Regional Operational Plan SF.2A.2018.XX

Monitoring and Assessment of Anchorage Management Area lakes, 2018–2021

by

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and

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May 2018

Alaska Department of Fish and Game Divisions of Sport Fish and Commercial Fisheries

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**Weights and measures (metric)**

centimeter cm

deciliter dL

gram g

hectare ha

kilogram kg

kilometer km

liter L

meter m

milliliter mL

millimeter mm

**Weights and measures (English)**

cubic feet per second ft3/s

foot ft

gallon gal

inch in

mile mi

nautical mile nmi

ounce oz

pound lb

quart qt

yard yd

**Time and temperature**

day d

degrees Celsius °C

degrees Fahrenheit °F

degrees kelvin K

hour h

minute min

second s

**Physics and chemistry**

all atomic symbols

alternating current AC

ampere A

calorie cal

direct current DC

hertz Hz

horsepower hp

hydrogen ion activity pH

(negative log of)

parts per million ppm

parts per thousand ppt,

‰

volts V

watts W

**General**

Alaska Administrative

Code AAC

all commonly accepted

abbreviations e.g., Mr., Mrs., AM, PM, etc.

all commonly accepted

professional titles e.g., Dr., Ph.D.,

R.N., etc.

at @

compass directions:

east E

north N

south S

west W

copyright ©

corporate suffixes:

Company Co.

Corporation Corp.

Incorporated Inc.

Limited Ltd.

District of Columbia D.C.

et alii (and others) et al.

et cetera (and so forth) etc.

exempli gratia

(for example) e.g.

Federal Information

Code FIC

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

registered trademark ®

trademark ™

United States

(adjective) U.S.

United States of

America (noun) USA

U.S.C. United States Code

U.S. state use two-letter abbreviations (e.g., AK, WA)

**Mathematics, statistics**

*all standard mathematical*

*signs, symbols and*

*abbreviations*

alternate hypothesis HA

base of natural logarithm *e*

catch per unit effort CPUE

coefficient of variation CV

common test statistics (F, t, χ2, etc.)

confidence interval CI

correlation coefficient

(multiple) R

correlation coefficient

(simple) r

covariance cov

degree (angular ) °

degrees of freedom df

expected value *E*

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) log2, etc.

minute (angular) '

not significant NS

null hypothesis HO

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

variance

population Var

sample var

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Monitoring and Assessment of ANchorage Management AReA Lakes 2018–2021

by

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May 2018

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# abstract

Many Anchorage area lakes have been annually stocked with hatchery fish since the 1950’s to provide anglers local fishing opportunities and provide alternative to fishing small wild stocks which do to the proximate to the city, of Anchorage, are susceptible to over harvest by high angler participation. The local stocked lake fisheries are anecdotally very popular, but the lake condition have had very little monitoring or assessment. Many of these local lakes are man-made and assumed to be put-and-take fisheries. With that fishery type in mind, very little emphasis has been made to record annual changes in water conditions or fish health after initial stocking. Lake specific information is important to determine if lake conditions are suitable for current stocking levels and stocking strategies.

This information is going to provide area biologists information to make more informed decision about stocking strategies on Anchorage management area lakes. This investigation will also provide direct benefit to improve information that is available to sportfishing angler’s. Additionally, this project will establish a baseline for lake conditions in stocked lakes in the AMA for future investigations as well as the ground work for a future creel survey to better understand angler effort.

During this exploration new lakes will be investigated to determine if these lakes are suitable for future stocking. If they are suitable for stocking what food source is present and which stock species will be most suitable.

Results from this project are going to made available to the public through information handouts, on the ADF&G website as well in a Fisheries Data Series Report.

Key words: Anchorage, Anchorage Management Area, stocking evaluations, stocking strategy, lake monitoring and assessment.

# Purpose

The purpose of this project is to assess a select number of lakes in the Anchorage Management Area (AMA) to determine lake dynamics, fish stocking success, and gain a better understanding of angler use patterns. These assessments will include the collection of AMA lake water quality and physical conditions and fish health information including food availability. We will attempt to evaluate the dynamics of stocked fish populations in the lakes of the AMA, by assessing growth, health, and survival. These objectives coupled with gaining information from informal creel surveys to estimate effort, catch, and harvest will assist with providing the framework for a more aggressive creel survey and sampling protocol to provide valuable information that will help determine the success of the current stocking strategy and sportfish regulations in the AMA. Current assessment of lakes in the AMA comes only from what is reported on the Statewide Harvest Survey (SWHS).

# background

There are currently 26 stocked lakes in the Anchorage Management Area (AMA). Stocked lakes can be categorized into four subunits based on their general location in the AMA and their nearby communities: Anchorage Bowl, Chugiak/Eagle River, Joint Bases Elmendorf-Richardson (JBER), and Turnagain Arm (Statewide Stocking Plan, RII, 2017). Anchorage lakes are widely distributed, ranging from as far south as Portage Valley Road to the community of Chugiak in the north (Figure 1). With Alaska’s most populated city as a main hub, AMA lakes serve a large, diverse population. Fishery experience can range from fishing a neighborhood lake in the urban environment to remote fisheries in the Chugach Mountains, such as Rabbit Lake and Symphony Lake. The size range is drastic with lakes as small as four acres (Triangle Lake) and as large as 125 acres (Otter Lake). APU/University Lake is unique in that it is an intermittent lake of the Chester Creek drainage. These varying features amongst all AMA lakes results in each lake providing their own unique experience for the angler, but also very different environmental stressors that affect the dynamics of a stocked fish population.

