

HISTORICAL RECORD OF RAIN AND ITS IMPACT ON
SKAGIT RIVER FLOODS

SKAGIT COUNTY, WASHINGTON

1896 THROUGH 1969

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PREFACE

This paper is the fourth in a series of papers that will be prepared regarding issues concerning the history of the Skagit River floods and other issues as well. Ninety eight percent of the verbiage contained herein comes directly from historical newspaper articles gleaned from a project that began in July 2004, when Skagit County Public Information Officer, Dan Berentson, contacted me and asked if I would like to help him review all the old articles of the Skagit Argus. I and my son Josef, jumped at the opportunity. We had barely began the project when we all realized that this was an opportunity to preserve the past for use in the present and future generations of our valley and we expanded the project to include not only the Argus, but the Burlington Journal, the Courier Times and the Skagit Valley Herald.

It was originally planned to just concentrate on flood events themselves, however we quickly realized that this was an opportunity to preserve the written record of the history of our valley on many issues. Three hard copy books have been published and are available in local libraries and from the Skagit County Public Works Department containing the hard copy articles mentioned herein. The individual articles are also accessible by clicking on the PDF versions in this paper as well as the following two web sites: www.skagitriverhistory.com and http://www.skagitcounty.net/Common/Asp/Default.asp?d=PublicWorksSalmonRestoration&c=General&p=HistoricIndex.htm#_ftnref1. Neither Dan nor I benefit in any monetary gain for this project.

I would like to take this opportunity to publicly thank Stedem Wood, publisher of the Skagit Valley Herald for his cooperation on this project as well as Tony Flynn of the Argus and Ruth Richardson of the Courier Times. Local newspapers do not just bring us the day to day news. They are the recorders of history in the making and are without a doubt one of the most important elements in our society. Without them the past could so easily be forgotten.

I would also like to thank the members of my immediate family, my wife Linda of 25 years, and my two sons, Josef (my webmaster) and Jeffery (my PDF master). Having your family's support and understanding on any endeavor you set out on is priceless.

Larry Kunzler





Rain and Rain on Snow Impacts Skagit River Floods

From the very beginning of Skagit County's history local settlers realized that rain and rain on snow events, especially when they were accompanied by warm "Chinook winds", would cause flood events on the Skagit River. The purpose of this paper is to look at historical flood events and related newspaper articles to try and determine how much rain causes serious flooding on the Skagit River. Not all flood events will be discussed in this paper as no written record was reviewed as to the rain issue for those events.

November 16, 1896 Flood

The highest water in the Skagit River known to white men occurred last night. On last Thursday a **Chinook wind commenced to blow which was accompanied by a warm rain.** This rapidly cut away the snow which for several weeks had been creeping down the mountain sides. The wind continued over Friday when the river commenced to rise rapidly. By Saturday afternoon the river was booming and many thought it had reached its highest stage. This however, was not the case as it continued to creep upward during yesterday, and until last night. As the water gradually rose on the levees it became apparent that unless strenuous efforts were made to raise them, the town would be flooded. The experience of former occasion¹ was enough to induce all parties to lend a hand, so that when the fire bell rang out the alarm, not for fire but water, an army of men turned out with shovels and commenced to build a dike on top of the levee, commencing at the hill and working clear down through the city. This work saved the town, and but for it, from **ten to eighteen inches of water would have swept over the levees and through the city.** (Source: [11/16/1896 TSN](#))

November 18, 1897 Flood

On Wednesday morning a **very warm Chinook wind commended to blow** which increased in force until evening, when it was almost a gale. This hot wind blowing directly on the snow which had been creeping down the hills for the last few weeks, cut it away with the rapidity of fire, and resulted in a raging torrent rushing down the valley of the Skagit on its way to the sea. The rise did not commence until Wednesday evening², as it usually takes from twelve to fourteen hours for the effects of a Chinook to make their appearance, and the same time to cease. (Source: [11/22/1897 TSN-H](#))

¹ Previously downtown Mt. Vernon went underwater during the 1894 flood event. (See [10/21/1895 The Skagit News](#))

² Downtown Mt. Vernon again went underwater.



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December 20, 1917 Flood

The heavy rains of the past two weeks have caused considerable inconvenience to people living along the Skagit River. It seemed that the high point of the raging Skagit had been reached Sunday morning when the debris dam and the Mount Vernon bridge went out, carrying a portion of the temporary trestles away. Part of the trestle went out on Saturday, thus putting the bridge out of commission and causing those who wished to get to Mount Vernon to go around by the Avon road and come in from the north. . . . The river dropped Sunday and Monday, but **the heavy rains of Monday night brought the river up again. Heavy rains in the hills kept the stream up to a dangerous point and in many places the water covered the low lands. . . . The heavy rains of Tuesday brought raging torrents of water down the old Skagit** and for the first time in nine years the danger line was reached on Wednesday morning when a little over twenty-one feet of water was registered. The dike broke south of town and considerable land was flooded. However, the standstill came about noon and by Thursday morning the water had fallen to the seventeen foot mark.³ (Source: [12/20/17 MVH](#))

December 30, 1917 Flood

The dear old Skagit Valley, the one green spot in the northwest, has been given a drenching which wrought much damage and caused considerable inconvenience to all persons, ranchers and townspeople alike. An almost **unprecedented rainfall and a Chinook wind** starting last Friday in the upper part of the county caused the old timers to open their weather eyes and soon the alarm was given that a “big river” was expected. . . . The first intimation of danger was when advices up river were received to the effect that **the water was higher on Saturday morning than it had been during the flood of 1909** and people began to prepare for a wet season. By midnight it had reached the high point at the hospital and was still rising. . . . The loss in stock also promises to be comparatively light for the reason that the valley is so flat that a sudden rise sufficient to endanger life is almost impossible.⁴ (Source: [1/3/18 MVH](#))

Four weeks of rains and Chinooks finally resulted in a freshet Saturday night that for a time threatened to inundate the entire valley. The warm winds from the south melted the snows, it is said, up to the 6000-foot level⁵ and brought the combined waters of the Upper Skagit, the Sauk, Baker and numerous tributary streams down to the lower valley in greater and more continuous volume than has ever been recorded in the history of the country. (Source: [1/4/18 Argus](#))

³ Previous to this historical research project this flood event had went undocumented in either the USGS or Corps of Engineers records. It shows that the “disastrous” flood of December 30, 1917 was a “double pump event” i.e. two floods back to back.

