Special Publication No. 95-2

Lake Stocking Manual for Nonanadromous Fisheries in Southcentral Alaska

by

Al Havens,

Terry Bradley,

and

Craig Baer

May 1995

Alaska Department of Fish and Game

Division of Sport Fish

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
ounce	oz
pound	lb
quart	qt
yard	yd

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

SPECIAL PUBLICATION NO. 95-2

LAKE STOCKING MANUAL FOR NONANADROMOUS FISHERIES IN SOUTHCENTRAL ALASKA

by

Al Havens,
Terry Bradley,
and
Craig Baer
Division of Sport Fish, Palmer

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599
May 1995

This information was partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under Project F-10-10 , Job No. E-2-3.

The Special Publications series was established in 1991 for the publication of techniques and procedures manuals, informational pamphlets, symposia and workshop proceedings, application software documentation, in-house lectures, special subject reports to decision-making bodies, and other documents that do not fit in another publication series of the Division of Sport Fish. Special Publications are intended for fishery and other technical professionals. Distribution is to state and local publication distribution centers, libraries, and individuals and, on request, to other libraries, agencies, and individuals. This publication has undergone editorial and peer review.

Al Havens, Terry Bradley, and Craig Baer
Alaska Department of Fish and Game, Division of Sport Fish
1800 Glenn Highway, Suite 4, Palmer, AK 99645-6736, USA

This document should be cited as:
Havens, Al, Terry Bradley, and Craig Baer. 1995. Lake stocking manual for nonanadromous fisheries in Southcentral Alaska. Alaska Department of Fish and Game, Special Publication No. 95-2, Anchorage.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

Stocked lakes benefit sport anglers and industries related to sport fishing by providing diverse, year-round fishing opportunities and by diverting pressure from natural stocks. In Southcentral Alaska, selected landlocked lakes have been stocked on an annual or biennial basis with hatchery-reared sport fish since 1952. These lakes range in size from approximately 1 to 3,520 surface acres. Most lakes were barren or contained only threespine stickleback *Gasterosteus aculeatus* and occasionally, longnose suckers *Catostomus catostomus*, prior to stocking. The lakes are stocked with rainbow trout *Oncorhynchus mykiss*, Arctic grayling *Thymallus arcticus*, landlocked salmon *Oncorhynchus*, Arctic char *Salvelinus alpinus*, or lake trout *Salvelinus namaycush*, depending on the nature of the water to be stocked, the availability of fish for stocking, and the desires of anglers for diversified fishing opportunities.

The proportion of stocked lake fishing effort compared to total sport fishing effort varies greatly between Southcentral management areas, but the importance of lake stocking in all areas is significant. Stocked landlocked lakes represent "new" fisheries, created primarily by growing a crop of fish from fingerling to catchable size. These fisheries provide diverse and year-round fishing opportunities. Lake fishing effort is highest in the spring, fall and winter when anadromous species are not available. In the Anchorage bowl salmon fishing opportunities are limited. Stocking rainbow trout, landlocked salmon, and Arctic char at a catchable size is required to meet sport fishing needs. Palmer, and to a lesser degree, the Kenai Peninsula, Kodiak, Glennallen, and Prince William Sound areas also rely on stocked lakes. The lakes provide an alternative to the often crowded fishing conditions on wild stocks. In all areas, the greatest effort is on easily accessible roadside lakes with generous parking areas.

Many recommendations (goals) proposed in 1986 by Sport Fish Division Area Management Biologists in the Region II 5-Year Stocking Plan have been realized. The result has been increased lake fishing opportunities for Southcentral Alaska anglers. One thing we've learned from talking with anglers is that most people don't realize they are utilizing lakes that contain stocked fish rather than wild fish. They also don't know that trout, grayling, salmon, and char cannot spawn successfully in most of the small stocked landlocked lakes.

Numerous management questions are associated with a lake stocking program. Did the stocked fish survive? If so, how many? Are the growth and survival rates adequate such that a target sport fishery could develop? And if so, at what stocking rate?

This manual was written in an attempt to record in one document a summary of Alaska Department of Fish and Game, Division of Sport Fish, Region II stocking history and stocked lake research from the 1960s through the early 1990s. Research data are presented on survival and growth of sport fish species stocked in landlocked lakes. Information on physical, chemical, and biological properties of natural lakes in Southcentral Alaska and their relationship to stocked sport fish survival and growth is summarized. Development and use of experimental nets and traps to sample both native and stocked fishes is discussed. Procedures necessary to include a lake in the stocking program are outlined. General recommendations for stocking and sampling sport fish populations in Southcentral landlocked lakes are included. Specific stocking and sampling recommendations are listed for Matanuska-Susitna Valley lakes. A summary of effort, catch, harvest, and related estimated costs is presented for Matanuska-Susitna Valley lakes from

1986 through 1992. A list of lakes with information on drainages, fish species present, and Fish Transport Permit(s) is also included.

LANDLOCKED LAKE STOCKING HISTORY

Landlocked lakes in Southcentral and Interior Alaska have been enhanced by the stocking of hatchery reared sport fish since 1952. These lakes are all located in Alaska Department of Fish and Game (ADF&G) Sport Fish Division Region II and Region III.

The Alaska Department of Fisheries (ADF) was created in 1949 by an act of the Alaska Territorial Legislature. A Sport Fish Division was established in 1951. A lake rehabilitation and sport fish stocking program was created and concentrated adjacent to larger population centers where sport fish stocks had already shown marked declines.

Private individuals, sportsmens groups, and various federal agencies transplanted fish throughout the territory for many years. Alaska's first rainbow trout hatchery was constructed at the outlet of Birch Lake near Fairbanks. Rainbow trout fry production began in 1952 (hatched from eyed-eggs imported from Idaho and Montana) for 16 Southcentral and Interior Alaska lakes. An Anchorage hatchery was built at the outlet of Upper Fire Lake and donated to ADF by the Anchorage Sportsmans Association in 1953. A hatchery was developed on the Kodiak Naval Station in 1953. A joint agreement was reached between ADF and the Kodiak Conservation Club in 1956 for continued operation of the hatchery.

The lake rehabilitation and stocking program enjoyed continued expansion between 1952 and 1959. Rehabilitation projects were conducted on 23 lakes. An estimated 6 million rainbow trout and steelhead fry and fingerlings were planted in over 75 different Southcentral and Interior lakes and ponds. Sport fishing regulations were created (with recommendations from the Alaska Fisheries Board) and enforced by the U.S. Fish and Wildlife Service during this period. In general, daily bag limits for rainbow trout, grayling, and landlocked salmon were a combined total of 10 fish in the Anchorage, Palmer, Kenai Peninsula, and Fairbanks areas and a total of 15 fish in the Kodiak and Prince William Sound areas. Newly planted lakes were often closed for a designated period following stocking. Several stocked lakes in the Anchorage, Palmer, and Fairbanks area were only open to fishing for persons under 16 years of age from 1954-1957.

Passage of the Alaska Statehood Act in 1959 resulted in the State of Alaska assuming regulatory control of its fish and game resources on January 1, 1960. Sport Fish Division increased the number of personnel and their responsibilities. Included was an investigative program to be conducted under the Federal Aid in Fish Restoration program funded by the Dingell-Johnson Act (D-J). Major emphasis was devoted to cataloging waters most accessible to anglers. In the first 2 years following statehood, the inventorying of 367 lakes and streams led directly to acquisition of 132 public access sites, rehabilitation of 15 lakes, and the stocking of 57 separate waterbodies. Emphasis gradually shifted from a simple catalog and inventory process to a more in-depth lake research program. Lake surveys included volumetric mapping, water chemistry analysis, life history investigations of naturally occurring predator/competitor species, and evaluation of hatchery sport fish survival and growth. The surveys led to refinements in the stocking program.

Poor survival of imported domestic rainbow trout in Alaskan waters and the suspicion that "outside" eggs carried nonindigenous diseases led to the search for Alaskan rainbow trout brood stock sources. Wild egg takes of native Alaskan rainbow trout began at Talarik Creek on the

Alaska Peninsula and Swanson River on the Kenai Peninsula in 1974. The last "outside" eggs from Ennis, Montana National Fish Hatchery were imported in 1973-1975 to serve as interim brood stock until the Alaskan fish matured. Eggs were hatched at the Fire Lake hatchery (near Eagle River) and ensuing brood stock were held at the Fort Richardson and Elmendorf hatcheries. These Anchorage area hatcheries were under control of ADF&G Hatchery Services Section starting in 1971, but was combined with ADF&G Fisheries Rehabilitation, Enhancement and Development Division in 1977. Research on stocked rainbow trout indicated significantly greater survival for Swanson River rainbow than for the Talarik Creek or the domestic Ennis strains. Consequently, all Ennis and Talarik brood stock and progeny were phased out by 1981. A new Fort Richardson Hatchery was constructed with brood stock holding facilities. The hatchery received wild Swanson River and Big Lake (Matanuska Valley) rainbow trout eggs in 1982 and the first progeny were stocked in 1985 for comparative experimental purposes. Kitoi strain rainbow trout were stocked for comparative experimental purposes with the Swanson River strain in 1984 on Kodiak Island. The Kitoi rainbow trout strain was phased out in 1987, while Big Lake strain were stocked mainly in Big Lake/Meadow Creek drainage lakes until being phased out in 1993.

Eight species of salmonids have been stocked in Southcentral landlocked lakes since 1952. Rainbow trout, coho salmon *O. kisutch*, and Arctic grayling have been the primary species supporting the stocking program. Cutthroat trout *Salmo clarki* from Washington and Alaskan steelhead, Dolly Varden *Salvelinus malma*, and sockeye salmon *O. nerka* were stocked with minimal success. Five strains of Alaska rainbow trout and trout eggs imported from eight Montana, Idaho, Oregon, and Washington sources have been incubated in Alaska hatcheries and planted as fry, fingerlings, subcatchables, or catchables since 1952. Subcatchable and catchable trout have been stocked primarily in Anchorage area lakes since 1966 and 1974, respectively. At least 12 strains of coho salmon, plus coho from Washington and Oregon hatcheries have been stocked since 1958. Arctic grayling, from at least four Alaska sources, have been planted since 1962. Four Alaska strains of chinook salmon *O. tshawytscha* have been released in Southcentral landlocked lakes since 1978. Lake trout from Paxson Lake and Arctic char from Aleknagik Lake have been stocked since 1988. Rainbow trout brook stock, and small numbers of Arctic grayling, Arctic char, and lake trout brood stock are reared and spawned in hatcheries. Eggs from coho and chinook salmon, most Arctic grayling, Arctic char, and lake trout are taken from spawning fish in lakes and rivers, hatched in incubation facilities and stocked in lakes.

LAKE STOCKING REQUIREMENTS

REQUESTS FOR LAKE STOCKING

Every year numerous requests are received from individuals or groups asking the department to stock fish in a particular lake or lakes. Several criteria must be met before a lake can be included in the department stocking plan: (1) the lake must be able to support sport fish populations year-round unless catchable fish are used for a put-and-take fishery, (2) the lake must be landlocked and no wild sport fish populations can be present, and (3) the lake must have year-round legal public access. A handout which explains lake stocking requirements in detail has been developed and is included in Appendix A1.

LAKE SURVEYS

Lake surveys are performed to determine: (1) the presence and relative abundance of fish stocks including sport fish species and non-fished species such as stickleback, suckers, sculpins, blackfish, eels, etc. which may indicate whether the lake is part of an open system, a normally closed lake susceptible to annual or occasional flooding, or completely landlocked; (2) whether the lake has sufficient year-round oxygen levels to support stocked sport fish (if no fish of any species or only threespine stickleback are found in a lowland lake it may be an indication of annual or occasional fish winterkill and oxygen sampling should be done in late March or early April when oxygen levels tend to be lowest); (3) water chemistry (pH, alkalinity, hardness, conductivity and dissolved oxygen) indices for comparison with other area lakes; and (4) surface acres, shoreline length, water volume, mean and maximum depths, and shoreline development. Lake surveys are also necessary to produce contour maps. Instructions for performing lake surveys are presented in Appendix B1 and instructions for filling out lake survey forms are shown in Appendices B2 through B6.

PUBLIC ACCESS

Background

Utilization of hatchery fish to create additional lake fisheries and, in turn, expanded fishing opportunities has generally received widespread public support throughout the region. The importance of this program is expected to gain even greater significance as Alaska's expanding human population places added pressure on endemic fishery resources. However, if lake stocking is to become a prominent future management strategy, it is essential that greater attention be given to the improvement of access sites.

Public access has always been recognized as a prerequisite to stocking because without lake access the general public is denied an opportunity to realize the benefits of stocking. During the early development of Alaska, public land was plentiful near urban centers, sport anglers few in number, and angler/private landowner conflicts relatively insignificant. Those days are rapidly disappearing as lands surrounding lakes become privately developed. Access arrangements at a number of stocked lakes are presently recognized to be inadequate for a variety of reasons. Access problems are usually most acute at lakes that receive heavy pressure from nearby urban populations.

Access problems fall into several broad categories. First are angler dissatisfactions associated with the physical features of public use sites. Some access sites are too small to accommodate existing fishing pressure, others lack parking opportunities, many do not provide for boat launching, and the terrain (often marshy) at a number of sites is not well suited (without improvement) for heavy or convenient public use. Accumulation of litter, absence of sanitary facilities, and a lack of site boundary identification are additional problems associated with stocked lakes. Poor or inadequate public use sites not only reduce angler satisfaction with the overall recreational experience but also can catalyze angler/private landowner conflict. Underdeveloped public access will often tempt anglers to seek more convenient access by trespassing on private lands. Angler/private landowner conflicts are particularly prevalent on lakes in the rapidly developing Matanuska and Susitna valleys.

Access Acquisition

Watersheds having a questionable public access corridor are investigated according to the classification of the barrier property:

(1) A lake completely surrounded by private property may have a section line easement, a dedicated public easement platted by a subdivider, or a road right-of-way. This information is usually available from a local government entity, i.e., the Mat-Su Borough, by reviewing subdivision plats or other land status maps such as tax plats. If no easement or right-of-way exists, it becomes necessary to solicit for acquisition from the private landowner.

(2) Access to a watershed fronted by property under government ownership is investigated through the corresponding agency. If no platted access exists, it may be possible to reserve or acquire one. In some cases a purchase may be necessary, i.e., the Mat-Su Borough may choose to sell ADF&G a parcel instead of voluntarily dedicating an easement. Reserve use or right-of-way applications will usually be processed for access across Department of Natural Resources (DNR) property. If ADF&G plans any development on state property classified for public recreation, DNR may require an interagency land management assignment agreement.

(3) Mental Health lands were set aside at statehood to fund mental health programs for the State of Alaska. Disposition of mental health land has, until recently, been tied up in court. Although past attempts to acquire access across mental health lands were fruitless, future attempts may now be successful.

Easement applications filed with government agencies must be submitted with an as-built survey done by or checked by a registered land surveyor. Applications are processed, denied or approved, and platted according to staff workload, normally 3 months to 1 year and 3 months.

Property acquisition requires state and federal (D-J) funding approval, a survey (normally), and a property appraisal done by a certified appraiser. If an agreement is reached between the buyer and seller, the necessary documentation and transaction is performed by Sport Fish Division Headquarters lands contract officer.

In the past unsolvable problems securing access to a lake usually involved mental health lands or lakes surrounded by private land where property owners refuse to sell land(s) for public access.

STATEWIDE STOCKING PLANS

Favorable results from the lake survey and access determination means that planning to develop a recreational fisheries stocking program can be initiated. A fishery management plan is prepared during the initial stage of planning. Each fishery management plan lists the following: management objectives to be met by fish stocking, specific measures required to accomplish the objectives, and performance criteria that will be used to evaluate whether objectives are achieved. Management objectives have recently been defined in terms of benefits and are currently measured in angler-days (one angler fishing for any portion of a day) of fishing effort. Maintenance or increase in fishing effort due to stocking is a measure of performance and provides an indicator of program success. Specific stocking actions are the numbers of fish and locations for stocking. Performance evaluation criteria require a listing of parameters to be measured (fishing effort, harvest, catch, etc.) and how they will be measured (creel survey, Statewide Harvest Survey [SWHS], harvest cards, etc.). A single fishery management plan may cover numerous stocking sites over a broad geographical area or a single stocking site.

The second stage in developing a recreational fisheries stocking program is to ensure that fish production in the hatcheries matches fish production demands in the fishery management plans. On a periodic (4-5 years) basis, all sport fisheries management plans which address fish stocking are incorporated into a Statewide Stocking Plan for Recreational Fisheries (SSP). The SSP contains specific information about each stocking location: region of the state, Division of Sport Fish management area, reference to a sport fishery management plan which covers the stocking location, release site, species to be released, whether the location is open or landlocked, size of fish to be stocked, and number of fish to be stocked by year. If demand for hatchery fish exceeds hatchery capacity, projects are prioritized and fish are allocated to the most important projects. Time is allowed for public viewing of the draft plan. The plan becomes finalized when it is approved by the commissioner of the Alaska Department of Fish and Game. The SSP is finally submitted to the regional director of the United States Fish and Wildlife Service for approval, since the major funding source for the projects in the SSP is federal money administered through the United States Fish and Wildlife Service (D-J and Wallop-Breaux, or W-B, moneys).

The recreational stocking program changes frequently to adjust to success or failure of prior fish stockings, angler preferences, acquisition of public lands, human population growth, availability of funding, hatchery limitations, and recreational trends. Consequently, changes to the SSP are inevitable and to the extent possible anglers and the general public are alerted to any significant departures from the plan. Most changes appear in an update to the SSP which is made available to the public annually. Due to complexities of long-term rearing of fish in a hatchery, it is unusual to have exactly the planned number of fish for each location available for stocking. It is often necessary for professional staff of the department to make minor changes in fish numbers, fish species or stock, or exact release location to accommodate variables in fish production.

FISH TRANSPORT PERMITS (FTP)

A Fish Transport Permit is required before any fish are transported from the hatchery and stocked in a lake. The State of Alaska strictly regulates transportation, possession or release of live fish in the state. Regulations have existed since the Alaska hatchery program expanded in the 1970s. These regulations are part of the Alaska Administrative Code (Title 5, Chapter 41) and are thus state law. Two specific regulations form the backbone of the fish stocking regulatory process.

The first regulation (5 AAC 41.070.) prohibits importation of any live fish into the state for purposes of stocking or rearing in the waters of the state. Ornamental fish not raised for human consumption or sport fishing purposes may be imported into the state, but may not be reared in or released into the waters of the state. This regulation prohibits introduction of nonindigenous species or stocks of fish into the state.

The second regulation (5 AAC 41.005.) Makes it unlawful to transport, possess, export from the state, or release into the waters of the state, any live fish without a Fish Transport Permit or FTP. An FTP is issued for a fixed term and authorizes only that operation specified in the permit. Any change of species, brood stock, or location requires a new permit. Each applicant for an FTP submits the following information to the department (5 AAC 41.010.):

1. Species and stock involved;
2. Incubation, rearing and/or release site(s);
3. Number and life history stage involved;

4. History of previous transport, if any;
5. Disease history of the stock, hatchery, or rearing facilities involved, any previous disease treatments or vaccinations, or, if the disease history is incomplete or unavailable, a brood stock inspection and certification;
6. Isolation measures planned to control disease;
7. Description of proposed egg take methods;
8. Source of water for rearing and proposed effluent discharge location;
9. Identification and status of native stocks involved;
10. Method of transport or release and the expected date of transport or release;
11. Purpose and expected benefits of the project; and
12. Evaluation plans.

FTP applications are processed through the Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, in the Juneau headquarters office. Each FTP application is reviewed by numerous entities within the Alaska Department of Fish and Game. An FTP is issued if it is determined that the proposed transport, possession or release of fish will not adversely affect the continued health and perpetuation of native, wild, or hatchery stocks of fish. Terms and conditions may be attached to the FTP if it is determined that terms and conditions are necessary to protect the continued health and perpetuation of native, wild, or hatchery stocks of fish. An FTP can be denied if the proposed plans, methods, or specifications are not adequate, on the basis of fish disease, genetics, competition, predation, or other biological considerations, to assure the continued health and perpetuation of native, wild, or hatchery stocks of fish (5 AAC 41.030).

DEPARTMENT POLICIES

In addition to regulations, there are department policies that apply to fish stocking programs in Alaska. The State of Alaska genetic policy for salmon (ADF&G 1985) addresses stock transports, protection of wild stocks, and maintenance of genetic variability. The genetic policy is reviewed as part of the FTP application process.

The State of Alaska has also adopted a policy relating to fish health and disease control (ADF&G 1988). This policy is intended to prevent dissemination of infectious finfish and shellfish diseases within or outside the borders of Alaska without introducing impractical constraints for aquaculture and necessary stock-renewal programs. Again, the FTP process serves as a forum for reviewing fish health and disease control policies as well as regulations.

Another policy of note which influences sport fish stocking programs in Alaska exists only in draft form. The Division of Sport Fish wild stock protection policy is still being formalized, but the intent of the policy is clear. Sport Fish Division will not stock hatchery fish in locations where wild stocks of sport fish occur unless: (a) the indigenous wild stock(s) is (are) incapable of supporting a recreational fishery, or (b) the indigenous wild stock(s) is (are) important to sport anglers and is (are) found to be depressed, or (c) adequate evaluation can be dedicated to the stocking project to maintain historical levels of natural production, run timing and spawning distribution. As previously mentioned, Sport Fish Division will not initiate any new

enhancement stocking programs until evaluations of existing programs have thoroughly documented impacts on indigenous wild stocks of fish. The wild stock protection policy is generally reviewed for compliance as the fishery management plan is being composed.

A final policy pertains to requirements for stocking rainbow trout in landlocked, barriered, or open-system lakes (excerpted from a 5/11/93 Memo by Paul Krasnowski, SF Division Region II Regional Supervisor to Jim Seeb, Geneticist, CFMD): "A lake which does not have an outlet passable to fish is considered landlocked. Landlocked lakes can receive any biologically appropriate hatchery product. Flood events which can cause periodic outflow disqualify a lake from landlocked status if in the biologists judgment the probability of flooding is greater than once in ten years. Open systems with indigenous rainbow trout or competitor sport fish species should not be stocked. Open systems where there is a practical possibility of emigration across saltwater to another open system with rainbow trout or competitor sport fish species should not be stocked. Open systems, such as Campbell Creek in Anchorage, which have neither problem described above could be stocked. Lakes with ephemeral outlets [lasting a very short time] and lakes that are judged likely to flood more often than once every ten years are to be treated on a case by case basis for consideration for stocking with all female triploids. Risk assessment will be done by the local biologist and documented in the FTP. Pertinent factors will include: (i) the potential that up to 5% of the triploids will be fertile females; (ii) the best estimate of survival rate of the stocked fish to maturity (include fishing mortality); (iii) the best judgment of the probability of a flood event that would allow emigration of stocked fish from the lake; iv) the best estimate of the size of the spawning stock of indigenous trout downstream. Any system where the above conditions may result in an occurrence of emigrant mature fertile females from the stocked fish mixing with the indigenous spawning stock at a proportion of 2% or greater of the spawning stock, should be considered an open system. Items ii-iv are generally not known nor reasonably measured, but will be estimated by local sport fish staff using any available information and the staff's best judgment".

FISH HATCHERY LIMITATIONS

As previously mentioned, it may not be possible to fill all requests for fish production from department hatcheries. Consequently, some stocking projects may need to be prioritized. Prioritization of lakes for stocking within management areas is, in general, based on the following criteria: (a) angler use, (b) research needs, and (c) location relative to other stocked lakes or other available fishery resources. High priority lakes usually have good access and parking, often have picnic or camping and boat launch facilities, and/or produce good fishing.

LAKE RESEARCH SUMMARY

Sampling for population abundance and size distribution of stocked sport fish in landlocked lakes has been performed since the inception of the stocking program. In 1973, a specific project was designed to provide information for development of improved lake stocking practices. Initial studies concentrated on detailed collection of physical and chemical data as well as indexing various planktonic and invertebrate populations in stocked lakes. Since 1976, stocked sport fish survival and growth have been estimated in lakes of known limnological characteristics. The following narrative on species evaluation, lake types, and sampling equipment in Alaskan lakes stocked with resident sport fish species includes author citations.

RAINBOW TROUT

Strain Selection

The stocking of hatchery-reared rainbow trout in Southcentral Alaska was initiated in 1952. Steelhead eggs from Kodiak Island, and rainbow trout eggs from Idaho, Montana, Oregon, or Washington were incubated in Alaska hatcheries and stocked in lakes as fry, fingerlings, subcatchables, or catchables. Imported strains experienced poor survival ranging from zero to 25% and averaged 8% when stocked as fingerling (Redick 1971, 1972; Watsjold 1973; Kalb 1974, 1975; Chlupach 1976-1978). Low survival rate, the risk of possible importation of nonindigenous disease organisms, and a change in Alaska law which made it illegal to import fish stocks from outside Alaska led to a decision to develop and use Alaska brood stocks.

Three strains of rainbow trout were initially selected for extensive evaluation of survival and growth: an Alaska-produced Ennis (Montana) strain, a native strain from Swanson River on the Kenai Peninsula, and a native strain from Talarik Creek in Bristol Bay. Ennis rainbow trout were chosen for evaluation because the strain's extensive cultural background accommodated comparative studies between native Alaska and domestic brood programs. Swanson River rainbow trout were selected because they exhibited a lake-rearing background and a possible greater tolerance to stickleback competition, while Talarik rainbow trout were chosen primarily for their large size and long life span. Egg takes of native rainbow trout began at Talarik Creek and at the Swanson River in 1974. Comparative survival evaluations between Swanson and Talarik fingerlings were initiated in 1974. The first Ennis fingerlings from Alaska brood stocks were stocked in 1975, while the Swanson and Talarik fingerlings resulting from hatchery brood stocks were stocked in 1977.

Extensive evaluations of the various rainbow trout strains were conducted from 1974 through 1979 (Havens 1980; Hammarstrom 1981; Van Hulle and Murray 1981; Williams and Potterville 1981). Swanson River rainbow trout exhibited significantly greater survival in 16 out of 17 experiments when stocked in lakes with Ennis and Talarik trout of the same size. Based on the results of these tests, the Swanson River strain of rainbow trout was selected as the primary brood stock for Alaska's Lake stocking program in 1980. However, evaluations were continued using other strains of native Alaska rainbow trout stocks.

Rainbow trout stocks from the Kitoi River on Afognak Island and Big Lake in the Matanuska Valley were compared with Swanson River rainbow trout. Evaluations were initiated in 1984 and 1985 (Havens 1986; Murray 1986; Havens et al. 1987; Havens 1988). Swanson River rainbow trout were significantly more abundant than Kitoi River rainbow trout in six of the seven experiments, and were larger in all experiments. Swanson River rainbow trout were compared with Big Lake rainbow trout in nine lakes. Swanson River fish exhibited greater survival in eight lakes, while the mean length of the two strains was almost equal for age-1 fish. Big Lake fish were utilized to stock lakes in the Big Lake drainage. Production of Big Lake rainbow trout was discontinued in 1993 when it was decided to use sterile triploid Swanson River rainbow trout to stock these lakes.

Stocking Methods (Truck Versus Air-Drop)

In 1986 and 1987, the relative survival of rainbow trout released directly from a hatchery truck was compared to survival of rainbow trout air-dropped from a Cessna 188 Agtruck. The comparisons were made using 1-2 g fingerlings and survivals were compared after 1 year using

fyke net catches. In Matanuska Lake (62 surface acres) relative survival to age 1 of truck-released fish was significantly greater than that for air-dropped fish, although the fyke net catch ratio was biologically insignificant 1.15:1 (Havens et al. 1987). In South Rolly Lake (108 surface acres) there was not a significant difference in trout relative survival to age 1 between the two stocking methods (Havens 1988). Based on these results we recommend that the air-drop stocking method be continued for stocking fingerling sport fish in lakes not accessible to hatchery tank trucks.

Stocking Sizes and Timing

Twenty experiments using Swanson River strain rainbow trout were performed between 1978 and 1983 to estimate survival of age-0 fingerlings to age 1. Fish of various weights were stocked at a standard density of 200 fish per surface acre in small landlocked Mat-Su lakes containing threespine stickleback. The estimated survival for fingerlings stocked at 0.5 g was only 2% for one experiment. In nine experiments the estimated average survival for fingerlings stocked at approximately 1 g was 24% with a range of 8%-35%. Fingerlings stocked at approximately 2 g had an estimated average survival of 36% with a range of 9%-63% in 10 experiments (Havens 1985).