Historically, stocking in the AMA has been primarily by 2 fish hatcheries (Fort Richardson Hatchery and Elmendorf Hatchery), both located on Ship Creek since the late 1950s. The Fort Richardson hatchery was built in 1958 by the U.S. Army to provide fish for lakes on the DOD property. The Alaska Department of Fish and Game became involved in the early 1960s and assumed full operation of the Fort Richardson Hatchery facility by the late 1960s. The Fort Richardson Hatchery sits on the banks of Ship Creek, just downstream of the Glenn Highway (ADF&G website Fort Richardson State Fish Hatchery; http://www.adfg.alaska.gov/index.cfm?adfg=fishingSportStockingHatcheries.ftrichardson, accessed December 2016) and approximately 5 miles upstream from the Elmendorf Hatchery. The Elmendorf State Hatchery started in 1965. Elmendorf State Hatchery was located in Anchorage on the north bank of Ship Creek near the intersection of Reeve Boulevard and Post Road (ADF&G website Elmendorf State Fish Hatchery; http://www.adfg.alaska.gov/index.cfm?adfg=fishingSportStockingHatcheries.elmendorf, accessed December 2016). The permanent loss of heated effluent from the Fort Richardson (2003) and Elmendorf (2005) power plants resulted in a reduction in fish size and number of catchable-sized fish released from 2005 to 2011. The catchable rainbow trout program shifted from producing 1-year-old catchable fish to producing 3-year-old catchable fish and 2-year-old undersized catchable or subcatchable-sized fish. The closure of Elmendorf Hatchery in 2010 resulted in the release of rainbow trout fingerling into local lakes. The catchable Chinook salmon program saw reductions in fish size, number of fish released, and number of lakes stocked starting in 2006 when an outbreak of Bacterial Kidney Disease, also known as BKD, in the Chinook salmon at Fort Richardson Hatchery resulted in the release of fingering instead of catchable Chinook salmon that year. In addition, from 2007 to 2009, only category 1 (landlocked) lakes were permitted for releases of catchable-sized fish from Elmendorf Hatchery after an Oregon State University graduate student reported the presence of DNA from the parasite that causes whirling disease. Catchable-sized Chinook salmon were not released in 2010–2011. Due to disease concerns, catchable-sized Arctic grayling production ceased in 2002. Arctic grayling fingerling and subcatchable-sized fish were released from 2003 to 2012. Arctic Grayling stocking in Symphony Lake was discontinued in 2003 however this lake maintains a self-sustaining population of relatively small fish. A small group of AMA lakes were historically stocked with Arctic Graying (*Thymallus arcticus*) but this program was discontinued in 2015.

In June 2011, construction of the new William Jack Hernandez Sport Fish Hatchery (WJHSF Hatchery) was completed. With over 100 rearing tanks, there is the capacity to produce over 6 million sport fish each year to stock throughout permitted areas of Alaska. The rainbow trout and Chinook salmon catchable production programs returned to historical stocking levels when the first catchable-sized fish were released from the WJHSF Hatchery in 2012. The new WJHSF hatchery is using more update technology and advanced stocking protocols to often produce healthier and stronger products than historical stocking product. In addition, the first release of catchable-sized Arctic grayling from WJHSF Hatchery occurred in 2013; however, due to budget restrictions, the Arctic graying stocking program was suspended indefinitely after stocking in 2015 to reduce operating expenses (ADF&G Statewide Stocking Plan for Sport Fish The lakes in the AMA are stocked primarily with catchable Rainbow Trout (*Onchorhynchus mykiss*), Arctic Char (*Salelinus alpinus*), and Chinook salmon (*O. tshawytscha*) from the WJHSFH. The grayling stocking program is being revisited and it is scheduled to restock lakes those lakes that have historically been stocked, with arctic grayling starting in 2019.

The primary purposes of the non-anadromous stocking program are to provide diverse year-round fishing opportunities to the general public and alleviate fishing pressure that would otherwise be directed towards wild stocks (ADF&G, 2017). Stocking records for AMA lakes over the last five years (2013–2017) can be found in Appendix A1\_. Four other fish species are known to be present in some but not all AMA lakes: three-spined Stickleback (*Gasterosteus aculeatus*), Longnose Sucker (*Catostomus catostomus*), Alaska Blackfish (*Dallia pectoralis*) and Northern Pike (*Esox lucius*).