⁴ This statement, given the tremendous development in South Burlington since 1917, would undoubtedly be false today.

⁵ If this statement is true and the snow level only went up to 6,000 feet it strongly suggest that this flood event was caused more by rain then rain on snow especially since just 10 days before this event there was another flood that would have melted most of the snow.



December 12, 1921 Flood

Skagit valley has been in the grip of a flood for the past week. **Torrential rains and strong southerly winds**, amounting to gales at times, preceded the onrush of waters from the melting snow of the Cascade mountains, that came pouring down the Skagit river in a volume that almost equaled that of the memorable flood of 1909, when the river rose to 26 feet 4 inches, just 1½ inches higher than the present flood measured.

Three days of heavy rains and warm rains beginning their work Friday, melted the snows in the upper Skagit region and as a result, the Skagit River began its rise with startling rapidity, reaching a point Sunday night which caused alarm to be spread over the valley and the residents of the lower lands prepared to move. (Source: [12/15/21 Argus](#))

Mr. Meehan⁶ has his idea of how the water may be controlled. On the map he pointed it out to us. Whether it is feasible, possible or the best thing to do I am not prepared to say – but this I do truly believe: If there is no way to control this condition which prevails **when a warm wind and much rain hits soft snow in the foothills and lower mountain regions**, it will be one of the very few problems the Yankee mind has failed to solve! (Source: [12/15/21 Argus](#))

The Skagit lowland region is passing through another memorable flood period. In consequence of which thousands of dollars of property have been destroyed in the path of the flood. **Six weeks of excessive rains**,⁷ followed last Sunday night till Monday noon by compelling Chinook breezes at the beginning of which the Skagit River was bank full, opened the flood gates in the foothills, and mountains of water poured out to the sea, inundating the greater portion of the valley of the Skagit. (Source: [12/16/21 B.J.](#))

James E. Stewart Report 1923

James E. Stewart, government hydraulic engineer employed about two years ago⁸ by Skagit County to investigate flood conditions along the Skagit valley, has just submitted a report on his findings of the “stage and volume of past floods in Skagit valley and advisable protective measures prior to the construction of permanent flood controlling works. . . . Mr. Stewart gives data showing that rainfall for the two largest floods since data has been kept is much the same. At the Skagit power camp in 1909 for Nov. 28 and 29, the rainfall for the two days was 7.85

⁶ Meehan was the County Engineer. Although his plan is not identified here it is believed that “his plan” would have been the Avon Bypass as by this time he would have been talking to Herzog who worked for the GNRR who published his report in 1922.

⁷ Six weeks of excessive rains would have meant that the Skagit River was probably running a pretty much “bank full” conditions when the 1921 flood event happened which would mean that most of the overbank storage areas would not have been available to lessen the impacts of the flood event.

⁸ Actually Mr. Stewart was hired and worked under the direct supervision of the County Engineer in November 1922.



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inches. At the Davis ranch on Dec. 11 and 12, 1921, the rainfall was 7.62 inches⁹, while the maximum temperature in both cases was about 52 degrees. (Source: [12/20/23 CT](#))

February 12, 1924 Flood

After several days of rain and Chinooks, the river in all parts of the district, went over their banks in many places on Tuesday. A stretch of some 150 feet of the Great Northern near Hamilton was washed out, and the town of Hamilton was cut off from everything but telephone communication Tuesday morning. . . . Big areas of land in the Burlington and Sterling districts were under water Tuesday, and also in the upper valley. All sloughs along the Skagit River are covering the adjacent land, and the river is filled with drifting trees and debris. (Source: [2/14/24 CT](#))

John Finstead, Flood Control Committee Member Writes About Floods

Not considering the disastrous summer freshet in 1894¹⁰ we have had six or seven fast winter freshets during the past 30 years. The highest one of these was the one of November 30, 1909, when **about eight inches of rain fell in two days at upriver points**. This flood measured about 220,000 second feet at Sedro-Woolley¹¹. Competent engineers claim that only about 150,000 second feet can pass through at the Riverside Great Northern bridge.¹² Consequently about 70,000 second feet had to seek an outlet somewhere else. The February flood of this year was not considered dangerous but still it destroyed half a dozen homesteads at the Sauk delta and broke dikes at the Skagit delta to the value of at least \$20,000, besides destroying several bridges at upriver points. (Source: [3/20/24 Argus](#))

⁹ Mr. Stewart's work product is highly questionable and in direct conflict with many of the historical newspaper accounts of flood events in Skagit County. In 1961, several years after Mr. Stewart's passing, USGS published Water Supply Paper 1527. At page 10 of that paper it states that Mr. Stewart recorded 10.21 inches of rain at Reflector Bar (Town of Diablo). That is only about 1.5 miles upriver from the old Davis Ranch which is now underwater behind Gorge Dam. It is highly unlikely that 3 more inches of rain fell during that period only 1.5 miles upstream. During the November 21 through 25, 1990 flood event 6 inches of rain fell at Marblemount, 15.5 inches of rain fell at Reflector Bar, 11 inches of rain fell at Glacier on the Baker River side and 11.3 inches of rain fell at Darrington on the Sauk River. The regulated peaks of 146,000 cfs and 152,000 cfs at Concrete and Mount Vernon respectively would have been 182,000 cfs and 180,000 cfs if left unregulated. One has to ask that if Stewart and USGS computations of the 1921 flood are to be believed, how did we end up with only 180,000 cfs unregulated flow with 15.5 inches of rain at Reflector Bar, and Stewart and USGS end up with 240,000 cfs and 225,000 cfs respectfully with only 10.21 inches of rain falling at Reflector Bar (Davis Ranch 7.6)? (Sources: Flood Summary Report, Nooksack, Skagit and Snohomish River Basins, November 1990 Events, Corps of Engineers, 7/18/91; Stewart/Bodhaine Report, Geological Survey Water-Supply Paper 1527, 1961)

¹⁰ The first time settlers saw downtown Mt. Vernon go underwater.