Several studies have been conducted on threespine stickleback in Mat-Su Valley lakes and other Alaska lakes (Greenbank and Nelson 1959, Engel 1971, Cannon 1974). In Mat-Su lakes, July appeared to be the month when most age-2 stickleback had finished spawning and died. Age-0 young-of-the-year stickleback may not have been large enough to seriously compete with rainbow trout fingerlings for food and habitat. Although age-1 stickleback were present in the lakes, catch per unit of effort data suggest that total stickleback population densities were lowest in July. Consequently, there may be a July "window period" in stickleback lakes when hatchery rainbow trout fingerlings would experience reduced competition and have a better chance of survival. In addition, rainbow trout released at approximately 2 g in July should be larger entering the winter season and should experience higher survival than fish stocked at 2 g in the fall (Havens 1985). Most rainbow trout fingerlings are now stocked in July at 1.5 g to 2 g.

Different methods of stocking rainbow trout in interior Alaska lakes were evaluated from 1985 through 1989. Fingerling rainbow trout were stocked at age 0 in July, while subcatchable rainbow trout were stocked at age 1 in May. Survival and growth rates were estimated in September and October for age-1 fingerlings and age-1 subcatchables. The survival rate of rainbow trout stocked as 2 g fingerlings was about 19% compared to the survival rate of about 28% for rainbow trout stocked as 20 g subcatchables (Doxey 1986, 1988, and 1989). Mean length-at-age 1+ of fish stocked as fingerlings was 186 mm compared to a mean length of 194 mm for subcatchables. Subcatchable rainbow trout are now stocked in both Birch Lake (803 surface acres) and Quartz Lake (1,504 surface acres) while fingerlings are still stocked in Quartz Lake, Chena Lake (259 surface acres), and small natural lakes and gravel pits (Bentz et al. 1991).

In 1986, a creel survey was conducted on three Anchorage lakes. These lakes are stocked with catchable rainbow trout at 300 fish per surface acre immediately after ice-out. The creel survey indicated angler participation and rainbow trout harvest were highest during the 3 weeks following stocking (23 May). Dramatic declines in effort, catch rates, and harvest occurred by late June (Havens et al. 1987). Anchorage lakes now receive 60% of their catchable trout request shortly after ice-out in May and the remaining 40% the third week in June.

Stocking Densities

Stocking density experiments were performed between 1989 and 1991 in 19 Matanuska-Susitna Valley landlocked lakes (11-180 surface acres). Age-0 (1-2 g) Swanson River rainbow trout were stocked at densities of 50, 100, 200, 400, 800, or 1,000 fish per surface acre to compare survival and growth to age 1+. Detailed results are presented in Table 1 (Havens and Sonnichsen 1992). Survival rates were highest for the three lowest stocking densities. Estimated abundance increased with stocking density. Mean length to age 1+ tended to decrease with increased stocking density. The cost per rainbow trout produced was lowest for stocking densities of 100 and 200 fish per surface acre. Currently, rainbow trout stocking densities are 100 fingerlings per surface acre for lakes receiving low angler effort and 200 fingerlings per surface acre for lakes with high angler effort.

Comparison of Production and Select

Initially, it was thought that the hatchery brood stock could be improved by selecting for certain characteristics such as early spawning and rapid early growth. An experiment was conducted to determine if there were significant differences in survival and growth between Swanson River strain "select" rainbow trout and production Swanson River strain "normal" trout. Equal numbers of 2.5 g fingerlings were stocked in Reed Lake (20 surface acres) in 1989. Survival at age 1 for the "select" group was estimated at 26%, while survival for the "normal" trout was 32%. Mean lengths at-age 1+ were 269 mm for the "select" trout and 276 mm for the "normal" fish (Havens 1991). Hatchery "selection" procedures and production of "select" rainbow trout were discontinued as a result of the experiment.

Comparison of Diploid and Triploid

Stocking rainbow trout in open systems where interbreeding with wild stocks could occur is a serious genetic concern. Consequently, a program was initiated to produce and evaluate sterile rainbow trout. Also, the potential for bypassing the rigors of spawning to produce older, larger fish could increase the public appeal and participation in existing stocked fisheries. Diploid mixed-sex (normal) and triploid (sterile) mixed-sex rainbow trout were stocked as age-0 fingerlings in "closed to sport fishing" Johnson Lake (40 surface acres) in 1989 and 1990 to determine if there were significant differences in survival, growth, and longevity. Estimated survival at age 1+ for the 1989 diploid plant was 69% and mean length was 217 mm, while survival for the triploid fish was 58% with a mean length of 196 mm (Havens 1991). Fyke net and gillnet sampling in spring 1993 produced catches of 614 age-4 diploid trout (stocked in 1989) and 379 age-4 triploid fish for a ratio of 1.6:1. Likewise, catches of age-3 trout (stocked in 1990) were 378 diploid and 225 triploid for a catch ratio of 1.7:1. Mean lengths were: age-4 diploid 347 mm, age-4 triploid 340 mm; age-3 diploid 325 mm, and age-3 triploid 304 mm (Al Havens, ADF&G, personal communication). Triploid mixed-sex rainbow trout appeared to be suitable for stocking in open systems. However, production of triploid mixed sex rainbow trout was discontinued when triploid all-female trout were developed.

Comparison of Diploid and Triploid All-female

Triploid (sterile) mixed sex rainbow trout stocked in open systems still presented a danger to wild stocks of fish. Sterile males could attempt to spawn with wild females and reduce the wild production of fertilized eggs. Consequently triploid (sterile) all-female rainbow trout were examined for sport fish stocking applications in Alaska. Swanson River strain diploid (normal) mixed-sex and triploid all-female rainbow trout were stocked as age-0 fingerlings in Long,

Wishbone, and "X" lakes (53-101 surface acres) in 1991. All three lakes are open to catch-and-release fishing only. Estimated survivals for age-1 diploid trout in the three lakes averaged 11%, while average survival for the triploid all-female fish was 5%. Mean lengths at age 1+ for the diploid fish averaged 187 mm, while triploid all-female trout averaged 163 mm (Havens and Sonnichsen 1993). At age 2, estimated survivals for diploid trout across the three lakes averaged 4% while average survival for the triploid all-female fish was 2%; mean lengths at age 2+ for the diploid fish averaged 284 mm, while triploid all-female trout averaged 252 mm.

Table 1.-Results of rainbow trout stocking density experiments conducted in 19 Matanuska-Susitna Valley lakes from 1989 to 1991.

Stocking Density[a]	Number of Experiments	Number of Lakes	Mean Survival to Age 1	Estimated Abundance[a]	Mean Length to Age 1 (mm)	Cost Per Rainbow Trout Produced
50	4	4	35%	17	218	$1.19
100	11	4	37%	37	194	$0.32
200	10	4	30%	61	178	$0.33
400	6	3	11%	44	198	$1.41
800	7	4	10%	83	168	$0.85
1000	1	1	15%	161	172	$0.52

From Havens and Sonnichsen 1992.

[a] Number of fish per surface acre

The experiment was repeated in Dawn, Ravine, and Tigger lakes (12-19 surface acres). Estimated survivals for age-1 diploid rainbow trout in the three lakes averaged 19% while average survival for the triploid all-female fish was 16%, (triploid all-female estimated survival was higher in one lake). Mean lengths at age 1+ for the diploid fish averaged 230 mm, while triploid all-female rainbow trout averaged 196 mm (Brock et al. 1994). Although survival and size of the triploid all-female fish appeared to be reduced, performance was adequate. Triploid all-female rainbow trout are being used for stocking applications where there is potential for intermixing with wild fish.

Comparison of Diploid and Diploid All-female

The Alaska Department of Fish and Game began producing groups of all female rainbow trout in 1991 in an effort to reduce the number of brood stock required to meet annual fingerling and subcatchable production needs. An additional potential benefit was improved growth and greater longevity. Age-0 mixed-sex and all-female rainbow trout fingerlings were stocked in Long, Johnson, and "X" lakes in July 1993. Fyke net sampling in September 1994 revealed only a small difference in survival (8% mixed sex to 7% for all-female). Mean length of the age-1+ fish in the mixed sex to all-female comparisons were 179 mm to 181 mm (Long), 263 mm to 256 mm (Johnson), and 174 mm to 169 mm ("X" Lake). No differences in survival or size are apparent.

ARCTIC GRAYLING

The stocking of hatchery reared Arctic grayling in Alaska was initiated by the Alaska Department of Fish and Game in 1961. Grayling eggs were taken from Bear Creek and Mud Creek stocks (Glennallen area) and incubated at Fire Lake Hatchery. The resultant fry were stocked in three barren Glennallen area landlocked lakes (Van Wyhe 1962). Grayling eggs have been obtained from several wild stocks in the Glennallen/Delta Junction area since the inception of the stocking program. The primary sources have been Tolsona Lake or Moose Lake.

The Alaska Department of Fish and Game's Clear Hatchery has been the sole producer of grayling for stocking Southcentral Alaska lakes since 1980. The first successful hatchery rearing of grayling to fingerling size using a commercially prepared diet occurred in 1983 (Dave Parks, Clear Hatchery Manager, personal communication).

Fry Stocking

Establishment of new fisheries from hatchery reared grayling fry stockings has been variable. Fry stockings have succeeded only in barren lakes, lakes chemically treated to remove stickleback, or lakes naturally lacking stickleback populations but containing other native or stocked sport fish species (Van Wyhe 1963; Sexsmith 1964; Marriott 1965, 1967, 1968; Williams 1968, 1971; Redick 1970; Van Hulle 1970; Van Hulle and Murray 1972, 1976, 1980, 1981; Engel 1973; Murray 1982-1986; Williams and Potterville 1984). Evaluation of two consecutive years of grayling fry stockings in barren Johnson Lake (40 surface acres) indicated survivals to age 0+ of 1.9% and 2.2%, respectively (Havens 1986).

Grayling fry stockings often produced fishable populations in landlocked lakes where other sport fish stockings had failed due to low winter dissolved oxygen concentrations (Williams 1971, 1972, 1974, 1976; Redick 1972; Van Hulle and Murray 1975). Occasional natural reproduction was observed in several lakes.

Fingerling Stocking

Survival of grayling stocked as fingerling in a lake containing whitefish, burbot, and stocked rainbow trout was 18% at age 1 (Williams and Potterville 1986). In 1985 two Mat-Su Valley lakes, Sliver Lake (7 surface acres) and Wolf Lake (62 surface acres), were stocked with 1.24 g Arctic grayling fingerlings. Both lakes contained populations of threespine stickleback. Grayling survival to age 1 was 10% in Sliver Lake and 1% in Wolf Lake (Havens 1987).

Fry Versus Fingerling Stocking

Survival between grayling stocked as fry and fingerling was compared in stickleback-free Canoe Lake (21 surface acres). Fry were stocked at a density of 600 per surface acre and fingerlings were stocked at 200 per acre. Fingerling survival to age 1 was 59% (mean length 134 mm) while too few age-1 fish from the fry plant (mean length 200 mm) were captured to provide an estimate (Havens 1986).

One large experiment was conducted to reduce the cost of developing and maintaining enhanced Arctic grayling sport fisheries. Age-0 grayling were stocked in 31 small Interior and Southcentral Alaska lakes as sac-fry and 4 g and 6 g fingerlings. The rate of survival, cost per survivor, and growth were compared at age 1. The average cost per survivor was lowest for grayling that were stocked as 4 g fingerlings (Skaugstad 1988, 1989). Four Mat-Su lakes were part of this experiment. Two lakes contained stickleback and two did not. No grayling from the

fry plant were captured in the lakes containing stickleback and estimated fry survival in the lakes without stickleback averaged 1.2%. Survivals for all four lakes for the 4 g and 6 g stocking groups averaged 67% and 85%, respectively.

As a result of these experiments, the 4 g grayling are used for enhancement of lakes along the road system in Interior and Southcentral Alaska. However, sac-fry are stocked if a lake has no other fish species or a large number of fish must be transported by aircraft.

LANDLOCKED SOCKEYE, COHO, AND CHINOOK SALMON

Sockeye Salmon

Sockeye salmon were transplanted from Bear Lake to seven Kenai Peninsula landlocked lakes (8-280 surface acres) between 1965 and 1968. Bear Lake was being intensively managed for anadromous silver salmon and sockeye salmon were transplanted to reduce competition. An additional benefit was to establish sport fish populations in barren roadside lakes (Engel 1968-1972). Five of the lakes developed successful winter sport fisheries. Four of five lakes were relatively deep with cool summer water temperatures. Coho salmon were inadvertently transplanted with the sockeye salmon and displayed better growth in most lakes. The better growth presumably resulted from the superior ability of coho salmon to utilize and/or compete for available food. Stomach analysis indicated that larger coho salmon were consuming sockeye salmon.

Sockeye salmon sac-fry were stocked in landlocked Harding Lake (2,470 acres) near Fairbanks in an attempt to provide a recreational sport fishery for kokanee. The stocking density was approximately 200 per surface acre in 1988, 1989, and again in 1990. Tow net samples indicated that the estimated abundance of age-1 sockeye salmon was lower than expected. Low survivals will likely preclude sockeye salmon from fulfilling the management goal (Clark 1991).

Coho Salmon

Stocking of hatchery reared coho salmon began in Southcentral Alaska lakes in 1958. Eggs from Ward Cove Creek (Ketchikan) were incubated at Fire Lake Hatchery. Resultant fry and fingerlings were stocked in four landlocked Anchorage/Matanuska Valley lakes and one Fairbanks area lake (Alaska Fisheries Board and Alaska Department of Fisheries 1958). At least 12 Alaska strains of coho salmon as well as coho salmon from Washington and Oregon hatcheries have been stocked in Southcentral Alaska landlocked lakes.

Coho salmon stocked in Southcentral Alaska landlocked lakes provided good experimental net catches and satisfactory angler catch rates (McGinnis 1963-1966, Redick 1967). Seven population estimates were performed on stocked fingerling coho salmon. Survivals at age 1 ranged from 31% to 50% and averaged 40% (Chlupach 1978, Murray and Van Hulle 1980, 1981; Murray 1982).

A significant portion of male coho salmon mature at age 2+ and die 1 year earlier than females (Redick 1970). Comparison of a Kodiak versus Green River, Washington strain of coho salmon fingerlings stocked at the same time, size, and density indicated the Kodiak strain was significantly larger at age 1+. However, 29% were mature males whereas only 2% of the Washington fish were mature (Kalb 1975).

Redick (1970) suggested that coho salmon fingerlings should be used to create fisheries in lakes easily accessible to winter anglers. The fingerlings only reach harvestable size at age 1+ after 18

months lake residency and produce high winter angler catch rates. Acceptable winter angler catch rates of age-1+ coho salmon resulted only from stocking densities of at least 200 to 500 fish per surface acre. Coho salmon exhibit larger size at age 1 when stocked at densities of 200 to 300 per acre than at densities greater than 450 per acre (Engel 1971, Hammarstrom 1977; Murray and Van Hulle 1981). Early summer coho stockings exhibit better relative survival than fall stockings of similar size coho (Engel 1973). Coho stocked as fingerling (2 g-7 g) at densities of 100 to 200 fish per acre are larger and produce better catch rates than fry (<1 g) stocked at higher densities (Watsjold 1981).

Coho salmon of Little Susitna River origin were stocked at a size of 3.7 g in four Matanuska-Susitna Valley landlocked lakes in June 1988. An additional four lakes were stocked with 1.1-1.3 g coho salmon fingerlings in July 1988. Mean length at age 0+, mean length at age 1, and survival at age 0+ were compared. In September 1988 estimated survivals of coho stocked at 3.7 g ranged from 48%-90% and averaged 60%. The corresponding survivals of coho stocked at 1.1-1.3 g ranged from 24%-36% and averaged 32%. In September 1988 mean lengths of coho stocked at 3.7 g ranged from 109 mm-126 mm and averaged 118 mm. Mean lengths at age 1 in May 1989 ranged from 124 mm-150 mm and averaged 139 mm. The corresponding mean lengths of coho salmon stocked at 1.1-1.3 g ranged from 78 mm-98 mm and averaged 89 mm in September 1988 and ranged from 115 mm-129 mm and averaged 118 mm in May 1989. Based on these results, it is recommended that coho salmon be stocked in landlocked lakes soon after ice-out at as large a size as can be produced (Havens 1990).

Evaluation of dual stocking of rainbow trout and coho salmon fingerlings as well as coho salmon stocked in lakes previously stocked with rainbow trout indicate higher experimental gillnet catches and angler catch rates. However, growth was slower for coho salmon than for rainbow trout (Andrews 1960; Van Wyhe 1962; Redick 1970; Engel 1971; Watsjold 1976; Chlupach 1978).

Chinook Salmon

Chinook salmon fingerlings were stocked in two Interior Alaska lakes in 1985 to evaluate survival and growth. Survival to age 1 was approximately 30% but survival beyond age 2 was estimated to be less than 5%. Mean length at ages 1 and 2 was approximately 170 mm and 250 mm, respectively (Doxey 1988). Stocking of chinook salmon fingerlings was dropped from the Interior lake stocking program.

Coho Versus Chinook Salmon Survival

Dual stocking of chinook salmon and coho salmon 15 g fingerlings in lakes previously stocked with just coho salmon were evaluated. The lakes experienced higher experimental gillnet catches, higher angler catch rates and more rapid growth for chinook to age 0+. However, by age 1+ most chinook had either been harvested or died (Bentz 1982). Two consecutive years of stocking 2 g coho salmon versus 2 g then 7 g chinook salmon fingerlings revealed significantly higher gillnet catch rates for coho salmon. The few chinook salmon captured were large enough to enter the winter fishery at age 0+. However, none were captured the following year at age 1+ when age-1+ coho salmon were dominant in the winter fishery. Estimated coho salmon survivals to age 0+ in four lakes ranged from 32% to 65% and averaged 51%, while 7 g chinook salmon survivals were less than 1%. (Havens 1985 and 1986).

Coho and chinook salmon were stocked as 3.5 g fingerlings and 13-14 g fingerlings, respectively, in Memory, Rocky, and Victor lakes in 1985. Relative survival to age 0+ was significantly greater for the coho salmon. In Johnson Lake, absolute survival of age-0+ coho (85%) was greater than chinook survival (50%). Mean length of chinook salmon was significantly greater than that of coho salmon in all four lakes, however the coho salmon were approximately 25% smaller than the chinook salmon at the time of stocking (Havens et al. 1987).

ARCTIC CHAR AND LAKE TROUT

Arctic Char

Arctic char fingerlings were stocked in several small Interior lakes between 1987 and 1989 to evaluate survival and growth to age 1 (these data include only single species stockings and were excerpted from the data by Skaugstad and Clark 1991). Dick's Pond (5 surface acres, 24 ft maximum depth) Arctic char had estimated survivals to age 1 in 1988, 1989, and 1990 of 90%, 41%, and 2%, respectively. Mean lengths were 170 mm, 123 mm, and 143 mm, respectively. Rangeview Lake (4 surface acres, 9 ft maximum depth) Arctic char had estimated survivals to age 1 in 1988, 1989, and 1990 of 37%, 41%, and 36%, respectively. Mean lengths were 163 mm, 97 mm, and 185 mm, respectively. Last Lake (5 surface acres, 11 ft maximum depth) Arctic char had estimated survivals to age 1 in 1988, 1989, and 1990 of 56%, 29%, and <1%, respectively. Mean lengths were 186 mm in 1988, 133 mm in 1989, and the one fish captured in 1990 was >100 mm. Brodie Lake (5 surface acres, 17 ft maximum depth) Arctic char had estimated survivals to age 1 in 1988, 1989, and 1990 of 60%, 24%, and 5%, respectively. Mean lengths were 141 mm, 134 mm, and 153 mm, respectively (Skaugstad and Clark 1991).

Lake Trout

Lake trout fingerlings were stocked in several small Interior lakes between 1987 and 1989 to evaluate survival and growth to age 1 (these data include only single species stockings and was excerpted from the data by Skaugstad and Clark 1991). Paul's Pond (5 surface acres) lake trout in 1989 had an estimated survival to age 1 of 46% and a mean length of 130 mm. Sheefish Lake (8 surface acres) lake trout in 1990 had an estimated survival to age 1 of <1% and a mean length of 161 mm. Silver Fox Pit (6 surface acres, 15 ft maximum depth) lake trout stocked as fingerlings in 1988 and fingerlings and subcatchables in 1989 had no survival. Burr (1993) describes evaluations of lake trout stocked in Interior lakes containing other sport fish species.

MIXED-SPECIES STOCKING

Single-Species Versus Mixed-Species Stockings

Forty-four small lakes, ponds, and gravel pits (1-100 surface acres) near Fairbanks and Delta Junction and three small lakes in the Mat-Su Valley were stocked with sport fish over a period of several years. In some cases, single species were stocked in a given year. In other cases, combinations of two, three, or four species of hatchery-reared sport fish were stocked in a given year. Species stocked were Arctic char, Arctic grayling, chinook salmon, coho salmon, lake trout, and rainbow trout. Evaluations were performed on 113 annual stockings in 47 study waters. Mark-recapture experiments on age-1 fish were used to determine density, average fork length, and species diversity. Criteria were as follows: (1) overall stocking success [density]: (a) failure = <1 fish/surface acre, (b) moderately successful = 1-8 fish/surface acre, or (c) fully successful = >8 fish/surface acre; (2) growth of stocked fish [mean fork length]: (a) inadequate = age-1 fish with mean fork length <100 mm, or (b) adequate = age-1 fish with mean fork length

>100 mm; and (3) diversity achieved through mixed species stocking: (a) inadequate = at least one species <10% of overall abundance of age-1 stocked fish, or (b) adequate = each species >/= 10% of overall abundance of age-1 stocked fish.

Results of the 52 single species stockings for density were 27% failure, 6% moderate, and 67% fully successful. Mean fork length results were 5% inadequate and 95% adequate. Results of 61 mixed species stockings for density were 23% failure, 16% moderate (100% met minimum for fork length), 61% fully successful (95% met minimum for fork length). Only 23% of the mixed species stockings resulted in a density >8 fish/surface acre, mean fork length >100 mm, and each species representing > or = 10% of the age-1 sport fish population. None of the three or four species stocking combinations (n = 15) achieved all three criteria. On the other hand, the only two species stocking combination that completely failed was Arctic char and coho salmon and that specific combination was only evaluated once.

Based on the evaluations, species combinations that appear most promising for stocking small lakes, ponds, and gravel pits in Interior Alaska are: (1) rainbow trout/Arctic grayling, (2) rainbow trout/coho salmon, (3) rainbow trout/Arctic char, (4) rainbow trout/lake trout, and (5) Arctic grayling/arctic char. The proportions of single species and mixed species stockings that produced sparse, medium, and dense populations of age-1 sport fish were not statistically different. Consequently, the major benefit from annual mixed species stockings of specific waters was an increase in diversity rather than an increase in the number of available sport fish (Skaugstad and Clark 1991). There is an excellent discussion and bibliography on mixed species stocking in the introduction section of the report by Skaugstad and Clark (1991).

Arctic Grayling and Coho Salmon

Arctic grayling were stocked in Wolf Lake (62 surface acres) in the Mat-Su Valley in 1986. The 4.6 g fish had an estimated survival at age 1 of 2.5%. Coho salmon stocked at 1.4 g had an estimated survival to age 1 of 9.9% (Havens 1988). This stocking was judged to have been fully successful for fish density, mean fork length, and species diversity according to criteria from Skaugstad and Clark (1991). However, Arctic grayling stocking was discontinued because it was thought Arctic grayling would perform better in another lake.

Arctic Grayling and Rainbow Trout

Arctic grayling were stocked in Eska Lake (9 surface acres) in the Mat-Su Valley in 1986. The fish were stocked as 6.4 g fingerlings and had an estimated survival at age 1 of 0.9%. Rainbow trout stocked at 2.3 g had an estimated survival to age 1 of 6.2% (Havens 1988). This stocking was judged to have been fully successful for species diversity and mean fork length. However, it was only moderately successful for fish density. Consequently, the low survival of both Arctic grayling and rainbow fingerlings resulted in discontinued fingerling stockings. Eska Lake is now stocked with catchable rainbow trout.

Arctic Grayling and Lake Trout

Long [Mi. 86 Glenn Highway] Lake (106 surface acres, 95 ft maximum depth) is in the Mat-Su Valley and contains populations of burbot, longnose suckers, and stocked Arctic grayling. It was stocked with fingerling lake trout annually from 1988 to 1991 in an attempt to provide a recreational sport fishery for lake trout. No abundance estimates were attempted but summer gillnet sampling in 1989 (two gillnets set overnight) resulted in catches of 2 lake trout 130 and 147 mm in length, 3 lake trout 84-225 mm in length in 1990, and 12 lake trout 229-405 mm in

length in 1991 (Al Havens, ADF&G, personal communication). Catch and harvest of lake trout in Long Lake have been reported in the SWHS.

Rainbow Trout and Coho Salmon

Rainbow trout were stocked in Echo Lake (23 surface acres) in the Mat-Su Valley in 1986. The fish were stocked as 3.0 g fingerlings and had an estimated survival at age 1 of 12.1%. Coho salmon stocked at 3.5 g had an estimated survival to age 1 of 13.0%. The mean length of age-1+ coho salmon in Echo Lake from a single species plant in 1983 was 246 mm. Stockings at equal densities with chinook salmon in 1984 and 1985 yielded age-1+ coho salmon with mean lengths of 222 mm (1985) and 204 mm (1986). In these three cases, the mean length of age-1+ coho salmon was greater than the mean length of 185 mm attained by the coho stocked with rainbow trout in 1986 (Al Havens, ADF&G, personal communication). Although it appears a dual stocking of rainbow trout and coho salmon may limit first year fish growth, 80% of the salmon were larger than 165 mm and would be available for harvest in the winter fishery. Echo Lake is now stocked annually with coho salmon fingerlings at a density of 200 fish per surface acre and rainbow trout catchables at 100 fish per surface acre.

Arctic Char and Other Stocked Species

Arctic char have been stocked in five landlocked Mat-Su lakes in combination with one or more stocked sport fish species. Three lakes (18-113 surface acres) contained rainbow trout. One lake (123 surface acres) contained coho salmon. The last lake (362 surface acres) was first stocked with Arctic char in 1993 and contained rainbow trout, Arctic grayling, coho salmon, and chinook salmon. Sampling was conducted in three lakes using gillnets and fyke nets. Samples in Irene Lake (18 acres stocked annually since 1988 with catchable rainbow trout and fingerling Arctic char) contained rainbow trout to 465 mm and Arctic char to 432 mm. Samples in Marion Lake (113 acres stocked annually since 1989 with fingerling rainbow trout and Arctic char) contained rainbow trout to 432 mm and Arctic char to 392 mm. Samples in Benka Lake (123 acres stocked annually since 1990 with fingerling coho salmon and Arctic char) contained coho salmon to 250 mm and Arctic char to 440 mm (Al Havens, ADF&G, personal communication). Catches of Arctic char have been reported by anglers in four of the lakes.

Mixed-Species Plants in Large Lakes

There are several excellent reports on growth, survival and abundance estimates of stocked fish in larger (259-2,470 surface acres) Interior lakes. Another report estimates fish abundance and net pen rearing of sport fish stocked into Harding Lake (2,470 acres). These reports include but are not limited to: Doxey 1988, Doxey 1991a and 1991b, Viavant and Clark 1991, Doxey 1992, Viavant 1992, Skaugstad 1993.

Lake Physical, Chemical, and Biological Parameters

Indicators of biological productivity measured in Alaska lakes include plankton, periphyton, chlorophyll *a*, phaeopigments, and fish yield. Parameters used to estimate biological productivity in Mat-Su lakes were water chemistry (alkalinity and hardness), the morphoedaphic index (MEI) (derived by dividing specific conductance by mean depth), and the degree of dissolved oxygen demand fluctuation (biochemical oxygen demand) during the winter period of restricted circulation. Significant correlations were found between plankton index and MEI, epilithic periphyton biomass and MEI, water chemistry and MEI, and biochemical oxygen demand and MEI. Fish production is affected by morphometric, edaphic, and climatic factors (Ryder 1965).

It does not appear that any individual factor (physical, chemical, or biological) consistently controls fish production in Southcentral Alaska stocked landlocked lakes (Woods 1985). MEI gives a gross measure of relative potential productivity and is useful for categorizing and management purposes. In Mat-Su lakes, MEI values above 13 are most productive, values below 3 are least productive, and values between 3 and 13 range from moderately low to moderately high productivity (Engel 1974, Kalb 1975, Watsjold 1975, Chlupach 1977 and 1978, Schmidt 1977, Havens 1986).

