ALASKA DEPARTMENT OF FISH AND GAME
SPORT FISH DIVISION

FISH POPULATION CONTROL A,
PRE-CHEMICAL RESTORATION PLAN

GENERAL

Region II Lake or Stream Vagt Lake Clearance obtained from D.E.C.

Federal Clearance (date) None State Clearance (date) Oct. 2, 1973 Land Managing Agency U.S.Forest Service

1. Physical Characteristics: a,b. Borough Kenai t 4N r 1E s 7 Lat 60°27' Long 149°21' U.S. Map Call Out # S-B-7

Surf. acres 43 (when surveyed) Max. depth 50 Avg. depth 18.7 Acre feet 806 Established B.M. location

Describe method used in establishing information for contour map Aerial photograph and recording fathometer

Lake was previously reclaimed in (year) No Toxicant used - Result -

c. Outlet Vagt Creek - 0.25 miles long to Lower Trail Lake 0.5-2 cfs

d. Inlet (number, miles, flow & description) Two unnamed on E and SE shore - both less than 1 cfs

e. Estimated duration of toxicity 60-90 days

f. Shoreline and lake bottom description (springs, seeps, bogs, swamp, shallow areas, aquatic vegetation) Lake has no known springs and little aquatic vegetation

2. Fishery Characteristics: a. Target fish Threespine stickleback Population composition Threespine stickleback, rainbow trout, Dolly Varden and Sculpin

c. Sample method used Gill nets and visual observations d. Most recent survey date Sept. 27, 1972

3. Status of Existing Fishery: Fish growth and or survival and collection means (creel census, net, etc.) Gill net sampling showed RB and DV catch/hour of 0.03 and 0.01, respectively. Mean lengths were 449 and 244 m

4. Restoration Plan: a. Toxicant Pro-nox fish Percent or weight (active ingredient) 5% rotenone Form to be applied Liquid

Application rate (active ingredient) 1.1 ppm c. Method of application Boat pumps time 18 month Sept. 1973

d. Quantity required 330 gal (10% error) (gal. or lbs.) Acre feet to be treated 806 (lake or stream) lake

e. Number of sub-area treatments and description of sites No sub-areas

f. Areas to be treated with caution None

g. Precautions to be taken in downstream areas (if none are needed, state why). Outlet drains 0.25 mile to Trail Lake so a rock dam with plastic constructed h. Chemical rehabilitation benefits Improved growth and survival of stocked fish i. Monitoring Periodic test fish samples

5. Water-Physical Chemistry Properties: a. ph 7.0 Methyl orange alkalinity 34 Total alkalinity 34 b. TDS dissolved solids 140 conductivity Date(s) June 20, 1972 6. Estimated Project Cost: Lbs or gallons/0.39 acre feet @ $4.00 cents per lb. or gal. = $ 1.56 Toxicant requirements 330 gal @ $ 4.00 /gal = $ 1,320 lbs @ $ lb. = $ Man days 12

Wage $ 850 Per diem $ 15 Travel 45 Barrier dam (if required) type rock dam with plastic $ No cost to state

M & O cost: List None $ Other cost (items) Forest Service provide helicopter charter $ 500 Total estimated cost $ 2,730

7. Planned initial fish stocking:

DATE	SPECIES	INCHES	POUNDS	NUMBER
Early July	RT	7-9/lb		26,200

8. Public Considerations: a. Is water to be used locally for domestic, industrial or irrigation purposes?

b. Public access assured (how) U.S.Forest Service land c. If the affected waters contain any rare or endangered species, describe the measures to be undertaken for their protection None

d. Procedure for salvage and disposal of fish killed Donated to general public

e. Cooperating agencies (attitude and support) U.S.Forest Service with favorable support

f. General attitude of the public to the project Fishermen favorable toward project

g. Remarks

ALASKA DEPARTMENT OF FISH AND GAME
SPORT FISH DIVISION
FISH POPULATION CONTROL B.
POST-TREATMENT EVALUATION, CHEMICAL RESTORATION

Region II Project Number _____ Project Name _____ Submitted by S. Logan Date 1/5/76

