The Oregon Weather Book

A State of Extremes

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Floods

Floods are among the most frequent and costly natural disasters in the United States in terms of human hardship and economic loss. Between 1985 and 1994, the cost of floods in the United States averaged $3.1 billion per year. An average of 95 lives is lost every year to floods.

Oregon is no stranger to floods. Most of Oregon's most destructive natural disasters have been floods. Loss of life, property damage, and economic consequences of floods have been severe.

Floods can occur in Oregon at various times of year and in nearly every county. Of course, they have one thing in common: excessive amounts of water. But the causes of flooding are many and varied, due to Oregon's very diverse physical setting and climate. In the interests of simplicity, however, four general categories of floods in Oregon can be identified:

Flash floods. Severe local thunderstorms occasionally produce high-intensity precipitation which can lead to flash flooding. Floods of this type are common during warmer months, and in eastern Oregon.

Rain-on-snow floods. Heavy rains falling on a deep snow pack can produce flooding due to the cumulative runoff from rain water and snow melt. These are most common during winter months

Spring snow-melt floods. Warm weather in spring or early summer melts the high-elevation snow pack. If the snow pack is extensive and temperatures rise very quickly, the resulting snow-melt can produce significant flooding.

Debris flows. Logs, ice, or other debris can temporarily dam a river or stream, creating a backlog of water; when this “dam” breaks, flooding can result from the sudden release of water.

Flash Floods

Western Oregon's annual precipitation is dominated by large winter storms which affect extensive areas over a period of several days. A typical winter might bring rain from British Columbia into northern California and last one to three days. Although storm totals can be quite high, precipitation intensities are usually light to moderate (less than one half inch per hour, for the most part). In general, western Oregon locations receive about 75% of their annual precipitation between October and March.

East of the Cascades, however, things are very different. In crossing the Cascades, winter storms lose much of their available water, and consequently produce significantly less precipitation on the east side. Mild marine air has much less influence to the east of the Cascades than to the west, so summer temperatures are often higher in eastern Oregon than in the west. As a result, summer thunderstorms (and potentially high amounts of precipitation) are fairly common in those areas during the summer months. Many eastern locations, in fact, receive more precipitation during summer than during winter, while others are more or less uniform throughout the year.

Thunderstorms result from a process called "convection," in which air near the ground is heated by the warm surface and rises in the atmosphere. As the air rises, it cools, eventually condensing to form clouds or produce precipitation. If the surface is very warm, heating occurs quickly and the air rises rapidly; the warmer the surface, the faster the air will rise. In turn, the faster the air rises, the more intense will be the condensation and precipitation which result. Thunder, lightning, and hail are additional products of these extremely strong storms.

Topography plays an important role in thunderstorm formation. Terrain discontinuities (such as ridges and valleys) produce uneven surface heating, which can concentrate convection in certain areas. In addition, mountain and hill slopes can direct moving air upward, often triggering the upward air flow which can result in a thunderstorm.

Nearly all of eastern Oregon is susceptible to thunderstorms (for that matter, western Oregon is susceptible as well, but the storms are much less frequent). The most common areas for storm formation are over mountains (such as the Cascades, the Blues, and the Wallowas). Occasionally a thunderstorm will produce such intense precipitation that local flooding ("flash floods") occur.

Dr. John Merriam, a University of California paleontologist, experienced just such a flood during a fossil hunt in 1900. On June 23, Merriam and a companion were digging near Bridge Creek, 6 miles downstream from Mitchell in central Oregon. They were working in the shade of a low cliff under a partly cloudy sky. Suddenly,

> *...there began to fall what might best be called balls of water. Thinking the shower would soon pass, we kept at work, but heavy clouds swung across the sky. During the next hour, as we made our way out of the area, we were exposed to one of the hardest rain storms I have ever seen.*

That storm devastated a large area in Wheeler County. Crops were destroyed, mud- and rockslides were common, and farm buildings were ruined. Eyewitnesses reported hailstones up to 6 inches in diameter. Fortunately, no lives were lost (*Oregonian*, 1976).

Not far away from the site of that storm, in a secluded graveyard, are buried Nancy Wilson and three of her children. They died on June 2, 1884, when an intense thunderstorm sent a "wild torrent of muddy boulder-laden water over the flatlands of what is now Painted Hills State Park" (*Oregonian,* 1976).