¹¹ These are Stewart's figures. Eight inches of rain would not produce 220,000 cfs at Sedro-Woolley.

¹² In 1990 157,000 cfs made it through the bridge opening.



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Rains Cause River To Rise 14 Feet In Less Than 24 Hours

Rising rapidly, the Skagit River is fourteen and one-half feet higher today than it was at 9:30 last night. The Skagit began rising last night, due to warm winds of Thursday. Before it started to rise, the river was one-half foot below sea level; the lowest it has been this season. Boats on the river had difficulty in docking. The heavy rains of last night have had no effect thus far. It is not expected that there will be any flood danger. (Source: [10/25/24 MVDH](#))

December 12, 1924 Flood

Continued heavy rains and Chinook winds during the last twenty-four hours have caused the Skagit river to rise rapidly and today the high water conditions have assumed a serious aspect. Since yesterday noon the river here has risen about six feet and observers today claim that the water is rising about three inches an hour. At one o'clock the river was nearing the eighteen-foot mark. . . . Several of the old timers say the conditions are just about right for flood. Crest of the high waters has not been reached, they declare.¹³ (Source: [12/12/24 MVDH](#))

Heavy rains and warm winds caused the Skagit to rise rapidly Friday and Saturday, the stream reaching the 20-foot mark at the old gauge across the river from the Mission theatre. With the sudden drop in temperature however, the stream began to go down. Dry Slough southwest of Mount Vernon was unable to hold the flood and the water soon covered the farming district of Fir Island with from one to two feet of water. Water also backed across the pavement between Mount Vernon and Conway and south of Milltown. Traffic, however, was not interrupted. (Source: [12/18/24 Argus](#))

Flood Feared But Didn't Materialize

Judge Crookston urged that the Puget Sound Power & Light Co. be requested to lower the level of the water in Lake Shannon, behind the Baker River dam, so the lake could absorb the surplus which will come down when the warm weather sets in. He said that conditions now are similar to those in the spring of 1894, when the Skagit Valley was flooded. The difference now, he added is that the forests on the hills which formerly retarded the rush of melted snow have been removed; therefore the danger is more acute. . . . I do not wish to assume the role of a harbinger of disaster," said Mr. Moore today, "but those citizens of the Skagit Valley whose homes and live stock are protected from floods by dikes, should understand that the stage is partly set for a more than ordinary flood. The mountainous district to our east **has as heavy a snowfall as I have seen in 15 years,**¹⁴ with much of it recent or new snow, **which is rapidly melted by a warm rain or Chinook wind,** and as the spring is far advanced we can expect a sudden change. (Source: [5/5/27 Argus](#))

¹³ Flood would have been on December 12th and 13th, 1924. USGS and Corps reported flood carried 92,500 cfs and reached 32.44 feet at Concrete. No figures for Mt. Vernon.

¹⁴ Most snow since 1912? If correct would tend to support theory 1917 and 1921 floods were caused more by rain than snow.



January 12, 1928 Flood

Warm winds and rain Wednesday following several days of warmer weather caused the Skagit river and its tributary streams to overflow in several places east of this city, blocking the road west of Hamilton and undermining the Great Northern track between Lyman and Sedro-Woolley. Other damage all along the river between here and Marblemount was reported, but so far the main river had not flooded any territory. Backwater and high water in the creeks was responsible for most of the damage, together with slides along the road.¹⁵ (Source: [1/12/28 CT](#))

February 27, 1932 Flood

Unable to withstand the pressure of the mighty Skagit, **swelled by rains and melting snow**, dikes broke at three widely different places during the week-end, allowing flood waters to inundate more than 12,000 acres of farm land in the lower valley, resulting in considerable damage to property.¹⁶ . . . sections where the water had previously been held at the very top of the dike, were perilously near a break this time on account of a weakened condition of the dikes, which have been neglected somewhat because of confidence in present dams to hold back floods, it is said. (Source: [3/3/32 Argus](#))

Record Breaking Monthly Rainfall At Sedro-Woolley

Jupiter Pluvis¹⁷ Shatters Record With March Floods Flooded fields and basements **filled with surface water** attested a **record breaking rainfall of 11.15 inches for the month of March** in this vicinity. **Harry L. Devin, official weather observer** here, can find no counterpart of this in the more than 40 years since he first began observing weather conditions in this district. The average for March over a 33-year period is a precipitation of 4.30 inches. The first week of March this year was far under this average, with .33 of an inch. As the month progressed the rainfall became greater, to end with a 42-hour deluge Tuesday and Wednesday, to set a new record.¹⁸ (Source: [3/13/32 CT](#))

¹⁵ USGS 95,500 cfs at Concrete (32.9), no figure given for Mt. Vernon or Sedro-Woolley.

¹⁶ USGS and Corps records state this flood crested 2/27/32 at Concrete at 39.99 on the gage with 147,000 cfs. Greater than the 1951 and 1975 floods but less than the 1980 flood at least at Concrete. Both the 51 and 75 floods produced more water at Mt. Vernon than Concrete. 1980 was less water at Mt. Vernon.

¹⁷ Jupiter Pluvis was the Supreme God in ancient Roman days comparable to Zeus in Greek mythology. The name translated into "Rain Giver".

¹⁸ This article is significant from the standpoint that while Sedro-Woolley in the lower valley registered 11.5 inches of rain most of which apparently fell in a 42 hour period, it was snowing in the mountains.



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November 13, 1932 Flood

Scarcely nine months after one of the most disastrous floods the Skagit Valley has experienced in recent years, rivers and streams of the County, swollen by continual heavy rains, were again on the rampage, breaking dykes and flooding farm lands in several sections¹⁹.

