MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

JOB PROGRESS REPORT

State : Montana

Project Number: F-46-R-3
Job Number: II-c

Project Title: Statewide Fisheries Investigations
Study Title: Survey and Inventory of Cold Water Lakes
Job Title: Southwest Montana Cold Water Stream Investigations
Period Covered: July 1, 1989 through June 30, 1990

JOB OBJECTIVES

1. Increase late summer and fall reservoir pool in Ruby Reservoir (post-irrigation levels) to provide greater amount of aquatic habitat.

   Worked with Ruby Valley water users and SCS to formulate a reservoir management plan using predicted water availability. In order to make these water availability predictions more accurate, a low evaluation Snotel moisture measurement site was installed in the drainage.

2. Insure that land uses do not adversely affect lake water quality or tributary stream spawning habitat.

   Comments were made on U.S.F.S. timber sales and grazing allotments in critical areas where it affected reservoir or tributary stream spawning habitat.

3. Collect necessary information to properly manage mountain lake fisheries as time and funding allows.

   A total of 15 mountain lakes on the Beaverhead National Forest were gill netted and a stocking plan was formulated for each lake. In addition four other mountain lakes were surveyed for either spawning success or population/species data.

4. Maintain catch rates at an acceptable level for mountain lake cutthroat fisheries.

   McBride Lake cutthroat trout were stocked in those mountain lakes scheduled for stocking in 1988.

5. Maintain wild rainbow trout fishery in Hidden Lake sustaining 1000 angler days/year with catch rates of $\geq$0.5 fish/hour. Maintain densities reflected in average sample of $\geq$20 fish per 125 foot floating gill net set.

Floating gill nets were set in Hidden Lake to evaluate the population of wild rainbow trout. Data has yet to be analyzed.

6. Maintain fishery of Elk Lake sustaining 4000 angler days/year with catch rates of 0.5 fish/hour. Maintain densities reflected in average sample of ≥18 cutthroat trout per 125 foot gill net set with opportunity to catch trophy grayling.

   Gill nets were set in Elk Lake to evaluate the cutthroat trout and grayling fishery. Data has yet to be analyzed.

7. Maintain wild rainbow and brown trout fishery in Ruby Reservoir sustaining 4000 angler/year with catch rates of 0.5 fish/hour and rainbow densities reflected in average samples of ≥18 fish per 125 foot gill net set.

   Gill nets were set in Ruby Reservoir to determine trend data for the wild rainbow and brown trout population. Data has not yet been analyzed.

8. Develop a consistent rainbow trout fishery with opportunities to catch edible size yellow perch in Daily Lake.

   Gill nets were set in Daily Lake to determine densities of rainbow trout and yellow perch. Data has not yet been analyzed.

9. Introduce Eagle Lake strain rainbow trout to Haypress Lake and establish population as a brood source for further introductions.

   Initial plants of Eagle Lake rainbow trout were introduced into Haypress Lakes.

10. Manage Culver pond as a trophy brook trout fishery with the opportunity of catching brook trout >14 inches.

    Gill nets were set in Culver Pond to evaluate the number and sizes of brook trout present. Data has not yet been analyzed.

11. Manage McDonald Pond as a trophy rainbow trout fishery, with the opportunity of catching rainbow trout >18 inches.

    Gill nets were set in McDonald Pond to determine the number and sizes of the wild rainbow trout population. Data has not yet been analyzed.

12. Provide opportunity for catching trophy size cutthroat trout in selected mountain lakes of the region.

    No activity in this objective.

VARIANCES

12. No lakes were identified during this period as having potential for a trophy sized cutthroat trout fishery.

PROCEDURES

Mountain lakes were sampled by using an inflatable boat packed in on horses and/or backpacks or through motorized boats, when possible. Sinking monofilament and/or nylon floating experimental mesh gill nets were set in each lake during the overnight period (12 to 18 hr.). Most of the gill nets were of the sinking variety except in Wade, Cliff, Sawtooth and Twin Lakes where floating gill nets were also used. Fish captured were measured to the nearest 0.1 inch, weighted to the nearest 0.01 pound. Scale samples were taken and aged using annulus formation for fish captured in Rainbow, Sawtooth, Twin, Upper Seymour, and Warren lakes. Stomach contents of some captured fish were examined in the field to determine food items consumed immediately prior to sampling. Stomach contents were classified into broad food groups, including zooplankton, aquatic macroinvertebrates (usually insects), adult aquatic insects (usually mature forms eaten off the water's surface), terrestrial insects, fish, leeches, and clams. Fish condition was calculated as:

$$K = \frac{100{,}000 * W}{L^3}$$

Where: K = Coefficient of Condition
W = Weight in Pounds (nearest 0.01)
L = Length in Inches (nearest 0.1)

Surface areas and elevations of sampled lakes were obtained from the "Beaverhead National Forest Lake Inventory" (revised April, 1989). This was also the source for correct names of mountain ranges and stream drainages which contained the lakes. Depth profiles were measured across at least two transect per lake for all lakes except Twin and Skytop lakes. Secchi disk depths and temperature profiles sere measured in Continental, Crystal, Lion, Mystic, Oreamnos, Rainbow, Sawtooth, and Warren lakes. The amount and accessibility of potential spawning habitat was assessed by walking the shoreline of each lake and surveying any inlet and/or outlet streams to a point where fish passage was believed possible. In Cliff and Wade Lakes fish were also sampled utilizing night electrofishing.

In addition to the formal surveys, a local angler who fished high mountain lakes was contacted. He provided information on his catches by species and size class.

FINDINGS

BEAVERHEAD NATIONAL FOREST LAKES

Bear Lake

Physical Description - Bear lake is a 19 acre lake at an elevation of 8,030 feet at the head of the Beaver Creek which flows into Pintler Creek. Bear Lake is located in the Pintler Mountains within the Anaconda Pintler Wilderness Area. Bear Lake was visited on August 30, 1988. The lake was in the final stages of succession and was very shallow with most of the lake shallower than five feet. The lake had no defined inlet or outlet stream. Emergent vegetation was observed along the entire margin of the lake and lily pads covered most of the lake.

Fisheries - No fish sampling was conducted, but observations along the shoreline failed to see any sign of fish activity. Given the shallow depth and lack of inlet or outlet, it is believed that Bear Lake is barren.

Recommendations - It is doubtful if Bear Lake can support a fishery. Do not try to manage the lake for fish.

Bear Lake

Physical Description - Bear Lake is a six acre lake located at an elevation of 7,580 feet in the West Pioneer Mountains. The lake was surveyed on August 29 and 30, 1989. It is in an alpine meadow. Lily pads cover the surface of the lake along most of the shoreline. The inlet stream has a low gradient for approximately 0.25 mile above the lake. There is abundant spawning habitat in this portion of the inlet. The lake basin drops off quickly to 15 to 20 feet along its east side, but depths in the west portion were no deeper than eight feet. The deepest recorded point in the lake was 25 feet.

Fisheries - A single mountain gill net set overnight captured 17 eastern brook trout. These fish averaged 11.5 inches (Range: 7.8 - 14.8) and 0.80 pounds (Range 0.24 - 1.60) and had a condition factor of 46.5 (Table 1 and Figure 1). These fish were approaching a ripe sexual condition and the sex ratio of captured fish was 2 males to 15 females (0.1:1). A cursory examination of stomach contents found that zooplankton (primarily Gammerus), terrestrial adult insects, and immature aquatic macroinvertebrates (primarily dragonfly larvae) were consumed in about equal proportions prior to sampling. There is no record of fish stocking in Bear Lake.

Recommendations - Bear Lake presently provides an opportunity to catch brook trout up to 15 inches in a remote setting. I recommend that no fish be stocked into Bear Lake.

Table 1 Summary of gill net catches including date sampled, number of

sets, species captured, number per net, and average length and weight (range) in inches and pounds for mountain lakes sampled on the Beaverhead National Forest from 1986 to 1989.

Lake (Date)	Number of Sets1/	Species	Number per Net	Average Length (Range)	Average Weight (Range)	Condition
Bear (08-30-89)	1M	Brook Trout	17.0	11.5 (7.8-14.8)	0.80 (0.24-1.60)	46.5
Crystal (08-31-88)	1M	Rainbow Trout	6.0	9.3 (7.6-11.5)	0.35 (0.19-0.65)	40.7
Highup (09-02-88)	1M	None captured				
Lion (09-02-88)	1M	Rainbow Trout	17.0	7.7 (5.6-13.5)	0.26 (0.07-1.18)	46.8
Mystic (08-31-88)	1M	Rainbow Trout	14.0	9.4 (6.3-12.9)	0.38 (0.10-0.91)	40.0
Oreamnos (08-31-88)	1M	Rainbow Trout	2.0	8.7 (6.4-11.0)	0.48 (0.12-0.83)	54.1
Pioneer (09-13-89)	1M	Cutthroat Trout	7.0	12.4 (8.5-14.8)	0.88 (0.21-1.61)	40.9
Rainbow (07-29-87)	2M	Rainbow Trout	28.0	9.2 (5.7-13.3)	0.27 (0.07-0.64)	31.6
Sawed Cabin (08-30-88)	1M	None captured				
Sawtooth (06-30-87)	2 F/S	Golden Trout	4.0	9.9 (8.6-12.7)	0.35 (0.23-0.63)	35.7
		Brook Trout	8.5	10.1 (8.2-11.2)	0.44 (0.22-0.57)	42.4
Skytop (09-13-89)	1M	Golden Trout	11.0	13.5 (11.3-15.4)	0.88 (0.60-1.26)	35.7
Twin (Lower) (08-26-86)	1M	Brook Trout	15.0	9.6 (7.3-11.4)	0.44 (0.18-0.62)	48.7
		Rainbow	1.0	10.5	-	

Table 1 continued.

Twin

(Upper) (08-26-86)	1F	Brook Trout	6.0	8.5 (6.7-11.3)	0.34 (0.10-0.82)	46.1
	2S	Brook Trout	3.0	11.4 (8.1-13.9)	0.65 (0.26-0.94)	43.2
		Lake Trout	4.0	14.6 (13.8-15.6)	0.91 (0.70-1.10)	28.9
		Burbot	2.5	13.4 (9.3-16.8)	0.70 (0.36-0.88)	-
Upper Seymour (09-15-89)	1M	Rainbow Trout	15.0	9.3 (6.3-13.5)	0.31 (0.09-0.85)	33.8
Warren (07-30-87)	2M	Rainbow Trout	3.0	9.8 (7.8-15.7)	0.47 (0.18-1.50)	39.2

1/ The number of nets is followed by the type of net: M = Mountain; F = Floating; S = Sinking (See methods for description of the nets).

Continental Lake

Physical Description - Continental Lake is a two acre lake located in the Pintler Mountain Range in the upper Thompson Creek drainage at an elevation of 7,776 feet. This lake is within the Anaconda Pintler Wilderness Area. A survey of this lake on September 1, 1988 found the lake had a uniform depth of between three and five feet. The lake appeared to be three to four feet lower than usual, based on water marks along the shoreline, which could be attributed to the drought conditions experienced in 1988. A secchi disk could be seen to the bottom of the lake in five feet of water. The lake had a small inlet entering from the north and an outlet at its south end which looked like it flowed only during the spring. Large boulders were observed throughout the lake and its bottom was composed of large boulders and silt. The lake was surrounded by coniferous forest. There is no trail access to the lake.

Fish Sampling - No gill nets were set in Continental Lake. It was stocked with 1,440 rainbow trout in 1946, however, no fish were observed during the survey. The lake probably cannot sustain a fish population because its shallow depth likely results in high over-winter mortality.
Recommendations - Do not try to manage Continental Lake as a fishery.

Crystal Lake

Physical Description - Crystal Lake is a three acre lake located in the Pintler Mountain Range within the Thompson Creek drainage at an elevation of 7,810 feet. This lake lies within the Anaconda Pintler Wilderness Area. The lake was surveyed on August 31, 1988. The lake is located in a mountain meadow surrounded by coniferous forest. Much of the lake is deeper than 20

feet with a maximum depth of 35 feet. A small stream enters from the northwest. The outlet is larger than the inlet and leaves the lake from the southeast. The streambed in both the inlet and outlet was predominated by silts, but there were a few small patches of gravel in the outlet which may provide spawning habitat. There were two small springs which entered the lake from the north. The western portion of the lake was covered with lily pads. A beaver lodge, which was believed inactive, was located along the northeast shoreline of the lake. The thermal profile of the lake indicated weak stratification and the lake appeared stained which was confirmed by a relatively shallow secchi disk reading of six feet (Figure 2).

Fish Sampling - A single mountain gill net set overnight captured six rainbow trout. These trout averaged 9.3 inches in length (range: 7.6 - 11.5) and 0.35 pounds (range: 0.19 - 0.65) and had a condition factor of 40.7 (Table 1). Aquatic macroinvertebrates were the predominate food item observed in a cursory examination of stomach contents. Some zooplankton, small freshwater clams, and debris were also observed. Two stomachs were empty. Supplemental sampling by angling captured an additional 11 rainbow trout. These rainbow averaged 9.0 inches (range: 7.3 - 12.7). The length frequency of all captured fish revealed little size bias between the two capture methods (Figure 3), however, both methods are known to under sample small individuals. In 1958, 2,700 rainbow trout fry were stocked into Crystal Lake. This is the only recorded plant made into the lake.
Recommendations - Based on past stocking information presented above, it appears that the rainbow trout population in Crystal Lake is self-sustaining and needs no further supplementation.

Highup Lakes

Physical Description - Highup Lakes have a surface area of five acres and are located in the Bitterroot Mountains at an elevation of 8,860 feet. Highup Lakes is two lake basins separated by a narrow rock dike with a small pond located below both lakes. These lakes were surveyed on September 11 and 12, 1989. The lakes lie within a high alpine cirque basin. Water depths in the upper lake basin drop off sharply from the shoreline to eight feet all around its perimeter. The maximum recorded depth of this upper basin was 14 feet. Most of this basin was deeper than 10 feet. No defined inlet channel to this upper basin was found. The middle basin was connected to the upper basin by a narrow channel which cut through the rock dike between the two lakes. Very little spawning gravel were observed in this channel. The middle basin had a limited amount of gravel along the north shore. The middle basin had a maximum depth of 15 feet. Most of the basin was deeper than 10 feet. The middle basin had an outlet to a very small shallow pond (the lower basin). This pond's outlet dropped immediately off the cirque basin and cascaded down a steep slope before entering Pioneer lake.

Fish Sampling - A mountain gill net set in the middle basin captured no fish. No fish were observed in any of the lake basins during the survey. No evidence of fish was seen. There is no record of fish ever having been stocked into Highup Lakes.

Recommendations - Stocking westslope cutthroat fry is recommended for both

the middle and upper basin of Highup Lakes. Stock 200 fry into the upper basin and 300 fry into the middle basin. The lower pond should be able to support fish. A five year stocking rotation should provide a good fishery in the upper two basins. Westslope cutthroat is recommended because it appears Pioneer Lake, lower in the drainage, may have originally had westslope cutthroat trout and there may still be a few pure strain westslope remaining in that lake. It would be an opportunity to evaluate westslope cutthroat trout in high mountain lakes east of the divide. An assessment of stocking success should be made by surveying the lake again three to four years after the initial stocking.

Lion Lake

Physical Description - Lion Lake is an eight acre lake at an elevation of 7,635 feet which lies within the Thompson Creek drainage in the Pintler Mountain Range. This lake is within the Anaconda Pintler Wilderness Area. Lion Lake was sampled on September 1 and 2, 1988. The maximum depth of the lake is 42 feet. Much of the lake is deeper than 30 feet. Temperature measurements by depth detected weak thermal stratification and a secchi disk reading of 14 feet indicated the lake was clear (Figure 5). The major inlet to the lake was on the southwest corner of the lake. This tributary had excellent spawning habitat along approximately 100 feet of the stream immediately upstream from the lake. Two other small inlets north of the major inlet had limited spawning habitat. The outlet flowed through a swampy area at the southeast corner of the lake. This swampy area was a floating bog which covered an undetermined portion of the southeast portion of the lake. A diver could not swim far enough under this floating portion to ascertain its limits. It extends towards shore at least 15 linear feet from its outer edge.

Fish Sampling - A single overnight mountain gill net set captured 17 rainbow trout. These trout averaged 7.7 inches in length (range: 5.6 - 13.5) and 0.26 pounds (range: 0.07 - 1.18) and had a condition factor of 46.8. Stocking records documented a single release of 2,265 trout made in 1958. It appears that this lake has adequate reproduction with several length groups represented in the gill net catch. Cursory examination of captured fish stomachs found that zooplankton, aquatic invertebrates, Oligocheates, and terrestrial insects were the primary food items. Snails, dragonfly larvae, small fish, spiders, and aquatic beetles were also observed. The sex ratio was about 1.0 male to 1.0 female. Supplemental sampling via angling captured several larger rainbow up to 19 inches.

Recommendations - No supplemental stocking is necessary. This lake provides a self-sustaining rainbow trout fishery.

Mystic Lake

Physical Description - Mystic Lake is an 18 acre lake located in the Pintler Mountain Range within the Howell Creek drainage at an elevation of 7.916 feet. The lake was surveyed on August 30 and 31, 1988. The lake has a maximum depth of 51 feet and much of the lake is deeper than 20 feet. The

lake is surrounded by coniferous forest with a few small meadows along the west and north ends of the lake. The inlet to the lake is a stream which enters from the west near a Forest Service cabin. This stream contains suitable spawning gravel and is accessible from the lake. Several small springs also enter the lake from the west. The outlet stream leaves the lake from the east and flows through several log jams near the lake. Little spawning habitat was observed in the outlet stream. The south, northwest and north perimeter of the lake was covered with lily pads. Large rocks and downed trees provided abundant cover along the edges of the lake where lily pads were absent. The thermal profile of the lake indicated some thermal stratification and a secchi disk reading of 20 feet indicated relatively clear water (Figure 6).

Fish Sampling - An overnight set of one maintain gill net captured 14 rainbow trout. The average length of these 14 rainbow trout was 9.4 inches (range: 6.3 - 12.9) and the average weight was 0.38 pounds (range: 0.10 -0.91) (Figure 7). These fish had a condition factor of 40.8. A cursory examination of the stomachs from these captured fish found the fish were feeding primarily on plankton and aquatic macroinvertebrates. The plankton was dominated by Gammerus. The aquatic macroinvertebrates were dominated by aquatic beetles and immature insects. many of the stomachs contained very little food or were empty and several contained only debris. A total of 18,880 rainbow and 30,500 cutthroat of an unknown strain (most likely Yellowstone cutthroat) have been planted into Mystic Lake between 1928 and 1958. The last recorded fish stocking was September 6, 1958 when 10,500 cutthroat trout were stocked. These were also of an unknown strain.

Recommendations - Since both cutthroat and rainbow trout were released into the lake and our sampling found what we identified as rainbow trout, it is likely that the lake is supporting a self-sustaining population of rainbow/cutthroat hybrids. I would recommend no supplemental releases of any additional fish into the lake until angling pressure increases to a level where natural reproduction cannot keep pace with harvest.

Oreamnos Lake

Physical Description - Oreamnos Lake is a ten acre lake at an elevation of 8.363 feet at the head of the Pintler Creek drainage. The lake is within the Anaconda Pintler Wilderness area in the Pintler Mountain Range. Oreamnos Lake was sampled on August 29 and 30, 1988. The maximum depth of the lake is 27 feet. Approximately one third of the lake is deeper than 20 feet. Measurement of the thermal profile of the lake found no stratification and a secchi disk depth of 15 feet indicated the lake is clear (Figure 8). Little spawning habitat was observed. The inlet stream had a low gradient immediately above the lake, but little gravel was seen in this portion of the inlet. The outlet fell steeply out of the basin before entering a meadow approximately 10 vertical feet below the lake. One spring entered the lake near the inlet. Very little suitable spawning habitat was observed.

Fish Sampling - Only two rainbow trout were captured in a single overnight mountain gill net set. These two fish were 6.4 and 11.0 inches long and 0.12 and 0.83 pounds and had an average condition factor of 54.1. Both fish

appeared to be eating plankton and Gammerus was identified in both stomachs. The last plant of rainbow trout into Oreamnos Lake was made in 1960 when 1,500 fingerlings were released. Prior to that time, 29,000 rainbow trout were stocked in 1951 and 1959, and 7,200 undesignated cutthroat trout were stocked in 1934. Obviously, there is some reproduction occurring, however, it is extremely limited and given the high angler use of the lake, based on observed campsite use, the population should be supplemented.

