Volume 26 Study G-III-I

STATE OF ALASKA

Bill Sheffield, Governor

Annual Performance Report for

# EVALUATION OF INTERIOR ALASKA WATERS AND SPORT FISH WITH EMPHASIS ON MANAGED WATERS DELTA DISTRICT

by

Richard Peckham

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

DIVISION OF SPORT FISH
E. Richard Logan, Director

TABLE OF CONTENTS

Study: G-III LAKE AND STREAM INVESTIGATIONS Page

Job: G-III-I Evaluation of Interior Alaska Waters and Sport Fish with Emphasis on Managed Waters Delta District
by: Richard Peckham


Abstract. . . . . 27
Key Words . . . . . 28
Background. . . . . 28
Recommendations . . . . . 28
Research . . . . . 28
Management . . . . . 31
Objectives. . . . . 31
Techniques Used . . . . . 31
Findings. . . . . 32
Fish Stocking Evaluation . . . . . 32
Survival Estimates. . . . . 39
Creel Census . . . . . 39
Quartz Lake . . . . . 39
George Lake . . . . . 44
Volkmar Lake. . . . . 44
Tangle Lakes. . . . . 44
Fielding Lake . . . . . 51
Landmark Gap Lake and Glacier Lake . . . . . 51
Fish Stock Assessment Studies . . . . . 51
George Lake . . . . . 51
Volkmar Lake. . . . . 54
Fielding Lake . . . . . 58
Literature Cited. . . . . 65


LIST OF TABLES AND FIGURES


Table 1. List of common names, scientific names and abbreviations . . . . . 29
Figure 1. Location of waters in the Delta district. . . . . 30
Table 2. Population characteristics of stocked lakes determined by graduated-mesh gill nets, interior Alaska, 1984. Abbreviations for species are listed in Table 1 . . . . 33
Table 3. Comparison of capture rates, growth and stocking data for Age-I Swanson rainbow trout in 15 interior Alaska lakes, 1983 and 1984. . . . . 35
Table 4. Comparison of capture rates and growth and stocking data for various strains of Age-I and Age-II rainbow trout in Quartz Lake, 1973-1984 . . . . . 36
Table 5. Comparison of capture rates and growth and stocking data for Age-I and Age-II Swanson rainbow trout in Interior Alaska lakes, 1983 and 1984. . . . . 37
Table 6. Comparison of growth and condition of Age-I Swanson rainbow trout in seven Interior Alaska lakes, 1984. . . 38
Table 7. Comparison of capture rates and growth and stocking data for Age-I coho salmon in Quartz Lake, 1978-1984. . 40

TABLE OF CONTENTS (CONT'D)

Page

Table 8. Comparison of survival estimates for Age-I Swanson rainbow trout in five Interior Alaska lakes, 1983 and 1984. . . . . 41
Table 9. Quartz Lake creel-census summary for summer (May 4 to September 3) and winter (November 3, 1983 to April 4, 1984), 1984 . . . . . 42
Table 10. Creel-Census Summaries for George Lake and Volkmar Lake, 1984. . . . . 45
Table 11. Tangle Lakes angler-effort and harvest estimates from postal surveys*, 1978-1983. Abbreviations for Species are listed in Table I. . . . . 47
Table 12. Tangle Lakes creel-census summary, June 10 to August 11, 1984 . . . . . 48
Table 13. Age frequency and length of Arctic grayling, Tangle Lakes, June 23 to August 11, 1984 . . . . . 49
Table 14. Ages and lengths of lake trout, Tangle Lakes, 1984. . . 50
Table 15. Fielding Lake creel-census summary, June 10 - August 11, 1984 . . . . . 52
Table 16. Age frequency and fork lengths of Arctic grayling, Fielding Lake, June 16 - July 18, 1984. . . . . 53
Table 17. Fielding Lake effort and harvest estimates from postal surveys*, 1981-1983 . . . . . 55
Table 18. Length-frequency data for northern pike captured with sport-fishing gear, George Lake, 1975-1984. . . . . 56
Table 19. Age-frequency, fork lengths and weights of burbot and Northern Pike, George Lake, February, 1984. . . . . 57
Table 20. Length-frequency data for northern pike*, Volkmar Lake, May 24-25 and September 11-13, 1984 . . . . . 59
Table 21. Ages, lengths and weights of northern pike, Volkmar Lake, 1983-1984 . . . . . 60
Table 22. Gear-type comparison and burbot catch, Fielding Lake, October 1-10, 1984. . . . . 61
Table 23. Length frequency of BB = burbot sampled* in Fielding Lake, 1982-1984 . . . . . 62
Table 24. Age frequency, lengths and weights of burbot from Fielding Lake, 1983 and 1984. . . . . 64

RESEARCH PROJECT SEGMENT

| | | | |
|---|---|---|---|
| State: | Alaska | Name: | Sport Fish Investigations of Alaska |
| Project: | F-9-17 | | |
| Study: | G-III | Study Title: | LAKE AND STREAM INVESTIGATIONS |
| Job: | G-III-I | Job Title: | Evaluation of Interior Alaska Waters and Sport Fish with Emphasis on Managed Waters Delta District |

Cooperator: Richard Peckham

Period Covered: July 1, 1984 to June 30, 1985

ABSTRACT

Fourteen lakes stocked with rainbow trout, *Salmo gairdneri* Richardson, and coho salmon, *Oncorhynchus kisutch* (Walbaum), were sampled with gill nets. Data on survival and growth relative to stocking rates, size at stocking, and strains are presented.

Estimates of survival to Age I of Swanson rainbow trout in Donna Lake and Little Donna Lake were 35% and 36%, respectively. Poor survival of Swanson rainbow trout stocked in Mark Lake and North Twin Lake was poor, compared to excellent survival the previous year. Growth and condition data for Age-I Swanson rainbow trout in seven lakes are also presented.

Harvest composition and catch success on Quartz, George, Volkmar, Fielding and Tangle Lakes is provided. The catch success for coho salmon of 0.11 fish per hour for the summer fishery in Quartz Lake was the lowest recorded since the fish were first stocked in 1977. Winter fishing success for coho salmon improved to 0.54 fish per hour but was down from the previous winter. No coho salmon were available from the hatchery in 1982, and only 46,500 were stocked in 1983.

Natural fish stocks were assessed in George, Volkmar and Fielding Lakes. A total of 103 northern pike *Esox Lucius* (Linnaeus) sampled in George Lake during June had lengths that ranged from 242 mm to 730 mm, (mean, 467 mm). Comparisons of length-frequency data for 8 years (1975-1984) are shown. Length and age composition for the principal sport-fish species in each lake is presented.

## KEY WORDS

Tanana River drainage, stocked fish evaluation, survival estimates, creel census, stock assessment, rainbow trout, coho salmon, northern pike, burbot, Arctic grayling, lake trout.

## BACKGROUND

The recreational fisheries located in the upper Tanana River drainage generally fall into three categories: streams, lakes with indigenous fish species and stocked lakes. Table 1 lists common and scientific names of all fish species mentioned in this report.

The principal fish species of recreational importance in area streams are Arctic grayling and round whitefish. Burbot are widely distributed in the larger glacial rivers and near the confluences of many tributary streams. Lakes at lower elevations (generally below 2,200 ft) that connect to a river system usually contain populations of northern pike, burbot, least cisco and humpback whitefish. Lakes at higher elevations support populations of lake trout, Arctic grayling, round whitefish and burbot.

Landlocked lakes are typically barren. Since statehood, most lakes near the highway system have been surveyed, and several that were found to contain undesirable fish populations have been chemically rehabilitated. Many capable of supporting fish have been stocked with rainbow trout or coho salmon. A few have been stocked with Arctic grayling. Various stocking rates, sizes, strains and timing, have been tested to determine those which provide optimum survival and growth of stocked fish.

Research and management of selected waters are directed toward monitoring fish-population levels and use by anglers. The locations of waters within the study area are shown in Figure 1.

## RECOMMENDATIONS

### Research

1. Continue fall gill-net sampling of stocked lakes as a means to assess survival and growth of stocked fish.

2. Continue life-history investigations of burbot, lake trout and grayling in Fielding Lake and intensify efforts to more accurately assess population abundance and composition.

3. Continue life-history investigations of northern pike in George, Volkmar and T Lakes and intensify efforts to more accurately assess population abundance and composition.

4. Conduct life-history investigations of burbot in George Lake, T Lake and the Tanana River and assess population abundance and composition.

