2620 Planning
November, 1972

VAGT LAKE FISHERIES HABITAT SURVEY

Kenai Ranger District
Chugach National Forest

INTRODUCTION

A fishery habitat survey of Vagt Lake, located on the Kenai Ranger District, Chugach National Forest, was conducted on June 20, 1972, by Norman R. Howse, Chugach Forest Wildlife Biologist, and 24 Youth Conservation Corps enrollees and supervisors. The lake was again surveyed on September 28, 1972, by Norman R. Howse, Chugach National Forest Wildlife Biologist, Ted McHenry, Fisheries Biologist - Alaska Fish and Game Department, and Jim Dague, Kenai Ranger District. The lake is located in T4N, R1E, Section 7, Seward Meridian on USGS Quad Map Seward B-7 and is on the east side of Trail Lake. The objectives of the survey were:

1. To assess the limnological characteristics of the lake.

2. To assess the fishery potential of the lake.

3. To determine what management actions might be taken to increase the quality and recreational use of the fishery resource.

METHODS AND MATERIALS

1. Office

Prior to the field work, an enlarged drawing of the lake was prepared from aerial photographs and maps. From these drawings, lake topography determinations were made and copies produced for field checking of measurements and plotting of field data. A polar planimeter was used in area determination.

Upon return from the field, analysis of zooplankton, benthal invertebrates, and aquatic insects were conducted using a Bausch and Lomb stereo microscope.

2. Field

In the field physical, chemical, and biological data were secured at several stations on the lake.

Physical measurements of lake topography, air temperature, water temperature, bottom composition, water color, light penetration, locations and abundance of spawning gravels were taken. Maximum depths and depths at selected locations were plotted on the lake drawings so that contours could be drawn and approximate volumes determined.

Chemical measurements were taken using a Hach DR Engineers Water Analysis Laboratory. A one liter Kemmerer water sampler was used to obtain samples.

Biological samples were taken of zooplankton using a Wisconsin plankton net and benthal invertebrates using an Ekman dredge. Aquatic vegetation was noted and plotted. A rubber boat was used to transport personnel and equipment around the lake.

RESULTS AND DISCUSSION

The natural lake is on a rolling topography bench above Trail Lake at an elevation of about 575 feet. It has one major inlet at the southeast end, two intermittent inlets, and a V-shaped draw at the outlet which is a tributary to Lower Trail Lake. The watershed area is about 600 acres in size. Access to the lake is via a game trail from a mining road on the south end of Lower Trail Lake. The game trail distance is about one mile and it takes about 30 minutes to walk to the lake. Another means of access is around the shore of Trail Lake and up the outlet stream to Vagt Lake. Again, this is a game trail but easy to follow and only a distance of about 1/4 a mile. There are no campsites at the lake and past fishing is reported to have been very light. The lake is surrounded by spruce and birch with an understory of alder and willow. The south end of the lake is a flat, grassy area that gently slopes into the lake. The area on the east side is moderately steep, becoming extremely steep in the head waters of the inlet stream.

The outlet stream to Vagt lake has a moderate gradient for about 200 feet and then enters a narrow rock wall canyon with an increasing gradient down to Lower Trail Lake. There is a 20 foot falls about 70 yards upstream from Lower Trail Lake that is a total block to all fish. The total length of the outlet stream is about 1500 feet. It is approximately 9 feet wide by 3 inches deep and has an overall gradient of about 6% and is flowing at about a half a foot per second. Bottom types are 50% rubble, 15% boulder, 15% gravel, 15% bedrock and 5% detritus material. The stream has good cover and is in a stable channel. The pool/riffle ratio is 75/25, however the pools are small and do not provide good rearing habitat. There is little spawning gravel available in the outlet and spawning quality would be poor. There are several small desbris jams below the narrow canyon. On June 20, 1972, at 1100 hours, the water temperature was 51° F. and on September 28, 1972, at 1200 hours, the water temperature was 48° F. There is some moss and Algea on the bottom materials.

The main inlet stream is on the southeast side of Vagt Lake and provides about 200 feet of spawning stream before the gradient becomes too steep. The stream is about 5 feet wide by 2 1/2 inches deep and has a good cover of grass, brush and trees. The bottom material is

25% rubble, 50% gravel, and 25% boulder. It has a pool/riffle ratio of 25/75. The pools are shallow and do not provide good resting areas for spawning fish. Approximately 200 feet upstream there is a 15 foot falls and cataract with an increasing gradient. The stream is flowing at about 2.5 feet per second. It has a total length of about 6000 feet and an average gradient of about 6%. The stream banks are stable. The quality of the spawning gravels (1/4 inch - 1 1/2 inches) is good and abundant. The other small inlet streams entering the lake on the east side are steep and appear to be unstable and have intermittent flows. They do not provide any spawning or rearing habitat.