Recommendations - Stocking of 1,000 westslope cutthroat fry (0 to 3 inches long) every four to five years is recommended. Westslope cutthroat trout were observed in upper Pintler Creek below the lake. The genetic purity of this cutthroat population is unknown. If this cutthroat population is pure westslope, only westslope cutthroat should be stocked into the lake. If the genetic integrity of the creeks's cutthroat population has been compromised, McBride stock of Yellowstone cutthroat or rainbow trout could be released into the lake. A survey of the lake should be repeated four years after the first plant to evaluate planting success. Given the apparent high use level of the lake, based on observed campsite use, it may be necessary to stock at a slightly lower stocking rate every two years.

Pioneer Lake

Physical Description - Pioneer Lake is situated in the headwaters of Pioneer Creek. It is a four acre lake at an elevation of 8,760 feet in the Bitterroot Mountains. The surface temperature was 49 F on September 12, 1989. Its maximum depth was 21 feet. Much of the lake was shallower than 10 feet. Several springs enter the lake from the west. Gravel was abundant along the west shoreline of the lake near these springs. The outlet flowed approximately 50 feet over large boulders before dropping off the basin in a series of cascades.

Fish Sampling - A single mountain gill net set captured seven cutthroat trout. Some of these cutthroat appeared to be pure westslope cutthroat, some appeared to be Yellowstone cutthroat, and some appeared hybridized between the two. Genetic analysis of this population should be conducted. there is no recorded of any fish planting in Pioneer Lake, however, very early plantings were often not well documented. Since there is not record of recent releases into the lake, it appears that this cutthroat population is successfully reproducing, probably using the gravel at the west side of the lake. The average length and weight of the seven captured fish was 12.4 inches (range: 8.5 - 14.8) and 0.88 pounds (range: 0.21 - 1.61), and they had a condition factor of 40.9 (Figure 9). Cursory examination of stomach contents found the fish were eating leeches, immature aquatic macroinvertevrates, (primarily Ephemeroptera), earthworms, and terrestrial insects (beetles). No zooplankton was observed in any stomachs. A gill net sample taken in 1981 (Wells 1982) captured a single cutthroat trout that was 13.5 inches long.

Recommendations - Stocking of fish is not necessary. The genetic status of the existing population should be determined. If this population is a pure strain of westslope cutthroat, utilizing this strain of cutthroat as a source for a high mountain lake westslope cutthroat strain should be considered.

Rainbow Lake

Physical Description - Rainbow Lake is an 18 acre lake located at an elevation of 7,860 feet in the Anaconda Pintler Wilderness area of the Pintler Mountain Range. The lake lies at the headwaters of the West Fork of Fishtrap Creek. A survey of the lake was completed on July 28 and 29, 1987. The maximum depth of the lake is 35 feet and much of the lake is deeper than 20 feet. coniferous forest surrounds most of the lake except for an open avalanche area on the southwest side. The inlet stream, a small cascading spring, flows through this avalanche area before entering the lake from the southwest. The outlet leaves the lake from the northeast. Logs and debris choke the mouth of the outlet. The outlet flows over large boulders and falls off the cirque basin containing the lake. Downed logs and rocks provide cover around most of the perimeter of the lake. No thermal stratification occurred, based on temperature profile measurements, and water in the lake is very clear with a secchi disk reading of 27 feet (Figure 10).

Fish Sampling - A total of 56 rainbow trout were captured in two mountain gill nets set overnight. The average length of these captured fish was 9.2 inches (range: 5.7 - 13.3) and the average weight was 0.27 pounds (range: 0.07 - 0.64) and had a condition factor of 31.6 (Figure 11). The high catch rate and low condition factor indicates that fish densities in this lake may be too high and growth has been affected. A cursory examination of stomach contents found chironomid larvae to be the predominate food item. Plankton (Gammerus was identified in several stomachs), terrestrial insects, and debris made up the rest of the stomach contents. Three fish had empty stomachs. No record of any fish stocking into Rainbow Lake could be found.

Recommendations - The origin of the rainbow trout inhabiting this lake is unknown. Electrophoretic analysis should be done to determine their genetic makeup. These fish appear to be reproducing successfully, even though no suitable spawning habitat was observed. The West Fork of Fishtrap Creek below the lake supports a population of what appear to be pure westslope cutthroat trout. It would be worthwhile to evaluate the genetic purity of this population to determine if it has maintained its genetic integrity even though there is a rainbow trout population in its headwater lake. No further stocking of rainbow trout into Rainbow Lake is recommended. If the rainbow trout population in the lake is reduced to a level where stocking is necessary, it is recommend that emphasis should be shifted to westslope cutthroat, especially if genetic analysis of cutthroat from the West Fork of Fishtrap reveals this population to be pure westslope.

Sawed Cabin Lake

Physical Description - Sawed Cabin Lake is a five acre lake at an elevation of 8,422 feet which is in the headwaters of the Pintler Creek drainage within the Pintler Range. This lake is within the borders of the Anaconda Pintler Wilderness Area. The lake was surveyed on August 29 and 30, 1988. The maximum depth of the lake is 13 feet and much of the lake is deeper than 10 feet. An inlet stream enters the lake from the southwest. This stream contains about 100 square feet of spawning gravel immediately upstream from

the lake. The outlet leaves the lake to the east and flows about 150 feet before dropping as a water fall off the cirque basin containing the lake.

Fish Sampling - An overnight mountain gill net set captured no fish. No fish were observed in the lake. There is no documentation of the lake having ever been planted.

Recommendations - The stocking of 500 westslope of McBride strain Yellowstone cutthroat trout into the lake is recommended. If westslope cutthroat trout are available and can be planted in both Oreamnos and Sawed Cabin lakes, this would be the desired species. Westslope cutthroat trout would be more in concert with wilderness area management because it was native to the area. Stocking fish into Sawed Cabin Lake will require special coordination with the Forest Service, given that the lake does not have a history of fish planting. The lake should be re-surveying every four years following the first release of fish into the lake. The first sampling would determine the success of the initial fish release. The second sampling would discover if they can reproduce successfully in the inlet stream. If westslope cutthroat trout do not demonstrate an ability to reproduce in the inlet, a switch to McBride strain Yellowstone cutthroat trout should be considered. If no reproduction can be obtained from either westslope or Yellowstone cutthroat, westslope cutthroat fry should be stocked every five years.

Sawtooth Lake

Physical Description - Sawtooth Lake is a 16 acre lake located in the Pioneer Mountains at an elevation of 8,511 feet near the head of Clark Creek. Sawtooth Lake was sampled on June 29 and 30, 1987. The maximum depth was over 60 feet and much of the lake was over 20 feet deep. The lake has coniferous forest on its north side, scree rock and cliffs on its south and southwest sides, and a mix of scattered timber and meadow on its southeast and east sides. The inlet enters from the southeast and flows through a low gradient meadow before entering the lake. There is abundant spawning gravel in the inlet stream above the lake. The outlet leaves the lake at its northwest side. The outlet flows through log debris and over large rock for approximately 100 yards before dropping steeply into a series of cascades. Cover in the lake is provided by submerged logs along its north shore and large boulders along the south shore. A shallow bar composed of sands and silts dominates the east shoreline. There are large boulders scattered within the lake along its northwest corner. Some thermal stratification was evident based on a thermal profile and the lake was very clear with a secchi disk reading of 39 feet (Figure 12).

Fish Sampling - One floating experimental and one mountain gill net were set overnight. These two nets caught a total of 17 brook trout and eight golden trout. The eight golden trout averaged 9.9 inches long (range: 8.6 - 12.7) and 0.35 pounds (range: 0.23 - 0.63) and had a condition factor of 35.7 (Figure 13). The 17 brook trout averaged 10.1 inches long (range: 8.12 - 11.2) and 0.44 pounds (range: 0.22- 0.57) and had a condition factor of 42.4. A cursory examination of the stomachs from these fish found that aquatic and terrestrial insects predominated. Plankton was observed in three stomachs and three stomachs were empty. There appeared to be little

difference in use of food items between the two species.

The Montana Department of Fish, Wildlife and Parks has been managing Sawtooth Lake as a golden trout fishery and refuge since it stocked golden trout into the lake in 1959 (personal communication, Dick Oswald, MDFWP, Dillon). This initial release of golden trout was made after an airplane carrying a cargo of insecticide crashed into the lake totally killing all life in the lake. No subsequent stocking was done. It appears that brook trout either ascended the creek to enter the lake or were illegally introduced. The present population of brook trout is made up of a single year class (age 3), so an illegal introduction is likely responsible for their presence.

Recommendation - In the future fish should not be stocked into the lake and the brook trout limit should be liberalized to reduce potential competition between brook and golden trout.

Skytop Lake

Physical Description - Skytop Lake is a five acre lake located at an elevation of 9,370 feet in the Bitterroot Mountains near the Continental Divide. The lake lies within the Pioneer Creek drainage. A survey of the lake was conducted on September 12 and 13, 1989. Its maximum depth is 36 feet. A survey of the lake indicated it lies within a relatively uniform cirque basin. The lake has no defined inlet stream. A large snowfield was present along its western shore and this snowfield contributes water to the lake throughout the summer. The outlet flows approximately to 20 feet before dropping down series of cascades and falls as it leaves the cirque basin containing the lake. Visibility into the water was estimated to be 15 to 20 feet.

Fish Sampling - A total of 11 golden trout were captured in a single mountain gill net set. These fish averaged 13.5 inches (range: 11.3 - 15.4) and 0.88 pounds (range: 0.60 - 1.26) and had a condition factor of 35.7 (Figure 14). These fish appeared to have recently completed spawning. Spawning success for these fish is unknown because no stream spawning habitat was available. An examination of stomach contents revealed that these fish were primarily consuming plankton. Some fish had consumed benthic macroinvertebrates. One fish had eaten some type of small freshwater clam and one fish had eaten ants.

Approximately 500 golden trout fry had been planted into the lake on September 15, 1984. Based on that information, the fish sampled in 1989 would be five years old. It appears that his plant experienced high survival, but it is unknown if they are able to successfully reproduce. Length frequencies for captured fish indicates the population is made up of a single year class. Consequently, it is doubtful that these fish are successfully reproducing.

Recommendations - It is recommend that 500 golden trout fry be stocked every five to six years. The lake should be managed as a remote refuge and fishery for large golden trout. Every effort should be made to retain the remote nature of the lake. Access is presently not too difficult, even though no

designated trail goes to the lake. The lake can be reached in approximately an hour from Pioneer Lake.

Twin Lakes

Physical Description - Twin Lakes have a surface area of 75 acres and are located at the head of the Big Lake Creek drainage in the Bitterroot Mountains at an elevation of 7,235 feet. These lakes were surveyed on August 25 and 26, 1986. Twin Lakes comprise two lake basins separated by a rock dike with an open channel through it. The lower basin is a relatively shallow basin with abundant lily pads covering the surface. The upper basin is a steep sided deep basin with little shoreline structure. No depth or temperature information was collected.

Fish Sampling - Two experimental floating and two experimental sinking gill nets were set overnight. One floating net was set in the lower basin and two sinking and one floating net were set in the upper basin. A total of 15 brook trout and one rainbow trout were captured in the floating net set in the lower basin. The 15 brook trout averaged 9.6 inches long (range: 7.3 - 11.4) and 0.44 pounds (n = 3) (range: 0.18 - 0.62) and had a condition factor of 48.7 (Figure 15). The single rainbow trout was 10.5 inches long. A total of six brook trout which averaged 8.5 inches long (range: 6.7 -11.3) and 0.34 pounds (range: 0.10 - 0.82) and had a condition factor of 46.1 were captured in the one floating net set in the upper basin. A total of six brook trout, eight lake trout, and five burbot were captured in the two sinking gill nets set in the upper basin. The brook trout averaged 11.4 inches long (range: 8.1 - 13.9) and 0.65 pounds (range: 0.26 -0.94) and had a condition factor of 43.2. The lake trout averaged 14.6 inches long (range: 13.8 - 15.6) and 0.91 pounds (range: 0.70 - 1.10) and had a condition factor of 28.9. The burbot averaged 13.4 inches long (range: 9.3 - 16.8) and 0.70 pounds (n = 3) (range: 0.36 - 0.88). A total of 3,960 rainbow trout were planted into Twin Lakes in 1963. This is the only recorded plant of fish into the lakes.

Twin lakes were sampled in 1964, 1970 and 1978. Results for these years and 1986 are presented in Table 2. Rainbow trout appear to be present in limited numbers and declining. Brook trout numbers and sizes appear to be stable during this period. Lake trout numbers appear somewhat stable, but the number of large fish may be declining. Burbot numbers and sizes appear to be stable.

Recommendations - Twin Lakes supports a population of lake trout which is believed to be a relic native population (Brown 1971). The burbot population is also probably a native population. Further studies should determine the status of these two populations. It appeared from this sampling that a single year-class of lake trout was present, but other age classes may have been using different depths or geographic areas of the lake. I recommend no further stocking of the lakes. The upper lake should be managed as a refuge and fishery for lake trout. The lower basin provides a good brook trout fishery which is easily accessible from the campground.

Upper Seymore Lake

Physical Description - Upper Seymour Lake is a 35 acre lake at an elevation of 8,270 feet at the head of the Seymour Creek drainage in the Pintler Mountains. The lake lies within the Anaconda Pintler Wilderness Area. The maximum depth of the lake was 84 feet. Water depths in the west half of the lake dropped off sharply to 30 feet or more. the lake was extremely clear and the bottom could be seen at 30 feet. The surface temperature on September 15, 1989 was 50 F. The inlet which entered from the northwest split into three channels prior to entering the lake. Two of these channels contained spawning gravel with an estimated surface area of approximately 300 square feet. The outlet dropped into a series of cascades immediately after leaving the lake.

Fish Sampling - A single mountain gill net set overnight captured 15 rainbow trout (one of which was released). The average length and weight of the 14 measured fish was 9.3 inches (range: 6.3 - 13.5) and 0.31 pounds (range: 0.09 - 0.85) (Figure 16). These fish had a condition factor of 33.8. A total of 19,000 rainbow trout and 9,200 cutthroat trout were stocked into "Seymour Lake" (which is assumed to be Upper Seymour Lake) between 1931 and 1940. No stocking in the lake was recorded after 1940.

Recommendations - The age structure for captured fish indicates Upper Seymour Lake supports a healthy reproducing population of rainbow trout (Figure 16). No further stocking of the lake appears necessary.

Warren Lake

Physical Description - Warren Lake is an 18 acre lake at an elevation of 8,462 feet located in the Anaconda Pintler Wilderness in the Pintler Mountain Range. Warren Lake was sampled on July 29 and 30, 1987. The lake lies within a relatively shallow cirque basin. Most of the lake is less than 10 feet deep, but a few areas were up to 15 feet deep. Several springs enter a shallow bay on the west side of the lake. These springs drain a wet marshy area and contain no spawning gravel. A small area of potential spawning habitat was observed at the mouths of these springs. A secchi disk could be seen to the bottom at 13 feet, indicating relatively clear water (Figure 17).

Table 2. Number of fish per gill net set, average length, average weight, and their respective ranges for Twin Lakes for the 1964 -1988 period.

Year	No. of nets[1]	Number/ net	Average Length(in)	Average Weight(lbs)
			Eastern Brook Trout	
1964	2	9.5	11.4 (7.7 - 15.6)	0.61 (0.15 - 1.60)
1970	2	11.0	9.8 (6.2 - 14.3)	0.49 (0.10 - 1.04)
1978	2	7.5	9.5 (7.1 - 14.2)	0.39 (0.12 - 1.14)
1986	4	6.7	9.7 (6.7 - 13.9)	0.49 (0.10 - 0.94)
			Rainbow Trout	
1964	2	1.0	10.3 (9.8 - 10.8)	0.39 (0.32 - 0.46)

1970	2	1.5	17.5 (14.6 - 19.7)	1.94 (1.29 - 2.72)
1978	2	-		
1986	4	0.2	10.5	-
			Lake Trout	
1964	2	3.0	19.2 (16.2 - 25.7)	2.66 (1.14 - 7.00)
1970	2	1.0	15.8 (15.6 - 16.0)	1.10 (1.07 - 1.12)
1978	2	1.0	17.8 (16.2 - 19.5)	1.88 (1.45 - 2.30)
1986	4	2.0	14.6 (13.8 - 15.6)	0.91 (0.70 - 1.10)
			Burbot	
1964	2	2.0	15.2 (13.0 - 17.9)	0.80 (0.45 - 1.24)
1970	2	3.5	13.4 (11.9 - 15.2)	0.57 (0.39 - 0.85)
1978	2	1.0	18.7 (16.0 - 21.5)	1.68 (1.12 - 2.24)
1986	4	1.2	10.2 (9.3 - 16.8)	0.69[2] (0.32 - 0.86)

[1] Both nets set in upper basin in 1964 and 1978, one net set in upper and one lower basin in 1970, and two nets set in upper and two in lower basin in 1986.

[2] Lengths based on a sample of all fish, while weights based on a smaller sample of fish.

Fish Sampling - Two mountain gill nets set overnight captured a total of six rainbow trout. These six fish averaged 9.8 inches (range: 7.8 - 15.7) and 0.47 pounds (range: 0.18 - 1.50) and had a condition factor of 39.2 (Figure 18). A cursory examination of the stomachs from captured fish found that these fish were feeding primarily on flying ants. A total of 25,840 rainbow trout were stocked into Warren Lake in 1941 and 1944. A total of 4,800 cutthroat trout of unknown origin were released into the lake in 1950.

Recommendations - This lake's ability to support a fish population is marginal, however, it appears that the lake is supporting a small self sustaining population. Spawning habitat is limited and the lake's lack of deep water reduces its ability to over-winter fish. No further stocking of this lake is recommended.

ANGLER SURVEY OF BEAVERHEAD NATIONAL FOREST LAKES

The local angler visited 41 lakes from 1980 to 1986. His summary is presented in Table 3.

Table 3. Angler summary from Bob Flynn for high mountain lakes surveyed on the Beaverhead National Forest from 1980 to 1985.

Lake (Date)	Fish Caught	Size Range	Comments
Agnes (05-31-81)	24 Grayling	11-14"	Numerous Grayling observed
Browns	2 Brook	7-9"	

(04-12-81)	1 Rainbow		
(05-13-82)	7 Brook 1 Rainbow	9-10"	
Cowbone	None		Saw 2 or 3 Cutthroat Appeared to be 16-20
Deer head (06-18-82)	17 Cutthroat	11-14"	Spawners in creek look like Yellowstone cutthroat
(06-28,29-83)	44	9-14"	Trout feed during ice out.
(06-07-84)	30 cutthroat	11-15"	Many spawners in creek
(06-27-85)	16 cutthroat	12-15"	Many spawners in creek
Ferguson (05-17-80)	None		Saw one large trout feed
Gorge (North) (07-28,29-82)	25 cutthroat	11-12"	Saw numerous fish
(08-24-85)	13 cutthroat	11-13"	Saw numerous fish
Gorge (South) (08-12-84)	6	11-15"	Saw 20-30 trout rising, some 16 20 inches.

Table 3 continued.

Hidden[1/] 22-83)	3 Golden 1 Cutthroat 1 Brook Trout	10-12"	Saw several trout (05- around edge of ice
(05-02-84)	1 Golden	10"	Saw cutthroat, golden and rainbows
Hidden[2/] (08-20-84)	7 Cutthroat	6-13"	Saw several similar size trout rising
Hopkins (07-27-85)	None Captured		Saw a few small trout rising
Cherry (09-01,02-82)	35 cutthroat	10-16"	Saw many trout
Granite	1 rainbow	13"	Saw a few rising

(09-01-82)			
Johanna 22-81)	None captured		Saw one good trout (07- rising
Kelly Res. (06-20-82)	2 Brook Trout 1 Rainbow	10" 12"	Saw several rising
Elk (06-20-81)	5 Grayling 1 Cutthroat	10-14" 16"	Saw several rising
Lake Canyon (09-0285)	None captured		Saw 10 to 15 cutthroat
Lake of the Woods (07-16-83)	None captured		No fish seen
Lena 15-84)	5 rainbow	7-9"	Lake full of same (08- size
Lily[3/] (06-03,04-84)	10 cutthroat	9-15"	Lots of 6-20" fish seen in shallow lily
(07-14,27-84)	24 Cutthroat	8-20"	pads
(06-30-85)	8 Cutthroat 2 Rainbow	8-16"	
Lily[4/] (09-22-82)	3 Rainbow	11-13"	Saw several similar size trout rising
(08-09,23,30-83)	11 Rainbow	10-13"	
Minor (06-3,24-84)	33 Grayling 8 Brook Trout	10-13" 10-13"	Saw several fish of similar size rising

Table 3 continued.