The species and number of fish stocked in each lake is determined by lake morphometry and angling pressure, as well as the availability of fish at the WJHSFH. For example, activity in Arctic Char has been documented to decrease dramatically when water temperatures are in excess of 10°C, therefore Arctic Char are only stocked in six AMA lakes that provide thermal refuge through relatively large average or maximum depths. Conversely, Rainbow Trout have greater thermal and dissolved oxygen (D.O.) concentration ranges of tolerance and as a result are stocked routinely in all 26 of the currently stocked lakes. All currently stocked lakes are stocked on an annual basis with the exception of Rabbit Lake, which is scheduled to be stocked every odd year due to its remoteness. Some lakes have supplemental stockings of larger Arctic Char and Rainbow Trout broodstock to add a new dimension to the stocked lake fisheries in the AMA.

Each year new lakes are suggested or proposed as candidates for stocking and also some lakes have stocking discontinued for various reasons. For example, in 2014 stocking was discontinued in Lower Fire Lake. This lake has a known, active population of Northern Pike and in an effort to reduce the pike population ADF&G halted the stocking of Rainbow Trout, a prey item of Northern Pike. In other AMA lakes Northern Pike have been eradicated and stocking has been resumed (e.g., Otter Lake on JBER). New ways to access a lake may also provide an encouraging reason to stock fish. These lakes should be assessed prior to being added to the stocking plan.

When determining if a lake that has been historically stocked (or not) should be restocked, a protocol is necessary to determine the timing, species, and quantity of fish that should be stocked that would benefit the angler and their fishing experience. Current means for assessing the success of the stocking strategy in place is limited to comparing annual SWHS data to the objective goals in the Statewide Stocking plan for the AMA. The SWHS is a mail-out survey that produces estimates of annual effort, catch, and harvest for a various waterbodies in Alaska, including the AMA lakes. The goals in the Stocking Plan are defined as a minimum level of effort while providing diverse, year-round fish opportunities. Unfortunately, responses for some of the AMA lakes are of times low and sporadic, therefore estimates fluctuate greatly from year-to-year (SWHS, 2016). For a site, such as a lake, to be reported on the SWHS, the site must receive 12 mail-in responses on surveys. Often times, an individual AMA lake does not receive enough responses to be published in the SWHS report and a site specific creel survey is necessary to assess the lake.

A current creel survey would be required to be conducted to collect data on angler effort, catch, harvest, and determine the demographics of the users of AMA lakes. The secondary objectives is to determine the details of conducting a creel survey across a select number of Anchorage lakes to estimate effort, catch, and removals, as well as other catch data and information from anglers. A creel survey was performed by in 1986 (Havens et. al) for four AMA lakes although the product stocked has improved and the population of Anchorage has greatly changed. Creel information that is over 30 years old may no longer be relevant today. A current creel survey is important to make better understand the fisheries that occur on AMA stocked lakes and help define current stocking strategies. Basic water quality and stocking data can be juxtaposed to the creel survey data to explain durations of high or low catches. Creel survey data will be integral to overall assessment of stocked lakes in the AMA. When compared with the biotic and abiotic data collected, creel survey information can reveal valuable information about stocked lake fisheries and ecology.

Additional objectives will include assessing select lakes currently stocked for annual trends in water chemistry/quality, morphometry and physical characteristics, and fish population information. Water Quality monitoring, bathymetric mapping, and single-event netting will be used to meet these objectives for assessing AMA stocked. All the data collected from this assessment will be compiled and presented to Anchorage area managers and organized in a fashion that can be utilized by the Sportfish Information Center staff to provide information to the general public through brochures and the Alaska Lake Database (ALDAT).

# Objectives

Primary Objective: Document and monitor biotic and select abiotic factors that have potential to impact sportfish species in AMA lakes.

Objective 1: Monitor water quality parameters on select Anchorage Management Area lakes throughout the year to identify seasonal trends.

*Task:* Collect dissolved oxygen (D.O.), temperature, clarity, and pH will be collected at two locations on nine AMA lakes.

Objective 2: Document physical features for all lakes in the AMA that can be used for managing, fishing or stocking a lake.

*Task:* Generate bathymetric maps and lake images for all lakes in the Anchorage Management Area.

Objective 3: Provide current information about fish species present, age, size range, overall health, and assess the food presence and consumption of stocked fish species.

*Task 1:* Sample fish through netting and minnow trapping.

*Task 2*: Identify food sources presence available in AMA lakes by:

-Assessing the stomach content (diet) of captured stocked fish species.

*-*Identifying other food sources in the lake using D-frame dip nets.

Secondary Objective: Develop objectives and methods for AMA creel survey.

# 

# Methods

## Objective 1: WATER QUALITY MONITORING

### Study Design

Water quality sampling will be collected on nine lakes in the AMA in 2018 and 2019. Specifically, dissolved oxygen (D.O.), temperature, clarity, and pH will be collected at on each lake (Appendix x). Each lake will be sampled 1–2 times per month, as conditions allow. The goal of more frequent monitoring will help identify long term trends rather than individual snapshots of temperature and dissolved oxygen are expected to be above and below biological tolerances. With this sampling frequency, we should be able to not only determine times of oxygen minimums and temperature maximums, but also rates of oxygen depletion during the winter, times of cooling and warming, and periods of vertical lake mixing, such as spring and fall turnover.