The same area was also the scene of one of the largest flash floods in the United States. On July 13, 1956, intense thunderstorms and heavy rain occurred near Mitchell between 5 and 6 p.m., with the greatest intensities near Bridge Creek. The creek rose from its usual depth of about 1 foot to a rapidly moving torrent; over 20 buildings were destroyed (including houses, businesses, a garage, and a post office). A highway was blocked by washouts and mud and rock slides. People who had accidentally left two open containers out during the 50-minute storm calculated that the rainfall was 3.5 inches in Mitchell and 4 inches in Girds Creek. This was more than 25% of the area's annual average rainfall!

Two other eastern Oregon towns that appear to receive more than their share of flash floods are Heppner and Ashwood. Heppner, in Umatilla County of north-central Oregon, was the scene of the greatest natural disaster in Oregon's history (see below) as well as several smaller floods. Ashwood, on Trout Creek about 30 miles east of Madras, has seen several large flash floods. In August, 1976, over 2 inches of rain fell during a short period of time, resulting in a wild flood of water carrying logs, boulders, and debris through Ashwood.

Recent years have proven that flash floods remain a danger, even with better weather forecasting tools. On July 24, 1991, tremendous rainfall occurred in Deschutes County (4.8 inches fell in 1 hour at LaPine). Mud slides washed out part of a highway. Hail from the storm broke windows, windshields, and damaged cars, roofs, and satellite dishes. Snow plows were needed to remove hail from the roads. On Century Drive the hail was 6 to 8 inches deep. Two weeks later (on August 5, 1991), Newsome Creek Canyon in Crook County was the scene of a wall of water 200 feet wide and 50 feet high that rushed into the Aspen Valley Ranch. A man died while holding onto a fence that was swept up by the water. There were reports of farm equipment, cars, and animals that had moved up to 6 miles downstream.

New technologies now in use by the National Weather Service (particularly the NEXRAD Doppler radar) greatly improve our knowledge of the atmosphere and our ability to identify the locations of severe thunderstorms. Flash floods will continue to occur on occasion, but early warning and good communications should reduce the danger of loss of life from such floods and insure that an event such as the 1903 Heppner flood will never again occur in Oregon.

Heppner, 1903

Many farmers in Oregon east of the Cascades were worried about water conditions during the late spring of 1903. Very low precipitation totals in April and May had left the soil dry and began to threaten crops. The agricultural report for May 25 stated "ranges drying up, and more rain needed in eastern and southern Oregon. Wheat backward and becoming weedy ... corn, sugar beets, field onions and gardens making very slow growth." Dry and warm weather continued, although local showers brought some relief. The June 8 report included a single sentence about water conditions: "Spring wheat and forage plants deteriorating on account of the drought." Little wonder, then, that gathering clouds on the afternoon of June 14th were welcomed by the residents, many of them dry-land farmers whose economic survival depended on summer rains.

Heppner is the county seat of Morrow County, and had a population in 1903 of about 1,400. Willow Creek, which originates in the Blue Mountains only a few miles southeast of Heppner and flows northwestward toward the Columbia, had created an alluvial valley 500 to 1,500 feet wide, a fertile strip of cropland on which Heppner was built.

As storm clouds gathered over the Columbia Plateau on the afternoon of June 14, they seemed to congregate near the slopes of the Blue Mountains just south of Heppner. They grew darker and darker. Thunder was heard. Abruptly, a massive (and deadly) hailstorm began. John T. Whistler, a U.S. Geological Survey agent, later reported:

> *Some of the hail stones are said to have measured 1 1/4 inches in diameter ... A grim evidence of the amount of hail that fell is that, while most of the bodies being recovered on the fifth day were already badly decomposed, one was occasionally found almost perfectly preserved in a large drift of hail. Nearly all the hail was of clear ice and, unlike the usual hail stones, which are of a more opaque ice, being built up from a nucleus in successive layers.*

As bad as the hail storm was, things quickly grew worse. Heavy rain, appropriately called "cloudbursts" by residents, inundated the slopes of the Blues and the upper parts of the valley. Most of the rain fell in areas beyond any measurement gauges, but later reports estimated that an average of 1.5 inches fell over an area of 20-square-miles, most of it in a short period of time.