Table I presents the physical characteristics of the lake and Table II presents the physical measurements obtained on the survey date.

TABLE I

PHYSICAL CHARACTERISTICS OF VAGT LAKE

Area	43 Acres
Maximum Length	2640 Feet
Maximum Width	990 Feet
Maximum Depth	50 Feet
Volume	806 Acre-Feet
Mean Depth	19 Feet
Length of Shoreline	6848 Feet
Shoreline Development Ratio	1.4*

*The ratio of shoreline length (L) to circumference of a circle of area (A). The limiting value is 1, for a circular lake, in all other lakes higher development ratios are found.

TABLE II

PHYSICAL MEASUREMENTS OF VAGT LAKE ON JUNE 20, 1972

Time	1100 Hours
Weather	Cloudy
Wind	Calm
Air Temperature	55° F.
Inlet Water Temperature	41° F.
Lake Water Temperature	Surface 54° F. 25 Foot Depth 50° F.
Outlet Water Temperature	51 ° F.
Water Color	Light Brown.
Light Penetration	20 Feet
Bottom Composition	Silt over Rubble
Water Level	Normal with fluctuations of 1 foot.
Lake Bottom Vegetation	No vegetation observed.

The chemical composition of the water is presented in Table III.

TABLE III

WATER ANALYSIS OF VAGT LAKE ON JUNE 20, 1972

Chemical	Surface	35 Foot Depth	Outlet	Inlet
Disolved Oxygen	10.0 mg/1	9.0 mg/1	11.0 mg/1	11.5 mg/1
Carbon Dioxide	5.0	10.0	5.0	5.0
Total Acidity	5.0	5.0	5.0	5.0
M. O. Alkalinity	34.2	34.2	34.2	34.2
PHTH Alkalinity	0	0	0	0
Hydrogen-ion (pH)	7.0units	7.0 units	7.0 units	7.0 units
Hardness	51.3 mg/1	51.3 mg/1	51.3 mg/1	51.3 mg/1
Turbidity	Clear	Clear	Clear	Clear
Conductivity	140 mmhos/cm	145 mmhos/cm	140mmhos/cm	140 mmhos/cm
Total Dissolved Solids	91.0 mg/1	94.3 mg/1	91.0 mg/1	91.0 mg/1

The invertebrate and insect population composition is shown in Table IV.

TABLE IV

INVERTEBRATES AND INSECTS FOUND IN VAGT LAKE AND TRIBUTARIES ON

June 20, 1972

Invertebrates and Insects	Abundance
Stoneflies - Plecoptera	Average
Black Flies - Diptera simuliidae	Rich
Mayflies - Ephemeroptera	Average
Flatworm - Planaria	Average
Freshwater Shrimp - Gammarus	Very Few
Water Boatman - Hemiptera corixidae	Few
Water Strider - Hemiptera gerridae	Few
Midge Larvae - Diptera chironomidae	Rich
Mosquito - Diptera culicidae	Average
Caddis Flies - Trichoptera brachycentrus	Average
Whirligig Beetles - Coleoptera gyrinidae	Few
Snails - Mollusca gastropoda	Few
Zooplankton	
Copepoda cyclops	Average
Cladocera daphnia	Average

Four zooplankton hauls were made from the 35 foot depth to obtain samples for population composition and abundance. The bottom dredge samples were obtained at the 40 foot depth to obtain samples of aquatic invertebrates. The overall density of zooplankton and bottom invertebrates and insects indicates an average food source for trout.

One gill net was set in the lake between 1030 hours and 1600 hours on June 20, 1972, but no fish were captured. Minnow traps the same day captured numerous stickleback and observations indicated that stickleback populations were very abundant in the lake. On September 27, 1972, three variable mesh gill nets were set in the lake at 1200 hours. These were removed on September 28, 1972 also at 1200 hours. The nets contained the following.

