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Annual Performance Report for

POPULATION STUDIES OF GAME FISH AND EVALUATION OF MANAGED
LAKES IN THE SALCHA DISTRICT WITH EMPHASIS ON BIRCH LAKE

By

Michael Doxey

ALASKA DEPARTMENT OF FISH AND GAME
Don W. Collinsworth, Commissioner

SPORT FISH DIVISION
Richard Logan, Director

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ABSTRACT

This report presents the 1983 findings of a study to evaluate the performance of Swanson strain rainbow trout, Salmo gairdneri Richardson, in Birch Lake. First year data comparing trout stocked as fingerlings with three stockings of yearlings are presented. Trout stocked as fingerlings in 1982 grew faster to the end of their first full summer in the lake than a comparable stocking of yearlings.

Birch Lake creel census data indicate that anglers expended a total of 29,336 man hours to catch 24,977 rainbow trout and coho salmon, Salmo gairdneri Richardson, Oncorhynchus kisutch (Walbaum), for an overall catch per unit effort of 0.85 fish per hour during the period from November 7, 1982 to August 31, 1983.

Index data on relative abundance and distribution data are presented on fish species present in Harding Lake. No sheefish, Stenodus leucichthys (Guldenstadt), stocked in 1982 were found in 1983. Data are presented on the status of the coho salmon populations in Lost and Little Harding Lakes, and on the rainbow trout in Koole Lake.

Information is presented on the experimental stocking of Spencer Lake, the survey of another small lake near Harding Lake, and the Salcha River chinook salmon, Oncorhynchus tshawytscha (Walbaum), sport fishery.

KEY WORDS

Lake management, rainbow trout, lake trout, northern pike, sheefish, coho salmon, burbot, chinook salmon, angler effort, least cisco and Salcha district.

BACKGROUND

Salcha District

The Salcha district is bounded generally by the Salcha River drainage, the Tanana River upriver from its confluence with the Salcha River to the Little Delta River, and the Little Delta River and North Star Borough boundary (Fig. 1). The district contains two large and three small stocked lakes accessible from the Richardson Highway. These lakes, along with the Salcha River, provide excellent recreational potential for local residents, and those from Fairbanks and its environs, Fort Wainwright and Eielson Air Force Base. At least two other small lakes in the district may offer sport fishing opportunity in the future.

Table 1 lists the common and scientific names and abbreviations of fish mentioned in this report.

Birch Lake

Birch Lake is an 803-surface-acre lake located 56 mi southeast of Fairbanks on the Richardson Highway. The maximum depth of its lightly brown-stained waters is 49 ft.

The U.S. Air Force maintains a recreation camp on Birch Lake. Heavy summer use of this camp contributes significantly to angler pressure. There is a state parking and boat launching area along the eastern shoreline, and a turnoff and parking area where the highway passes the south end of the lake. About half the shoreline of the lake is private land with cabins. The lake has four small inlets and an outlet with a fish and water level control structure on it.

Chemical rehabilitation in 1966 removed humpback whitefish, least cisco, burbot, slimy sculpin, and stunted northern pike. Fingerling rainbow trout were subsequently stocked. Since that time, a popular summer and winter sport fishery has been maintained by stockings of rainbow trout and coho salmon fingerlings and sub-catchable rainbow trout.

Lake chubs and slimy sculpins have appeared in the lake, probably due to vandalization of the outlet structure in 1967. The chubs have attained such a high population level that they compete with stocked game fish for both space and food.

An evaluation of the Birch Lake rainbow trout fishery and a comparison of the stocking suitability of the Ennis-Alaska strain and the Swanson River strain rainbow trout was launched in the spring of 1979, and studies of Swanson strain fish are continuing. The results to date are presented in reports in Doxey, 1980-1983.

Harding Lake

Harding Lake is located 45 mi southeast of Fairbanks along the Richardson Highway. The transparent green, 2,470-acre lake has a