Table 1. List of common names, scientific names and abbreviations.

| Common name | Scientific name | Abbreviation |
|---|---|---|
| Arctic grayling | *Thymallus arcticus* (Pallas) | GR |
| Burbot | *Lota lota* (Linnaeus) | BB |
| Coho salmon | *Oncorhynchus kisutch* (Walbaum) | SS |
| Humpback whitefish | *Coregonus pidschian* (Gmelin) | HWF |
| Lake trout | *Salvelinus namaycush* (Walbaum) | LT |
| Least cisco | *Coregonus sardinella* Valenciennes | LCI |
| Northern pike | *Esox lucius* Linnaeus | NP |
| Rainbow trout | *Salmo gairdneri* Richardson | RT |
| Round whitefish | *Prosopium cylindraceum* (Pallas) | RWF |
| Slimy sculpin | *Cottus cognatus* Richardson | SSC |

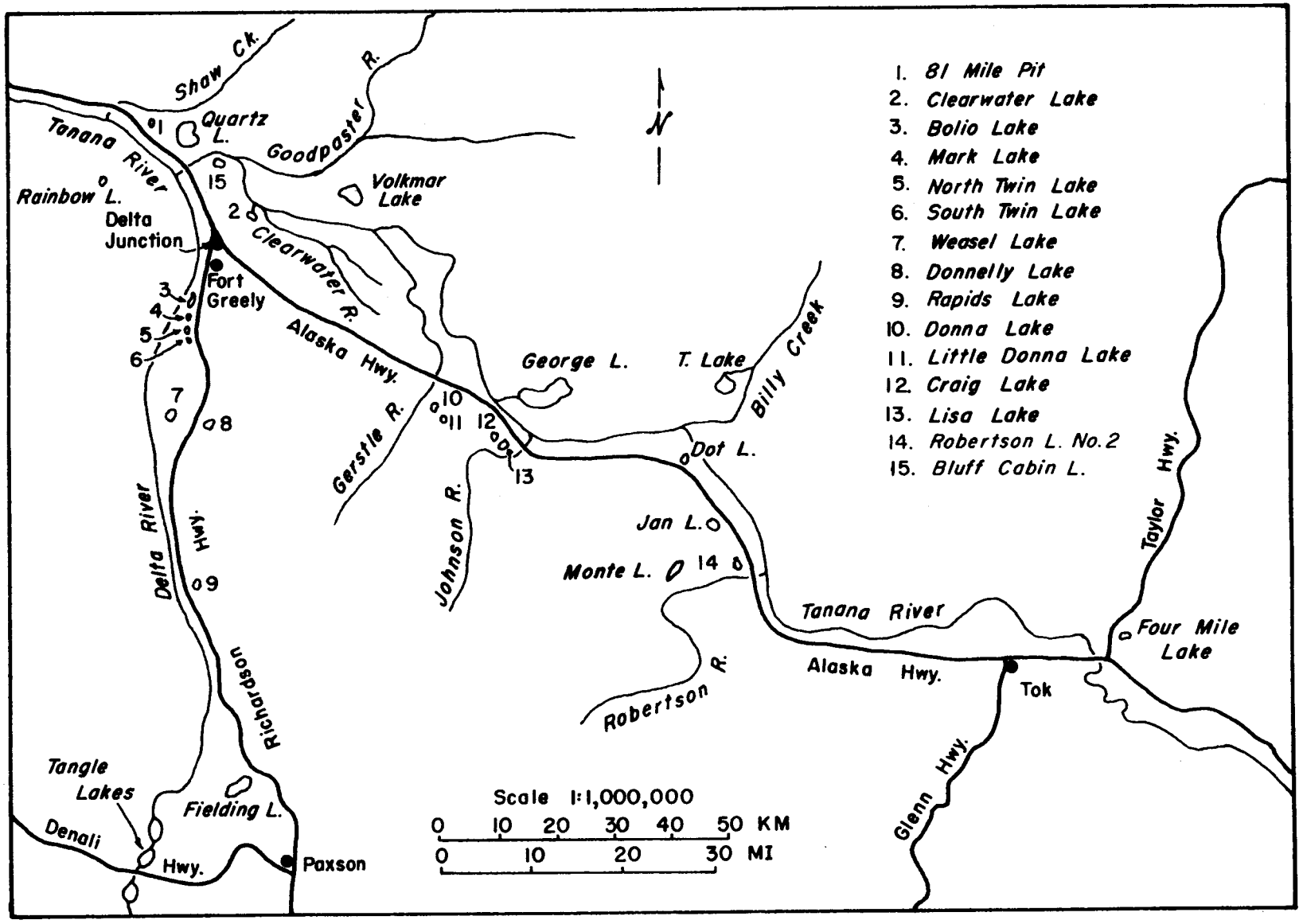


Figure 1. Location of waters in the Delta district.

Management

1. Continue monitoring angler harvests to determine catch composition and success on Quartz, George, Volkmar and Fielding Lakes.

2. Continue to cooperate with State and Federal agencies to monitor and implement plans to minimize or prevent adverse impacts to the Delta Clearwater River impacts resulting from agricultural activities and soil erosion.

3. Continue the investigation of public-access status to the area's recreational-fishery waters and provide assistance as required.

## OBJECTIVES

1. To evaluate stocking policies for rainbow trout and coho salmon in 16 lakes and formulate stocking recommendations for optimum survival and growth and to estimate survival to Age I of Swanson rainbow trout in selected lakes.

2. To determine harvest composition and catch success on Quartz, George and Volkmar Lakes during both the summer and winter seasons from May 15, 1984 to April 15, 1985 and on Fielding, Glacier, Landmark Gap and Tangle Lakes from May 15 to September 30, 1984.

3. To assess existing natural fish stocks in several high-use fisheries (George, Volkmar and Fielding Lakes) in both summer and winter to determine size and age composition and catch-per-unit-effort (CPUE) to provide a data base for comparison with past and future data, and to make regulatory and management decisions.

## TECHNIQUES USED

Techniques described by Peckham (1984) were used in lake surveys and for collecting and measuring fish samples.

The morphoedaphic index (MEI), a comparative measure of potential productivity for stocked lakes, is conductance divided by mean depth. Conductivity was measured with a Hach Model 2510 conductivity meter. Lake depths were determined with a Lowrance echo sounder.

Northern pike ages were determined using cleithra which were cleaned (using hot water) of all muscle and connective tissue , rinsed in clean water, and later viewed with a binocular microscope using transmitted and reflected light.

FINDINGS

Fish Stocking Evaluation

Between August 14 and September 13, population of stocked rainbow trout in 14 lakes were sampled to evaluate survival and growth. All lakes were sampled with one or two gill nets, except Quartz Lake, which was fished with three gill nets. Nets were fished from 17 to 25 hours.

Netting results, population characteristics and stocking histories are summarized in Table 2. Eight lakes with Age I Swanson rainbow trout had catch frequencies that ranged from 0 to 3.06 fish-per-net-hour (Table 2) Quartz Lake was stocked in August 1983 with 348/lb fingerling rainbow trout while the other seven lakes were stocked in September 1983 with fingerling rainbow trout (293/lb). Stocking rates varied from 156 to 274 fish/acre. The apparent poor survival in Mark and North Twin Lakes could possibly be attributed to the relatively high number of Age-I Swanson rainbow trout present in both lakes when the September 1983 stocking took place. Population estimates on July 1, 1983 revealed an estimated 176 Age-I rainbow trout per acre in Mark Lake and 126 Age-1 rainbow trout per acre in North Twin Lake (Peckham, 1984).

On August 22, 1983 just before the September stocking of 293/lb fingerlings, the Age-I rainbow trout in Mark Lake and North Twin Lake, had mean fork lengths of 181 mm and 172 mm respectively. In addition to the Age-I rainbow trout present in Mark Lake at the time of the 1983 stocking, there were also some Age-III rainbow trout. North Twin Lake had only Age-I fish. The remaining six lakes had Age-III or Age-IV rainbow trout or both. Quartz Lake contained Age-II coho salmon, as well.

It appears that the presence of larger rainbow trout may have less influence on survival than moderate numbers of smaller fish in the population, as was the case in Mark and North Twin Lakes. The highest catch frequencies of Age-I rainbow trout in 1984 were in Bluff Cabin Lake (3.04 fish/h) and Rainbow Lake (3.06 fish/h). The catch in Bluff Cabin Lake included 36 Age-I rainbow trout that were caught in a half-hour shoreline set. These fish were removed from the net and sampled, and the net was reset in deeper water. The overnight catch included an additional 40 Age-I rainbow trout and four Age-IV rainbow trout having a mean fork length of 521 mm (20.5 in) and a mean weight of 1.6 kg (3.6 lb). The overnight catch in Rainbow Lake included 55 Age-I rainbow trout and one Age-V rainbow trout that was 610 mm (24 in) long and weighed and 3.4 kg (7.5 lb).

The mean catch frequency (fish/net hour) of Age-I Swanson rainbow trout in eight lakes in 1984 was 1.12 fish/h, although catches in Mark and North Twin Lakes were low. If these two lakes are excluded, the mean catch frequency in the other six lakes was 1.46 fish/h. This compares to 1983 catch frequencies for Age-I Swanson rainbow trout in seven lakes; catch frequencies were 0.29-5.33 fish/h (mean, 1.70 fish/h). A summary of the comparisons for 1983 and 1984 is shown in Table 3. The mean fork length of the Age-I fish in 1984 was 197 mm (211 mm if North Twin Lake is excluded), as compared to a mean fork length of 206 mm in 1983.