Morrison 23-82)	1 Cutthroat	10"	Saw other trout of (07- same size rising
(08-16-85)	2 Cutthroat	20"	Saw six or seven other of similar size

1/ Clark Creek Drainage
2/ Big Swamp Creek Drainage
3/ Birch Creek Drainage
4/ Steel Creek Drainage

OTHER MOUNTAIN LAKES

Cliff Lakes

Cliff Lake is a 620-acre natural lake situated about one mile up the drainage from Wade Lake. Unlike Wade, Cliff Lake has at least three tributary streams which support spawning runs of rainbow trout. The lake has not been stocked since 1969 but over 700,000 rainbow trout were planted on top of the wild population between 1932 and 1969.

Cliff Lake produced the state record rainbow trout weighing 20 pounds, which stood from 1952 until the record was broken last year. The fishery was reputedly good until the 1950s when the rainbow population began to show signs of disease, parasitism and overcrowding. Poor food supply was the suspected problem and was attributed to the disappearance of weed beds in the lake. Sampling of the fishery in the 1970s indicated a recovery from those conditions and most recently the wild rainbow population appears to be doing well. The lake also has an abundance of small mountain whitefish and white suckers.

Due to the abundant forage and closed-basin nature of the system Cliff Lake was selected for an experimental plant of Bonneville cutthroat trout in 1990. These fish will be finclipped and stocked along with an equal number of marked McBride strain Yellowstone cutthroat for a period of three years and an evaluation will be carried out to determine the relative success of the two strains. It is anticipated that cutthroat will be more piscivorous than the resident rainbow and should attain larger sizes.

Gill net sets in October 1988 and electrofishing in October 1989 were employed in order to assess the baseline characteristics of the existing fishery. In 1988, two floating overnight gill nets captured 34 rainbow, 2 white suckers, and 2 mountain whitefish. On the night of October 3, 1989 a total of 80 minutes of electrofishing captured 119 rainbow trout and 11 mountain whitefish. Abundant populations of mottled sculpin and white suckers were sampled.

Rainbow trout from the 1989 sample ranged from 2.8-16.0 inches. Average length at age for ages 0-5, respectively, were 4.3, 9.2, 12.0, 13.4, 14.3, and 15.1 inches. Condition factors by half-inch group for fish over 6 inches ranged from 31.01 to 43.24 and averaged 37.09. These growth rates and conditions factors are markedly higher than those reported in the 1960s and would seem to indicate the present rainbow population is healthy and has overcome the earlier-reported problems.

Ramshorn Lake

Ramshorn Lake is a high mountain lake (8,500 ft. msl) at the base of Ramshorn Peak in the Buffalo Horn Creek drainage of the Madison River. It is approximately 25 acres in size and is fed by springs and snowmelt with no inlet stream. The outlet stream (Buffalo Horn Creek) flows over a gentle grade for about 100 yards before dropping into a steep, rocky channel.

On June 14,1989 approximately 200 adult cutthroat from 10-17" long were observed spawning in the outlet stream. These fish are apparent progeny from the 13,500 Yellowstone cutthroat stocked in the lake between 1950 and 1960. A sample of 25 fish was collected for electrophoretic analysis and results

showed they were pure Yellowstone cutthroat.

This lake appears to have a healthy self-sustaining fishery of outlet-spawning cutthroat. Precautions should be taken to avoid sedimentation of the basin from livestock grazing on the shorelines, which could jeopardize the long-term viability of the fishery.

Rat lake

Rat Lake is a shallow (5' max. depth), eutrophic natural lake about 20 acres in size in the Squaw Creek drainage of the Gallatin River. It has a history of producing large rainbow trout but winterkills have occurred frequently in the past. Plants of up to 10,000 Arlee rainbow per year were stocked in 1949-1986, most of those being catchable-size fish. In 1980, a single plant of 2,000 2-inch McBride cutthroat was made.

Two mountain lake gill nets were set overnight on October 5, 1989 to assess the current status of the fishery. The two nets captured 83 McBride cutthroat and no rainbow trout. From analysis of age data, it is apparent that McBride cutthroat have established a reproducing population in Rat Lake. The largest fish (19.1 inches) was probably a remnant of the 1980 plant with all the others a result of natural reproduction. Fish averaged 3.5 inches for young of the year (n=17), 8.1 inches for age 1 (n=29), 11.4 for age 2 (n=2), 13.7 for age 3 (n=15), and 16.0 for age 4 (n=19).

The age data would indicate that McBride cutthroat from the original stock in 1980 first spawned successfully in 1985 and have produced annual recruitment each year since that time. Growth rates are excellent and a healthy self-sustaining population has developed. The inlet stream is a small debris-clogged channel that should be monitored in the spring to ensure that the spawners have adequate access. The population should be managed as a self-sustaining fishery with occasional monitoring but no further stocking.

Wade Lake

Wade Lake is a 240-acre natural lake in the West Fork drainage of the Madison River. The inflow is primarily from a spring that cascades off the face of a steep hill on the south end of the lake at a flow rate of about 15 cfs. The likely source of these springs is Cliff Lake about one mile up the drainage which has no natural outlet. Likewise, Wade Lake has no outlet but reemerges as a spring downstream in the drainage which eventually feeds into Smith Lake.

Wade Lake has maintained a reputation for large fish. It was stocked with Coho salmon and cutthroat trout fry in the 1930s but neither reproduced. Rainbow plants began in 1939 and from 1946-1984 the lake was managed primarily as a put-grow-and-take fishery with annual plants of various domesticated rainbow trout strains. From 1978-1984, the annual plant consisted of 10,000 5-inch Arlee rainbow per year.

The lake's brown trout population apparently originated from a single plant of 18,700 3-inch fish in 1950. The lake has maintained a reproducing

population since that time and the state record brown trout of 29 lbs. was caught from Wade Lake in 1966. The lake also has an abundant white sucker population.

In 1985-1988, approximately 50,000 3-inch DeSmet rainbow were stocked annually in an attempt to develop a self-sustaining fishery with a wild strain of rainbow. Plants were made in late August or early September each year. Since 1986 monitoring by gill net or electrofishing has been conducted annually in the first week of October.

Gill net sampling in August 1984 revealed that the rainbow fishery was comprised mostly of three size classes of hatchery-reared Arlee rainbow. Twenty-five age 0 fish averaged 8.9 inches (7.6-9.9 in. range); thirteen age 1 fish averaged 13.4 inches (11.4-15.9 in. range); and eleven older fish ranged from 16.0-18.2 inches. Wild rainbow represented a minor component of the population.

Subsequent sampling in 1986 through 1989 has seen a dramatic decrease in the middle size classes of rainbow (9 to 18 inches) with an increase in large fish (over 18 inches). A few DeSmet rainbow from the 1986 plant were tracked through fluorescent pigment marking. They averaged 10.0 inches in Oct. 1987 (five fish sampled) and 13.7 inches in Oct. 1988 (two fish sampled). The DeSmet fish have failed to produce an adequate fishery due to poor survival.

Night electrofishing was utilized very successfully to sample the lake on October 3, 1989. A total of 103 rainbow were captured (Figure 1) in 110 minutes of electrofishing with a boom-mounted jet boat. Sixty-two of those fish were from 2.5-8.9 inches long. The lake was not stocked at all in 1989 and presumably those were all wild fish. The wide size distribution of this group suggests a prolonged spawning period as all appeared to be age 0 fish based on scale analysis.
Only two of the fish captured were between 9.0 and 17.5 inches (Figure 19). They were 10.9 and 11.0 inches long, respectively, and probably age 1 DeSmet from the 1988 plant.

The remaining 37 fish captured in 1989 were 17.8-22.3 inches long (Figure 1). All were well-conditioned trophy size rainbow weighing from two to four pounds each. Age analysis from scale samples was difficult, but these fish appear to be a mixture of 4 to 6 year old fish, probably both Arlee and wild rainbow. It is uncertain which are predominant.

Angler creel information collected during August-September 1989 reaffirms the top-heavy distribution of the rainbow population. Surveyed anglers fished 277 hours during the period and caught 46 rainbow for a catch rate of 0.17 rainbow per hour. All 46 fish caught were between 18 and 23 inches. Anglers also caught six brown trout.

Brown trout numbers have been fairly constant in the sampling over the years. Electrofishing sampling in 1989 captured 17 fish ranging from 3 to 23 inches long. As with rainbow, the brown trout sample was strongly bimodal with no medium-sized fish taken.

It is apparent from the foregoing analysis that reproduction may be a limiting factor for wild rainbow trout as well as for brown trout. The only usable spawning area is a small gravel delta at the spring mouth. Spawning fish are observed there annually, both spring and fall. The complement of large rainbow that is comprised of significant numbers of Arlee fish may be spawning in the fall as they do in the hatchery. This could account for the wide spread of sizes in age 0 fish. Presently, a feasibility study is being conducted to design a spawning channel in Wade Lake which would utilize water from the spring source. If the project is developed, there is a good chance the fishery could become self-sustaining.

Meanwhile, the fishery has responded poorly to annual fall plants of small DeSmet rainbow. For unknown reasons, survival is very limited. It's recommended that the stocking program be altered to include either overwintered DeSmet rainbow stocked in the spring or perhaps a different strain of wild rainbow such as Eagle Lake fish that can be stocked at a larger size earlier in the year. It is desirable to establish a wild rainbow trout base in Wade Lake which can utilize a spawning channel if it's completed.

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Prepared by: Richard Oswald, Brad Shepard and Wade Fredenberg.

Date: August 8, 1990

Waters Referred To:

Bear Lake	3-02-7275-03
Cliff Lake	3-13-7320-03
Continental Lake	3-02-7625-03
Crystal Lake	3-02-7675-03
Highup Lakes	3-02-8150-03
Lion Lake	3-02-8375-03
Mystic Lake	3-02-8650-03
Oreamnos Lake	3-02-8700-03
Pioneer Lake	3-02-8825-03

Rainbow Lake	3-02-8875-03
Ramshorn Lake	3-09-9272-03
Rat Lake	3-09-9310-03
Sawed Cabin Lake	3-02-8975-03
Sawtooth Lake	3-01-9460-03
Skytop Lake	3-02-9100-03
Twin Lakes	3-02-9425-03
Upper Seymour Lake	3-02-9500-03
Wade Lake	3-13-8920-03
Warren Lake	3-02-9600-03

Key Words

Lakes
High Mountain Lakes
Westslope Cutthroat Trout
Yellowstone Cutthroat Trout
Rainbow Trout
Lake Trout
Burbot

BEAR LAKE

Length Frequency - Brook trout

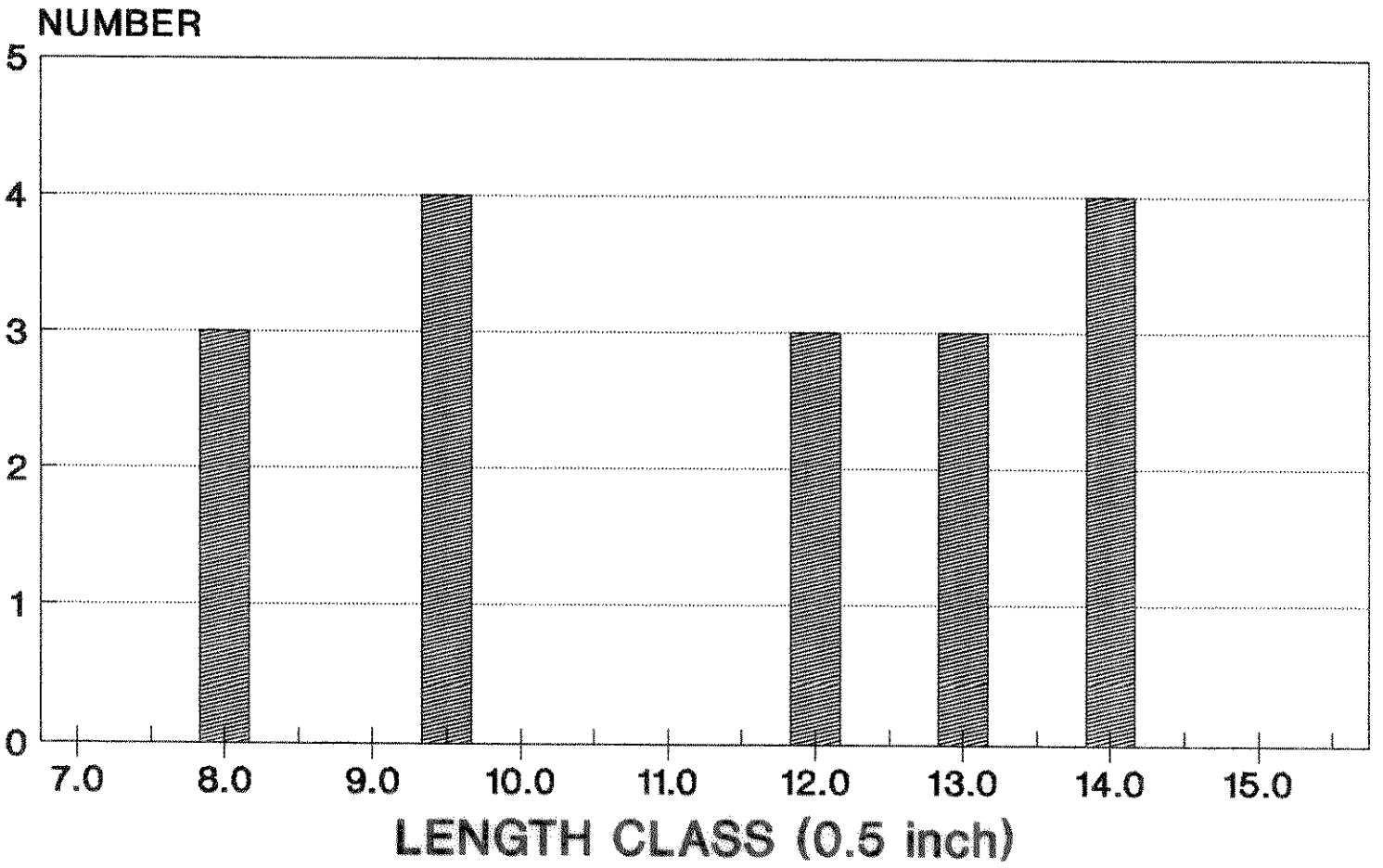


Figure 1. Length frequency (half inch length groups) for brook trout captured by gill net in Bear Lake on August 30, 1989.

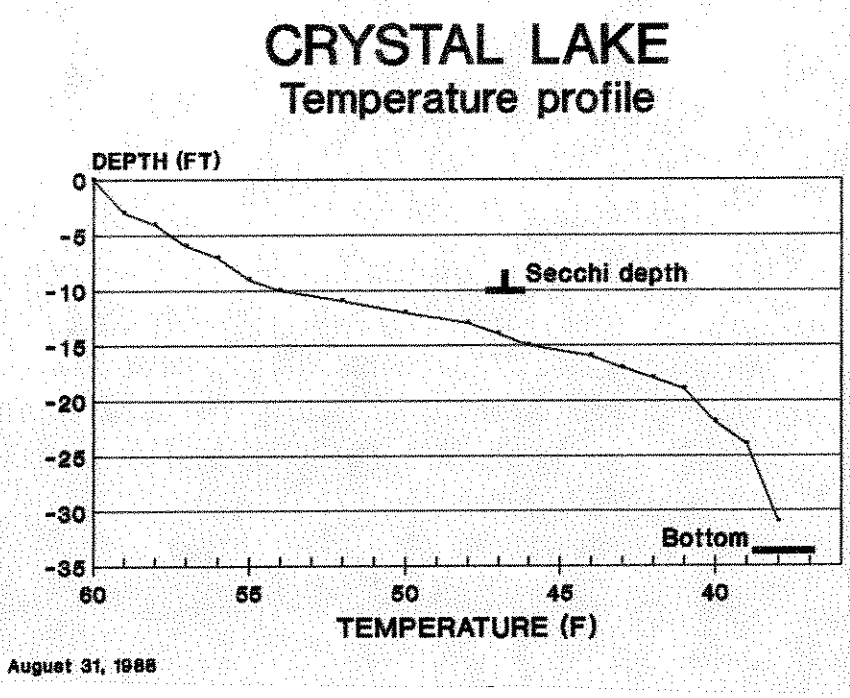


Figure 2. Temperature profile and secchi disk visible depth for Crystal Lake on August 31, 1988.

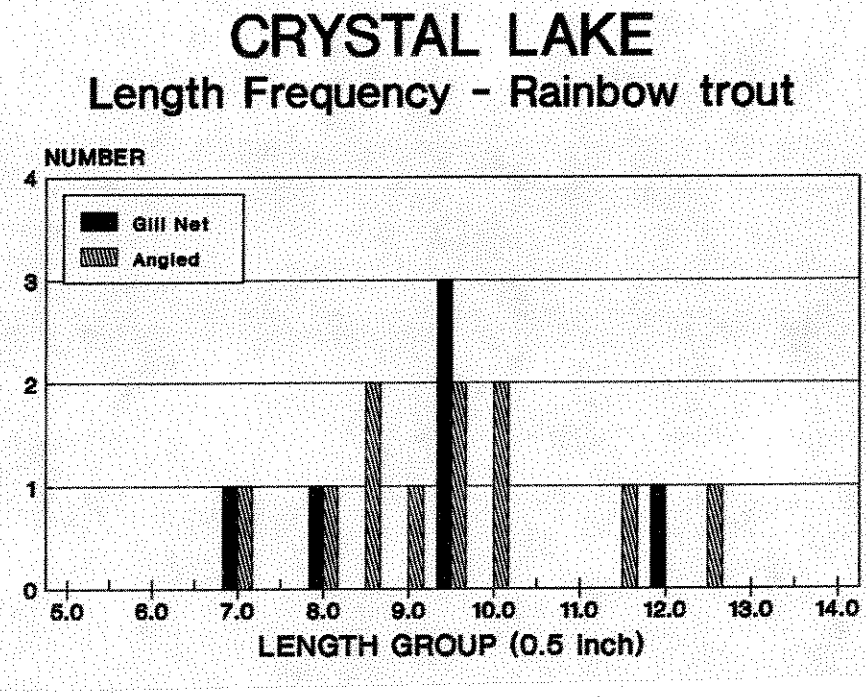


Figure 3. Length frequency (half inch length groups) for rainbow trout captured by gill net and angling in Crystal Lake on August 31, 1988.

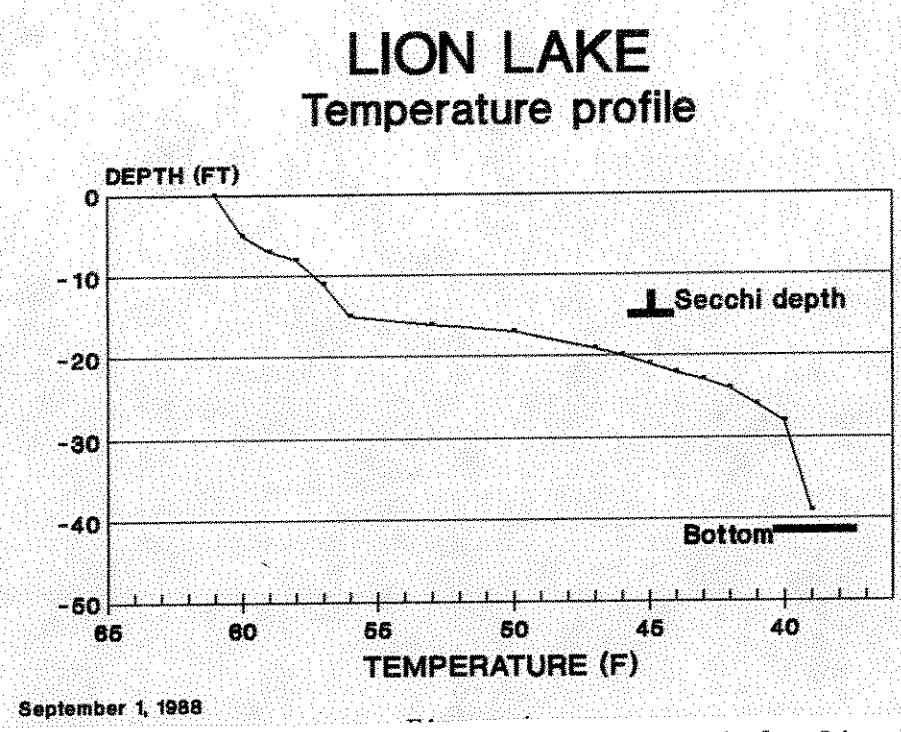


Figure 4. Temperature profile and secchi disk visible depth for Lion Lake on September 1, 1988.

