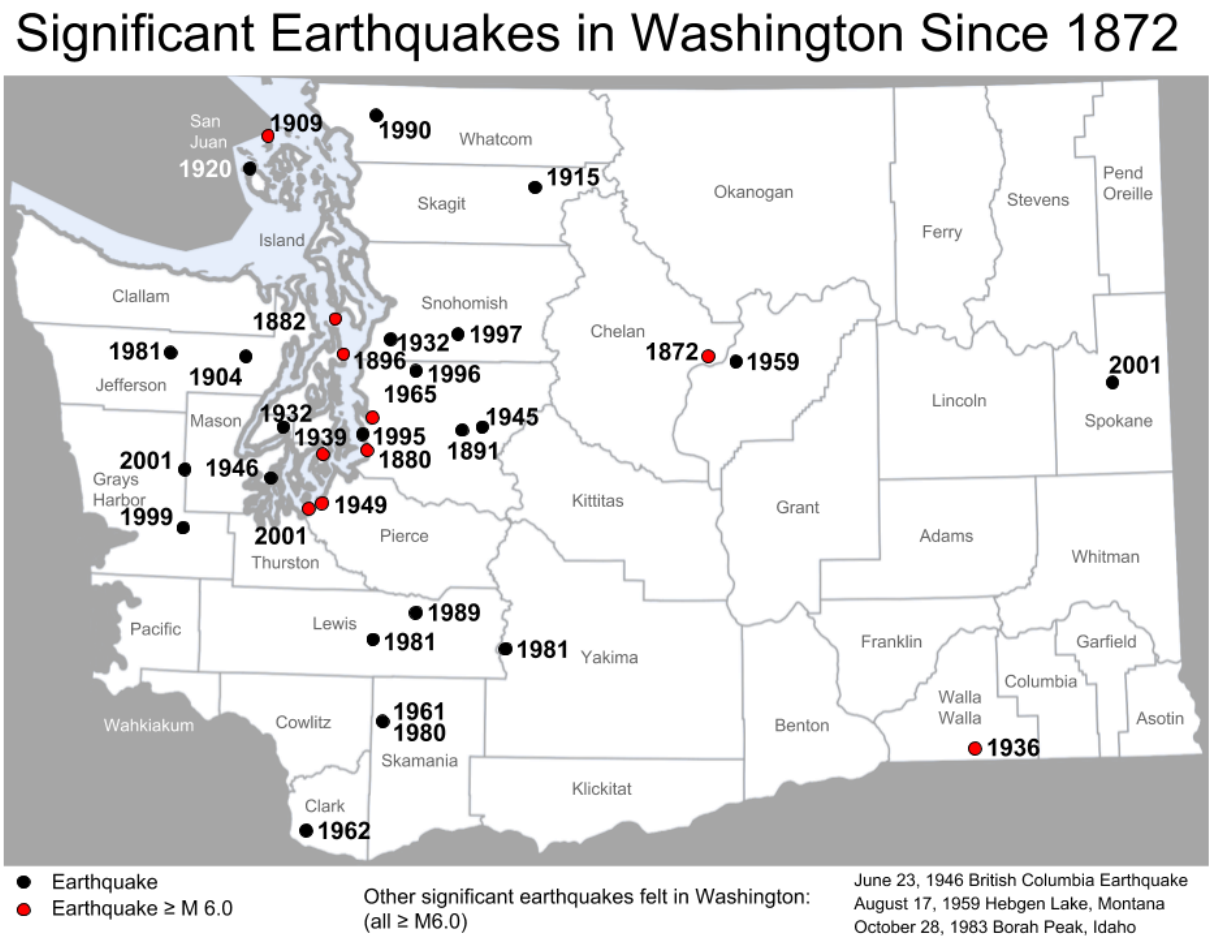
Significant Earthquakes Experienced in Washington Since 1872

Note: Top 6 earthquakes with greatest impacts are preceded by ** and <u>underlined</u>