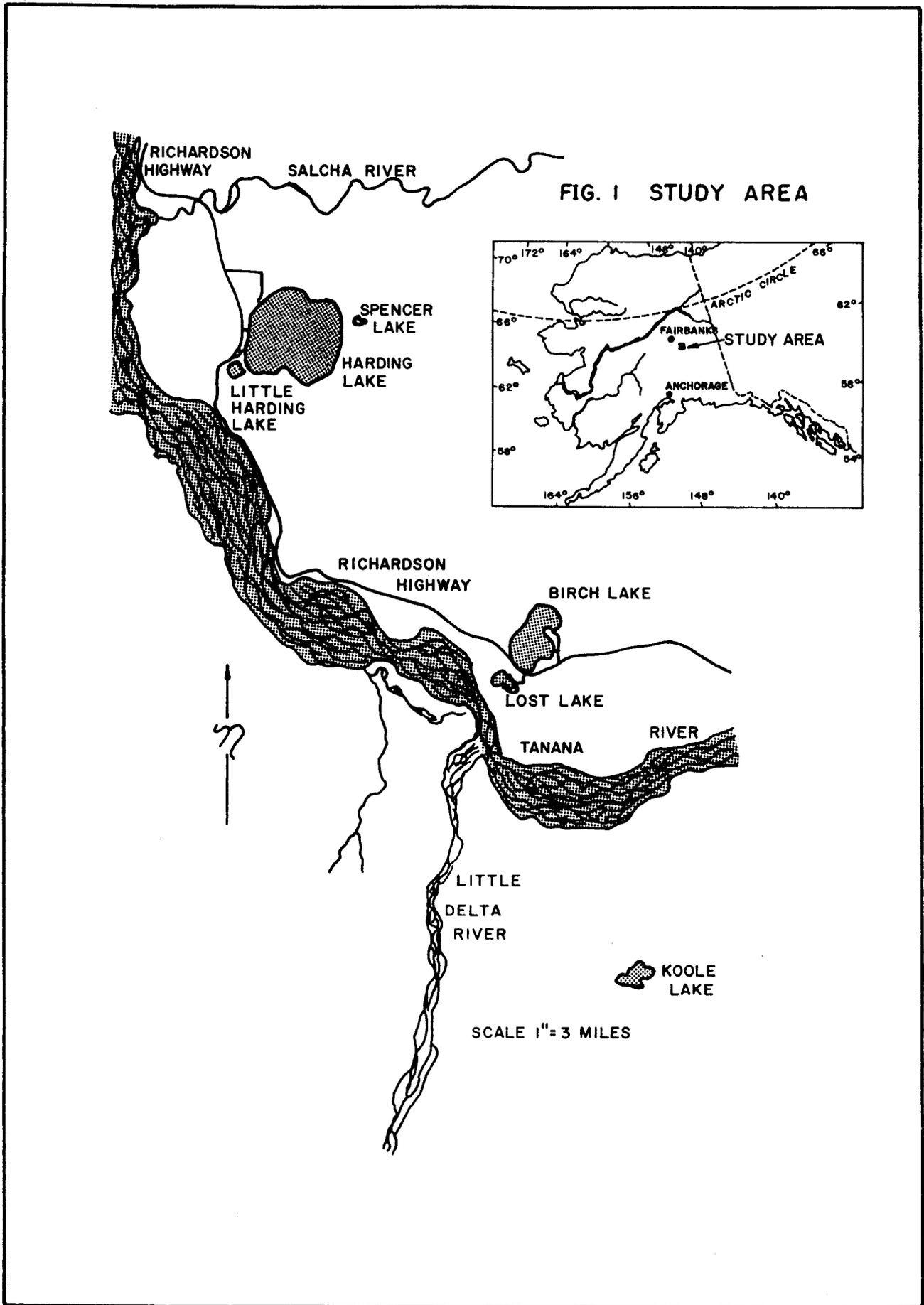


Figure 1. Delineation of study area. 28

Table 1. Scientific and common names of fish mentined in this report.

Common Name	Scientific Name and Author	Abbreviation
Burbot	<u>Lota lota</u> (Linnaeus)	BB
Chinook salmon	<u>Oncorhynchus tshawytscha</u> (Walbaum)	KS
Coho salmon	<u>Oncorhynchus kisutch</u> (Walbaum)	SS
Humpback whitefish	<u>Coregonus pidschian</u> (Gmelin)	HWF
Inconnu (sheefish)	<u>Stenodus leucichthys</u> (Guldenstadt)	SF
Lake chub	<u>Couesius plumbeus</u> (Agassiz)	LC
Lake trout	<u>Salvelinus namaycush</u> (Walbaum)	LT
Least cisco	<u>Coregonus sardinella</u> (Valenciennes)	LCI
Longnose sucker	<u>Catostomus catostomus</u> Forster	LNS
Northern pike	<u>Esox lucius</u> Linnaeus	NP
Rainbow trout	<u>Salmo gairdneri</u> Richardson	RT
Slimy sculpin	<u>Cottus cognatus</u> Richardson	SSC

maximum depth of 144 ft. There are two inlets but no visible outlet. Climatological trends and drainage changes had reduced the level of the lake about 3 ft since the mid-1960's, drying up large areas of pike spawning and summer habitat at the north end of the lake. By 1982 this trend had reversed itself, and the lake was rising and flooding the flats at the north end of the lake.

The indigenous fish in the lake include northern pike, burbot, least cisco and slimy sculpin. Lake trout were introduced into the lake in 1939, 1963 and 1965 as adults and in 1967 as fingerlings. Coho salmon fingerlings and smolts were stocked intermittently from 1968 until 1981. The contribution of stocking to the sport fishery has so far been negligible (Hallberg, 1979). Pike and burbot remain the basis of a light intensity sport fishery in the lake.

The results of fish population index and distribution studies conducted in conjunction with this project are presented in Doxey, 1980-1983.

In 1982, an experimental sheefish stocking program was begun with the planting of 141,735 fingerlings and 370 yearlings into the lake. Subsequent gill netting revealed no indications of their fate.

Little Harding Lake

Little Harding Lake is a 54-surface acre lake located adjacent to Harding Lake, 45 mi down the Richardson Highway from Fairbanks. The maximum depth is 28 ft. The water is brown-stained and the shoreline is swampy. The outlet empties into Harding Lake. There are control structures at both ends of the outlet to prevent fish movement.

Little Harding Lake was rehabilitated in 1966 to remove stunted northern pike and subsequently stocked with coho salmon. Reinfestation by pike necessitated rehabilitation again in 1976, followed by the stocking of 48,400 coho fingerlings that same year. Kramer (1978) and Hallberg (1979) found very high survival of these fish, and consequently growth was slow. Stocking levels were subsequently decreased. In 1982, three age classes of cohos were present in the lake, and were providing a popular winter fishery.

Lost Lake

Lost Lake is a 102-acre lake located 56 mi southeast of Fairbanks on the Richardson Highway, and 1/2 mi southwest of Birch Lake. The brown-stained waters have a maximum depth of 39 ft. A fish control structure blocks the outlet.

Lost Lake has been rehabilitated three times (last in 1970). Stockings of coho salmon and rainbow trout have produced an intermittently successful sport fishery. Efforts to maintain the sport fishery have been somewhat thwarted by vandalism of the weir on the outlet stream, which allowed the stocked fish to escape and permitted entry of undesirable species. In addition to stocked species, the lake is inhabited by lake chubs and longnose suckers.

Since 1979 the lake has been stocked with between 10,000 and 30,000 coho salmon per year. Sport fishing effort is increasing.

Koole Lake

Koole Lake is a 320-surface-acre lake lying in the Tanana flats 8 mi southeast across the Tanana River from Birch Lake. It has a large shoal area and a maximum depth of 22 ft. The water is transparent brown and much of the shoal area supports lily pads and emergent aquatic vegetation.