Table 2. Population characteristics of stocked lakes determined by graduated-mesh gill nets, interior Alaska, 1984. Abbreviations for species are listed in Table I.

| Lake | Date sampled | Species | Number captured | Age class | Length (mm) Range | Length (mm) Mean | Catch Frequencies* | Date stocked | Total number | No. /lb | No. /Acre | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bluff Cabin | 9/5 | RT | 40 | I | 193-242 | 217 | 3.04 | 9/14/83 | 10,000 | 293 | 200 | Swanson |
| | | RT | 4 | IV | 500-544 | 521 | 0.16 | 7/23/80 | 5,000 | 414 | 100 | Talarik |
| Coal Mine | 8/28 | SS | 25 | III | 192-232 | 216 | 1.04 | 5/14/81 | 3,000 | 374 | 300 | Seward |
| Donna | 8/22 | RT | 34 | I | 114-218 | 165 | 0.72 | 9/14/83 | 15,900 | 293 | 274 | Swanson |
| | | RT | 1 | IV | 584 | | 0.02 | 7/23/80 | 5,000 | 414 | 86 | Talarik |
| Dornelly | 8/28 | SS | 23 | 0 | 111-112 | 112 | 0.48 | 5/29/84 | 6,000 | 105 | 92 | Wood Creek |
| | | SS | 109 | II | 198-278 | 233 | 2.27 | 6/17/82 | 5,600 | 224 | 86 | Seward |
| | | SS | 4 | IV | 326-380 | 353 | 0.08 | 5/27/80 | 10,000 | 216 | 154 | Ship Creek |
| Four Mile | 8/14 | RT | 10 | II | 352-405 | 372 | 0.23 | 9/01/82 | 25,700 | 315 | 257 | Swanson |
| Lisa | 8/30 | SS | 43 | II | 204-239 | 225 | 1.10 | 6/17/82 | 8,500 | 224 | 170 | Seward |
| Little Donna | 8/22 | RT | 11 | I | 156-236 | 201 | 0.24 | 9/14/83 | 12,500 | 293 | 266 | Swanson |
| | | RT | 1 | V | 580 | | 0.02 | 9/18/79 | 3,550 | 203 | 76 | Talarik |
| Mark | 8/23 | RT | 39 | II | 218-286 | 252 | 1.81 | 9/16/82 | 8,000 | 140 | 400 | Swanson |
| Monte | 8/23 | RT | 27 | II | 254-380 | 321 | 0.77 | 9/01/82 | 30,000 | 315 | 168 | Swanson |
| | | LT | 5 | | 376-416 | 388 | 0.11 | Natural Population | | | | |

Table 2. (Cont.) Population characteristics of stocked lakes determined by graduated-mesh gill nets, interior Alaska, 1984.

| Lake | Date Sampled | Species | No. Captured | Age Class | Length (mm) Range | Length (mm) Mean | Catch Frequency* | Date Stocked | Total Number | No. /lb | No. /Acre | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Twin | 8/23 | RT | 3 | I | 108-120 | 114 | 0.15 | 9/14/83 | 4,000 | 293 | 174 | Swanson |
| | | RT | 6 | II | 223-378 | 277 | 0.30 | 9/16/82 | 6,000 | 140 | 261 | Swanson |
| Quartz | 9/5 | RT | 49 | I | 208-310 | 252 | 0.92 | 8/29/83 | 233,300 | 348 | 156 | Swanson |
| | | RT | 8 | II | 377-460 | 418 | 0.15 | 9/15/82 | 226,600 | 360 | 151 | Swanson |
| | | SS | 44 | 0 | 105-122 | 116 | 0.83 | 5/31/84 | 89,400 | 246 | 59 | Seward |
| | | SS | 42 | 0 | 150-205 | 177 | 0.79 | 5/29/84 | 66,350 | 105 | 44 | Wood Creek |
| | | SS | 17 | I | 217-282 | 254 | 0.32 | 5/23/83 | 46,550 | 170 | 31 | Clear Creek |
| | | SS | 9 | III | 282-382 | 344 | 0.17 | 5/14&19/81 | 149,500 | 303-374 | 100 | Bear Creek |
| Rainbow | 9/13 | RT | 55 | I | 194-260 | 255 | 3.06 | 9/14/83 | 24,000 | 293 | 250 | Swanson |
| | | RT | 1 | V | 610 | | 0.06 | 9/18/79 | 10,000 | 203 | 104 | Talarik |
| Robertson #2 | 8/30 | RT | 19 | I | 180-218 | 203 | 0.79 | 9/14/83 | 1,430 | 293 | 179 | Swanson |
| | | RT | 2 | V | 385-410 | 398 | 0.08 | 9/18/79 | 2,450 | 203 | 306 | Talarik |
| Weasel | 8/23 | RT | 9 | II | 265-324 | 297 | 0.45 | 9/16/82 | 2,000 | 140 | 250 | Swanson |

* Fish per net hour: 125 feet graduated-mesh gill net.

Table 3. Comparison of capture rates and growth and stocking data for Age-I Swanson rainbow trout in 15 interior Alaska lakes, 1983 and 1984.

| Lake | Date sampled | No. captured | Fork Length (mm) Range | Fork Length (mm) Mean | Catch Frequency* | No./ lb | No./ Acre |
|---|---|---|---|---|---|---|---|
| Bluff Cabin | 9/5/84 | 40 | 193-242 | 217 | 3.04 | 293 | 200 |
| Donna | 8/22/84 | 34 | 114-218 | 165 | 0.72 | 293 | 274 |
| Little Donna | 8/22/84 | 11 | 156-236 | 201 | 0.24 | 293 | 266 |
| Quartz | 9/05/84 | 49 | 208-310 | 252 | 0.92 | 348 | 156 |
| Rainbow | 9/13/84 | 55 | 194-260 | 225 | 3.06 | 293 | 250 |
| Robertson #2 | 8/30/84 | 19 | 180-218 | 203 | 0.79 | 293 | 179 |
| Mark | 8/23/84 | 0 | ... | ... | 0.00 | 293 | 200 |
| N. Twin | 8/23/84 | 3 | 108-120 | 114 | 0.15 | 293 | 174 |
| Four Mile | 8/30/83 | 15 | 209-247 | 227 | 0.29 | 315 | 257 |
| Hidden | 8/30/83 | 83 | 193-259 | 220 | 5.33 | 315 | 133 |
| Mark | 8/22/83 | 23 | 119-237 | 181 | 0.87 | 140 | 400 |
| Monte | 11/16/83 | 20 | 200-247 | 223 | 0.44 | 315 | 168 |
| N. Twin | 8/22/83 | 19 | 120-270 | 172 | 0.75 | 140 | 261 |
| Quartz | 9/07/83 | 46 | 197-260 | 224 | 0.72 | 360 | 151 |
| Weazel | 8/22/83 | 84 | 115-237 | 192 | 3.50 | 140 | 250 |

* Fish captured per net hour: 125 foot graduated-mesh gill net.

Table 4. Comparison of capture rates and growth and stocking data for various strains of Age-I and Age-II rainbow trout in Quartz Lake, 1973-1984.

| Date Sampled | Age Class | No. Captured | Fork Length (mm) Range | Fork Length (mm) Mean | Catch Frequency* | Date Stocked | Total No. | No. /lb | No. /Acre | Source |
|---|---|---|---|---|---|---|---|---|---|---|
| 08/08/73 | I | 71 | 269-391 | 335 | 1.97 | 6/23-7/26/72 | 306,800 | 106-163 | 204 | Ennis |
| 11/14/74 | II | 10 | 409-470 | 445 | 0.24 | | | | | |
| 11/14/74 | I | 22 | 275-352 | 323 | 0.52 | 8/1-8/15/73 | 285,100 | 98-105 | 190 | Winthrop |
| 10/13/75 | II | 13 | 340-412 | 358 | 0.27 | | | | | |
| 10/08/75 | I | 16 | 225-310 | 275 | 0.33 | 7/10-8/28/74 | 184,600 | 119-588 | 123 | Winthrop |
| 09/08/76 | II | 6 | 331-413 | 384 | 0.20 | | | | | |
| 09/08/76 | I | 2 | 274-289 | 282 | 0.05 | 7/24-28/75 | 210,000 | 171-186 | 140 | Ennis |
| 09/13/77 | II | 5 | 423-448 | 442 | 0.10 | | | | | |
| 09/13/77 | I | 2 | 300-304 | 302 | 0.04 | 8/3-24/76 | 97,800 | 100-670 | 65 | Oregon |
| 09/26/78 | II | 5 | 350-408 | 377 | 0.07 | | | | | |
| 09/26/78 | I | 1 | 264 | ... | 0.01 | 9/26-8/11/77 | 113,800 | 11-304 | 76 | Ennis-Alaska |
| 09/13/79 | II | 3 | 338-442 | 381 | 0.05 | | | | | |
| 08/27/80 | I | 8 | 193-240 | 219 | 0.09 | 9/13/79 | 32,858 | 283 | 22 | Swanson |
| 09/03/81 | II | 22 | 315-440 | 377 | 0.38 | | | | | |
| 09/03/81 | I | 18 | 200-315 | 226 | 0.31 | 8/28/80 | 87,600 | 372 | 58 | Swanson |
| 08/26/82 | II | 4 | 342-380 | 358 | 0.06 | | | | | |
| 09/07/83 | I | 46 | 197-260 | 224 | 0.72 | 9/15/82 | 226,600 | 360 | 151 | Swanson |
| 09/05/84 | II | 8 | 377-460 | 418 | 0.15 | | | | | |
| 09/05/84 | I | 49 | 208-310 | 252 | 0.92 | 8/29/83 | 233,300 | 348 | 156 | Swanson |

* Fish per net hour: 125 foot graduated-mesh gill net.