1800s

<u>December 14, 1872 Washington State Earthquake</u>**

The earthquake is the **largest historical earthquake in eastern Washington**, and the most widely felt earthquake in the state. The magnitude of the shallow earthquake, centered around Lake Chelan, WA, is debated. It was an estimated **M 6.5 to M 7.5**, with a moment intensity (M_I) of 6.8. The maximum modified Mercalli intensity was IX. It was felt over 390,000 mi^2. Landslides and groundwater disturbances occurred near the lake and along the Columbia River, and a

fissure split in the ground south of Seattle. Damages included chimney cracks and shattered windows. People were knocked off their feet at Snoqualmie Pass, and trees toppled. The failed Spencer Canyon fault was discovered long after the earthquake.
Sources:
https://assets.pnsn.org/HIST_CAT/SSA01274.pdf
https://web.archive.org/web/20160101023203/https://www.seattletimes.com/seattle-news/scientists-may-be-cracking-mystery-of-big-1872-earthquake/
http://www.burkemuseum.org/static/earthquakes/cur-history.html

December 12, 1880 Earthquake

The earthquake originating near Kent, WA has no recorded magnitude, but was felt from Victoria to Portland. It had a maximum **modified Mercalli intensity of VII**. Shaking caused ringing of bells, chimney damage.
Source: https://assets.pnsn.org/CASCAT2006/Index_152_216.html

April 30, 1882 Earthquake

Originating in the Puget Sound - Salish Sea area, the deep earthquake was estimated to be **M 5.75 to M 6.2**. Modified Mercalli intensity reported in Olympia was VI. A few broken chimneys were reported.
Source: https://assets.pnsn.org/CASCAT2006/Index_152_216.html

March 7, 1891 "Central Cascades Earthquake of March 7, 1891"

The **M 5.0** earthquake was centered near Mt. Si in the central Cascades, having an intensity of VI by Mt. Si. It was felt over about 14,000 mi^2, from Ellensburg to Seattle and Tacoma.
Source: https://assets.pnsn.org/CASCAT2006/Index_217_327.html

January 3, 1896 Earthquake

Originating in the Puget Sound - Salish Sea area, the earthquake had an approximate **VII modified Mercalli intensity** in Port Angeles. No magnitude was recorded.
Source: https://assets.pnsn.org/CASCAT2006/Index_217_327.html

1900-1950

March 16, 1904 Earthquake

The **M_l 5.3** earthquake originating in east Jefferson County was felt over about 19,000 mi^2. The maximum recorded modified Mercalli intensity was V. Lamps swayed and windows shook but no damage was noted.
Source: https://assets.pnsn.org/CASCAT2006/Index_328_430.html

January 11, 1909 Earthquake

The deep **M 6.0** earthquake originated near the San Juan Islands. It was felt over about 58,000 mi^2, most strongly in Puget Lowland from Seattle to Bellingham. Some damage occurred, including: cracked chimneys, a fallen chimney, and broken windows.

Source: https://assets.pnsn.org/CASCAT2006/Index_328_430.html

August 18, 1915 Earthquake

Recorded as originating near the Washington-British Columbia Border, the **M 5.6** earthquake was felt over nearly all of British Columbia, and felt to a maximum modified Mercalli intensity of about V in Washington. Doors and windows rattled and people woke from sleep, but no damage was reported.

Source: https://assets.pnsn.org/CASCAT2006/Index_431_535.html

January 23, 1920 Earthquake

Originating in the San Juan area, the **M_l 5.5** earthquake had a modified Mercalli intensity up to VII in northwestern Washington. It was felt over about 27,000 mi^2. Reported damage consisted of cracked brick walls, fallen plaster, broken windows, and a fallen water conduit.

Source: https://assets.pnsn.org/CASCAT2006/Index_536_674.html

1932 Earthquake Swarm in Snohomish County

With origins from Sultan to Kirkland, the swarm consists of three quakes: 1) a January 5 **M 4.3** near Sultan, 2) a July 17 **shallow M 5.7** near Granite Falls, and 3) an August 6 **M 5.0** near Kirkland. Most affected areas included the Puget Sound, east to mostly the cascades, though the largest July earthquake was felt in central Washington. The July M 5.7 earthquake was felt, but no damage reported. In the following August M 5.0 earthquake, a few chimneys were demolished and others badly damaged in Seattle.

