

A REPORT ON SILTATION
IN
STEQUALEHO CREEK

State of Washington
DEPARTMENT OF FISHERIES
Management and Research Division

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August 4, 1971

ABSTRACT

The Department of Fisheries investigated complaints of heavy siltation in the Clearwater River system in Jefferson County. The source was found to be in a tributary stream, Stequaleho Creek, and was caused by road-building activities on land administered by the Department of Natural Resources. About 5 miles from the mouth of the creek, a large slide was found containing cut logs and stumps. Several tributary streams upstream of the slide were extremely muddy. A falls about 2 miles from Stequaleho Creek mouth blocks upstream migration of anadromous fish. Juvenile coho were observed downstream from the barrier, and trout were found both above and below the falls. The heavy siltation severely depleted the supply of fish food organisms and covered the coho spawning gravel. With fall rains and continuing practices, siltation and slides will deteriorate rapidly. Concern is expressed regarding the entire watershed, and remedial suggestions are made.

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INTRODUCTION

Stequaleho Creek is a tributary of the Clearwater River located in the coastal drainage of the Olympic Peninsula in Jefferson County, Washington. Because of continuing reports and complaints of heavy siltation in the Clearwater River by various Departmental personnel and concerned citizens, several surveys were performed to investigate the matter.

The area in question is largely comprised of State-owned lands administered by the Department of Natural Resources, and is under intensive timber management program.

Three trips to the area were made in July and will be described separately.

JULY 7, 1971 SURVEY

At the logging bridge crossing to Clearwater River near the Morrison Logging Camp, the main Clearwater River was quite cloudy, the visibility being about 1-1/2 to 2 ft. Deposits of silt could be seen in the shallows. The river should have been, and is usually, clear this time of year. The river remained cloudy at the high bridge and at Coppermine Bottom. The Snahapish River and Bull Creek were both clear, as was the Clearwater River at the bridge between the Solleks River and Stequaleho Creek. I hiked to the mouth of Stequaleho Creek and found that this stream was the source of the siltation. The lower mile of the creek had an extremely heavy deposit of silt, especially along the edges, and the visibility was about 1 to 1-1/2 ft. A sparse population of juvenile coho and trout was observed. A gross examination of the rocks showed a very low abundance of fish food organisms. Dense accumulations of caddis larvae ("periwinkles") were seen in eddies along shore. I noted very little activity of these animals and further examination revealed that 10 to 20% had died. Since these animals are "algal grazers", they were probably starving to death, as the silt had blanketed the rocks. The rest of the day I spent exploring the road system in the area, and found both logging and road-building activities occurring. The upper watershed had a very steep terrain.

JULY 20, 1971 SURVEY

At the suggestion of Sergeant Lake, Fisheries Patrol, plans were made for an extensive field survey of the Stequaleho Creek watershed on July 20. Participating in the survey were Sergeant Lake, Patrol Officers Greeley and Listfeld, Bruce Chesterfield of Stream Improvement, and myself.

The plan was to drive to the end of the Stequaleho Creek road (the upper end of which is under construction), hike down to the creek, and walk downstream to the mouth. It was noted that in the lower half of the watershed, several blocks had been clearcut, with buffer strips being left along the creek. The terrain became very steep in the upper watershed where the road was being extended. It was evident that side-casting of dirt was a common practice (Photo No. 1 to 4). No large slides were apparent from driving along the road.

We drove as far as possible on the road, then walked about a half mile where the road was presently under construction. This was high on the ridge near Yahoo Lake. We hiked a half mile or more down a steep ridge to a fork of upper Stequaleho Creek and began a 7-mile downstream survey. The stream is described by numbered sections as given on the attached map.

1 to 2: Start of survey to forks of main Stequaleho Creek - about 0.75 miles.

This fork of the creek was small at the start of the survey, the wetted perimeter averaging about 3 ft in width. The gradient was quite steep and a rubble bottom predominated. A few potential spawning sites existed. Small trout (probably cutthroat) were fairly numerous. Three small steep tributaries entered the stream from the north in this section. The lower two had traces of silt deposition on the bottom and cloudy water. Very little silt in main creek.

2 to 3: Forks to major tributary in Section 19 - about 1 mile.