Access to the lake is by snowmobile or light aircraft. An intermittent outlet is blocked by an old beaver dam. The land surrounding the lake is primarily military reservation and there are no roads in the area.

Originally a barren lake, Koole Lake has been stocked with rainbow trout since 1975. Trout fishing has generally been excellent due to the rapid growth of the fish. Koole Lake has been used during the summer by at least two sport fishing guide services and numerous private pilots. Winter use by anglers traveling to the lake overland with snowmobiles, three-wheelers, and dog teams has been increasing, in part due to department efforts.

Spencer Lake

Spencer Lake is a brown-stained 11 acre lake lying 3/8 mi east of Harding Lake. The lake has no apparent inlet. A small, swampy outlet drains toward Harding Lake. A survey in August, 1979 revealed a population of small northern pike and encouraged the staff to continue evaluating the lake for possible rehabilitation and stocking (Doxey, 1980).

Bathymetric and dissolved oxygen analyses were conducted in the spring of 1980 and 1981, and further information was collected on the northern pike population of the lake. In late October, 1982, the northern pike in Spencer Lake were eradicated with rotenone.

RECOMMENDATIONS

Management

1. Birch Lake should be managed for a rainbow trout sport fishery.
2. Koole Lake should be stocked yearly with 30,000-40,000 rainbow trout at 200/lb.
3. Little Harding Lake should be stocked yearly with 10,000 coho salmon fingerlings at a minimum size of 340/lb.
4. Lost Lake should be maintained as a coho salmon sport fishery. If sheefish experiments begin in Lost Lake in 1984 (see research recommendations), a total of 3,000 cohos at a minimum size of 340/lb should be stocked immediately after breakup.

Research

1. The evaluation of the survival and catchability of Swanson River strain rainbow trout in Birch Lake should continue, emphasizing comparisons between trout stocked as fingerlings and sub-catchables.
2. The evaluation of coho salmon growth, survival, catchability, and stocking practices in Lost and Little Harding Lakes should continue.
3. A total of 5,000 large sheefish fingerlings should be experimentally stocked into Lost Lake, and an evaluation of their performance begun.
4. Methods of improving sport fishing in Harding Lake should be investigated, and studies of indigenous fish should be continued. The multi-year sheefish stocking experiment should continue with the planting of 300,000-500,000 large fingerlings in 1984.
5. Evaluation of the performance of the rainbow trout stocked into Spencer Lake should begin. Experimental stockings should continue as necessary and feasible in order to create a sport fishery.
6. Rainbow trout growth and catchability in Koole Lake should be monitored to determine the effects of annual stocking.

OBJECTIVES

1. The performance of Age I Swanson strain rainbow trout stocked as fingerlings into Birch Lake in 1982 will be compared with the previously determined performance of Swanson Strain rainbow trout stocked as Age I sub-catchables. Performance will be evaluated by:
 - a. A statistically based summer creel census program covering the Birch Lake rainbow trout sport fishery from breakup in May to late August, 1983.
 - b. A limited winter creel census program covering the Birch Lake rainbow trout sport fishery from freeze-up in 1983 to breakup of 1984.
 - c. Monthly assessments of the growth of various age classes of Birch Lake rainbow trout with emphasis on Age 0, I, and II fish.
 - d. A fall population estimate of the Age I rainbow trout population of Birch Lake.
2. The sheefish stocking program will continue in Harding Lake in 1983 with the addition of approximately 50 Age II

sheefish from the Clear hatchery. The evaluation of the 142,000 sheefish stocked as fingerlings in 1982 will be continued during the summer, fall, and possibly winter of 1983. Interaction of stocked sheefish with the northern pike, burbot, lake trout, least ciscos and coho salmon in the lake will be assessed by collecting fish from various habitats in the lake and noting the degree of predation. Growth and availability to the creel of stocked sheefish will be assessed as specimens become available. General information on the population levels, growth, and distribution of indigenous fish in Harding Lake will be collected, with emphasis on least ciscos and lake trout.

3. Limnological conditions that may affect survival and growth of stocked rainbow trout, coho salmon, and sheefish in district lakes will be monitored as appropriate. These conditions may include length of ice cover period, summer water temperatures, winter dissolved oxygen levels, and water levels. Emphasis will be placed on Birch and Harding Lakes.
4. Stocks of planted coho salmon in Little Harding and Lost Lakes will be evaluated to determine the growth, relative abundance, and catchability of the year classes present in the lakes.
5. The growth and availability to anglers of stocked rainbow trout in Koole Lake will be evaluated by visiting Koole Lake at least twice yearly, once in winter and once in summer, to collect specimens and assess angling potential.
6. Rainbow trout will be stocked in Spencer Lake on an experimental basis in 1983, and a program will begin to assess the growth and catchability of those fish, and to monitor limnological conditions which may affect their survival.
7. The Salcha River chinook salmon run and other sport fisheries in the district will be monitored as time allows.

TECHNIQUES USED

An electrofishing unit based on the boat-mounted unit described by Van Hulle (1968) and Roguski and Winslow (1969) was used for obtaining part of the rainbow trout population estimate in Birch Lake.

Fyke nets measuring 20 ft in length by 4 ft diameter with 3/8 in knotless nylon webbing and 100 ft x 4 ft center leads were set along the shoreline of Birch Lake to capture fish for population estimates and growth studies.

For the Birch Lake rainbow trout population estimate, captured fish were marked by fin clips and released. Different fin clips were used in different areas of the lake to determine the degree of mixing. Numbers of marked and unmarked fish were tabulated upon recapture, and population estimates and confidence limits were determined using Schnabel multiple mark and recapture estimates.

Multifilament and monofilament sinking or floating gill nets measuring 125 x 6 ft and consisting of five 25-ft panels of 1/2-2 1/2 in bar mesh were used to monitor fish populations in Lost, Harding, Little Harding, and Koole Lakes. Gill nets were set at varying depths and habitats on both the bottom and surface. Fish were occasionally collected by angling.