Source: https://assets.pnsn.org/HIST_CAT/1932.html

****July 15, 1936 Earthquake**

The **M 6.1** originating near Walla Walla in **eastern Washington** resulted in about **$100,000 (in 1936 dollars) of damage**. It impacted about 105,000 mi^2, felt up to a VI intensity. The earthquake cracked the ground and changes in water well flow. It rotated cemetery headstones, moved objects, stopped clocks, cracked plaster, collapsed several chimneys. Shaking lasted 2 minutes.

Source: https://assets.pnsn.org/HIST_CAT/1936.html

November 12, 1939 Puget Sound Earthquake

The **deep** earthquake, **recorded in different sources as M 5.8 and M 6.2** occured between Bremerton and Olympia. It was felt by 60,000 mi^2 across most of state except small portions of northeast and southeast Washington. Many areas felt up to VII intensity. Damage consisted of few fallen and twisted chimneys, cracked masonry, concrete, plaster, some fallen plaster, broken windows, and some power outages. Damage was considered slight to significant. Most damage was in Centralia, Oakville and Olympia.

Sources:

https://assets.pnsn.org/HIST_CAT/1939.html

http://file.dnr.wa.gov/publications/ger_ic85_earthquake_hazards_wa.pdf

April 29, 1945 "1945 Puget/Cascades Border Region Earthquake"

The **shallow M 5.7** earthquake felt on April 29, followed by a M 5.0 earthquake the following day, was centered near North Bend. Felt across 50,000 mi^2 across much of the state, intensity was recorded up to VII. The earthquake caused a rock slide on Mt. Si and cracks in the ground. Damage consisted of cracked plaster and chimneys, some fallen bricks from chimneys, broken windows and town water main, and damage to seams and joints. **One person was struck on the head by a falling brick.**

Sources:

https://assets.pnsn.org/HIST_CAT/1945.html

http://file.dnr.wa.gov/publications/ger_ic85_earthquake_hazards_wa.pdf

****February 14, 1946 Washington Earthquake**

The **deep M 5.8** earthquake originated near Olympia, and was felt across about was felt across about 70,000 mi^2. Intensities reached VI and VII in many locations in the Puget Sound. Damage estimating **$250,000 (in 1946 dollars)**, mostly in Seattle, included plaster and cornice damage, and few instances of major damage, though most was minor. Major damage in Seattle occured in industrial buildings overlaying fill and waterfront building on piles. Plaster cracks, broken windows, and broken chimneys were rare. A **few deaths were charged indirectly** to the shock.

Sources:

https://assets.pnsn.org/HIST_CAT/1946.html

http://file.dnr.wa.gov/publications/ger_ic85_earthquake_hazards_wa.pdf

June 23, 1946 British Columbia Earthquake felt in Washington

The **deep M 7.4** earthquake originated near Courtenay, British Columbia. It had a long duration, and was felt across 55,000 mi^2 in Washington, up to an intensity of VI. In Snohomish county, a 20-foot crack appeared in a glacier on Big Four Mountain, and layers of rock were shaken from a fireplace and plaster fell at a nearby inn. Additional Washington damage includes cracked and fallen chimneys and plaster, fallen bricks, interrupted service from power lines, and housing slightly damaged from swaying. Landslides occured near glacier peak.
Source: https://assets.pnsn.org/HIST_CAT/1946.html

****April 13, 1949 Olympia Earthquake**

The **deep M 6.8 or 7.0** earthquake struck about 8 miles north-northeast of Olympia, along the southern edge of Puget Sound, **killing 8 people and injuring many more**. **Property damage in Olympia, Seattle, and Tacoma was estimated at $25 million (in 1949 dollars).**
In Centralia, alone, the earthquake damaged 40 percent of the homes and businesses. Ground water, released by the shaking, flooded several blocks of Puyallup. In Olympia, a lot of damage was concentrated at the Port, which faced dangers of liquefaction from being built on artificial fill. A USGS report notes that almost all large buildings in Olympia were damaged to some extent, including eight structures on the Capitol grounds.
Near Tacoma, a huge section of a 200-foot cliff toppled into Puget Sound three days after the earthquake that produced a tsunami that swept across Tacoma Narrows and reflected back to Tacoma, flooding a group of houses along the shoreline. South of Tacoma, railroad bridges were thrown out of alignment. A 23-ton cable saddle was thrown from the top of a Tacoma Narrows bridge tower, causing considerable damage.
Source: https://mil.wa.gov/blog/news/post/big-1965-earthquake-happened-50-years-ago