Abundance and survival estimates were performed at age 1+ on three strains of rainbow trout fingerlings stocked in five Mat-Su Valley lakes. A significant correlation was found between MEI and pounds of fish per surface acre ($r = 0.99$), MEI and pounds of fish per littoral acre ($r = 0.97$), and MEI and pounds of fish produced per pound of fish stocked ($r = 0.97$) (Havens 1980).

Twenty-two biomass estimates of rainbow trout in nine stocked landlocked Mat-Su Valley lakes ranged from 2 to 46 pounds per surface acre and averaged 18 pounds per surface acre. In four of the lakes with trout abundance estimates, threespine stickleback abundance was also estimated. Total combined biomass estimates ranged from 48 to 76 pounds per surface acre with an average of 56 pounds for the four lakes combined. Threespine stickleback comprised 58%-96% of the total biomass (Chlupach 1978, Havens 1980, 1983 and 1984).

Havens (1982) compared stomach contents, minnow trap and fyke net CPUE, and growth between rainbow trout fingerlings and threespine stickleback. The rainbow trout were stocked in August or September 1980 in three Mat-Su Valley landlocked lakes, two with stickleback and one without. Samples were taken monthly from August 1980 through June 1981. Catch rate and growth of rainbow trout was highest in the lake without stickleback. Zooplankton were a major diet item of rainbow trout only in the lake without stickleback. Havens (1983) examined stocked fingerling rainbow trout survival to age 1+ in 15 lakes without stickleback and 17 lakes with stickleback. Survival of rainbow trout in the lakes without stickleback was more than double the survival in stickleback lakes (37% vs. 15%). Competition between rainbow trout and stickleback appears to reduce the success of rainbow trout stockings.

FISH SAMPLING GEAR

Numerous reports discuss evaluation of fishing gear used to sample fish populations in stocked Southcentral Alaska lakes versus gillnetting in lakes.

Two types of variable mesh gillnets were fished for similar periods of time on identical stocked lake fish populations. The overall catch per unit of effort was similar but with substantial catch differences in the 1/2 in mesh panel. The nets with larger monofilament diameter failed to capture representative samples of rainbow trout in the 100+ mm range. This suggested a complete failure of the previous year's stocking program. The nets with smaller monofilament diameter showed good survival of this size group. Consequently, the recommended variable mesh gillnet is as follows: 1/2 in monofilament bar mesh at 0.18 mm; 3/4 in monofilament bar mesh at 0.20 mm; 1 in monofilament bar mesh at 0.25 mm; 1 1/2 in monofilament bar mesh at 0.30 mm; 2 in monofilament bar mesh at 0.45 mm (Van Hulle and Murray 1975 and 1976).

One gillnet with 1/2 in, 3/4 in, 1 in, 1 1/2 in, and 2 in bar mesh and two without the 3/4 in mesh but with various monofilament diameters were used to sample stocked lake fish populations. A gillnet with small diameter monofilament, but no 3/4 in mesh, captured smaller (103-154 mm) and larger (194-271 mm) members of the populations while the net with 3/4 in mesh but larger

diameter monofilament captured rainbow trout primarily in the 154-194 mm size range. If only nets without the 3/4 in mesh panel had been used, erroneous conclusions about the fish populations would have resulted (Watsjold 1975). Further data substantiate the lack of bias of gillnets on fish populations containing only larger fish. Johnson Lake contained only rainbow trout larger than 200 mm. Gillnets set the day prior to rotenone application captured 54 rainbow trout with a mean length 269 mm. Following rotenone application 168 rainbow trout were recovered. The mean length was 269 mm with almost identical length frequencies to the gillnet sample (Kalb 1974).

Age-1+ rainbow trout from three Mat-Su lakes were captured in October 1982 using fyke nets, regular gillnets with 1/2 in, 3/4 in, 1 in, 1 1/2 in, and 2 in mesh, and modified gillnets which included a 5/8 in mesh panel. Then the lakes were rotenoned and fish were recovered for length measurements. Rainbow trout captured with fyke nets averaged 168 mm (n = 979); regular gillnets averaged 200 mm (n = 125); modified gillnets (n = 295) averaged 188 mm (n = 125); and killed with rotenone averaged 189 mm (n = 169) (Havens 1983). The gillnet catches were similar to age-1+ rainbow trout samples from four Mat-Su lakes. Modified gillnets which included a 5/8 in mesh panel in addition to the 1/2 in, 3/4 in, 1 in, 1 1/2 in, and 2 in mesh panels recaptured fish in size ranges similar to fyke net captured fish which had been marked and released. Gillnets without the 5/8 in mesh did not capture rainbow trout between 136-165 mm that were present in some of the lakes (Havens 1981). Gillnets used for sampling rainbow trout in stocked lakes should be the modified nets with the 5/8 in mesh panel.

Mark-recapture abundance estimates of age-1+ rainbow trout that had been stocked as fingerlings were obtained from seven landlocked Mat-Su lakes. Fyke nets were used to capture fish for marking and gillnets were used for the recapture. The portion of estimated populations killed by gillnets ranged from 15%-46% and averaged 29% (Havens 1980). Subsequently, fyke nets have been used to capture fish for both the marking and recapture portions of abundance estimates in stocked lakes. Fyke nets are effective for capturing all age classes of stocked rainbow trout, landlocked salmon, and Arctic grayling during spring and fall when surface water temperatures are near or below 50^{o}F.

The size of fish captured with electrofishing gear and gillnets were compared in six stocked lake fish populations. Electrofishing gear sampled smaller fish but failed to capture representatives of larger size groups present in the lakes. Gillnets failed to capture smaller members in the population because of a large diameter monofilament in the 1/2 in mesh (Watsjold 1975). In another experiment, electrofishing gear and gillnets were used in two lakes stocked with rainbow trout and two lakes stocked with coho salmon to compare catch rates and length frequencies. In general, electrofishing in stocked lakes tends to capture smaller fish while gillnets more readily capture larger fish (Hammarstrom 1975).

Green (painted) and silver (unpainted) minnow traps were both fished in two Mat-Su stocked landlocked lakes. The green traps captured age-0+ rainbow trout fingerlings at 3 and 15 times the rate of silver traps (Havens 1979). Four Mat-Su lakes were each fished with 25 minnow traps, 5 each painted green, blue, red, yellow, or unpainted silver. A total of 966 rainbow trout fingerlings were captured in the following percentages by trap color: green (25%), yellow (22%), red (21%), blue (20%), and unpainted silver (12%). A total of 20,464 threespine stickleback were captured in the following percentages by trap color: red (24%), blue (22%), yellow (20%), silver (18%), and green (16%). Overall, green traps captured more trout but fewer stickleback

than expected while red traps captured the greatest number of stickleback. The catch for both trout and stickleback was less than expected in unpainted silver traps (galvanized metal traps directly from the manufacturer) (Havens et al. *Unpublished*).

RAINBOW TROUT LENGTHS FROM CREEL SURVEYS

Fish lengths from creel survey data collected from both wild and hatchery rainbow trout fisheries in the Matanuska Valley between 1956 and 1983 (Allin and Baxter 1957; Andrews 1961; Dave Watsjold, U.S. Fish and Wildlife Service, personal communication; Havens 1985) have been compiled. Rainbow trout retained by sport anglers ranged from 3 in to 23 in (the mode was 8-8.9 in) and almost 75% of the fish harvested were within the 6 in to 10.9 in range. A creel survey was conducted on nine Mat-Su Valley stocked lakes from April 30 through September 5, 1977 (Watsjold 1978). May received 48% of the fishing effort, while 22%, 16%, 9%, and 3%, occurred during June, July, August, and September, respectively. Harvest rates where highest in June and September.

RECOMMENDATIONS

FISH SAMPLING GEAR

A lake which has never (or recently) been surveyed should be sampled using a combination of minnow traps, fyke nets, and gillnets set at the recommended number of sets per shoreline mile (or sets per surface acre if shoreline miles cannot be determined). The number of sets recommended are: minnow traps 15 per shoreline mile (or 20 per surface acre), fyke nets-5 per shoreline mile (or 1 per 5 surface acres), and gillnets-1 per shoreline mile (or 1 per 50 surface acres). If burbot or lake trout are suspected the number of hoop traps recommended is 1 per 50 surface acres.

A stocked lake that contains rainbow trout, Arctic grayling, and/or landlocked salmon should be sampled with a combination of minnow traps and fyke nets. The best sampling periods are from ice-out to mid-June or September to ice-up. The number of recommended sets is the same as above.

A stocked lake that contains lake trout or Arctic char singly or in combination with rainbow trout, Arctic grayling, and/or landlocked salmon should be sampled using a combination of minnow traps, fyke nets, and gillnets. The best sampling periods are from ice-out to mid-June or September to ice-up. The number of recommended sets is the same as above.

Specific recommendations for overnight fyke net sets in Palmer area stocked lakes are given in Appendix B6.

Gillnets

A sinking gillnet is recommend for lake sampling. The net should be 120 ft in length and composed of six 20 ft panels of the following square mesh sizes (and monofilament diameters): 1/2 in (0.18 mm), 5/8 in (0.18 mm), 3/4 in (0.20 mm), 1 in (0.25 mm), 1 1/2 in (0.30 mm), and 2 in (0.45 mm). Complete specifications are given in Appendix C1.

Fyke Nets

The following fyke net is recommend for lake sampling: 12 ft in length composed of 3/16 in square mesh (Delta 44) with three internal funnels. Complete specifications are given in Appendix C2.

Minnow Traps

The following minnow trap is recommend for lake sampling: 18 in length composed of 1/8 in square mesh spray-painted a camouflage green and brown color. Complete specifications are given in Appendix C3.

Hoop Traps

The following hoop trap is recommend for lake sampling: 8 ft in length composed of 3/4-1 1/2 in square mesh. Complete specifications are given in Appendix C4.

HATCHERY SPORT FISH STOCKING RECOMMENDATIONS

Rainbow Trout Catchables

Rainbow trout catchables are stocked in high use roadside lakes where they make an instant contribution to the sport fishery. They are normally stocked at 50-300 fish per surface acre depending on whether a lake is stocked with a single or multiple species. In most of these lakes, biologists feel that stocking fingerlings alone could not provide the numbers of harvestable size fish necessary to generate the angler-days provided by stocking catchables. Potential high use lakes that experience occasional fish winterkills may be good candidates for rainbow trout catchables. They can be stocked soon after ice-out and are available for harvest throughout the summer, fall, and early winter fishing season. The majority of the fish stocked should be harvested by late February when most winterkill would occur due to low dissolved oxygen conditions (Table 2). Catchables are often stocked as part of a mixed-species stocking along with catchable chinook salmon or Arctic char. This practice is common in some Anchorage area lakes in order to provide a diversified fishing opportunity. Catchables are also stocked with fingerling rainbow trout, coho salmon, grayling, or Arctic char in a few Mat-Su lakes to provide immediate fishing opportunity and provide diversity. The catchables probably do not compete directly with fingerlings for food and habitat thus allowing a crop of fingerlings to grow to harvestable size.

Chinook Salmon Catchables

Chinook salmon catchables, also known as super-smolt, are stocked in high use roadside lakes where they make an instant contribution to the sport fishery. These fish are stocked at ice-up. They are voracious biters and provide an excellent winter ice fishery. These catchables are used instead of coho salmon fingerlings when a lake is stocked with fingerlings of other sport fish species, or when they are expected to be fished out before a lake might winterkill (Table 2). Chinook salmon catchables are normally stocked at 50-200 fish per surface acre depending on whether the lake is stocked with single or multiple species.

Arctic Char Catchables

Arctic char catchables, as is the case with all catchables, are almost always stocked in high use roadside lakes where they make an instant contribution to the sport fishery. These fish are stocked at ice-up. They readily take angler offerings and provide an excellent winter ice fishery. They are normally stocked at 50-100 fish per surface acre depending on whether the lake is stocked with single or multiple species.

Table 2.-Estimated annual percentage of harvest produced from stocking different species and life stages of fish in Southcentral Alaska lakes.

Species and Life Stage at Stocking	Percentage of Fish Harvested by Year[a]				
	In Year Stocked	Second Year	Third Year	Fourth Year	Fifth Year
Rainbow Trout Fingerlings (age 0)	0%	10%	70%	15%	5%
Rainbow Trout Catchables (age 1)	80%	18%	2%	0%	0%
Coho Salmon Fingerlings (age 0)	5%	75%	18%	2%	0%
Chinook Salmon Catchables (age 1)	28%	70%	2%	0%	0%
Arctic Grayling Fry (age 0)	0%	10%	70%	15%	5%
Arctic Grayling Fingerlings (age 0)	0%	10%	70%	15%	5%
Arctic Grayling Catchables (age 1)	No Estimates				
Lake Trout Fingerlings (age 0)	0%	10%	70%	15%	5%
Arctic Char Fingerlings (age 0)	0%	10%	70%	15%	5%
Arctic Char Catchables (age 1)	No Estimates				

[a] Year is calendar year January 1 to December 31. The second year begins on January 1 following the year of stocking.

Rainbow Trout Fingerlings

Rainbow trout fingerlings are normally stocked at 50-200 fish per surface acre. The stocking density depends on sport fishing effort and whether the lake is stocked with single or multiple species. Rainbow trout fingerlings (1 g-2 g) stocked in lakes experience an average survival of 30% to harvestable size. Those that do survive have adapted to natural food and habitat. Fingerlings appear to have the potential to live longer and thus eventually reach a larger size than stocked catchable rainbow trout. Catchables spend their first year in a crowded hatchery raceway eating pelletized food. Rainbow trout fingerlings provide good spring, summer, fall, and early winter fisheries in almost all stocking situations. Most adults produced from stocking rainbow trout fingerlings are harvested in the third year after stocking (Table 2). Stocking density examples are: 50-100 fish per surface acre every 2 or 3 years in a remote lake that would be expected to receive little angling pressure; 100 fish per surface acre annually in a lake with medium angling pressure or when stocked in combination with another species in a high use lake; and 200 fish per surface acre annually when stocked in a single species high use lake.

Arctic Grayling Fingerlings

Arctic grayling fingerlings are normally stocked at 50-200 fish per surface acre. Stocking density depends on sport fishing effort and whether the lake is stocked with single or multiple species.

Arctic grayling fingerlings are stocked in lakes with or without stickleback and often in combination with rainbow trout fingerlings and/or rainbow trout catchables. The better Arctic grayling producing lakes are stocked only with grayling and are free of stickleback. Unfortunately, there are very few lowland lakes in Southcentral Alaska that do not contain threespine stickleback and that would overwinter stocked Arctic grayling fingerlings. Arctic grayling provide excellent spring fisheries prior to and immediately after ice-out. However, they are readily available for harvest even during the warm summer months if anglers fish in deeper waters near bottom structure, i.e., submerged trees, etc. Most adults produced from fingerling stocking are harvested in the third year after stocking (Table 2). Recommended stocking densities are 50-100 fish per surface acre annually in a lake with medium angling pressure or when stocked in combination with another species in a relatively high use lake and 200 fish per surface acre annually when stocked in a single species high use lake.

Coho Salmon Fingerlings

Coho salmon fingerlings are normally stocked at 50-200 fish per surface acre. Stocking density depends on sport fishing effort and whether the lake is stocked with single or multiple species. Coho salmon fingerlings provide excellent winter fisheries. They are most often stocked in combination with rainbow trout which are more easily harvested by anglers during the summer months. Coho salmon can be readily harvested during the warm summer months by anglers fishing along drop-offs in waters 15 feet or deeper. Most of the fish produced from stocking fingerlings are harvested in the second year after stocking. Recommended stocking densities are 50-100 fish per surface acre annually in a lake with medium angling pressure or when stocked in combination with another species in a relatively high use lake and 200 fish per surface acre annually when stocked in a single species high use lake.

Arctic Char Fingerlings

Arctic char fingerlings are stocked at 100 fish per surface acre annually in five Matanuska-Susitna Valley lakes in combination with other stocked species. Arctic char fingerlings have been stocked for at least 3 years in three lakes. Reported angler catches have been variable. Irene Lake (a relatively fertile lake stocked since 1988) produces Arctic char to 5 pounds in the summer, but winter anglers have not been successful. Marion and Benka lakes (sterile lakes stocked since 1989 and 1990, respectively) produce catches year-round of fish to 16 inches. All five lakes should eventually provide good Arctic char fishing but it may require educating anglers in the proper fishing techniques. Most fish are harvested in the third year after stocking (Table 2).

Lake Trout Fingerlings

Lake trout fingerlings might be stocked at 50-200 fish per surface acre depending on sport fishing effort and whether the lake receives single or mixed-species stockings. Long Lake (Mi. 86 Glenn Highway) in Southcentral is currently the only lake stocked with lake trout fingerlings. Fingerlings were stocked at 100 fish per surface acre annually between 1988-1991. This lake is 95 ft deep and has an area of boulders and cobble for spawning. The lake has a relatively large population of longnose suckers (for food) and a small population of burbot. It is stocked with Arctic grayling fry and fingerlings and rainbow trout fingerlings (in 1993). The lake has the potential for very high use since it is adjacent to a major highway. Hundreds of tourists use the rest stop/picnic area located on the shore of the lake. Hopefully natural reproduction will occur

with the lake trout although it may require supplemental stocking to keep up with fishing pressure. Most fish are harvested in the third year after stocking (Table 2).

Arctic Grayling Fry

Arctic grayling fry are stocked at 1,000 fish per surface acre annually in two Matanuska-Susitna Valley stickleback-free lowland lakes along with Arctic grayling fingerlings at 200 fish per surface acre. These two single species lakes produce consistently good grayling catches and are only stocked with Arctic grayling because of low winter dissolved oxygen and past winterkills. Arctic grayling fry are stocked at 600 per surface acre in high elevation stickleback-free Long Lake (Mi. 86 Glenn Highway, see previous paragraph on lake trout fingerlings). Most fish are harvested in the third year after stocking (Table 2).

ESTIMATING ANGLER-DAY, CATCH, AND HARVEST COSTS

A responsible lake stocking program must monitor select parameters to determine success and cost effectiveness. Catch, harvest and effort for most of our lakes can be obtained from the annual Alaska Statewide Harvest Survey.

We have developed a method for estimating harvest costs. The first parameter needed is the cost of producing the fish which are stocked. Estimated hatchery costs are presented in Table 3. Most stocked fish are harvested over a period of years. Consequently, it is necessary to estimate

Table 3.-Estimated costs of Alaska hatcheries to produce fish for stocking into Alaska lakes.

Species and Life Stage	Size	Stocking Date(s)	Cost Each
Rainbow Trout Fingerlings[a]	1-2 g	July-Aug	$0.06
Rainbow Trout Catchables[a]	70-110 g	May-June	$1.50
Landlocked Coho Salmon Fingerlings[b]	3-6 g	May-June	$0.059
Landlocked Chinook Salmon Catchables[a]	70-110 g	October	$1.50
Arctic Grayling Fry[c]	0.02 g	May-June	$0.0015
Arctic Grayling Fingerlings[c]	3-5 g	Aug-Sept	$0.086
Arctic Grayling Catchables[c]	100 g	June	$2.54
Lake Trout Fingerlings[c]	4 g	June	$0.087
Arctic Char Fingerlings[c]	9 g	June	$0.184
Arctic Char Catchables[c]	60 g	Sept	$1.18
Arctic Char Catchables[c]	145 g	Sept	$2.86

[a] Fort Richardson Hatchery estimated costs for FY93

[b] Elmendorf Hatchery estimated costs for FY93.

[c] Clear Hatchery estimated costs for FY93.

the percentage of stocked fish harvested by year (Table 2). Combining the effort, harvest, and catch data with the cost data allows us to evaluate the costs associated with providing fishing effort, harvest and catch in Southcentral Alaska stocked lakes (Table 4).

Table 4.-Example of estimating cost per angler-day, fish harvested, and fish caught using Ravine Lake stocked rainbow trout.

		Number Which Produced		Angler		Rainbow Trout			
						Harvested		Caught	
Year	Number Stocked	Available Harvest[a]	Cost @ $0.06/RT[b]	Days	Cost/ Day[c]	Number	Cost[d]	Number	Cost[e]
1982	2,440								
1983	2,460								
1984	4,550								
1985	4,543								
1986	2,460	4,130	$247.82	153	$1.62	458	$0.54	no data	no data
1987	3,706	4,232	$253.90	246	$1.03	155	$1.64	no data	no data
1988	2,500	3,002	$180.09	0	0	no data	no data		
1989	2,500	3,440	$206.42	227	$0.91	617	$0.33	no data	no data
1990	2,500	2,679	$160.73	562	$0.29	952	$0.17	2,084	$0.08
1991	2,500	2,560	$153.62	188	$0.82	823	$0.19	865	$0.18
1992	2,460	2,500	$150.00	299	$0.50	285	$0.53	420	$0.36
		22,543	$1,352.58	1,675	$0.81	3,290	$0.41	3,369	$0.14

[a] Using 1986 as an example, the number of stocked fish which produced the fish available for harvest in 1986 is: 0.00 x the 1986 stocking + 0.10 x the 1985 stocking + 0.70 x the 1984 stocking + 0.15 x the 1983 stocking + 0.05 x the 1982 stocking.

[b] Cost to produce harvestable fish is $0.06 x the number of stocked fish which produced the fish available for harvest.

[c] Cost to produce harvestable fish/the number of angler days.

[d] Cost to produce harvestable fish/the harvest.

[e] Cost to produce harvestable fish/the catch.

PALMER MANAGEMENT AREA DATA

All fisheries programs need to collect and manage data associated with the program. The Palmer Management Area maintains a large lake stocking database.

STOCKING SUMMARY

Northern Cook Inlet Management Area 1993 lake stocking summary data are located in Appendix D1.

FTP LISTS

Northern Cook Inlet Management Area FTP number(s), species, and effective dates, by lake, are summarized in Appendix D2.

Northern Cook Inlet Management Area stocked lakes drainage system and estimated risk to wild fish populations are listed by lake in Appendix D3.

STATEWIDE HARVEST SURVEY DATA, 1986-1992, BY YEAR

Summary SWHS data is presented in Appendices E1 through E7.

STATEWIDE HARVEST SURVEY DATA, 1986-1992, AND ASSOCIATED ESTIMATED COSTS

Summary data are presented in Appendix F1.

MATANUSKA-SUSITNA VALLEYS STOCKED LAKE SERIES

The Matanuska-Susitna Valleys Stocked Lake Series contains detailed information for each lake stocked in the Matanuska-Susitna Valley. The information includes location, contour maps, directions to the public access, directions to the stocking access, a 1987-1993 stocking summary, a summary of effort, catch, and harvest, FTP numbers and effective dates, the most recent test net sampling results, and a paragraph with issues and recommendations for each lake. One example, Finger Lake, is presented in Appendix G1.

LITERATURE CITED

ADF&G (Alaska Department of Fish and Game). 1985. Genetic policy. Alaska Department of Fish and Game, Fisheries Rehabilitation Enhancement and Development Division, Juneau.

ADF&G (Alaska Department of Fish and Game). 1988. Regulation changes, policies and guidelines for Alaska fish and shellfish health and disease control. Alaska Department of Fish and Game, Fisheries Rehabilitation Enhancement and Development Division, Juneau.

Allin, R. W. and R. Baxter. 1957. Environmental studies of the rainbow trout of Alaska as related to their spawning habits, age, growth, fecundity, migration, and movements, Wasilla Lake. U.S. Fish and Wildlife Service. Federal Aid in Fish Restoration, Game Fish Investigations, 1956-1957, Project F-1-R-6, (6-1), Juneau.

Andrews, R. E. 1960. Creel census and population sampling of the sport fishes in the Cook Inlet and Copper River drainages. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1959-1960, Project F-5-R-1, 1 (2C), Juneau.

Andrews, R. E. 1961. Creel census and population sampling of the sport fishes in the Cook Inlet and Bristol Bay drainages. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1960-1961, Project F-5-R-2, 1 (2C), Juneau.

Alaska Fisheries Board and Alaska Department of Fisheries. 1958. Annual Report No. 10. Juneau.

LITERATURE CITED (Continued)

Bentz, R. W. 1982. Inventory and cataloging of the sport fish and sport fish waters in upper Cook Inlet. Alaska Department of Fish and Game. Federal Aid in Sport Fish Restoration, Annual Report of Progress, 1981-1982, Project F-9-15, 24 (G-I-D), Juneau.

Bentz, R. W., A. Havens, G. Sanders, and C. Skaugstad. 1991. Evaluation of fish stocking in Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 91-7, Anchorage.

Brock, I. R., P. Hansen, D. McBride and A. C. Havens. 1994. Culture and performance of triploid rainbow trout in Alaska. Pages 263-273 in R. E. McCabe and K. G. Wadsworth, editors. Transactions of the Fifty-ninth North American Wildlife and Natural Resources Conference. Wildlife Management Institute, Washington, D.C.

Burr, J. M. 1993. Evaluations of introduced lake trout in the Tanana drainage, and estimation of mortality using maximum age analysis. Alaska Department of Fish and Game, Fishery Data Series No. 93-27, Anchorage.

Cannon, R. L. 1974. Summer distribution and feeding behavior of threespine stickleback, *Gasterosteus aculeatus*, (Linnaeus) in Lower Jean Lake, Alaska, 1974. Master's thesis, Institute of Marine Science, University of Alaska, Fairbanks.

Chlupach, R. S. 1976. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1975-1976, Project F-9-8, 17 (G-III-D), Juneau.

Chlupach, R. S. 1977. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1976-1977, Project F-9-9, 18 (G-III-D), Juneau.

Chlupach, R. S. 1978. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1977-1978, Project F-9-10, 19 (G-III-D), Juneau.

Clark, J. H. 1991. Abundance, length, and age composition of sockeye salmon, Arctic char, and least cisco in pelagic waters of Harding Lake, Alaska, 1989-1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-4, Anchorage.

Doxey, M. R. 1986. Interior landlocked trout and salmon program. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1985-1986, Project F-10-1, 27 (T-8-1), Juneau.

Doxey, M. R. 1988. Evaluation of stocked waters in the Tanana drainage, 1987. Alaska Department of Fish and Game, Fishery Data Series No. 73, Juneau.

Doxey, M. R. 1989. Evaluation of stocked waters in the Tanana drainage, 1988. Alaska Department of Fish and Game, Fishery Data Series No. 106, Juneau.

Doxey, M. R. 1991a. Evaluation of rainbow trout and coho salmon stocking programs in Birch, Chena, and Quartz lakes, Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 91-66, Anchorage.

Doxey, M. R. 1991b. A history of fisheries assessments and stocking programs in Harding Lake, Alaska. Alaska Department of Fish and Game, Fishery Manuscript No. 91-2, Anchorage.

LITERATURE CITED (Continued)

Doxey, M. R. 1992. Abundance of rainbow trout in Birch and Quartz lakes, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-10, Anchorage.

Engel, L. E. 1968. Inventory and cataloging of the sport fish and sport fish waters in the Kenai-Cook Inlet-Prince William Sound areas. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1967-1968, Project F-5-R-9, 9, Juneau.

Engel, L. E. 1969. Inventory and cataloging of Kenai Peninsula, Cook Inlet and Prince William Sound drainages and fish stocks. Alaska Department of Fish and Game, Federal Aid in Fish Restoration, Annual Report of Progress, 1968-1969, Project F-9-1, 10, Juneau.

Engel, L. E. 1970. Evaluation of sport fish stocking on the Kenai Peninsula-Cook Inlet area. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1969-1970, Project F-9-2, (7-C-1), Juneau.

Engel, L. E. 1971. Evaluation of sport fish stocking on the Kenai Peninsula-Cook Inlet area. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1970-1971, Project F-9-3, 12 (G-II-F), Juneau.

Engel, L. E. 1972. Evaluation of sport fish stocking on the Kenai Peninsula-Cook Inlet area. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1971-1972, Project F-9-4, 13 (G-II-F), Juneau.

Engel, L. E. 1973. Inventory and cataloging of Kenai Peninsula, Cook Inlet, and Prince William Sound drainages and fish stocks. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1972-1973, Project F-9-5, 14 (G-1-C), Juneau.

Engel, L. E. 1974. Inventory, cataloging and population sampling of the sport fish and sport fish waters in Upper Cook Inlet. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1973-1974, Project F-9-6, 15 (G-1-D), Juneau.

Greenbank, J. and P. R. Nelson. 1959. Life history of the threespine stickleback, *Gasterosteus aculeatus*, (Linnaeus) in Karluk Lake and Bare Lake, Kodiak Island, Alaska. United States Department of the Interior, Fish and Wildlife Service. Fishery Bulletin 153, 59:537-559.

Hammarstrom, S. 1975. Inventory and cataloging of Kenai Peninsula, Cook Inlet, Prince William Sound, and fish stocks. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Performance, 1974-1975, Project F-9-7, 16 (G-1-C), Juneau.