For growth studies, Birch Lake rainbow trout and coho salmon samples were collected monthly, and coho salmon were collected in Lost and Little Harding Lakes twice during the open water season. Koole Lake rainbows were collected in June. The fish were measured to the nearest millimeter of fork length and weighed to the nearest gram on a triple beam balance or Chatillon IN-2 spring scale. Larger fish were weighed on a Chatillon IN-25 spring scale. Scales used for age determination were individually cleaned and mounted between glass slides or were impressed on 20 mil acetate using a Carver press at 20,000 psi, heated to 200^oF for 30 seconds. The scales were read on a Bruning 200 microfiche reader.

Birch Lake nearshore water temperatures were recorded continuously through most of the summer by a Ryan thermograph. Thermograph temperatures were calibrated and verified through spot checks with conventional thermometers.

A summer creel census program was set up at Birch Lake. Weeks were stratified according to predicted intensive use periods on Saturdays, Sundays, and holidays, and predicted light use periods on weekdays. Two random angler counts were taken during weekend intensive use periods and a minimum of one weekly count was made at random on weekdays. Two or three counts were made during holiday intensive use periods. Immediately after one of the weekend fisherman counts, most or all of the fishermen were interviewed. Notes were made on the number and size composition of the rainbow trout in the catch, and on the time spent angling.

A limited winter creel census was also conducted at Birch Lake. Similar information was gathered. For the purposes of organizing the creel census data, a "fishing year" is defined as the period from freeze-up (November) of one year through the end of August of the next. Angler effort is very low from early September to freeze-up, and no creel census is undertaken.

The instantaneous angler counts were expanded to yield an estimate of angler hours during the periods. These estimates were then adjusted for known weather and darkness conditions to obtain the final estimate. Catch per unit effort (CPUE) data, expressed as fish per angler hour,

were obtained from the interviews. Previous years' creel census data are included in the tables in this report (Doxey, 1980-1983).

The Salcha River chinook salmon sport fishery was monitored as time allowed by traveling by boat to the area where fishermen concentrated, making a count, and interviewing most or all of the anglers as to catch, angler hours, and previous catch. A sport fishing charter service at the Salcha River also provided valuable information.

Notes were taken on catch whenever anglers were encountered on water bodies which were not subject to an organized creel census.

FINDINGS

Birch Lake

Stocking:

Birch Lake stocking in 1983 began on June 13 when sub-catchable rainbow trout became available from the Clear Hatchery as a result of their broodstock program. From June 13 to June 17 a total of 19,482 rainbows at 9.6/lb was planted. These fish were of mixed Swanson River and Big Lake stocks. Stocking mortality was almost zero. All of the fish were missing part or all of their pelvic and pectoral fins, a result of their fighting with each other in the raceway. In addition, many had ragged caudal fins.

On August 29, a total of 125,218 Swanson strain fingerlings at 243/lb was stocked. The fish appeared to be in excellent condition, and few mortalities were noted.

Creel Census - Fishing Year 1983:

A limited winter creel census was conducted and data were expanded to cover the period from November 7, 1982 to May 1, 1983, after which most ice fishing activity ended due to rotting ice. In mid-winter 30 fishing shanties were in use on Birch Lake.

The greatest number of anglers seen on the lake was 50 on November 27, and weekend counts averaged 25 anglers. Weekday counts ranged from 0 to 48 fishermen.

Overall CPUE was 1.28 fish per hour, and ranged from 0.07 to 1.81. Catches were best in early and mid-winter and declined toward spring.

Winter anglers spent an estimated 11,530 man hours to catch 14,757 rainbow trout and coho salmon. Cohos comprised the majority (53%) of the catch (7,840 at 0.68 fish per hour). The estimated catch was rounded out by 2,882 trout stocked as sub-catchables in 1982 (0.25 fish per hour), 3,113 trout stocked as sub-catchables in 1981 (0.27 fish per hour) and 922 trout from the 1980 stocking of sub-catchables (0.08 fish per hour). The contribution of 1982 Swanson strain sub-catchables to the

winter fishery of 1982-83 is lower than that of yearlings stocked during the summers of previous years. Swanson strain yearlings from the 1981 planting provided a catch of 9,194 trout during the winter of 1981-1982, and Swanson strain yearlings stocked in 1980 provided 8,013 to the 1980-81 winter fishery. Ennis-Alaska strain yearlings stocked in 1979 contributed 9,221 trout to the 1979-1980 winter fishery. The lower winter take of 1982 yearlings is a continuation of the results (reported in Doxey, 1983) of stocking them at a smaller size, which caused them to have lower survival to the fall than trout previously stocked at a larger size, and provided no contribution to the creel during their first summer in the lake.

The 1983 summer creel census covered the period from May 19 to August 31. A total of 300 anglers was interviewed. The number of anglers seen during weekend counts ranged from 5 to 84. Anglers spent an estimated 17,806 man-hours to catch a projected total of 10,220 trout and coho salmon, for an overall CPUE of 0.55 fish/hr. Effort was about the same as the previous two summers (Table 2), but the rainbow trout catch was up due to the availability of the Clear Hatchery sub-catchables and the increasing contribution of 1982 sub-catchables. Table 3 compares rainbow trout fisheries for the summers 1979-1983. As noted in the table, Age I trout stocked as fingerlings in 1982 contributed almost nothing to the creel. Many were caught and released, being too small to be acceptable to anglers.

Table 4 gives details of the 1983 summer creel census. The large yearlings stocked from the Clear Hatchery contributed significantly to the fishery from mid to late summer.

The combined winter and summer totals for the fishing year 1983 are combined with past years in Table 5. Anglers spent an estimated 29,336 man hours to catch 24,977 rainbow trout and coho salmon, for an overall CPUE of 0.85 fish per hour.