1950-2000

August 4 (conflicting dates), 1959 Earthquake

The **M 5.0** earthquake originated near Chelan, WA, **east of the Cascades**. Dates conflict between August 4 and August 6. The greatest intensity was VI near the epicenter, rapidly decreasing to V or less away from the epicenter. It was felt over 25,000 mi^2. The shaking resulted in minor damage, including chimney damage, at several locations and triggered rock slides near Chelan and Waterville.
Source: https://assets.pnsn.org/HIST_CAT/1959.html

August 17, 1959 Hebgen Lake, Montana Earthquake, felt in Washington

The **shallow M 7.3** Hebgen Lake, Montana, earthquake was felt in Washington mostly with an intensity of I to IV, with some locations as high as V.

Sources:
https://assets.pnsn.org/HIST_CAT/SSA01274.pdf
https://pubs.usgs.gov/of/1984/0297/report.pdf

September 17, 1961 Earthquake
The **shallow M 5.1** originated near Mount St. Helens, and was felt over 9,000 mi^2. The maximum intensity was VI. Slight damage, cracked chimneys and cement foundations, occured in a few towns along Columbia River.
Source: https://assets.pnsn.org/HIST_CAT/1961.html

November 5, 1962 Earthquake
The **shallow M 5.5** earthquake originated near Vancouver, WA. It was felt over 20,000 mi^2 in Washington and Oregon to a maximum intensity of VI. Minor damage consisted of mostly cracked plaster, some fallen bricks from chimneys, and broken windows.
Source: https://assets.pnsn.org/HIST_CAT/1962.html

****April 29, 1965 Seattle-Tacoma Puget Sound Earthquake**
The **deep (30-40 miles), M 6.5 to M 6.7** earthquake centered just south of Seattle had a modified Mercalli of VIII. Shaking was felt from Oregon to British Columbia and Montana. **$12.5 million (in 1965 dollars)** of damages were similar to the 1949 earthquake, though utility damage was less severe. **Seven people were killed** by the earthquake, three of whom were killed by falling debris (1 in Seattle, 2 in Harbor Island according to the July 1965 Mineral Information Service report). **Damage in Seattle was concentrated in areas of filled ground**, including Pioneer Square and the waterfront, both with many **older masonry buildings**. **Nearly every waterfront building experienced damage.** Buildings with unreinforced brick-bearing walls with sand-lime mortar were damaged most severely. Multistory buildings generally had slight or no damage. However, the Legislative Building once again was damaged and temporarily closed. Government activities moved to nearby motels. The Legislature Building in Olympia would sustain more damage in the 2001 Nisqually earthquake. **The low-lying and filled areas along the Duwamish River and its mouth settled, causing severe damage at Harbor Island. Slumping occurred along a steep slope near Admiral Way. Eight Seattle schools, normally serving 8,000 students were closed until safety inspection could be carried out.** Minor damage was widespread through Seattle to Everett on the north and to Olympia on the south and extended from a few miles east of Renton to almost as far west as the Hood Canal.
Sources:
https://mil.wa.gov/blog/news/post/big-1965-earthquake-happened-50-years-ago

http://www.burkemuseum.org/static/earthquakes/cur-history.html

May 18, 1980 Mount St. Helens Eruption Earthquake

The eruption of Mount St. Helens on May 18, 1980 was coupled with a **shallow M 5.7** earthquake. Many earthquakes larger than M 4.5 preceded the eruption, and many earthquakes smaller than M 4.5 followed the eruption.