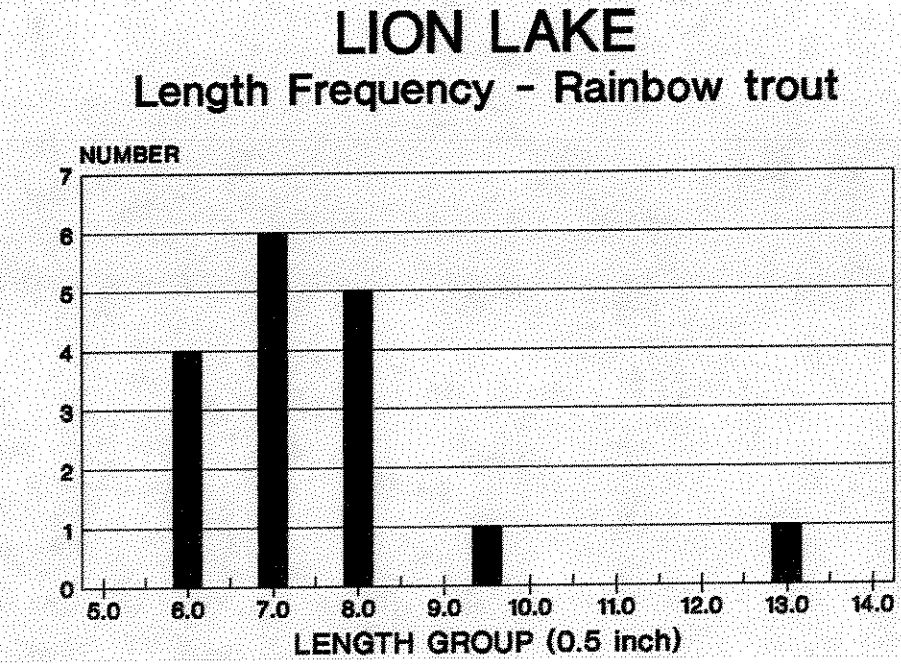


Figure 5. Length frequency (half inch length groups) for rainbow trout captured by gill net in Lion Lake on September 2, 1988.

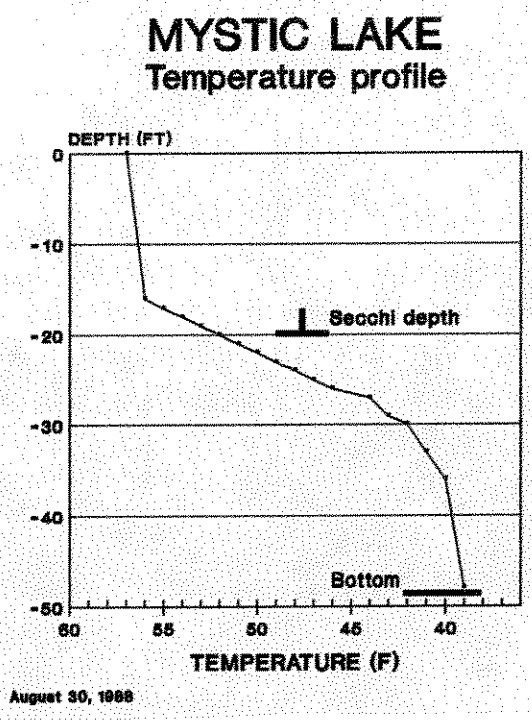


Figure 6. Temperature profile and secchi disk visible depth for Mystic Lake on August 30, 1988.

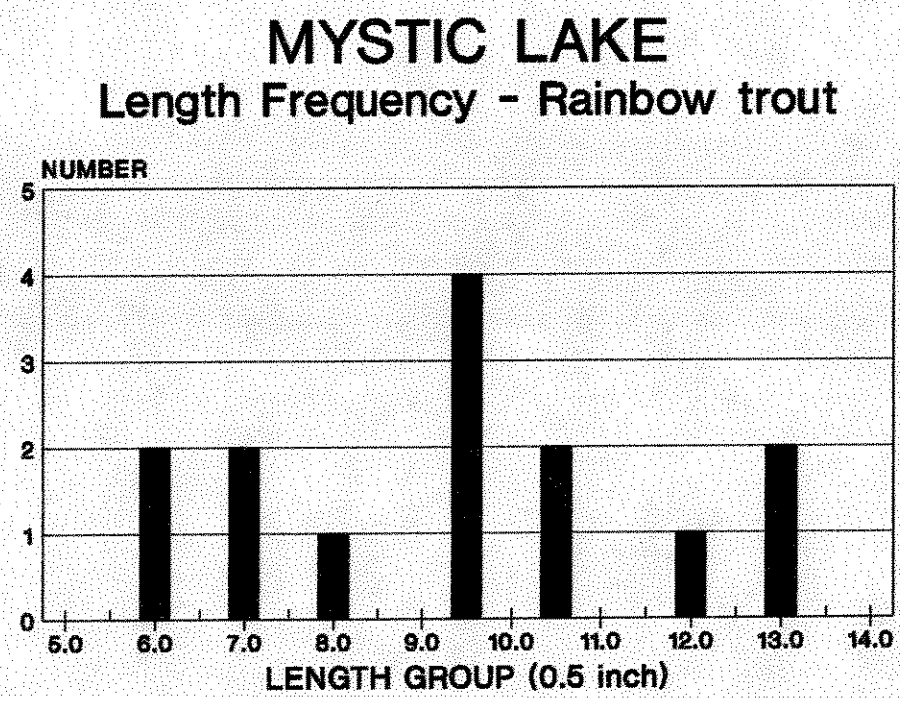


Figure 7. Length frequency (half inch length groups) for rainbow trout captured by gill net in Mystic Lake on August 30, 1988.

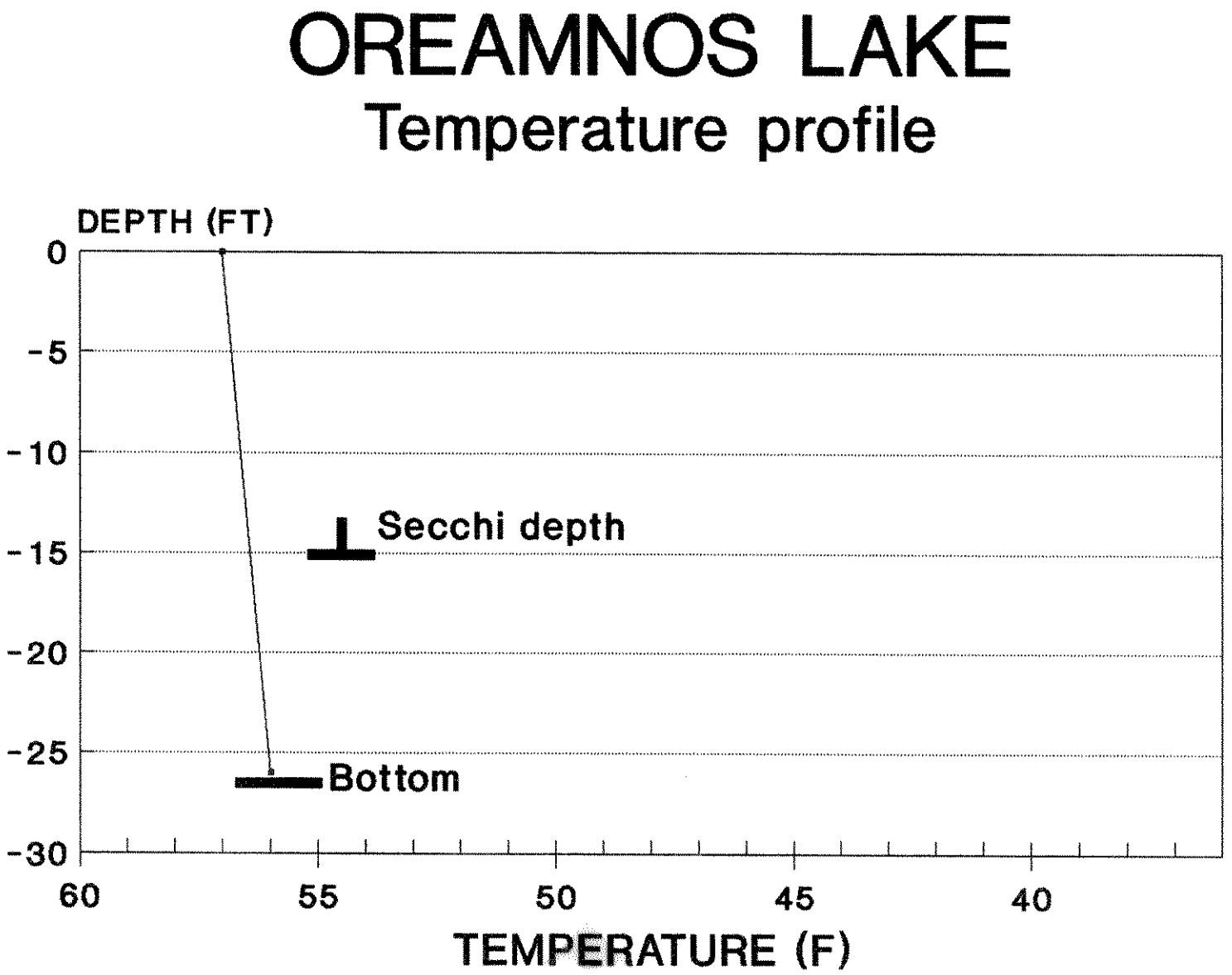


Figure 8. Temperature profile and secchi disk visible depth for Oreamnos Lake on August 29, 1988.

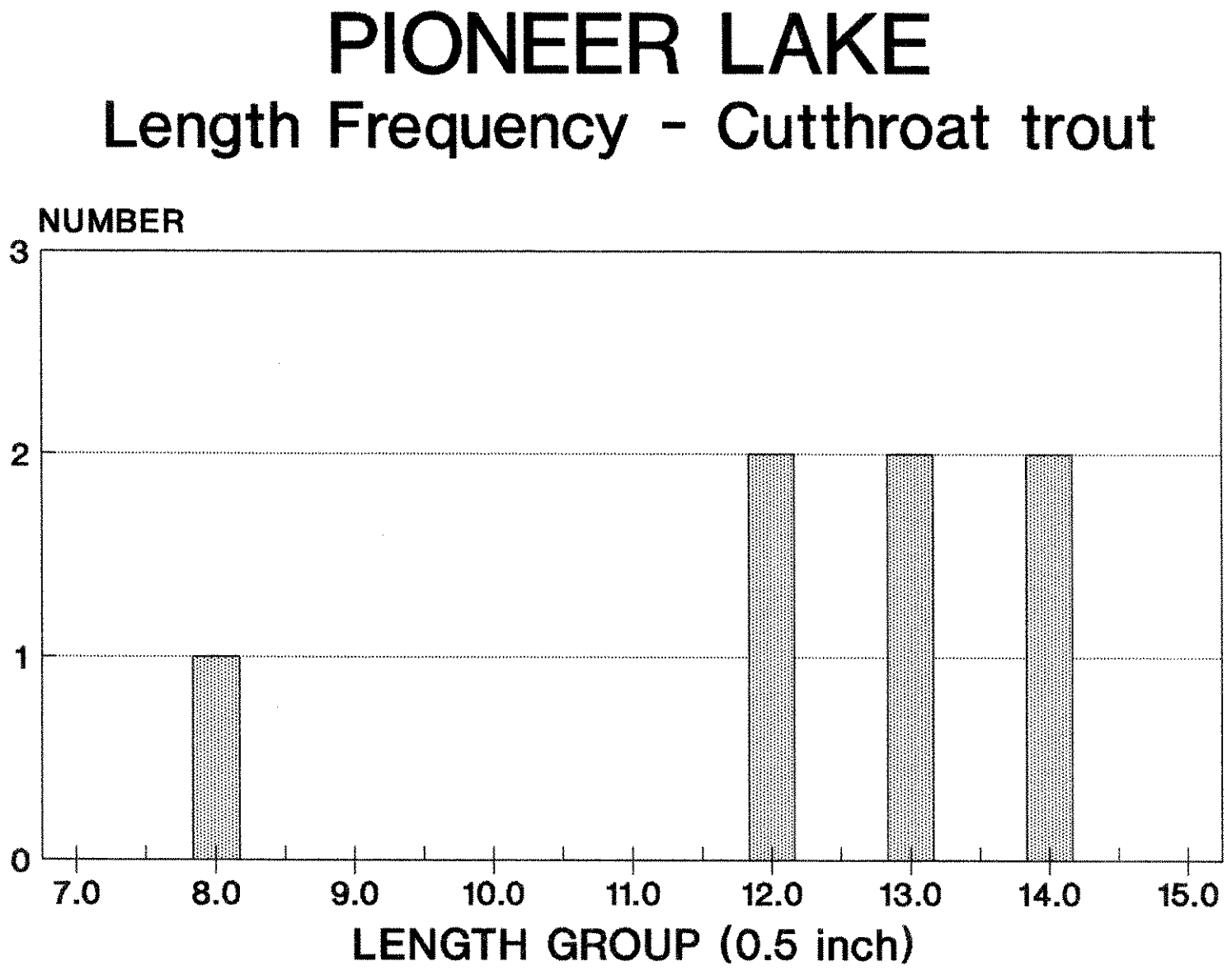


Figure 9. Length frequency (half inch length groups) for cutthroat trout captured by gill net in Pioneer Lake on September 12, 1989.

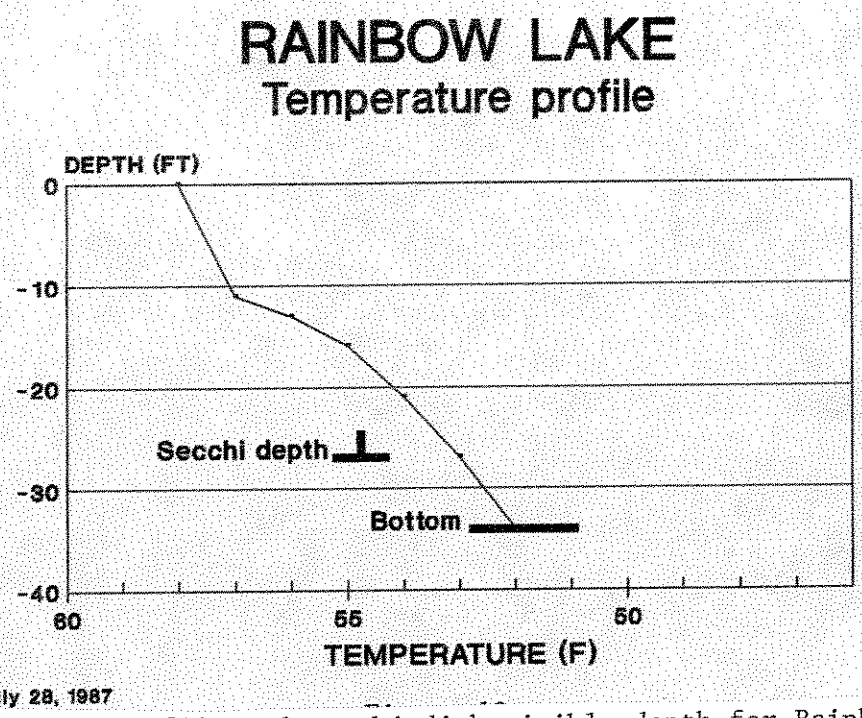


Figure 10. Temperature profile and secchi disk visible depth for Rainbow Lake on July 23, 1987.

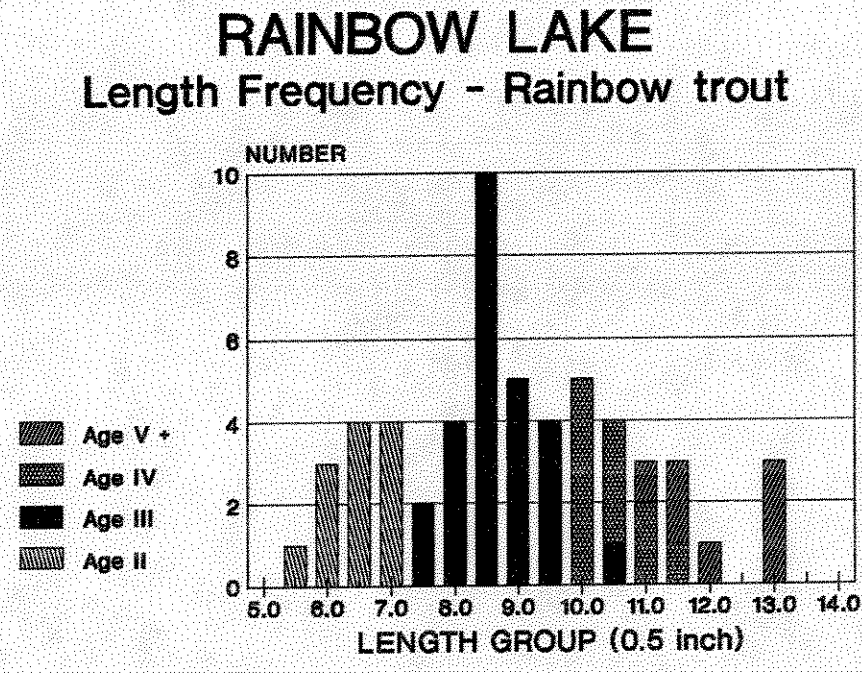


Figure 11. Length frequency (half inch length groups) and age structure for rainbow trout captured by gill net in Rainbow Lake on July 29, 1987.

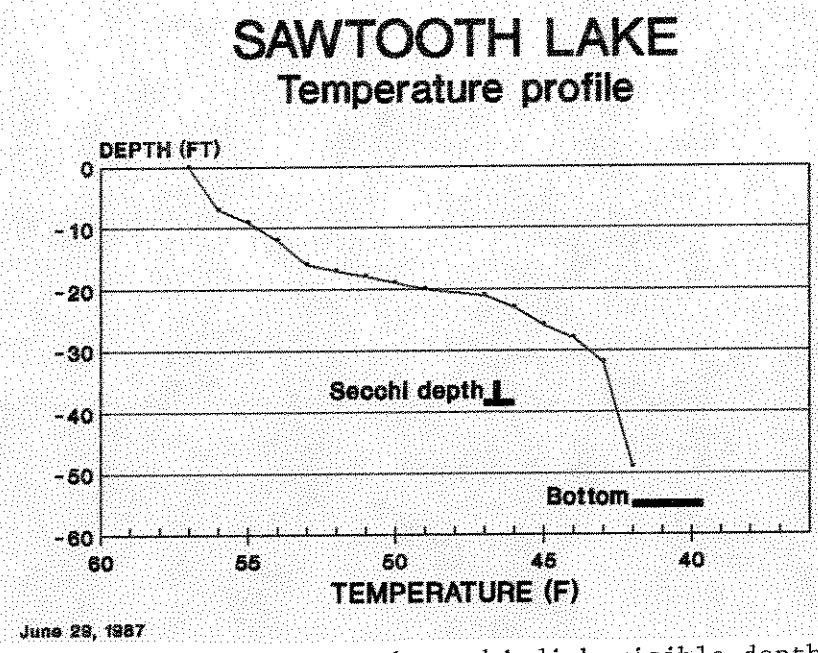


Figure 12. Temperature profile and secchi disk visible depth for Sawtooth Lake on June 29, 1987.