Rainbow Trout Population Estimate:

In late September and early October of 1983, a population estimate of the 1982 fingerling rainbow trout was attempted, using night electrofishing and fyke netting. These methods, which had been highly effective in previous years, failed in 1983. The smaller size of the target age class of trout reduced the capability of the electrofishing unit to stun them, and wind-induced turbidity made it impossible to see those that had been stopped. Shocking was impossible during one night because of rough water. Rough, windy days also precluded consistent trap checks, and fouled up the sets on several occasions. The end result was a total of 441 marked yearlings, compared to 4,129 in 1982 and an average of 2,215 for the years 1979-82.

The combination of a low number of marked fish and weather-induced problems with the capture methods rendered any estimate derived from the results unreliable. After the 1984 fall estimate of the survival of trout stocked as fingerlings in 1983, the 1983 results may be reevaluated.

Table 2. Total effort and CPUE* comparisons of 1979 through 1983 summer fisheries for Birch Lake rainbow trout.

Dates	Total Catch	Angler-Hours	CPUE
May 27 - Sept. 3, 1979	4,473	16,324	0.27 fish/hr
May 19 - Sept. 1, 1980	7,602	22,290	0.34 fish/hr
May 11 - August 30, 1981	9,932	17,974	0.55 fish/hr
May 28 - Aug. 29, 1982	7,897	17,058	0.46 fish/hr
May 19 - August 31, 1983	9,390	17,806	0.53 fish/hr

* CPUE = catch per unit effort

Table 3. Comparison of catch by age class of rainbow trout in Birch Lake for the summers of 1979 through 1983.

Dates	Age III & Older		Age II		Age I	
	Number	Percent	Number	Percent	Number	Percent
May 27 - September 3, 1979	Combined w/ Age II		3,053	68.0	1,420	32.0
May 19 - September 1, 1980	890	12.0	5,015	66.0	1,697	22.0
May 11 - August 30, 1981	53	0.5	5,068	51.0	4,811	48.5
May 28 - August 29, 1982	1,446	18.0	6,451	82.0	0	0
May 19 - August 31, 1983	2,042	22.0	5,870	62.0	1,478*	16.0

* The 1983 Age I rainbow trout consist of 1,440 large yearlings stocked in June from the Clear Hatchery and 38 yearlings stocked as fingerlings in August, 1982.

Table 4. Birch Lake summer creel census, 1983. Estimated fishing pressure and catch statistics by species and Age Class.

Period	Man- Hours	Fish/ Hour	Cohos		Age III & Older Rainbows		Age II Rainbows		Age I (a) Rainbows		Age I (b) Rainbows		Total Rainbows		Total Catch No.
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
May 19 - June 4	5,271	0.41	580	27	632	29	949	44	0	-	0	-	1,581	73	2,161
June 5 - July 2	3,533	0.33	212	18	389	32	601	50	0	-	0	-	990	82	1,202
July 3 - July 30	5,252	0.76	0	-	421	10	2,783	69	0	-	840	21	4,044	100	4,044
July 31 - August 31	3,750	0.74	38	1	600	22	1,537	55	38	1	600	21	2,775	99	2,813
Totals	17,806		830	8	2,042	20	5,870	57	38	1	1,440	14	9,390	92	10,220
Mean fish/hour by Age Class and by species.			0.05		0.11		0.33		0		0.08		0.52		0.57

Note: Age III and older rainbows were primarily Swanson Strain fish stocked during or before 1981.

Age II Rainbows were Swanson strain trout stocked in 1982.

Age I (a) Rainbows were Swanson strain trout stocked as fingerlings in 1982.

Age I (b) Rainbows were Swanson and Big Lake strain trout.

Table 5. Fishing year totals from combined winter-summer Birch Lake creel census.
Contributions of year classes.

Fishing Year	Man Hours	CPUE Fish/hr	Older RT	1979 RT	1980 RT	1981 RT	1982a RT	1982b RT	1983 RT	Coho	Total
Dec. 1, 1979 - Sept. 1, 1980	34,921	0.52	2,027	14,236	1,697	...	...	...	...	...	17,960
Nov. 23, 1980 - Aug. 30, 1982	29,933	0.79	241	2,682	13,081	4,811	...	...	...	2,832	23,647
Nov. 21, 1982 - Aug. 31, 1982	28,999	0.80	0	50	2,640	15,645	0	0	...	4,658	22,993
Nov. 7, 1982 - Aug. 31, 1983	29,336	0.85	0	0	1,366	4,711	8,752	38	1,440	8,670	24,977

Note: 1982a Rainbow trout were stocked as sub-catchables in 1982.
1982b Rainbow trout were stocked as fingerlings in 1982.
1983 Rainbow trout were stocked as sub-catchables in 1983.
Cohos are from the combined 1980-1981 stockings.

Survivors of the 1982 stocking of 298,500 fingerlings did not appear to be as abundant as previous stockings of larger fish, but as their size approached acceptability for anglers in mid-winter 1983-1984, more were appearing in the creel.

Rainbow Trout Growth:

Sixty-two yearling rainbows from the 1982 stocking of Swanson strain fingerlings were sampled for length in October 1983. Mean length was 166 mm (an increase of 102 mm from October 1982) and range was 130-200 mm. Thus they were larger at the end of their summer as yearlings than the 1982 subcatchable yearlings stocked at 85 mm, which grew only to a mean length of 154 mm by the end of the summer of 1982 (Table 6). Havens (1981) found similar results in comparisons between Swanson strain fry versus fingerlings. Table 6 describes the growth of rainbow trout stocked as yearlings into Birch Lake since 1979.

Rainbows stocked from the Clear Hatchery in June 1983 grew from a mean length of 167 mm in early July to 207 mm in October. Observation and weight data indicate that these fish are not as heavy at a given length as other fish in the lake. Having some or all of each of their ventral fins torn off probably put them at a disadvantage in competing for food. Many of the fish had their fins bitten off at the base, making regeneration impossible.

Representative growth samples of trout stocked as sub-catchables in 1980 and 1981 were unobtainable due to the relatively small numbers of those fish captured. However, the 1980 fish seen ranged from 350 mm to 400 mm and 1981 fish ranged from 209 mm to 271 mm.