Nine lakes have been selected for monitoring (Table 1). Each lake will have one location near the deepest depth of the lake. In the summer this will require launching a canoe or kayak. A GPS will be used when accessing sampling location to get as close as possible each time sampling occurs. Appendix x maps includes each of the 9 lakes that will be sampling locations in each lake. Additional lakes will be sampled opportunistically while management and research needs will take priority, possibly resulting in more widespread distribution of sampled lakes.

### Data Collection

Using an *YSI Pro Plus* with a multiparameter *Pro1020 Sonde*, water quality parameters will be measured at the location of a target lake’s maximum depth (Zmax). The Pro1020 Field Cable will be equipped with accessory D.O. and pH sensory probes, and a temperature sensor that is integrated into the design of the cable. Temperature (°C), pH, barometric pressure (mmHg), and both D.O. concentration (mg/L) and saturation (%) readings will be recorded for every 0.5m interval from the surface down to the lake bottom. Water quality sampling on the lakes close to the Anchorage ADF&G office will occur bimonthly throughout the year, as conditions allow. The time required for travel to more distant lakes may only allow for water quality sampling once per month at these locations. Additional water quality sampling events may occur opportunistically, if technicians are conducting other sampling or events on a stocked lake.

Winter sampling will require drilling an ice hole with a gas-powered auger. An auger bit with a diameter of 25.4cm (10-inch) will be used so a 20cm Secchi disk will fit through to sample clarity. Ice thickness and snow cover will be recorded during sampling that occurs while the lakes are iced up. If lake ice is unsafe or known to be less than 10cm, sampling will be deferred until conditions are safe. Clarity of the water will be measured using a 20cm Secchi disk. The Secchi disk will be slowly lowered into the lake until the disk disappears out of sight. The disk will be slowly retrieved until the disk reappears, and this depth will be recorded. The average of these two depths represents the Secchi Depth, a measure of water transparency (Koenings, et al., 1987). Samplers will also note the water color and other characteristics that are present.

Samplers will record the date and the time sampling occurred as well as weather data at the time of sampling. Samplers should note cloud cover, wind speed, air temperature (°C), and GPS coordinates (ddd.ddddd) of the location where sampling occurred. All water quality data and other notes will be recorded on the waterproof data sheet that can be found in Appendix \_\_.

### Data Reduction

Upon return from the field, water quality data will be entered into a Microsoft Excel spreadsheet for each corresponding lake. Other notes and observations will be entered and saved within the same spreadsheet. The Secchi depth will be entered as the average of the depth where the disk disappeared and reappeared. Data will be reviewed for errors by the field crew leader. The crew leader will create depth profiles of water temperature, D.O., and pH in Microsoft Excel and those graphics will be saved in the same files as the associated spreadsheet.

### Data Analysis

Water temperature, D.O., pH, and clarity will be assessed for seasonal trends, drastic changes, and periods when water quality parameters are not ideal for stocked fish species. Seasonal highs of water temperature and low D.O. concentration will be determined for each lake. Using water quality data, including Secchi depth, lakes that may experience turnover or winter kill events will be identified.

Water quality data will be interpreted to determine if stocking dates are appropriate or if stocking dates need to be adjusted to accommodate better lake conditions for the fish. It is important to identify if a given lake provides the range of D.O. and temperatures suitable for a species of stocked fish to survive and grow. Proposed stocked lakes will be evaluated following the same water quality criteria.

## Objective 2: DOCUMENT PHYSICAL FEATURES OF AMA LAKES

## LAKE MAPPING (BATHYMETRY)

### Study Design

Many of the stocked lakes in the AMA have been sampled for the purpose of creating bathymetric maps. The recent mappings were completed using new sonar technology produced by Lowrance. The maps are created with more fine scale resolution than previous techniques. The bathymetric maps created from the sonar data can provide vital information that can be used to make decisions on stocking, future project designs, and improve anglers fishing knowledge. Field crews will need bathymetric maps for making decisions on water quality monitoring and determine netting locations.

Morphometric values such as maximum depth (Zmax), mean depth, shoreline length, surface area, and volume can be calculated from sonar data. Collecting these metrics is the first step in better understanding and assessing a lake for management purposes. The morphometry of a lake has profound effects on water chemistry and productivity, and in turn, affect the ability of a fish to inhabit a lake. Other physical characteristics such as inlets and outlets, man-made structures, and public access are included on the bathymetric maps produced by Anchorage Sportfish Staff and GIS Analysts as these are advantageous to anglers and provide useful information to the management of these lakes.

The ADF&G, Sport Fish Division will continue its mapping of stocked lakes in the AMA. There is short list of currently stocked lakes that have not been mapped yet: Lower Six Mile and Rabbit lakes. Additional lakes in the AMA that have not been stocked or are no longer stocked will also be mapped under the same methodology.