Lake or Stream Vagt Lake Location: T. 4N R. 1E S. 7 Map Reference S-B-7 Lat. 60°27' Long. 149°21'

Borough Kenai Chemical Treatment (date) Sept. 18, 1973

1. Surface area at treatment 43 (acres) Water Volume 806 (acre-feet) Tributaries:

Name	Flow	Total Length	Length Treated
Unnamed (East)	0.2	100 yards	Entire
Unnamed (SE)	1.0	1,500 yards	Entire
		TOTAL	

Outlet(s):

Name	Flow	Total Length	Length Treated
Vagt Creek	0.5-2.0 cfs	0.25 miles	None
		TOTAL	

2. Stream(s) treated 1.2 total miles Main streams:

Name	Flow	Total Length	Length Treated
Unnamed inlet stream (see above)			

Tributaries:

Name	Flow	Total Length	Length Treated
		TOTAL	

3. Toxicant used (lake) 5% emulsified rotenone (tributary) same

4. Methods used in distributing the toxicant: Boat pump

5. Cost of Project:
(items) Rotenone $1,320
(items) Salary $850
(items) Per diem + Travel $60
(items) Total $2,230

6. Condition of water on date of treatment:

Depth (feet) or flow (cfs)	Temperature (°F)	pH	Dissolved Oxygen Content
0	54	7.0	10.0
35	50	7.0	9.0

Total Dissolved Solids 140 Conductivity

7. Species and estimated observed numbers of fish eradicated:

Lake (Stream)		Inlet (Tributaries)	
Threespine stickleback	Abundant	Threespine stickelback	Few
Dolly Varden	Few	None	

8. Period of Toxicity Two-three months estimated

9. Method of determination of effectiveness: Test fish and shoreline survey

10. Detoxification: Non-chemical (natural) Natural Outlet Control Structure Operation Date Sept. 18, 1973 until

Chemical _____ Application dates _____ Amount applied _____ Cost of chemical $ _____

Results the following spring

11. Public reaction to project (after treatment) Favorable

12. Comments on angler use (after treatment) Use increased appreciably

13. Additional remarks: _____

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
P.O. Box 1628, Juneau, Alaska 99801

2630

July 5, 1973

Mr. Howard Metsker
Federal Aid Coordinator
Alaska Department of Fish and Game
Subport Building
Juneau, AK 99801

Dear Howard:

Enclosed is a copy of Washington Office approval of the Vagt Lake rehabilitation project.

Sincerely,

W. L. SHERIDAN
Fisheries and Wildlife Coordinator

RECEIVED
AUG 8 1973
ALASKA DEPT. OF
FISH & GAME

Copy to Wadsworth 7/5/73

FOREST SERVICE

WO

REPLY TO: 1350 Committees
(2240)

June 15, 1973

SUBJECT: Pesticide-Use Proposals
Fiscal Year 1974

TO: Regional Forester, R-10
Attn: R. E. Lockhart, Chairman, PUCC

The enclosed proposal was acceptable to the Program Review Panel, Working Group on Pest Management, at its June 12 94th meeting.

A copy of the meeting minutes will be provided upon receipt from the Panel.

A. B. EVANKO
Pesticide-Use Coordinator

Enclosures

FSH 3

JP ON PESTICIDES KOL PROGRAM REPORT	DEPARTMENT, AGENCY USDA, Forest Service	DATE SUBMITTED
	DIVISION Range Management	PERSON TO CONTACT/TELEPHONE NO. A. B. Evanko, 557-1460