We arrived at the forks and found the other fork to be the main creek. It was 3 to 4 yards wide with a rubble bottom near the mouth. The gradient was fairly steep. Below these two tributaries, Stequaleho Creek became much wider (7 to 10 yards average), the gradient flattened out, and there was an abundance of potential spawning gravel. Trout of various sizes (1 to 10 inches) were very abundant, as were fish food organisms on the rocks. A crude hunting cabin and a helicopter landing area were noted here. The tributary entering (at 3 on the map) averaged about 2-1/2 yards wide. It had a flat gradient, and abounded in potential spawning gravel. Trout were numerous, but no juvenile salmon had yet been seen.

3 to 4: Tributary to falls - 0.5 mile.

The nature of the stream was very similar to that of the previous section. In the southeast corner of Section 18, we noted a falls under a log jam which would be a total block to migratory fish. It was at least 10 to 15 ft in height, being difficult to see under a jumble of logs.

4 to 5: Falls to muddy tributary flowing through NE 1/4 Section 18 - 0.75 miles.

The stream then entered a box canyon for about 0.5 mile, with five falls (4 to 8 ft) being noted. Three would probably be migratory fish blocks. Trout remained abundant. The bottom was largely bedrock, boulders, and rubble with no potential spawning gravel.

5 to 6: Muddy tributary to slide - 0.25 miles.

At the start of this section, a good-sized steep tributary enters Stequaleho Creek from the north (logging road side). It was very muddy and had a flow of about 2 cfs (Photo No. 5). The tributary had carried an immense bed load during higher flows, with silt deposits 1 to 2 ft in depth occurring downstream in Stequaleho Creek. Both fish life and food organisms had been virtually wiped out for about 0.25 mile downstream to a huge slide (Photos 6-8).

6 to 7: Slide to falls - 2.5 miles.

It appeared that the aforementioned slide was located in the NW 1/4, S 18, T25N, R10W, about 1/4 mile below the muddy tributary. A big swath had been cut down the mountainside (Photo No. 9), dumping large trees, stumps, and debris in Stequaleho Creek. The slide had deposited logs and debris in an area about 250 ft long and 50 ft wide in the creek bottom (Photo No. 10). Some felled logs (Photo No. 11) and stumps from road building were evident (Photo No. 12). Tremendous accumulations of silt were commonplace (Photo No. 13). Immediately downstream from this slide, was evidence of a much shorter natural slide, pointing out the instability of the soils.

For about 2.5 miles downstream from the slide, extremely heavy deposits of silt occurred. Practically no fish life nor food organisms were seen. A 20-ft falls marked the downstream end of this section - a total block to migratory fish. A log jam was forming on top of the falls. About 1/8 mile upstream from the barrier was evidence of an older man-caused slide. This had blocked the creek with a head of 10 ft or so, with the creek cutting back down to its former bed. One old cut stump remained.

7 to 8: Falls to mouth - 2.0 miles.

For about 1/4 mile below the falls, the gradient was steep, with boulders and rubble predominating. At a point some 1/2 mile below the falls, the first evidence of the presence of migratory fish was noted, with juvenile coho being observed. However, their numbers were sparse. Several natural slides, 5-10 years old, were noted. In the lower 1.5 miles, the gradient flattened out, with some spawning gravel being present. It is no doubt used by steelhead, coho salmon, and probably by chinook salmon. Extremely heavy deposits of silt remained to the mouth.

JULY 27, 1971 SURVEY

The primary purpose of this survey was to collect information regarding the abundance of fish food organisms in Stequaleho Creek in comparison to a less disturbed area. Observation in the upper creek on July 20 revealed virtual elimination of food organisms for a several-mile stretch. More knowledge of the lower creek's food production was desired, since migratory fish inhabited this area. Samples were taken in the lower 0.1 mile of Stequaleho Creek, and in the adjacent Clearwater River immediately downstream from its confluence with Stequaleho Creek in areas having similar bottom composition, depth, and velocity. The results of 10 sq ft bottom samples and handpicking of insects from 10 rocks in each area are summarized:

<u>Area</u>	<u>Number of organisms</u>	
	<u>10 square foot bottom samples</u>	<u>Handpicking 10 rocks</u>
Stequaleho Creek Near mouth (about 4.5 miles below major silt sources)	98	25
Clearwater River 50-200 ft upstream from Stequaleho Creek mouth	848	845

It was abundantly clear that the heavy siltation in Stequaleho Creek severely depleted the fish food organisms in the stream, and undoubtedly will drastically lower the rearing capabilities. Also, gravel spawning areas have been silted in, thereby reducing the survival of future spawn. The main Clearwater River will also be affected, but it would be difficult to assess the damage at this time.