Coho Salmon Growth:

Two coho year classes were present in Birch Lake. In early October terminal year fish stocked in 1980 had a mean length of 318 mm (range 303-342, n=10). Cohos from the 1981 stocking had a mean length of 282 mm (range 266-294 mm, n=13).

Limnological Information:

The 1983 open water season on Birch Lake extended from breakup on May 21 to freeze-up on October 18.

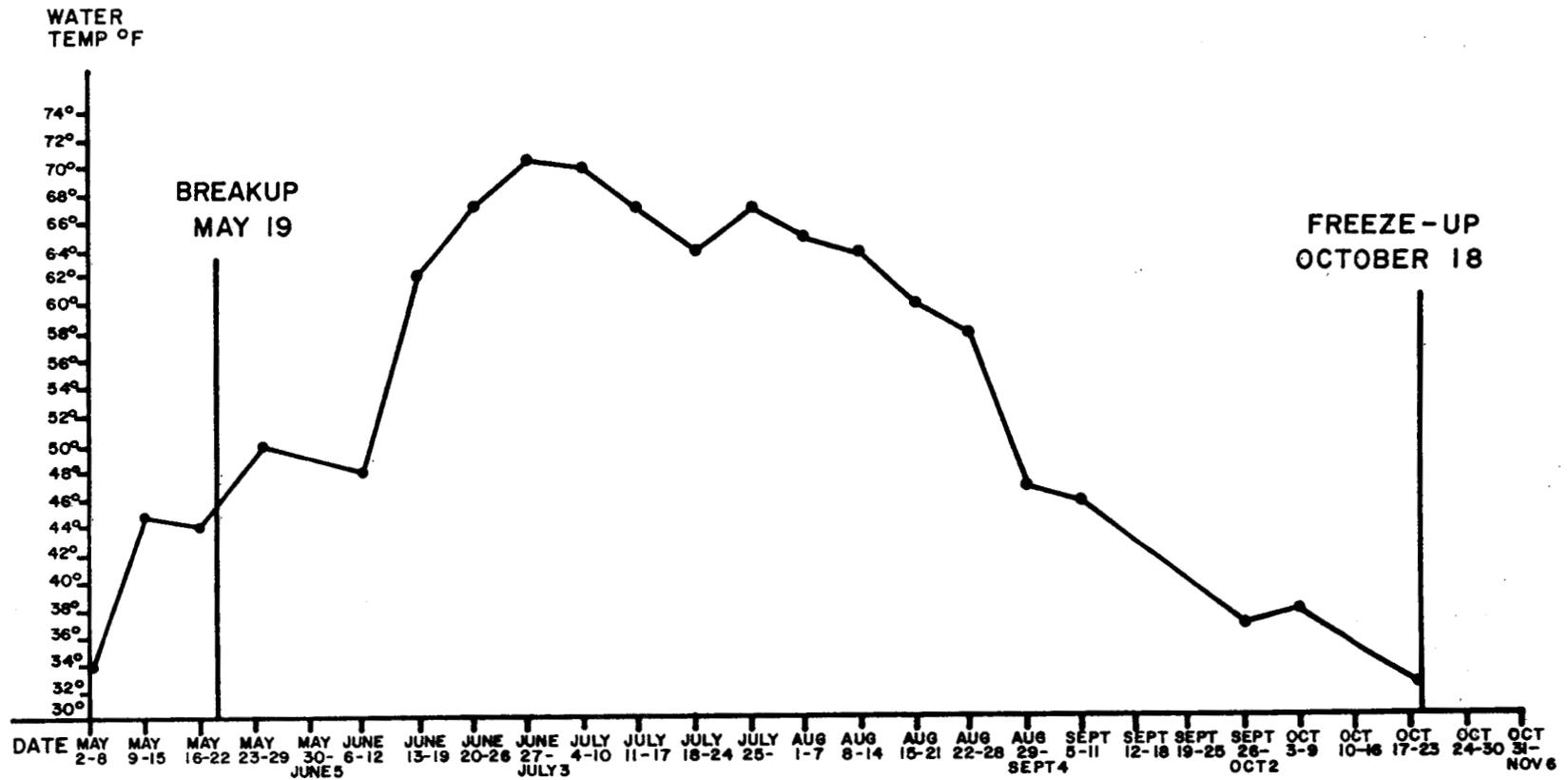
High weekly average water temperatures in the nearshore zone approached the highs of 1982. Weekly average temperatures were 70.5°F during the week of June 27-July 3, and 70.0°F during the week of July 4-10. The highest water temperature recorded was 74.0°F on June 26. After mid-July temperatures declined gradually until the last week of August, when they plunged due to cold, rainy (and snowy) weather. From late August until early October, temperatures were 2.0°F to 9.0°F cooler than had been recorded during the 3 previous years. Summer weekly average water temperatures are plotted on Figure 2.

Table 6. Length data for Age I rainbow trout stocked in Birch Lake since 1979.

Date Stocked	Broodstock	Mean Length		
		At Stocking	Fall of First Year	Fall of Second Year
5/21/79	Ennis-Alaska	127 mm	225 mm	232 mm
5/23/80	Swanson River	130 mm	179 mm	259 mm
5/20/81	Swanson River	125 mm	188 mm	267 mm
6/08/82	Swanson River	85 mm	154 mm	227 mm

FIGURE 2

AVERAGE WEEKLY SURFACE WATER TEMPERATURES
BIRCH LAKE 1983
NEARSHORE AREA



Maximum ice thickness during the winter of 1982-83 was 36". A dissolved oxygen-water temperature profile taken on February 4, 1983 in 18 feet of water is presented in Table 7.

Harding Lake

Fish Stocking:

Due to failure of the 1982 sheefish egg take, no sheefish were available for the scheduled 1983 stocking. The F.R.E.D. Division sheefish egg take during September 1983 was a success, and as of January 1984 it appears that the sheefish experiment can be continued in 1984.