Table 5. Comparison of capture rates and growth and stocking data for Age-I and Age-II Swanson rainbow trout in interior Alaska lakes, 1983 and 1984.

| Lake | Date Sampled | Age Class | No. Captured | Length (mm) Range | Length (mm) Mean | Catch Frequency* | No./ lb | No./ Acre | MEI** |
|---|---|---|---|---|---|---|---|---|---|
| Four Mile | 8/30/83 | I | 15 | 209-247 | 227 | 0.29 | 315 | 257 | 3.6 |
| | 8/14/84 | II | 10 | 352-405 | 372 | 0.23 | | | |
| Mark | 8/22/83 | I | 23 | 119-237 | 181 | 0.87 | 140 | 400 | 6.0 |
| | 8/23/84 | II | 39 | 218-286 | 252 | 1.81 | | | |
| Monte | 11/16/83 | I | 20 | 200-247 | 223 | 0.44 | 315 | 168 | N/A |
| | 8/23/84 | II | 27 | 254-380 | 321 | 0.77 | | | |
| N. Twin | 8/22/83 | I | 19 | 120-270 | 172 | 0.75 | 140 | 261 | 5.7 |
| | 8/23/84 | II | 6 | 223-378 | 277 | 0.30 | | | |
| Quartz | 9/07/83 | I | 46 | 197-260 | 224 | 0.72 | 360 | 151 | 34.9 |
| | 9/05/84 | II | 8 | 377-460 | 418 | 0.15 | | | |
| Weazel | 8/22/83 | I | 84 | 115-237 | 192 | 3.50 | 140 | 250 | 2.2 |
| | 8/23/84 | II | 9 | 265-324 | 297 | 0.45 | | | |
| All Lakes | ... | I | 207 | 115-270 | 203 | 1.10 | ... | ... | ... |
| | ... | II | 99 | 218-460 | 323 | 0.62 | ... | ... | ... |

* Fish per net hour: 125 foot graduated-mesh gill net.
** MEI = morphoedaphic index, conductance divided by mean depth.

Table 6. Comparison of growth and condition of Age-I Swanson rainbow trout in seven interior Alaska lakes, 1984.

| Lake | Date | Sample Size | Fork Length (mm) | | Weight (g) | | K* | MEI** |
|---|---|---|---|---|---|---|---|---|
| | | | Range | Mean | Range | Mean | | |
| Bluff Cabin | 9/5/85 | 17 | 193-242 | 217 | 94-187 | 138 | 1.35 | 12.5 |
| Donna | 6/13/84 | 30 | 72-109 | 87 | 5-13 | 7 | 1.06 | 3.8 |
| | 8/22/84 | 19 | 114-218 | 165 | 18-136 | 59 | 1.31 | |
| Little Donna | 6/13/84 | 30 | 70-110 | 91 | 6-17 | 10 | 1.33 | 2.8 |
| | 8/22/84 | 11 | 156-236 | 201 | 50-154 | 109 | 1.34 | |
| Quartz | 7/23/84 | 20 | 98-197 | 158 | 9-97 | 50 | 1.27 | 34.9 |
| | 9/05/84 | 20 | 208-310 | 252 | 118-372 | 209 | 1.31 | |
| Rainbow | 9/13/84 | 55 | 209-244 | 222 | 130-180 | 140*** | 1.28 | 4.1 |
| Robertson #2 | 8/30/84 | 14 | 180-218 | 203 | 86-154 | 122 | 1.46 | 4.5 |
| N. Twin | 6/07/84 | 4 | 74-82 | 77 | 6-8 | 7 | 1.53 | 5.7 |
| | 8/23/84 | 3 | 108-120 | 114 | 13-20 | 17 | 1.15 | |

* K = condition factor.

** MEI = morphoedaphic index, conductance divided by mean depth.

*** Weights and corresponding lengths were taken on four fish.

A comparison of capture rates and growth and stocking data for Age-I coho salmon in Quartz Lake from 1978 to 1984 is presented in Table 7. The mean fork length of 254 mm recorded in 1984 is greater than that recorded in previous years and is likely caused by an early stocking date and larger fish being stocked (170 fish/lb). Fish stocked on May 23, 1983 reached a length of 197 mm in 3.5 months (September 7, 1983), as reported by Peckham (1984).

The increase in growth during the second season after stocking is considerably less for coho salmon than for rainbow trout. Age-I coho salmon in Donnelly Lake in 1983 had a mean fork length of 226 mm and, 12 months later, had grown to a mean length of only 233 mm. Similarly, in Lisa Lake, Age-I coho salmon in 1983 had a mean length of 197 mm and, 12 months later, had a mean length of 225 mm.

Survival Estimates:

Estimates of survival to Age I of Swanson rainbow trout stocked in Donna and Little Donna Lakes were 35% and 36%, respectively. These estimates were lower than survival estimates of Age-I Swanson rainbow trout stocked in 1983 in Mark Lake (44%), North Twin Lake (48%), and Weazel Lakes (69%) (Table 8). Estimates in 1983 and 1984 were made about 10 months after stocking. The probable major factor accounting for the lower estimated survival in 1984 is the smaller size of fish stocked (293/lb in 1983 compared to 140/lb in 1982). Moderate populations of Age-III rainbow trout (mean length, 549 mm) in Donna Lake and Age-IV rainbow trout (mean length, 555 mm) in Little Donna Lake were present at the time of the September 1983 stocking (Peckham, 1984). The survival estimate on Donna Lake is judged to be the more accurate of the two 1984 estimates because it was based on 927 fish marked and released, 522 fish examined for marks and 86 recaptured fish on Little Donna Lake, 184 fish were marked and released, 122 fish were examined for marks and 5 were recaptured fish. The rate of capture was also much higher on Donna Lake. The average number of Age-0 rainbow trout caught with fyke nets in an overnight set in June was 97 in Donna Lake, compared to 45 fish in Little Donna Lake. In late August, gill nets captured Age-0 rainbow trout at a rate of 0.72 fish/h in Donna Lake and 0.24 fish/h in Little Donna Lake.

Survival estimates originally planned for Mark and North Twin Lakes were cancelled after two fyke nets set in each lake on June 6 and 7 captured only seven Age-I rainbow trout in each lake. Likewise, one overnight gill-net set in each lake in late August resulted in poor catches of Age-I rainbow trout. None were caught in Mark Lake and only three were caught in North Twin Lake (catch frequency, 0.15 fish/h. As suggested earlier, the high number of Age-I trout in both lakes in 1983 was probably responsible for the poor survival of the fingerling rainbow trout (293 fish/lb) stocked in 1983 in Mark and North Twin Lakes.

## Creel Census

Quartz Lake:

A statistically based schedule for sampling angling effort and harvest was used on Quartz Lake from May 4 to September 3, 1984. A summary of the results is shown in Table 9.

Table 7. Comparison of capture rates and growth and stocking data for Age-I coho salmon in Quartz Lake, 1978-1984.

| Date Sampled | No. Captured | Fork Length (mm) Range | Fork Length (mm) Mean | Catch Frequency* | Date Stocked | Total No. | No. /lb | No. /Acre | Source |
|---|---|---|---|---|---|---|---|---|---|
| 9/26/78 | 74 | 212-243 | 223 | 1.03 | 6/28/77-8/15/77 | 197,000 | 170-394 | 130 | Seward Lagoon |
| 9/13/79 | 5 | 208-232 | 221 | 0.08 | 8/17/78 | 55,549 | 129 | 37 | Seward Lagoon |
| 8/27/80 | 162 | 185-235 | 211 | 1.85 | 9/21/79 | 150,095 | 57 | 100 | Seward |
| 8/26/82 | 110 | 193-280 | 221 | 1.53 | 5/14/81-5/19/81 | 149,500 | 303-374 | 100 | Bear Creek |
| 9/05/84 | 17 | 217-282 | 254 | 0.32 | 5/23/83 | 46,550 | 170 | 31 | Clear Creek |

* Fish per net hour: 125-foot graduated-mesh gill net.