Hammarstrom, S. 1977. Inventory and cataloging of Kenai Peninsula, and Cook Inlet drainages and fish stocks. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Performance, 1976-1977, Project F-9-9, 18 (G-1-C), Juneau.

Hammarstrom, S. 1981. Inventory and cataloging of Kenai Peninsula, and Cook Inlet drainages and fish stocks. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Performance, 1980-1981, Project F-9-13, 22 (G-1-C), Juneau.

Havens, A. C. 1979. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1978-1979, Project F-9-11, 20 (G-III-D), Juneau.

LITERATURE CITED (Continued)

Havens, A. C. 1980. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1979-1980, Project F-9-12, 21 (G-III-D), Juneau.

Havens, A. C. 1981. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1980-1981, Project F-9-13, 22 (G-III-D), Juneau.

Havens, A. C. 1982. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1981-1982, Project F-9-14, 23 (G-III-D), Juneau.

Havens, A. C. 1983. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1982-1983, Project F-9-15, 24 (G-III-D), Juneau.

Havens, A. C. 1984. Upper Cook Inlet population studies. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1983-1984, Project F-9-16, 25 (G-III-D), Juneau.

Havens, A. C. 1985. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1984-1985, Project F-9-17, 26 (G-III-D), Juneau.

Havens, A. C. 1986. Matanuska-Susitna lake enhancement evaluation. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1985-1986, Project F-9-18, 27 (T-3-2), Juneau.

Havens, A. C. 1987. Enhancement evaluation techniques for Arctic grayling in Alaska, 1986. Alaska Department of Fish and Game, Fishery Data Series No. 10, Juneau.

Havens, A. C. 1988. Evaluation of enhancement efforts for rainbow trout, coho salmon, and Arctic grayling in Southcentral Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 60, Juneau.

Havens, A. C. 1990. Evaluation of enhancement efforts for rainbow trout and coho salmon in Southcentral Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 90-56, Anchorage.

Havens, A. C. 1991. Evaluation of enhancement efforts for rainbow trout in Southcentral Alaska, 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-21, Anchorage.

Havens, A. C. and S. Sonnichsen. 1992. Evaluation of enhancement efforts for rainbow trout in Southcentral Alaska, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-37, Anchorage.

Havens, A. C. and S. Sonnichsen. 1993. Comparative performance of stocked diploid and triploid all-female rainbow trout in landlocked lakes, Southcentral Alaska, 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-34, Anchorage.

Havens, A. C, D. E. Sweet, C. L. Baer, and T. J. Bradley. *Unpublished.* Project #3: Investigation of threespine stickleback abundance in landlocked Matanuska-Susitna Valley lakes. Alaska Department of Fish and Game cooperative agreement with U.S. Fish and Wildlife Service. Located at: ADF&G, 1800 Glenn Highway, Suite 4, Palmer, Alaska.

LITERATURE CITED (Continued)

Havens, A. C., J. B. Murray, K. J. Delaney and K. J. Roth. 1987. Enhancement evaluation techniques for Arctic grayling (*Thymallus arcticus*) in Alaska, 1986. Alaska Department of Fish and Game, Fishery Data Series No. 10, Juneau.

Kalb, C. J. 1974. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1973-1974, Project F-9-6, 15 (G-III-D), Juneau.

Kalb, C. J. 1975. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1974-1975, Project F-9-7, 16 (G-III-D), Juneau.

Marriott, R. A. 1965. Inventory and cataloging of the sport fish and sport fish waters of southwest Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1964-1965, Project F-5-R-6, 6 (6-A), Juneau.

Marriott, R. A. 1967. Inventory and cataloging of the sport fish and sport fish waters of southwest Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1966-1967, Project F-5-R-8, 8 (6-A), Juneau.

Marriott, R. A. 1968. Inventory and cataloging of the sport fish and sport fish waters of southwest Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1967-1968, Project F-5-R-9, 9 (6-A), Juneau.

McGinnis, D. 1963. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1962-1963, Project F-5-R-4, 4 (10-A), Juneau.

McGinnis, D. 1964. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1963-1964, Project F-5-R-5, 5 (10-A), Juneau.

McGinnis, D. 1965. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1964-1965, Project F-5-R-6, 6 (11-A), Juneau.

McGinnis, D. 1966. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1965-1966, Project F-5-R-7, 7 (11A), Juneau.

Mills, M. J. 1982. Alaska statewide sport fish harvest studies (1981). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1981-1982, Project F-9-14, 23 (SW-I-A), Juneau.

Mills, M. J. 1983. Alaska statewide sport fish harvest studies (1982). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1982-1983, Project F-9-15, 24 (SW-I-A), Juneau.

Mills, M. J. 1984. Alaska statewide sport fish harvest studies (1983). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1983-1984, Project F-9-16, 25 (SW-I-A), Juneau.

LITERATURE CITED (Continued)

Mills, M. J. 1985. Alaska statewide sport fish harvest studies (1984). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1984-1985, Project F-9-17, 26 (SW-I-A), Juneau.

Mills, M. J. 1986. Alaska statewide sport fish harvest studies (1985). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1985-1986, Project F-10-1, 27 (RT-2), Juneau.

Mills, M. J. 1987. Alaska statewide sport fisheries harvest report. Alaska Department of Fish and Game, Fishery Data Series No. 2, Juneau.

Mills, M. J. 1988. Alaska statewide sport fisheries harvest report. Alaska Department of Fish and Game, Fishery Data Series No. 52, Juneau.

Mills, M. J. 1989. Alaska statewide sport fisheries harvest report. Alaska Department of Fish and Game, Fishery Data Series No. 122, Juneau.

Mills, M. J. 1990. Harvest and participation in Alaska sport fisheries during 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-44, Anchorage.

Mills, M. J. 1991. Harvest, catch, and participation in Alaska sport fisheries during 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-58, Anchorage.

Mills, M. J. 1992. Harvest, catch, and participation in Alaska sport fisheries during 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-40, Anchorage.

Mills, M. J. 1993. Harvest, catch, and participation in Alaska sport fisheries during 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-42, Anchorage.

Murray, J. B. 1982. Inventory and cataloging of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1981-1982, Project F-9-14, 23 (G-I-B), Juneau.

Murray, J. B. 1983. Inventory and research of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1982-1983, Project F-9-15, 24 (G-I-B), Juneau.

Murray, J. B. 1984. Kodiak area angler use and stock assessment studies. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1983-1984, Project F-9-16, 25 (G-I-B), Juneau.

Murray, J. B. 1985. Kodiak area angler use and stock assessment studies. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1984-1985, Project F-9-17, 26 (G-I-B), Juneau.

Murray, J. B. 1986. Evaluation of Kitoi rainbow trout vs. Swanson River rainbow trout. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1985-1986, Project F-9-18, 27 (T-4-2), Juneau.

Redick, R. R. 1967. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1966-1967, Project F-5-R-8, 8 (11A), Juneau.

LITERATURE CITED (Continued)

Redick, R. R. 1970. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1969-1970, Project F-9-2, 11 (11A), Juneau.

Redick, R. R. 1971. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1970-1971, Project F-9-3, 12 (G-I-D), Juneau.

Redick, R. R. 1972. Inventory, cataloging and population sampling of the sport fish and sport fish waters of the Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1971-1972, Project F-9-4, 13 (G-1-D), Juneau.

Ryder, R. A. 1965. A method of estimating the potential fish production of north-temperate lakes. Trans. Amer. Fish. Soc. 94 (3):214-218.

Schmidt, A. E. 1977. Inventory of high quality recreational fishing waters in southeast Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1976-1977, Project F-9-9, 18 (G-I-R), Juneau.

Sexsmith, J. C. 1964. Inventory and cataloging of the sport fish and sport fish waters of southwest Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1963-1964, Project F-5-R-5, 5 (5A), Juneau.

Skaugstad, C. L. 1988. Evaluation of Arctic grayling enhancement in Alaska during 1987. Alaska Department of Fish and Game. Fishery Data Series No. 48, Juneau.

Skaugstad, C. L. 1989. Evaluation of Arctic grayling enhancement: a cost per survivor estimate. Alaska Department of Fish and Game, Fishery Data Series No. 96, Juneau.

Skaugstad, C. L. 1993. Comparative catch per unit of effort of resident and stocked species of fish test netted in Harding Lake, 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-4, Anchorage.

Skaugstad, C. L. and J. H. Clark. 1991. Evaluation of the stocking of mixed species of game fish in small lakes. Alaska Department of Fish and Game, Fishery Data Series No. 91-60, Anchorage.

Van Hulle, F. D. 1970. Inventory and cataloging of the sport fish and sport fish waters of southwest Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1969-1970, Project F-9-2, 11 (6-A), Juneau.

Van Hulle, F. D. and J. B. Murray. 1972. Inventory and cataloging of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1971-1972, Project F-9-4, 13 (G-I-B), Juneau.

Van Hulle, F. D. and J. B. Murray. 1975. Inventory and cataloging of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1974-1975, Project F-9-7, 16 (G-I-B), Juneau.

Van Hulle, F. D. and J. B. Murray. 1976. Inventory and cataloging of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1975-1976, Project F-9-8, 17 (G-I-B), Juneau.

LITERATURE CITED (Continued)

Van Hulle, F. D. and J. B. Murray. 1977. Inventory and cataloging of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1976-1977, Project F-9-9, 18 (G-I-B), Juneau.

Van Hulle, F. D. and J. B. Murray. 1980. Inventory and cataloging of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1979-1980, Project F-9-12, 21 (G-I-B), Juneau.

Van Hulle, F. D. and J. B. Murray. 1981. Inventory and cataloging of sport fish and sport fish waters in southwestern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1980-1981, Project F-9-13, 22 (G-I-B), Juneau.

Van Wyhe, G. 1962. Inventory and cataloging of sport fish and sport fish waters of the Copper River and Prince William Sound drainages. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1961-1962, Project F-5-R-3, 3 (11A), Juneau.

Van Wyhe, G. 1963. Inventory and cataloging of the sport fish and sport fish waters of the Copper River and Prince William Sound drainages, Tyone River and Susitna River drainage above Oshetna. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1962-1963, Project F-5-R-4, 4 (11A), Juneau.

Viavant, T. R. 1992. Comparative abundance of resident and stocked species of fish in Harding Lake, Alaska, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-9, Anchorage.

Viavant, T. R. and J. H. Clark. 1991. Distribution and relative abundance of stocked species in Harding Lake, 1987-1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-21, Anchorage.

Watsjold, D. A. 1973. Population studies of game fish and evaluation of managed lakes in the upper Cook Inlet drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1972-1973, Project F-9-5, 14 (G-111-D), Juneau.

Watsjold, D. A. 1975. Inventory, cataloging, and population sampling of sport fish and sport fish waters in upper Cook Inlet. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Performance, 1974-1975, Project F-9-7, 16 (G-1-D), Juneau.

Watsjold, D. A. 1976. Inventory, cataloging, and population sampling of sport fish and sport fish waters in upper Cook Inlet. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Performance, 1975-1976, Project F-9-8, 17 (G-1-D), Juneau.

Watsjold, D. A. 1978. Inventory, cataloging, and population sampling of sport fish and sport fish waters in upper Cook Inlet. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Performance, 1977-1978, Project F-9-10, 19 (G-1-D), Juneau.

Watsjold, D. A. 1981. Inventory, cataloging, and population sampling of sport fish and sport fish waters in upper Cook Inlet. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Performance, 1980-1981, Project F-9-10, 22 (G-I-D), Juneau.

Williams, F. T. 1968. Inventory and cataloging of the sport fish and sport fish waters of the Copper River and Prince William Sound drainage, and the upper Susitna River. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1967-1968, Project F-5-R-9, 9 (14-A), Juneau.

LITERATURE CITED (Continued)

Williams, F. T. 1971. Inventory and cataloging of the sport fish and sport fish waters of the Copper River and Prince William Sound drainage, and the upper Susitna River drainage. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1970-1971, Project F-9-3, 12 (G-1-F), Juneau.

Williams, F. T. 1972. Inventory and cataloging of the sport fish and sport fish waters of the Copper River, Prince William Sound, and the upper Susitna River drainages. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1971-1972, Project F-9-4, 13 (G-1-F), Juneau.

Williams, F. T. 1974. Inventory and cataloging of the sport fish and sport fish waters of the Copper River, Prince William Sound, and the upper Susitna River drainages. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1973-1974, Project F-9-6, 15 (G-1-F), Juneau.

Williams, F. T. 1976. Inventory and cataloging of the sport fish and sport fish waters of the Copper River, Prince William Sound, and the upper Susitna River drainages. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1975-1976, Project F-9-8, 17 (G-1-F), Juneau.

Williams, F. T. and W. D. Potterville. 1981. Inventory and cataloging of the sport fish and sport fish waters of the Copper River, Prince William Sound, and the upper Susitna River drainages. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1980-1981, Project F-9-13, 22 (G-1-F), Juneau.

Williams, F. T. and W. D. Potterville. 1984. Glennallen/Prince William Sound angler use and stock assessment studies. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1983-1984, Project F-9-16, 25 (GIF), Juneau.

Williams, F. T. and W. D. Potterville. 1985. Glennallen/Prince William Sound angler use and stock assessment studies. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1984-1985, Project F-9-17, 26 (G-I-F), Juneau.

Williams, F. T. and W. D. Potterville. 1986. Glennallen lake and stream evaluations. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1985-1986, Project F-9-18, 27 (T-2-1), Juneau.

Woods, P. F. 1985. Limnology of nine small lakes, Matanuska-Susitna Borough, Alaska, and the survival and growth rates of rainbow trout. U.S. Geological Survey, Water-Resources Investigations Report 85-4292:1-32.

APPENDIX A. HANDOUT FOR INQUIRIES TO OBTAINING FISH FOR STOCKING

Appendix A1.-Handout for inquiries to obtaining fish for stocking.

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

SPORT FISH DIVISION

Alaska Administrative Code: Section 5, 41.060 prohibits the importation of any live fish into the state for purposes of stocking or rearing in the waters of the state.

Alaska Administrative Code: Section 5, 75.055 prohibits the possession, transport, and release of live fish or live fish eggs without a permit issued by the Commissioner of Fish and Game under 5 AAC 41 or AS 16.05.930 (a).

Alaska Department of Fish and Game hatcheries DO NOT produce fish for sale.

General criteria for including a lake in the non-anadromous stocking program. The process involved to determine whether a lake meets criteria 1-4 may take anywhere from a few weeks to a few years, depending on lake location, public approval, FTP approval, and available funding. Criteria 5, producing fish for stocking, if funding is available, could take up to 4 years:

(1) **LAKE SURVEY REQUIRED.**

(a) **LAKE MUST BE ABLE TO SUPPORT SPORT FISH YEAR-ROUND.**

Comments: The limiting factor is usually insufficient dissolved oxygen during winter ice-cover. Dissolved oxygen sampling in late February or early March may be required to determine winter oxygen levels. A shallow lake might preclude stocking Arctic char which require fairly deep water. Presence of a fish prey species such as stickleback might be necessary for Arctic char to attain a size acceptable to sport anglers.

(b) **NO WILD SPORT FISH POPULATIONS PRESENT.**

Comments: This is not an absolute but normally ADF&G is trying to attract anglers to "new" lakes where there were no fish prior to stocking. Exceptions may be where a limited population of Arctic char exists in a landlocked lake or a limited population of naturally reproducing rainbow trout exists in a lake. There may not be adequate numbers of natural (wild) fish to attract anglers due to limited reproduction so the lake could be stocked with the same or another sport fish species. A lake survey using gillnets, fyke nets, and minnow traps often will be required to determine presence and relative abundance of fish stocks.

(2) **YEAR-ROUND LEGAL PUBLIC ACCESS.**

Comments: If there is legal public access, i.e., a section line, other dedicated right-of-way (ROW), or the lake is adequate for a float/ski plane, it still may not provide physical access sufficient to draw many anglers (for example, an uncleared section line or dedicated ROW, no available parking, or a remote fly-in lake with limited access or no land that may be used by the public for camping). Sport Fish Division access personnel may have to contract for a land/trail survey and work out a legal access agreement with local, state, or federal government agencies.

(3) **PUBLIC REVIEW PROCESS TO AMEND THE STATEWIDE STOCKING PLAN.**

Comments: Amending the stocking plan requires a public review process (outside the time frame of a statewide 4-year or 5-year stocking plan update). This consists of issuing a press release requesting comment plus any public and/or agency notification regarding a proposed site. If there is no significant issue raised, the plan can then be amended. If there is significant objection it may trigger a more formal public review to conform to National Environmental Protection Act requirements before the issue can be resolved and the plan amended.

(4) **ISSUANCE OF A FISH TRANSPORT PERMIT (FTP) BY THE COMMISSIONER OF FISH AND GAME (5 AAC 41.005)**

Comments: An FTP generally limits the stocking of rainbow trout, Arctic grayling, Arctic char, coho and chinook salmon fingerlings to landlocked lakes with no inlets or outlets. This eliminates potential genetic mixing of planted fish with wild stocks. If a lake has an active or potential connection to an anadromous system, an FTP may be issued if local stocks of fish or sterilized hatchery fish will be planted.

(5) **FISH AVAILABLE FROM HATCHERIES EXCESS TO THE NEEDS OF CURRENTLY APPROVED STOCKING PROGRAMS.**

Comments: In most cases, if the above criteria are met, a "new" landlocked lake could be stocked with rainbow trout or Arctic grayling fingerlings within a year. However, this process might require a 2-4 year lead time in order to obtain sufficient eggs and resulting fingerlings for additional stockings.

APPENDIX B. INSTRUCTIONS FOR LAKE SAMPLING

Appendix B1.-Instructions for conducting a lake survey.

Always contact Fish and Wildlife Protection and let them know which lake(s) will be netted, by date.

EQUIPMENT: boat, outboard motor, recording fathometer, extra roll of recording paper, 12 volt battery, water sample bottle, fish collection bottle (filled with 10% formaldehyde solution), copies of lake outline from aerial photo or U. S. Geological Survey (USGS) map, write-in-rain book for recording information, and minnow traps, fyke nets, and gillnets (hoop traps can be tried as a non-lethal method for sampling species). The best results for live trapping trout, salmon, and grayling of all sizes will be in the spring or fall when surface water temperatures are below 50^{o} F.

Recommendations for sampling traps and nets (ordering specifications are attached).

Minnow Traps: Set 15 minnow traps/shoreline mile (1/8 in mesh baited with salmon eggs). These small-mesh traps will catch rainbow trout, coho and chinook salmon fry and fingerlings stickleback, cottids (sculpins), and many invertebrates. Minnow traps will seldom catch sockeye salmon, grayling, Arctic char, pike, or longnose sucker fry or fingerlings in lakes.

Fyke Nets: Set 5 fyke nets/shoreline mile (3/16 in mesh baited with salmon eggs). Fyke nets are set parallel to the shoreline in a random manner to obtain abundance estimates. If abundance estimates aren't necessary fyke nets can be set near beaver houses, in dense vegetation, behind fallen trees, and near obvious shoreline irregularities to maximize catches. Fyke nets will capture trout, salmon, grayling, pike, and occasionally Arctic char/Dolly Varden fry, fingerlings, and adults, as well as stickleback, cottids, longnose suckers, and many invertebrates.

Gillnets: Unlike other sampling gear, gillnets kill fish. Set one gillnet/5 miles of shoreline (1/2, 5/8, 3/4, 1, 1 1/2, and 2 inch mesh panels). Gillnets will capture fingerlings and adults of all fish species except burbot (which are occasionally caught), stickleback, and cottids. Gillnets may offer the only chance to catch Arctic char and the larger members of other sport fish species. This is important when surveying a "new" lake and you need to determine the kinds and sizes of fish present. It is also important during the warm water summer months. In a small lake with 10 or less miles of shoreline, set one gillnet at a location where the lake depth drops off rapidly (small mesh end to shore) and a second gillnet offshore near the deepest part of the lake. In a larger lake more than one gillnet may be set offshore.

Hoop Nets: Hoop nets (usually 3/4 in mesh or larger baited with bait herring or salmon eggs) are set in deeper portions of a lake at one/5 surface acres, especially if Arctic char or burbot populations are suspected.

INITIAL PREPARATION: An outline of the lake with scale (e.g., 1 in = ? ft.) is needed. The preferred source is an aerial photo with a known scale (USGS maps will give a gross outline). A scale can be determined by measuring obvious structures on the aerial photo (i.e., guard rails, roads, buildings, between prominent lake shoreline irregularities) and applying that measurement to the lake. Several copies of the lake outline are needed; one to mark the exact runs made with the recording fathometer, one to mark locations of nets and traps, and spares.

SETTING NETS & TRAPS: Upon arriving at the lake, the minnow traps, fyke nets and gillnets are set. The minnow traps are baited with salmon eggs and set around the lake shoreline. Numbered flagging should be used for ease in locating. The fyke nets are baited with salmon eggs and set along the shoreline in areas of potential fish habitat. One gillnet is set in shallow water and the other in deep water to sample all areas of fish habitat. A few fathometer sounding runs across the lake may be necessary to determine deeper areas. Hoop nets are set in deep water. Minnow trap and net locations should be marked on a map. The map should be included in the lake file. Soak time for traps and nets should be at least 20 hours.

PULLING NETS & TRAPS: The numbers and kinds of fish and invertebrates captured should be recorded for each minnow trap. Stickleback are normally not measured. Stickleback numbers are recorded and a sample is placed in formaldehyde solution for later analysis of species, size, and morphological characteristics. Lengths (and weights if feasible) of fish caught in the gillnets and fyke nets are recorded. Fish caught in the gillnets are entered on the Gillnet Sampling Record. A summary of the lengths and species are recorded on the Test Net Evaluation Record form which becomes part of the lake file.

OPERATION OF THE RECORDING FATHOMETER: A fully charged 12 volt battery is required for operation of the Raytheon Survey Fathometer (Model # 0000 is used by the Palmer staff). Set the recorder on the seat of the boat and prop at an angle with the built-in support. Plug the transducer cable into the appropriate receptacle in the back of the recorder chassis. Plug the battery cable into the D. C. Power 12 volt receptacle. Make sure the OFF/STANDBY/ON control is in the off position. Connect the battery clips to the 12 volt battery, observing the correct polarity. The transducer must be in water to give correct readings. Initially the FEET switch should be set at 0-55 (the FEET control will need to be adjusted if depths go beyond 55 ft) and the CHART SPEED at 4. The OFF/STANDBY/ON control when switched to on applies power to the recorder. The SENSITIVITY control is set by turning the control slowly clockwise until the bottom echo appears. Continue advancing the control until there is no change in the depth indication. Read the upper edge of the recording for the proper depth reading. Always have extra chart paper along. The recorder should now be ready for operation.

Two people are required for mapping the contours of the lake, one to operate the boat and one to operate the recorder. Normally, one or two long runs are made (depending on the size of the lake) down the center of the lake. The beginning and ending points must be numbered on the lake map (e.g., Run 1-2). The boat operator MUST keep the boat at a steady speed. At the beginning of a run, the FIX MARK control is switched on and off. This makes a straight line on the chart paper, indicating the beginning of a run. At the end of the run switch the FIX MARK control again to indicate the end of the run. The run on the chart paper should be numbered corresponding to the numbered runs on the lake map. The initial long runs down the middle of the lake will give an indication of the lake depth. Shorter runs should then be done parallel to each other and perpendicular to the initial middle run. The short runs should advance along the lake shoreline from one end of the lake to the other for a representation of the contours of the lake.

DRAWING THE CONTOUR MAP: Remove the chart paper from the recorder. Locate and mark the depths in 5 ft increments for each run. Beginning with the first run, measure (to the nearest 1/16 in) the length of the run on the chart paper and the corresponding run on the lake map. Divide the lake map measurement by the chart measurement to obtain the ratio of the run.

Lake Map Measurement/Chart Measurement=Run Ratio

Measure from the beginning of the run on the chart paper to the first 5 ft depth. Then multiply the measurement by the Run Ratio to get the corresponding measurement on the lake map for the first 5 ft depth. Do this for each 5 ft depth change on the chart paper run. A new Run Ratio will need to be computed for each separate run.

After all the measurements for the depths of each run have been computed, they must be transcribed onto the lake map. Now it is a matter of connecting the dots of each corresponding 5 ft depth to draw in the contours of the lake.

CALCULATING SHORELINE LENGTH, SURFACE ACRES, VOLUME, MEAN DEPTH, SHORELINE DEVELOPMENT:

SHORELINE LENGTH: Using a Map Measure, measure around the shoreline of the lake map three times, taking the average and multiplying it by the map scale. Divide the total length in feet by 5,280 to obtain the shoreline length in miles.

SURFACE ACRES: To determine the surface acres (area) of a lake requires the use of an instrument called a polar planimeter.

a) Set the tracer arm setting at 155.1.

b) Spread the lake map on a hard, flat surface securing the corners with tape. Place the magnifying tracer in the approximate center of the lake and move the pole weight to a position where the angle between the pole arm and tracer arm form an approximate right angle. Be sure the magnifying tracer can circumscribe the area. If it does not, move the pole weight until this can be accomplished.

c) Secure the pole weight in a piece of cardboard taped to the table. Pick out and mark a starting point on the lake shoreline. Set the measuring wheel and dial to read zero. Beginning at the starting point, carefully trace the shoreline in a clockwise direction to the point of beginning, always keeping the index mark of the magnifying Tracer on the shoreline line.

d) Read the dial and record the measurement. Repeat the tracing three times, dividing the measurement by three to obtain the average reading.

e) Multiply the average reading by .016.

f) Next determine the factor by squaring the map scale and dividing by 43,560 [Factor = (map scale)^2/43,560]

g) Now multiply the Factor by the answer from step (e). This answer will be the Surface Acres of the lake. Round the answer to the nearest tenth.

VOLUME: The volume can be determined by computing the volume of each horizontal stratum (in our case between each 5 ft contour) and taking the sum of the volumes of the strata for total volume of the lake.

Procedure:

a) Using the polar planimeter repeat the above procedure for determining surface acres for each 5 ft contour. Make three clockwise tracings around each contour. Take the average of the three and multiply by .016. Then multiply by the factor.

b) Volume = h/3[a^1 + a^2 + square root of (a^1)*(a^2)] in which h is the vertical depth of each stratum (depth between contours, in most of our cases 5 ft) and a^1 is the area of upper surface and $a^2$is area of the lower surface of stratum whose volume is to be determined.

EXAMPLE

Factor: Map Scale 1 in=377 ft so Factor=(377*377)/43,560=3.3

Planimeter Readings 0 ft or Shoreline:

0 ft =632,642,648 Ave.=641 (641*.016)=10.26 (10.26*3.3)=33.9 so there are 33.9 Surface Acres

0-5 ft

5/3[33.9+19.6+square root of (33.9*19.6)]=134.7

Planimeter Readings for 5 ft Contour:

5 ft =372,371,370 Ave.=371 (371*.016)=5.94 (5.94*3.3)=19.6

5-10 ft

5/3[19.6+8.5+square root of (19.6*8.5)]=69.7

Planimeter Readings for 10 ft Contour:

10 ft =159,165,160 Ave.=161 (161*.016)=2.58 (2.58*3.3)=8.5

10-15 ft

5/3[8.5+3.9+square root of (8.5*3.9)=30.8

Planimeter Readings for 15 ft Contour:

15 ft =78,71,71 Ave.=73 (73*.016)=1.17 (1.17*3.3)=3.9

So VOLUME = 134.7 +69.7 +30.8 = 235.2 ACRE FT.

MEAN DEPTH: = Volume/Surface Acres

In the above example Mean Depth = 235.2/33.9 = 6.9 ft

SHORELINE DEVELOPMENT: Shoreline development is the degree of regularity or irregularity of shoreline and is expressible in the form of an index figure. A lake with a shoreline closely resembling a circle will have an index figure close to 1.0. As the value of the index increases beyond 1.0, increasing irregularity is indicated.

S.D. = Shoreline Length/2*(square root of Surface Area*pi) in which Surface Length is expressed in feet and Surface Area in square feet. There are 43,560 square ft. in an acre.

In the above example assume the shoreline length is 6,598 ft

Surface Area in Square Ft.= 33.9*43,560 = 1,476,684 so

S.D. = 6,598/2[square root of (1,476,684*3.14)] = 1.5

WATER ANALYSIS: A water sample is collected from just below the lake surface. It is important to conduct the analysis promptly, although the water sample may be refrigerated for a day. A HACH PORTABLE WATER TEST KIT is used for measuring pH, hardness and alkalinity. Using fresh chemicals and following the procedures outlined in the test kit booklet should provide adequate results. A HACH CONDUCTIVITY METER is used for measuring conductivity. The results are recorded on a Water Analysis form to be kept in the lake file.

