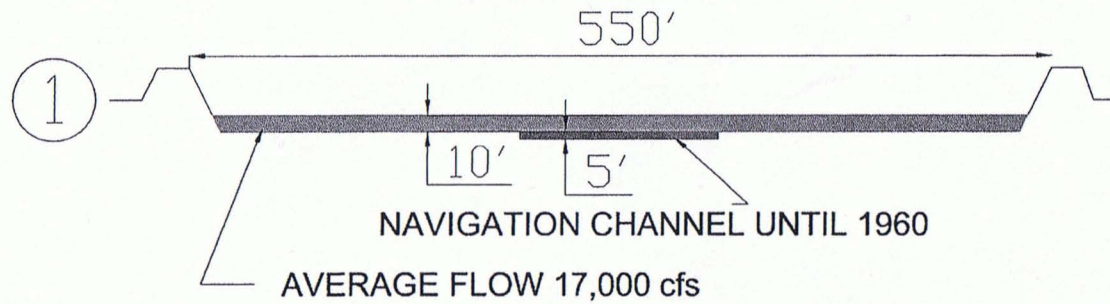
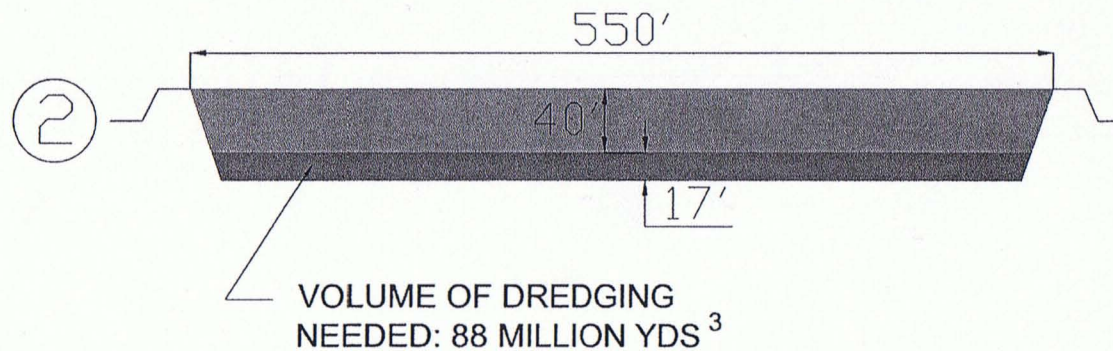


DREDGING FOR NAVIGATION
TOTAL OF 1.5 MILLION YDS³ DREDGED, 1920-1960



DREDGING FOR FLOOD



1. CURRENT RIVER WITH LOW FLOW AND DREDGED NAVIGATION CHANNEL

2. CHANNEL DREDGED BY 17' TO INCREASE CAPACITY TO 220,000 CFS

DREDGING

As of February 9, 1996, the Skagit River has reached flood stage 64 times since 1900, for an average of once every 1.5 years. Due to the increased interest surrounding dredging for flood control, Skagit County Surface Water Management recently compiled some general information regarding this subject. Attached you will find this compilation for your reading pleasure.

Frequently asked Questions/Statements

Question:

The Army Corps of Engineers used to dredge the river for flood control, why don't they do it now?

Answer:

The Army Corps of Engineers previously operated a boat called the "Preston" that was used to remove snags and/or suction dredge the river. The purpose of this work was to provide a deeper channel for navigation (commercial vessels, log rafts, etc.). The dredging that was accomplished simply "side-casted" the material from the middle of the river to the river's edge. Therefore, there was very little flood control benefit received.

Statement:

If they dredge the Skagit River now, they will eliminate the flooding problem.

Comment:

The Corps of Engineers removed snags and dredged the Skagit River from 1920 to 1960. During this time, the Skagit River flooded at least twelve times. Three of these floods (1921, 1932, and 1951) equalled or exceeded the flooding of 1990.

However, dredging has been studied as an alternative for flood control (see the attached Army Corps article). However, due to its short-term benefit and its potential for environmental impacts it has been less attractive as an alternative. One main difficulty is the ongoing maintenance cost necessary to provide adequate flood protection. The initial construction cost of dredging for flood control on the Skagit is relatively similar to other alternatives. This initial cost (approximately \$75 million to dredge from Skagit Bay to Sedro-Woolley) would be cost-shared 50/50 with the Army Corps of Engineers. However, it would

be the responsibility of the local sponsor (Skagit County) to maintain the dredging project. Preliminary estimates indicate that on an average of every 3-5 years a dredging maintenance project would have to occur at an estimated cost of \$4 million. These costs would be the County's responsibility.

