WASHINGTON CLIMATE AND GEOGRAPHY

When it comes to climate and geography, Washington State is a study in contrasts. Washington State can be divided geographically into two distinct sides by the Cascade Mountain Range, with each side providing a distinct climate. While there is a common perception that it rains all the time in Washington, Seattle ranks 44th amongst major US Cities for annual rainfall.

Joint Base Lewis-McChord is located on the Western side of the Cascade Mountains on the border between Pierce and Thurston counties. Western Washington makes up approximately 60% of the state's population and JBLM lies between Seattle and the state's capital city of Olympia.

The weather is relatively mild in western Washington. Summer days rarely rise above 79 degrees Fahrenheit and winter days below 45 degrees Fahrenheit during the day. Snow is rare, but winter temperatures can easily dip into the 20s and 30s at night.

The Pacific Ocean creates a marine layer where clouds are frequent in the winter, spring and fall, but a day that is filled with rain is the exception rather than the rule. July and August are the driest months in Western Washington; January and February are the wettest.

Because of the marine air and diverse topography, the state rarely experiences severe weather patterns like damaging hurricanes or tornadoes. Blizzards and major windstorms are rare. The same is true for large-scale flooding. During the rainy season or when snow melts rapidly in the mountains, there may be some localized flooding along rivers but the topography doesn't allow for widespread flooding like you may get in Florida or Louisiana.

The one true force of nature the state deals with is the occasional earthquake. Most are minor and newer homes and buildings are built to allow for minimal damage.

The geology of JBLM is dominated by glacial deposits. The upland areas are characterized by scattered rolling hills and depressions. Numerous lakes and wetlands occur in the depressions, which indicate an unconfined aquifer. Several small streams traverse the upland interior of the installation. The majority of the soils on JBLM are of the Spanaway-Everett series. These soils have developed from glacially-deposited sediments and consist of undifferentiated till, often mixed with outwash gravel. These soil types are often shallow, gravely, sandy loam with low water holding capacity. They are associated with historic prairie and oak woodland habitats, of moderate to low natural fertility, and occur on gently undulating and flat topography. The high permeability and relatively level topography results in a low erode-ability index.

EARTHQUAKES

Earthquakes occur nearly every day in Washington. Most are too small to be felt or cause damage. Large earthquakes are less common but can cause significant damage to the things we count on in everyday life, such as buildings, roads, bridges, dams, and utilities.

Washington has the second highest risk in the U.S. of these large and damaging earthquakes because of its geological setting. Washington has dozens of active faults and fault zones. In general, larger faults make larger earthquakes. The largest fault that will affect Washington (and the whole Pacific Northwest) is the Cascadia subduction zone. This fault produces some of the largest and most damaging earthquakes in the world. An earthquake on this fault is inevitable however, it is impossible to predict when it will happen.

Know what to expect. Electricity, water, natural gas, and phones may not work. This means that the internet, your cell phone, grocery stores, and gas stations may also not be available.

- Prepare to be on your own for at least three days
- Make an emergency response plan for your family
- Identify and secure items in your home and work that could cause damage such as flammable appliances like water heaters, tall book cases, or heavy pictures.
- Know what other hazards you might face. Earthquakes can trigger landslides and tsunamis which can be as destructive as an earthquake.
- Participate in earthquake drills. The Great Shakeout occurs on the 3rd Thursday of every October.

For more information, contact Directorate of Emergency Services, Emergency Management at 966-PLAN.

VOLCANOS

Washington has five major volcanoes: Mount Baker, Glacier Peak, Mount Rainier, Mount St Helens, and Mount Adams. These volcanoes are part of the cascade range, a 1,200-mile line of volcanoes from British Columbia to California.

Each of Washington's volcanoes is still active. In fact, all of them except for Mount Adams have erupted in the last 250 years. Volcanoes do not erupt at regular intervals making it difficult to determine when and where the next eruption will happen.

LAHARS

When enough water mixes with loose volcanic ash and rock on the side of a volcano, the mixture flows downhill and forms a lahar. In Washington, these mudflows can travel more than 50 miles from the volcano at speeds of 120 miles per hour. Some lahars can contain so much solid material that they look more like rivers of concrete.

Lahars can occur at almost any time and do not need volcanic eruption. The water that forms lahars can come from snow and ice being melted from the heat of the volcano or even from intense rainfall.

Evacuation and preparation is key. Before an eruption:

- Learn the risks at home, at work and where you travel.
- Plan ahead. Have emergency supplies, food and water.
- Plan an evacuation route away from streams that may carry lahars or debris.
- Have a pair of goggles and disposable breathing masks for ash and dust.
- Make a family emergency plan to know who to contact during an incident.
- Stay informed by enrolling in alert systems and listening to media outlets.