DETERMINATION OF DISSOLVED OXYGEN

Procedure 1

Equipment: Kemmerer Sampler, narrow neck ground-glass stoppered bottles with 300 ml capacity, Manganous Sulfate Powder Pillows, Alkaline Iodide-Azide Reagent Powder Pillows, Sulfamic Acid Powder Pillows, HACH Digital Titrator, 0.2000N Sodium Thiosulfate Titration Cartridge, starch indicator solution.

Field Procedure:

1. Lower sampler to desired depth. Send messenger down rope to close sampler.

2. Raise sampler and fill oxygen bottle keeping rubber tube at bottom of bottle. While filling, allow about twice the volume of the bottle to overflow. Be sure bottle is full to brim. This ensures there are no air bubbles trapped in the bottle.
3. Add the contents of one Manganous Sulfate Powder Pillow and one Alkaline Iodide-Azide Reagent Powder Pillow. Carefully insert the stopper so that no air is trapped in the bottle. Pour any excess water off the bottle rim and invert several times to mix. A flocculent precipitate will form which will be brownish-orange if dissolved oxygen is present or white if oxygen is absent.
4. Allow the sample to stand until the floc has settled, leaving the top half of the solution clear. Mix the bottle again, to ensure reaction of the chemicals with all of the dissolved oxygen present.
5. After the floc has settled the second time, remove the stopper and add the contents of one Sulfamic Acid Powder Pillow. Replace the stopper, being careful not to trap any air bubbles in the bottle and invert several times to mix. The floc will dissolve and leave a yellow color if dissolved oxygen is present.
6. Make sure each bottle is properly labeled with name of lake and depth of water sample.

Lab Procedure:

1. Follow the procedure outlined in the HACH Digital Titrator Methods Manual for dissolved oxygen analysis, using the Digital Titrator, a 0.2000N Sodium Thiosulfate Titration Cartridge and starch indicator solution. Water samples may be kept refrigerated for a day before conducting lab procedure.

Procedure 2

Equipment: Numerous dissolved oxygen meters are on the market. These meters mechanically measure dissolved oxygen and greatly simplify measuring this parameter.

Field Procedure: Follow instructions in the operation manual of the meter.

Appendix B2.-Instructions for use of Alaska Department of Fish and Game Lake Survey Summary Form FG-206 (2/69).

LAKE: Use (1) name recorded on USGS maps, (2) name used by lakeshore or nearby landowner, or (3) name the lake according to shape, size, location, etc. and register the name officially with USGS.

MAP REF: refers to USGS map (e.g., Finger Lake is located on Anch. C-7)

T: Township, R: Range, and S: Section are found on the USGS Map (e.g., Finger Lake: T:18N, R:1E, S:33); LAT: Latitude, and LONG: Longitude are found on the USGS Map (e.g., Finger Lake: 61°36'25"N, 149°16'30"W)

LOC: Location (e.g., Finger Lake Loc: Palmer off Bogard Rd.)

SURF ELEV: Surface Elevation found on USGS Map

1. SURF ACRES: Surface Acres, MAX DEPTH: Maximum Depth, AVG DEPTH: Average Depth, and ACRE FT: Acre Feet (all the above are determined from mapping the lake). SHOAL AREA, WATER COLOR, SECCHI READING, and AQUATIC VEGETATION are self explanatory (secchi readings have not been done in many of our surveys).

2. FISH SPECIES: NATIVE: Determined from gillnet, fyke net and minnow trapping, any species originally in the lake. INTRODUCED: any species stocked, not native.

3. FISHING HISTORY: previous record of sport fishing from lake files, SWHS data, local residents, personal knowledge.

4. INVERTEBRATES: dragonfly nymphs, leeches, beetles, freshwater shrimp, etc. caught in minnow traps and nets.

5. INLETS: any water flow into lake, list the source of the stream if known (e.g., swamps), DISCHARGE: cubic feet per second of water flow for inlet, rarely determined in our surveys, and BARRIERS: any blockages in inlet streams (e.g., beaver dams).

6. OUTLETS: any water flow out of lake, list the drainage and stream flows into if known, DISCHARGE: cubic feet per second of water flow for outlet, rarely determined in our surveys, and BARRIERS: any blockages in outlet streams (e.g., beaver dams).

7. SPAWNING AREAS: specify if any area of lake, inlet or outlet stream is suitable for spawning, with regard to specific species of fish.

8. WATERSHED TYPE: type of forest (e.g., birch), and topography, and DRAINAGE AREA: acres drained are rarely determined in our surveys.

9. ACCESSIBILITY: directions for access to lake, i.e., road accessible, foot trail 1/4 mile from vehicle parking area, float-plane only (in summer) but ski-plane, snow machine, or 4-wheeler access in winter).

10. ACCESS STATUS: type of public access available (see portion on access in Lake Stocking Manual narrative). or only private access.

11. USE SITE: list if there are cabins or homes on lake, and FACILITIES: any private, or government agency campgrounds, boat launches, etc.

12. OTHER USE: swimming, water skiing, irrigation, etc.

13. POLLUTION: any pollution if known.

14. REMARKS: list anything else worth noting, not covered in the above information.

BY: name of person conducting survey, and DATE: date of survey.

Appendix B3.-Instructions for use of Alaska Department of Fish and Game test net evaluation record.

LAKE: name of lake

LOCATION: general location of lake

Year: date lake is netted

Species: species of fish caught

Age Class: age classes for each species caught

No.: number of fish caught for each species age class

Ln. Range in mm: length range in millimeters for each species age class

Avg.: average length for each species age class

Wt. Range in grams: weight range for each species age class (fish weights are rarely taken)

Avg.: average weight for each species age class

Stocking History: obtained from the stocking records includes for each species age class the number stocked, average weight in grams, and date stocked

Total Net Hrs: combined soak time of all the nets

Catch/Net Hrs: number caught of each species age class divided by total net hours

% Catch: percent for each species age class of the total catch

Appendix B4.-Instructions for use of Alaska Department of Fish and Game Water Analysis Record Form FG-208 (2/69).

Water: name of lake

Location: general location of lake

Date: date lake is netted

Station: location of sample taken

Time: time sample was taken

Snow Cover: average snow depth on lake

Ice Cover: ice depth at sample location

Sample Depth: depth at which sample was taken

Temperature (Air): air temperature at time sample was taken

Temperature (Water): surface temperature at time sample was taken

DO: dissolved oxygen reading in ppm

CO_2: carbon dioxide reading in ppm (not usually taken)

pH: pH reading

Total Alkali: alkalinity reading in mg/l

Remarks: ADD THE FOLLOWING READINGS

Hardness: hardness reading in mg/l

Specific Conductance: specific conductance reading in mg/l

By: name or initials of sampler(s)

Appendix B5.-Instructions for use of Alaska Department of Fish and Game sport fish stocking record.

Lake: name of lake

Location: general location of lake

Date: date lake is stocked

Species: species of fish stocked and treatment, i.e., Triploid, All-Female, Triploid All-Female, etc.

Stocking Weight: average weight, in grams, of fish stocked

Number: number of fish stocked

Surface Temperature: lake surface temperature at time of stocking

Fish Strain Stocked: strain stocked, i.e., Swanson River (rainbow trout)

Releasing Hatchery: Hatchery, i.e., Ft. Richardson, Elmendorf, Clear, etc.

Comments: any comments that might give insight to survival of this stocking, i.e., "approximately 100 mortalities in hatchery truck tank, or counted 25 mortalities at release, or water at 72^{o} was extremely warm and fingerlings appeared stressed," etc.

Appendix B6.-Recommended number of fyke nets for sampling the Palmer management area.

				Number of Fyke Nets			
Number	Lake	Surface Acres	Shoreline Miles	1 Per 5 Surface acres	5 Per Shoreline Mile	Difference	Recommended
1	Barley	18.6	0.8	4	4	0	4
2	Bear Paw	45.0	1.1	9	6	3	6
3	Bench L(Glenn Hwy)	34.0	1.1	7	6	1	6
4	Benka	123.0	3.6	25	18	7	18
5	Beverly	42.0	1.3	8	7	2	7
6	Big Beaver	161.0	2.4	32	12	20	12
7	Big	2894.0	26.0	579	130	449	130
8	Big No Luck	67.9	2.0	14	10	4	10
9	Blodgett	57.6	1.6	12	8	3	8
10	Bruce	20.9	0.9	4	5	0	5
11	B-J	18.3	1.0	4	5	1	5
12	Canoe	21.2	1.1	4	6	1	6
13	Carpenter	176.4	3.8	35	19	16	19
14	Christiansen	179.0	4.6	36	23	13	23
15	Coyote	1.0	0.2	0	1	1	2
16	Crystal	131.7	2.8	26	14	12	14
17	Dawn	11.6	0.6	2	3	1	4
18	Diamond	139.0	2.7	28	14	14	14
19	Dollar	5.8	0.4	1	2	1	3
20	East Twin	41.1	1.6	8	8	0	8
21	Echo	23.0	0.9	5	5	0	5
22	Eklutna	3550.0	15.0	710	75	635	75
23	Eska (Slipper)	9.1	0.6	2	3	1	4
24	Farmer	21.0	0.8	4	4	0	4
25	Finger	362.0	7.8	72	39	33	39
26	Florence	54.6	1.6	11	8	3	8
27	Homestead	17.0	0.8	3	4	1	4
28	Honeybee	58.0	2.3	12	12	0	12
29	Ida	46.4	2.7	9	14	4	14
30	Irene	18.0	0.9	4	5	1	5
31	Johnson	40.3	1.1	8	6	3	6
32	Kalmback	125.0	2.3	25	12	14	12
33	Kashwitna	160.0	2.7	32	14	19	14
34	Kepler-Bradley	58.0	2.7	12	14	2	14
35	Klaire	9.0	1.0	2	3	1	4
36	Knik	50.4	1.5	10	8	3	8
37	Lalen	91.9	1.5	18	8	11	8
38	Lazy	22.5	1.2	5	6	2	6
39	Little Lonely	56.0	1.8	11	9	2	9
40	Little No Luck	34.1	0.9	7	5	2	5
41	Loberg (Junction)	10.9	0.6	2	3	1	4
42	Long (Big Lake)	44.4	1.4	9	7	2	7
43	Long (Kepler/Bradley)	74.4	2.4	15	12	23	12
44	Long (Glenn Hwy Mi 86)	106.0	3.0	21	15	6	15
45	Loon	108.0	1.9	22	10	12	10
46	Lorraine	132.0	2.3	26	12	15	12
47	Lower Bonnie	99.8	2.5	20	13	7	13

-continued-

Appendix B6.-Page 2 of 2.

Number	Lake	Surface Acres	Shoreline Miles	Number of Fyke Nets: 1 Per 5 Surface acres	5 Per Shoreline Mile	Difference	Recommended
48	Lucille	362.0	4.3	72	22	51	22
49	Lynda	11.2	0.6	2	3	1	4
50	Lynne	70.0	1.9	14	10	5	10
51	Marion	113.0	2.7	23	14	9	14
52	Matanuska	61.5	1.6	12	8	4	8
53	Meirs	16.8	0.6	3	3	0	4
54	Memory	83.0	2.2	17	11	6	11
55	Mile 180 Parks Hwy	15.0	1.4	3	7	4	7
56	Morvro	86.6	1.8	17	9	8	9
57	North Friend	81.4	2.7	16	14	3	14
58	Prator	98.0	1.5	20	8	12	8
59	Ravine	12.3	0.8	2	4	2	4
60	Reed	19.5	0.9	4	5	1	5
61	Rocky	58.7	1.4	12	7	5	7
62	Ruby	24.0	1.0	5	5	0	5
63	Seventeenmile	100.0	3.4	20	17	3	17
64	Seymour	229.0	3.1	46	16	30	16
65	South Friend	55.7	1.6	11	8	3	8
66	South Rolly	107.7	2.3	22	12	10	12
67	Stepan	59.9	1.9	12	10	2	10
68	Tigger	18.9	0.9	4	5	1	5
69	Twin Island	151.0	3.1	30	16	15	16
70	Twin	62.5	2.3	13	12	1	12
71	Vera	110.5	2.8	22	14	8	14
72	Victor	13.5	0.6	3	3	0	4
73	Visnaw	130.7	2.3	26	11	15	11
74	Walby	53.9	1.4	11	7	4	7
75	Weiner	20.7	1.0	4	5	1	5
76	West Beaver	118.0	1.8	24	9	14	9
77	West Sunshine	22.3	0.9	4	5	0	5
78	Willow	143.4	2.2	29	11	18	11
79	Wishbone	52.7	1.6	11	8	3	8
80	Wolf	62.0	1.7	12	9	4	9
81	X	101.4	3.2	20	16	4	16
82	Y	39.7	2.0	8	10	2	10

APPENDIX C. SAMPLING GEAR SPECIFICATIONS

Appendix C1.-Gillnet ordering specifications.

PURCHASE REQUISITION

GENERAL SERVICES & SUPPLY

SHIPPING ADDRESS:

☐ ROOM 113 MACKAY BUILDING 338 DENALI STREET ANCHORAGE 99501

☐ 7th FLOOR STATE OFFICE BLDG POUCH C JMS 02101 JUNEAU 99811

INSTRUCTIONS: FILL IN FORM BY TYPEWRITER. DOUBLE SPACE ENTRIES BETWEEN ITEMS. USE CONTINUATION SHEET 02-099A IF NEEDED.

DEPT. NO. | REQ. NO | PR-

SHIP TO

DEPARTMENT: FISH AND GAME

DATE DELIVERY REQUIRED: MAY 1, 1985

DATE OF PR:

DIVISION: SPORT FISH

F.O.B. POINT: PALMER

ADDRESS: PALMER, AK 99645

THIS SECTION FOR USE OF GENERAL SERVICES & SUPPLY ONLY

BID/CONTRACT NO. | DATED | ORDER NO.

ATTN: ALAN C. HAVENS

PHONE NO. (907) 745-5016

SHIPPING INSTRUCTIONS:

NOTIFY OFFICE OF SHIPPING DATE

ITEM NO.	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
	4	ea.	GILL NET, variable mesh: 120'x6' monafilament consisting of six 20' hung panels of the following mesh and strand sizes = 1/2" 0.20 mm diameter, 5/8" 0.20 mm diameter, 3/4" 0.25 mm diameter, 1" 0.30 mm diameter, 1-1/2" 0.30 mm diameter, and 2" 0.30 mm diameter. All mesh size square measure. NET HUNG TO SINK with green 3/8" leadcore line (approximately 30 lbs. per 100 fathom) and green polycore float line. COLOR: Green PANEL #1 One web - 1/2" bar mesh, approximately 50' s.m., D/S - 2/S hung approximately 10 meshes on each 5" both float and leadline, approximately 90 meshes deep. Total hung length 20 feet. PANEL #2 One web - 5/8" bar mesh, approximately 50' s.m., D/S - 2/S hung 8 meshes on each 5" - both floatline and leadline, approximately 73 meshes deep. Total hung length 20 feet. PANEL #3 One web - 3/4" bar mesh, approximately 50' s.m., D/S - 2/S hung 7 meshes on 5-1/4" both floatline and leadline, approximately 60 meshes deep. Total hung length 20 feet.		
				TOTAL ALL PAGES	$
				NOT TO EXCEED	$

CODE ENCUMBRANCE (AGENCY SHALL COMPLETE)

TRAN	DEPT.	PROG.	DIV.	ACCT.	OBJECT	ACTIV.	PROJECT	PER CENT/ITEM NO.
250	11	40	4					
250								
250								
250								
250								
250								
250								

NOTE: IF CODING EXCEEDS SIX LINES, USE FORM 02-028 INSTEAD

PAGE NO. 1 OF 2 PAGES

SUGGESTED VENDORS

EAST SIDE NET SHOP

14207 100th NE

BOTHELL, WA 98011

I HEREBY CERTIFY THAT THE UNENCUMBERED BALANCE IN THE APPROPRIATION CITED HEREON IS SUFFICIENT TO COVER THIS PURCHASE AND THAT THIS PURCHASE IS AUTHORIZED HEREUNDER.

REQUISITIONED BY

DIVISIONAL APPROVAL

CERTIFYING OFFICER (PRINT AND SIGN)

DATE

02-099 (10/78) REV

Appendix C1.-Page 2 of 2.

PURCHASE REQUISITION
CONTINUATION

PAGE 2 OF 2 PAGES	DEPT. NO	REQ. NO	SV
	PR-		

ITEM NO.	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
			PANEL #4 One web - 1" bar measure approximately 50' s.m., D/S - 2/S hung 5 meshes on each 5", both floatline and leadline, approximately 45 meshes deep. Total hung length 20 feet. PANEL #5 One web - 1-1/2" bar mesh, approximately 50' s.m. D/S - 2/S hung 3 meshes on 4-1/2", both floatline and leadline, approximately 32 meshes deep. Total hung length 20 feet. PANEL #6 One web - 2" bar mesh, approximately 50' s.m., D/S - 2/S hung approximately 3 meshes on each 6", both floatline and leadline, approximately 22 meshes deep. Total hung length 20 feet.		

FORM 02-0594-1(10.78) REV.

Appendix C2.-Fyke net ordering specifications.

PURCHASE REQUISITION

STATE OF ALASKA
DEPARTMENT OF ADMINISTRATION, DIVISION OF GENERAL SERVICES & SUPPLY

TO: ☐ 333 Willoughby Ave., 7th Floor, Pouch C (MS-0210), Juneau, AK 99811 ☐ 3601 C St., Suite 778, Anchorage, AK 99503-5925

PURCHASE REQUISITION NUMBER: DEPT | REQUISITION — PR-

SHIP TO: Alaska Department of Fish and Game
500 South Alaska Street
Suite B
Palmer, AK 99645
ATTN: Sport Fish Division

DATE DELIVERY REQUIRED AT DESTINATION: 31 August 1989
DATE OF PURCHASE REQUISITION: June 1989
F.O.B. POINT: Palmer, AK
DATE P.R. SENT TO GSS:
ASSIGNED TO: DATE:

CONTACT NAME: Al Havens | TELEPHONE NUMBER: (907) 745-5016 | Stock Req. No. | BID/CONTRACT NO. | DATED | ORDER NO. | DATED

SUGGESTED CONTRACTORS -(3)- (INCLUDE ADDRESS & PHONE NUMBER)

COMMENTS

SHIPPING INSTRUCTIONS

SPECIAL INSTRUCTIONS TO GS&S

ITEM NO.	COMMODITY CODE*	QUANTITY REQUIRED	UNIT OF MEASURE	DESCRIPTION, PERFORMANCE REQUIRED, INTENDED USAGE NOTE: If this P.R. is for leased space or janitorial services, attach appropriate specifications.	ESTIMATED UNIT PRICE	ESTIMATED EXTENDED PRICE
1		20	ea.	FYKE NET: Complete and ready to fish. These fyke nets must be lightweight but of sturdy construction as they will be set and pulled in numerous lakes (up to a total of 120 fishing days per year), will be backpacked into some lakes and also transported by pick-up trucks, float planes, and small lake boats. BODY: 13.5 ' overall length with two (2) frames and six (6) hoops: 2.5' between first and second frames; 6.5' between second frame and fifth hoop; 4.5' cod end with one (1) hoop. WINGS: Two (2) 3' x 18'. To be tied into first entrance frame, then brought back to form entrance throat at second frame.	$390.00	$7,800.00

*COMMODITY CODE REQUIRED ON ALL P.R.'s SENT TO GENERAL SERVICES AND SUPPLY

ESTIMATED TOTAL ALL PAGES $

INVOICE ADDRESS

ARE FEDERAL FUNDS INVOLVED? ☐ NO ☒ YES ____ %

PAGE 1 OF 2 PAGES

DO NOT EXCEED $ 8,000.00

REF	TYPE	NUMBER	AMOUNT	DATE	COMMENTS
1	VEN				
2					
3					
4					

FIN	AMOUNT	SY	CC	PGM	LC	ACCT	FY	DIST	LIQ
1			11002002	41204	11902232	74610	90		
2									
3									
4									

PURCHASING AUTHORITY NAME | TITLE | PURCHASING AUTHORITY'S SIGNATURE | TELEPHONE NUMBER ( )

SUPPLY OFFICER APPROVAL
Printed Name | Signature | Date

CERTIFICATION: I certify that the facts herein and on supporting documents are correct, that this voucher constitutes a legal charge against funds and appropriations cited, that sufficient funds ar encumbered to pay this obligation, or that there is a sufficient unencumbered balance in the appropriation cited to cover this obligation. I am aware that certifying false, inaccurate or misleading document constitutes an unsworn falsification under AS 11.56.210.

CERTIFYING OFFICER'S PRINTED NAME | CERTIFYING OFFICER'S SIGNATURE | DATE

02-099 (Rev. 6-85)

GS&S — JUNEAU

Appendix C2.-Page 2 of 4.

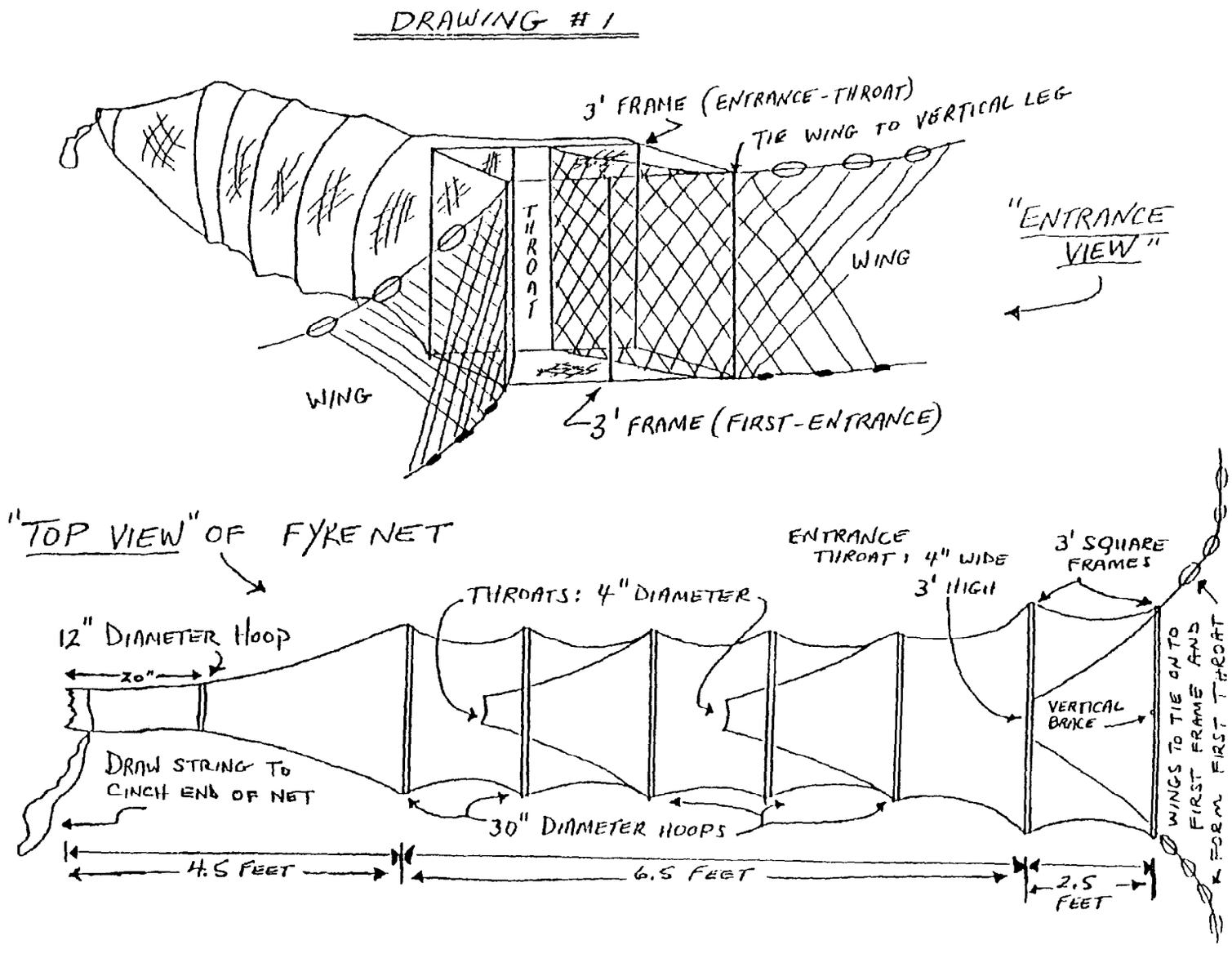
PURCHASE REQUISITION
CONTINUATION

DEPT. NO.	REQ. NO.	FY
PR-		

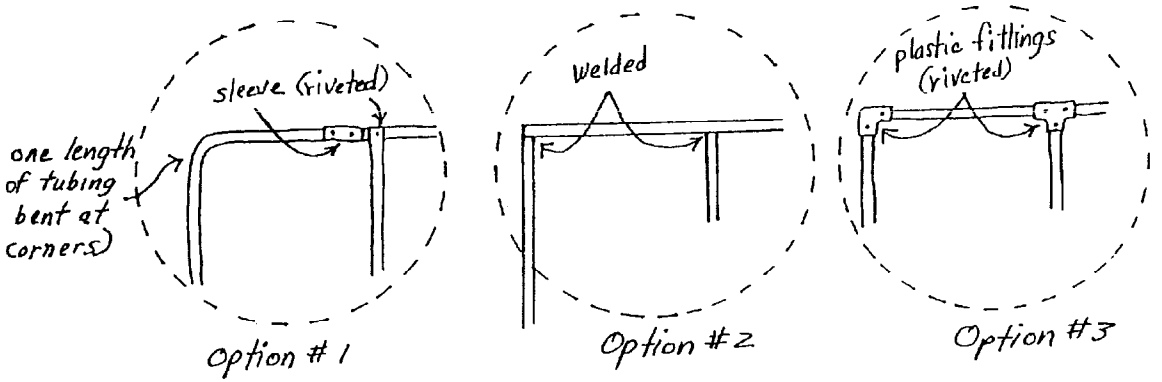
PAGE 2 OF 2 PAGES

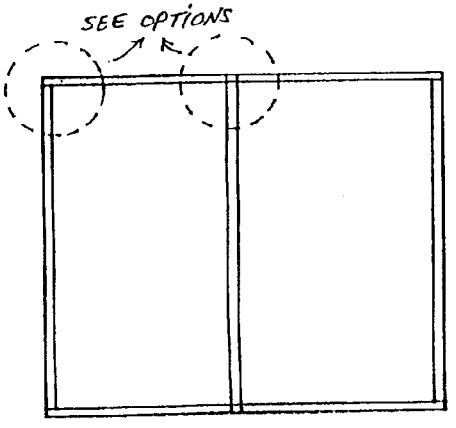
ITEM NO.	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
			NETTING: 3/16" square measure knotless nylon, extra heavy **"DELTA STYLE"** (44 lb. test), dyed dark green. **HUNG TO SINK** and allow lead line of wings to conform to the bottom of a lake in water over 3' in depth. Wing floats and float lines to be dark green. **FRAMES:** Two (2) each 3' x 3' x 3/4" O.D. aluminum. First (outer) frame to have a vertical center brace; second frame with two center braces separated by 4". All corners and joints to be smooth (or rounded) to prevent: (a) wear on netting, and (b) frames snagging on underwater structure. Remainder of body framing to consist of five (5) each hoops of 1/4" stainless steel, galvanized spring steel, or fiberglass at 30" in diameter, and cod end with one (1) 12" diameter hoop placed 20" forward of cod end exit. **THROATS:** To consist of one (1) 3' high x 4" wide at second entrance frame and one 4" diameter throat **AT EACH** first and third hoops. **COD END:** 8" diameter opening with drawstring long enough to overhand wrap and cinch down. **DRAWINGS:** #1 and #2 attached.		

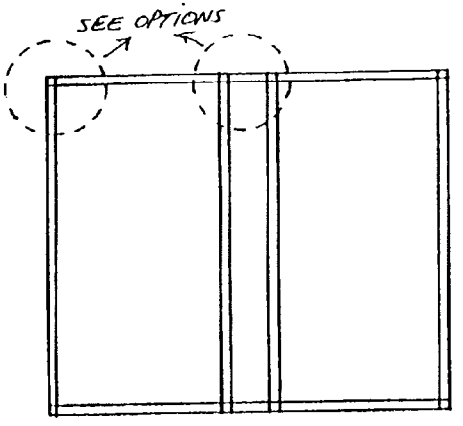
FORM 02-0994 (10/78) REV.