Table 8. Comparison of survival estimates for Age-I Swanson rainbow trout in five interior Alaska lakes, 1983 and 1984.

| Lake | Surface Acres | Date of Estimate | Petersen Estimate | Percent Survival | 95 % Confidence Interval | | Date Stocked | No./ lb | No./ Acre |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Estimate | % Survival | | | |
| Mark | 20 | 7/01/83 | 3,533 | 44 | 2,737-4,627 | 34-58 | 9/16/82 | 140 | 400 |
| North Twin | 23 | 7/01/83 | 2,897 | 48 | 2,468-3,419 | 41-57 | 9/16/82 | 140 | 261 |
| Weasel | 8 | 7/06/83 | 1,380 | 69 | 1,164-1,634 | 58-82 | 9/16/82 | 140 | 250 |
| Donna | 58 | 6/22/84 | 5,573 | 35 | 4,531-6,926 | 28-44 | 9/04/83 | 293 | 266 |
| Little Donna | 47 | 6/21/84 | 4,526 | 36 | 2,003-9,053 | 16-72 | 9/04/83 | 293 | 266 |

Table 9. Quartz Lake creel census summary for summer (May 4 to September 3) and winter (November 3, 1983 to April 1984), 1984. SS = Coho Salmon; RT = Rainbow Trout.

| Month | Anglers Contacted | Total Hours Fished | Coho Salmon | | | | Rainbow trout | | | | Catch fish/h | | | Hours Per Angler |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total Kept | Number Sampled | Fork length (mm) Range | Fork length (mm) Mean | Total Kept | Number Sampled | Fork length (mm) Range | Fork length (mm) Mean | SS | RT | Total | |
| SUMMER | | | | | | | | | | | | | | |
| May | 119 | 330 | 24 | 19 | 255-340 | 304 | 15 | 12 | 280-483 | 325 | 0.07 | 0.05 | 0.12 | 2.8 |
| June | 26 | 73 | 20 | 20 | 283-355 | 320 | 3 | 3 | 304-372 | 330 | 0.27 | 0.04 | 0.31 | 2.8 |
| July | 31 | 81 | 15 | 12 | 158-417 | 330 | 0 | 0 | ... | ... | 0.18 | ... | 0.18 | 1.9 |
| Aug.-Sept. 3 | 33 | 63 | 4 | 4 | 230-290 | 263 | 7 | 1 | 241 | ... | 0.06 | 0.11 | 0.17 | 2.6 |
| Total | 209 | 547 | 63 | 55 | 158-417 | 312 | 25 | 16 | 241-483 | 321 | 0.11 | 0.05 | 0.16 | 2.6 |
| WINTER | | | | | | | | | | | | | | |
| All months | 172 | 496 | 268 | 104 | 220-390 | 257 | 23 | 19 | 235-521 | 316 | 0.54 | 0.05 | 0.59 | 2.9 |

The catch rate for coho salmon of 0.11 fish/h in Quartz Lake is the lowest recorded since coho salmon were first stocked in 1977. This compares to a high of 1.59 fish/h in 1981 and a mean of 0.98 fish/h for the previous 6 years. The low sport harvest is the result of weak or absent year-classes because fish were not available from the hatchery. No coho salmon were stocked in 1982, and only 46,500 coho salmon were stocked in 1983.

The mean fork length of 312 mm for coho salmon harvested in 1984 is the largest recorded in Quartz Lake; most were Age-III fish from 149,500 fish planted in 1981. However, few of this age-class remained because harvest of Age-I and Age-II coho salmon is heavy.

In 1984, the sport-harvest rate for rainbow trout of 0.05 fish/h is expected greater than that recorded in 1983 (0.003 fish/h) and the mean rate for the prior 6 years (0.02 fish/h); however, the rate is lower than expected, because 233,300 rainbow trout were stocked in 1983 and 226,400 were stocked in 1982. No rainbow trout were available for stocking in 1981. Part of the reason for the low catch rate in 1984 could be the fishing techniques used by the majority of anglers: most anglers in recent years fish with bait from a boat anchored in deep water. This method has been effective for coho salmon but not for rainbow trout. A small percentage of anglers who drift; troll; or cast with flies, streamers, or lures near weed beds catch more rainbow trout.

Only Swanson rainbow trout have been stocked in Quartz Lake since 1979. An interesting phenomenon that has occurred since that time is that, in the spring, large rainbow trout (350-500 mm fork length) concentrate near the boat ramp soon after the first sign of open water until about 1 week after breakup. Schools of mature spawners cruise the shoreline at that time, often coming in near the feet of anglers; however, the success rate during that time is low.

Only a small amount of gravel is present near the boat ramp; the rest of the bottom in the vicinity is sand and muck. The attraction to this location, which is the site of release for all stocked fish, did not occur with other strains of rainbow trout stocked before 1979. Extensive gravel beds, present along portions of the southwest shoreline, have attracted rainbow trout spawners of all strains stocked in Quartz Lake.

Of the total of 25 rainbow trout recorded during summer creel census, 15 fish were caught in May. The fork-length range of the 16 rainbow trout sampled was 241-483 mm (mean, 321 mm).

Winter fishing success was monitored from November 3, 1983 to April 4, 1984. Success for the 172 anglers contacted was 0.54 fish/h for coho salmon, an increase from 0.11 fish/h during the summer but decrease from 1.38 fish/h during winter 1982-83. The catch rate for rainbow trout was 0.05 fish/h the same as recorded in the summer and greater than the 0.03 fish/h recorded for winter 1982-83.

The mean fork length of coho salmon harvested decreased to 257 mm in the winter as more Age-I fish were caught. The mean length of 316 mm for

rainbow trout showed little change from the summer. The data are summarized in Table 9.

George Lake:

A description of George Lake and data pertaining to past use and northern pike harvest are presented by Peckham (1982, 1983). In 1981, the estimated angler effort for George Lake was 1,351 days, and an estimated 2,236 northern pike were harvested (Mills, 1982), the greatest estimated effort and harvest since the by-mail harvest surveys began in 1977.

During the creel census conducted primarily in June, the period of heaviest fishing, the 55 anglers contacted had fished 231 hours, caught 180 northern pike and kept 105 of them (Table 10).

The 67 northern pike sampled ranged from 340 to 990 mm fork length (mean, 530 mm). Four of the 67 fish measured or 6% were greater than 762 mm long (30 in). Weights ranged from 0.45 kg to 7.3 kg (mean, 2.1 kg; n = 17).

Other length, weight and age data for fish sampled in George Lake during 1984 are reported later in the section on stock-assessment studies.

Volkmar Lake:

A description of Volkmar Lake, methods of access and other information are reported by Peckham (1984).

Twenty-nine anglers contacted on Volkmar Lake fished a total of 127 hours, caught 89 northern pike and kept 37 of them. The catch rate for fish caught was 0.70 fish/h and for fish kept was 0.29 fish/h. A sample of 12 northern pike ranged from 510 mm to 840 mm in length and from 1.1 kg to 6.1 kg in weight. Mean length was 626 mm and mean weight was 2.2 kg (Table 10).

The number of anglers contacted was about equally split between summer and winter. Catch rates for fish kept and size of fish harvested were also nearly the same. The most significant difference was that, during summer fishing, anglers caught 77 northern pike, released 52 and kept 25. The winter anglers kept all fish that were caught. The catch rate for all fish caught during the summer was 1.22 fish/h, compared to 0.37 fish/h in the winter.

Age, length and weight data are presented later in the section on stock-assessment studies.

Tangle Lakes:

Tangle Lakes is a 24-mile-long river-lake complex at the headwaters of the Delta River, located near Mile 22 of the Denali Highway. Public camping areas and boat launching ramps near the highway contribute to the popularity of this fishery.

Table 10. Creel-census Summaries for George Lake and Volkmar Lake, 1984.

| | George Lake | Volkmar Lake |
|---|---|---|
| Anglers Contacted | 55 | 29 |
| Total hours fished | 231 | 127 |
| Northern pike caught | 180 | 89 |
| Northern pike kept | 105 | 37 |
| Fish per hour (caught) | 0.78 | 0.70 |
| Fish per hour (kept) | 0.45 | 0.29 |
| Fork length range (mm) | 340-990 | 510-840 |
| Mean fork length (mm) | 530 | 626 |
| Weight range (kg) | 0.45-7.3 | 1.1-6.1 |
| Mean weight (kg) | 2.1 | 2.2 |
| Number of fish sampled | 67 | 12 |

Tangle Lakes, Tangle River and the Delta River below Tangle Lakes are part of the National Wild and Scenic River system. Tangle Lakes is the starting point for an increasingly popular grayling fishery and 35 mile float trip.

A summary of sport-fish effort and harvest estimates for Tangle Lakes from 1978 to 1983, resulting from postal surveys conducted by Mills (1979-1984), is shown in Table 11.

Angler effort and harvest have fluctuated considerably during the period. The total estimated effort was highest in 1982 at 9,502 days. In 1983, total effort was 5,513 days, the lowest for the 6-year period. The total estimated grayling harvest reached a high of 9,590 fish in 1982. Estimates of lake trout harvest have steadily increasd between 1978 and 1983. The estimate of 2,088 lake trout harvested in 1983 is nearly double the estimate in 1982.

The creel census was conducted on Tangle Lakes from June 10 to August 11, 1984. On June 10, some ice still remained, although boating was possible on the lakes near the highway. Results of interviews with 149 anglers are summarized in Table 12. Anglers enjoyed a high catch rate of 1.11 fish/h for grayling caught, while the catch rate for grayling kept was 0.30 fish/h. The Tangle River, connecting the lakes on both sides of the Denali Highway, is close to campgrounds and, therefore, is a popular grayling fishing area because of the ease of access. Grayling in this area are much smaller than those caught by anglers using boats or canoes to reach other parts of the lake-river system. Anglers release a high percentage of the grayling caught, particularly in the Tangle River near the campgrounds. A total of 569 grayling were caught, and 152 fish were kept. The fork length of 128 grayling sampled ranged from 120 mm to 356 mm (mean, 277 mm). Grayling caught by anglers using boats usually exceeded 300 mm mean length.