During an eruption:

- Follow evacuation orders.
- Become aware of an oncoming lahar that may affect you and get to higher ground.
- Stay informed and assist others in need.
- Go to a safe haven or shelter if safe to do so.

WILDLAND FIRES

The wildland fire season in Washington usually begins in early July and culminates in late September when regular rain returns back to the northwest. There are over 900 wildland fires across the state with about 70 percent in eastern Washington. They range from small and less than one acre in size. Wildland fires can spread to more than 100,000 acres and can several months to extinguish.

What to do before a wildfire:

- Have an evacuation plan.
- Designate a safety zone in case evacuation routes are burning.
- If you have medical needs ensure you have medications and supplies.
- Make plans for your pets and livestock.
- Family members should have an out-of-area contact in case you are separated. Make wallet cards with information.
- Have an emergency kit.
- Store copies of vital records in a safe place.
- Stay informed through media outlets

When threatened with a wildfire:

- Call family to tell them you may need to evacuate.
- Pre-load car with supplies, vital records and valuables.
- Have protective clothing for face, body and lungs.
- Set up a ladder, garden hoses and sprinkler on your roof. Conserve water by waiting until embers start falling.

When told to evacuate:

- Do so immediately.
- If time allows, close windows, vents, doors and remove lightweight curtains.
- Turn on home’s lights.
- Post a note on entrance.
- Lock your doors.
- Evacuate away from the hazard, Drive with your lights on.
- Do not re-enter unless told it is safe to do so.

FLOODS

Since 1970, every county in Washington State has received a Presidential Disaster Declaration for flooding. Floods cause loss of life and damage to structures, land, roads, and utilities. Floods can cause landslides and can transport debris and toxic products that cause secondary damage. Flood damage in Washington State exceeds damage by all other natural hazards.

Floods may happen at anytime but most likely happen through seasonal patterns:

- Heavy rainfall on wet or frozen ground, before a snowpack has accumulated, typically fall and early winter floods.
- Rainfall combined with melting of low-elevation snow pack typically cause winter and early spring floods.
- Thunderstorms embedded in winter-like rainstorms also cause flash flooding in Western Washington on rare occasions.

FLOOD SAFETY TIPS

Be extremely cautious at night, when it is harder to recognize flood dangers. Exercise extreme caution when on foot near moving traffic or driving in heavy rain. Heavy rain can significantly reduce visibility, increasing the risk of an accident. Monitor AFN television/radio for flood warnings and announcements affecting your area.

Children, in particular, need to be warned about the dangers of floodwaters and drainage channels/low lying areas. Unstable channel walls may cave in unexpectedly or a sudden rise in water levels can trap a child. Stagnant water can cause illness and disease and flood runoff can expose children to unhealthy pollutants.

Points to emphasize for children:

- Never play around high water, storm drains, ditches, ravines or culverts.

- Throw away food that has come into contact with floodwaters.

Use extreme caution during cleanups. Flood debris piles are off-limits. Stay away from power lines and electrical wires – the number two flood killer is electrocution. Electrical current can travel through water. Report downed power lines to the installation DPW. In buildings that have been flooded, have an electrician examine the building for electrical shorts and live wires and allow electrical components to dry out before restoring power or re-occupying the building.

Stay alert for landslide warning signs.

- Doors or windows stick or jam for the first time.

- New cracks appear in plaster, tile, brick, or foundations.
- Outside walls, walks, or stairs begin pulling away from the building.
- Slowly developing, widening cracks appear on the ground or on paved areas such as streets or driveways.
- Underground utility lines break.
- Bulging ground appears at the base of a slope.
- Water breaks through the ground surface in new locations.
- Fences, retaining walls, or trees tilt or move.
- You hear a faint rumbling sound that increases in volume as the landslide nears. The ground slopes downward in one specific direction and may begin shifting in that direction under your feet.

If inside a building during a landslide, stay inside. Take cover under a desk, table, or other piece of sturdy furniture. If outdoors when a landslide occurs, try to get out of the path of the landslide or mudflow.

- Run to the nearest high ground in a direction away from the path of the landslide.
- If rocks or other debris are approaching, run for the nearest shelter such as a group of trees or a building.
- If escape is not possible, curl into a tight ball and protect your head.

Severe Storm

A severe storm can be anything involving strong winds and large hail, thunderstorms, tornados, rain, snow, or other mixed precipitation. Typically, transportation issues and loss of utilities come about because of a severe storm.