Source: https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/earthquakes-and-faults#historic-earthquakes-in-washington

February 13, 1981 Earthquake

A **shallow M 5.2** occurred about 14.5 miles south of Morton, WA.

https://pnsn.org/event/10098863

https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/earthquakes-and-faults#historic-earthquakes-in-washington

February 14, 1981 Earthquake

A **shallow M 5.5** centered around Elk Lake in southwest Washington.

Source: https://assets.pnsn.org/HIST_CAT/SSA01274.pdf

May 28, 1981 Earthquake

A **shallow M 5.0** occurred about 42 miles east of Morton, WA.

https://pnsn.org/event/10106318

https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/earthquakes-and-faults#historic-earthquakes-in-washington

October 28, 1983 Borah Peak, Idaho Earthquake (Felt in eastern Washington)

The **shallow** 1983 **M 7.0** Borah Peak, Idaho, earthquake was followed by four felt aftershocks (Stover, 1987) and hundreds of small aftershocks (Richins et al., 1987). It was **felt in Spokane**, but no injuries or damage were reported. Some buildings swayed and many experienced shaking that was commonly initially thought to be something else by those within the buildings. Much of eastern Washington had intensities of II to IV.

Sources:

https://pubs.usgs.gov/of/1984/0297/report.pdf

https://news.google.com/newspapers?id=lP1LAAAAIBAJ&sjid=ffkDAAAAIBAJ&pg=5848%2C2561070

December 29, 1989 Earthquake

A **shallow M 4.9** earthquake occured southwest of Mount Rainier, about 10 miles northeast of Morton, WA.

Sources:

https://pnsn.org/event/10250873

https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/earthquakes-and-faults#historic-earthquakes-in-washington

April 13, 1990 Earthquake

A **shallow M 5.0** earthquake occurred near Deming, WA.

Sources:

https://pnsn.org/event/10257663

https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/earthquakes-and-faults#historic-earthquakes-in-washington

January 28, 1995 Robinson Point Earthquake

The Robinson Point Earthquake, a **shallow M 5.0** earthquake, occured between Tacoma and Seattle. It was felt in western Washington from Bellingham to Portland and east to Yakama. According to surveys, maximum intensity was V near Tacoma. There was minor damage.

Source: http://assets.pnsn.org/notable/Pt.Robinson/pointrob.html

May 2, 1996 "The May 2 Duvall Earthquake"

The May 2 Duvall Earthquake was a **shallow M_L 5.3** earthquake centered around Duvall, WA. There was some building damage, including chimney cracks, 2 major instances of chimney damage, a broken pipe, a few foundation cracks and one toppled wall.

Source: http://assets.pnsn.org/notable/Duvall/duval.html

July 3rd, 1999 Satsop Earthquake

The **deep M 5.5-5.9** has some disagreement by experts on the exact moment magnitude value. The maximum modified Mercalli intensity was VI based on damage observations. It caused significant damage: **$7.1 Million** to repair Montesano historic Courthouse built in 1910.

Source: http://assets.pnsn.org/legacy_reports/Sum99/A1302.htm

2000-Present

****February 28th, 2001 Nisqually Earthquake**

The **deep M 6.8** earthquake centered in the Nisqually are near Tacoma was felt all over western Washington, from Oregon to British Columbia and Montana. The maximum modified Mercalli intensity was VII, shaking lasting 10-20 seconds. It caused about **$2-4 billion in damage** (higher estimate from Hazus run $3.9 bill) and **400 injuries**. No deaths were directly related to the earthquake. Damage to Unreinforced Masonry extended all over Western Washington, especially in Olympia and the Pioneer Square area of Seattle (e.g. Fenix Underground). Liquefaction experienced and some landslides occurred.
Source: http://oregongeology.org/sub/nisquallyGLFolder/Mei2Nisqually.htm

June 10, 2001 Earthquake

The **deep M 5.0** earthquake near Satsop, WA, with a maximum instrumental intensity of IV.
Source:
https://pnsn.org/event/10529683#overview
https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/earthquakes-and-faults#historic-earthquakes-in-washington

2001: **Earthquake Swarm in Spokane, WA:**
Series of earthquakes, at least 75 felt in Swarm, magnitude 4 or less:
Still not fully understood whether they indicate a larger fault or not, but likely to have been caused by changing water levels underground.