Unfortunately for Heppner, most of this 20 square mile area funneled into Willow Creek and its tributaries. A wall of water surged downstream; in many places, the first surge of water coincided with the peak depth. Eyewitness reports of the height of the "wave" at the head of the flood waters ranged from 15 to 50 feet high, but many of these appear to have been exaggerated. Nonetheless, the water was very deep, and arrived so suddenly that residents were taken almost completely by surprise. The first notice that the people in the business district had of the flood was when T.W. Ayers' large two-story residence left its foundation, floated across the street, and crashed into some wooden buildings. Poplar trees over 2 feet in diameter were "snapped off like cornstalks." Julian Keithley, age 70, stayed in his home until everything was gone but the roof. He rode the current atop the roof for almost 2 miles, saving the life of another resident by pulling him onto the roof as he floated by.

About one-third of Heppner was completely destroyed, and more than 200 people died (about one-fourth of the total population). About 150 residences were destroyed. Whistler speculated that the destructiveness of the flood "is due more to the rugged character of the topography and the almost utter absence of vegetation than to the unusual rainfall." If this statement is true, it suggests that the biggest reason for the disaster was the location of Heppner in a very exposed and potentially dangerous location.

In the days following the flood, many remarkable stories were told as residents began to clean up, bury the dead, and rebuild their town. The heroic story of a Paul Revere-like ride by two horsemen became a legend. Leslie Matlock and Bruce Kelley, expert horsemen, secured horses from a livery stable and, armed with pruning shears, set out to warn ranchers and residents of Lexington (9 miles away) and Ione (18 miles away), both on lower Willow Creek. Below Heppner, Willow Creek meanders considerably, so the two riders cut across country, cutting fences as they went. Said Matlock in recalling the ride later, "We (Kelley and I) didn't talk much, except to call warnings at homes along the way. The flood waters had already beat us to Lexington, but we felt we could make it to Ione before the water hit." In Lexington the flood waters had swept through the community at about 7:00 p.m., destroying several buildings and forcing residents to evacuate to the hills nearby. Matlock and Kelly secured fresh horses and continued on to Ione, beating the crest of the flood.

Rain-on-Snow Floods

Oregon's water supply is very dependent on snowfall, due to a fundamental fact of Oregon climatology: water demand is greatest in summer, at low elevations, while most of the precipitation occurs in winter, and at high elevations. Snow serves the same function as reservoirs – it holds water in reserve through the low-demand months, making it available when it is needed during the warmer months. Ideally, the snow pack melts slowly during spring and summer, providing a steady supply of water to the soil, streams, and rivers. Occasionally, however, a dramatic change in weather conditions causes a rapid melting of the snow pack, bringing with it the possibility of flooding. Spring snow melt floods discussed in the next chapter are an example. Another occurs when warm rain falls on a deep snow pack, producing the feared and often destructive "rain-on-snow".

During winter, Oregon is affected primarily by air flowing across the Pacific from the west. The cool, wet storms associated with this air flow produce the wet winters so characteristic in the state, west of the Cascades. But, at times, the direction of movement of the air masses changes somewhat. Air coming from the northwest tends to be somewhat cooler; from the north, cooler still. Often, though, winds in the upper atmosphere blow from the southwest. Air reaching Oregon from that direction is always mild, and often wet. And in some cases a deep, wide, humid mass of air, almost literally a "river" of moist air, makes a beeline from the tropical Pacific directly for the Northwest. Known as a "subtropical jet stream," this wet air mass generally passes near the Hawaiian Islands on its way to Oregon. For that reason, many locals have begun calling this the "Pineapple Express," a misnomer since it actually is birthed much farther southwest, above the western Pacific near the Equator. To be more accurate, perhaps we should call this the "Sumatra Sponge" or the "Java Jet."

The effect of this weather event in Oregon is often dramatic: mild, and wet, generally producing Oregon's wettest winter weather. When the moist tropical air reaches the land and is forced to rise, abundant quantities of water are liberated (this is known as "orographic precipitation"). West-facing slopes of the Coast Range and Cascades in particular, will receive large amounts of precipitation, but all of western Oregon, and often much of the areas east of the Cascades, are affected. These air masses are warm; it is not unusual for temperature to rise 20° following the arrival of tropical air. Above-freezing temperatures extend very high, sometimes well above pass level in the Cascades (4000 - 5000 feet). The combination of warm air and rain can cause significant melting of the snowpack.