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

JECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS	
PROJECT NO. TARGET PEST PURPOSE	(a) COMMON NAME (b) % AI OR LB/GAL (c) REGISTERED USE AND REGISTRATION NO. *(if available)*	(a) FORM APPLIED *(Dust, granule, emulsion, bait, solution, gas, etc.)* (b) USE STRENGTH (%) OR MIX	LBS AI PER ACRE OR OTHER RATE	METHOD *(Aircraft, ground, aerosol, ULV, LV, other)*	(a) ACRES OR OTHER UNIT TO BE TREATED (b) NUMBER AND DESCRIPTION OF SITES	(a) SEASON OF YEAR (b) STATE OR REGION	(a) AREAS TO BE AVOIDED (b) AREAS TO BE TREATED WITH CAUTION *(Croplands, lakes, streams, human, exposure, other*	(a) PRECAUTIONS TO BE TAKEN (b) NO. OF APPLICATIONS (c) USE OF TRAINED/CERTIFIED PERSONNEL (d) MONITORING (e) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
-RM-163 10) ickleback iminate opulation	Rotenone 2.5% rotenone 2.5% sulfoxide 5% other cube extracts Reg. Use Reg. No. 432-171	Solution	1.5 ppm product/ acre foot	Boat, pumps, possibly aircraft	806 ac. ft. (43 sur. ac.) Three inlets. Two inlets will be treated near their confluence with the lake. The southeast inlet will be treated 200 ft. upstream	July/Nov. Alaska	a) Downstream	a) Treat at low water level. Detoxify rotenone before it reaches downstream areas. b) One application c) Fishery Biologist of State and U.S. Forest Service d) See Form No. 2

FORM 2

(a) AGENCY: (Alaska Dept. of Fish and Game), USDA, Forest Service
(b) PROJECT NO.: 74-RM-163 (R10)
(c) TARGET PEST: Stickleback

2. IMPORTANCE - Stickleback, a direct competitor to rearing salmonid fish species, are extremely prolific and capable of out-competing the more desirable fish species for food and space. Control of this fish in Alaska has resulted in manyfold increases in salmonid production and notable gains to the recreational and commercial harvest.

3. AREA TO BE TREATED - The Department is cooperating with the U. S. Forest Service in establishing a recreational fishery. Approximately one mile of constructed trail is planned from Lower Trail Lake, which is accessible by road. The watershed is about 600 acres in size, with one major inlet. Portions of all inlets will be included in the treatment program. The southeast inlet will be treated about 200 ft. above its mouth. Reinfestation of the lake is not considered possible because of natural barrier falls in the outlet system.

4. METHOD - Emulsified rotenone will be applied at a rate to obtain a 1.5 ppm concentration in the lake. A boat, various 55-gallon drum pumps, back pack pumps, and possibly restricted use of aircraft will be used to disperse controlled amounts of liquid in confined areas of the lake. Experienced fishery biologists and aides will be used on the project.

5. SPECIAL PRECAUTIONS - Potassium permangenate may be used to insure further detoxification of the outlet discharge if found necessary. It is the opinion of the biologists that the rotenone will be diluted and fully oxidized prior to its emergence with other waters. Detoxification treatment will probably not be required. Rotenone is considered to have no environmental effect on other than gill-breathing aquatic life forms (fish).

6. ALTERNATIVE MATERIALS OR METHODS - Noxfish, Reg. No. 432-172 was considered and may be applied.

7. COOPERATORS - The USDA Forest Service is assisting in the development of this area for rearing salmonid fish.

8. MONITORING - Live fish in holding boxes will be used periodically along the outlet course to determine its effect on downstream fish life. The point of confluence with another major water system will be critically observed for any toxic influence.

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PERMIT TO APPLY PESTICIDES

Permit No. PCP-10 Date of Issue: 10-2-73

The Department of Environmental Conservation under authority of AS 46.03 and 18 AAC 90.010 issues a Permit to Apply Pesticides to the

Alaska Department of Fish and Game
Division of Sport Fish
Box R
Soldotna, Alaska 99669

for the purpose of applying rotenone to

the Vagt Lake System

which is located

on the Kenai Peninsula along Seward Highway 1/4 mile east of Lower Trail Lake

The treatment will consist of the addition of Pro-Noxfish to the system to obtain an initial concentration of 1.5 ppm (of Pro-Noxfish) in order to eradicate fish such as stickleback prior to stocking with species of fish deemed more desirable by the Department of Fish and Game.

In addition to general safety precautions given on the labels the following restrictions are stipulated:

Empty rotenone drums will be thoroughly rinsed and these rinses added to the treated system.

The permit expires on December 31, 1973 or upon completion of the above described project, whichever comes first, and may be revoked in accordance with 18 AAC 90.010.

Max Brewer
Commissioner
Department of Environmental Conservation

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.