Question:

Is the Skagit River filling in?

Answer:

Following the November 1990 floods, Skagit County Surface Water Management re-surveyed nearly 20 river cross-sections on the Skagit River and compared these to a 1960 survey of the same locations. This comparison showed very little change in cross-sectional areas, however, there were some changes in the deposition loading, i.e., new sandbars were created or new areas of erosion occurred. Surface Water Management will continue to monitor this in the future.

Expert Opinions

University of Washington geologist Brian Collins uses cups to convey his skepticism about the practice. "It may create a little more space in the channel, but in most cases, it's like the difference between an 8-ounce cup and a 9-ounce cup," says Collins, who has studied gravel mining extensively. "Try pouring 10 gallons of water into either one -- the equivalent of a flood -- and you still wind up with a big puddle on the kitchen floor."¹

"In almost every instance, we've concluded that it's not a good solution to the flood problem," said Larry Merkle, Seattle-based chief of hydrology for the U.S. Army Corps of Engineers, the nation's flood-control specialists.²

The Effect on Flooding

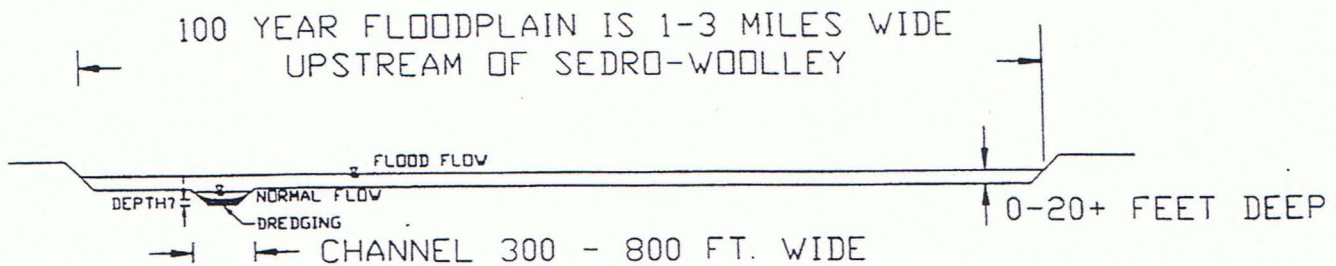
No one disputes that digging out gravel leaves more room in the river bed.

But is it enough to make any difference in a flood? And how long does it take the river to refill the hole with sand and rocks, erasing any flood-control benefit?

In many cases, the answer to the first question is no, said Collins of UW. He said each river system is unique, but in general, it's hard to dig out enough gravel to significantly boost the river's overall capacity.

Like 10 gallons of water in a small cup, a big flood quickly obliterates the narrow margin of space opened up by gravel mining, Collins explained.

Derek Booth, a geologist and director of the University of Washington's water resources management center, studied the Snoqualmie River a few years ago and found that gaps left by river mining were filled within a few hours during floods. That's the main reason King County conducts very little gravel mining for flood control, officials say. In most places, it's not cost-effective.³



Channel Dredging

Many individuals have suggested that flood reduction could be accomplished by channel dredging. Investigations of dredging were conducted during a 1979 Army Corps study to a sufficient level of detail to determine that the desired levels of flood protection could not be provided by dredging alone, and that a combination of dredging and levee construction to provide desired protection would be significantly more costly than levee construction alone. Studies showed that after initial dredging, approximately every 3 years one-half of the initial volume would again have to be removed to maintain the channel capacity. This dredged material could be disposed of in open water, on wetlands around Fir Island, on farmland, or on uplands, with the least costly location being on farmland. Any significant dredging of the Skagit River downstream of Sedro-Woolley would cause severe adverse environmental impacts. Long-term impacts would include loss of the shallow, vegetated shore zone habitat which provides a critical rearing area for juvenile anadromous fish (salmon, steelhead) during their out-migration to Skagit Bay; the localized loss of benthic communities; and the periodic disturbance caused by dredging maintenance. Short-term impacts would include increased turbidity levels caused by construction and maintenance activities; wildlife habitat losses associated with the need for areas on which to dispose of the excavated material; and impacts to Skagit Estuary wetlands caused by alteration of sediment deposition patterns. The dredging could significantly affect the fishery resource of the Skagit River and thus, indirectly, the threatened bald eagle which feeds on spawned-out salmon carcasses. Because of the foregoing, channel dredging was not considered a viable alternative for detailed study.⁴