Most tropical air masses linger over Oregon for only a day or so, but on rare occasions they remain overhead for several days, continually pumping warm, moist air into the region. Such occurrences, especially if they happen when snow is abundant, can result in huge quantities of runoff – a combination of snow melt and rain. In February, 1996, just such a situation occurred, and it was the largest flood in western Oregon in more than 30 years.

The Flood of February, 1996

A series of intense surges of subtropical moisture inundated western Oregon during the period February 5-9. The combination of record-breaking rain, warm temperatures, and a deep snowpack led to severe flooding throughout northern sections of the state. River flood stages were comparable to the December 1964 flood, the largest in Oregon since flood-control reservoirs were built in the 1940s and 1950s. The first precursor to the flooding was an unusually wet winter, saturating soils and filling streams and reservoirs to high levels. Most of northwest Oregon received at least 125% of normal precipitation for the first four months of the Water Year (October - January). There was very little snowfall in fall and winter; in mid-January, the snow water average for high-elevation sites (NRCS SNOTEL stations) in the Willamette drainage was only 29% of average. Beginning in mid-January, however, unusually high amounts of snow fell in the middle and high elevations of the Cascades and Coast Range (in many locations, several feet per day were reported for many days). By January 31, the average snowpack for the Willamette drainage had risen to 112% of average.

Then on February 6th, a strong subtropical jet stream reached Oregon. This warm, very humid air mass, which originated near the Equator in the western Pacific (near the Date Line), brought record rainfall amounts to northern sections of the state. Although such subtropical storms are by no means rare, it is unusual for them to persist with such intensity for such a long period of time (3-4 days). The table below shows 4-day total precipitation for northwestern Oregon locations, as well as the all-time 4-day records (some of them now surpassed — new records are in bold).

Site	4-day total (inches)	Previous Record (inches)	Year
Astoria	**8.88**	8.24	1975
Corvallis	**8.10**	7.84	1974
Eugene	9.14	10.30	1964
Govt. Camp	11.30	13.84	1964
Hillsboro	**6.70**	5.91	1974
Hood River	7.50	8.67	1964
Newport	9.81	10.17	1965
Oregon City	**7.51**	7.29	1964
Portland Airport	**7.00**	5.10	1994
Salem	8.18	8.69	1937

The most spectacular total was at Laurel Mountain in the Coast Range. Nearly 30 inches of precipitation fell in the 4-day period!

Temperatures were also unusually mild. In the Willamette Valley, daily minimum temperatures were higher than normal maximum values for early February. Nighttime lows in the mid-50s were quite common. The freezing level quickly moved upward, to 7,000 - 8,000 feet. Rain fell even at mountain pass level.

The warm rain and air temperatures quickly began to erode the snowpack. Streams rose quickly on the 6th and 7th, reaching flood stage in many locations. At Vida on the McKenzie River, the flow jumped from 4,000 cfs on the 5th to over 20,000 cfs on the 6th. Major and minor tributaries throughout western Oregon jumped their banks. Gradually the levels in the major tributaries and the main stem rivers increased as well. Several set all-time flood stage records. The table below is a summary of 1996 crests, as well as all-time records, for rivers throughout northern Oregon; new record levels are in bold.

River/site	Stage (feet)	Crest (feet)	Previous (feet)	Record Year
Columbia at Vancouver	16.0	27.2	31.0	1948
Willamette at Portland	18.0	28.6	33.0	1894
Willamette at Salem	28.0	35.1	47.0	1891
Willamette at Corvallis	20.0	23.5	32.4	1891
Sandy near Sandy -	22.6	22.3		1964
Clackamas at Estacada	10.0	17.4	18.4	1964
Johnson Cr. at Sycamore	11.0	13.8	14.7	1964
Tualatin at Farmington	32.0	37.2	37.0	1933
Molalla at Canby	13.0	14.6	16.8	1964
Pudding at Aurora	22.0	30.5	30.0	1923
S. Yamhill at Whiteson	38.0	47.5	47.2	1964
N. Santiam at Mehama	11.0	13.4	17.5	1923
Santiam at Jefferson	15.0	23.2	24.2	1964
Luckiamute at Suver	27.0	33.0	34.5	1964
Nehalem at Foss	14.0	27.4	24.9	1990
Wilson at Tillamook	13.0	18.1	n.a.	n.a.
Nestucca at Beaver	18.0	18.2	n.a.	n.a.
Siletz at Siletz	16.0	24.5	31.6	1921

The 1996 flood was the most recent rain-on-snow event, and easily the most documented: television crews were everywhere, and the live and film coverage was almost continuous. Similar stories, albeit with less documentation, are told about other such events. Probably the best comparison with the 1996 flood occurred in 1964.