### Data Collection

A Lowrance HDS-7 chart plotter equipped with an internal 10Hz GPS antennae is used to collect location data (ddd.ddddd) and depth data in feet. A traditional sonar and Structure Scan™ transducers are used in conjunction with the HDS-7 unit to collect depth sounding data (ft). The transducers are mounted on a piece of PVC-pipe and a short piece of 2”x10”, so that it can be clamped and used on boat with varying transoms. A two person crew is needed to conduct safe data collection. One person will operate the vessel, while the other manages the Lowrance unit and watches for shallow (<.3m) areas of the lake. The Lowrance is manually programmed to record paired depth and GPS location data as the boat is underway. The data will be saved as a .sl2 file onto an external storage (SD card).

While maintain a speed of less than 10km/hr, the vessel operator will begin making an initial transect around the shoreline of the lake, avoiding sections of the lake less than .3m deep. From there, transects will either be made in concentric circles towards the center of the lake if the lakes is less than 30 acres in size. For lakes greater than 30 acres in size, transects will be made perpendicular to the longest shoreline and with a space no greater than 25m apart. The operator of the Lowrance should monitor depths during the entire process to document areas with underwater structures, such as channel or drop-off; several parallel transects should be made over these structures. Prior to departure, the crew must measure the depth of the transducers below the lake surface and record it in a Rite-in-the-Rain™ notebook; this is referred to as the transducer offset.

While collecting data, the crew should observe and confirm inlet and outlet streams as well as features that should be documented for generation of a bathymetric map. These features are also important for determine the stocking category for the lake. GPS locations for all of these features should be recorded in a notebook. Photographs should be taken at all main public access locations on the lake as well as other features of the lake.

### Data Reduction

The .sl2 files collected from the lake are organized and renamed in a format that includes the lake name and the file number in sequential order of the time it was recorded. Notes and offsets for each file are written up in a word file, and saved with corresponding sonar files. The sonar files are submitted to ciBioBase, an online lake mapping software. ciBioBase extracts the depth and GPS location data from the .sl2 files. The data can then be downloaded from the website and saved in an excel spreadsheet.

### Data Analysis

ADF&G GIS Analysts will use the depth data plotted in GIS based GPS coordinates, and overlay it on a satellite image of the subject lake. Inlets, outlets, public access, and other features will be plotted on the map with the depth layer. The created maps will be reviewed for an accurate depth readings and appropriate cartography for the maps usage. From the generated map and depth data, maximum depth (Zmax), mean depth, shoreline length, surface area, and volume will be estimated. A final draft of the map will be submitted to the area management biologists with a table of morphometric values. Bathymetric maps as well as photographs of the lake access will be uploaded to ALDAT.

## Objective 3: POPULATION ASSESSMENT AND FOOD AVAILABILITY

To determine overwinter survival of fish in AMA stocked lakes, fish will be collected and sampled.

Provide current information about fish species present, age, size range, overall health, and document whether fish survive through the winter.

***Task 1:* Sample fish presence, size, and health through netting and minnow trapping.**

### Study Design

Single capture netting events will be conducted prior to each stocking event. The spring event should occur just after ice out and prior to the May stockings of any catchable Rainbow Trout, Arctic Char, and Chinook salmon. A second netting event will occur prior to the June stocking event, and so on over the course of 2–3 years. However, fish sampling will only occur when surface water temperature are <18°C as to avoid size bias and reduce stress on captured fish (Skaugstad and Behr, 2016). Water temperature 1m below the surface will be measured and recorded at the time that any netting is conducted.

A combination of fyke nets, variable-mesh gillnets, seine nets, and minnow traps will be deployed in varying quantities and for 24-hours on the selected lake. The surface area of an individual lake will determine the prescribed effort (Table 2), but each lake may have constraints, such as remoteness or presence of waterfowl that may result in netting effort that differs from that prescribed in table. These particular constraints will be identified during the event planning period and a site visit in the days prior to a netting event. To document any stray from the prescribed effort, soak time for each net will be recorded along with the associated catch for that net on the data sheet in appendix. Supplemental rod-and-reel sampling may occur while nets are fishing, but effort and catch will be recorded for this gear type in a similar fashion.

**Table 2.** Prescribed netting effort according to lake size.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hectares (Acres) | Days | Fyke Nets | Gillnets | Minnow Traps |
| 0-10 (25) | 1 | 4 | 4 | 4 |
| >10-20 (50) | 1 | 4 | 4 | 6 |
| >20-40(100) | 1 | 6 | 4 | 8 |
| <40 (100) | 1 | 8 | 4 | 10 |

Fyke nets will be set in the near shore environment and target fish migrating in water shallower than 2m. The openings of the fyke nets are comprised of two .9m tall by 1.2m wide aluminum frames and are followed by five galvanized hoops. Each net has two 25m long wings that extend to form a v-shape and funnel fish into the cod end. The selection of specific habitat to target and spacing will be determined by the crew lead based off of weather, knowledge of fish movement, and The fyke nets will be set prior to any other sampling gear and will be pulled at approximately the same time the following day.