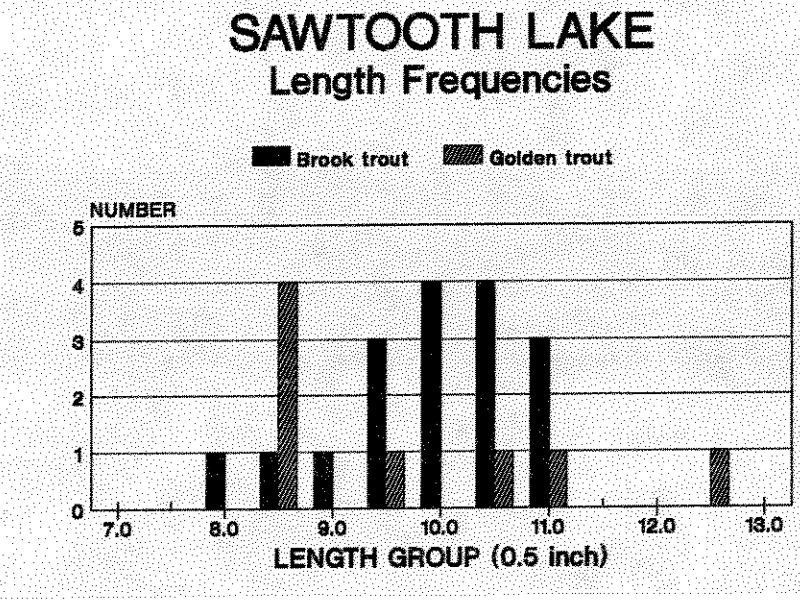
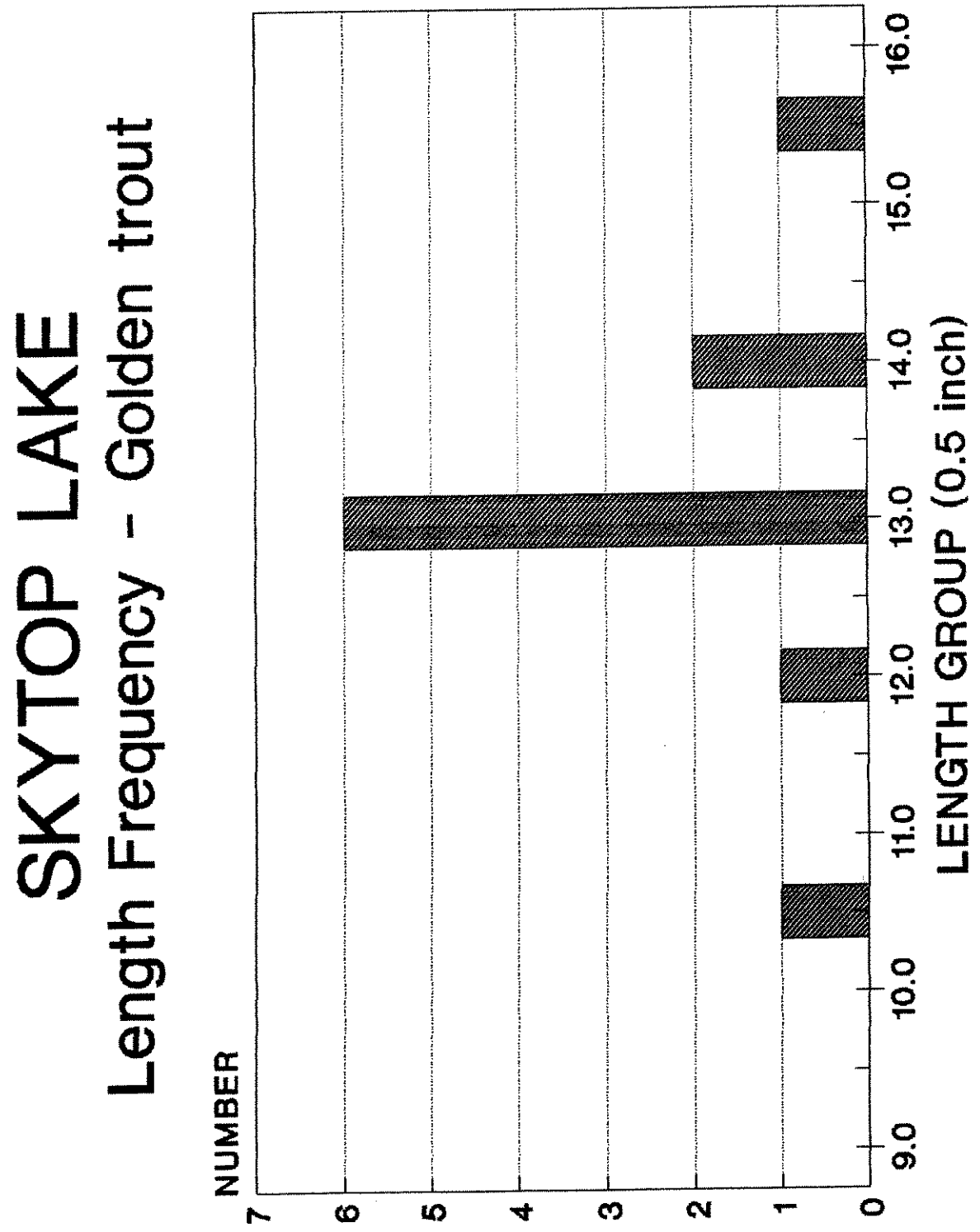


Figure 13. Length frequency (half inch length groups) for golden and eastern brook trout captured by gill net in Sawtooth Lake on June 30, 1987.

Figure 14. Length frequency of golden trout captured in gill nets.



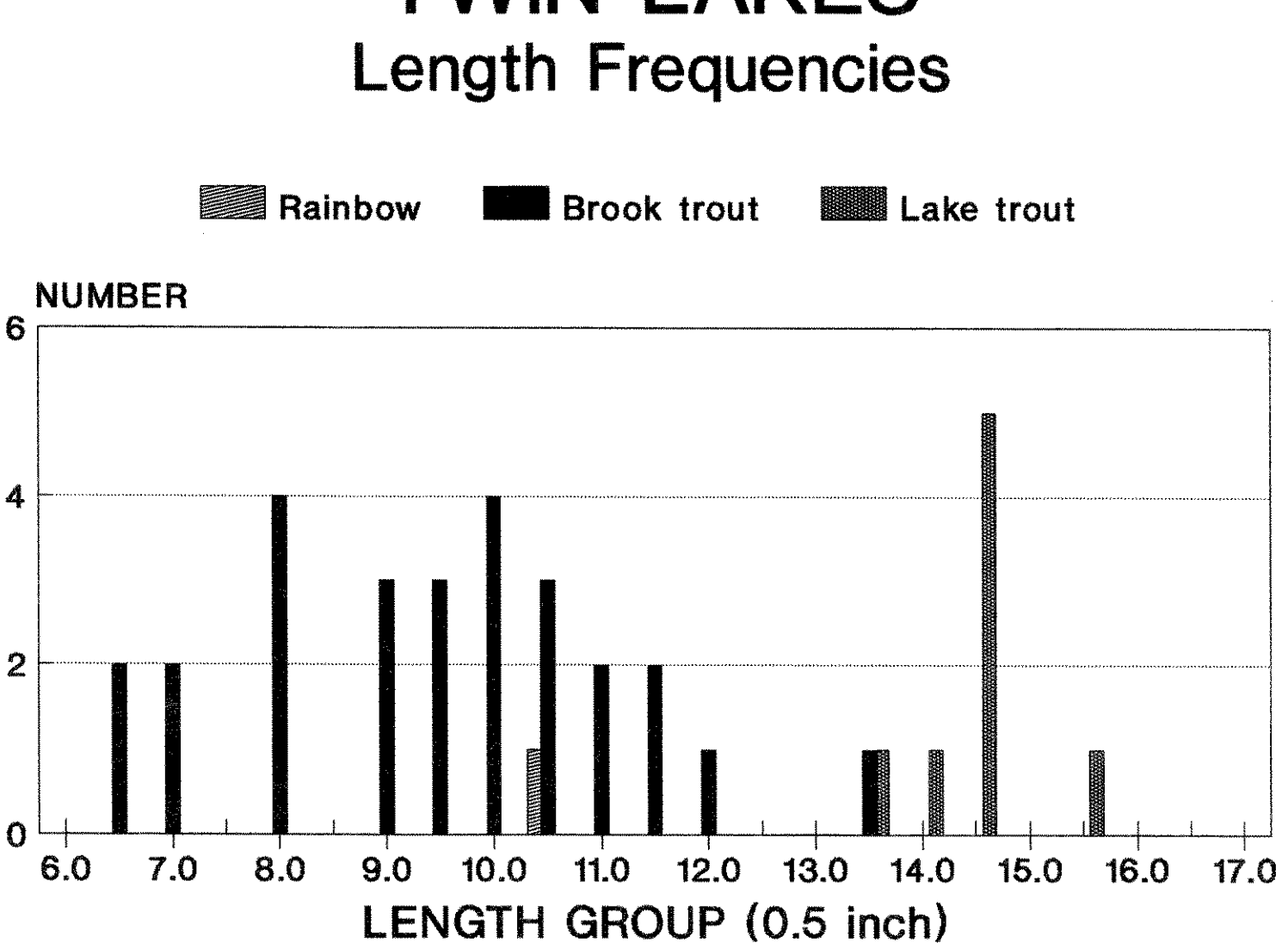


Figure 15. Length frequency (half inch length groups) for rainbow, eastern brook, and lake trout captured by gill net in Twin Lakes on August 26, 1986.

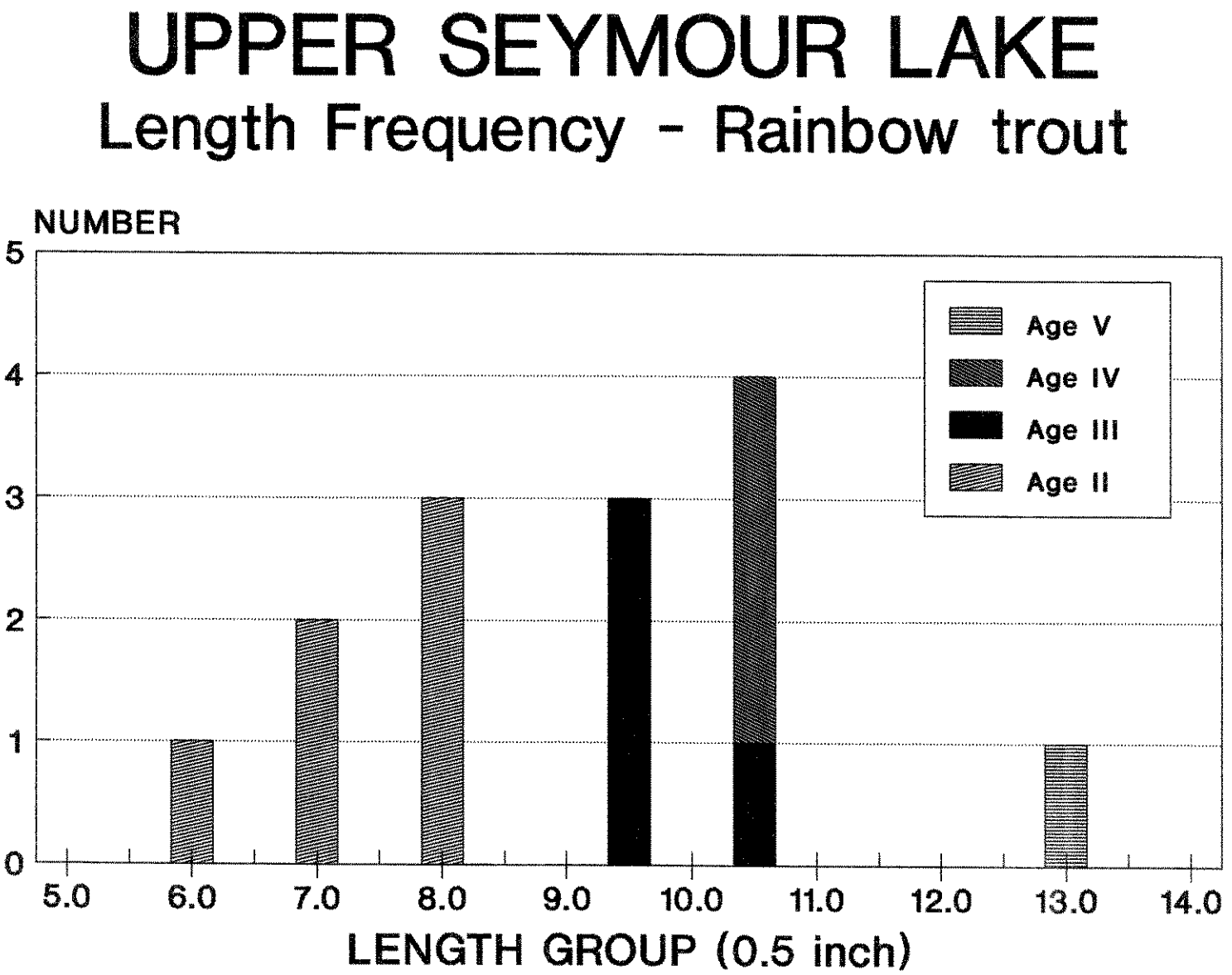


Figure 16. Length frequency (half inch length groups) and age structure for rainbow trout captured by gill net in Upper Seymour Lake on September 16, 1989.

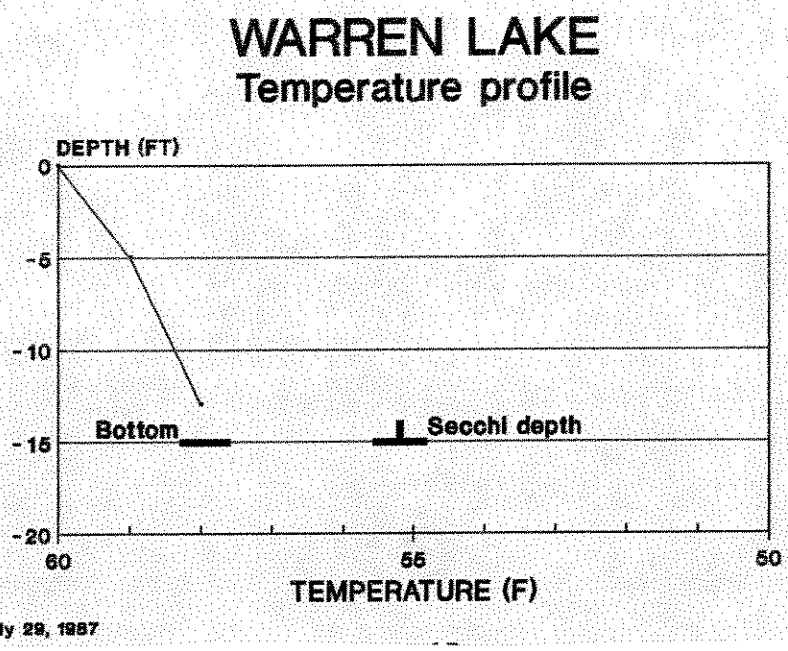


Figure 17. Temperature profile and secchi disk visible depth for Warren Lake on July 29, 1987.

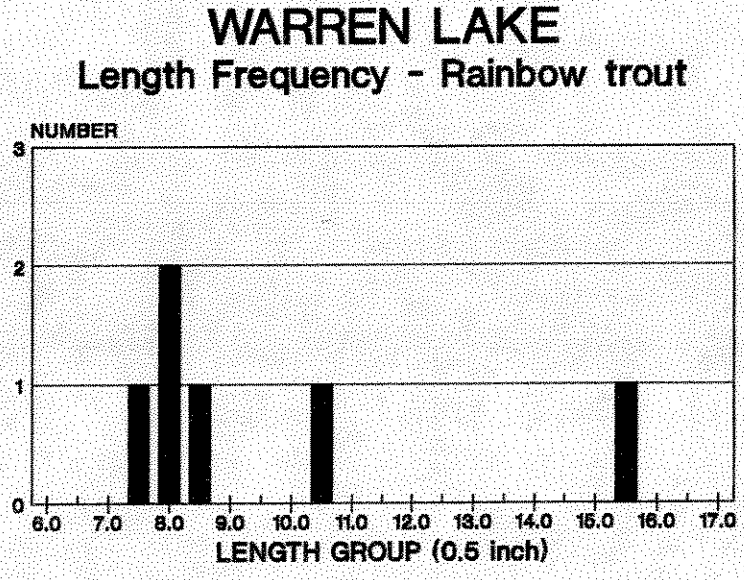


Figure 18. Length frequency (half inch length groups) for rainbow trout captured by gill net in Warren Lake on July 30, 1987.

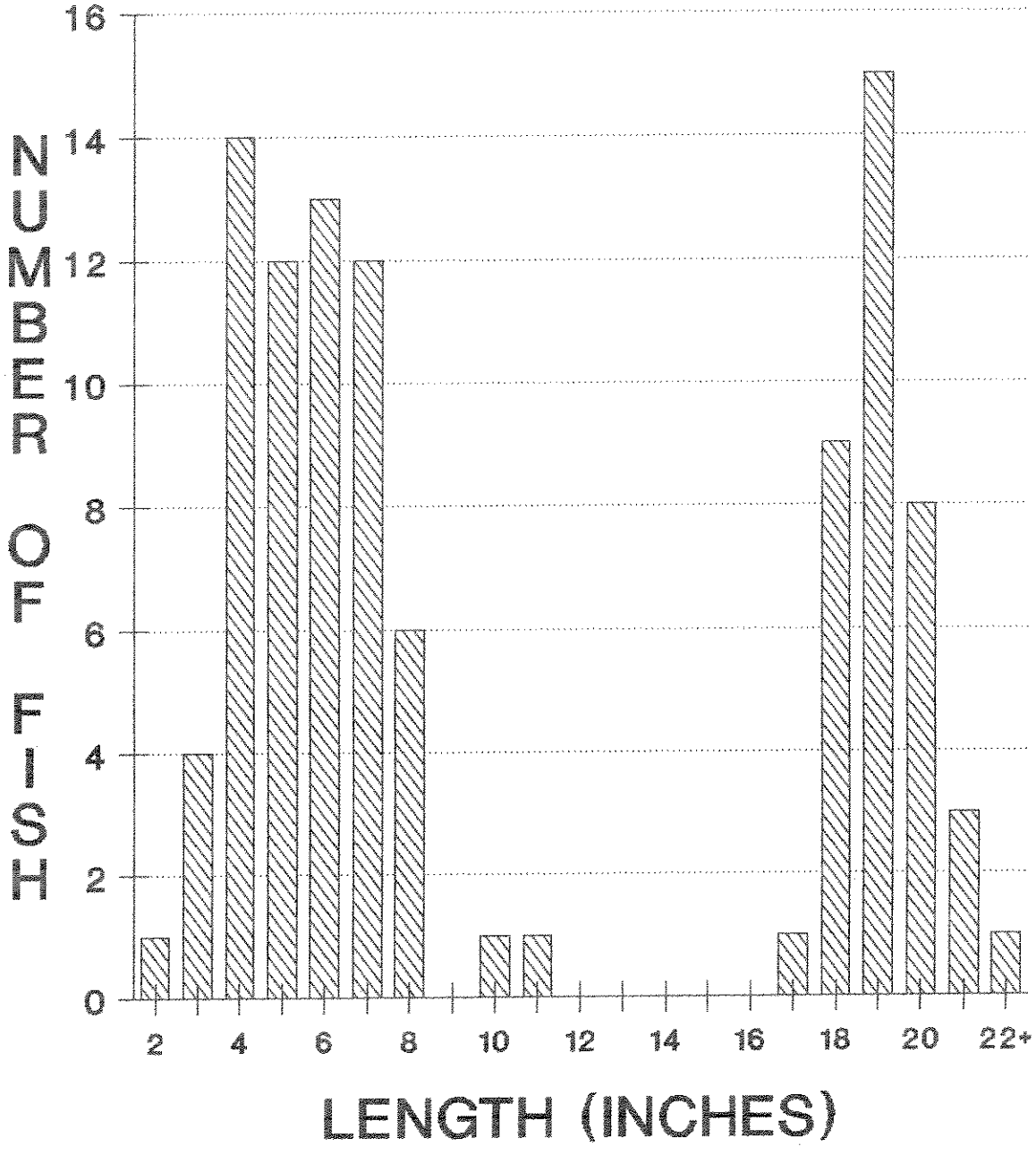


Figure 19. Length frequency of rainbow trout electrofished from Wade Lake on October 3, 1989.