NORMAN R. HOWSE
Wildlife Biologist
Chugach National Forest

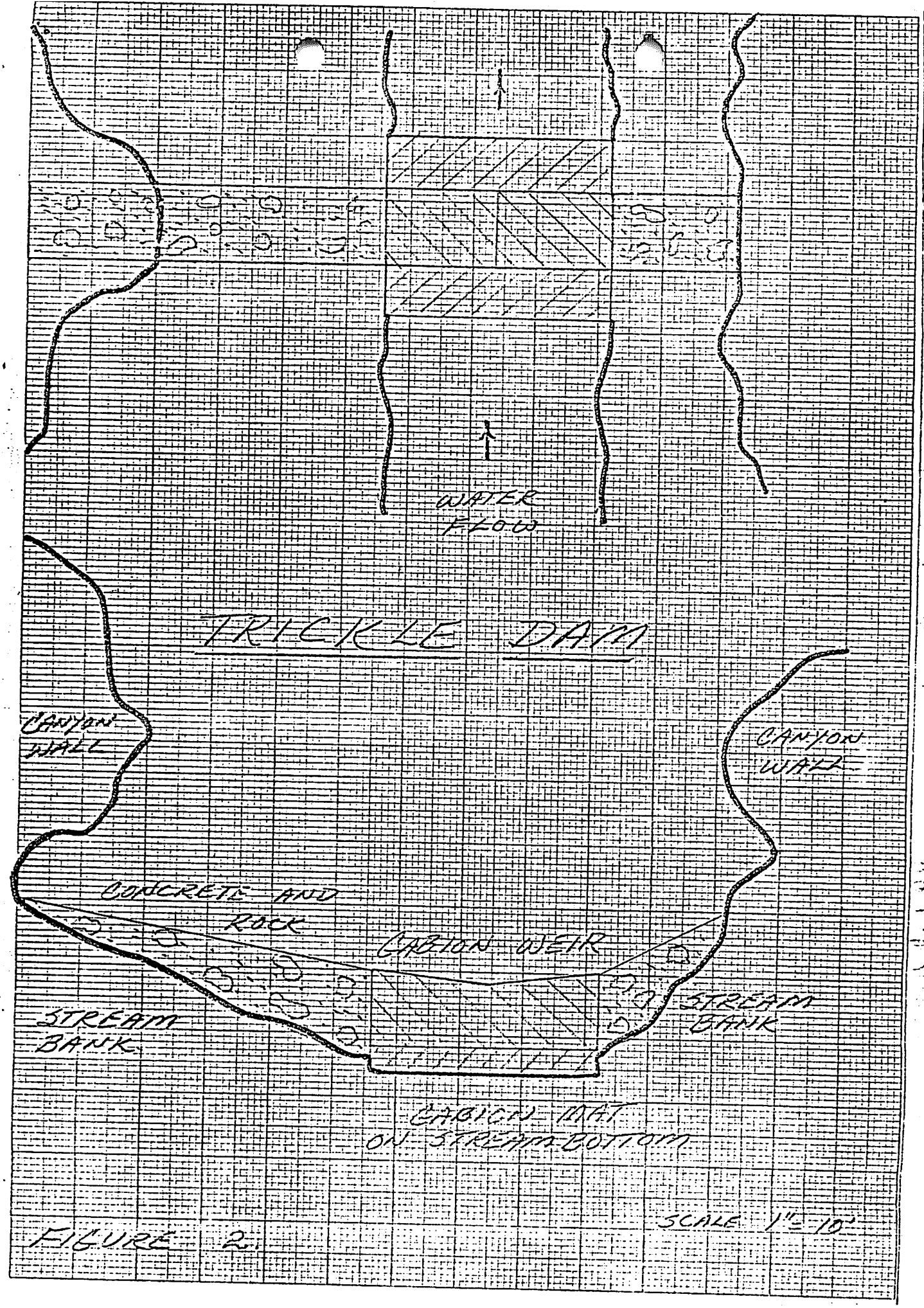

WATER FLOWS
TRICKLE DAM
CANYON WALL
CANYON WALL
CONCRETE AND ROCK
GABION WEIR
STREAM BANK
STREAM BANK
GABION MAT ON STREAM BOTTOM
SCALE 1" = 10'

FIGURE 2.