Minnow traps, also referred to as juvenile fish traps, are approximately cylindrical in shape. The traps that will be used are approximately \_\_cm in length, have a diameter of \_\_\_cm, and funneled ends with \_\_\_cm entrance holes. The minnow traps should be set uniformly distributed throughout the lake, and target a variety of habitats. Most traps will be set resting on the lake bottom, while some may be set suspended in the water column. Resting traps should be tied off to a secure object on shore or a buoy. Suspended traps will be attached to a buoy line and well-anchored.

While the minnow traps fish and fyke nets are fishing, a crew can work and closely monitoring gillnets. Gillnets should be closely monitored when waterfowl or swimming pets are present. Two nets will be fished shallow and near the surface; these nets are called “floaters”. The other two nets will be fished deep (>2m) with a heavier lead-line to sink the net; these gillnets are called a “sinkers”. These nets are 15m long and 2m deep consisting of three, 6m hung panels of variable mesh of 3/4”, 1”, 1 ½”. The gillnets will be set and alternately checked, every 30 minutes in order minimize fish mortality. As nets are checked, they may be reset in a new location or remain in the same spot; however, GPS location as well as pull and set times must be recorded each time.

Nets and traps will be deployed primarily from an open skiff, an inflatable raft, or a canoe. A crew of at least 2 personnel will be required to safely and effectively set nets. Additional crew members may allow for sampling with rod-and-reel, quicker response to incidents and, more frequent sets of gillnets. It is critical that the time that all nets and traps are set and pulled and GPS location is recorded. A waterproof copy of the bathymetric map and GPS will be provided to crews to determine and document where nets and traps are set. Netting data will be recorded on the datasheet in Appendix\_\_\_. Depth that a trap is set will also be recorded, and will be measured using a handheld depthfinder.

As fish are removed from a net or trap, captured fish will be identified and sorted into separate live buckets or totes containing aerators. The fish from one net or trap will be sampled prior to pulling the next.

### Data Collection

For each sampling event, all captured stocked fish will be identified and measured from the tip of the snout to the fork of the tail (FL) using a handmade fish measuring board. Lengths will be recorded to the nearest mm. In addition, all stocked fish over 150mm will be weighed using a Pesola™ Metric Spring Scale with weighing sling. Three scales from the preferred area will be collected using forceps and placed on scale cards for all salmonids that are captured. Record scale card data with length and weight measurements for each sport fish on the corresponding net data sheet as seen in Appendix\_\_\_\_. The general health, any abnormalities, and other notes will be recorded with the length, weight, and scale data for each fish.

For non-sport fish species, the first 30 individuals from each gear type will be measured (FL) and rest of the fish will be simply counted for a total number of fish captured. The tally including the fish that are sampled will be recorded on the datasheet found in Appendix\_\_\_. Any invasive species captured in AMA lakes should be immediately dispatched and retained. Location and other information pertinent to the capture should be recorded and relayed to the Anchorage area management biologists and Invasive Species Coordinator upon return from the field.

Prior to the release, each captured fish of a stocked species will receive a Floy™ tag. The Floy™ tag number should be recorded on the data sheet in Appendix \_\_ with the length, weight, and scale card data associated with the same fish. All captured fish will receive a half-circle mark on the upper lobe of the caudal fin with 7mm paper punch as described in Behr (2017); this is intended to prevent the sampling or tallying of the same fish twice in the same sample event. If a marked or tagged fish is captured in the subsequent fall sampling, length, weight, condition of the fish, and scales should again be collected and the Floy™ tag number should be recorded. Signs will be placed at all access points notifying the public of who to contact if a tagged fish is caught.

### Data Reduction

The length and weight data from the netting event will be compiled into a lake specific Microsoft Excel Spreadsheet for analysis. The project biologist will review the spreadsheet for any data entry errors and outliers. Maps will be generated with locations that nets and trap were set in each lake. Netting effort will be entered into an additional tab on the Excel Spreadsheet. Effort will be summed by each gear type.

The scale cards will accompany each corresponding datasheet. Scales will be pressed onto acetate cards and the scale impressions on the acetate cards will be read using a microfiche reader (Clutter and Whitesel, 1956). Aging will be conducted by the field crew leader. Scales will be used to age a fish since its stocking event; this will be called the scale age. Most stocked fish in the AMA spend the first year of their life or more in the hatchery, and in that time they are not exposed to the slow growth experienced by wild fish during the winter months. Due to steady temperatures and food supply that hatchery fish are exposed to, their scales are not expected to produce winter checks or annuli during this time, therefore the scales will be used to determine how many years since the fish had been stocked. Tracing back to the stocking year for a fish will tell about the fish’s history at the hatchery, allowing for us to calculate its true age based on how many years it spent in the hatchery. Both scale age and true age will entered for each fish into the Microsoft Excel Spreadsheet.

### Data Analysis

Scales will be examined for winter annuli to track an individual fish back to a stocking year and to calculate its true age. The presence of annuli will indicate winter and potentially long term survival of stocked fish. Analysis of scales may also be used to reveal natural reproduction in a lakes where historical diploid stocking occurred or wild fish are possible. Scales that have annuli radiating completely from the annuli would likely indicate a fish that was born in the wild. Scales can also be used to distinguish a released broodstock from a stocked fish that has survived and grown over many years.