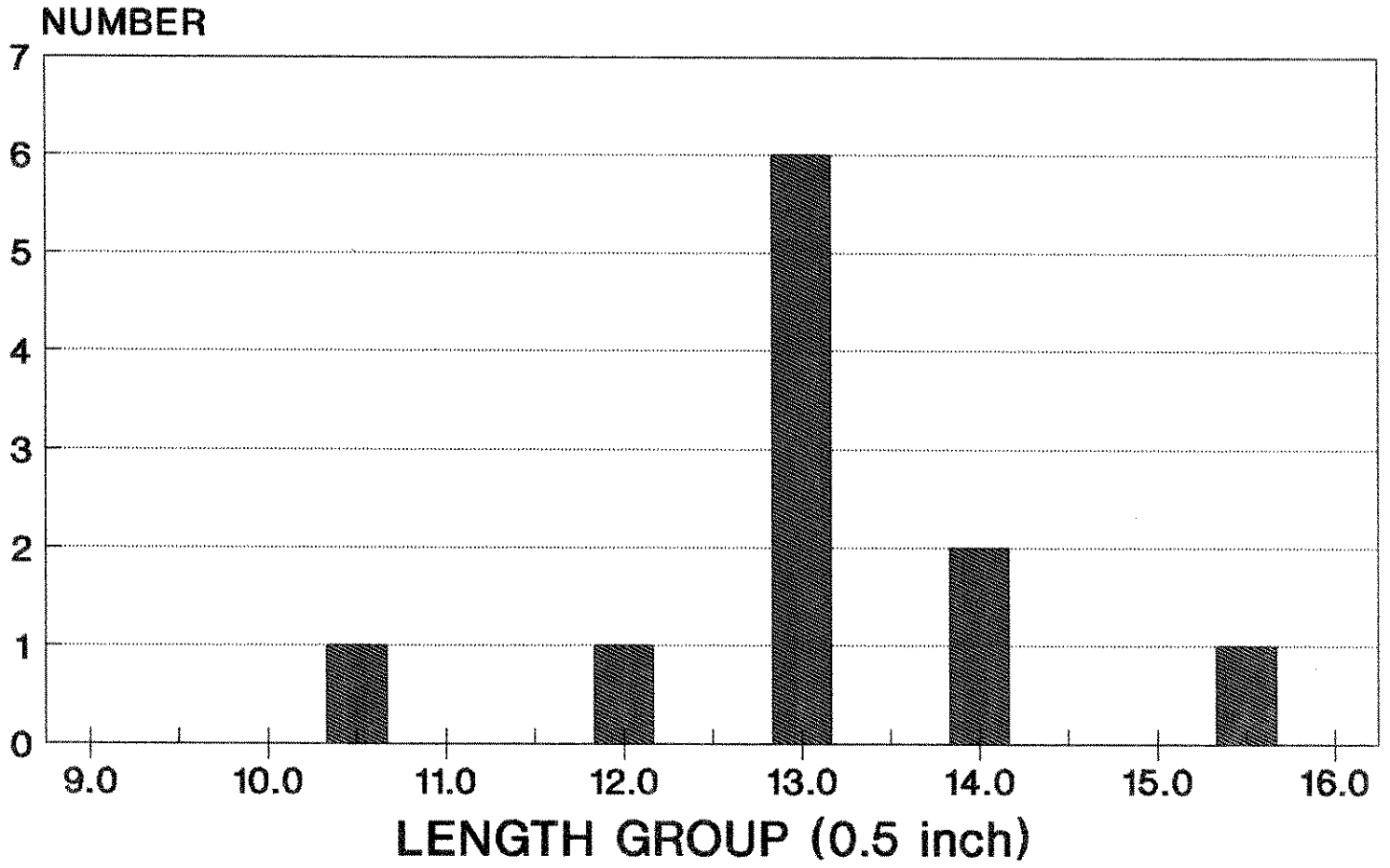


Figure 14. Length frequency (half inch length groups) for golden trout captured by gill net in Skytop Lake on September 13, 1989.

APPENDIX A - BEAVERHEAD NATIONAL FOREST MTN LAKE MAPS

Bear Lake

Location: T4S R13W Sec 7
Elevation: 7500 feet
Surface area: 6 acres
Maximum Depth: 25 feet
Drainage: Bear Creek

Field map for Bear Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Continental Lake

Location: T1N R16W Sec 10
Elevation: 7776 feet
Surface Area: 2 acres
Maximum Depth: 5 feet
Drainage: Thompson Creek

Field map for Continental Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Crystal Lake

Location: T1N R16W Sec 10
Surface area: 3 acres
Maximum Depth: 35 feet
Drainage: Thompson Creek

Field map for Crystal Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Highup Lake

Loaction:
Elevation: 8860 feet
Surface area: 5 acres
Maximum Depth: 15 feet
Drainage: Pioneer Creek

Field map for Highup Lakes showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Lion Lake

Location: T1N R16W Sec 15
Elevation: 7635 feet
Surface area: 8 acres
Maximum Depth: 42 feet
Drainage: Thompson Creek

Field map for Lion Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Msytic Lake

Location: T1N R16W Sec 2
Elevation: 7916 feet
Surface area: 18 acres
Maximum Depth: 51 feet
Drainage: Howell Creek

Field map for Mystic Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Oreasmnos Lake

Location: T2N R15W Sec 7
Elevation: 8363 feet
Surface area: 10 acres
Maximum Depth: 27 feet
Drainage: Pintlar Creek

Field map for Oreamnos Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Pioneer Lake

Location: T7S R16W Sec 29
Elevation: 8760 feet
Surface area: 4 acres
Maximum Depth: 21 feet
Draingage: Pioneer Creek

Field map for Pioneer Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Rainbow Lake

Location: T3N R15W Sec 34
Elevation: 8215 feet
Surface area: 18 acres
Maximum Depth: 35 feet
Drainage: W. Fork Fishtrap Creek

Field map for Rainbow Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Sawed Cabin Lake
Location: T2N R15W Sec 7
Elevation: 8422 feet
Surface area: 5 acres
Maximum Depth: 13 feet
Drainage: Pintlar Creek

Field map for Sawed Cabin Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Sawtooth Lake:
Location: T5S R12W Sec 1
Elevation:8,511 feet
Surface: 16 acres
Maximum Depth: >60 feet
Drainage: Clark Creek

Field map for Sawtooth Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Skytop Lake
Location: T7S R16W Sec30
Elevation: 9370 feet
Surface area: 5 acres
Maximum Depth: 36 feet
Drainage: Pioneer Creek

Field map for Skytop Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

Upper Seymour Lake
Location: T3N R13W Sec 6

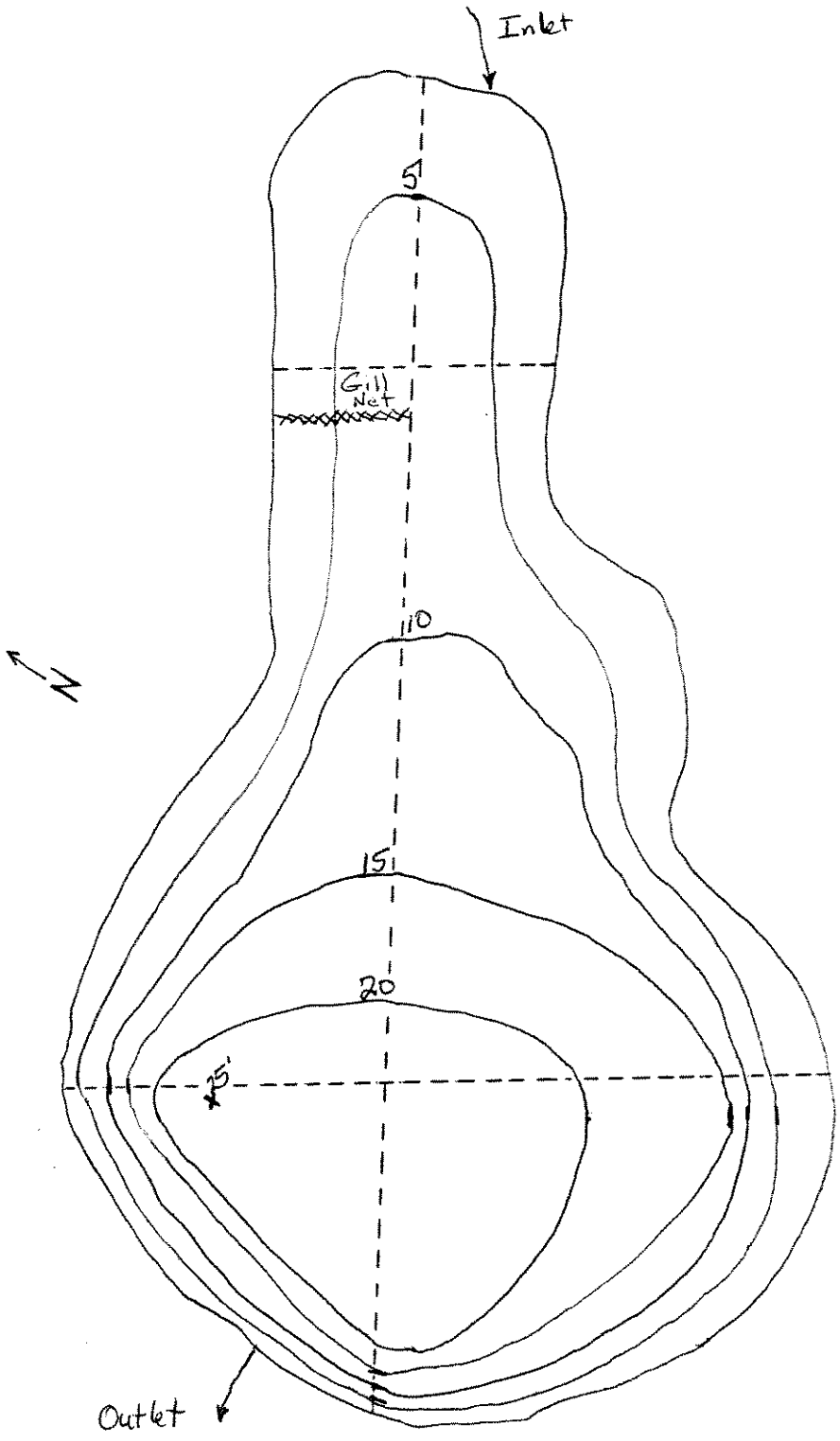
Surface area: 35 acres
Maximum Depth: 84 feet
Drainage: Seymour Creek

Field map for Upper Seymour Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).

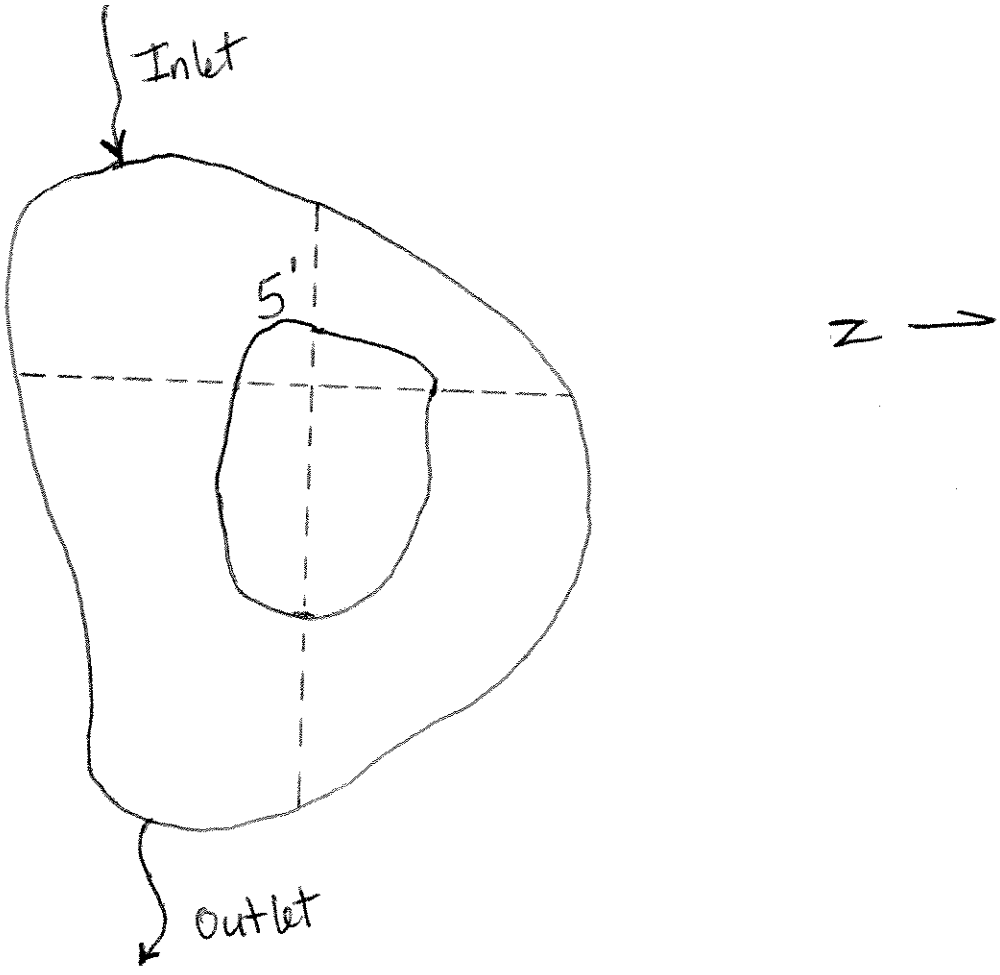
Warren Lake

Location: T3N R15W Sec 25
Surface area: 18 acres
Maximum Depth: 15 feet
Drainage: W.Fork LaMarche Creek

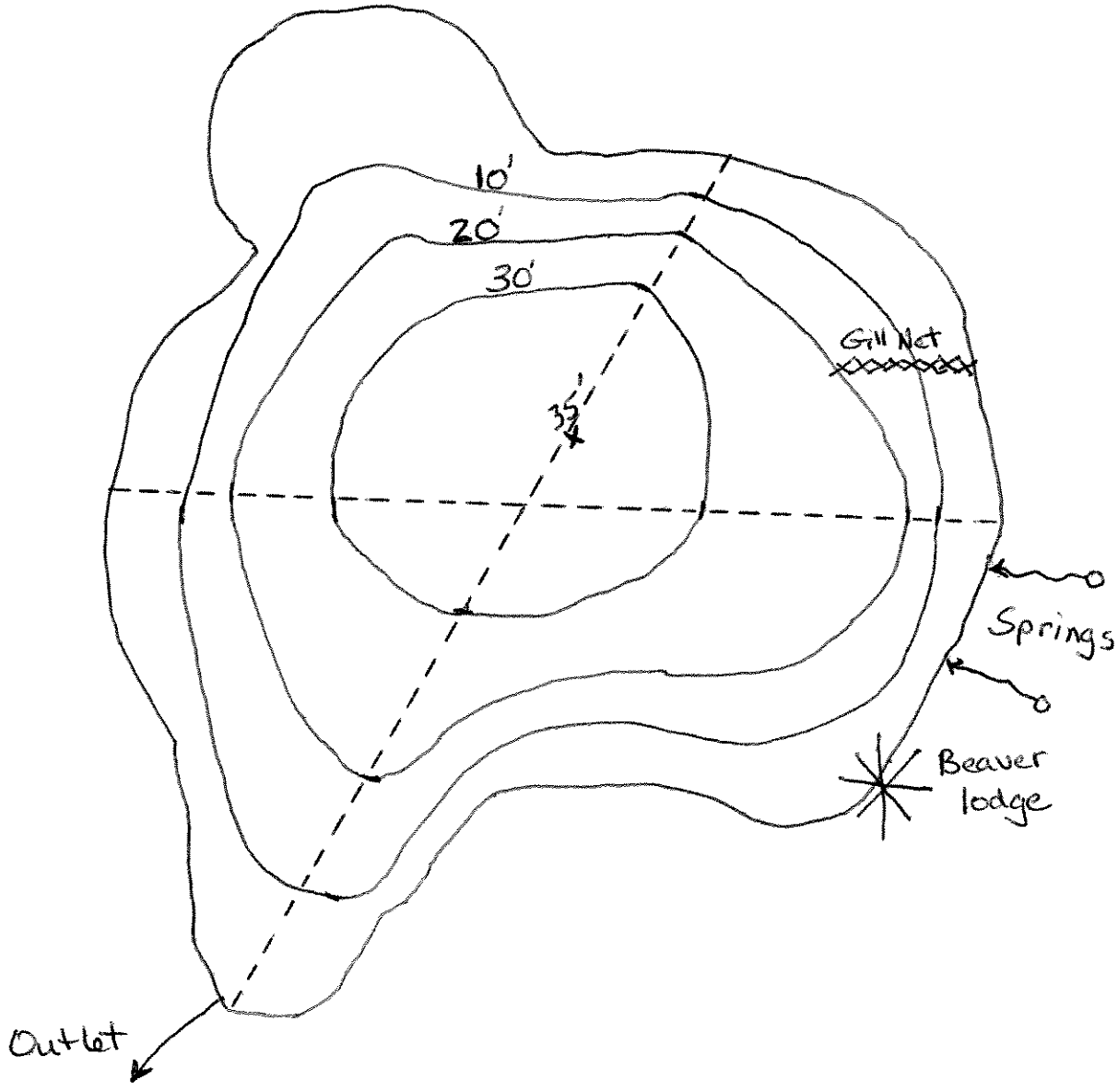
Field map for Warren Lake showing approximate depth contours (solid lines), depth transects (dashed lines), deepest measured point where temperature profile and secchi depth measured (X), inlet and outlet streams, and location of gill net sets (XXXXX line).