The following are severe storm elements (using National Weather Service definitions):

•**High winds** – Storms with sustained winds of 40 mph or gusts of 58 mph or greater, not caused by thunderstorms, expected to last for an hour or more.

•**Severe Thunderstorm** – Storms that produce winds of 58 mph or greater or three-quarters of an inch or larger hail.

•**Tornado** – A storm with a violently rotating column of air that contacts the ground; tornadoes usually develop from severe thunderstorms. Tornadoes can produce winds of 100 to 300 mph.

•**Winter storm** – A storm with significant snowfall, ice, and/or freezing rain; the quantity of precipitation varies by elevation. Heavy snowfall is 4 inches or more in a 12-hour period, or 6 or more inches in a 24-hour period in non-mountainous areas; and 12 inches or more in a 12-hour period or 18 inches or more in a 24-hour period in mountainous areas.

•**Blizzard** – A storm with considerable falling and/or blowing snow combined with sustained winds or frequent gusts of 35 mph or greater that frequently reduces visibility to less than one-quarter mile. Blizzards typically are confined to the Columbia River Gorge and Northwest Washington near the Fraser River Valley of British Columbia.

•**Dust storm** – A storm of dust and debris blown by wind gusts of at least 35 mph, or caused by a downburst from a dry thunderstorm, that reduces visibility to less than one-quarter mile.

•**Coastal flooding** – Flooding in coastal areas caused by storm surge, astronomical high tides, or a combination of them.

Landslides

A landslide is the movement of rock, soil and debris down a hillside or slope. Landslides take lives, destroy homes, businesses, and public buildings, interrupt transportation, undermine bridges, derail train cars, cover marine habitat and damage utilities.

Ground failures that result in landslides occur when gravity overcomes the strength of a slope. While gravity is the primary reason for a landslide, there can be other contributing factors, including:

•Saturation, by snowmelt or heavy rains, that weaken rock or soils on slopes.
•Erosion by rivers, glaciers, or ocean waves that create over-steepened slopes.
•Topography of a slope – its shape, size, degree of slope and drainage.
•Stress from earthquakes magnitude 4.0 and greater can cause weak slopes to fail.
•Volcanic eruptions that produce loose ash deposits and debris flows.
•Excess weight, from accumulation of rain or snow, from stockpiling of rock or ore, from waste piles, or from manmade structures, may stress weak slopes to failure.
•Human action, such as construction, logging or road building that disturbs soils and slopes.

Drought

Drought is a prolonged period of dryness severe enough to reduce soil moisture, water and snow levels below the minimum necessary for sustaining plant, animal, and economic systems.

Unlike most states, Washington has a statutory definition of drought (RCW 43.83B.400). According to state law, an area is in a drought condition when:
• The water supply for the area is below 75 percent of normal.
•Water uses and users in the area will likely incur undue hardships because of the water shortage.

Unlike most disasters, droughts normally occur slowly but last a long time.

Tsunami

The Pacific Coast, Strait of Juan de Fuca, Puget Sound, and large lakes are at risk from tsunamis, which are trains of waves that threaten people and property along shorelines. Sudden raising or lowering of the earth's crust during earthquakes generally causes a tsunami, although landslides and underwater volcanic eruptions also can generate them. Movements of the sea floor or lake bed, or rock fall into an enclosed body of water, displace the water column, setting off a series of waves that radiate outward like pond ripples.

Only as a tsunami approaches land does it become a hazard; in shallow water, it gains height as its waves slow and compress. Tsunamis do not resemble their usual icon, a towering wave with a breaking crest. Instead, they come onshore resembling a series of quickly rising tides, and they withdraw with currents much like those of a river. Swift currents commonly cause most of the damage from tsunamis. A Pacific Ocean tsunami can affect the entire Pacific basin, while a tsunami in inland waters can affect many miles of shoreline.

Tsunamis typically cause the most severe damage and casualties near their source. There, waves are highest because they have not yet lost much energy. The nearby coastal population often has little time to react before the tsunami arrives. Persons caught in the path of a tsunami often have little chance to survive; debris may crush them, or they may drown. Children and the elderly are particularly at risk, as they have less mobility, strength, and endurance.

Avalanche

An avalanche occurs when a layer of snow loses its grip on a slope and slides downhill. Avalanches kill one to two people, on average, every year in Washington, although many more are involved in avalanche accidents that do not result in fatalities. Most current avalanche victims are participating in recreational activities in the backcountry where there is no avalanche control. Only one-tenth of 1 percent of avalanche fatalities occurs on open runs at ski areas or on highways.

The avalanche season begins in November and continues until early summer for all mountain areas of the state. In the high alpine areas of the Cascades and Olympics, the avalanche season continues year-round.