DRAWING #1
3' FRAME (ENTRANCE-THROAT)
TIE WING TO VERTICAL LEG
"ENTRANCE VIEW"
THROAT
WING
WING
3' FRAME (FIRST-ENTRANCE)
"TOP VIEW" OF FYKE NET
ENTRANCE THROAT: 4" WIDE 3' HIGH
3' SQUARE FRAMES
THROATS: 4" DIAMETER
12" DIAMETER HOOP
20"
VERTICAL BRACE
DRAW STRING TO CINCH END OF NET
30" DIAMETER HOOPS
WINGS TO TIE ON TO FIRST FRAME AND FORM FIRST THROAT
4.5 FEET
6.5 FEET
2.5 FEET

DRAWING #2


one length of tubing bent at corners
sleeve (riveted)
Option #1
welded
Option #2
plastic fittings (riveted)
Option #3


SEE OPTIONS
1st FRAME


SEE OPTIONS
2nd FRAME

Appendix C3.-Minnow trap ordering specifications.

SUPPLIES

SURE-LIFE Products

Keep Your Fish and Profits Alive!

Minnow Holding Formula

This formula keeps bait frisky and lowers bait losses by conditioning the water, removing chlorine, stimulating a natural slime coat, removing heavy metals, adding electrolytes, and reducing fungus and bacteria.

STOCK NO.	QUANTITY	PRICE
B83	3 lbs.	$ 5.25
B8120	12 lbs.	16.95

Shiner Holding Formula

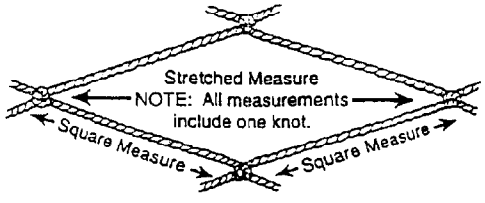
This formula lowers shiner losses by hardening scales, conditioning the water, removing chlorine, stimulating a natural slime coat, removing heavy metals, adding electrolytes, and reducing fungus and bacteria. Effective for both hatchery and wild shiners as well as goldfish.

STOCK NO.	QUANTITY	PRICE
FS3	3 lbs.	$ 9.80
FS12	10 lbs.	33.74

Foam-Off

Foam-Off helps clear bacterial fish diseases and removes harmful surface foam from bait tanks, transport trucks, cats, and livewells.

STOCK NO.	QUANTITY	PRICE
F08	8 oz.	$4.05



BAIT NETS

Minnow Shrimp and Eel Traps

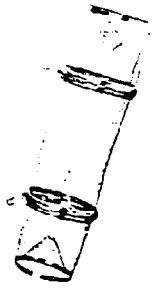
MT1. All Plastic Minnow Traps

These traps are ideal for use in alkaline, brackish, or salt water. They are color-styled with one half white, the other blue. The strong, tough plastic is rust-proof, and has no sharp edges to injure minnows. The two halves lock together, and stay together until opened. These are full-sized traps: 16-3/4 inches long, 8-3/4 inches at their largest diameter with 3/16-inch square mesh and a weight of one pound each.

MT2. Steel Minnow & Shrimp Traps

Sturdily constructed of the finest quality steel and wire, heavily galvanized and strongly reinforced, these MT2 semi-collapsible traps are built to conform to the laws of the various states as to overall dimensions, size of entrance hole and size of mesh. These traps have a 7/8 inch diameter entrance hole, and are 16-1/2 inches long, 9 inches at their largest diameter with 1/4-inch square mesh and a weight of 1-1/2 pounds each.

MT3. Minnow Trap/ Eel Pot Combinations



This is the old reliable Gee MT3 minnow trap with a center section added for use as an eel trap. The center section is also easily removed to convert to standard minnow trap size. These traps are 31-1/2 inches long, 9 inches at their largest diameter with 1/4-inch square mesh and a weight of 3 pounds each.

STOCK NO.	PRICE EACH	PRICE PER CARTON	QUANTITY PER CARTON
MT1	$ 6.75	$ 36.78 (6.13 each)	6
MT2	8.26	45.52 (7.57 each)	6
MT3	14.78	54.84 (13.71 each)	4

3-7529

THE NYLC

Appendix C4.-Hoop trap ordering specifications.

PURCHASE REQUISITION

DEPARTMENT OF ADMINISTRATION, DIVISION OF GENERAL SERVICES & SUPPLY

TO: ☐ 333 Raspberry Rd. Room C-MS-3210 Juneau, AK 99811 ☐ 3601 C St. Suite 778 Anchorage, AK 99503-5825

DEPT: PR- 11 | REQUISITION #: 066

SHIP TO:
Alaska Department of Fish & Game
Sport Fish Division
333 Raspberry Road
Anchorage, Ak 99518

DATE DELIVERY REQUIRED AT DESTINATION: 11/15/91
DATE OF PURCHASE REQUISITION: 11-20-91
F.O.B. POINT: Anchorage
DATE P.R. SENT TO GSS:
ASSIGNED TO:
DATE:

CONTACT NAME: D. Vincent-Lang/B. Lafferty | TELEPHONE NUMBER: 267-2218 | Stock Rec. No. | BID/CONTRACT NO. | DATED | ORDER NO. | DATED

SUGGESTED CONTRACTORS (3) (INCLUDE ADDRESS & PHONE NUMBER)

COMMENTS: EN 1101045

SHIPPING INSTRUCTIONS

SPECIAL INSTRUCTIONS TO GS&S

ITEM NO.	COMMODITY CODE*	QUANTITY REQUIRED	UNIT OF MEASURE	DESCRIPTION, PERFORMANCE REQUIRED, INTENDED USAGE NOTE: If this P.R. is for leased space or janitorial services, attach appropriate specifications	ESTIMATED UNIT PRICE	ESTIMATED EXTENDED PRICE
1		80	ea.	Hoop nets, 2'x10', knotted nylon netting, 1" square mesh front and back, web twin size #15. Seven galvanized no.3 spring steel (1/4"d) hoops joined wihh "NO SNAG" galvanized couplings. Taper between hoops to average 1.5". Two fingers style (crow foot) throats placed on second and fourth hoops with finger line tied to each mesh and 10 meshes per throat. Mesh to average 53 around and 8 to 9 1/2 between hoops. Nets dip treated with netcoat.	$ 85.00	$ 6,800.00
				SHIPPING		$ 1,200.00
					ESTIMATED TOTAL ALL PAGES $	$ 8,000.00

4551/726

*COMMODITY CODE REQUIRED ON ALL P.R.'s SENT TO GENERAL SERVICES AND SUPPLY

INVOICE ADDRESS

ARE FEDERAL FUNDS INVOLVED? ☐ NO ☒ YES 100 %

PAGE 1 OF PAGES

DO NOT EXCEED $

REF	TYPE	NUMBER	AMOUNT	DATE	COMMENTS
1	VEN				
2					
3					
4					

FIN	AMOUNT	SY	CC	PGM	LC	ACCT	FY	Year DIST	J/O
1		40	[illegible]	[illegible]	[illegible]	49 1460			
2									
3									
4									

PURCHASING AUTHORITY NAME | TITLE | PURCHASING AUTHORITY'S SIGNATURE | TELEPHONE NUMBER ( )

SUPPLY OFFICER APPROVAL

Printed Name | Signature | Date

CERTIFICATION: I certify that the facts herein and on supporting documents are correct, that this voucher constitutes a legal charge against funds and appropriations cited, that sufficient funds are encumbered to pay this obligation, or that there is a sufficient unencumbered balance in the appropriation cited to cover this obligation. I am aware that certifying false, inaccurate or misleading documents constitutes an unsworn falsification under AS 11.56.210.

CERTIFYING OFFICER'S PRINTED NAME: Gerald L White | CERTIFYING OFFICER'S SIGNATURE | DATE: 7-25-9

02-099 (Rev. 6-85)

GS&S — ANCHORAGE

APPENDIX D. NCI LAKE STOCKING INFORMATION

Appendix D1.-Palmer management area lake stocking (nonanadromous), 1993.

RAINBOW TROUT [1993]

LAKE STOCKED	SURFACE ACRES	DATE STOCKED	NUMBER STOCKED	FIN[a] MARK	BROOD STOCK[b] (TREATMENT)	HATCHERY	STOCKING SIZE	STOCKING* METHOD
Barley	18.6	7/15/93	1,860		93 Swanson R	Ft. Richardson	1.30g	T/BU
Bear Paw	45	7/26/93	4,500		93 Swanson R	Ft. Richardson	1.36g	T/BU
Bench[b]	34	10/4/93	3,440		93 Swanson R(TAF)	Ft. Richardson	7.50g	A
Big	2,495	9/10/93	612		90 Big Lake	Ft. Richardson	738.00g	T
Big Beaver	161	7/19/93	16,100		93 Big Lake	Ft. Richardson	0.85g	T
Big No Luck[b]	67.9	10/4/93	6,807		93 Swanson R(TAF)	Ft. Richardson	7.50g	A
Carpenter	176.4	7/15/93	17,651		93 Swanson R	Ft. Richardson	1.25g	T
Christiansen	179	7/26/93	17,900		93 Swanson R	Ft. Richardson	1.36g	T
Coyote[b]	1	6/23/93	323		92 Swanson R(TAF)	Ft. Richardson	101.50g	T
Crystal[b]	131.7	7/28/93	13,170		93 Swanson R(TAF)	Ft. Richardson	1.42g	T
Dawn[b]	11.8	7/28/93	2,360		93 Swanson R(TAF)	Ft. Richardson	1.10g	T/BU
Diamond	139	7/20/93	11,900		93 Swanson R	Ft. Richardson	1.70g	T
Dollar	5.8	7/19/93	1,388		93 Big Lake	Ft. Richardson	0.85g	T/BU
Echo[b]	23	6/22/93	1,816		92 Swanson R (AF)	Ft. Richardson	112.00g	T
Farmer	21	7/15/93	1,100		93 Swanson R	Ft. Richardson	1.30g	T/BU
Finger	362	7/16/93	36,200		93 Swanson R	Ft. Richardson	1.30g	T
Florence	54.6	7/20/93	5,460		93 Swanson R	Ft. Richardson	1.70g	T/BU
Homestead	17	7/19/93	3,588		93 Big Lake	Ft. Richardson	0.85g	T/BU
Honeybee	58	7/20/93	5,800		93 Swanson R	Ft. Richardson	1.70g	T/BU
Irene[b]	18	6/18/93	1,473		92 Swanson R (AF)	Ft. Richardson	105.00g	T/BU
Johnson [a&b]	40.3	7/20/93	3,931	RV	93 Swanson R (AF)	Ft. Richardson	1.11g	T
		7/20/93	3,938	LV	93 Swanson R	Ft. Richardson	1.11g	T
Kalmback	125	7/19/93	12,500		93 Swanson R	Ft. Richardson	1.77g	T
Kashwitna[b]	160	7/26/93	16,000		93 Swanson R(TAF)	Ft. Richardson	1.14g	T
Kepler-Bradley[b]	58	5/25/93	2,514		92 Swanson R (AF)	Ft. Richardson	95.20g	T
		6/22/93	2,105		92 Swanson R (AF)	Ft. Richardson	112.00g	T
		7/16/93	5,800		93 Swanson R	Ft. Richardson	1.30g	T
Knik[b]	50.4	5/27/93	1,998		92 Swanson R(TAF)	Ft. Richardson	92.00g	T
		7/15/93	2,500		93 Swanson R	Ft. Richardson	1.30	T
Lalen	91.9	7/19/93	4,500		93 Big Lake	Ft. Richardson	0.85g	T
Lazy	22.5	7/19/93	2,529		93 Big Lake	Ft. Richardson	0.85g	T

-continued-

Appendix D1.-Page 2 of 6.

RAINBOW TROUT [1993] (Continued

LAKE STOCKED	SURFACE ACRES	DATE STOCKED	NUMBER STOCKED	FIN[a] MARK	BROOD STOCK[b] (TREATMENT)	HATCHERY	STOCKING SIZE	STOCKING* METHOD
Little Lonely	56	7/26/93	5,600		93 Swanson R	Ft. Richardson	1.36g	T/BU
Loberg[b]	10.9	7/13/93	880		92 Swanson R(TAF)	Ft. Richardson	97.00g	T
Long [Big Lake]	44.4	7/19/93	4,658		93 Big lake	Ft. Richardson	0.85g	T
Long [K/B][a&b]	74.4	7/23/93	7,383	RV	93 Swanson R(TAF)	Ft. Richardson	1.01g	T
		7/23/93	7,355	LV	93 Swanson R	Ft. Richardson	1.15g	T
Long (Mi. 86)	106	7/16/93	10,600		93 Swanson R	Ft. Richardson	1.30g	T
Loon	108	7/19/93	10,800		93 Big Lake	Ft. Richardson	0.85g	T
Lorraine	132	7/15/93	13,200		93 Swanson R	Ft. Richardson	1.30g	A
Lucille	362	7/13/93	55,496		93 Big Lake	Ft. Richardson	0.90g	T
		7/20/93	16,304		93 Big Lake	Ft. Richardson	0.90g	T
Lynda	11.2	7/19/93	1,241		93 Big Lake	Ft. Richardson	0.85g	T/BU
Lynne	70	7/20/93	7,000		93 Swanson R	Ft. Richardson	1.70g	T
Marion	113	7/20/93	11,300		93 Swanson R	Ft. Richardson	1.70g	T/BU
Matanuska[b]	61.5	5/25/93	2,464		92 Swanson R(TAF)	Ft. Richardson	95.70g	T
		6/22/93	4,885		92 Swanson R (AF)	Ft. Richardson	112.00g	T
		7/16/93	3,100		93 Swanson R	Ft. Richardson	1.30g	T
Memory	83	7/16/93	8,300		93 Swanson R	Ft. Richardson	1.25g	T
Morvro	86.6	7/19/93	8,676		93 Big Lake	Ft. Richardson	0.85g	T/BU
North Friend[b]	81.4	7/26/93	8,140		93 Swanson R(TAF)	Ft. Richardson	1.14g	T
Prator	98	7/26/93	9,800		93 Swanson R	Ft. Richardson	1.36g	T
Ravine	12.3	7/16/93	2,500		93 Swanson R	Ft. Richardson	1.30g	T/BU
Reed	19.5	7/16/93	1,950		93 Swanson R	Ft. Richardson	1.30g	T/BU
Rocky	58.7	7/20/93	5,870		93 Swanson R	Ft. Richardson	1.70g	T
Ruby[b]	24	10/4/93	4,945		93 Swanson R(TAF)	Ft. Richardson	7.30g	A
Seventeenmile	100	7/16/93	10,000		92 Swanson R	Ft. Richardson	1.30g	T
Seymour	229	7/19/93	11,500		93 Big Lake	Ft. Richardson	0.85g	T
Slipper (Eska)[b]	9.1	6/23/93	726		92 Swanson R(TAF)	Ft. Richardson	101.50g	T
South Friend[b]	55.7	7/26/93	5,570		93 Swanson R(TAF)	Ft. Richardson	1.14g	T/BU
South Rolly[b]	107.7	7/28/93	21,596		93 Swanson R(TAF)	Ft. Richardson	1.26g	T
Stepan	59.9	7/19/93	5,694		93 Big Lake	Ft. Richardson	0.85g	T

-continued-

Appendix D1.-Page 3 of 6.

RAINBOW TROUT [1993] (Continued

LAKE STOCKED	SURFACE ACRES	DATE STOCKED	NUMBER STOCKED	FIN[a] MARK	BROOD STOCK[b] (TREATMENT)	HATCHERY	STOCKING SIZE	STOCKING* METHOD
Tigger	18.9	7/26/93	1,890		93 Swanson R	Ft. Richardson	1.36	T/BU(O2)
Twin	62.5	7/19/93	6,094		93 Big Lake	Ft. Richardson	0.85g	T
Vera[b]	110.5	7/28/93	11,050		93 Swanson R(TAF)	Ft. Richardson	1.10g	T/BU
Visnaw	130.7	7/19/93	6,559		93 Big Lake	Ft. Richardson	0.85g	T
Walby[b]	53.9	7/12/93	2,083		92 Swanson R(TAF)	Ft. Richardson	97.00g	T
		7/28/93	10,780		93 Swanson R(TAF)	Ft. Richardson	1.10g	T
West Beaver	102.5	7/19/93	11,500		93 Big Lake	Ft. Richardson	0.85g	T
West Sunshine[b]	22.3	7/26/93	4,460		93 Swanson R(TAF)	Ft. Richardson	1.14g	T/BU
Willow[b]	143.3	7/26/93	14,300		93 Swanson R(TAF)	Ft. Richardson	1.14g	T
Wishbone[b]	52.7	10/4/93	5,271		93 Swanson R(TAF)	Ft. Richardson	7.50g	A
"X"[a&b]	101.4	7/29/93	9,932	RV	93 Swanson R (AF)	Ft. Richardson	1.09g	T/BU(O2)
		7/29/93	10,017	LV	93 Swanson R	Ft. Richardson	1.43g	T/BU(O2)
"Y"	39.7	7/26/93	3,970		93 Swanson R	Ft. Richardson	1.36g	T/BU

RAINBOW TROUT [1993 Totals Stocked]
Lakes: 64
Surface Acres: 7,580.6

	Swanson River					
	Diploid Mixed-Sex	Diploid All-Female	Triploid All-Female	Swanson TOTAL	Big Lake	TOTAL STOCKED
# Brood stock	0	0	0	0	612	612
# Catchables	0	12,793	8,474	21,267	0	21,267
# Fingerling	239,562	21,246	127,889	388,697	166,627	555,324
Total Rainbow Stocked:	239,562	34,039	136,363	409,964	167,239	577,203

-continued-

Appendix D1.-Page 4 of 6.

COHO SALMON (nonanadromous) [1993]

LAKE STOCKED	SURFACE ACRES	DATE STOCKED	NUMBER STOCKED	FIN MARK	BROOD STOCK	HATCHERY	STOCKING SIZE	STOCKING* METHOD
Barley	18.6	5/14/93	1,860		92 Bear Lake	Elmendorf	5.50g	T/BU
Bear Paw	45	5/13/93	9,000		92 Bear Lake	Elmendorf	4.88g	T/BU
Benka	123	6/14/93	12,230		92 Bear Lake	Elmendorf	9.44g	T
Carpenter	176.4	5/14/93	17,560		92 Bear Lake	Elmendorf	5.50g	T
Christiansen	179	5/18/93	35,804		92 Bear Lake	Elmendorf	5.53g	T
Diamond	139	5/13/93	13,900		92 Bear Lake	Elmendorf	4.88g	T
Echo	23	5/3/93	4,600		92 Bear Lake	Elmendorf	4.20g	T
Finger	362	5/3/93	12,938		92 Bear Lake	Elmendorf	4.20g	T
Kalmback	125	5/12/93	12,492		92 Bear Lake	Elmendorf	5.44g	T
Klaire	9	5/3/93	1,800		92 Bear Lake	Elmendorf	4.20g	T
Knik	50	5/14/93	5,000		92 Bear Lake	Elmendorf	5.50g	T
Loberg	10.9	5/3/93	1,100		92 Bear Lake	Elmendorf	4.20g	T
Matanuska	61.5	5/3/93	6,200		92 Bear Lake	Elmendorf	4.20g	T
Memory	83	5/12/93	15,966		92 Bear Lake	Elmendorf	5.44g	T
Prator	98	5/13/93	19,905		92 Bear Lake	Elmendorf	4.88g	T
Rocky	58.7	5/12/93	6,062		92 Bear Lake	Elmendorf	5.44g	T
Victor	13.5	5/3/93	5,400		92 Bear Lake	Elmendorf	4.20g	T/BU

COHO SALMON (nonanadromous) [1993 Totals Stocked]
Lakes: 17
Surface Acres: 1,575.6

	Bear Lake
# Fingerling:	181,817
Total Coho Stocked:	181,817

-continued-

Appendix D1.-Page 5 of 6.

ARCTIC GRAYLING [1993]

LAKE STOCKED	SURFACE ACRES	DATE STOCKED	NUMBER STOCKED	FIN MARK	BROOD STOCK	HATCHERY	STOCKING SIZE	STOCKING* METHOD
Canoe	21.2	6/2/93	21,200		93 Moose L.	Clear	0.02g	CA/BG(02)
		9/20/93	4,200		93 Moose L.	Clear	4.74g	T/BU
Farmer	21	9/13/93	1,100		93 Moose L.	Clear	4.15g	T
Finger	362	9/21/93	18,100		93 Moose L.	Clear	4.73g	T
Florence	54.6	9/20/93	5,460		93 Moose L.	Clear	4.74g	T
Kepler-Bradley	58	9/21/93	5,800		93 Moose L.	Clear	4.74g	T
Knik	50.4	9/13/93	5,000		93 Moose L.	Clear	4.15g	T
Loberg	10.9	9/9/93	1,100		93 Moose L.	Clear	3.98g	T
Long [Mi. 86]	106	6/2/93	64,000		93 Moose L.	Clear	0.02g	CA/BG(02)
		9/9/93	10,600		93 Moose L.	Clear	3.98g	T
Lorraine	132	9/13/93	13,200		93 Moose L.	Clear	4.15g	T
Matanuska	61.5	9/21/93	3,100		93 Moose L.	Clear	4.74g	T
Meirs	16.8	6/2/93	16,700		93 Moose L.	Clear	0.02g	CA/BG(02)
		9/20/93	3,400		93 Moose L.	Clear	4.74g	T/BU
Reed	19.5	9/20/93	1,950		93 Moose L.	Clear	4.74g	T
Seventeenmile	100	9/13/93	10,000		93 Moose L.	Clear	4.15g	T
Y	39.7	9/20/93	3,900		93 Moose L.	Clear	4.74g	T

ARCTIC GRAYLING (1993 Totals Stocked)
Lakes: 14
Surface Acres: 1,053.6

	Moose Lake
# Fry:	101,900
# Fingerling:	86,910
Total Grayling Stocked:	188,810

ARCTIC CHAR [1993]

LAKE STOCKED	SURFACE ACRES	DATE STOCKED	NUMBER STOCKED	FIN MARK	BROOD STOCK	HATCHERY	STOCKING SIZE	STOCKING* METHOD
Benka	123	6/17/93	12,300		1992 domestic	Clear	7.79g	T
Finger	362	6/16/93	36,200		1992 domestic	Clear	7.35g	T
Irene	18	6/23/93	3,600		1992 domestic	Clear	11.70g	T/BU
Lynne	70	6/23/93	7,000		1992 domestic	Clear	11.70g	T/BU
Marion	113	6/23/93	11,300		1992 domestic	Clear	11.70g	T/BU

ARCTIC CHAR [1993 Totals Stocked]
Lakes: 5
Surface Acres: 686

	1992 domestic
# Fingerling:	70,400
Total Arctic Char Stocked:	70,400

-continued-

CHINOOK SALMON [1992]

LAKE STOCKED	SURFACE ACRES	DATE STOCKED	NUMBER STOCKED	FIN MARK	BROOD STOCK	HATCHERY	STOCKING SIZE	STOCKING* METHOD
Finger	362	11/3/93	12,183		1992 Willow Ck.	Ft. Richardson	82.00g	T
		11/4/93	11,378		1992 Willow Ck.	Ft. Richardson	84.00g	T
		11/5/93	9,868		1992 Willow Ck.	Ft. Richardson	85.00g	T
		12/15/93	2,712		1992 Willow Ck.	Ft. Richardson	88.90g	T
			36,141					

CHINOOK SALMON [1992 Totals Stocked]
Lakes: 1
Surface Acres: 362

	1992 Willow Ck.
# Catchables	36,141
Total Chinook Stocked:	36,141

PALMER MANAGEMENT AREA LAKES (1992 Totals Stocked)
ALL SPECIES (nonanadromous) SPORT FISH

Lakes: 69
Surface Acres: 7,764.1

# Rainbow Trout	=	577,203
# Coho Salmon (nonanadromous)	=	181,817
# Chinook Salmon (nonanadromous)	=	36,141
# Arctic Grayling	=	188,810
# Arctic Char	=	70,400
Total Fish Stocked (1993)	=	1,054,371

[a] FIN MARK: LV = diploid mixed-sex; RV = diploid all-female.

[b] TREATMENT: (AF) = diploid all-female; (TAF) = triploid all-female.

* Stocking Method: A = airdrop; T = tank truck; T/BU = carried in buckets to lake; T/BG(02) = carried to lake in sealed bags with oxygen or in aerated coolers; CA/BG(02) = flown on commercial airlines from Fairbanks to Anchorage in sealed bags, with oxygen, on ice.

Appendix D2.-Northern Cook Inlet Management Area FTP list for stocked lakes.

FISH TRANSPORT PERMIT DATA [landlocked salmon and/or freshwater resident species stocking]
MAT-SU AREA: Sport Fish Division Region II

LAKE CATEGORIES:
LL = Landlocked lake: no inlets or outlets with any potential connection to an anadromous system.
BR = Barriered lake: may have outlet(s) and/or inlet(s) BUT either has an outlet structure that prohibits fish movement AND/OR a very limited drainage system (often through swamps) that limits fish movement into or out of the lake EXCEPT in extreme high water conditions which might allow stocked fish into an anadromous system.
OS = Open System lake/stream: part of an anadromous system with none or few limits to fish movement.

RELEASE SITE	SURFACE ACRES	LAKE CATEGORY	PERMITTED SPECIES	FTP#, SPECIES, SIZE, EFFECTIVE PERIOD and/or COMMENTS
Barley L	18.6	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Barley L	18.6	LL	SS	93A-0055 SS FINGERLING (5/01/93-12/31/98)
Bear Paw L	45	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Bear Paw L	45	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Bench L(Glenn Hwy)	34	BR	RT (Sterile F)	93A-0050 RT FINGERLING (5/01/93-12/31/98)
Benka L	123	LL	AC	91A-0087 AC FINGERLING (7/01/91-12/31/96)
Benka L	123	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Beverly L	42	BR	RT (Sterile F)	94A-0015 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Big Beaver L	161	BR	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Big L	2,894	OS	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Big No Luck L	67.9	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
Blodgett L	57.6	OS	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Bruce L	20.9	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
B-J L	18.3	BR	RT (Sterile F)	93A-0051 RT FINGERLING (5/01/93-12/31/98)
Canoe L	21.2	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Carpenter L	176.4	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Carpenter L	176.4	LL	SS	93A-0055 SS FINGERLING (5/01/93-12/31/98)
Christiansen L	179	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Christiansen L	179	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)

-continued-

Appendix D2.-Page 2 of 6.

RELEASE SITE	SURFACE ACRES	LAKE CATEGORY	PERMITTED SPECIES	FTP#, SPECIES, SIZE, EFFECTIVE PERIOD and/or COMMENTS
Coyote L	~1	BR	RT (Sterile F)	*91A-0097 RT SC (7/91-12/93) ACH@6/94 requested amendment to 12/96
Crystal L	131.7	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
Dawn L	11.6	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
Diamond L	139	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Diamond L	139	LL	SS	93A-0055 SS FINGERLING (5/01/93-12/31/98)
Dollar L S	5.8	OS	NONE:	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
East Twin L	41.1	BR	RT (Sterile F)	93A-0047 RT FINGERLING (5/01/93-12/31/98)
Echo L	23	LL	RT	91A-0093 RT CATCHABLES (7/01/91-12/31/96)
Echo L	23	LL	SS	SS 91A-0101 SS FINGERLING (7/01/91-12/31/96)
Eklutna L	3,550	LL	RT	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to Dec-96
Farmer L	21	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Farmer L	21	LL	RT	93A-0052 RT FINGERLING (5/01/93-12/31/98)
Finger L	362	LL	AC	93A-0057 AC FINGERLING (5/01/93-12/31/98)
Finger L	362	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Finger L	362	LL	KS	*91A-0090 KS SC (7/91-12/91) ACH@6/94 requested amendment to 12/96
Finger L	362	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Finger L	362	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Florence L	54.6	LL	GR	93A-0056 GR FINGERLING (5/01/93-12/31/98)
Florence L	54.6	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Homestead L	17	BR	RT (Sterile F)	94A-0015 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Honeybee L	58	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Ida L	46.4	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Irene L	18	LL	AC	91A-0087 AC FINGERLING (7/01/91-12/31/96)
Irene L	18	LL	RT	91A-0093 RT CATCHABLES (7/01/91-12/31/96)
Johnson L	40.3	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)

-continued-

Appendix D2. -Page 3 of 6.