Test netting, life history and species distribution information:

Test netting efforts in 1983 were conducted with three general goals:

- a) determining the status of stocked sheefish.
- b) establishing and monitoring seasonal index areas to determine the population status of certain species.
- c) filling data gaps that exist in the seasonal fish distribution information for some habitats, with emphasis on the profundal zone.

A total of 36 net nights was expended at depths ranging from 1 ft to 105 ft. Netting was done at breakup, during late June and early July, during late July, and at freeze-up in mid-October. Prime northern pike habitat was generally avoided.

The following species information was derived from observation, test netting results, and analysis of previous netting information.

Sheefish:

No sheefish were netted, nor were any found as stomach contents of the 35 predators (pike, burbot, and lake trout) examined during the open water season. One possible sighting was made in late July.

Least Cisco:

Ciscos did not appear to be as abundant in the shallows and near the surface as they were in 1982, but overall CPUE for gill nets was similar (19.3 average per net-night, compared to 19.6 in 1982). Catch composition was similar to 1982, with (nearly all) ciscos being in Age Classes I-III. Ciscos were found at all depths down to 105 ft. Large concentrations of larval ciscos were observed (and some captured) in the very shallow areas of the lake from late May through mid-June. Mean length of seven collected on May 22 was 10 mm. After mid-June the young-of-the-year ciscos moved out to deeper water. A 260 mm least cisco taken on July 28 had skeletal remains in its stomach that were probably young-of-the-year ciscos.

Table 7. Birch Lake winter limnological sampling, Feb. 4, 1983.

Location	Water Depth	Snow Depth	Ice Thickness	Sample Depth	Water Temp. (^o F)	Dissolved Oxygen (ppm)	Comments
Rec Camp Point	18'	0	31"	31"	33.8	12	Just under ice.
				5'	34.7	11.6	
				10'	36.5	10.6	
				15'	37.0	10.2	
				18'	37.4	9	Just off bottom.

Lake Trout:

During the course of the season nine lake trout were netted. Five were weighed, tagged, and released. Weights ranged from 4,400 g to 9,600 g. Three were collected, sampled, and aged in late July. One was a 110 mm, Age II male taken in 35 ft of water. The other two were taken in 40 ft of water. One was an Age VII male prespawner weighing 3,675 g. The other was an Age VI, 3,480 g developing female. These bring to six the number of lake trout taken since 1981 that are evidence of natural reproduction in the lake. Depths at which lake trout were netted in July, 1983 ranged from 25 ft to 90 ft.

Northern Pike:

Information gathered on northern pike has been filed and will be presented in a future report.

Burbot:

Nine burbot were captured in 1983. Seven were netted and two were taken on setlines. A 134 mm juvenile was netted in the east inlet about 300 ft from the lake. Gut examination revealed that it was gorged with stone fly nymphs and chironomid larvae. Lengths of the others ranged from 292 mm to 698 mm.

In addition to the early winter ice fishery in 1982, Harding Lake burbot were subjected to an intensive setline fishery during weekends from late May to late June. Success rate was good in late May. On May 29, at 1 a.m., examination of 37 sets in the north end of the lake revealed that 23 burbot were hooked, for a 62 percent success rate. Estimated weights ranged from 500 g to 2,000 g (1-4 lbs.). It is probable that, by the time the three anglers checked their sets in the morning, they had caught additional fish.

Harding Lake Limnological Observations:

The refilling of the lake bed in 1982 due to increasing water levels stalled during the summer of 1983 due to extended hot, dry weather. Spring runoff, a dry early summer, and an extended period of precipitation from late July through late September resulted in a net 1983 water level increase of less than an inch. Measurements taken on the east inlet just above the lake during the peak of spring runoff on May 9 indicated a flow of 23 cfs.

Dissolved oxygen and temperature profiles taken on April 21 revealed very little stratification in 113 ft of water. Dissolved oxygen levels were at 15.3 ppm at 5 ft and declined steadily to 8.8 ppm at 105 ft. Thereafter the DO declined sharply to 4.0 ppm at 110 ft and 1.2 ppm at 113 ft, just off the bottom. The temperature at 5 ft was 36.5°F, and increased steadily to 38.3°F at 75 ft. From 75 to 113 ft the temperature remained at 38.3°F. Ice thickness was 36 in.

A temperature profile was taken of the upper 35 ft of the lake during the hot weather in late June. The surface temperature was 69.8°F. Temperature at the top of the thermocline at 10 ft was 68.0°F. The bottom of the thermocline was at 20 ft, where the temperature was 52.7°F. Thereafter temperatures declined steadily to 44.6°F at 35 ft.

Little Harding Lake

Fish Stocking:

On May 23, 1983, Little Harding Lake was stocked with 10,000 coho salmon at 170/lb. Cohos stocked in late May and early June generally average over 300/lb. The large 1983 fingerlings were provided by the Clear Hatchery and were in excellent condition. Stocking mortality was minimal.

General Information:

In 1983, Little Harding Lake contained two age classes of coho in addition to the fish that were stocked that summer. The lake was sampled by gill net on June 16, and by angling in October and November to assess population status and sport fishery potential.

Age I fish from the 1982 stocking were the most abundant, both in net catches and angling. They grew from a mean length of 137 mm in June (n=19) to 168 mm (n=20) in October. Fish from the 1981 plant grew from 195 mm in June (n=5) to 219 mm (n=4) in October.

Little Harding Lake supported a steady, low level fishery throughout the summer, primarily by anglers launching canoes and small boats at the outlet. Age II fish were the target of these fishermen, and good catches were reported.

In June the dike at the outlet was upgraded to prevent overflow when the culvert screens plugged as occurred during heavy runoff periods during 1982. This, coupled with some improvements to the screens themselves, resulted in the alleviation in large part of the difficulties encountered in previous years when Age I fish were attempting to smolt. Smolts first appeared in the outlet on May 15, the day after breakup. They continued to attempt to escape the lake until mid-July. Mortalities were minimal compared with past years, and few were known to have escaped downstream into the swamps between Little Harding and Harding Lake.

