW 70.070	Mandates of Local Health Officer
WAC 245-100	Duties and Responsibilities of Local Health Officer, Isolation and Quarantine Authority
WAC 245-100-036	Communicable and certain other diseases
RCW 68.50	Role, Responsibility and authority of the Medical Examiner
RCW 70.58.020.030	Local Health Officer is Registrar of Vital Statistics
RCW 43.20.050(4)	Enforcement of Isolation and Quarantine Orders by law enforcement
RCW 18.71	Physician’s Trained Mobile Intensive Care Paramedic
RCW 18.73	Emergency Medical Technicians, Transport Vehicles
RCW 70.168	State-wide Trauma Care System

The problem for Jefferson County is that a significant portion of its population can be considered vulnerable, and it has ecological factors that can exacerbate health issues. To begin with, due to its small population, the county shares its public health officer with the larger Clallam County. Jefferson County has one acute care hospital with 26 beds and six fire districts that provide emergency medical response. East Jefferson Fire & Rescue, which is the only fire district to provide 24x7 manned stations, provides out-of-county transport services for the hospital. All districts except for Fire District 7 are combination

departments relying heavily on volunteers. Fire District 7 is an all volunteer department that covers the West Jefferson County area. During region-wide events, such as a pandemic, local resources will be overwhelmed very quickly and result in the necessity to make life and death decisions at operational levels.

Jefferson County, demographically, is turning into a retirement area. The natural beauty and unspoiled terrain encourages people to build into wooded areas with the effect that deer herds and coyotes coexist in the same localities. It is the norm for people to have deer fences around their gardens. This also means that the retiree population, the over-50, is constantly exposed to the vectors for many of the viruses and illnesses listed above. Mice infest the engine compartments of vehicles parked outdoors, deer ticks are prevalent in fallow fields, and raccoons maintain super-highways through home-owner associations.

Some of Jefferson County's vulnerability issues stem from its maritime heritage and a "back-to-the-earth" movement that settled in the county during the 1970's. Port Townsend is a working Victorian seaport, and as such, receives visitors from all over the world. Each year in September, there is a world-renowned *Wooden Boat Festival* that attracts visitors from around the world. Over 40,000 visitors show up for that week-end, many in boats from who-knows-where, and who are capable of carrying a communicable disease into a dense group of people who are quickly going to disperse to a wide variety of geographic areas.

The "back-to-the-earth" movement has resulted in a robust food co-op and farmer's markets in Jefferson County and neighboring Clallam County. These entities provide a wide-variety of locally grown organic produce to the residents of the area. What is unique is that they also provide a source for raw milk and raw cheeses to be sold commercially. Sequim Washington has one of the few commercial dairies certified to produce and sell raw milk and cheese. While many people believe there is a significant health benefit for raw milk over pasteurized milk, it still has to be recognized that any contamination of the milk will not be killed during a heat-treatment process, and that consumers are dependent on the integrity of the dairy farmer to maintain a healthy product.

CONCLUSION

Jefferson County has several unique factors that increase its vulnerability to contaminated foods and the spread of infection, but public health officials recognize this and work hard to contain local outbreaks of disease or contaminated products. Nevertheless, the potential exists that in a region-wide event or a pandemic event, local resources will be quickly overwhelmed necessitating help from outside the region.