= Glacier Peak =

Glacier Peak or Dakobed (known in the Sauk Indian dialect of Lushootseed as " Tda @-@ ko @-@ buh @-@ ba " or " Takobia ") is the most isolated of the five major stratovolcanoes (composite volcanoes) of the Cascade Volcanic Arc in the U.S state of Washington . Located in the Glacier Peak Wilderness , the volcano is visible from the west in Seattle , and from the north in the higher areas of eastern suburbs of Vancouver such as Coquitlam and Port Coquitlam . The volcano is the fourth tallest peak in Washington state , and not as much is known about it compared to other volcanoes in the area . Local Native Americans have recognized Glacier Peak and other Washington volcanoes in their histories and stories . When foreign explorers reached the region , they learned basic information about surrounding landforms , but did not initially understand that Glacier Peak was a volcano . Positioned in Snohomish County , the volcano is only 70 miles (110 km) northeast of Seattle . The only volcano closer to Seattle is Mount Rainier , but as Glacier Peak is set farther into the Cascades and almost 4 @,@ 000 feet (1 @,@ 200 m) shorter , it is less noticeable than Mount Rainier .

Glacier Peak is one of the most active of Washington 's volcanoes . The volcano formed during the Pleistocene epoch , about one million years ago , and since the most recent ice age , it has produced some of largest and most explosive eruptions in the state . When continental ice sheets retreated from the region , Glacier Peak began to erupt regularly , erupting explosively five times in the past 3 @,@ 000 years . It has erupted repeatedly during at least six periods ; two of these eruptions have been among the largest in Washington .

= = Geology = =

Remnants of past , prehistoric lava domes are main components of the summit of the volcano , in addition to its false summit , Disappointment Peak . Past pyroclastic flow deposits are easily visible in river valleys near the volcano , likely caused by lava dome collapse , along with ridges found east of the summit consisting of ash cloud remains . On its western flank , the volcano also has a lahar , or mudflow deposit , which runs for about 35 kilometres (22 mi) into the White Chuck River Valley around 14 @,@ 000 years ago . 10 other pyroclastic flow deposits are visible , all identified as relatively 10 @,@ 000 years old . There is also a considerably newer mudflow , about 5 @,@ 500 years old , which covers an area of 15 kilometres (9 @.@ 3 mi) between the same river valley , along with two small incidents both under 3 @,@ 000 years old . Another lahar , of unidentified age , was rich in oxyhornblende dacite ; and continued for 30 kilometres (19 mi) into the Sauk River .

There are also ash cloud deposits on the opposite eastern flank of the volcano . Studies of the mountain have to date been unable to find any correspondence with pyroclastic flows , but several past mudflows have been identified . In the Dusty Creek , located by the mountain , there is a lahar at least 6 kilometres (3 @.@ 7 mi) thick , containing pyroclastic flow deposits and other mudflows . However , this large mudflow is part of a 300 metres (980 ft) thick concentration of past incidents at the volcano that spans the Dusty and Chocolate Creek . In the area at least ten cubic kilometers of lithic debris are contained . Tephra deposits are for the most part constrained to the left flank of the volcano , and at least nine past incidents have been identified . These form several layers of tephra constructing the mountain . Smaller eruptions involving tephra occurred between 6 @,@ 900 @-@ 5 @,@ 500 years ago , 3 @,@ 450 ? 200 years ago , and as recent as 316 ? 90 years ago .

On the mountain , three additional cinder cones , Dishpan Gap , Indian Pass , and White Chuck , are located about 1 @,@ 800 m (5 @,@ 900 ft) up . The volcano has also caused such thermal events such as hot springs . There were three hot springs on the mountain : Gamma , Kennedy , and Sulphur , but Kennedy Hot Springs was destroyed and buried in a slide .

= = = Tectonic setting = = =

The volcano is located in Washington , and is one of the five major stratovolcanoes there . Situated in the Cascade Volcanic Arc , the volcano was created by subduction of the oceanic Juan de Fuca

Plate under the North American Plate . Convergence between the two continues at a rate of 4 centimetres (1 @.@ 6 in) per year . This range has been volcanically active for about 36 million years , and the rocks that make up its volcanoes are between 55 and 42 million years old . Eruptions within the range are irregular and do not occur all at once . In an attempt to organize the volcanoes by age , scientists typically divide them into the High Cascades , younger volcanoes , and the Western Cascades , consisting of the older volcanoes . However , the vents in Washington are all of different ages so none of its volcanoes are included in either of the sections .

= = History = =

Around the area , there were many Native Americans , and along with other Washington volcanoes , the mountain was recognized by them as a spirit . When European @-@ American explorers reached the area , they learned about the mountain , though only partially , through local legends . Although the local people described Glacier Peak as a vital part of their storytelling and beliefs ; when other volcanoes in the area were mapped , Glacier Peak was left out . In 1850 natives mentioned the volcano to naturalist George Gibbs saying that the volcano had once " smoked " . In 1898 the volcano was finally documented on a map .

Native Americans also used the area around the Cascades for their agriculture , leading them to often congregate in the region . As a result , gold miners eventually reached the area in the 1870s @-@ 1890s , searching for resources and rich land . The first white man recorded to observe the mountain ? Daniel Lindsley ? was an employee of the Northern Pacific Railroad Company searching for possible railroad routes when he saw it in 1870 .