Sampling data from all gear types will be used to establish species present in sampled AMA lakes. The size range will be reported for all non-stocked species captured using minimum and maximum length. An arithmetic mean and the standard error will be calculated and reported for the length of all species in each lake; this mean will utilize data only from fish captured in gillnet or fyke net.

Fork length paired with age data from scales will be used to produce mean length-at-age for all stocked species captured in a lake. Mean length and size range will be reported for each individual age cohort. A standard error will be reported with each mean length-at-age. Length Frequency Distribution (LFD) plots will be created for all stocked species that are captured in a lake to aid with identifying age cohorts.

The length and weights collected for captured stocked salmonid species will be used to calculate Fulton’s Condition Factor (K). Condition Factor, K, will be used as a measurement of overall health for individual stocked fish in a population, but also as indicator of a lake’s ability to sustain healthy fish. Environmental factors such as food availability and water quality within a lake environment can have profound effects on a stocked fish population’s health. Inter- and intraspecific competition can affect the food availability on a per fish basis, therefore impact the condition factor of a fish. In the case of a stocked lake, stocking quantities can influence the level of competition. Fulton’s Condition Factor will be calculated for each fish using Equation 1.

(1)

Where:

The weight of a captured fish in grams.  
 The length of a captured fish in mm.

The arithmetic mean for the Condition Factor, K, for each stocked species in a lake as two separate size classes, 150mm ≤ L >350mm and L≥350mm. A standard error will be reported each associated mean. Condition Factor across size classes and season from lake to lake to give possible insight on the productivity and carrying capacity of a lake.

In this analysis, a caveat of tools is laid out to shed light on the fate of the stocked fish after release from the hatchery. There is currently very little knowledge about the survival and growth of stocked fish in the AMA lakes. The common conception is that AMA lakes are strictly put-and-take lakes, but there is limited empirical data to support or deny this claim with the high quality fish being stocked from the WJHSF hatchery. Through this assessment, population information can be used to better understand the management strategy that should be employed with each individual lake based on their ability to sustain survival, growth, and health of stocked fish.

***Task 2*: Identify food sources presently available in AMA lakes**

### Study Design

The intent of this assessment is to determine the variety of forage available to stocked species in a lake. The design to assess food availability will remain simple and result in a summary of macroinvertebrates families present. Additionally, data collected from minnow trapping will be used to determine species of fish that could be potentially consumed by a stocked fish. Any fish ≥150mm captured in a minnow trap will be considered to be a possible prey item for stocked fish. Diversity or abundance of macroinvertebrates and prey fish can be used as an indicator for productivity of lake and is just one criteria of a lake to sustain a population of one or more species of stocked fish. The assessment of food availability and consumption is a secondary objective, and will be conducted during netting events or when time is available throughout the summer months.

### Data Collection

Macroinvertebrates will be collected throughout the littoral zone of each lake using D-frame dipnets. Samples will be collected from four evenly spaced locations around the shoreline of the lake. Two samplers will work each station for five minutes, dragging dipnets through macrophytes, woody debris, and substrate. A timer will be used to keep track of each five minute sampling period. As time expires, samples will be collected in Whirl-paks™ and preserved in 70% ethanol. Each Whirl-pak™ will be labeled with the date, name of the lake, and sample station number. One additional sample will be collected at the deepest location of each lake using a ponar or benthic grab; this sample will stored in a Whirl-pak™ and labeled as “Benthic Grab”.

In the fish and game warehouse, a sub-sample of 50 individual organisms from each site will be used. The process for selecting the subsample will match the procedure described in Behr, 2011. A whole sample from a Whirl-pak™ will be poured and spread out on a white tray. A 30-square grid will be placed over the tray, and each square assigned a sequential number. A number will be randomly generated, and the corresponding grid square will be sampled for 50 individuals. In the case that 50 individuals are collected in this subsample, an addition grid will be selected and sampled (Behr, 2011). Using dichotomous keys in *Freshwater Macroinvertebrates of Northeastern North America* and *An Introduction to Aquatic Insects of North America*, the 50 individuals will be identified with a dissecting microscope to family, or a lower taxonomic level if necessary. This procedure will be repeated for all four sample stations and the benthic grab. As macroinvertebrates are identified, sample station information and individual organism identification should be recorded on the datasheet in Appendix \_\_\_

Stomach content for stocked fish in lake will be collected two ways. One non-lethal technique will be employed to pump the stomach content from sub-sample of stocked fish captured during netting. Every 5th Rainbow Trout, Chinook Salmon, and Arctic Char with fork length greater than 150mm caught until a max sample size of 20 for each species is obtained, per sampling event, while netting will have their stomach contents extracted using a pump. All fish mortalities that occur as result of stress during netting will have their stomach contents extracted through dissection. All northern pike captured will be dissected for collection of stomach content as well. The stomach content of each individual fish will be stored in scintillation vials and preserved in 70% ethanol. The vial will be labeled with the species, sample number, date, sampling location, and gear type; all data that can be found from the sampling datasheet in Appendix \_\_\_. With the digestion of stomach content, identification can be difficult. In some cases, insects, fish, and other organism can be identified down to family or even lower taxonomic level for recently consumed prey items. Well-digested items may have to be identified to a more general level such as “fish” or “adult insect”, or labeled as unidentified. A stomach content datasheet will be created to record specific fish data and diet content discovered in their digestive tract.

