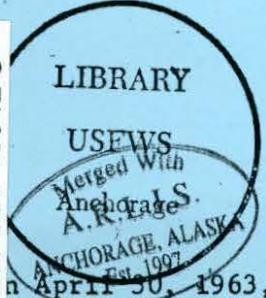


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PRINCE WILLIAM SOUND  
AND AFOGNAK ISLAND.

On April 30, 1963, I examined salmon stream improvement projects in Prince William Sound, accompanying Mr. G.L. Ziemer, Chief, Division of Engineering and Services, Alaska Department of Fish and Game; Mr. Jay Grant, Supervisor, Chugach National Forest; Mr. Richard Behan, Timber and Fire Control Staff, Chugach; Mr. Henry Dunn, Assistant Engineer, Chugach; and Mr. Lyle Jack, Cordova District Ranger.

On May 2, I accompanied Messrs Ziemer, Grant, Jack, Robert Simon (Regional Supervisor, Alaska Department of Fish and Game), and Jack Lechner (Assistant District Biologist, Alaska Department of Fish and Game, Kodiak District), to Paul's Lake and Afognak Lake.

Objectives of the trip, from a fisheries standpoint, were as follows:

1. To make second examinations of salmon habitat improvement projects in Billie's Hole, Control Creek, Olsen Bay, and Shrode Creek, all in Prince William Sound.
2. To conduct a preliminary reconnaissance of salmon habitat improvement projects in Paul's Lake and Afognak Lake, both on Afognak Island.
3. (a) To collect and analyze gravel samples from Big Kitoi Creek (at Alaska Department of Fish and Game Kitoi Bay Research Station), and (b) to carefully examine Big Kitoi Creek from the standpoint of construction of an artificial spawning channel.
4. To obtain from Alaska Department of Fish and Game personnel suggestions for additional salmon habitat improvement projects.

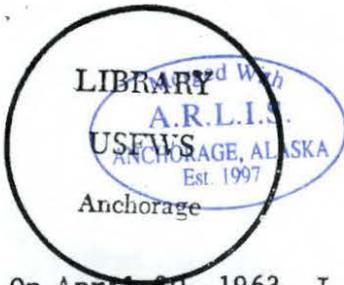
PRINCE WILLIAM SOUND

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Mr. Ziemer and Mr. Dunn discussed design of laddering project at Billie's Hole and Mr. Dunn remained at site with John Mathis to conduct preliminary survey. Mr. Ziemer's notes on all laddering projects examined will be sent to the Forest Service after he completes them.

At Control Creek, the estimate of number of steeppasses needed (2-3) is about the same as our estimate on the first reconnaissance of this system. It is essential that we obtain good streamflow data from Control Creek during the summer and fall months of 1963. Still needed are cross section profiles at gauge and where discharge measurements are made. On April 30, 1963, the water level on Control Creek gauge was at 2.5 feet; however, the upstream edge of the gauge was chewed by ice or drift up to 4.0 feet. The cork was frozen in place. We are now working on modifications of the crest gauge and results,

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when available, will be sent to Cordova District Ranger. Stream gauge in Control Creek is in an ideal location, with excellent and complete control formed by a bedrock canyon with banks up to 10 feet above level of streambed.

The question was posed, whether or not pink salmon would use fishways. Observations at Fritz Creek, near Homer, this summer should answer the question. At Fritz Creek, pinks must go through three sections of steep pass at a 20 percent grade. We already know that pink salmon ascend two sections of steep pass at Little Kitoi Lake every year.

Olsen Bay proposed spawning channel site examined. We wonder about the advisability of running the intertidal zone channel down as far as the 3-4 foot tide level since there is apparently little if any survival of pink salmon eggs below the 5-6 foot tide level. As soon as the Regional Office Engineer has examined the Olsen Bay Fish and Wildlife Service proposal, his recommendations for additional streamflow data should be forwarded to Fish and Wildlife Service, Auke Bay Laboratory.

#### AFOGNAK ISLAND

##### Paul's Lake Project

There are three interconnected lakes in the Paul's Lake system which is located on the east shore of Perenosa Bay along the northeast coast of Afognak Island. Paul's Lake is 81 acres, Laura Lake is 555 acres and Gretchen Lake is 53 acres, for a total rearing area of 689 acres.

Laddering of five barriers was completed by Waterways Construction Company of Juneau in 1952. (These barriers and their locations are described in detail in a previous report). Green and eyed egg plants were made each year to start a sockeye run in the upper watershed. Varying numbers of sockeye salmon have returned to Paul's Lake since the laddering project and egg plants were completed. In June, 1958, a run of 7,400 sockeye ascended the system and used spawning grounds that previous to laddering could not be reached by salmon.

Mr. Gil Ziemer of the Alaska Department of Fish and Game has submitted estimate of cost and plans for the Paul's Lake project. Plans have been examined by Chugach Supervisor's Office and Regional Office Engineers. Estimated cost is \$25,000, broken down into \$18,000 for labor and \$7,000 for material. Five of the eleven sections of steep pass required are at location now. Project could be completed in one summer field season with a 6-8 man crew.