(Source: [11/17/32 Argus](#))

The **heaviest rainfall in the history of Sedro-Woolley**, fell here Wednesday night, according to **H. L. Devin, official government weather man here for 36 years**. Between 6 p.m. Wednesday night and 9 a.m. Thursday morning, there was a total of 2.25 inches of rainfall, which followed 1.83 inches Wednesday up to 6 p.m.²⁰ . . . **Heavy rainfall during the past few days brought the river almost to flood levels**, closed the road between here and Concrete, and caused sloughs to overflow in many places. Many roads were closed Sunday, including the Pacific highway at Silvana, but cooler weather brought the water down. **The river rose eleven feet Sunday**, but at last reports, had gone down five or six feet, in spite of continued rain. According to statistics of **H.L. Devin, local government weatherman**, November is twice as wet as usual. October rainfall was 6.31 inches here as compared to the normal 4.8 inches and the November rainfall up to November 15, was 6.4 inches as compared to the normal of 6.74 inches for the entire month. (Source: [11/17/32 CT](#))

Continued rise of the Skagit River during more than forty-eight hours came to a halt in Mount Vernon today, giving hope that the flood danger that has hovered over this community would soon pass. . . . The river had reached a height of nearly 23 feet on the gauge here this morning, two or three feet from the danger mark. . . . The rise of the Skagit River was the most abrupt in the memory of old timers. Between Saturday afternoon at 2 o'clock, until this morning, the river had risen a total of fifteen feet, according to records kept by the county engineer's office. The rise was caused by a deluge of rain and melting snows in the Cascades. **An inch and a fourth of rain fell between Saturday morning and this morning**,²¹ the county records showed. (Source: [11/18/32 MVDH](#))

The most rain to fall in twelve hours in the history of Sedro-Woolley fell here Wednesday night and Thursday morning totaling 2.25 inches, according to H.L. Devin, official government weatherman for the past 36 years. The entire precipitation for the 24 hours was not extraordinary, however. (Source: [11/19/32 MVDH](#))

Logging Blamed For Increased Flooding

Cities Are Menaced As we have been building our dikes, the timber has been logged from our hills. They are now bare. **They no longer hold back the rainfall and melting snow**. This water comes into the rivers more rapidly than before. (Source: [11/20/35 MVDH](#))

¹⁹ USGS 116,000 cfs Concrete, 125,000 cfs Sedro-Woolley. Close to a 1975 event.

²⁰ The flood crested on November 13, 1932 which was a Sunday. The Wednesday and Thursday referenced in this article would have been November 9th and 10th.

²¹ It is believed that this article has been mis-dated in the index based on the verbiage contained therein. It should have been dated November 14th. The article would have been written on a Sunday and published on Monday.



What Causes A Bad Skagit Flood?

In a recent article in the Seattle Star, James A. Stewart, hydraulic expert with the government, who worked for Skagit County after the big flood in 1932²², states that **ten inches of precipitation in 34 hours on the Skagit** would cause a major catastrophe.²³ **The 1932 flood had 11 inches of rainfall but was spread over four days.** Experts say this section is due for another major flood catastrophe like the flood of 1815, and that it should come within a century, which makes it 21 years overdue. The Star article says: “Today a condition known as a ‘trough’ exists on the Skagit—a section of the country which is as much be-dyked as Holland ever thought of being. The trough, say City Light engineers, has resulted from a three-month deficiency in precipitation with a corresponding level in water run-off for the period. “The condition is such that should an extremely heavy precipitation come, a flood would be almost inevitable. And if a flood should come, Stewart’s report indicates that the communities of Hamilton, Lyman and Burlington would have to be vacated and the lower parts of Concrete, Sedro-Woolley and Mt. Vernon likewise. “Now that we have the flood all figured out, all we have to do is discover **what the possibilities are of getting 10 inches of rainfall in 34 hours.** “How can I tell? How can anybody tell?” demands Lawrence P. Fisher, head of Seattle’s U.S. weather bureau. ‘Experts are continually studying weather conditions and causes, but to say exactly what will happen in the future, is going a bit too far.’” Harry Devin, Sedro-Woolley official government weather observer for some 40 years, had the following comments to make on the prospects for the weather said to be necessary for this disastrous flood: “As **ten inches of rainfall is nearly double the average per month for the wet months at Sedro-Woolley** for the last 40 years, the probability of having that amount in 34 hours, instead of two months, seems rather remote; unless our climate is to become tropical. . . . **There never has been a major flood in the Skagit river caused by rain.**²⁴ It has always required heavy snowfall in the mountains and a hot wind to melt it. Skagit Jim asked the preacher who delivered a sermon on the flood, “All rain? No Chinook?” The preacher replied, ‘Yes, it does not say there was any Chinook.’ ‘Heap lie,’ said Jim, and walked off. “Some data as to the floods of 1615 and 1715 would also be of interest in relation to the hundred-year flood cycles.” (Source: [1/30/36 CT](#))

“I suppose we could work out by the theory of probabilities just how often such a big flood might occur. It may be once every hundred years, or every four hundred,” said Mr. Smith,²⁵ but the only condition necessary is to get **ten inches of rain over the watershed in a period of 34 hours** with the temperature above 50 degrees. **In 1932 we had 11½ inches of rain but it was spread over a period of 72 hours.** In 1932 conditions were all in order for a flood in the proportions of that if 1815, but the rain broke one day early.” If such a flood should occur, all

²² Actually Mt. Stewart worked for Skagit County after the bad flood of 1921. Began work in November 1922 and completed his work in March 1923 and issued his report in October 1923.

²³ “10 inches of rain in 34 hours would cause major catastrophe.” In 1990 15.5 inches of rain fell at Reflector Bar (Diablo) in 4 days. In 1921 10.2 inches fell at Reflector Bar with 7.5 inches falling in 48 hours.. (Sources: Flood Summary Report, Nooksack, Skagit and Snohomish River Basins, November 1990 Events, Corps of Engineers, 7/18/91; (Stewart/Bodhaine Report, Geological Survey Water-Supply Paper 1527, 1961)

²⁴ It has now been proven that several floods on the Skagit have been caused by just rain. Most recent October 2003.

²⁵ Speaker was Glen Smith engineer with Seattle City Light. Confirms that City Light had copy of Stewart Report.