Appendix: Un-edited Notes

1800s

1872: Washington State Earthquake (https://assets.pnsn.org/HIST_CAT/SSA01274.pdf **- 2002): The December 14, 1872 (M 6.5-7.5; M_I 6.8)** earthquake, calculated to be near Lake Chelan, WA, is the largest historical earthquake in eastern Washington. Dramatic accounts of landslides and groundwater disturbances; shallow.
https://web.archive.org/web/20160101023203/https://www.seattletimes.com/seattle-news/scientists-may-be-cracking-mystery-of-big-1872-earthquake/ - 2014: Chimney cracks in

Olympia, trees toppled in Puyallup, fissure split in the ground south of Seattle, windows shattered as far away as Victoria B.C., people knocked off their feet at Snoqualmie Pass; scarp from a fault (now named the Spencer Canyon fault);
(1872 - December 14 - Centered around Lake Chelan. Shallow. Largest and most widely felt earthquake in state. Magnitude 7.3 with a modified Mercalli of IX. Felt over 390,000 square miles. Landslides occurred near lake and along Columbia River - http://www.burkemuseum.org/static/earthquakes/cur-history.html)
1880 - South Puget Sound; December 12, 1880, felt from Victoria to Portland, caused ringing of bells, damaged hop-kiln chimneys; intensity VII MM
https://assets.pnsn.org/CASCAT2006/Index_152_216.html

1882 - Puget sound/ Salish Sea area; April 30, 1982; deep M 5.75-6.2, intensity VI MM in olympia; few broken chimneys

1891 - Southern Puget Sound; Mt Si “Central Cascades Earthquake of March 7, 1981”, M 5.0, VI intensity at Mt Si, felt over 36,000 km2

1896 - Puget sound/ Salish Sea area;January 3, 1896; felt to a VII RF ~ VII MM intensity at Port Angeles

1900-1950

1904 - east Jefferson County; March 16, 1904 MI 5.3 felt to V MM intensity; felt over 50,000 km2; noticed and swaying lamps and shaken windows, but no noted damage

1909 - San Juan Area January 11, 1909 deep M 6.0 located near Blaine, WA. Felt over 150,000 km2, most strongly in Puget Lowland from Seattle to Bellingham.

1915 - northeast Skagit County 1915 – August 18, 1915 M 5.6, RF (Rossi-forel intensity scale) intensity of V as max intensity in WA; felt over nearly all of BC; doors and windows rattles and sleepers woken; no damage
1920 - San Juan area 1920 – January 23, 1920 M 5.5 MI, up to VII n WA, 70,000 sq mi felt, damage in WA consists of cracked brick walls, fallen plaster, broken windows, water conduit to mill shaken down in Port Ludlow.

1932 - northeast Mason (?) County - actually snohomish county?; shallow; Shocks felt in January, July and August of 1932 affected areas in the puget sound and east to mostly the cascades, though affects of the largest of the shock (in July) reached into central washington (https://assets.pnsn.org/HIST_CAT/1932.html); (July-M5.7): no damage reported, but felt; (Aug-M5.0) few chimneys demolished and others badly damaged in Seattle

1936 - south Columbia county (eastern WA) 1936 – July 15, 1936 near Walla Walla, WA. M6.1; $100,000 damage. 105,000 sq mi impacted; cracked ground and changes in water well flow, cemetery headstones rotates 90 degrees clockwise(OR); up to VI intensity in WA – felt by practically all, moved objects, stopped clocks, cracked plaster, several fallen chimneys; alarmed people; 2 minutes of shaking

1939 - southwest Whitman county (eastern WA) 1939 – mis-mapped on major earthquakes since 1880? Appears as Bremerton, not Whitman county. November 12, 1939. Deep M6.2 or 5.8 near Bremerton, WA. Felt by most of state except small portions of northeast and southeast. 60,000 sq mi felt. Many areas felt up to VII intensity; no structural collapse of buildings – few fallen and twisted chimneys, cracked masonry, concrete, plaster and some fallen plaster and broken windows. Damage considerable to slight; most damage in centralia, oakville and olympia