During angler interviews, a number of people commented that they were unfamiliar with the area, were just on a family outing, or were not concerned if they caught fish or not. This probably accounts for the high percentage of anglers contacted (40%) that had no fish. Of the successful anglers, 28% had caught their limit of five grayling. Of the 28% who caught five or more grayling, 18% retained fewer than their legal limit.

Table 13 depicts the age frequency and length of 79 grayling sampled from anglers' catch. The percentages of fish in each age-class are not intended to be representative of fish retained in the creel or the composition of the grayling population.

Interviewed anglers caught only 23 lake trout, a catch rate of 0.04 fish/h. Seventeen fish sampled ranged from 287 mm to 597 mm fork length (mean, 378 mm). The age and length composition of 15 lake trout ranging from 287 mm to 445 mm are shown in Table 14.

No burbot and only one round whitefish (295 mm fork length) were observed in the creels. Harvest of both species is low (Table 11). Because the Denali Highway is not kept open in winter, the burbot harvest is limited to summer fishing, which is currently light.

Table 11. Tangle Lakes angler-effort and harvest estimates from postal surveys*, 1978-1983. Abbreviations for species are listed in Table 1.

| Year | Days Fished | Estimated Harvest of Each Species (No.) | | | |
|---|---|---|---|---|---|
| | | GR | LT | WF | BB |
| 1978 | 7,711 | 5,786 | 416 | 137 | 72 |
| 1979 | 5,864 | 3,466 | 428 | 31 | 88 |
| 1980 | 8,168 | 5,522 | 603 | 574 | 229 |
| 1981 | 5,530 | 6,858 | 864 | 97 | 194 |
| 1982 | 9,502 | 9,590 | 1,079 | 73 | 105 |
| 1983 | 5,513 | 7,794 | 2,088 | 315 | 84 |
| Mean (1978-1983) | 7,048 | 6,503 | 913 | 205 | 129 |

* The postal survey was conducted by Michael J. Mills, Biometrician, Sport Fish Division, Anchorage.

Table 12. Tangle Lakes creel census summary, June 10 to August 11, 1984.

| Month | Anglers Contacted | Total Hours Fished | Grayling | | | | | Lake Trout | | | | | Fish per hour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total Caught | Total Kept | Number Sampled | Length (mm) Range | Length (mm) Mean | Total Caught | Total Kept | Number Sampled | Length (mm) Range | Length (mm) Mean | Grayling Caught | Grayling Kept | Lake trout Caught | Lake trout Kept |
| June | 25 | 47 | 33 | 32 | 22 | 275-350 | 313 | 12 | 11 | 9 | 287-393 | 328 | 0.70 | 0.68 | 0.26 | 0.23 |
| July | 101 | 396 | 517 | 107 | 93 | 120-356 | 268 | 11 | 11 | 8 | 315-597 | 434 | 1.30 | 0.27 | 0.03 | 0.03 |
| August | 23 | 69 | 19 | 13 | 13 | 210-348 | 284 | 0 | 0 | 0 | ... | ... | 0.28 | 0.19 | 0 | 0 |
| Total | 149 | 512 | 569 | 152 | 128 | 120-356 | 277 | 23 | 22 | 17 | 287-597 | 378 | 1.11 | 0.30 | 0.04 | 0.04 |

Table 13. Age frequency and length of Arctic grayling, Tangle Lakes, June 23 to August 11, 1984.

| Age Class | Number | Percent | Length (mm) | |
|---|---|---|---|---|
| | | | Range | Mean |
| I | 2 | 2 | 120-125 | 123 |
| II | 3 | 4 | 178-210 | 198 |
| III | 25 | 32 | 226-273 | 250 |
| IV | 17 | 21 | 235-332 | 280 |
| V | 22 | 28 | 228-333 | 308 |
| VI | 10 | 13 | 285-356 | 326 |
| All ages | 79 | ... | 120-356 | 277 |

Table 14. Ages and lengths of lake trout, Tangle Lakes, 1984.

| Age | Number | Length (mm) | |
|---|---|---|---|
| | | Range | Mean |
| V | 1 | 315 | ... |
| VI | 2 | 287-350 | 319 |
| VII | 5 | 310-352 | 321 |
| VIII | 2 | 320-445 | 383 |
| IX | 3 | 322-420 | 378 |
| XI | 1 | 354 | ... |
| XII | 1 | 420 | ... |
| All ages | 15 | 287-445 | 349 |

Fielding Lake:

A creel census was conducted at Fielding Lake from June 10 to August 11, 1984. Fishing pressure was down from that observed in 1982 and 1983, partly because of an emergency closure to burbot fishing from March 17 to December 31, 1984. At the November 1984 Board of Fisheries Meeting, a staff proposal to allow the use of set lines only from October 15 through May 15 was adopted. The regulation change will also standardize the Open Season with nearby Summit and Paxson Lakes.

Open-water angling for grayling and lake trout commenced in early June. On June 10, Fielding Lake was about half ice-free. A total of 43 anglers contacted during the summer census fished 136 hours, caught 93 grayling, and kept 63 fish. The catch rate for all grayling caught was 0.68 fish/h and for grayling kept was 0.46 fish/h. The 26 grayling sampled ranged from 220 mm to 387 mm fork length (mean, 318 mm) (Table 15). The age frequency and lengths of 22 grayling are shown in Table 16.

Ten lake trout were reported caught at a rate of 0.07 fish/h. Five lake trout sampled ranged from 350 mm to 410 mm fork length (mean 376 mm). One angler reported catching a 7.7 kg (17 lb) lake trout on a previous trip, during June. The catch was confirmed by the owner of the Fielding Lake Lodge. Age frequencies and lengths of 10 lake trout ranging from Age-IV to Age-VII are shown in Table 16.

Angler effort and harvest estimates based on postal surveys from 1981 to 1983 (Mills, 1982, 1983, 1984) are shown in Table 16. Harvest and effort were highest in 1982, when an estimated 3,044 grayling, 346 lake trout and 365 burbot were reported harvested in 2,764 days of effort (Table 17).

Landmark Gap Lake and Glacier Lake:

Landmark Gap and Glacier Lakes are located about 2 miles north of the Denali Highway near Mile 26 and Mile 31, respectively. Unimproved trails provide access to both lakes. Landmark Gap can be reached by four-wheel-drive vehicles, while access to Glacier Lake is limited to all-terrain vehicles or foot.

Use on both lakes is typically light, although as many as four vehicles at one time have been observed near the start of the access trail to Landmark Gap Lake in previous years. During 1984, the lakes were periodically checked for activity during the creel census on nearby Tangle Lakes. No fishermen were observed.

## Fish Stock Assessment Studies

George Lake:

Northern pike in George Lake were sampled from June 2 to June 20, 1984. Fish were captured with sport-fishing gear. A total of 103 pike ranging from 242 mm to 730 mm fork length (mean, 467 mm) were captured. Eighty-seven of the above sample weighed from 0.16 kg to 3.1 kg (mean, 0.89 kg).

Table 15. Fielding Lake creel census summary, June 10 - August 11, 1984.

| | |
|---|---|
| Anglers contacted | 43 |
| Total hours fished | 136 |
| Grayling | |
| Total caught | 92 |
| Total kept | 63 |
| Fish/h (caught) | 0.68 |
| Fish/h (kept) | 0.46 |
| Number sampled | 26 |
| Fork length range (mm) | 220-387 |
| Mean fork length (mm) | 318 |
| Lake Trout | |
| Total caught | 10 |
| Fish/h (caught) | 0.07 |
| Number sampled | 5 |
| Fork length range (mm) | 350-410 |
| Mean fork length (mm) | 376 |

Table 16. Age frequency and fork lengths of Arctic grayling and Lake Trout, Fielding Lake, June 16-July 18, 1984.

| Age Class | Number | Percent | Length (mm) Range | Length (mm) Mean |
|---|---|---|---|---|
| | | ARCTIC GRAYLING | | |
| III | 4 | 18 | 222-266 | 243 |
| IV | 6 | 27 | 260-290 | 275 |
| VI | 7 | 32 | 315-375 | 353 |
| VII | 4 | 18 | 363-380 | 373 |
| VIII | 1 | 5 | 385 | ... |
| All ages | 22 | ... | 222-385 | 317 |
| | | LAKE TROUT | | |
| IV | 2 | 20 | 284-300 | 292 |
| V | 1 | 10 | 370 | ... |
| VI | 4 | 40 | 370-455 | 404 |
| VII | 3 | 30 | 512-597 | 556 |
| All ages | 10 | ... | 284-597 | 424 |

Table 18 shows a comparison of length-frequency data collected during 8 years from 1975 to 1984. Northern pike were captured with sport fishing gear mostly in late May and June. About 14% of the pike sampled in 1978 were caught in late July; these 48 pike were slightly larger (mean fork length, 464 mm) than the 286 pike sampled in early June (mean length, 450 mm). Compared to the 8-year average, the 1984 sample had a greater percentage of fish less than 400 mm fork length, a greater percentage of fish from 550 mm to 699 mm, and a smaller percentage of fish from 400 mm to 549 mm. The high percentage of pike from 550 mm to 699 mm long corresponds to the high percentage of pike (79%) in the 450 mm to 599 mm size range in the 1981 sample.