Species	Length	Sex	Condition
Rainbow Trout - Salmo gairdneri	559 mm	Female	Immature
Rainbow Trout	340 mm	Female	Immature
Dolly Varden - Salvelinus malma	330 mm	Female	Spent
Dolly Varden	275 mm	Female	Mature
Dolly Varden	255 mm	Male	Ripe
Dolly Varden	250 mm	Male	Ripe
Dolly Varden	215 mm	Male	Ripe
Dolly Varden	196 mm	Female	Immature
Dolly Varden	186 mm	Female	Immature
Sculpin - Cottus	75 mm		

Scale samples collected from the two rainbow trout indicated that the 559 mm rainbow trout had completed 5 years of age and the 340 mm rainbow trout was two years of age. It was reported that grayling had been planted in the lake in the 1960's but no indication of grayling were observed or samples collected in the nets or traps.

Stomach samples of the trout indicated that they had been feeding on stickleback Gasterostus aculeatus. There were many of these in the 25 to 75 mm range observed in the stomachs of all of the fish except the Dolly Varden which was 186 mm in length. The stomach sample of this Dolly Varden contained only aquatic insects. Other food in the stomach samples included snails, mollusca gastropoda, caddisflies Trichoptera, water boatman Hemiptera corixidae, ant - terrestial, spider - terrestial, and damselfly Odonata. The caddisfly, water boatman, ant, spider and damselfly were found in the 186 mm Dolly Varden. Parasites were also noted to be abundant in the fish.

Tapeworms Cestoda schistocephalus, is an intestinal tapeworm common to the Kenai Peninsula. Thread worm Nemadtoda were observed next to the kidneys and hookworm Acanthocephasla were observed near the esophagus. The viscera of the fish was also noted to be attached in many places to the body wall and the flesh of these appeared to be soft.

Other observations of wildlife made at the lake included moose browse which had been moderately utilized down to the snowline, indications of bear activity and an old beaver dam lodge and old cuttings observed in the lake, signs of rabbits, squirrel, porcupine and spruce grouse were also found.

It appears from the data obtained that the physical, chemical, and biological characteristics of Vagt Lake indicate that the conditions are more than satisfactory for production of a good trout population. The lake has a good depth which should provide adequate over winter survival. The water quality is satisfactory and food for trout appears to be adequate. Stickleback are abundant in the lake but rainbow trout and Dolly Varden appear to be able to sustain themselves and maintain good growth. This lake could become one of the better sport fishing lakes on the Kenai Ranger District.

RECOMMENDATIONS

1. It is recommended that in cooperation with the Alaska Fish and Game Department a complete rehabilitation of Vagt Lake be planned for Fiscal Year 1974. A meeting should be set up with Sid Logan, Area Fisheries Manager, Alaska Fish and Game Department, to discuss financing a cooperative agreement, and necessary administrative details. The Alaska Fish and Game Department has indicated that Rotenone is available and that the project would be tentatively planned on for Fiscal Year 1974. The necessary coordination and approval of the Rotenone project must be completed by March 1, 1973 and forwarded to the Washington Office Pesticide Committee for review and approval. The Kenai Ranger District should initiate the environmental analysis required.

2. It is recommended that the lake be stocked with rainbow trout upon completion of the rehabilitation program and detoxicification of the lake. This would be done in cooperation with the Alaska Fish and Game Department and YCC assistance could probably be provided for both the rehabilitation work and restocking being coordinated by the Alaska Fish and Game Department.

3. It is recommended that a trickle-type dam similar to Figure 2 be constructed in the narrow channel approximately 194 feet downstream from the lake outlet. The purpose of the trickle dam will only be to retain rainbow trout in the lake and not to restrict fish from coming

upstream. The movement of fish upstream from Lower Trail Lake is already affectively restricted with the falls just above the mouth of the creek. The trickle dam could be build as a YCC project. However, engineering assistance will probably be needed in both the design and construction.

4. It is recommended that the YCC construct a spawning channel in the outlet to Vagt Lake similar to the one shown in Figure 3. Again engineering assistance will be needed in the survey and design. The gravel for the spawning channel can be obtained from the beach area on the southside of the lake and easily transported to the site. The outlet of the lake has warmer water temperatures and incubation survival should be more productive than the inlet. The size of the spawning channel should be adequate for the amount of rainbow trout recruitment necessary.

5. It is recommended that fresh water shrimp from Jerome Lake be collected and planted in the lake following the rehabilitation and detoxification and prior to stocking with rainbow trout. This could also be a YCC project. The project will have to be well coordinated to insure survival of the invertebrates during travel from Jerome Lake to Vagt Lake.

6. Planning should begin for developing trail access to the lake from either the mining road or from Lower Trail Lake.

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