DISCUSSION

It is evident that current road-building practices in the unstable steep terrain of the Clearwater River area are highly detrimental to the fisheries resource. If present methods continue, undoubtedly massive slides will occur as clear cutting and road building continues, not only in Stequaleho Creek but other tributaries as well. Heavy accumulations of silt will eliminate or greatly reduce juvenile salmon and trout food; directly kill the fish if heavy enough; and severely reduce the survival of eggs and alevins in the gravel. Not only are the tributaries of concern, but the main Clearwater River as well. This may call for extensive and costly gravel cleaning. Monetary losses to the fishing industry, related industries, and State tax revenues will probably occur for a decade or more.

The Clearwater River system is one of the finest producers of anadromous fish in the State of Washington, containing major runs of chinook and coho salmon, steelhead and cutthroat trout. Also, there are small runs of chum, pink, and sockeye salmon. The size of the chinook escapement at present is estimated at 2,500 to 5,000 fish (3,750 average), while coho escapement is estimated to range from 5,000 to 10,000 fish (7,500 average). Based on the amount of spawning area

available, the Clearwater River system has the potential for a total escapement of 29,000 chinook - 21,000 of which would be downstream from the mouth of Stequaleho Creek. For every fish escaping to spawn, from three to five (or more) are caught in the various ocean sport and commercial fisheries of the State and adjacent areas. Also, the Clearwater River contributes greatly to the Queets River Indian fishery. Based on average run size, the annual catch value of chinook and coho produced in the Clearwater system is given in Table 1. Total average run size (catch plus escapement) for chinook is 22,500 fish, and 30,000 fish for coho. The average annual value of these two species to all fisheries is estimated at \$538,000.

RECOMMENDATIONS

While losses to the fisheries resource have already occurred, the future potential is even grater. A concerted effort must be made to stop the degradation of these valuable streams. Following are immediate remedial actions we deem necessary.

1. All road building and logging in affected area should be terminated immediately.
2. Soil experts should make thorough investigation, similar to that made by Forest Service in Olympia National Forest. Decisions may have to be made to leave critical areas untouched as potential losses to the general public's welfare would be greater than the profits derived from logging.
3. Back haul dirt in gully and steep terrain areas.
4. Improve drainage by using more culverts with riprapped outfalls. All previous culvert installations should also be riprapped.
5. Reseed immediately all cuts, fills, and slide areas with fast-growing grass such as hydra-mulch.
6. Lower 1.5 miles of Stequaleho Creek should be cleaned, using gravel-cleaning techniques similar to those used on Bear River project. Because of steep terrain, inaccessibility, and amount of silt deposit between mile 1.5 and mile 4.5, this cleaning operation will have to be conducted annually for X years until bulk of silt deposits have been removed.
7. Clearwater River below the mouth of this Stequaleho Creek may have to be similarly cleaned as No. 6 above. Further investigation will determine need and extent of Clearwater River's cleaning operation.

Table 1. Average annual value to all fisheries of chinook and coho salmon runs in the Clearwater River, Washington.

Species	Fishery	Per cent ^{1/} of catch	Number ^{2/} caught	Value ^{3/}	
				Per fish	Total
Chinook	Commercial	60.	11,250	\$ 7.92	\$ 89,100
	Sport	40	7,500	28.00	210,000
Subtotal		100	18,750	-	\$299,100
Coho	Commercial	70	15,750	\$ 3.17	\$ 49,900
	Sport	30	6,750	28.00	189,000
Subtotal		100	22,500	-	\$238,900
Total of all fisheries			41,250	-	\$538,000

^{1/} Determined from 5-year average commercial and sport catches from 1965-1969.

^{2/} Based on catch-to-escapement ratio of 3:1 for coho and 5:1 for chinook.

^{3/} Sport value based on Brown and Mathews \$28 per angler day value (estimating the average catch at one fish per day, each fish is worth \$28).

Commercial value based on average prices in recent years paid to the fishermen. (The wholesale value would be about double this figure, and the retail value about 2-1/2 times higher.)