A winter survey on George Lake from February 21 to 24, 1984 resulted in the capture of 12 northern pike and seven burbot. The northern pike were considerably larger than previous June samples. Nine pike sampled ranged from 610 mm to 805 mm fork length (mean length, 709 mm), and their weight ranged from 1.81 kg to 5.22 kg (mean, 3.53 kg or 7.8 lb). All nine of the pike sampled were females. Only one Age-VI female (650 mm in length) was immature. Table 19 shows ages, lengths and weights of 41 northern pike sampled in George Lake in 1984.

The seven burbot ranged from 565 mm to 880 mm (mean, 688 mm) in fork length and ranged from 1.1 kg to 4.9 kg (mean, 2.6 kg or 5.7 lb)in weight. Three of the burbot were mature males; four were mature females. The females appeared to have recently spawned. Age frequency, lengths and weights for the burbot are presented in Table 19. The fish ranged from Age-VII to Age-XIV.

Volkmar Lake:

Northern pike were sampled in May and September 1984 with fyke nets, gill nets, and sport-fishing gear to determine the size of the population and to test methods for capturing pike with minimal injury so that the fish could be tagged and released. Although numerous pike were observed in shallow, vegetated areas along the shoreline on May 24, only two juvenile northern pike (102 mm and 152 mm long) and one slimy sculpin were captured in two fyke nets set for 48 hours.

A 125-foot graduated-mesh sinking gill net was set twice on May 25 for 1 hour 15 minutes or for 45 minutes. The first set, nearshore at a depth of 1-2 meters, caught six northern pike and 18 humpback whitefish, while the other set in 3-4 meters depth caught one northern pike and eight humpback whitefish. The 18 humpback whitefish sampled were 190-500 mm long (mean length, 342 mm).

Sport angling for a total of 19.6 hours on May 24 and May 25 resulted in the capture of 23 northern pike at a catch rate of 1.17 fish/h. Mature female pike examined on May 24-26 were spent. Water temperature during the period was from 10-12°C.

The multifilament floating gill nets used September 11-13 captured 25 northern pike in a total of 28 hours. The nets were checked at least once every hour, and no mortality was observed. A green net, 100 feet long,

Table 17. Fielding Lake effort and harvest estimates from postal surveys*, 1981-1983.

| Year | Days Fished | Estimated Harvest | | |
|---|---|---|---|---|
| | | Grayling | Lake Trout | Burbot |
| 1981 | 1,369 | 1,913 | 295 | 249 |
| 1982 | 2,764 | 3,044 | 346 | 365 |
| 1983 | 1,737 | 2,035 | 294 | 367 |

* The postal survey was conducted by Michael J. Mills, Biometrician, Sport Fish Division, Anchorage.

Table 18. Length frequency data for northern pike captured with sport-fishing gear, George Lake, 1975-1984.

| Fork Length Group (mm) | Year 1975 No. | 1975 % | 1976 No. | 1976 % | 1977 No. | 1977 % | 1978 No. | 1978 % | 1979 No. | 1979 % | 1980 No. | 1980 % | 1981 No. | 1981 % | 1984 No. | 1984 % | 1975-1984 Total No. | 1975-1984 Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 200-249 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | <1 | 1 | <1 |
| 250-299 | 1 | <1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 4 | <1 |
| 300-349 | 12 | 3 | 5 | 2 | 25 | 10 | 42 | 13 | 0 | 0 | 5 | 4 | 2 | 2 | 13 | 13 | 104 | 6 |
| 350-399 | 75 | 19 | 13 | 4 | 35 | 14 | 35 | 10 | 15 | 8 | 13 | 11 | 4 | 4 | 14 | 14 | 204 | 11 |
| 400-449 | 128 | 33 | 34 | 12 | 15 | 6 | 87 | 26 | 43 | 23 | 16 | 13 | 11 | 10 | 20 | 19 | 354 | 20 |
| 450-499 | 100 | 26 | 121 | 42 | 30 | 12 | 103 | 31 | 64 | 35 | 35 | 29 | 23 | 21 | 9 | 9 | 485 | 27 |
| 500-549 | 48 | 12 | 81 | 28 | 80 | 32 | 32 | 10 | 31 | 17 | 29 | 24 | 39 | 35 | 15 | 15 | 355 | 20 |
| 550-599 | 13 | 3 | 29 | 10 | 52 | 21 | 15 | 4 | 14 | 8 | 18 | 15 | 25 | 23 | 13 | 13 | 179 | 10 |
| 600-649 | 2 | <1 | 4 | 1 | 12 | 5 | 8 | 2 | 9 | 5 | 3 | 2 | 4 | 4 | 9 | 9 | 51 | 3 |
| 650-699 | 2 | <1 | 1 | <1 | 0 | 0 | 8 | 2 | 6 | 3 | 2 | 2 | 1 | <1 | 5 | 5 | 25 | 1 |
| 700-749 | 1 | <1 | 3 | 1 | 0 | 0 | 2 | <1 | 0 | 0 | 1 | <1 | 2 | 2 | 1 | <1 | 10 | <1 |
| 750-799 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | <1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | <1 |
| 800-849 | 1 | <1 | 0 | 0 | 0 | 0 | 1 | <1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | <1 |
| 850-899 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | <1 | 1 | <1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | <1 |
| 900-949 | 0 | 0 | 0 | 0 | 1 | <1 | 0 | 0 | 0 | 0 | 1 | <1 | 0 | 0 | 0 | 0 | 2 | <1 |
| Total number | 387 | | 291 | | 250 | | 334 | | 184 | | 123 | | 111 | | 103 | | 1,783 | |
| Length range (mm) | 266-809 | | 311-743 | | 303-904 | | 314-870 | | 350-854 | | 322-915 | | 330-740 | | 242-730 | | 242-915 | |
| Mean length (mm) | 450 | | 490 | | 487 | | 452 | | 489 | | 491 | | 516 | | 467 | | 480 | |
| Date sampled | 5/28-6/15 | | 6/3-10 | | 6/2-6 | | 6/2-4; 7/21 | | 6/5-8 | | 6/4-6 | | 5/29-31 | | 6/2-20 | | ... | |
| Number of fish tagged | 387 | | 291 | | 250 | | 334 | | 184 | | 123 | | 102 | | 72 | | 1,743 | |

Table 19. Age frequency, fork lengths and weights of burbot, and Northern Pike, George Lake, 1984. Numbers in parentheses indicate number of fish sampled for weight.

| Age | Number | Length (mm) Range | Length (mm) Mean | Weight (kg) Range | Weight (kg) Mean |
|---|---|---|---|---|---|
| | | BURBOT* | | | |
| VII | 1 | 680 | ... | 2.4 | ... |
| VIII | 2 | 600-705 | 653 | 1.4-3.3 | 2.3 |
| IX | 1 | 565 | ... | 1.1 | ... |
| X | 2 | 685-700 | 693 | 2.4-2.7 | 2.6 |
| XIV | 1 | 880 | ... | 4.9 | ... |
| All ages | 7 | 565-880 | 688 | 1.1-4.9 | 2.6 |
| | | NORTHERN PIKE | | | |
| II | 5 (5) | 242-354 | 312 | 0.2-0.4 | 0.3 |
| III | 2 (0) | 410-468 | 439 | ... | ... |
| IV | 3 (2) | 454-500 | 479 | 0.8-0.9 | 0.8 |
| V | 6 (4) | 490-605 | 553 | 1.2-1.6 | 1.4 |
| VI | 7 (4) | 446-650 | 552 | 0.7-1.8 | 1.2 |
| VII | 2 (1) | 602-610 | 606 | 1.7 | ... |
| VIII | 5 (4) | 604-715 | 658 | 2.1-3.6 | 2.8 |
| IX | 4 (4) | 630-690 | 665 | 1.9-3.3 | 2.6 |
| X | 2 (1) | 702-770 | 736 | 4.4 | ... |
| XI | 3 (2) | 866-990 | 929 | 5.1-7.2 | 6.2 |
| XIII | 2 (2) | 780-805 | 793 | 4.4-5.0 | 4.7 |
| All ages | 41 (29) | 242-990 | 587 | 0.2-7.2 | 2.2 |

* Sampled in February 1984.

with mesh sizes of 0.5 in, 1 in, 1.5 in and 2.5 in (bar measure), caught all but one of the northern pike. A white net, 80 feet long, with mesh sizes of 2 in and 2.5 in (bar measure) caught only two humpback whitefish and one northern pike.

Eighteen pike were captured in 14 hours of angling on September 12 and September 13. Catch rate was 1.28 fish/h. Three of the pike caught by this method died from hooking injuries.

A fyke net employed during September again resulted in poor catches. Only one 266-mm pike was captured in two net nights.

Seventy-three northern pike sampled in 1984 had a fork length range of 266-876 mm (mean length, 571 mm). The length frequency is shown in Table 20. Pike in the 550-mm to 599-mm size group were predominant, comprising 23% of the total. Pike greater than 30 inches (762 mm) accounted for 13% of the total sample. The current sport-fishing limit for northern pike in the Tanana River drainage is 30 inches or more, two fish per day, two fish in possession; less than 30 inches, 10 fish per day, 10 fish in possession.