An on site inspection on May 2, revealed that the most pronounced barrier in the system is the third barrier, a combination of a 12 foot falls and a 9 foot cataract 2,680 feet upstream from Paul's Lake. Here, upon modification, sockeye will have to go through nine sections (90 feet) of steep pass without stopping. Although the Alaska Department of Fish and Game engineer (Mr. Ziemer) does not at this time know if the fish can easily negotiate this distance, he should know by next fall because of experiments of this type planned for the Frazer Lake fishway on South Kodiak Island. There, the ease with which sockeye salmon can negotiate 11 sections of steep pass without stopping will be determined.

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Production of Paul's Lake system may be as low as 10,000 or as high as 40,000 sockeye salmon per year. Little Kitoi Lake, in roughly the same vicinity (adjacent to Alaska Department of Fish and Game Kitoi Bay Research Station) with an area of 90 acres produces from 3,000 to 6,000 sockeye salmon per year. The Paul's, Laura, Gretchen Lake complex contains 7 times more rearing area than Little Kitoi Lake. Although initial cost of the project is relatively high, repair, maintenance, and evaluation will probably all be done by Alaska Department of Fish and Game. If 10,000 of the Paul's Lake sockeye salmon run is captured each year, this is a yield of \$10,000 annually. It is possible that the system could be brought to full production by fry plants from the Kitoi hatchery.

#### Afognak Lake Project

Afognak Lake, located in the southwest part of Afognak Island, contains about 1,200 surface acres. There are two major sockeye salmon spawning inlets, Hatchery Creek in the vicinity of the Navy Recreation Camp and Egg Take Creek, about two thirds of the way up the lake. Silver, sockeye and pink salmon all spawn in this system as do dolly varden and steelhead trout. Afognak Lake produces roughly, from 15,000 to 45,000 sockeye salmon per year. The initiation of studies on this system by Alaska Department of Fish and Game in 1963 will reveal the true production of the system.

The objective of examining Egg Take Creek was to determine if the barriers on this stream could be laddered, permitting sockeye salmon to migrate into about a mile of what appears to be good spawning area above the falls. The examination of Egg Take Creek was conducted on May 2, 1963. Mr. Ziemer, Engineer, Alaska Department of Fish and Game observed that the falls would be difficult to ladder and that laddering would be expensive (Mr. Ziemer's notes will be available later on). If laddering is attempted at all it should be considered for the future. The next step is to measure the available spawning area above the falls to determine if area is sufficient to justify the cost. It is possible that the present stock spawning in the lower stream would not attempt to go over the falls if these were laddered. If not, a strong, long ranging stock would have to be introduced into the upper portion of the stream. It would be a good idea to observe the present stock either a little before, or at the peak of spawning to find out whether or not they now attempt to surmount the falls.

Actually, Hatchery Creek, Egg Take Creek and the outlet of Afognak Lake all lend themselves to gravel cleaning. If workable equipment is developed to clean gravels and if this equipment can be transported to Afognak Island (it may be possible to obtain free transportation of equipment from the Industry, Department of Fish and Game or another agency) gravel cleaning could be carried on in Afognak Lake and other places.

The lake outlet is quite stable and now supports a large run of pink salmon. Hatchery and Egg Take Creeks spawning gravels are composed respectively of about 23 percent and 18 percent of particles less than 0.8 mm in diameter. If quantity and quality of spawning gravels in Egg Take Creek is similar above and below the falls, laddering would theoretically double the available spawning area and production of fry. However, if spawning gravels below the falls are

cleaned (materials up to 1/8" to 1/4" diameter removed from streambed) this should also at least double fry production. No actual comparison of costs can be made between gravel cleaning and laddering until the cleaning equipment has been developed and used, and an estimate of cost of laddering has been obtained. Since Alaska Department of Fish and Game personnel are working on sockeye salmon in the lake and on pink salmon in the lake outlet, evaluation of improvement should not be a major problem.

#### Big Kitoi Creek

No gravel samples were collected in Big Kitoi Creek for the following reasons:

1. Because of excessive flooding during the winter it is probable that fine materials settling in streambed gravels as a result of pipeline construction were washed out.
2. This assumption is borne out by preemergent fry sampling conducted by Bob Roys, Alaska Department of Fish and Game in early April. Roys observed no excessive amount of fine materials in the gravel while he excavated pink salmon fry.
3. The determination of mechanics of silting of a stable streambed (such as Big Kitoi Creek usually is) should be done in a more controlled environment.

The potential of Big Kitoi Creek for supporting a lateral flow spawning channel was determined. Under present flow conditions, the 400 feet of stream from the trestle down to about the 4 foot tide level is suitable for construction of a flood plain channel about 10 feet wide, total area 4,000 square feet. If flow is controlled, artificial channel can be extended another 400 feet above the trestle increasing total area to 8,000 square feet. Gravel and heavy equipment are both available at Kitoi Research Station. A four thousand square foot channel should accommodate 400 pink salmon females (at 10 per 100 sq. ft.) and, at a 50 percent egg to fry survival produce 360,000 fry and 18,000 returning adult pink salmon. Doubling the area would double the return. If a spawning channel is constructed in Big Kitoi Creek all upstream silt sources would have to be eliminated.

Alaska Department of Fish and Game, Kodiak, suggested that Hidden Lake on Afognak Island might be an additional potential salmon habitat improvement project. It is my impression that the Cordova District Ranger intends to examine Hidden Lake when he has an opportunity to do so.