Coho stocking levels at Little Harding have been adjusted downward from the 15, to 20,000 fish levels of 1979-82 to 10,000 fingerlings per year. Growth and angling potential at this level will be monitored for several years.

Lost Lake

Fish Stocking:

Due to a production failure at the Elmendorf Hatchery no coho salmon

were available for the annual stocking at Lost Lake. On June 2 an experimental stocking of 50,000 grayling sac fry took place. About half of the fish were stocked into nearshore waters, and the other half were spread over deeper water. Immediate mortality was low. Surface temperature was 64°.

General Information:

During test netting on June 15, eight longnose suckers and seven coho salmon were captured. All of the suckers were large, mature fish. During test netting on October 18, 5 cohos and one large sucker were taken. The absence of smaller suckers in the net catches may indicate a lack of reproductive success in the lake.

All of the cohos netted were Age II. Age I and an Age III fish were taken by angling in December, 1983. Growth of Lost Lake cohos is similar to that of Little Harding Lake cohos through Age II. By early winter, 1983, Age I cohos in Lost Lake had a mean length of 166 mm, Age II fish were 203 mm, and the Age III fish was 249 mm long. The mean length of Age II fish is less than in 1982, possibly as a result of gear selectivity or angler pressure.

Angler interest continues to increase at Lost Lake, and it is the subject of light fishing pressure year round.

During the summer of 1984, an experimental stocking of sheefish into Lost Lake is scheduled. The coho sport fishery potential will be maintained with a light stocking of cohos. The performance of the sheefish and their interrelationships with other fish species in the lake will be studied.

Koole Lake

Fish Stocking:

On September 14, 1983, Koole Lake was stocked with 34,600 Swanson strain rainbow trout fingerlings at 271/lb. They were transferred from the hatchery truck to a float plane at Chena Lake for the 25 minute flight to Koole Lake. Condition of the fish was fair to poor upon arrival and immediate mortality was estimated at 500.

General Information:

Koole Lake trout were collected by gill net and angling on June 14, 1983, and by angling on January 10, 1984.

Trout collected in June were all (n=6) Talarik strain Age III fish stocked in 1980. Length range was 396 mm to 434 mm with a mean length of 415 mm. Weight range was 710 g to 1,100 g with a mean weight of 892 g. These fish provided excellent angling through the summer of 1983, and the ADF&G staff members involved received considerable favorable public comment on them. In January, 1984, the first specimens were collected from the 1982 stocking of Swanson fingerlings. Length

range (n=9) was 195 mm to 251 mm, with a mean length of 216 mm. Weight range was 82 g to 188 g, with a mean weight of 122 g. Observations indicate good survival of these Age I fish.

Spencer Lake

On June 28, 1983, Spencer Lake was experimentally stocked with 3,610 rainbow trout from the Clear Hatchery at 7/lb. Considerable mortality was observed due to thermal stress, and subsequent observations indicate that few, if any, of the trout survived. On October 27, 1983, 5,100 rainbow trout fingerlings at 74.3/lb were stocked through the ice. No initial mortality was observed. The performance of these fish and limnological parameters will be monitored through 1984, and future stocking recommendations will be made.

Salcha Valley Lake

On February 23, 1983, an unnamed lake 2 mi northeast of Harding Lake was reached by snowmobile from the Salcha winter trail and surveyed. Depth and dissolved oxygen profiles were taken, and angling was undertaken.

The lake is 3/8 mi long and 1/8 mi wide, with a maximum depth of 14 ft. The main body of the lake is of fairly uniform depth. Examination of landsat photos and measured depths indicate that the littoral zone (as indicated by lily pads) consists of about 1/3 of the lake, and that the other 2/3 of the lake has depths ranging from 8 to 14 ft. There is an intermittent outlet to the Salcha River, and no major inlets were observed. Dissolved oxygen levels ranged from 3.6 ppm just under the ice to 0.6 at the bottom. Three small pike (300-400 mm FL) were taken in 1/2 hour of angling. The fish were very thin. Stomach contents consisted of aquatic insects, and all were prespawning females.

Should road access ever be established in the vicinity of this lake, further studies should be conducted to assess the potential for rehabilitation and stocking with another species.

Salcha River

Chinook Salmon Fishery:

The 1983 Salcha River chinook salmon sport fishery began on about June 30 and was essentially over by July 28. Commercial fish biologists counted a spawning escapement (above the sport fishery) of 1961 chinooks (Fred Andersen; Commercial Fish Division, pers. comm.). During 5 days of the run the river was unfishable due to high, turbid river conditions.

Angler effort concentrates in the 1½ mi section from the Richardson Highway bridge downriver to the confluence with the Tanana River. A total of 75 anglers was interviewed during four interview periods. They had five chinook salmon and reported 23 previously taken, for a take of 0.37 chinooks per angler, compared with figures of 0.33 in 1979 and 0.34 in 1982. During angler counts made on 5 days when the river was fishable, an average of 30 anglers was seen (range 19-46).

A sport fishing boat charter service operated on the lower Salcha during the chinook run. Their clients reportedly took 61 chinooks for an estimated CPUE of 0.13 fish per hour. They saw 42 chinooks taken from other boats. This brings the combined documented chinook catch to 131 fish. Weight range of 99 of those fish was 3 to 36 lbs, with an average weight of 12 lbs. Jacks (precocious males averaging 6 lbs each) comprised 60 percent of the observed angler take, probably due to the fact that nearly all jacks hooked are landed, while many larger fish are lost.

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Prepared by:

Approved by:

Michael R. Doxey
Fishery Biologist

Richard Logan, Director
Division of Sport Fish

Louis S. Bandirola, Deputy Director
Division of Sport Fish