Age composition of 14 northern pike is shown in Table 21. Two pike 770 mm and 790 mm in length were Age X.

Fielding Lake:

Because of the emergency closure on burbot fishing in Fielding Lake effective March 17, 1984 and the 1984 staff proposal to the Board of Fisheries to eliminate the use of set lines in the lake during the open-water season, fish population sampling efforts during 1984 concentrated on burbot.

Four baited traps, two fyke traps, and nine set lines were used to capture burbot from July 16 to July 19. Of 43 burbot captured, 5 fish were caught in baited hoop traps, 6 fish were caught on set lines and 32 fish in fyke traps. Those caught in hoop traps and on set lines were 285-550 mm long (mean length, 414 mm). The burbot caught in fyke traps were 80-310 mm long (mean length, 135 mm). Other fish captured included 2 lake trout (512 mm and 578 mm long) caught on set lines and 21 grayling (64-193 mm), 131 round whitefish (80-210 mm) and 33 slimy sculpin caught in fyke traps.

More intensive sampling was conducted from October 1 to October 8 when 24 pieces of gear including seven types of baited traps and two trotlines with a total of 42 hooks were fished. Hoop traps, the most effective type of gear, captured a total of 71 burbot or 2.0 burbot/net night. A total of 108 burbot were captured with all gear. A comparison of gear effectiveness is shown in Table 22. Burbot were caught at depths ranging from 4 m to 22 m. Surface-water temperature ranged from 4°to 6°C.

The length-frequency distribution of burbot sampled in 1984 and a combined sample of burbot collected from 1982 to 1984 in Fielding Lake are shown in Table 23. Burbot in the 350-449 mm size range comprised 58% of the total in 1984 and 56% of the combined 1982-1984 total. The mean length of burbot

Table 20. Length-frequency data for northern pike*, Volkmar Lake, May 24-25 and September 11-13, 1984.

| Size group (mm) | Number | Percent | Fork length (mm) Range | Fork length (mm) Mean |
|---|---|---|---|---|
| 250-299 | 2 | 3 | 266-285 | 276 |
| 300-349 | 0 | 0 | ... | ... |
| 350-399 | 1 | 1 | 385 | ... |
| 400-449 | 8 | 11 | 400-438 | 419 |
| 450-499 | 11 | 15 | 456-492 | 477 |
| 500-549 | 13 | 18 | 500-543 | 530 |
| 550-599 | 17 | 23 | 550-594 | 573 |
| 600-649 | 7 | 10 | 600-646 | 624 |
| 650-699 | 3 | 4 | 674-690 | 685 |
| 700-749 | 1 | 1 | 700 | ... |
| 750-799 | 1 | 1 | 790 | ... |
| 800-849 | 5 | 7 | 800-842 | 826 |
| 850-899 | 4 | 5 | 855-876 | 862 |
| All sizes | 73 | ... | 266-876 | 571 |

* 61 of these fish were tagged with Floy FD-68 anchor tags.

Table 21. Ages, fork lengths and weights of Northern Pike, Volkmar Lake, 1983-1984.

| Age | Number | Length (mm) | | Weight (kg) | |
|---|---|---|---|---|---|
| | | Range | Mean | Range | Mean |
| 0 | 3 | 90-105 | 98 | ... | ... |
| I | 2 | 168-190 | 179 | ... | ... |
| III | 3 | 456-488 | 475 | 0.8-1.0 | 0.9 |
| IV | 1 | 474 | ... | 1.0 | ... |
| VI | 3 | 536-566 | 551 | 1.1-1.4 | 1.2 |
| X | 2 | 770-790 | 780 | 3.6-3.7 | 3.7 |
| All ages | 14 | 90-790 | 412 | 0.8-3.7 | 1.6 |

Table 22. Gear-type comparison and burbot catch, Fielding Lake, October 1-10, 1984. BB = Burbot.

| Gear Type | Pieces of Gear | Total Net Nights | Total BB Caught | Catch/Net Night |
|---|---|---|---|---|
| Hoop trap | 6 | 36 | 71 | 2.0 |
| Pyramid trap | 6 | 40 | 26 | 0.7 |
| Wooden slat trap | 1 | 7 | 4 | 0.6 |
| Rectangular (metal) trap | 5 | 16 | 2* | 0.1 |
| Trotline | 2** | 98 | 5 | 0.1 |
| Modified pyramid trap | 2 | 9 | 0 | 0.0 |
| Fyke trap | 2 | 2 | 0 | 0.0 |
| | 24 | 207 | 108 | |

* Includes one that fell out of the trap as it was lifted.

** 42 hooks total.

Table 23. Length frequency of burbot sampled* in Fielding Lake, 1982-1984.

| Fork Length (mm) | July and October 1984 | | All Samples, 1982-1984 | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| 250-299 | 2 | 2 | 2 | <1 |
| 300-349 | 3 | 3 | 17 | 7 |
| 350-399 | 31 | 26 | 67 | 29 |
| 400-449 | 38 | 32 | 63 | 27 |
| 450-499 | 19 | 16 | 33 | 14 |
| 500-549 | 9 | 8 | 23 | 10 |
| 550-599 | 4 | 3 | 10 | 4 |
| 600-649 | 3 | 3 | 4 | 2 |
| 650-699 | 1 | <1 | 1 | <1 |
| 700-749 | 0 | 0 | 4 | 2 |
| 750-799 | 4 | 3 | 5 | 2 |
| 800-849 | 3 | 3 | 3 | 1 |
| 850-899 | 0 | 0 | 0 | 0 |
| 900-949 | 0 | 0 | 0 | 0 |
| 950-999 | 0 | 0 | 0 | 0 |
| 1000-1049 | 1 | <1 | 2 | <1 |
| Total | 118 | ... | 234 | ... |
| Mean length (mm) | 462 | ... | 453 | ... |

* Does not include burbot caught in fyke traps that were predominantly juveniles.

sampled in 1984 was 462 mm; mean length for the 1982-1984 sample was 453 mm. The largest burbot sampled was 1,020 mm (40 in) and 6.0 kg (13.2 lb).

Age frequency, lengths and weights for 33 burbot sampled in 1983 and 1984 are shown in Table 24. The fish were 391-740 mm long and their ages ranged from Age-IV to Age-XV. Age-V and Age-VI fish comprised 66% of the sample.

A total of 107 burbot captured in 1984 were tagged and released.

Table 24. Age frequency, lengths and weights of burbot from Fielding Lake, 1983 and 1984.

| Age Class | Number | Percent | Length (mm) Range | Length (mm) Mean | Weight (kg) Range | Weight (kg) Mean |
|---|---|---|---|---|---|---|
| IV | 1 | 3 | 391 | ... | ... | ... |
| V | 12 | 36 | 352-451 | 390 | 0.4 | ... |
| VI | 10 | 30 | 355-446 | 401 | 0.3-0.6 | 0.5 |
| VII | 3 | 9 | 422-500 | 450 | 0.9 | ... |
| VIII | 1 | 3 | 508 | ... | ... | ... |
| IX | 2 | 6 | 435-550 | 493 | 0.9 | ... |
| X | 1 | 3 | 538 | ... | ... | ... |
| XI | 2 | 6 | 570-592 | 581 | 1.1-1.3 | 1.2 |
| XV | 1 | 3 | 740 | ... | ... | ... |
| All ages | 33 | ... | 391-740 | 435 | ... | ... |

LITERATURE CITED

Mills, M.J. 1979. Alaska Statewide Sport Fish Harvest Studies. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1978-1979, Project F-9-11, 20(SW-I-A): 1-112.

_____ 1980. Alaska Statewide Sport Fish Harvest Studies. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1979-1980, Project F-9-12, 21(SW-I-A): 1-65.

_____ 1981a. Alaska Statewide Sport Fish Harvest Studies. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1980-1981, Project F-9-13, 22(SW-I-A): 1-77.

_____ 1981b. Alaska Statewide Sport Fish Harvest Studies. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1980-1981, Project F-9-13, 22(SW-I-A): 1-107.

_____ 1982. Alaska Statewide Sport Fish Harvest Studies. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1981-1982, Project F-9-14, 23(SW-I-A): 1-115.

_____ 1983. Alaska Statewide Sport Fish Harvest Studies. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1982-1983, Project F-9-15, 24(SW-I-A): 1-118.

_____ 1984. Alaska Statewide Sport Fish Harvest Studies. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1983-1984, Project F-9-16, 25(SW-I-A): 1-122.

Peckham, R.D. 1982. Evaluation of Interior Alaska waters and sport fish with emphasis on managed waters - Delta District. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1981-1982, Project F-9-14, 23(G-III-I): 1-28.

_____. 1983. Evaluation of Interior Alaska waters and sport fish with emphasis on managed waters - Delta District. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1982-1983, Project F-9-15, 24(G-III-I): 1-38.

_____. 1984. Evaluation of Interior Alaska waters and sport fish with emphasis on managed waters - Delta District. Alaska Dept. of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1983-1984, Project F-9-16, 25(G-III-I): 1-25.

Prepared by:

Richard Peckham
Fishery Biologist

Approved by:

E. Richard Logan, Ph.D., Director
Division of Sport Fish

Louis S. Bandirola, Deputy Director
Division of Sport Fish