1945 - eastern King County 1945 – shallow; the largest of the swarm was felt on April 29, 1945. M 5.7 with an epicenter near North Bend. Felt across much of the state; intensity up to VII; affected area covered about 50,000 sq mi; cracked plaster and chimneys, some fallen bricks from chimneys, broken windows and town water main, caused rock slides on Mount Si, felt by all, cracked ground, rocked some buildings, damage to seams and joints

1946 - eastern Mason County 1946 – two major earthquakes felt in WA – one originating in Washington near Olympia (February 15, 1946) of M5.8 deep, and one originating near Courtenay, British Columbia (June 23, 1946) of M 7.4, deep. The February 14 earthquake reached intensities of VI and VII in many locations in the Puget Sound, and was felt across about 70,000 sq mi. Damage estimated $250,000 (most in Seattle), and a few deaths charged indirectly to the shock. Olympia had damage to plaster and cornice damage, but no structural damage. With the exception of a few cases, Seattle damage was minor. Plaster cracks, broken windows and broken chimneys were rare. The few outliers had cracked plaster, fallen brick, loss of equipment and goods through damage of fallen materials, broken chimneys in Tacoma, etc. The June 23 Canadian event was felt across 55,000 sq mi in WA state, up to a VI intensity, with a long duration. In Snohomish county, a 20-foot crack appeared in a glacier on Big Four Mountain, and layers of rock shaken from a fireplace and plaster fell at a nearby inn. Additional

Washington damage includes cracked and fallen chimneys, interrupted service from power lines, cracked and fallen plaster, housing swayed and was slightly damaged, fallen bricks, landslides near glacier peak.

1949: Steven Article on WA Earthquakes (1949 and 1965):
https://mil.wa.gov/blog/news/post/big-1965-earthquake-happened-50-years-ago
The **April 13, 1949 earthquake (deep M 6.8 or 7.0)** struck about 8 miles north-northeast of Olympia, along the southern edge of Puget Sound, killing 8 people and injuring many more. **Property damage in Olympia, Seattle, and Tacoma was estimated at $25 million (in 1949 dollars).**
In Centralia, alone, the earthquake damaged 40 percent of the homes and businesses. Ground water, released by the shaking, flooded several blocks of Puyallup. In Olympia, there was a lot of damage concentrated at the Port, which faced dangers of liquefaction and was built on artificial fill. A USGS report notes that almost all large buildings in Olympia were damaged to some extent, including eight structures on the Capitol grounds.
Near Tacoma, a huge section of a 200-foot cliff toppled into Puget Sound three days after the earthquake that produced a tsunami that swept across Tacoma Narrows and reflected back to Tacoma, flooding a group of houses along the shoreline. South of Tacoma, railroad bridges were thrown out of alignment. A 23-ton cable saddle was thrown from the top of a Tacoma Narrows bridge tower, causing considerable damage.

1950-2000

1959 - western Douglas County 1959 – On August 4[HA(1)] , 1959, an M5.0 occurred with an epicenter near Chelan, WA, east of the Cascades. The intensity was felt up to VI near the epicenter, rapidly decreasing to V or less away from the epicenter. Felt over 25,000 sq mi of WA. Minor damage at several locations and triggered rock slides near Chelan and Waterville; chimney damage near epicenter, slight damage;

[HA(1)]I see it listed as the 4th, 5th and 6th in this same source

1961; September 17, 1961 shallow M 5.1 near Mt St Helens; Felt over 9000 sq mi. Max intensity VI - slight damage in few towns along Columbia River (cracked chimney and cement foundations)

1962 November 5, shallow M5.5 near Vancouver WA; felt over 20,000 sq mi in WA and OR; Max intensity VI. Minor damage of mostly cracked plaster and some fallen bricks from chimneys, broken windows

Seattle and two on Harbor Island, according to the July 1965 Mineral Information Service report.