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of Sedro-Woolley, Burlington, Hamilton and La Conner would be under water, and most of Mount Vernon. **Every farmhouse on the Skagit flats would stand in 7 to 15 feet of water**, explained Mr. Smith. In the report of the survey made in 1923, Mr. Smith further commented, Mr. Stewart recommended that should the Skagit valley area every get six inches of rain or more in one day, the whole valley would be abandoned without attempting to take any possessions along. **He also recommended that dikes twelve feet high be built around the entire city of Burlington.** In his second point, Mr. Smith showed by a series of charts how the City Light project on the Skagit river has materially lessened the danger from floods by its huge reservoir at Diablo. The Baker river reservoir at Concrete also is instrumental in lessening flood danger. The city of Seattle has spent \$25,000,000 on the Skagit power project, and receives 85 per cent of its current therefrom. Thus, the city of Seattle is deeply interested in flood control work in the Skagit valley. (Source: [5/20/37 MVDH](#))

River Lowest In 47 Years

This section is having the driest season it has known for many years. H.L. Devin, official weather statistician, says that the Skagit River is the lowest he has ever seen it in the month of November for the past 47 years. The water as low now as it ordinarily is most Februarys, when everything is frozen in the mountains. **The water in the Baker River dam at Concrete, which generates electricity for Sedro-Woolley, is 75 feet low**, and for the last six weeks it has been necessary for Sedro-Woolley to get power from the Shuffleton plant on Lake Washington. . . . There has been only **one-fifth as much rainfall as usual for this month.** Precipitation from November 1 to 24, inclusive, has been 1.34 inches, while the **normal precipitation for this period is 6.74 inches. October also was a dry month. The rainfall was 1.06 inches as compared to the normal of 4.80 inches. For the past month and three-quarters there has been only 2.4 inches of rainfall, while the normal for the same period would be 10.2 inches.** (Source: [11/26/36 CT](#))

Flood Possibilities Worst On Record

Flood possibilities in the Skagit Valley last winter were the worst on record, it was learned by the Skagit county delegates attending the Puget Sound flood control meeting in Chehalis last Saturday, October 9. **The snows were the deepest on record, the rains had saturated the lowlands and the upstream dams were full.** The only thing that saved the valley was the fact that the temperature remained very low throughout the winter and stayed low for most of the summer. Such a threat, little known by the average citizen, lead the flood control council to recommend that Skagit county immediately take steps to set up a flood warning system. (Source: [10/14/43 CT](#))

Hanson Creek And Samish River Flooding

Torrential rains last week near the headwaters of Hanson creek swelled the stream to unprecedented flood stage and swept the log jam downstream, from where it had been lodged for



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several years in the ravine. The logs were the accumulation of abandoned cuttings from a logging operation in the nearby hills several years ago and residents of that vicinity estimated that there were perhaps a thousand logs packed in the ravine, many of them of great size. Mr. and Mrs. G. H. Gaston, who reside about two miles below the dam, and near Hanson creek, narrowly escaped death when the huge mass of logs crashed through their premises riding a six-foot wall of swirling water. . . . The Samish River was at its highest peak in history last week and flood waters covered hundreds of acres of farm land, but without causing material damage. (Source: [1/11/45 CT](#))

11 Inches Of Rain At Diablo

Extraordinary rainfall – a total of approximately **11 inches** – was recorded by the weather station at Diablo for the **week ending October 27**. Heaviest rainfall was recorded on **October 24, with 6.49 inches of precipitation**, and **October 25, with 2.21 inches**.²⁶ . . . Residents of Marblemount, Newhalem, Diablo and Ross Dam were marooned for three days, while every available City Light man worked to get traffic lines open. . . . the **water in back of Ross Dam was raised 18.5 feet**, to the maximum possible with the present construction. This impounded 25,660 acre feet of water and took the peak off the flood which descended on the Skagit valley from the drainage area below the dam. Enough flood water was stopped by Ross Dam to cover 25,000 acres of land more than a foot deep, had it not been held back, said City Light officials. Completion of the second step of the dam, now under construction, will create an even more effective flood control, company officials pointed out. (Source: [11/2/45 MVDH](#))

October 19, 1947 Flood

The swirling waters of the Skagit River, after having reached a flood crest of 21.6 feet²⁷ here at 6 p.m. last night, are rapidly receding today, apparently eliminating for the time being at least, the threat of major flood in this area. . . . **Families Marooned** Several families in the Day Creek area today are marooned as the Gilligan Creek bridge washed out completely Saturday and the Lyman ferry, that provided the only other outlet for some 50 families, sunk after having been covered with debris from the rushing river. . . . All of the ferries crossing the Skagit River were grounded today and will not be operated during the high water period. School children residing on the south side of the river in the Day Creek, Lyman and Concrete districts are unable to attend school today. . . . **Trucks Overturn . . . A total of 1.29 inches of rainfall fell in this area over the weekend**, according to reports maintained at the county engineer's office. (Source: [10/20/47 MVDH](#))

A bridge was washed out, two trucks were wrecked by rushing flood waters, traffic was interrupted, rivers were swelled to flood levels and sewers backed up in the Sedro-Woolley area,

²⁶ 8.7 inches of rain in less than 48 hours. This amount of rain caused the October 26, 1945 flood. USGS 102,000 cfs Concrete (34.0), 94,300 cfs Mt. Vernon (30.25) Comparable to 1982 flood at Concrete and second flood of 1989 at Mt. Vernon.

²⁷ USGS 95,200 cfs Concrete (32.9), 69,400 cfs Mt. Vernon (28.68). Comparable to first October flood in 2003.