Why Not Dredge the Skagit for Flood Control

The Interagency Technical and Policy Workgroups have been together for over a year and meet at least once a month. The groups include technical and policy experts from USFWS, NMFS, USEPA, Corps, S & G Miners, local Flood Engineers, WDFW, Ecology, DNR, Nooksack Indian Tribe, Muckleshoot Tribe of Indians, Puyallup Tribal Council, and Lummi Indian Business Council. The groups focus specifically on removal of sand and gravel from riverine systems and the reasons behind this. These groups have the following thoughts on the topic under discussion:

The consensus opinion among the members on whether or not removing sand and gravel from a riverine system would have a flood hazard reduction benefit (flood control benefit) is not something that can be determined without the following minimum information: 1) watershed characteristics; 2) site specific information and information on the features being evaluated; 3) past flood events (magnitude, duration, and type of events); 4) the amount and quality of the material being recruited into the system. Even with this information, it is difficult to predict whether removal of large quantities of material would have a benefit or not because it is difficult to estimate the characteristics of the next future flood.

However, whether or not a flood hazard benefit will be derived must be balanced against the detrimental aspects of such a proposal. Removal of the large quantities from riverine systems would probably have many detrimental impacts to the aquatic environment. These could include downcutting, changes in the channel geometry, changes in the existing sediment yield and transport, channel changes, bank erosion, changes in water temperature, a change in total suspended solids, and dewatering of side channels and riparian wetlands. In addition, salmon spawning habitat could be redistributed or destroyed, fish could strand, fish eggs and redds could be suffocated or dislodged, and an overall decrease in biodiversity could be experienced. Numerous unknown impacts to traditional fishing could occur, and the historic cultural use of the river by Native American groups could be compromised as a result of the proposed mining activities as originally proposed. In addition, social and economic impacts could be realized if mining practices continue as they have in the past. If fish are adversely impacted by aggregate mining, they are unable to effectively reproduce and are, therefore, unavailable to the general public for use. If fish stocks fall to unacceptable levels, the species may be listed as threatened or endangered. This would eliminate many recreational and social uses of the river for all. Rivers are intended to function naturally and provide respite for people in active pursuit of life's interests. If the river is altered, and rendered aesthetically displeasing or undesirable as a result of that alteration, one of its primary functions to society would be lost.

Finally, mining sand and gravel may have negative long-term impacts to bridges, footing, rip rap, and other structures placed within river system. If aggregate mining causes increased erosion, utilities and private properties could be damaged as a result.⁵

References

1. Article in News Tribune by Sandi Doughton
2. ibid
3. ibid
4. "Channel Dredging," Skagit GDM 1979, p. B-12.
5. "Why Not Dredge the Skagit for Flood Control"



DREDGING AND SNAGGING ON SKAGIT RIVER

YEAR	CUBIC YARDS	YEAR	CUBIC YARDS
1920	14,461	1921	2,500
1922	3,788	1923	7,074
1924	13,992	1925	13,911
1926	4,571	1927	18,956
1928	39,338	1929	14,409
1930	5,977	1931	27,195
1932	18,276	1933	12,777
1934	27,108	1935	24,012
1936	36,087	1937	21,364
1938	55,710	1939	110,339
1940	10,689	1941	45,132
1944	27,145	1945	75,580
1946	51,417	1947	74,717
1948	61,027 N. FORK 7,480 S. FORK	1949	68,482 UPSTREAM FORKS 77,900 UPSTREAM M.V.
1950	49,904 N. FORK 127,514 UPSTREAM M.V.	1951	38,788 N. FORK 79,603 S. FORK 38,325 UPSTREAM M.V.
1952	36,220 N. FORK	1953	44,112 N. FORK
1954	27,718 N. FORK	1955	33,270 N. FORK
1956	35,965 N. FORK	1957	3,313 N. FORK
1958	17,760 N. FORK	1959	13,298 N. FORK
1960	900 N. FORK	1961	0

Source: Corps of Engineers MFR dated May 31, 1991, based on Seattle District annual reports from 1920-1966.