RELEASE SITE	SURFACE ACRES	LAKE CATEGORY	PERMITTED SPECIES	FTP#, SPECIES, SIZE, EFFECTIVE PERIOD and/or COMMENTS
Johnson L	40.3	LL	SS	SS (trip/dip) Genetics Section Experiment
Kalmback L	125	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Kalmback L	125	LL	SS	93A-0055 SS FINGERLING (5/01/93-12/31/98)
Kashwitna L	160	BR	RT (Sterile F)	87A1044 RT (8/03/87-9/30/97); also 91A-0096 amendment requested 6/94
Kepler-Bradley L	58	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Kepler-Bradley L	58	LL	RT	91A-0093 RT CATCHABLES (7/01/91-12/31/96)
Kepler-Bradley L	58	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Klaire L	9	LL	SS	93A-0055 SS FINGERLING (5/01/93-12/31/98)
Knik L	50.4	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Knik L	50.4	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Knik L	50.4	LL	RT	91A-0093 RT CATCHABLES (7/01/91-12/31/96)
Knik L	50.4	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Lalen L	91.9	BR	RT (Sterile F)	94A-0015 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Lazy L	22.5	OS	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Little Lonely L	56	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Little No Luck L	34.1	BR	RT(Sterile F)	NP93A-0046 RT FINGERLING (5/01/93-12/31/98), no more stocking due to NP
Loberg (Junction)	10.9	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Loberg (Junction)	10.9	LL	RT	91A-0093 RT CATCHABLES (7/01/91-12/31/96)
Loberg (Junction)	10.9	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Long L (Big Lake)	44.4	OS	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Long L (K/B)	74.4	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Long L (Mi 86)	106	LL	GR	93A-0056 GR FINGERLING (5/01/93-12/31/98)
Long L (Mi 86)	106	LL	LT	94A-0013 LT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Long L (Mi 86)	106	LL	RT	93A-0052 RT FINGERLING (5/01/93-12/31/98)
Loon L	108	BR	RT (Sterile F)	94A-0015 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Lorraine L	132	LL	GR	93A-0056 GR FINGERLING (5/01/93-12/31/98)
Lorraine L	132	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)

-continued-

Appendix D2.-Page 4 of 6.

RELEASE SITE	SURFACE ACRES	LAKE CATEGORY	PERMITTED SPECIES	FTP#, SPECIES, SIZE, EFFECTIVE PERIOD and/or COMMENTS
Lower Bonnie L	99.8	BR	GR	NOT BEING STOCKED: NO FTP REQUESTED
Lower Bonnie L	99.8	BR	RT	NOT BEING STOCKED: NO FTP REQUESTED
Lucille L	362	BR	RT (Sterile F)	94A-0014 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Lynda L	11.2	OS	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Lynne L	70	LL	AC)	91A-0087 AC FINGERLING (7/01/91-12/31/96)
Lynne L	70	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Marion L	113	LL	AC	91A-0087 AC FINGERLING (7/01/91-12/31/96)
Marion L	113	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Matanuska L	61.5	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Matanuska L	61.5	LL	RT	93A-0052 RT FINGERLING (5/01/93-12/31/98)
Matanuska L	61.5	LL	RT	91A-0093 RT CATCHABLES (7/01/91-12/31/96)
Matanuska L	61.5	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Meirs L	16.8	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Memory L	83	LL	RT	93A-0052 RT FINGERLING (5/01/93-12/31/98)
Memory L	83	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Mile 180 Parks Hwy	15	BR	None	NOT BEING STOCKED: NO FTP REQUESTED
Morvro L	86.6	LL	RT (Sterile F)	94A-0015 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
North Friend L	81.4	BR	RT (Sterile F)	87A1051 RT (8/03/87-9/30/97); also 91A-0096 amendment requested 6/94
Prator L	98	LL	RT	93A-0052 RT FINGERLING (5/01/93-12/31/98)
Prator L	98	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Ravine L	12.3	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Reed L	19.5	LL	GR	93A-0056 GR FINGERLING (5/01/93-12/31/98)
Reed L	19.5	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Rocky L	58.7	LL	RT	93A-0052 RT FINGERLING (5/01/93-12/31/98)
Rocky L	58.7	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Ruby L	24	BR	RT (Sterile F)	93A-0050 RT FINGERLING (5/01/93-12/31/98)

-continued-

Appendix D2.-Page 5 of 6.

RELEASE SITE	SURFACE ACRES	LAKE CATEGORY	PERMITTED SPECIES	FTP#, SPECIES, SIZE, EFFECTIVE PERIOD and/or COMMENTS
Seventeenmile L	100	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
Seventeenmile L	100	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Seymour L	229	BR	RT (Sterile F)	94A-0015 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Slipper [Eska] L	9.1	BR	RT (Sterile F)	*91A-0097 RT SC (7/91-12/93) ACH@6/94 requested amendment to 12/96
South Friend L	55.7	BR	RT (Sterile F)	87A1041 RT (8/03/87-9/30/97); also 91A-0096 amendment requested 6/94
South Rolly L	107.7	BR	RT (Sterile F)	93A-0053 RT FINGERLING (5/01/93-12/31/98)
Stepan L	59.9	OS	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Tigger L	18.9	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
Twin Island L	151	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
Twin L	62.5	OS	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
Vera L	110.5	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
Victor L	13.5	LL	SS	91A-0101 SS FINGERLING (7/01/91-12/31/96)
Visnaw L	130.7	BR	RT (Sterile F)	94A-0015 RT FINGERLING (6/94-?) signed by SEEB on 6/23/94
Walby L	53.9	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
Walby L	53.9	BR	RT (Sterile F)	93A-0054 RT CATCHABLES (5/01/93-12/31/98)
Weiner L	20.7	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
West Beaver L	115	BR	None	OPEN DRAINAGE: NO BIG LAKE RT AVAILABLE
West Sunshine L	22.3	BR	RT (Sterile F)	93A-0048 RT FINGERLING (5/01/93-12/31/98)
Willow L	143.4	BR	RT (Sterile F)	FTP Request submitted to Museth by ACH on 6/23/94 (1993 request lost?)
Wishbone L	52.7	BR	RT (Sterile F)	*91A-0096 RT FING (7/91-12/93) ACH@6/94 requested amendment to 12/96
Wolf L	62	BR	RT (Sterile F)	93A-0049 RT FINGERLING (5/01/93-12/31/98)

-continued-

Appendix D2.-Page 6 of 6.

RELEASE SITE	SURFACE ACRES	LAKE CATEGORY	PERMITTED SPECIES	FTP#, SPECIES, SIZE, EFFECTIVE PERIOD and/or COMMENTS
"X" L	101.4	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)
"Y" L	39.7	LL	GR	91A-0089 GR FINGERLING (7/01/91-12/31/96)
"Y" L	39.7	LL	RT	91A-0092 RT FINGERLING (7/01/91-12/31/96)

Appendix D3.-Northern Cook Inlet Management Area stocked lakes drainage systems and potential risk to wild stocks.

LAKE CATG (Category):
LL = Landlocked lake: no inlets or outlets with any potential connection to an anadromous system.
BR = Barriered lake: may have outlet(s) and/or inlet(s) but either has an outlet structure that prohibits fish movement and/or very limited drainage system (often limits fish movement into or out of the lake except in extreme high water conditions that might allow stocked fish into an anadromous system.
OS = Open System lake/stream: part of an anadromous system with few or no limits to fish movement.

FLOOD, WILD FISH POP (Populations):
>10 = Chance of flooding, with stocked fish escaping, greater than once every ten years.
<10 = Chance of flooding, with stocked fish escaping, less than once every ten years.
S = Significant population of wild fish, of the species being stocked, in the drainage system.
NS = No significant population of wild fish, of the species being stocked, in the drainage system.

RISK TO WILD POP WITH TRIPLOID (Triploids):
High= High risk, even using triploid fish, of genetic contamination of wild fish in the drainage system due to unrestricted movement.
Low = Low risk, using triploid fish, of genetic contamination of wild fish in the drainage system due to restricted movement.

#	RELEASE SITE	SURFACE ACRES	LAKE CATG	FLOOD, WILD FISH POP	RISK TO WILD POP WITH TRIPLOID	FIRST (Primary) DRAINAGE TO COOK INLET SALTWATER	SECOND DRAINAGE	THIRD DRAINAGE	FOURTH DRAINAGE	FIFTH DRAINAGE	PLANNED STOCKING OF PERMITTED SPECIES
1	Barley L	18.6	LL			* No fish immigration or emigration because of land morphology.					RT,SS
2	Bear Paw L	45	LL			* No fish immigration or emigration because of land morphology.					SS,RT
3	Bench L(Glenn Hwy)	34	BR	<10, NS		Matanuska R.	Tatadon Ck.	"Bench L. Ck."			RT (Sterile F)
4	Benka L	123	LL			* No fish immigration or emigration because of land morphology.					AC
5	Beverly L	42	BR	>10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.	"Rainbow L. Ck."	"Beverly L. Ck."		RT (Sterile F)
6	Big Beaver L	161	BR	<10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.				None
7	Big L	2,894	OS		High	Fish Ck.(Big Lake)	Big Lake	Mirror (Mud) L.	Flat L.	Lloys's Pond	None
8	Big No Luck L	67.9	BR	<10, S	Low	Susitna River	Fish Ck.(Red Shirt)	"Milo L. Ck."	"No Luck L. Ck."	"No Luck L. Ck."	RT (Sterile F)
9	Blodgett L	57.6	OS		High	Fish Ck.(Big Lake)	Meadow Ck.				None
10	Bruce L	20.9	LL			* No fish immigration or emigration because of land morphology.					GR
11	B-J L	18.3	BR	<10, S	Low	Susitna River	Yentna R.	Rolly Slough	Fish Ck.	"B-J L. Ck."	RT (Sterile F)
12	Canoe L	21.2	LL			* No fish immigration or emigration because of land morphology.					GR
13	Carpenter L	176.4	LL			* No fish immigration or emigration because of land morphology.					RT,SS
14	Christiansen L	179	LL			* No fish immigration or emigration because of land morphology.					SS,RT
15	Coyote L	2.4	BR	<10, NS		Matanuska R.	Eska Creek	"Coyote L. Ck."			RT (Sterile F)
16	Crystal L	131.7	BR	<10, S	Low	Susitna River	Willow Ck.	"Shirley L. Ck."	"Long L. Ck."	"Crystal L. Ck."	RT (Sterile F)
17	Dawn L	11.6	BR	<10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.	Lucille Ck.	Dusk L. Creek		RT (Sterile F)
18	Diamond L	139	LL			* No fish immigration or emigration because of land morphology.					RT,SS
19	Dollar L	5.8	OS		High	Fish Ck.(Big Lake)	Big Lake	"Dollar L. Ck."			None
20	East Twin L	41.1	OS		Low	Susitna River	Rolly Ck.	"E. Twin L. Ck."			None
21	Echo L	23	LL			* No fish immigration or emigration because of land morphology.					RT,SS
22	Eklutna L	3,550	LL			Eklutna R.					RT
23	Farmer L	21	LL			* No fish immigration or emigration because of land morphology.					GR,RT
24	Finger L	362	LL			* No fish immigration or emigration because of land morphology.					KS,RT,GR,AC

-continued-

Appendix D3.-Page 2 of 3.

#	RELEASE SITE	SURFACE ACRES	LAKE CATG	FLOOD, WILD FISH POP	RISK TO WILD POP WITH TRIPLOID	FIRST (Primary) DRAINAGE TO COOK INLET SALTWATER	SECOND DRAINAGE	THIRD DRAINAGE	FOURTH DRAINAGE	FIFTH DRAINAGE	PLANNED STOCKING OF PERMITTED SPECIES
25	Florence L	54.6	LL			* No fish immigration or emigration because of land morphology.					RT,GR
26	Homestead L	17	BR	<10, S	Low	Fish Ck.(Big Lake)					RT (Sterile F)
27	Honeybee L	58	LL			* No fish immigration or emigration because of land morphology.					RT
28	Ida L	46.4	LL			* No fish immigration or emigration because of land morphology.					RT
29	Irene L	18	LL			* No fish immigration or emigration because of land morphology.					RT,AC
30	Johnson L	40.3	LL			* No fish immigration or emigration because of land morphology.					RT,SS
31	Kalmback L	125	LL			* No fish immigration or emigration because of land morphology.					RT,SS
32	Kashwitna L	160	BR	<10, S	Low	Susitna River	L. Willow Ck.	"Kashwitna L. Ck."			RT (Sterile F)
33	Kepler-Bradley L	58	LL			* No fish immigration or emigration because of land morphology.					RT,GR
34	Klaire L	7.4	LL			* No fish immigration or emigration because of land morphology.					
35	Knik L	50.4	LL			* No fish immigration or emigration because of land morphology.					RT,GR,SS
36	Lalen L	91.9	BR	<10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.				RT (Sterile F)
37	Lazy L	22.5	OS		High	Fish Ck.(Big Lake)	Meadow Ck.				None
38	Little Lonely L	56	LL			* No fish immigration or emigration because of land morphology.					RT
39	Little No Luck L	34.1	BR	>10, S	Low	Susitna River	Fish Ck.(Red Shirt)	"Milo L. Ck."	"No Luck L. Ck."		None
40	Loberg (Junction)	10.9	LL			* No fish immigration or emigration because of land morphology.					RT,SS,GR
41	Long L (Big Lake)	44.4	OS		High	Fish Ck.(Big Lake)	Meadow Ck.				None
42	Long L (K/B)	74.4	LL			* No fish immigration or emigration because of land morphology.					RT
43	Long L (Mi 86)	106	LL			* No fish immigration or emigration because of land morphology.					GR,LT,RT
44	Loon L	108	BR	<10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.				RT (Sterile F)
45	Lorraine L	132	LL			* No fish immigration or emigration because of land morphology.					RT,GR
46	Lower Bonnie L	99.8	BR	<10, NS		Matanuska R.	Chickaloon R.	Sawmill Ck.	"L. Bonnie Ck."		None
47	Lucille L	362	BR	>10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.	Lucille Ck.			RT (Sterile F)
48	Lynda L	11.2	OS		High	Fish Ck.(Big Lake)	Meadow Ck.				None
49	Lynne L	70	LL			* No fish immigration or emigration because of land morphology.					RT,AC
50	Marion L	113	LL			* No fish immigration or emigration because of land morphology.					RT,AC
51	Matanuska L	61.5	LL			* No fish immigration or emigration because of land morphology.					RT,GR,SS
52	Meirs L	16.8	LL			* No fish immigration or emigration because of land morphology.					GR
53	Memory L	83	LL			* No fish immigration or emigration because of land morphology.					SS,RT
54	Mile 180 Parks Hwy	15	OS		Low	Susitna River	Chulitna River	"Mile 180 Ck."			None
55	Morvro L	86.6	LL			* No fish immigration or emigration because of land morphology.					RT (Sterile F)
56	North Friend L	81.4	BR	>10, S	Low	Susitna River	"S. Friend L. Ck."	"N. Friend L. Ck."			RT (Sterile F)
57	Prator L	98	LL			* No fish immigration or emigration because of land morphology.					SS,RT
58	Ravine L	12.3	LL			* No fish immigration or emigration because of land morphology.					RT
59	Reed L	19.5	LL			* No fish immigration or emigration because of land morphology.					RT,GR
60	Rocky L	58.7	LL			* No fish immigration or emigration because of land morphology.					SS,RT

-continued-

Appendix D3.-Page 3 of 3.

#	RELEASE SITE	SURFACE ACRES	LAKE CATG	FLOOD, WILD FISH POP	RISK TO WILD POP WITH TRIPLOID	FIRST (Primary) DRAINAGE TO COOK INLET SALTWATER	SECOND DRAINAGE	THIRD DRAINAGE	FOURTH DRAINAGE	FIFTH DRAINAGE	PLANNED STOCKING OF PERMITTED SPECIES
61	Ruby L	24	BR	<10, NS		Matanuska R.	Kings River	Young Ck.	"Ruby Ck."		RT (Sterile F)
62	Seventeenmile L	100	LL			* No fish immigration or emigration because of land morphology.					GR,RT
63	Seymour L	229	BR	<10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.	"Carousel L. Ck."	"Seymour L. Ck."		RT (Sterile F)
64	Slipper L	9.1	BR	>10, NS		Matanuska R.	Eska Creek	"Slipper L. Ck."			RT (Sterile F)
65	South Friend L	55.7	BR	>10, S	Low	Susitna River	"South Friend Ck."				RT (Sterile F)
66	South Rolly L	107.7	BR	>10, S	Low	Susitna River	Fish Ck.(Red Shirt)	"Milo L. Ck."	"Rolly Twin L. Ck.	"S. Rolly L. Ck."	RT (Sterile F)
67	Stepan L	59.9	OS		High	Fish Ck.(Big Lake)	Meadow Ck.				None
68	Tigger L	18.9	LL			* No fish immigration or emigration because of land morphology.					RT
69	Twin Island L	151	BR	>10, NS		"Island L. Ck."					RT (Sterile F)
70	Twin L	62.5	OS		High	Fish Ck.(Big Lake)	Meadow Ck.				None
71	Vera L	110.5	BR	<10, S	Low	Susitna River	"Vera L. Ck."				RT (Sterile F)
72	Victor L	13.5	LL			* No fish immigration or emigration because of land morphology.					SS
73	Visnaw L	130.7	BR	<10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.				RT (Sterile F)
74	Walby L	53.9	BR	<10, NS	Low	Wasilla Creek	"Basil Springs Ck."	"Walby L. Ck."			RT (Sterile F)
75	Weiner L	20.7	BR	<10, NS		Matanuska R.	Purinton Ck.	"Weiner L. Ck."			RT (Sterile F)
76	West Beaver L	115	BR	<10, S	Low	Fish Ck.(Big Lake)	Meadow Ck.				RT (Sterile F)
77	West Sunshine L	22.3	BR	>10, S	Low	Susitna River	Sunshine Ck.				RT (Sterile F)
78	Willow L	143.4	BR	<10, S	Low	Susitna River	Willow Ck.	"Willow L. Ck."			RT (Sterile F)
79	Wishbone L	52.7	BR	<10, NS		Matanuska R.	Moose Creek	"Wishbone L. Ck."			RT (Sterile F)
80	Wolf L	62	BR	<10, NS	Low	Cottonwood Ck.	"Anderson L. Ck."	"Wolf L. Ck."			RT (Sterile F)
81	"X" L	101.4	LL			* No fish immigration o emigration because of land morphology.					RT
82	"Y" L	39.7	LL			* No fish immigration o emigration because of land morphology.					RT,GR

APPENDIX E. NCI STATEWIDE HARVEST SURVEY DATA

Appendix E1.-Northern Cook Inlet Management Area stocked lakes 1986 SWHS data.

*** 1986 Statewide Harvest Survey (32 stocked lakes comprise the 24 reported SWHS "Fishing Sites") ***

24 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Harvest	RT Harvest	GR Harvest	HPUE	Total Harvest	Percent of Harvest
Bear Paw	77	0.32 %	614	0	0	7.97	614	1.95 %
Benka	385	1.62 %	182	0	0	0.47	182	0.58 %
Christiansen	1,026	4.33 %	1,924	0	0	1.88	1,924	6.11 %
Finger	5,589	23.56 %	6,244	3,172	0	1.68	9,416	29.91 %
Florence	49	0.21 %	0	67	0	1.37	67	0.21 %
Kalmback	179	0.75 %	0	168	0	0.94	168	0.53 %
Knik	689	2.9 %	0	268	0	0.39	268	0.85 %
Kepler Lk Complex[a]	9,544	40.24 %	2,580	7,249	860	1.12	10,689	33.95 %
Long [Mi. 86 Glenn]	77	0.32 %	0	0	156	2.03	156	0.5 %
Loon	102	0.43 %	782	0	0	7.67	782	2.48 %
Lucille	829	3.5 %	246	168	0	0.5	414	1.32 %
Marion	146	0.62 %	0	89	0	0.61	89	0.28 %
Meirs	146	0.62 %	0	0	246	1.68	246	0.78 %
Memory	2,667	11.24 %	3,161	0	0	1.19	3,161	10.04 %
Prator	49	0.21 %	45	0	0	0.92	45	0.14 %
Ravine	153	0.65 %	0	458	0	2.99	458	1.45 %
Rocky	146	0.62 %	78	0	0	0.53	78	0.25 %
Seymour	651	2.74 %	0	726	0	1.12	726	2.31 %
Tigger	193	0.81 %	0	399	0	2.07	399	1.27 %
Walby	89	0.38 %	0	179	0	2.01	179	0.57 %
Weiner[b]	600	2.53 %	0	928	0	1.55	928	2.95 %
Wishbone	255	1.08 %	0	112	0	0.44	112	0.36 %
Wolf	77	0.32 %	380	0	0	4.94	380	1.21 %
"X" and "Y"[c]	855	3.6 %	0	436	0	0.51	436	1.38 %
TOTALS:	23,718	100 %	16,236	13,983	1,262	1.33	31,481	100 %

[a] Kepler Lk Complex includes Echo, Matanuska, K/B, Long, Irene, Canoe, Victor, and Sliver Lakes.

[b] Weiner Lake has natural reproducing GR, so didn't use GR harvest data.

[c] "X" and "Y" Lakes are reported as Talkeetna Lakes in the SWHS.

Appendix E2.-Northern Cook Inlet Management Area stocked lakes 1987 SWHS data.

*** 1987 Statewide Harvest Survey (32 stocked lakes comprise the 25 reported SWHS "Fishing Sites") ***

25 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Harvest	RT Harvest	GR Harvest	HPUE	Total Harvest	Percent of Harvest
Big No Luck	492	1.29 %	0	87	0	0.18	87	0.27 %
Crystal	109	0.29 %	0	10	0	0.09	10	0.03 %
Finger	10,830	28.51 %	8,439	2,476	54	1.01	10,969	33.99 %
Florence	72	0.19 %	0	0	0		0	
Kalmback	326	0.86 %	0	155	0	0.48	155	0.48 %
Knik	344	0.91 %	0	252	0	0.73	252	0.78 %
Kepler Lk Complex[a]	14,379	37.85 %	3,550	7,758	942	0.85	12,250	37.96 %
Little No Luck	308	0.81 %	0	49	0	0.16	49	0.15 %
Loon	326	0.86 %	272	0	0	0.83	272	0.84 %
Lucille	4,690	12.34 %	1,521	3,379	18	1.05	4,918	15.24 %
Lynne	181	0.48 %	0	243	0	1.34	243	0.75 %
Marion	92	0.24 %	0	39	0	0.42	39	0.12 %
Meirs	62	0.16 %	0	0	0		0	
Memory	123	0.32 %	453	0	0	3.68	453	1.4 %
Prator	54	0.14 %	417	0	0	7.72	417	1.29 %
Ravine	246	0.65 %	0	155	0	0.63	155	0.48 %
Reed	62	0.16 %	0	68	0	1.1	68	0.21 %
Rocky	235	0.62 %	0	0	0		0	
Seymour	344	0.91 %	0	165	0	0.48	165	0.51 %
South Rolly	2,119	5.58 %	0	291	0	0.14	291	0.9 %
Tigger	272	0.72 %	0	417	0	1.53	417	1.29 %
Walby	1,123	2.96 %	0	350	0	0.31	350	1.08 %
Weiner[b]	978	2.57 %	0	563	0	0.58	563	1.74 %
Wishbone	154	0.41 %	0	146	0	0.95	146	0.45 %
Wolf	72	0.19 %	0	0	0		0	
TOTALS:	37,993	100 %	14,652	16,603	1,014	0.85	32,269	100 %

[a] Kepler Lk Complex includes Echo, Matanuska, K/B, Long, Irene, Canoe, Victor, and Sliver lakes.

[b] Natural reproducing GR, so didn't use harvest data.

Appendix E3.-Northern Cook Inlet Management Area stocked lakes 1988 SWHS data.

*** 1988 Statewide Harvest survey (41 stocked lakes comprise the 33 reported SWHS "Fishing Sites") ***

33 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Harvest	RAINBOW TROUT Harvest	GRAYLING Harvest	HPUE	Total Harvest	Percent of Harvest
Bear Paw	109	0.2 %	218	0	0	2	218	0.33 %
Benka	62	0.11 %	0	0	0		0	
Big No Luck	437	0.79 %	0	255	0	0.58	255	0.38 %
Christiansen	186	0.33 %	546	145	0	3.72	691	1.04 %
Crystal	382	0.69 %	0	328	0	0.86	328	0.49 %
Finger	8,240	14.83 %	11,896	5,241	0	2.08	17,137	25.84 %
Florence	62	0.11 %	0	55	0	0.89	55	0.08 %
Honeybee	1,455	2.62 %	0	728	0	0.5	728	1.1 %
Kalmback	4,384	7.89 %	0	1,110	0	0.25	1,110	1.67 %
Knik	1,492	2.69 %	0	1,947	0	1.3	1,947	2.94 %
Kepler Lk Complex[a]	18,245	32.84 %	2,183	16,462	5,366	1.32	24,011	36.2 %
Lalen	218	0.39 %	0	0	0		0	
Little No Luck	340	0.61 %	0	473	0	1.39	473	0.71 %
Long [Mi. 86 Glenn]	582	1.05 %	0	0	91	0.16	91	0.14 %
Loon	73	0.13 %	0	55	0	0.75	55	0.08 %
Lorraine	891	1.6 %	0	1,910	0	2.14	1,910	2.88 %
Lucille	6,312	11.36 %	618	8,495	0	1.44	9,113	13.74 %
Lynne	31	0.06 %	0	18	0	0.58	18	0.03 %
Marion	473	0.85 %	0	546	0	1.15	546	0.82 %
Meirs	509	0.92 %	0	0	400	0.79	400	0.6 %
Memory	1,182	2.13 %	1,619	0	0	1.37	1,619	2.44 %
Prator	146	0.26 %	109	0	0	0.75	109	0.16 %
Reed	364	0.66 %	0	691	0	1.9	691	1.04 %
Seventeenmile	582	1.05 %	0	0	1,382	2.37	1,382	2.08 %
Seymour	6,185	11.13 %	0	1,619	0	0.26	1,619	2.44 %
South Rolly	1,609	2.9 %	0	564	0	0.35	564	0.85 %
Tigger	309	0.56 %	0	782	0	2.53	782	1.18 %
Visnaw	62	0.11 %	0	36	0	0.58	36	0.05 %
Walby	248	0.45 %	0	273	0	1.1	273	0.41 %
Weiner[b]	62	0.11 %	0	91	0	1.47	91	0.14 %
Wishbone	93	0.17 %	0	18	0	0.19	18	0.03 %
Wolf	200	0.36 %	0	0	0		0	
"X" and "Y"[c]	31	0.06 %		55		1.77	55	0.08 %
TOTALS:	55,556	100 %	17,189	41,897	7,239	1.19	66,325	100 %

[a] Kepler Lk Complex includes Echo, Matanuska, K/B, Long, Irene, Canoe, Victor, and Sliver lakes.

[b] Naturally reproducing grayling, so didn't use data.

[c] "X" and "Y" Lakes are reported as Talkeetna Lakes in the SWHS.

Appendix E4.-Northern Cook Inlet Management Area stocked lakes 1989 SWHS data.