The "Christmas Flood" of 1964

In general, Northwest weather is more reliable and predictable than it is in many other parts of the country. The Southwest, for example, can have year-to-year variations in total precipitation of as much as 400%, far exceeding what is observed in the Northwest. Nonetheless, there are times when the severity of weather change over a short period of time almost defies description. 1964 was one such year.

The first half of December 1964 was wet and mild. Temperatures were slightly above normal in Oregon, and precipitation totals were above normal as well. Then on the 14th and 15th, a strong surge of Arctic air entered Oregon, and temperatures quickly approached record low levels in many parts of the state. West of the Cascades, the night-time lows dropped to 5° to 15°, while east of the mountains they ranged to as low as -38°F. Statewide, this was the coldest winter period since 1919.

On the 18th, a powerful storm moved into Oregon, bringing heavy snow to virtually all of the state. In the next 24 to 36 hours, near-record snow depths accumulated through the northern half of the state. Hundreds of motorists were trapped in their cars, unable to drive because of snow and ice conditions; most were rescued, forced to abandon their cars. Portland Airport reported 11 inches of snow on the ground on the morning of the 19th. Residents began to expect that this would be a rare "White Christmas," an event that occurs in the Willamette Valley only a handful of times per century.

But this was not to be. December 19th brought a tremendous record-breaking rain storm, accompanied by unusually warm temperatures. In retrospect, this storm almost certainly originated in the subtropics, as did the 1996 storm. Temperatures were so mild that rain was reported nearly to the crest of the Cascades.

At Government Camp, in the Cascades (elevation 3,900 feet), the situation was typical of much of the state. The 55 inches of snow on the frozen ground on the 20th contained around 5.44 inches of water. Twenty-four hours later, rain had compacted the snow to a depth of 45 inches with an additional 1.57 inches of water. Most people did not worry; rain had fallen on snow packs before. But this time the rain did not stop. In the next 48 hours another 9 inches of rain fell at Government Camp, melting all but 6 inches of the snow.

Throughout the state this pattern of snow, followed by heavy rains was occurring. New December record 3- and 4-day precipitation totals were established at many locations, some of them at stations with 75-100 years of record. Many places reported 2 to 3 times the December monthly normal precipitation in a 5-day period.

Eventually the snowpack collapsed. Immediately, the mass of rain water mixed with melting snow began to move into drainage streams. This, in combination with the ceaseless rains, greatly increased the water level in streams and rivers, with some of them 50 percent higher than any levels measured before. The next day, Dorena Dam could no longer hold back the water; it surged over the dam at a depth of 8 feet. Water flowed over the Cottage Grove Dam so forcefully that people living below had to be evacuated and moved to homes and shelters. In one case, 18 children were all brought to a single house; the family living there was not aware that this was happening until they woke up the next morning. Thousands of people had to evacuate their homes.

Just when it seemed that the situation could not get worse, the storm reintensified. Even more heavy rains fell on the 25th through the 29th. The already densely saturated ground could hold no more water; the result was mud and debris slides and even more flooding of streams. Many highways and roads were closed and streams were dammed. In Mapleton, a mud slide buried several buildings and between 25 and 30 cars as well as much of the town. On the lower Umpqua, the town of Reedsport was almost completely covered with 10 feet of water. Homes were flooded, bridges, wood piles, and lawn furniture were carried away, trees were uprooted, and roads were destroyed all over Oregon, southern Washington, most of Idaho, and northern California. Interestingly, many old bridges remained intact during the storm, even when struck by logs and other debris, yet many of the newer ones broke quickly and with relatively little force.

At the end of December, temperatures once again dropped, slowing the rescue and reconstruction process. According to Gilbert L. Sternes, the Weather Bureau State Climatologist.

> *Destruction in Oregon due to weather was greater in this December than in any previous month or storm in this State's recorded history. Practically every facet of the State's economy was seriously affected.*

Many families had instantly become homeless andhelpless. Regionally, the damage totals came to $430 million ($34 million in Oregon). 47 people died in the 4 states affected, 17 of those in Oregon. It was not a very merry Christmas for most area residents.