SPAWNING CHANNEL

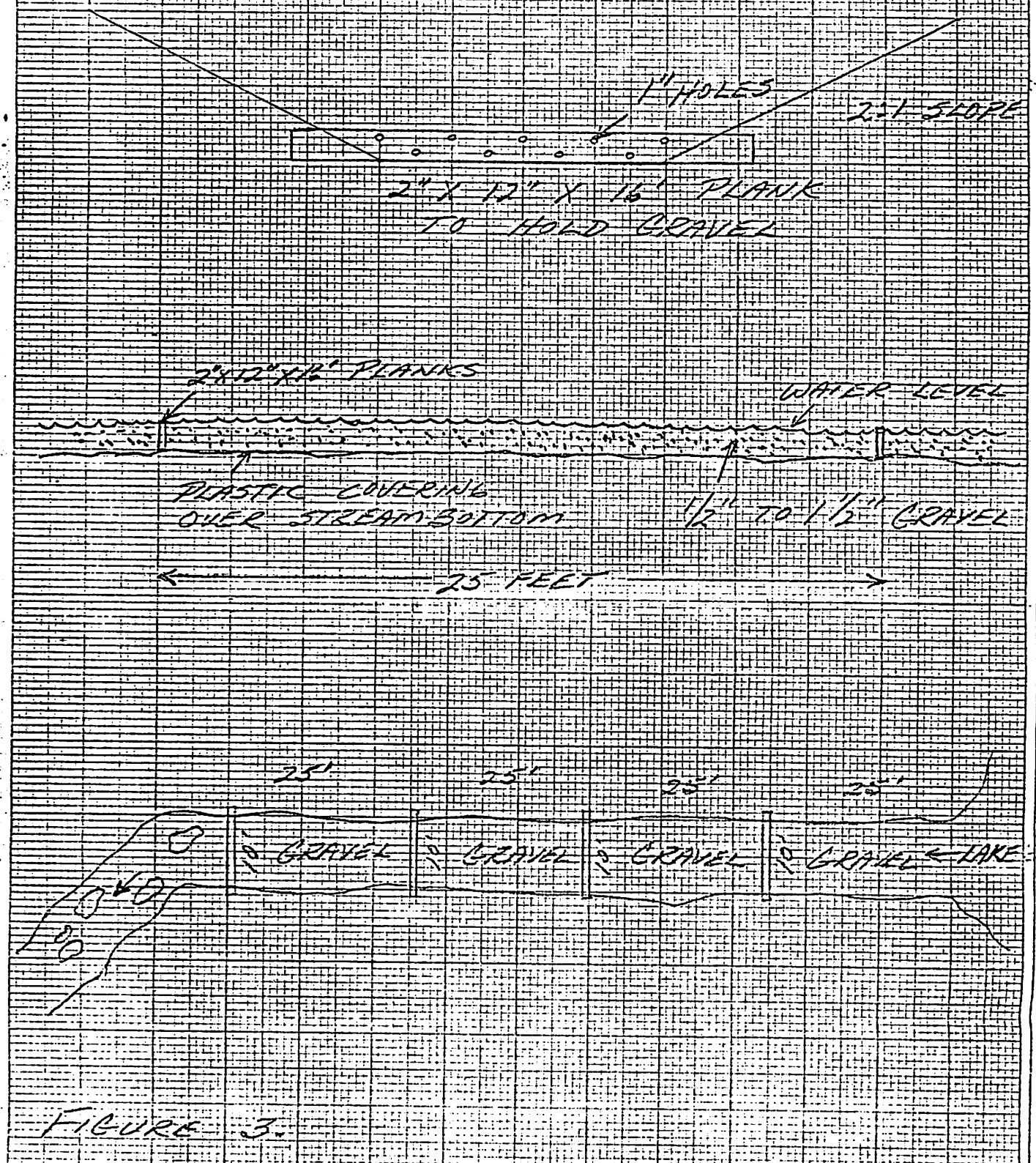
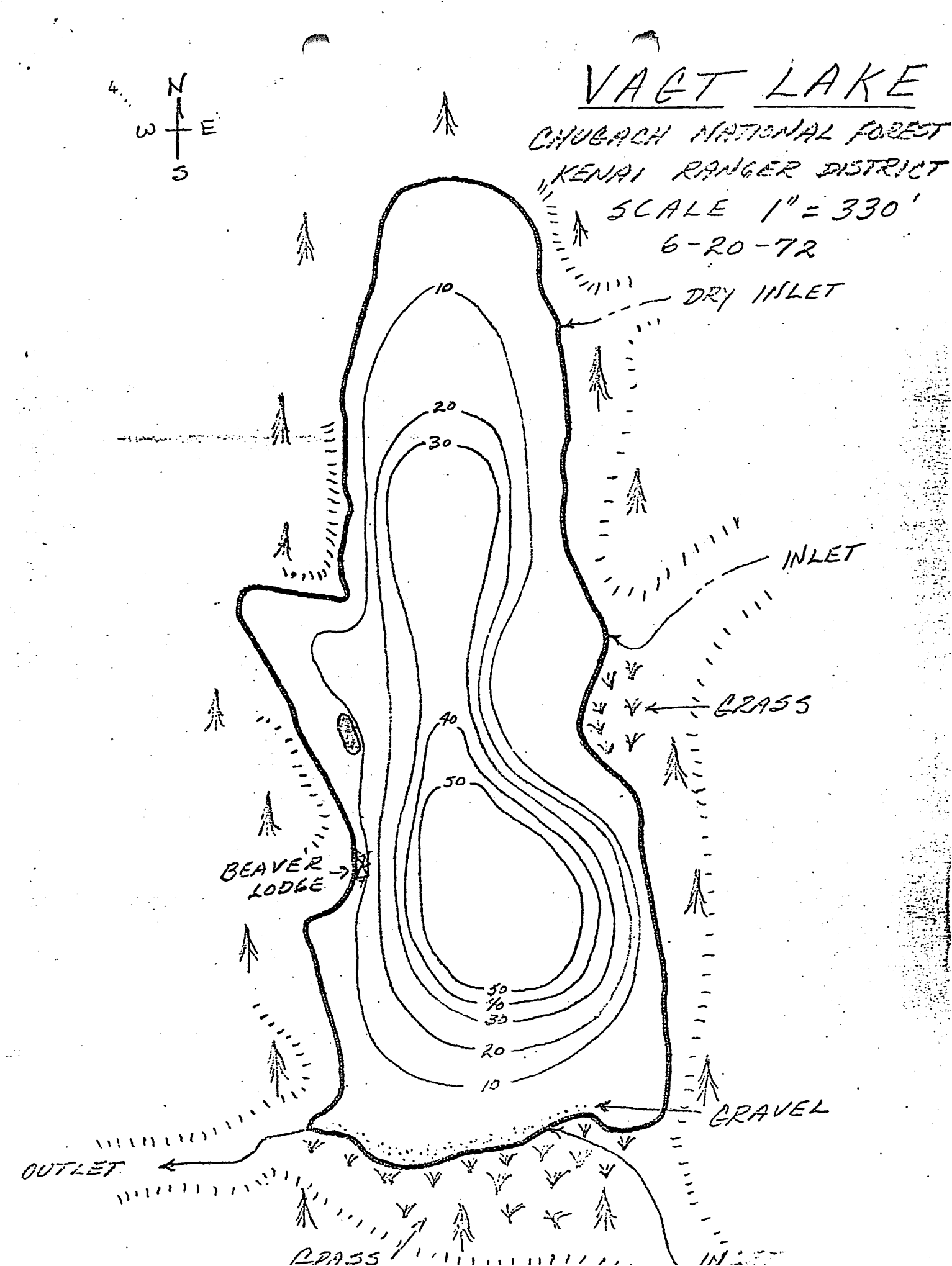


FIGURE 3.


VACT LAKE
CHUGACH NATIONAL FOREST
KENAI RANGER DISTRICT
SCALE 1" = 330'
6-20-72
N
W
E
S
DRY INLET
INLET
GRASS
BEAVER LODGE
GRAVEL
OUTLET
10
20
30
40
50
50
40
30
20
10