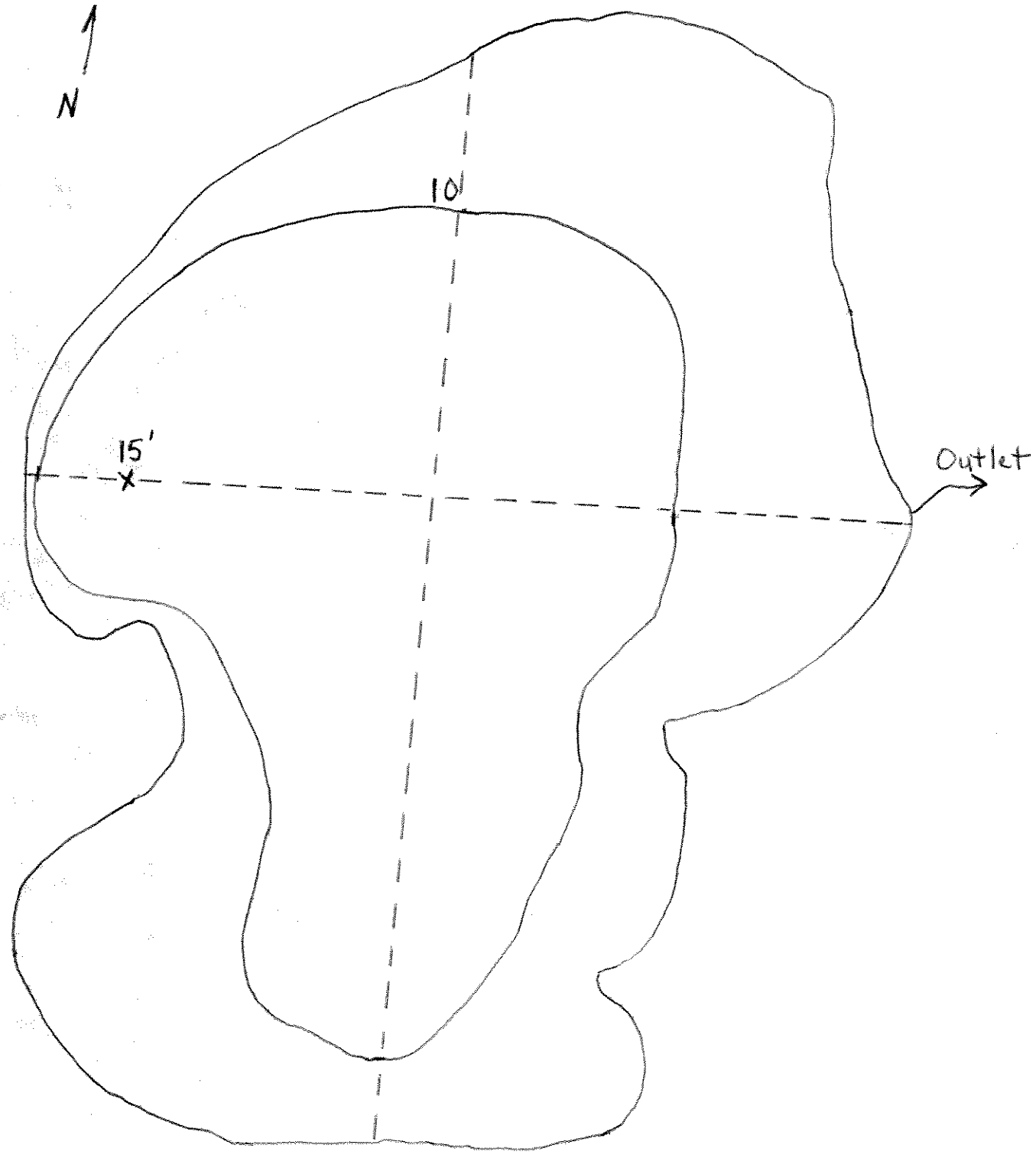
Bear Lake



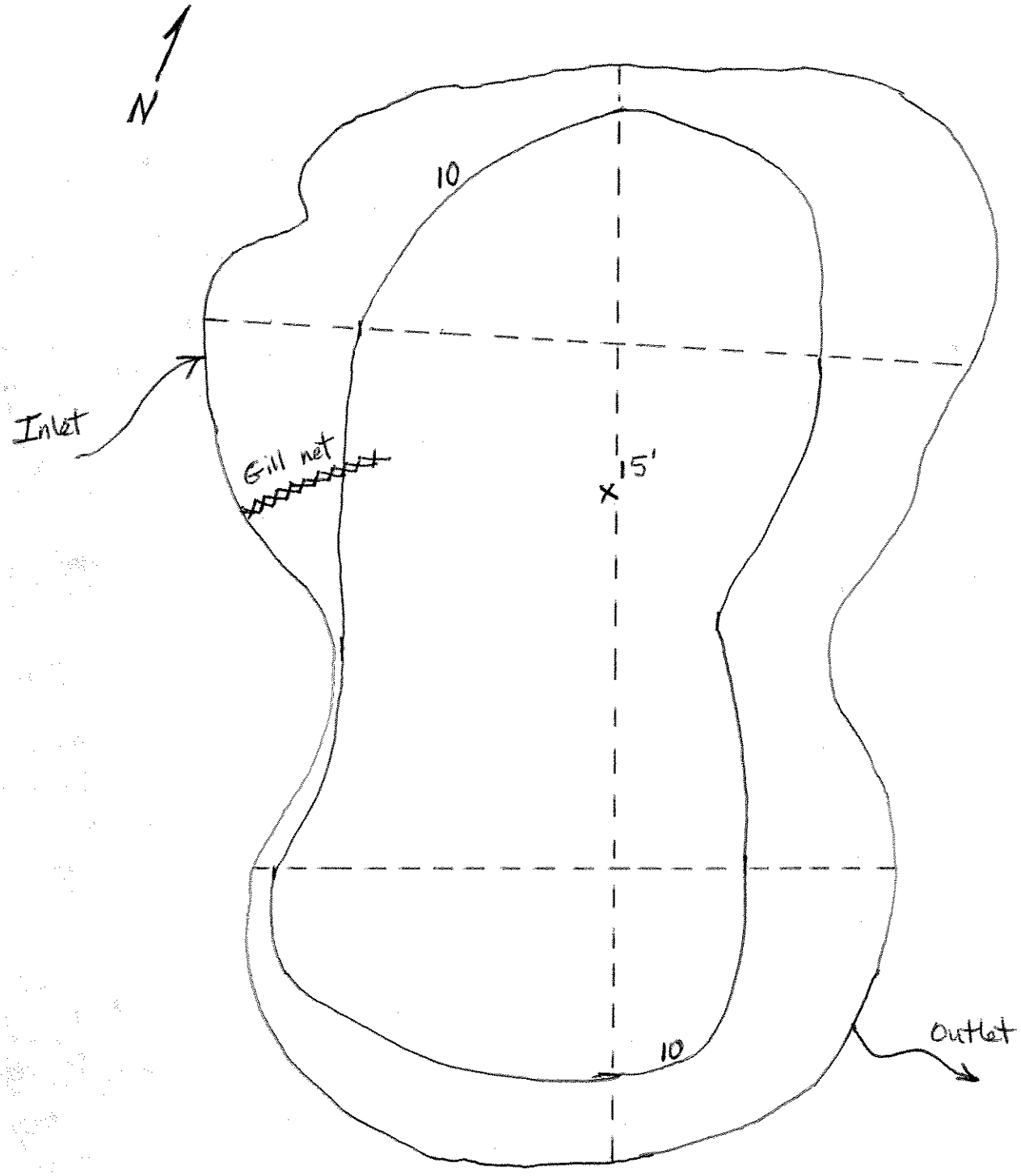
Continental Lake



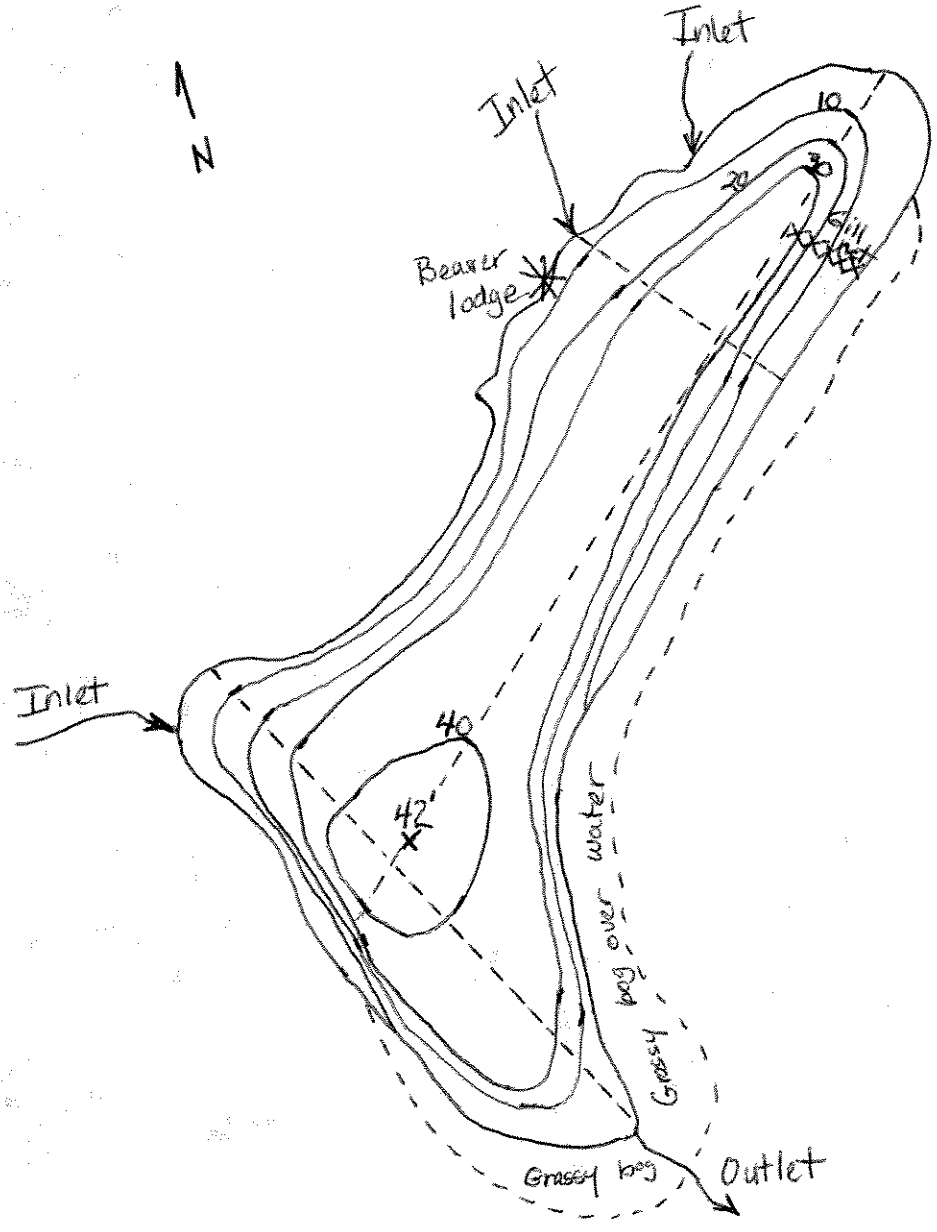
Crystal Lake



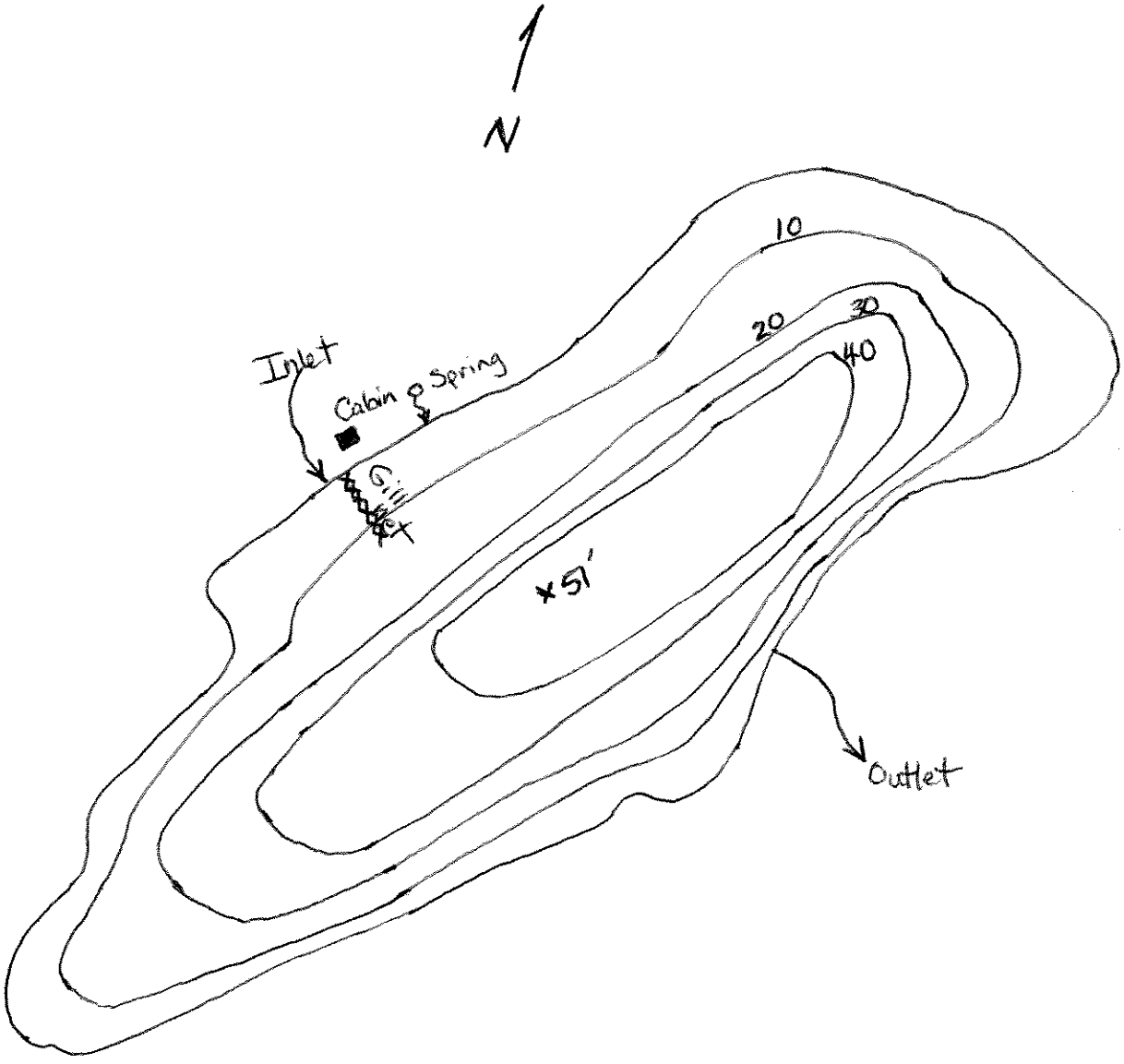
Upper Highup Lake



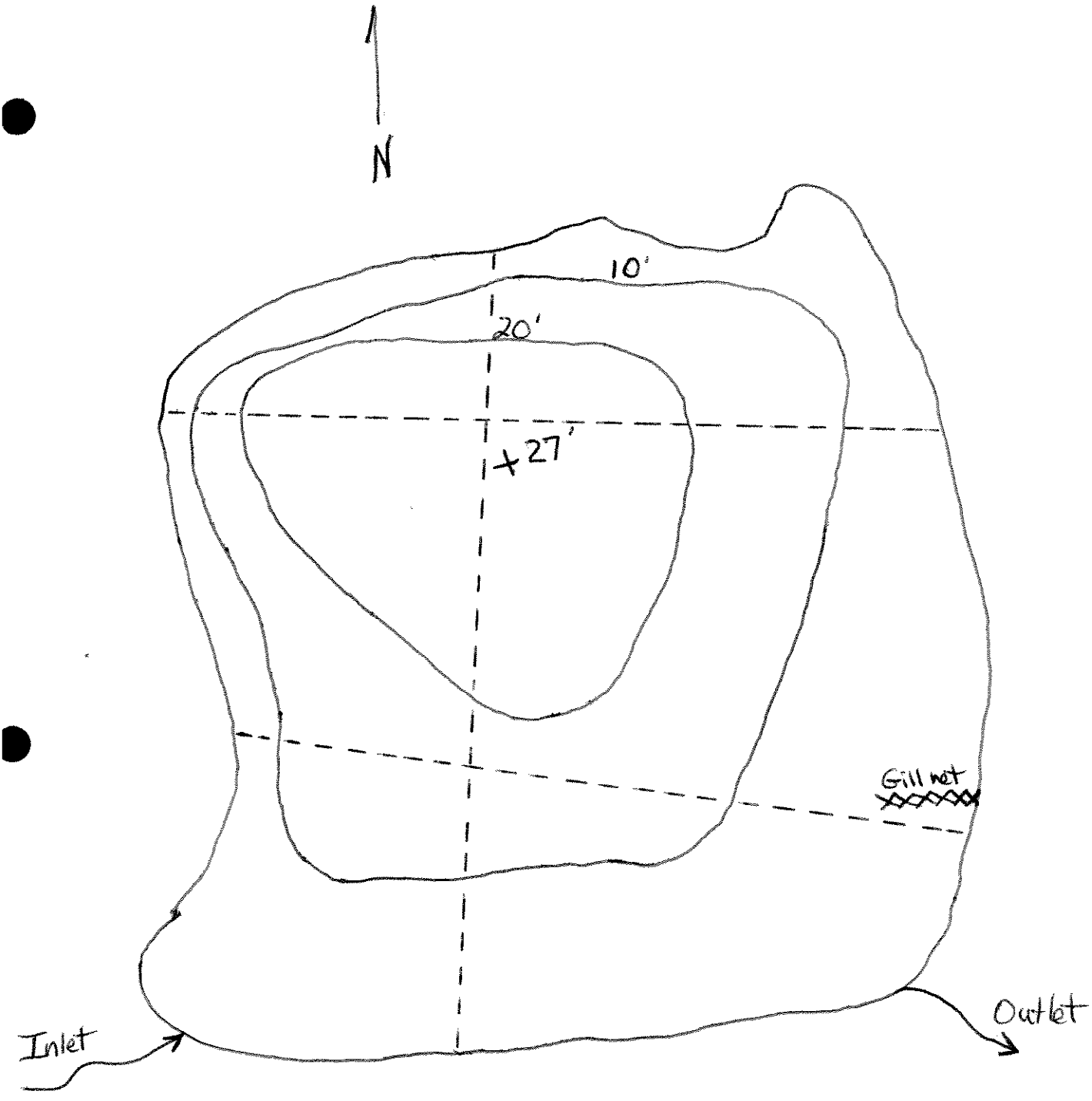
Mid (lower) Highup Lake


N
Inlet
Inlet
Inlet
10
20
30
Beaver lodge
40
42'
Grassy bog over water
Grassy bog
Outlet