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as the skies opened up and dumped more than **two inches of rainfall in 48 hours** last weekend to bring the month's rainfall to 5.97 inches. This is an inch above the average for the entire month of October. . . . By Saturday night water was rushing across the Lyman road as Wiseman Creek emptied gravel in two high banks across the highway to hamper traffic and stall may a motorist. Flood waters reached a peak of 21.6 feet about 6:00 p.m. Sunday and began receding after that. Rising waters also chopped away more land from farm property near the Burlington bend. During the last rainstorm two weeks ago, the Austin Lytle place lost 11 feet of land in two days (*Source: [10/23/47 CT](#)*)

November 28, 1949 Flood

Ranked the worst since 1921²⁸ this week's flood caused an estimated \$2 million loss of property, land, homes, household goods, clothing and food, the highest loss of any flood in Skagit county history. Sedro-Woolley residents assert that the floods of 1932, 1921, 1909 and 1897 were worse for this city, but for upriver residents, this week ranked with the 1909 and 1921 disasters. This weeks flood followed a **heavy downpour of rain last weekend and a warm Chinook wind which melted snow in the hills** and brought down a deluge into the mainstream of the Skagit river. The 1909 flood started after rains and a Chinook wind on Sunday and Monday, November 28 and 29, 1909 according to a copy of the Herald-Recorder, Skagit County's official newspaper of that day, which was printed at Hamilton. (*Source: [12/1/49 CT](#)*)

Seattle City Light's Ross Dam in the upper Skagit played a large part in keeping the serious flow from begin even worse, E. R. Hoffman, Lighting Superintendent, reports. The valves in the big dam were closed Wednesday, Nov. 23, and no water from the entire upper river was allowed to pass. From Thursday midnight until Sunday midnight enough water was held behind the dam to cover 116,000 acres of land to a depth of one foot. At the crest of the flood approximately 42,600 cubic feet of water were impounded every second. Elevation of Ross Lake, nearly 20 miles long, came up ten feet, and is now forty feet higher than anticipated for this time of year. **On November 28 there was still enough storage space to impound another 200,000 acre feet of water behind Ross Dam.** The valves were still closed and **no water was getting past the dam.** . . . The flood crest at Concrete, a large town below Ross Dam crested at 149,000 cubic feet per second on Sunday, Nov. 27. This would have been disastrously worse except for the water held behind Ross Dam. The flood was caused by **heavy rains and unseasonable warm temperatures that melted snow** already in the mountains. From **Tuesday through Sunday approximately 11 inches of rain fell on the upper Skagit.** About **4 inches of rain fell in 24 hours** on Saturday and one and one-half inches on Sunday. Maximum temperatures were from 45 to 58 degrees, melting an undetermined amount of snow. (*Source: [12/1/49 CT](#)*)

“This flood was caused chiefly by sudden and heavy rainfall, augmented by quick melting of new snow on the mountain slopes. During the three days previous to the flood moderate rains fell and to this was added a popularly reported **four inch precipitation during a 24 hour period** on November 27 and 28. . . . The peak flow of the Skagit River, according to

²⁸ USGS 154,000 cfs Concrete (40.8), 149,000 cfs Sedro Woolley, 114,000 cfs (34.2) Mt. Vernon. At Concrete the flood was larger then the 1990 floods but a foot lower then the October 2003 flood which reached 41.5



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the gauge at Mt. Vernon was 132,000 cfs.²⁹ This is the highest flood since 1921. The cause of much of this flood damage is simply that the water rose to a greater height than the farmers had prepared dikes for, and that too many of the dikes were not of sufficient cross section to withstand a flood that remained high on them for any considerable time. **This was a quick flood.** Probably there would have been much greater break-through if the river had remained high over an extended period. . . . Dikes should be raised and greatly strengthened to prevent a recurrence of flooding that might very easily be disastrous under conditions less fortunate than existed this time. (Source: [12/15/49 CT](#))

February 11, 1951 Flood

At 1 p.m. the river was at the 25.1 level in Mt. Vernon, 1.4 feet above the 1949 crest. A shortage of sacks and workers in some districts hampered the job, but dike strengthening was going ahead at a rapid pace. . . . The county engineer's office predicted a 28.5 foot level in Mt. Vernon by 9 p.m. almost two feet above the a November 1949 crest . . . The river was up to 38.85 at Concrete this morning and continuing to rise. **Rain was still falling upriver** at noon, but a cool wave was reported coming in from the north, which might check the river rise later. (Source: [2/10/51 MVDH](#))

Bailing out after a record high water, Skagit County was finding late this week that its losses were not as great as the first frantic press and radio reports indicated. . . . Hamilton residents were swamping out their homes and stores today in the first-flooded community but in the second, Conway, it was to be a matter of days before there could be hope of relief from overflow waters. The flood-breeding **combination of a Chinook wind and heavy, warm rains** last Thursday night set the Skagit River off on its 1951 rampage. By Sunday morning it had risen to what the county engineers office said was an all-time high of 28.2 feet in Mt. Vernon, as against the previous, November 1949, record of 26.05.³⁰ (Source: [2/15/51 Argus](#))

October 26, 1955 Flood

Considerable loss of crops, some damage to property but no loss of lives and questionable loss of live stock seems to sum up the high water and flood situation this morning. **Break At Lundeen's**—A break in the dike on Freshwater slough near the Lundeen farm southwest of the Fir-Conway bridge plunged about 2,000 acres of farm land under water Wednesday afternoon. . . . Local river reading reached 23.7 and top reading at Concrete was 35.17. The crest was reached at 7 a.m. Wednesday and held fairly steady for several hours. . . . Rains caused the rapid rise. It was reported that a **4.36 inch rain fell within 24 hours at Diablo.**³¹ (Source: [10/27/55 Argus](#))

²⁹ USGS says only 114,000 cfs at Mt. Vernon. Rain on snow event.

³⁰ USGS published figures for this flood are 139,000 cfs at Concrete and 144,000 cfs at Mt. Vernon 36.85 feet.

³¹ No reading was provided by USGS for this flood event at Concrete but article says 35.17 observed which would be about 115,000 cfs. Mt. Vernon is reported by USGS to have been 30.69 or 84,900 cfs.