A man died when his car was crushed

Most of the **damage in Seattle was concentrated in areas of filled ground**, including Pioneer Square and the waterfront, both with many **older masonry buildings**. **Nearly every waterfront building experienced damage. The low-lying and filled areas along the Duwamish River and its mouth settled, causing severe damage at Harbor Island; slumping occurred along a steep slope near Admiral Way, April 29, 1965, a 6.7 deep earthquake** struck 12 miles north of Tacoma, killing 7 people and causing about $12.5 million (in 1965 dollars).

Minor damage was widespread through Seattle to Everett on the north and to Olympia on the south and extended from a few miles east of Renton to almost as far west as the Hood Canal. Felt OR to BC to MT

Three persons were killed by falling debris, one in downtown

Centered just south of Seattle. Deep (30-40 miles). Magnitude 6.5 with a modified Mercalli of VIII. Similar damages to 1949 earthquake. Eight Seattle schools, normally serving 8,000 students were closed until safety inspection could be carried out. (Burke Museum Page)

Damage to utilities in the area was not as severe as in 1949.

Buildings with unreinforced brick-bearing walls with sand-lime mortar were damaged most severely. Multistory buildings generally had slight or no damage. However, the Legislative Building once again was damaged and temporarily closed. Government activities moved to nearby motels. The Legislature Building in Olympia would sustain more damage in the 2001 Nisqually earthquake.

1980: May 18, 1980 shallow M5.7 from Mt. St Helens

February 14, 1981 M5.5 Elk Lake; shallow**(**https://assets.pnsn.org/HIST_CAT/SSA01274.pdf**)**

1981 mis-mapped? Near Morton, WA? 5.0/5.2 shallows? need more info to determine correct earthquake; shallow

1989, December 29, 1989; shallow M 4.9 sw of rainier (DNR Historic Earthquakes)

1990 - Whatcom county 1990 – April 13, 1990 M5.0 near Deming, WA, shallow

1995 - King County/Puget Sound 1995 – January 28, 1995 M5.0 near Kent, WA, in the Puget sound; Robinson Point Earthquake, felt in western Washington from Bellingham to Portland and east to Yakama. Maximum intensity was V near Tacoma according to surveys; minor damage

1996 May 2, 1996; ML 5.3, shallow; The May 2 Duvall Earthquake; Some building damage; chimney cracks, 2 major chimney damage, broken pipe, few foundation cracks, 1 toppled wall

July 3rd, 1999 Satsop Earthquake M 5.5-5.9 (moment magnitude: Some disagreement on magnitude from experts)
Deep Earthquake
Significant damage: $7.1 Million to repair Montesano historic Courthouse built in 1910
Max MMI: 6 (based on damage observations)
For more information: http://assets.pnsn.org/legacy_reports/Sum99/A1302.htm

2000-Present

February 28th, 2001: Nisqually Earthquake M 6.8:
Deep Earthquake - ~2-4 billion Dollars in damage (higher estimate from Hazus run $3.9 bill).
Felt all over Western Washington.
~400 injuries, no deaths
Max MMI: VII. 10-20 seconds of shaking.
Significance: Damage to Unreinforced Masonry all over Western WA, especially in Olympia and the Pioneer Square area of Seattle. (Fenix Underground).
Liquefaction experienced. Some landslides reported.
http://oregongeology.org/sub/nisquallyGLFolder/Mei2Nisqually.htm (DOGAMI resource with information on the earthquake)
Felt OR to BC to MT

2001 deep M 5.0 near aberdeen
2001: **Earthquake Swarm in Spokane, WA:**
Series of earthquakes, at least 75 felt in Swarm, magnitude 4 or less:

Still not fully understood whether they indicate a larger fault or not, but likely to have been caused by changing water levels underground.

The shallow 1983 M 7.0 Borah Peak, Idaho, earthquake was followed by four felt aftershocks (Stover, 1987) and hundreds of small aftershocks (Richins et al., 1987). The shallow 1959 M 7.3 Hebgen Lake, Montana, earthquake was followed by a vigorous aftershock sequence (Stover and Coffman, 1993).https://assets.pnsn.org/HIST_CAT/SSA01274.pdf