Spring Snow Melt Floods

Strictly speaking, floods occur every spring in Oregon and the Northwest, as high-elevation snow fields melt as temperatures rise. The U.S. Army Corps of Engineers for many years published annual summaries describing each year's event, with titles like 'The Flood of 1953.' Many of these 'floods' were not particularly damaging nor unusual.

The dams on the Columbia River have greatly reduced the intensity and danger of spring floods. The Army Corps of Engineers and other dam operators can now draw down the reservoir levels in the spring prior to onset of snow melt to maximize the flood control potential of the dams. The Northwest River Forecast Center (the National Weather Service office with primary responsibility for river forecasts) has improved its forecasts due to better observational data (such as remote sensing platforms, and high-elevation automated stations such as NRCS SNOTEL sites).

Although spring floods are no longer the danger that they once were in most low-elevation areas in Oregon, they remain an important aspect of Oregon's weather history. Among the state's most significant weather-related disasters, several were spring snow melt floods. Probably the most notable was the one that inundated the town of Vanport in 1948 (see story below).

Examples of snow melt floods include:

1894. *There was flooding along the entire lower Columbia. Much of Umatilla County was under water. Flow rate at The Dalles was 1,200,000 cubic feet per second, the highest ever observed on the Columbia River. The Willamette River was 33 feet deep in Portland. Photographers caught people boating and fishing in downtown Portland.*

1989. *Warm rains and warm temperatures in eastern Oregon caused extensive melting of snow packs over a short period of time. Many rivers and creeks overflowed their banks.*

1993. *Rain and warm temperatures helped to melt a deep snow pack. The Owyhee River had been nearly dry in February, but the snow melt produced a record flow of 42,000 cubic feet per second on the 18th. Owyhee Reservoir, the largest in the state, was nearly empty in February, but by the end of March it had filled and was spilling. Flooding also occurred in Harney County, Grant County, and Wheeler County.*

Although dams have nearly eliminated snow melt floods in the Willamette Valley and other "regulated" areas, they can still occur in areas which are not downstream from dams, as the last two examples above show. Fortunately, such floods are far less damaging than the huge floods which once affected nearly all low-lying areas in the state.

On the other hand, those same flood control strategies, so successful in reducing the impacts of spring snow melt flooding, may be contributing to increases in the frequency of cool season rain-on-snow flood events. By keeping winter river levels higher than during pre-dam periods, the dams may make it more likely that winter flooding will occur. This is described in more detail in the next section.

Oregon's major industries - forest products, agriculture, and tourism - were deeply affected by the Great Depression. Although agriculture was helped somewhat by New Deal programs of the Roosevelt administration, the tourism industry was virtually destroyed. World War II changed things dramatically. New industries developed almost overnight, the population quickly became more diverse, and the federal government began to play an important role in the lives of the citizens. Oregon's role in the war effort was primarily produc-tion of ships, food, fiber, and aluminum; however, its relatively small population required an influx of additional workers.

By 1942, Portland had become a major shipbuilding center, primarily because of three very large shipyards built by Henry Kaiser. Nearly 100,000 people were employed in the shipyards, many of them recent arrivals to the area; Portland's population grew from 340,000 to 500,000 in the first years of the war, creating a monumental housing shortage. Kaiser attempted to satisfy the housing need by purchasing 650 acres of lowland along the Columbia River, not far from the shipyards, planning what would become "the most spectacular of all" wartime housing projects and the major project of the largest local housing authority in the nation. The city of Vanport was completed in 1943. It comprised a patterned arrangement of two-story buildings 38 by 108 feet, each with 14 apartments. A total of 9,942 dwelling units was built, housing a population of about 40,000. Post-war layoffs reduced the population significantly; by 1948, about 18,500 residents called Vanport home.

Despite Vanport's location on a flood plain near the largest river in the western U.S., there was very little concern about its safety. A Kaiser publication stated that "the entire project is surrounded by an impervious dike". Because of that confidence, the exceptionally heavy winter snowfall in the upper Columbia Basin during the 1947-48 winter produced little concern. But, warm temperatures and heavy rains in May 1948 caused snow melt to occur very quickly. Tributaries overflowed their banks, and the biggest flood since 1894 filled the Columbia to overflowing.