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November 4, 1955 Flood

In the 24 hour period ending at 8 a.m. the weather bureau reported that **4.03 inches of rain fell at Diablo Dam. 3.68 inches at Darrington, and 3.85 inches at Marblemount.** The Northwestern Washington Experiment Station reported that yesterday's rainfall of 1.71 inches in the Skagit Valley was the highest amount in a 24-hour period since records were started in July, 1949. The freezing level was at 9,000 feet this morning. "The dike at Mount Vernon withstood 28.2 feet in 1951, but it was right up to the top and lapping over"³². (Source: [11/3/55 MVDH](#))

Logging Again Blamed For Floods

Since the first white men settled in the Skagit Valley there has hardly been a more irritating or time-consuming problem than flood control. The river, aptly named Skagit³³ by the Indians, goes on a rampage now and then and in so doing often provides materials that practically choke the stream, thereby setting up the stage for further floods. . . . We are indeed fortunate to have on that Control Council men who understand the situation—men like Earl Hanson, Lowell Hughes, Nobel Lee, Leo Beckley, Jim Dunlap, Dan Sundquist and Charles Christenson. County Engineer HO Walberg will be adviser to the Council. . . . **We no longer have the great forests that sop up rain waters and let them seep out slowly.** We still have a great expanse of rainshed, regardless of the fact that dams do some good in holding back excessive water. (Source: [12/29/55 Argus](#))

November 24, 1959 Flood

Rains, which fell almost continuously this weekend, sent creeks and other small streams over their banks and posed a possible flood threat along the Skagit River if there are any dike breaks or deluges of rain. The Skagit County Engineer's office expected the rain-swollen debris-laden Skagit to reach a crest of 24 feet at Mount Vernon about 7 or 8 p.m. tonight³⁴. (Source: [11/23/59 SVH](#))

January 16, 1961 Flood

At 1 p.m., when flood readings began, the river stood in Concrete at 26.85 feet. At 6:30 p.m., the Concrete reading was 28.09 feet. Then at 7 o'clock last night, three gates at Baker Dam, normally closed from Friday evening through Sunday evening, were opened. Engineers at the dam immediately forecast a normal river rise of half a foot. Then half a foot and additional water created by **downpours of rain in the upper Valley** served to increase the river's level to 29.27 feet by 8:30 last night. Early this morning, at 12:30 a.m., the Skagit County Sheriff's

³² USGS 106,000 cfs, 34.48 Concrete; 113,000 cfs Sedro Woolley; 107,000 cfs, 33.52 Mt. Vernon

³³ (Wildcat in Indian language) (Source: [11/17/55 Argus](#))

³⁴ USGS 89,300 cfs, 32.17 Concrete; 91,600 cfs, 31.58 Mt. Vernon



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office reported the Skagit at Concrete had hit 30.08 feet – less than three feet below its predicted 6 a.m. crest of 33 feet.³⁵

Ross Lake Lowered For Spring Rains

Ross dam spillways on upper Skagit river were dry Sunday, holding back water to level off late spring runoff for lower valley, when group of newspaper folk toured Seattle City Light's project. Joe DeLeon, City Light public relations director, above, told Mrs. Stephen Mergler of The Argus, and others, that **water level behind this dam was about 40 feet below overflow point**, to provide storage in case of heavy warm rains that could bring flood threat. Excess water was being spilled from lower Diablo and Gorge dams as necessary to maintain the emergency storage in Ross Lake, which extends north of Canadian border. (Source: [6/11/64 Argus](#))

Personal Opinion

When I began this paper I stated that its purpose was to look at historical flood events and related newspaper articles to try and determine how much rain causes serious flooding on the Skagit River. It is clear from reading the articles cited herein that both rain and rain on snow events coupled with warm Chinook winds will most certainly cause floods on the Skagit. It is just as clear that the severity of those events are directly attributable to the duration and/or amount of rainfall in a given period of time as well as how closely one flood event follows another.

Back to back or "double-pump" flood events seem to produce the largest floods simply because the overbank storage that was available in the first event is not available to the second event causing more water to flow downstream. This was clearly the case in 1917. (Sources: [12/20/17 MVH](#); [1/3/18 MVH](#); [1/4/18 Argus](#))

It can also rain from 4 to 6 weeks keeping the Skagit at bankful conditions until a severe rainstorm will come inland and cause the Skagit to experience a severe flood event. (Sources: [12/15/21 Argus](#); [12/16/21 B.J.](#))

It is no secret of my personal disdain and distrust for the work of James E. Stewart in 1923 or USGS, Corps of Engineers or FEMA's reliance on his work product today. Nothing revealed in this research paper has moved me to change those feelings. Mr. Stewart stated that rainfall for the two largest floods since data has been kept is much the same. At the Skagit power camp in 1909 for Nov. 28 and 29, the rainfall for the two days was 7.85 inches. At the Davis ranch on Dec. 11 and 12, 1921, the rainfall was 7.62 inches, while the maximum temperature in both cases was about 52 degrees. (Source: [12/20/23 CT](#))

³⁵ USGS 30.61, 79,000 cfs Concrete, 29.40, 76,000 cfs Mt. Vernon



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Mr. Stewart's work product is highly questionable and in direct conflict with many of the historical newspaper accounts of flood events in Skagit County. In 1961, several years after Mr. Stewart's passing, USGS published Water Supply Paper 1527. At page 10 of that paper it states that Mr. Stewart recorded 10.21 inches of rain at Reflector Bar (Town of Diablo) in 1921. That is only about 1.5 miles upriver from the old Davis Ranch which is now underwater behind Gorge Dam. It is highly unlikely that 3 more inches of rain fell during that period only 1.5 miles upstream. During the November 21 through 25, 1990 flood event 6 inches of rain fell at Marblemount, 15.5 inches of rain fell at Reflector Bar, 11 inches of rain fell at Glacier on the Baker River side and 11.3 inches of rain fell at Darrington on the Sauk River. The regulated peaks of 146,000 cfs and 152,000 cfs at Concrete and Mount Vernon respectively would have been 182,000 cfs and 180,000 cfs if left unregulated. One has to ask that if Stewart and USGS computations of the 1921 flood are to be believed, how did we end up with only 180,000 cfs unregulated flow with 15.5 inches of rain at Reflector Bar, and Stewart and USGS end up with 240,000 cfs and 225,000 cfs respectfully with only 10.21 inches of rain falling at Reflector Bar? (Sources: Flood Summary Report, Nooksack, Skagit and Snohomish River Basins, November 1990 Events, Corps of Engineers, 7/18/91; (Stewart/Bodhaine Report, Geological Survey Water-Supply Paper 1527, 1961)

Further there are the articles which contradict Stewart's accounts of the 1909 flood being larger then the 1917 and 1921 flood events upriver. (Sources: [1/3/18 MVH](#), [12/22/21 CT](#))

Further still consider the October 2003 flood events. Depending on who you want to believe all of the reports cast further dispersions on Stewart's conclusions concerning the cfs in the 1909 and 1921 flood events.