= = Eruptive history = =

Despite its elevation of 10 @,@ 541 feet (3 @,@ 213 m) , Glacier Peak is a small stratovolcano . Its relatively high summit is a consequence of its location atop a high ridge , but its volcanic portion extends only 1 @,@ 600 ? 3 @,@ 200 feet (500 ? 1 @,@ 000 m) above the underlying ridge . Another Cascade Arc volcano with similar geomorphology is the Mount Meager massif in southwestern British Columbia , Canada , which is situated on a 1 @,@ 300 ft (400 m) ridge of nonvolcanic , crystalline and metamorphic rock .

Of the five major volcanoes in Washington , only Glacier Peak and Mount St. Helens have had large eruptions in the past 15 @,@ 000 years . Since both volcanoes generate magma of dacitic origin , the viscous magma builds up since it cannot flow through the eruptive vent . Gradually , the pressure grows , culminating in an explosion that ejects materials such as tephra , which in its simplest form , is ash .

Tephrochronology and radiocarbon dating indicate that Glacier Peak eruptions occurred in 1700 AD ± 100 years , 1300 AD ± 300 years , 900 AD ± 50 years , 200 AD ± 50 years , 850 BC , 3150 BC , and in 3550 BC . The Volcanic Explosivity Index (VEI) for three of these was 2 to 4 , small compared to the 5 of the 1980 eruption of Mount St. Helens . They were characterized mainly by a central vent eruption , followed by an explosive eruption . These eruptions varied in outcome ; some produced lahars , some pyroclastic flows , and others lava domes .

A little more than 13 @,@ 000 years ago , a sequence of nine tephra eruptions occurred within a period of less than a few hundred years . Associated with these eruptions were pyroclastic flows . Mixed with snow , ice and water , these formed lahars that raced into three nearby rivers , filling their valleys with deep deposits . Subsequently the mudflows drained into both the North Fork of the Stillaguamish River (at that time an outlet of the Sauk River) and Skagit Rivers . In Arlington , 60 miles (97 km) downstream , lahars deposited seven feet of sediment . Subsequent erosion of lahar deposits near Darrington led to the current river system with the Stillaguamish River separated from the Sauk / Skagit Rivers . Lahar debris was deposited along both the Skagit and Stillaguamish Rivers all the way to Puget Sound . A small portion of the erupted tephra was deposited locally . However , most of the tephra reached higher levels of the atmosphere , and was transported by the wind hundreds of miles . Deposits from this congregation were as thick as 1 foot (0 @.@ 30 m)

near Chelan and 0 @.@ 3 inches (7 @.@ 6 mm) near Missoula , Montana .

Since these events , Glacier Peak has produced several lahars . The largest events were 5 @,@ 900 and 1 @,@ 800 years ago and were associated with dome @-@ building eruptions . In both cases , the lahars traveled down the Skagit River to Puget Sound .

= = = Hazards = = =

When lahars reach populated areas , they can bury structures and people . An example was the Armero tragedy at Nevado del Ruiz where 23 @,@ 000 died from an enormous mudflow . Lahars from Glacier Peak pose a similar threat to the small communities of Darrington and Concrete and a lesser threat to the larger and rapidly growing towns of Mount Vernon and Burlington , as well as other communities along the lower Skagit and Stillaguamish Rivers . A 2005 study conducted by the United States Geological Survey identified nine Cascade volcanoes , including Glacier Peak , as " very @-@ high @-@ threat volcanoes with inadequate monitoring " . At the time of the study , only one seismometer was installed on Glacier Peak that had not " worked in two years " .

= = Glaciers = =

Eleven significant glaciers cover Glacier Peak . When C.E. Rusk first saw these glaciers in 1906 they were beginning to retreat , but were still very advanced . The average retreat of Glacier Peak glaciers from the Little Ice Age to the 1958 positions was 5 @,@ 381 feet (1 @,@ 640 m) . Richard Hubley noted that North Cascade glaciers began to advance in the early 1950s , after 30 years of rapid retreat . The advance was in response to a sharp rise in winter precipitation and a decline in summer temperature beginning in 1944 . Ten of the fifteen glaciers around Glacier Peak advanced , including all of the glaciers directly on the mountain 's slopes . Advances of Glacier Peak glaciers ranged from 50 to 1 @,@ 575 feet (15 to 480 m) and culminated in 1978 . All eleven Glacier Peak glaciers that advanced during the 1950 ? 79 period emplaced identifiable maximum advance terminal moraines . From 1984 to 2005 , the average retreat of eight Glacier Peak glaciers from their recent maximum positions was 1 @,@ 017 feet (310 m) . Milk Lake Glacier , on the north flank of the mountain , melted away altogether in the 1990s .

= = Recreation = =

The Pacific Crest Trail passes near Glacier Peak . The Suiattle River crossing is a well known feature on the Pacific Crest Trail (PCT) as it passes through the area . The Suiattle PCT crossing used to have a bridge crossing until it was flooded out by storms in late 2003 .

The first person to climb the mountain was Thomas Gerdine , along with a group of United States Geological Survey scientists , in 1897 . The volcano is also available to skiers . To reach the mountain itself , it takes 5 miles of walking along the White Chuck River Trail (Forest Service Trail No. 643) and up the Sitkum Glacier . The trail is reached via Forest Service Road No. 23 . Mainly , the slopes consist of black diamonds for both the ascent and descent .