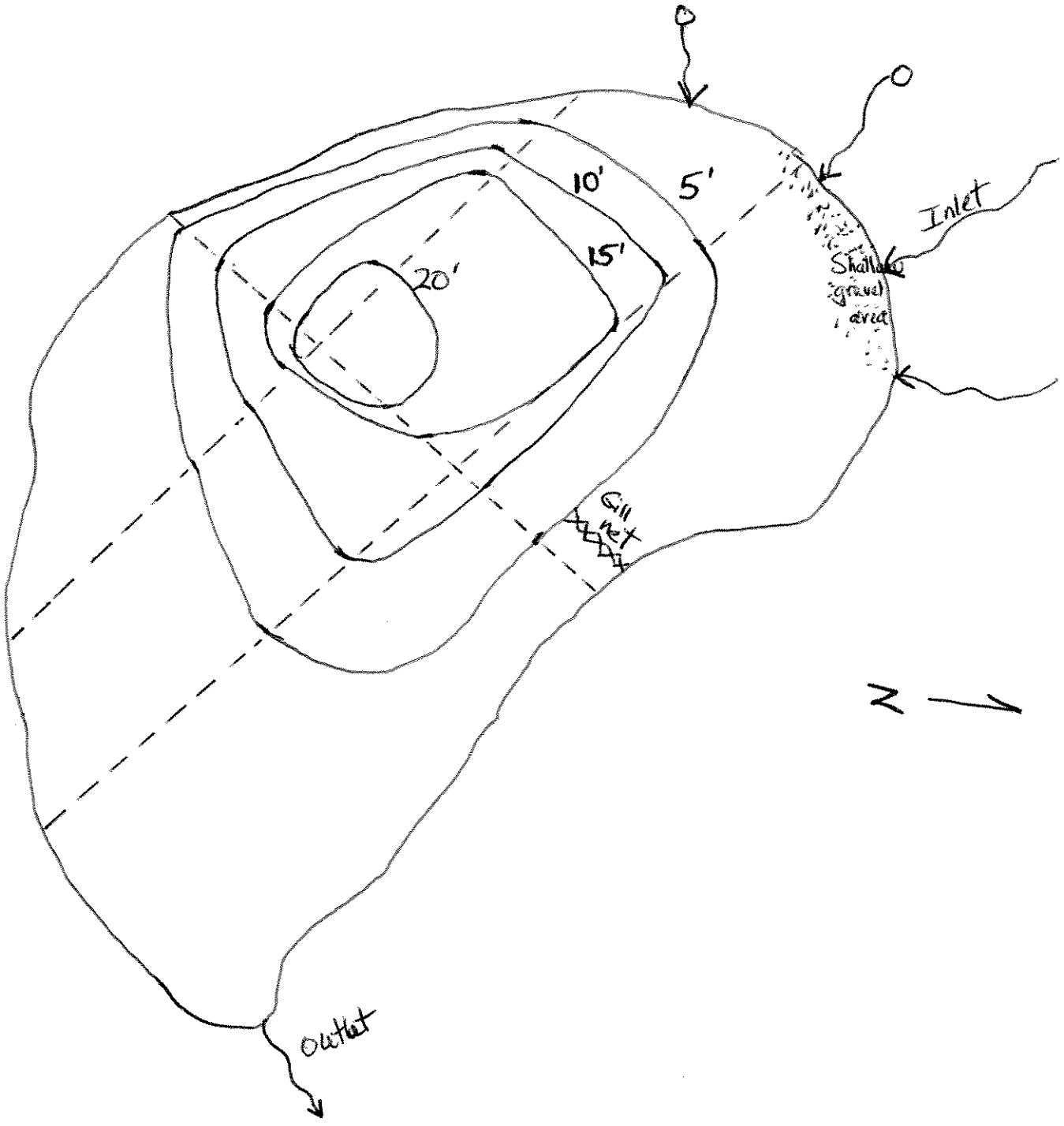
Lion Lake



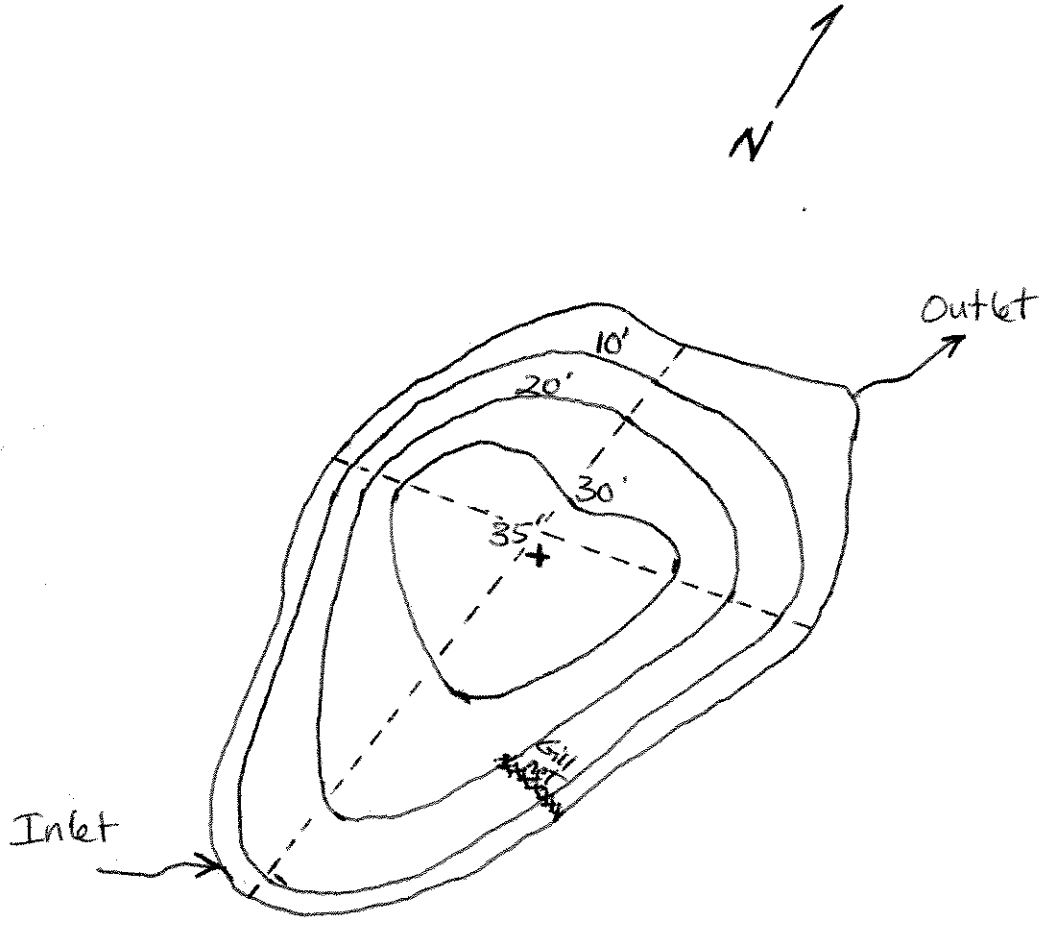
Mystic Lake



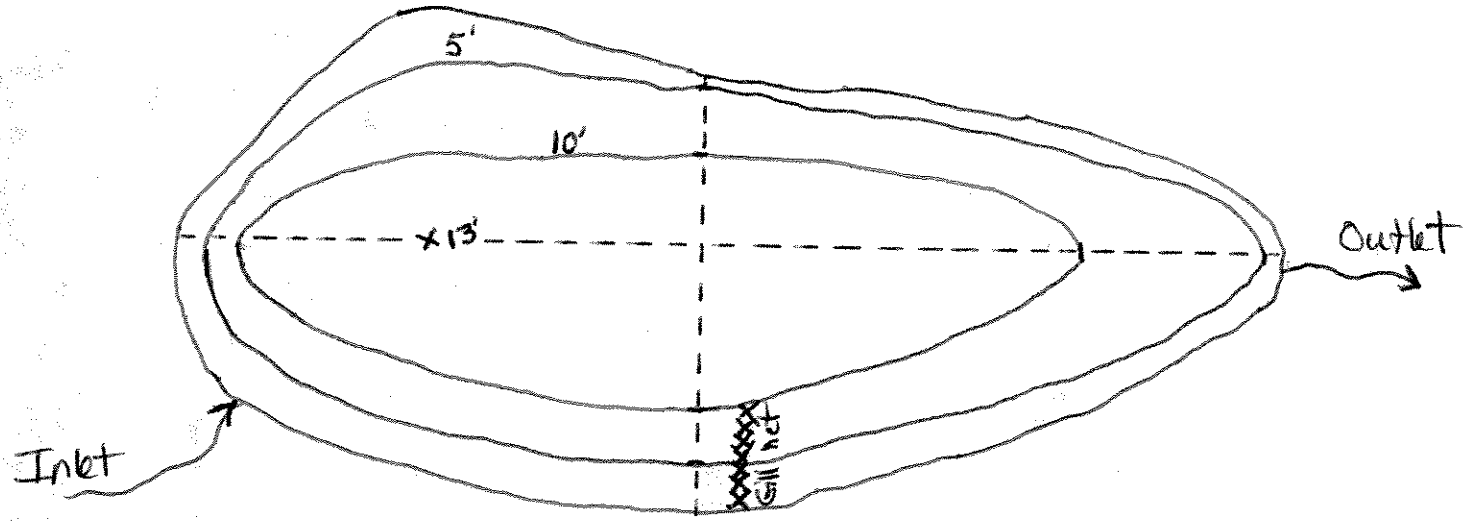
Oreamnos Lake



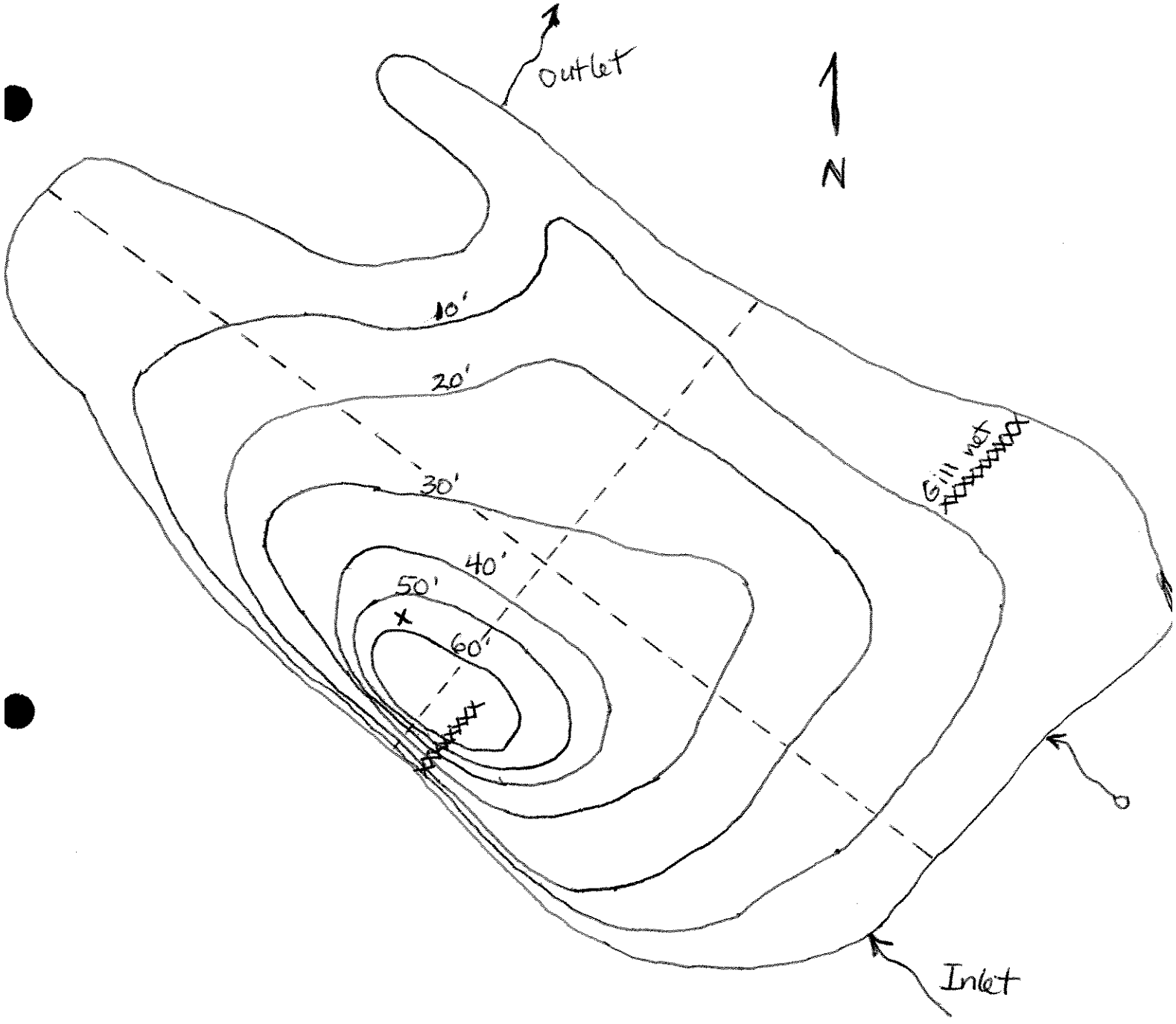
Pioneer Lake



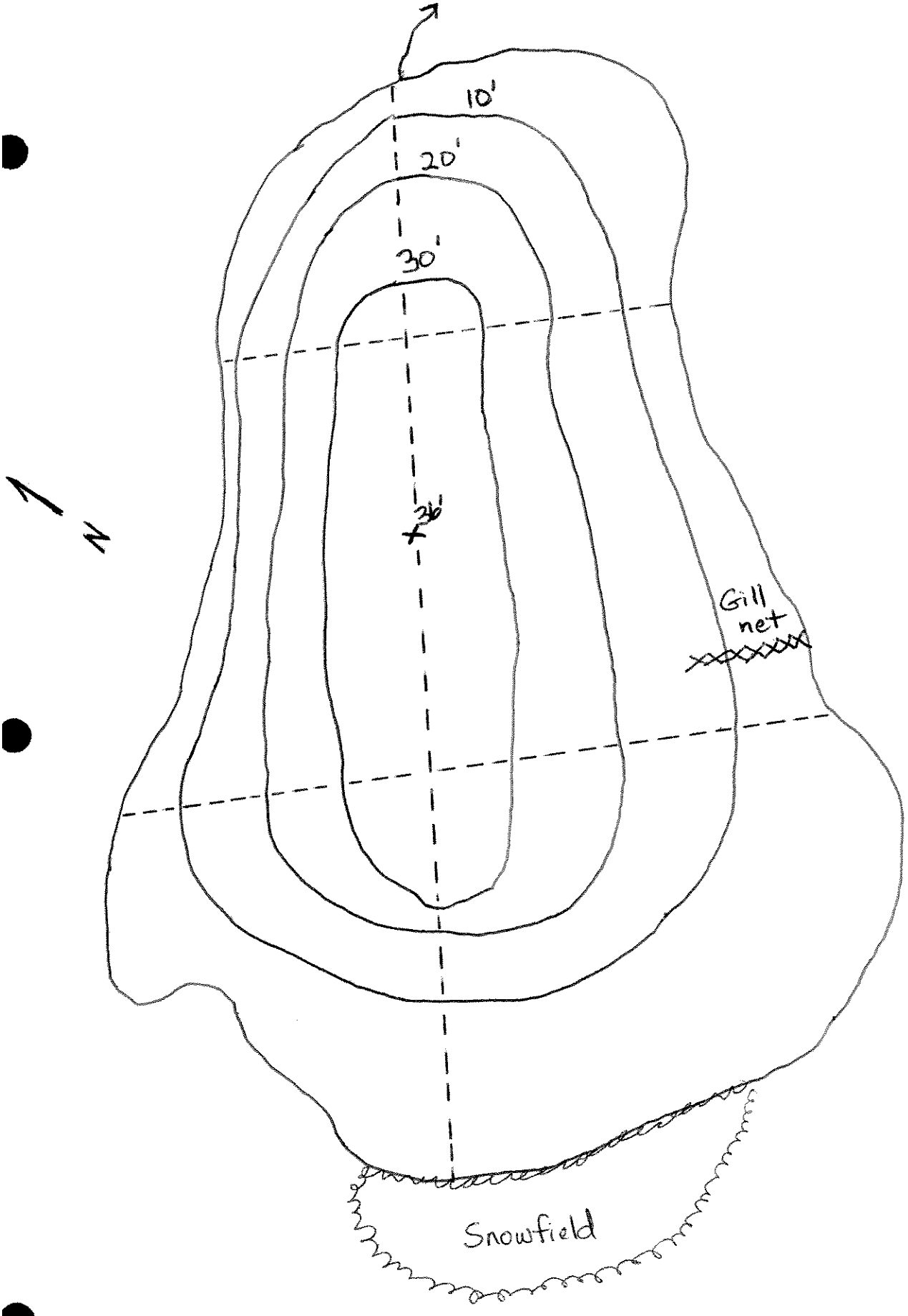
Rainbow Lake



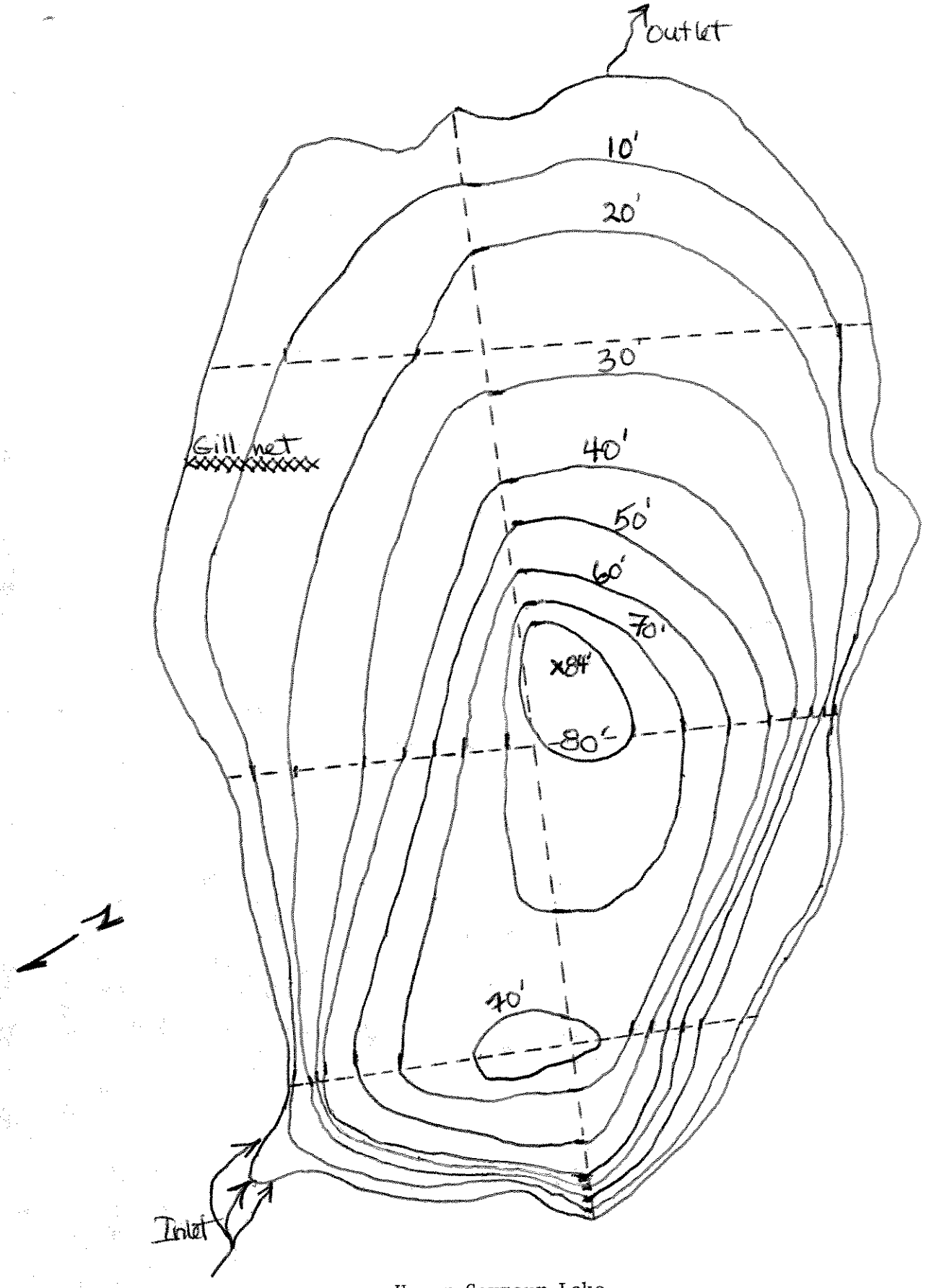
Sawed Cabin Lake



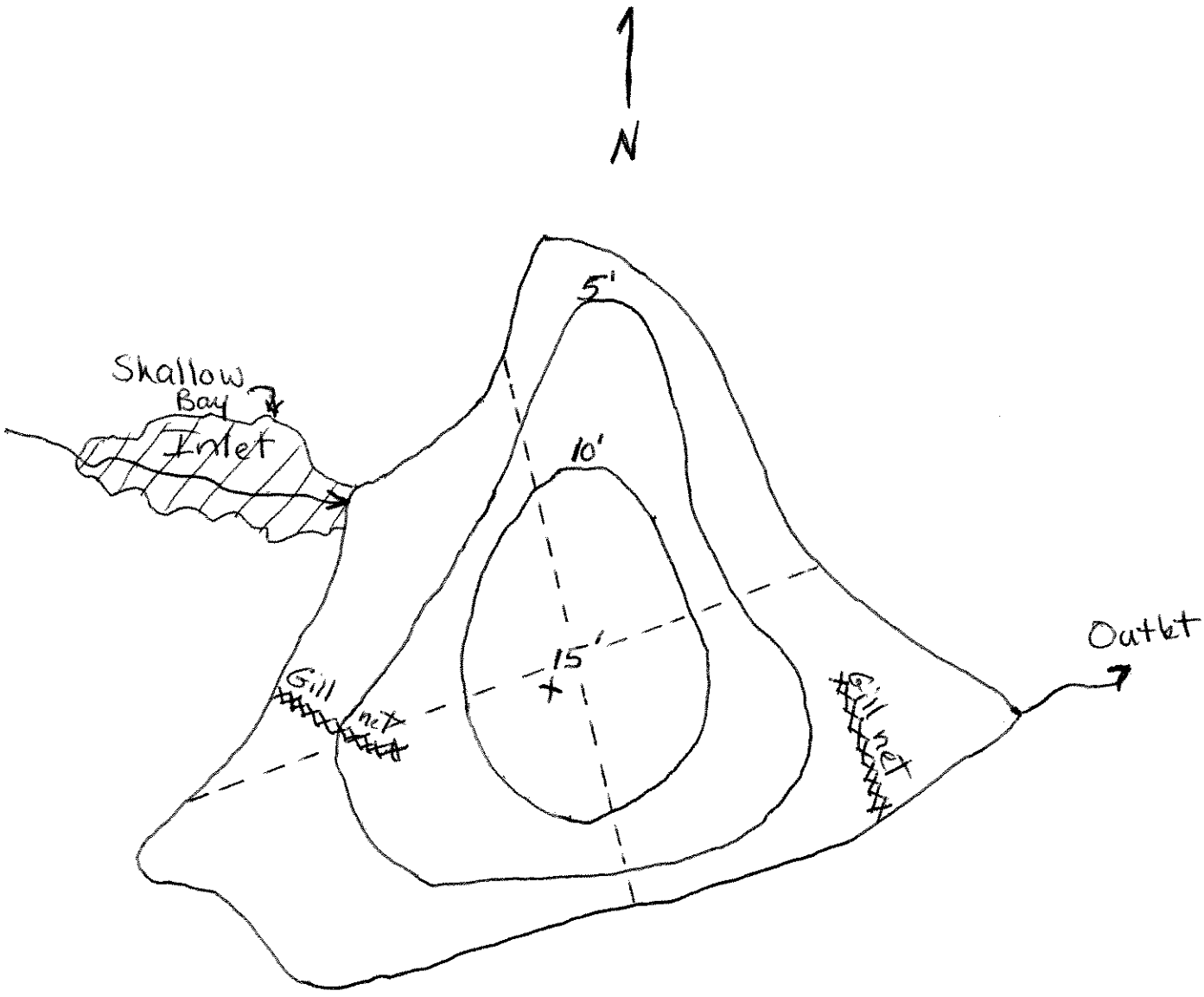
Sawtooth Lake



Skytop Lake



Upper Seymour Lake



Warren Lake