Seattle City Light reported that more than 7 inches of rain fell at the Town of Diablo (Stewart's Reflector Bar) on October 16, 2003. (Source: *Seattle City Light, The Light Report, November 2003, Vol. 7 No. 11,*) That flood event produced a river level at Concrete of 33.4 feet or 94,200 cfs. The National Park Service reported 10 inches of rain in a 48 hour period of time for the same flood event. (Source: *National Park Service, Morning Report, October 22, 2003*)

The Skagit Fisheries Enhancement Group reported over 12 inches of rain in a 24 hour period of time for the October events (there were two floods back to back). Unfortunately the organization failed to state what 24 hour period of time or their source of information to back up the statement. (Source: *Skagit Fisheries Enhancement Group, Annual Report 2003-2004*)

The week of October 16 through 21 is on record as one of the wettest weeks ever in Western Washington history. Monday, October 20 alone shattered nearly every record. The Diablo Dam, just off State Route 20, received 16.25 inches of rain in five days. (Source: <http://www.wsdot.wa.gov/northcascades/flooding/default.htm>)



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Perhaps the most credible source of information concerning both the October 2003 flood events comes from NOAA's October Flood Report:

Site NWS ID	Site Name	River Basin	Event 1	Event 2	Both Events
			Oct 15-18 Precip (in)	Oct 19-23 Precip (in)	Oct 15-23 Precip (in)
MARW1	Marblemount RS	Skagit	5.2	6.7	11.9
DARW1	Darrington	Skagit/Stillaguamish	7.5	7.6	15.1
RAIW1	Rainy Pass SNOTEL	Skagit/Methow	3.1	4.1	7.2
THBW1	Thunder Basin SNOTEL	Skagit/Lake Chelan	6.5	9.3	15.7
PCRW1	Park Creek Ridge	Skagit/Lake Chelan	3.7	4.8	8.5

Table 2. Storm Total Precipitation for Sites across Northern Washington.

In the Skagit River Basin, record floods were recorded at several sites during the October 21st event. Ross Reservoir inflow peaked at 53,000 cfs, which was the largest inflow recorded since the dam was constructed in 1956. The Sauk River near Sauk also recorded the largest flow in its 73 year record and it was computed to have a 100 year return period. At Concrete, the Skagit River peaked at 42.2 feet or 14.2 feet above flood stage, which was the largest event in its 77 year record.

Effects of Reservoir Storage and Routing on the Lower Skagit

Dry conditions prior to the event caused reservoir levels to be lower than normal. Although the reservoirs in the Skagit Basin have limited flood storage capacity, the additional capacity increased the ability to reduce downstream discharge. A comparison of regulated stream flow measured at Concrete with simulated unregulated flow shows the degree that river stage was affected by reservoir regulation of runoff. **The simulation indicates that the Skagit River at Concrete would have peak around 46.0 feet if there were no dams within the basin.** The highest observed stage at Concrete was 42.2 feet.

Routing of flood flows through the 38 mile reach from Concrete to Mount Vernon dramatically attenuated the peak. The peak discharge decreased from 164,000 cfs to 129,000 between those two points. The 21% decrease in discharge appears to primarily result from temporary runoff storage in the channel and on the flood plain (see Figure 14). The figure depicts the change in runoff volume between Concrete and Mount Vernon. Values below zero indicate runoff going into storage and positive numbers show runoff coming out of storage. Runoff went into storage during the rising limb of the hydrograph at a faster rate than it exited from storage after the flow peaked. The flood event on October 21st also had relatively low volume, so a larger percentage of the peak discharge was lost to storage. Another factor to consider was the total event runoff volume passing



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Mount Vernon was only 1.7% greater than the volume measured at Concrete, though the drainage area increased by about 10%. It was not known if the low increase in volume was due to high transmission losses within the reach or to limited local area flow contributions.

(Source: Washington State October 2003 Flood Report, Prepared by Rick van der Zweep, NOAA, NWRFC, http://www.nwrfc.noaa.gov/floods/oct_2003/wa_oct2003_flood.html)

Finally after reading the above and comparing what was presented to the statement attributed to Stewart that “10 inches of rain in 34 hours would cause a flood like that of 1815 (estimated by Stewart to carry 500,000 cfs and reach a gage height of 69.3 feet) one can truly see the ridiculousness of Mr. Stewart’s analysis. *(Sources: [1/30/36 CT](#); [5/20/37 MVDH](#))* However, even if you are a die-in-the-wool Stewart fan, and accept everything he did as the gospel, at a minimum, if you accept the data presented by NOAA, then the second October 2003 flood event was a reincarnation and greater than the 1917 flood event assuming there were no dams. (1917 estimated by Stewart as 45.7 feet and 220,000 cfs. at Concrete.)

So, how much rain does it take to cause a Skagit River flood? The short answer to that question is “it depends”. Based on the information contained in this paper, anytime you have 10 or more inches of rain above Concrete, in a 4 day or less period or 8 inches of rain in a 48 hour period of time or 4 inches of rain in 24 hours, your chances of having a flood event are more likely than not, especially if any of those periods of time have been preceded by weeks of light rainfall or flooding events no matter how small within the previous ten days to 14 days. *(Sources: [1/30/36 CT](#); [5/20/37 MVDH](#); [11/2/45 MVDH](#); [12/1/49 CT](#); [12/15/49 CT](#); [2/15/51 Argus](#); [10/27/55 Argus](#); [11/3/55 MVDH](#))*

The one thing that is certain in Skagit Valley is that the severity of the flooding events is entirely influenced by the acts of man and not by Mother Nature alone. The operation of the dams and the placement of and the maintenance of the levee system in the lower valley are entirely determinative of who gets water in their homes and who does not.

The historical process is determined not by the gods, but by man-made natural causes. *(THUCIDIDES, 460 - c.400 BC, Greek Historian)*