In Vanport, the initial reaction was minimal. Routine patrols of the dikes surrounding the city began on May 25. Sandbags were procured, as well as quantities of baled straw, canvas tarpaulins, and dump trucks. Assistance was sought from the U.S. Army Corps of Engineers, who had built the dikes and had extensive flood-control experience. The Engineers informed Kaiser that there was no need for worry.

On Sunday, May 30, Portland residents were enjoying a warm, sunny, Memorial Day weekend. Meanwhile, river levels continued to rise. At Vancouver the level was 28.3 feet, 15 feet above flood stage. Since Vanport was almost exactly at flood-stage elevation, river levels were 15 feet above the Vanport apartments' lower floors. At 4:17 p.m., the railroad fill along the west boundary of the develop devgave way. A seaplane flying over the tracks at that time reported that a sudden six-foot break quickly increased to 60 , then 500 feet wide. Water poured into Vanport. In the next two hours, the entire development was flooded.

The following day, the dike on the east side of Vanport also collapsed. The town was completely destroyed, with damages to government property totaling over $21 million. The number of lives lost was uncertain, but most estimates now place the total at about 25. In addition, so little warning was given that most residents lost nearly all their personal belongings[3] . Cars and trucks choked the single exit road from Vanport. Many cars were abandoned to the rising flood waters, unable to leave because of the congestion. Scores of young children watched, terrified, as their homes were destroyed before their eyes; their parents had repeatedly assured them that nothing would happen, as the officials had said. Those assurances, almost up to the time the flood began, were the reason many residents left their homes with almost none of their belongings.

Later analyses indicated that the railroad fill was poorly built, despite its massive and strong appearance. At one time the railroad ran along a trestle over the lowlands. In about 1918, the fill was made by simple dumping aggregate around the trestle. Over the years, the timbers rotted, weakening the roadbed at those points.

Blame for the disaster was an ongoing and hotly-debated issue. Many lawsuits were filed. Eventually a federal court decision was made regarding damage claims by Vanport residents. In 1951, Judge James Alger Fee agreed with the defense (The U.S. government) that Title 33 of the judicial code applied: the government shall not, he concluded, be held responsible for flood damage. Thus the Vanport residents were able to collect nothing other than their personal insurance payments[3] .

Could the Vanport disaster reoccur? According to the Corps of Engineers, the answer is no. There are now 14 major dams on the Columbia system, and peak river levels are now much more controllable. Nonetheless, the Vanport area was never rebuilt for housing. Currently an auto race track, golf course, and parks cover the flood plain. The viewer can behold "a sense of peace and tranquillity that was never present in Vanport City."

Debris Flow Floods

Debris flow floods occur when ice, mud, logs, or other material creates a temporary dam. Water backing up behind this dam continues to increase in depth and pressure; eventually the dam collapses, and the resulting flow of water can be comparable to a large flash flood.

Debris flow floods are rather rare in Oregon, and usually quite localized. The 1980 Polallie Creek event was by far the biggest and most significant one of its kind in Oregon's recorded history.

Polallie Creek, 1980

Christmas 1980 was not white in northern Oregon, but was one of the mildest ever. Pendleton, Eugene, and Salem all had record-breaking high temperatures, and Portland set its all-time high of 64° for the month of December at this time. Earlier rains had saturated the ground, and when warm heavy rains began on Christmas Day, the headwall near Polallie Creek, on the northeast flank of Mount Hood, began to slump and form a landslide. In almost no time the landslide became a large debris flow, depositing more than 100,000 cubic yards of creek material at the confluence of Polallie Creek and the east fork of the Hood River. The debris formed a dam that blocked the flow of water and resulted in a lake behind it. As water behind the dam deepened, the pressure increased, until the dam collapsed, causing a massive flood wave. The wave destroyed everything in its path, including roads, a bridge, and a campground; it left only boulders, river sand, and pieces of demolished trees. The wave flowed across Highway 35 and forced the closure of 10 miles of highway.

Eastern Oregon, 1985-86

Several weeks of freezing temperatures caused over 40 miles of ice jams on the Snake River between Farewell Bend (northwest of Weiser, Idaho) and Ontario on December 30, 1985, and January 1, 1986. The ice jams forced water outside the normal channels and caused flooding. In one case, the water went around the state information center east of Ontario and moved into a K-Mart parking lot. At least 35 people evacuated their homes.