*** 1989 Statewide Harvest Survey (49 stocked lakes comprise the 43 reported SWHS "Fishing Sites") ***

43 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Harvest	AC/LT Harvest	RT Harvest	GR Harvest	HPUE	Total Harvest	Percent of Harvest
Bear Paw	345	1.01 %	445	0	27	0	1.37	472	1.04 %
Beverly	291	0.85 %	0	0	336	0	1.15	336	0.74 %
Big Beaver	73	0.21 %	0	0	18	0	0.25	18	0.04 %
Big No Luck	300	0.88 %	0	0	481	0	1.6	481	1.06 %
Christiansen	416	1.22 %	536	0	74	0	1.47	610	1.35 %
Crystal	100	0.29 %	0	0	54	0	0.54	54	0.12 %
Diamond	45	0.13 %	0	0	36	0	0.8	36	0.08 %
Farmer	15	0.04 %	0	0	0	45	3	45	0.1 %
Finger	4,840	14.2 %	3,805	0	2,788	0	1.36	6,593	14.58 %
Florence	60	0.18 %	0	0	91	0	1.52	91	0.2 %
Honeybee	263	0.77 %	0	0	645	0	2.45	645	1.43 %
Ida	536	1.57 %	0	0	654	0	1.22	654	1.45 %
Kalmback	1,271	3.73 %	0	0	1,625	0	1.28	1,625	3.59 %
Knik	754	2.21 %	163	0	890	245	1.72	1,298	2.87 %
Kepler Lk Complex[a]	12,821	37.62 %	1,462	0	18,233	3,351	1.8	23,046	50.96 %
Lalen	120	0.35 %	0	0	18	0	0.15	18	0.04 %
Little No Luck	270	0.79 %	0	0	0	0		0	
Long [Mi86 Glenn])	154	0.45 %	0	0	0	73	0.47	73	0.16 %
Loon	45	0.13 %	91	0	73	0	3.64	164	0.36 %
Lorraine	363	1.07 %	0	0	173	0	0.48	173	0.38 %
Lucille	3,124	9.17 %	663	0	972	54	0.54	1,689	3.74 %
Lynne	30	0.09 %	0	0	18	0	0.6	18	0.04 %
Marion	90	0.26 %	0	0	18	0	0.2	18	0.04 %
Meirs	15	0.04 %	0	0	0	0		0	
Memory	1,725	5.06 %	1,734	0	590	0	1.35	2,324	5.14 %
Prator	390	1.14 %	499	0	91	0	1.51	590	1.3 %
Ravine	227	0.67 %	0	0	617	0	2.72	617	1.36 %
Reed	463	1.36 %	0	0	436	0	0.94	436	0.96 %
Rocky	872	2.56 %	608	0	0	0	0.7	608	1.34 %
Seventeenmile	300	0.88 %	0	0	0	835	2.78	835	1.85 %
Seymour	672	1.97 %	0	0	445	0	0.66	445	0.98 %
Slipper	45	0.13 %	0	0	0	0		0	
South Rolly[b]	1,423	4.18 %	0	0	518	0	0.36	518	1.15 %
Tigger	46	0.13 %	0	0	0	0		0	
Twin Island	36	0.11 %	0	0	36	0	1	36	0.08 %
Vera	64	0.19 %	0	0	27	0	0.42	27	0.06 %
Visnaw	100	0.29 %	0	0	36	0	0.36	36	0.08 %
Walby	754	2.21 %	0	0	327	0	0.43	327	0.72 %
Weiner[c]	75	0.22 %	0	0	73	0	0.97	73	0.16 %
West Beaver	91	0.27 %	0	0	9	0	0.1	9	0.02 %
Willow	277	0.81 %	0	0	0	37	0.13	37	0.08 %
Wishbone	45	0.13 %	0	0	0	0		0	
Wolf	135	0.4 %	145	0	0	0	1.07	145	0.32 %
TOTALS:	34,081	100 %	10,151	0	30,429	4,640	1.33	45,220	100 %

[a] Kepler Lk Complex includes Echo, Matanuska, Kepler/Bradley, Long, Irene, Canoe, and Victor lakes.

[b] 91 wild NP and 91 wild LL harvested from South Rolly Lake, didn't use harvest data.

[c] Naturally reproducing GR, so didn't use harvest data.

Appendix E5.-Northern Cook Inlet Management Area stocked lakes 1990 SWHS data.

***1990 Statewide Harvest Survey (45 stocked lakes comprise the 39 reported SWHS "Fishing Sites") ***

49 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Catch	LL Harvest	LL Harvest	Arctic char/Lake trout Catch	Arctic char/Lake trout Harvest	Arctic char/Lake trout Harvest	Rainbow trout Catch	Rainbow trout Harvest	Rainbow trout Harvest	Grayling Catch	Grayling Harvest	Grayling Harvest	Total Catch	Total Harvest	Percent of Catch	Percent of Harvest
Bear Paw	33	0.10%							49	16	33%				49	16	0.06%	0.04%
Benka	98	0.29%													0	0		
Beverly	117	0.35%							181	98	54%				181	98	0.20%	0.27%
Big No Luck	308	0.91%							985	607	62%				985	607	1.11%	1.69%
Carpenter	95	0.28%													0	0		
Christiansen	218	0.65%	252	151	60%				168	34	20%				420	185	0.48%	0.51%
Crystal	233	0.69%							131	33	25%				131	33	0.15%	0.09%
Dawn	85	0.25%							197	66	34%				197	66	0.22%	0.18%
Diamond	131	0.39%							574	295	51%				574	295	0.65%	0.82%
Eska (Slipper)	66	0.20%							16	16	100%				16	16	0.02%	0.04%
Finger	6,737	19.97%	17,066	10,453	61%				5,645	2,544	45%	164	82	50%	22,875	13,079	25.88%	36.39%
Florence	159	0.47%							706	263	37%				706	263	0.80%	0.73%
Honeybee	16	0.05%													0	0		
Ida	1,687	5.00%							1,198	295	25%				1,198	295	1.36%	0.82%
Kalmback	138	0.41%							1,723	361	21%				1,723	361	1.95%	1.00%
K/B Complex[a]	13,644	40.44%	4,414	2,314	52%				35,085	10,223	29%	3,216	837	26%	42,715	13,374	48.33%	37.21%
Knik	181	0.54%	66	33	50%				558	279	50%	164	66	40%	788	378	0.89%	1.05%
Lalen	148	0.44%							98	115	117%				98	115	0.11%	0.32%
Little No Luck	148	0.44%							98	82	84%				98	82	0.11%	0.23%
Long [Mi 86]	233	0.69%				328	164	50%				16	16	100%	344	180	0.39%	0.50%
Loon	115	0.34%	328	164	50%				148	98	66%				476	262	0.54%	0.73%
Lorraine	197	0.58%							656	312	48%				656	312	0.74%	0.87%
Lucille	1,772	5.25%	410	279	68%				1,034	246	24%				1,444	525	1.63%	1.46%
Marion	138	0.41%							33	0					33	0	0.04%	
Meirs	340	1.01%										656	377	57%	656	377	0.74%	1.05%
Memory	1,422	4.21%	2,576	1,247	48%				1,362	377	28%				3,938	1,624	4.46%	4.52%
Prator	32	0.09%							33	16	48%				33	16	0.04%	0.04%
Ravine	562	1.67%							2,084	952	46%				2,084	952	2.36%	2.65%
Rocky	361	1.07%	131	0											131	0	0.15%	
Seventeenmile	594	1.76%							197	197	100%	755	230	30%	952	427	1.08%	1.19%
Seymour	785	2.33%							1,329	558	42%				1,329	558	1.50%	1.55%
South Rolly	2,058	6.10%							656	148	23%				656	148	0.74%	0.41%
Twin Island	42	0.12%							197	66	34%				197	66	0.22%	0.18%
Vera	21	0.06%							98	98	100%				98	98	0.11%	0.27%
Visnaw	33	0.10%							328	164	50%				328	164	0.37%	0.46%
Walby	414	1.23%							903	345	38%				903	345	1.02%	0.96%
Weiner[b]	159	0.47%							361	66	18%				361	66	0.41%	0.18%
West Beaver	21	0.06%													0	0		
Wolf	202	0.60%	1,001	558	56%										1,001	558	1.13%	1.55%
TOTALS	33,743	100.00%	26,244	15,199	58%	328	164	50%	56,831	18,970	33%	4,971	1,608	32%	88,374	35,941	100.00%	100.00%

[a] K/B Complex includes Echo, Matanuska, Kepler/Bradley, Long, Irene, Canoe, and Victor lakes.

[b] Naturally reproducing GR, didn't use harvest data.

Appendix E6.-Northern Cook Inlet Management Area stocked lakes 1991 SWHS data.

1991 Statewide Harvest Survey (51 stocked lakes comprise the 44 reported SWHS "Fishing Sites")

49 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Catch	LL Harvest	LL Harvest	Arctic char/Lake trout Catch	Arctic char/Lake trout Harvest	Arctic char/Lake trout Harvest	Rainbow trout Catch	Rainbow trout Harvest	Rainbow trout Harvest	Grayling Catch	Grayling Harvest	Grayling Harvest	Total Catch	Total Harvest	Percent of Catch	Percent of Harvest
Barley	16	0.05%													0	0		
Bear Paw	212	0.63%	17	17	100%				126	42	33%				143	59	0.17%	0.15%
Bench	47	0.14%							112	70	63%				112	70	0.13%	0.17%
Big Beaver	49	0.15%													0	0		
Big No Luck	262	0.78%							126	0					126	0	0.15%	0.00%
Carpenter	894	2.68%							3,892	1,716	44%				3,892	1,716	4.64%	4.26%
Christiansen	285	0.85%	216	0					231	184	80%				447	184	0.53%	0.46%
Crystal	365	1.09%							1,604	363	23%				1,604	363	1.91%	0.90%
Diamond	24	0.07%							28	28	100%				28	28	0.03%	0.07%
Eska (Slipper)	694	2.08%							510	261	51%				510	261	0.61%	0.65%
Finger	5,998	17.96%	9,243	6,816	74%				4,576	2,539	55%	121	111	92%	13,940	9,466	16.62%	23.50%
Florence	94	0.28%							70	56	80%				70	56	0.08%	0.14%
Honeybee	635	1.90%							1,772	851	48%				1,772	851	2.11%	2.11%
Ida	482	1.44%							600	466	78%				600	466	0.72%	1.16%
Kalmback	529	1.58%							4,548	293	6%				4,548	293	5.42%	0.73%
Kashwitna	33	0.10%							77	77	100%				77	77	0.09%	0.19%
Knik Lake	858	2.57%							2,246	600	27%	654	121	19%	2,900	721	3.46%	1.79%
K/B Complex[a]	11,337	33.95%	3,596	2,188	61%				18,986	8,498	45%	3,591	1,338	37%	26,173	12,024	31.21%	29.86%
Lalen	282	0.84%							279	112	40%				279	112	0.33%	0.28%
Little Lonely	47	0.14%							349	0					349	0	0.42%	
Little No Luck	229	0.69%							223	98	44%				223	98	0.27%	0.24%
Long [Mi. 86]	16	0.05%													0	0		
Loon	16	0.05%	34	0											34	0	0.04%	
Lorraine	410	1.23%							1,297	795	61%				1,297	795	1.55%	1.97%
Lucille	776	2.32%	899	899	100%				670	600	90%				1,569	1,499	1.87%	3.72%
Lynne	388	1.16%							1,032	614	59%				1,032	614	1.23%	1.52%
Marion	1,282	3.84%				13	13	100%	1,646	1,004	61%				1,659	1,017	1.98%	2.53%
Meirs	482	1.44%										2,817	493	18%	2,817	493	3.36%	1.22%
Memory	1,329	3.98%	3,358	1,628	48%				1,576	1,046	66%				4,934	2,674	5.88%	6.64%
Morvro	35	0.10%							419	70	17%				419	70	0.50%	0.17%
Prator	259	0.78%	984	170	17%				251	56	22%				1,235	226	1.47%	0.56%
Ravine	188	0.56%							865	823	95%				865	823	1.03%	2.04%
Reed	212	0.63%							2,776	70	3%				2,776	70	3.31%	0.17%
Rocky	1,023	3.06%	560	560	100%				363	363	100%				923	923	1.10%	2.29%

-continued-

Appendix E6.-Page 2 of 2.

49 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Catch	LL Harvest	LL Harvest	Arctic char/Lake trout Catch	Arctic char/Lake trout Harvest	Arctic char/Lake trout Harvest	Rainbow trout Catch	Rainbow trout Harvest	Rainbow trout Harvest	Grayling Catch	Grayling Harvest	Grayling Harvest	Total Catch	Total Harvest	Percent of Catch	Percent of Harvest
Seventeenmile	165	0.49%							237	237	100%	30	30	100%	267	267	0.32%	0.66%
Seymour	600	1.80%							1,046	990	95%				1,046	990	1.25%	2.46%
South Rolly	1,505	4.51%							767	530	69%				767	530	0.91%	1.32%
Tigger	99	0.30%							430	0					430	0	0.51%	
Twin Island	235	0.70%							1,004	1,004	100%				1,004	1,004	1.20%	2.49%
Vera	106	0.32%							698	209	30%				698	209	0.83%	0.52%
Walby	447	1.34%							586	167	28%				586	167	0.70%	0.41%
Weiner[b]	202	0.60%							544	98	18%				544	98	0.65%	0.24%
Wishbone	33	0.10%							28	0					28	0	0.03%	
Wolf	212	0.63%	1,018	848	83%				112	112	100%				1,130	960	1.35%	2.38%
TOTALS:	33,392	100.00%	19,925	13,126	66%	13	13	100%	56,702	25,042	44%	7,213	2,093	29%	83,853	40,274	100.00%	100.00%

[a] K/B Complex includes Echo, Matanuska, Kepler/Bradley, Long, Irene, Canoe, Victor, and Klaire lakes.

[b] Naturally reproducing grayling, didn't use harvest data.

Appendix E7.-Northern Cook Inlet Management Area stocked lakes 1992 SWHS data.

1992 Statewide Harvest Survey (57 stocked lakes comprise the 49 reported SWHS "Fishing Sites")

49 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL			Arctic char/Lake trout			Rainbow trout			Grayling			Total		Percent of	Percent of
			Catch	Harvest	Harvest	Catch	Harvest	Harvest	Catch	Harvest	Harvest	Catch	Harvest	Harvest	Catch	Harvest	Catch	Harvest
Bear Paw	25	0.06%							16	16	100%				16	16	0.02%	0.05%
Bench	256	0.64%							79	79	100%				79	79	0.09%	0.26%
Benka	427	1.06%	541	0					198	0					739	0	0.83%	
Beverly	224	0.56%							364	301	83%				364	301	0.41%	1.01%
Big Beaver	53	0.13%													0	0		
Big No Luck	288	0.72%							681	230	34%				681	230	0.77%	0.77%
Blodgett	37	0.09%							55	47	85%				55	47	0.06%	0.16%
Carpenter	672	1.67%							1,868	1,116	60%				1,868	1,116	2.11%	3.73%
Christiansen	224	0.56%	173	54	31%				633	190	30%				806	244	0.91%	0.82%
Crystal	149	0.37%							135	24	18%				135	24	0.15%	0.08%
Dawn	160	0.40%							182	166	91%				182	166	0.21%	0.56%
Diamond	352	0.87%							768	253	33%				768	253	0.87%	0.85%
Eska (Slipper)	224	0.56%							356	47	13%				356	47	0.40%	0.16%
Finger	5,506	13.67%	10,190	4,965	49%				6,087	1,860	31%	23	23	100%	16,300	6,848	18.38%	22.90%
Florence	758	1.88%							570	142	25%				570	142	0.64%	0.47%
Honeybee	331	0.82%							1,061	467	44%				1,061	467	1.20%	1.56%
Ida	213	0.53%							427	317	74%				427	317	0.48%	1.06%
Kalmback	1,825	4.53%							3,103	610	20%				3,103	610	3.50%	2.04%
Kashwitna	299	0.74%							404	245	61%				404	245	0.46%	0.82%
Knik	1,451	3.60%	865	768	89%				1,504	887	59%	346	83	24%	2,715	1,738	3.06%	5.81%
K/B Complex[a]	15,556	38.63%	4,673	1,222	26%				24,887	6,839	27%	6,800	1,187	17%	36,360	9,248	41.01%	30.92%
Lalen	256	0.64%							237	111	47%				237	111	0.27%	0.37%
Little Lonely	64	0.16%							697	103	15%				697	103	0.79%	0.34%
Little No Luck	125	0.31%							301	8	3%				301	8	0.34%	0.03%
Long [Mi. 86][b]	747	1.86%				1,655	291	18%				263	135	51%	1,918	426	2.16%	1.42%
Loon	128	0.32%							55	16	29%				55	16	0.06%	0.05%
Lorraine	800	1.99%							1,045	332	32%				1,045	332	1.18%	1.11%
Lucille	1,515	3.76%	400	173	43%				602	309	51%	53	0		1,055	482	1.19%	1.61%
Lynne	192	0.48%							301	103	34%				301	103	0.34%	0.34%
Marion	427	1.06%				131	115	88%	887	530	60%				1,018	645	1.15%	2.16%
Meirs	320	0.79%										1,104	368	33%	1,104	368	1.25%	1.23%
Memory	864	2.15%	4,056	1,525	38%				1,314	364	28%				5,370	1,889	6.06%	6.32%
Morvro	32	0.08%							71	71	100%				71	71	0.08%	0.24%
Prator	12	0.03%							8	0					8	0	0.01%	

-continued-

Appendix E7.-Page 2 of 2.

49 SWHS "Fishing Sites"	Days Fished	Percent of Effort	LL Catch	LL Harvest	LL Harvest	Arctic char/Lake trout Catch	Arctic char/Lake trout Harvest	Arctic char/Lake trout Harvest	Rainbow trout Catch	Rainbow trout Harvest	Rainbow trout Harvest	Grayling Catch	Grayling Harvest	Grayling Harvest	Total Catch	Total Harvest	Percent of Catch	Percent of Harvest
Ravine	299	0.74%							420	285	68%				420	285	0.47%	0.95%
Reed	331	0.82%							507	63	12%				507	63	0.57%	0.21%
Seventeenmile	597	1.48%							522	285	55%	240	143	60%	762	428	0.86%	1.43%
Seymour	608	1.51%							712	459	64%				712	459	0.80%	1.53%
South Rolly[c]	1,419	3.52%							522	269	52%				522	269	0.59%	0.90%
Tigger	64	0.16%							237	0					237	0	0.27%	
Twin Island	277	0.69%							554	269	49%				554	269	0.62%	0.90%
Visnaw	181	0.45%							388	150	39%				388	150	0.44%	0.50%
Vera	53	0.13%							190	32	17%				190	32	0.21%	0.11%
Walby	1,110	2.76%							2,517	269	11%				2,517	269	2.84%	0.90%
Weiner[d]	330	0.82%							792	333	42%				792	333	0.89%	1.11%
West Beaver	37	0.09%							55	16	29%				55	16	0.06%	0.05%
Willow	224	0.56%										128	45	35%	128	45	0.14%	0.15%
Wishbone	43	0.11%							55	0					55	0	0.06%	
Wolf	181	0.45%	660	595	90%										660	595	0.74%	1.99%
TOTALS	40,266	100.00%	21,558	9,302	43%	1,786	406	23%	56,367	18,213	32%	8,957	1,984	22%	88,668	29,905	100.00%	100.00%

[a] K/B Complex includes Echo, Matanuska, Kepler/Bradley, Long, Irene, Canoe, Victor, Sliver, and Klaire lakes.

[b] Lake trout in Long Lake.

[c] 26 northern pike caught, 0 harvested.

[d] Naturally reproducing grayling, didn't use harvest data.

APPENDIX F. NCI STOCKED LAKES COST ANALYSIS

Appendix F1.-Northern Cook Inlet Management Area stocked lakes sport fishing effort, harvest, catch, and associated costs.

(a)	1986	1987	1988	1989	1990	1991	1992	1993
Angler Days Fished =	23,718	37,993	55,556	34,081	33,743	33,392	40,266	29,718
Cost per Day Fished =	$4.04	$2.51	$1.97	$4.07	$3.88	$3.31	$3.08	$5.98
Total Harvest (all species) =	31,481	32,269	66,325	45,220	35,941	40,274	29,905	26,462
HPUE (harvest/day fished) =	1.33	0.85	1.19	1.33	1.07	1.21	0.74	0.89
Cost per Fish Harvested (all species) =	$3.04	$2.96	$1.65	$3.07	$3.64	$2.74	$4.14	$6.71
Total Catch (all species) =	"no data"	"no data"	"no data"	"no data"	88,374	83,853	88,668	73,269
CPUE (catch/day fished) =	"no data"	"no data"	"no data"	"no data"	2.62	2.51	2.2	2.47
Cost per Fish Caught (all species) =	"no data"	"no data"	"no data"	"no data"	$1.48	$1.32	$1.40	$2.43
Rainbow Trout Harvest =	13,983	16,603	41,897	30,429	18,970	25,042	18,213	13,388
Cost/RT Harvested =	$4.86	$4.47	$2.04	$3.28	$5.58	$3.52	$4.38	$6.85
Rainbow Trout Catch =	"no data"	"no data"	"no data"	"no data"	56,831	56,702	56,367	43,135
Cost/RT Caught =	"no data"	"no data"	"no data"	"no data"	$1.86	$1.56	$1.42	$2.13
Landlocked Salmon Harvest =	16,236	14,652	17,189	10,151	15,199	13,126	9,302	11,934
Cost/LL Harvested =	$1.65	$1.15	$1.06	$3.00	$1.14	$1.13	$3.40	$6.03
Landlocked Salmon Catch =	"no data"	"no data"	"no data"	"no data"	26,244	19,925	21,558	25,452
Cost/LL Caught =	"no data"	"no data"	"no data"	"no data"	$0.66	$0.74	$1.47	$2.83

-continued-

Appendix F1.-Page 2 of 2.

(a)	1986	1987	1988	1989	1990	1991	1992	1993
Arctic Grayling Harvest =	1,262	1,014	7,239	4,640	1,608	2,093	1,984	1,099
Cost/GR Harvested =	$0.84	$4.15	$0.79	$1.83	$4.05	$2.74	$4.84	$7.56
Arctic Grayling Catch =	"no data"	"no data"	"no data"	"no data"	4,971	7,213	8,957	4,611
Cost/GR Caught =	"no data"	"no data"	"no data"	"no data"	$1.31	$0.80	$1.07	$1.80
Arctic Char Harvest =	...	...	...	0	0	13	115	41
Cost/AC Harvested =	...	...	...			$64.77	$17.64	$121.17
Arctic Char Catch =	...	...	...	"no data"	0	13	131	51
Cost/AC Caught =	...	...	...	"no data"		$64.77	$15.48	$97.41
Lake Trout Harvest =	...	...	...	0	164	0	291	0
Cost/LT Harvested =	...	...	...		$1.82		$6.97	NA
Lake Trout Catch =	...	...	...	"no data"	328	0	1,655	20
Cost/LT Caught =	...	...	...	"no data"	$0.91		$1.23	$32.21

[a] Above data do not include stocking, catch, or harvest from Eklutna Lake, Bonnie Lakes, Big Lake, or Johnson Lake.

APPENDIX G. MATANUSKA-SUSITNA VALLEYS STOCKED LAKE SERIES EXAMPLE

Appendix G1.-Finger Lake example of the Matanuska-Susitna Valleys Stocked Lake Series.

MATANUSKA-SUSITNA VALLEYS STOCKED LAKE SERIES

State of Alaska

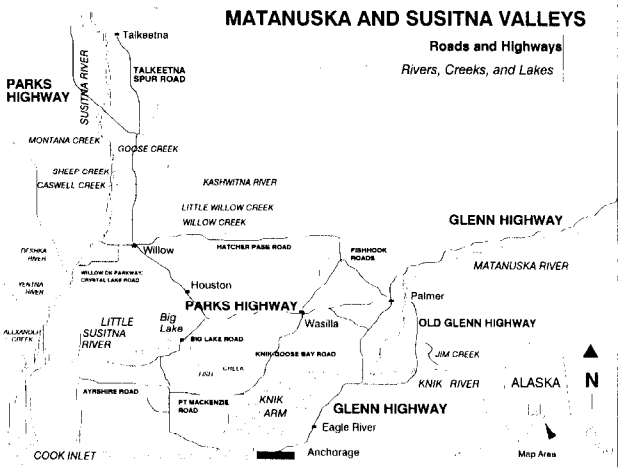
Department of Fish and Game

Sport Fish Division

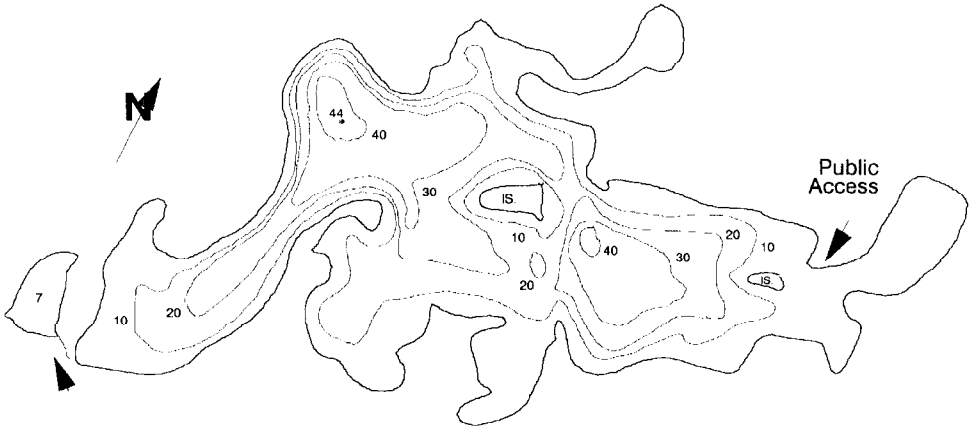
1800 Glenn Hwy #4

Palmer, Alaska 99645

(907) 745-5016



FINGER LAKE



U.S.G.S. Map Ref. --Anch. C-7, T18N, R1E, S33	Geographic Location --61°36'25"N, 149°16'30"W			
	Elevation	337 Feet	Surface Acres	362
	Volume	5,622 Acre Feet	Maximum Depth	-44 Feet
	Mean Depth	15.5 Feet	Shoreline Length	7.8 Miles
	ADF&G Survey	2/72 (Stocked RT, SS Present)	Year 1st Stocked	1953 (Rainbow Trout)

Game Fish Present 1994: Rainbow Trout (RT), Coho Salmon (SS), Arctic Grayling (GR), Chinook Salmon (KS), Arctic Char (AC). All game fish species in landlocked Finger Lake have been stocked by Fish and Game.

FINGER LAKE PUBLIC ACCESS: Mile 41.8 Glenn Hwy. East on Palmer-Wasilla Hwy 4 miles to Trunk Rd. Right on Trunk Rd 1.1 miles to Bogard Rd. Left on Bogard Rd. 0.7 mile to Finger Lake State Recreation Site. Left on gravel road 0.2 mile to lake and campground with picnic tables, toilet facilities and developed boat launch. Fees required for camping and launching.

Appendix G1.-Page 2 of 2.

MATANUSKA-SUSITNA VALLEYS STOCKED LAKE SERIES - FINGER LAKE (continued)

STOCKING ACCESS: same as public access

STOCKING METHOD: truck

FINGER LAKE STOCKING AND SPORT FISHING DATA (362 surface acres; MEI considered in the highly productive range at 13.4):

Year Stocked	Species[1]	Number Stocked	Stocking Stocking Size	Effort Density (fish/a)	Number Harvested (H) or Caught (C) (angler days)		Landlocked Salmon	Rainbow Trout	Fish/ Arctic Grayling	Arctic Char/ Lake Trout	Angler-Day
1987	SS	72,400	1.0g	200							
	GR	12,558	3.2g	37	10,830	H	8,439	2,476	54	0	1.01
1988	SS	145,433	3.8g	402							
	GR	6,758	4.0g	19	8,240	H	11,896	5,421	0	0	2.10
1989	SS	37,410	4.9g	103							
	RT	36,608	1.4g	101	4,840	H	3,805	2,788	0	0	1.36
1990	SS	72,156	3.0g	199							
	RT	23,890	1.8g	66	6,737	H	10,453	2,544	82	0	1.94
	GR	36,800	5.1g	102		C	17,066	5,645	164	0	3.40
1991	SS	72,420	5.7g	200							
	RT	36,592	1.7g	101	5,988	H	6,818	2,539	111	0	1.58
	GR	18,100	5.1g	50			9,243	4,576	121	0	2.32
						C					
1992	SS	23,856	4.7g	66							
	RT	37,034	1.3g	102							
	GR	36,600	3.5g	101	5,506	H	4,965	1,860	23	0	1.24
	KS	40,686	97.0g	112			10,190	6,087	23	0	2.96
						C					
1993	SS	12,938	4.2g	36							
	RT	36,200	1.3g	100							
	GR	18,100	4.7g	50							
	KS	33,429	84.0g	92							
	AC	36,200	7.4g	100							

[1] SS = Coho Salmon; RT = Rainbow Trout; GR = Arctic Grayling; KS = Chinook Salmon; AC = Arctic Char.

TEST NET SAMPLING

Date	Species	Age Class	#	Range(mm)	Avg	C/FNHr	Date	Species	Age Class	#	Range(mm)	Avg	C/FNHr
10/09/92	RT	0,1,2,3	187	64-510	195mm	0.95	10/20/93	RT	0,1,2,3++	40	79-296	184mm	0.10
"	SS	0,1,2	384	92-312	163mm	1.96	"	SS	0,1++	421	99-272	151mm	1.00
"	GR	0,1,2	12	68-248	147mm	0.06	"	GR	0,1++	112	78-247	139mm	0.27

ISSUES and RECOMMENDATIONS: Finger Lake probably receives the highest effort for any single Mat-Su stocked landlocked lake. There appear to be no angler-landowner conflicts but could be conflicts with new Mat-Su Borough motorcraft restrictions. Recommend continuing annual plants of RT (100/a), GR (50/a), and AC (100/a) fingerling (= total 250 fish/acre) and KS catchables (100/a) - should do abundance evaluation at some point to check growth and survival of mixed-species plants. Should work with DNR Parks signing campground/boat launch area to let anglers know game fish species stocked.