### Data Reduction

After identification of macroinvertebrates and stomach content, data will be manually entered into additional worksheet tabs labeled “Food Availability” and “Diet Analysis” on the correspond lake’s Microsoft Excel file. Macroinvertebrate identification and tallies will be entered each sample station. Minnow trapping data will be entered added to the Macroinvertebrate data for the Food Availability analysis; only species and number of fish captured is all that is required for this spread sheet. The stomach content discovered will be entered for each individual fish. The method used for collecting stomach content (pump or dissection) should be recorded with each fish. If a stomach is found to be empty, or extraction is unsuccessful, this should be denoted in the excel file as well.

### Data Analysis

A list of macroinvertebrates and forage fish present will be generated for each sampled lake. Stomach content will be examined to determine what portion of the forage available is utilized by stocked fish species. Low consumption can be tied to various reasons such as environmental stress or food availability outside the preferred diet of stocked fish species. Trends seen from lake to lake of prey consumed by a particular fish species will be evaluated. These prey preferences and prey abundances could provide insight when considering stocking in AMA lakes.

**Secondary Objective:**

Develop the information necessary to develop a AMA creel survey operation plan. This would include working with hatchery and information staff to identify the following questions:

-Identify reasonable timeline for implementation of AMA Creel survey

-Identify creel questions

-Identify medium to contact anglers and collect creel survey information

-Identify angler incentives for completing survey

-Identify sampling locations

-Identify interview schedule

-Develop an outreach plan for the creel efforts.

Conduct informal interviews at AMA lakes to assist in the development of a creel survey.

# Schedule and Deliverables

Preliminary dates for sampling, data, reduction, and analysis, and reporting are summarized below.

* Results from lake evaluations will be summarized in a FDS report containing 2018–2020 data.
* A draft of this report will be submitted to the Research Coordinator by March 1, 2021.
* Water quality data and bathymetric maps resulting from lake surveys will be summarized and available by lake at the Anchorage Fish and Game office.

# RESPONSIBILITIES

Jay Baumer, Area Management Biologist, Project administrator, ADFG

Duties: Oversees project. Coauthor of operational plan, project administrator.

Brittany J. Blain, Assistant Area Management Biologist, Project Leader, ADF&G.

Duties: Oversees project. Coauthors operational plan; Coordinates collection of survey index data. Co-author Area Management report.

Donald E. Arthur, Fisheries Biologist I, Field lead, ADF&G

Duties: Oversee field preparation, field collections and data assimilations.

Fish and Wildlife Technician III, ADF&G.

Duties: Assist with field data collection and data entry.

Kali Hulquist, Region II Information Officer

Duties: Disseminate information to the public through handouts, booklets, and ADF&G webpage.

Jason Graham, GIS Analyst II, ADF&G.

Duties: Creates and updates maps for operational plan and reports.

Jiaqi Huang, Biometrician II, ADF&G.

Duties: Coauthors operational plan; provide statistical support for study design and data analysis.

# reference cited

Dunn, J.R. 1961. Silver salmon studies in the Resurrection Bay Area. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1960-60, Project F-5-R-2(2)Job-6. Juneau.

# Figure

Figure .–Map of common lakes and streams in the Anchorage Management Area.

# Appendix: Stocking in the Anchorage management area, 1996­–2015

Appendix X.–Chinook salmon stocking in the Anchorage Management Area by year (1996–2015) and site.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Catchable a | | | | | | | | | | | | | | | | | | | | Smolt |
|  | Lake | | | | | | | | | | | | | | | | | | |  | Ship Creek |
| Year | Beach | Camp-bell Pt | Cheney | | Clunie | Delong | | Green | | Hillberg | Jewel | Mirror | | Otter | | Sand | Spring | Taku Camp-  bell | Tan-gle Pond | Total |
| 1996 | 2,989 | 1,588 | 4,880 | | 4,023 | 5,020 | | 1,558 | | 1,587 | 13,929 | 8,191 | | 6,776 | | 3,929 | 998 | 1,985 | 1,154 | 58,607 | 228,000 |
| 1997 | 2,000 | 1,000 | 4,191 | | 2,767 | 4,032 | | 1,586 | | 1,586 | 7,325 | 7,000 | | 5,500 | | 4,000 | 1,000 | 2,231 | 1,651 | 45,869 | 325,891 |
| 1998 | 4,533 | 2,036 | 6,364 | | 3,000 | 7,291 | | 2,016 | | 2,062 | 13,865 | 7,275 | | 0 | | 6,796 | 1,000 | 3,996 | 1,008 | 61,242 | 204,741 |
| 1999 | 2,744 | 643 | 6,228 | | 4,045 | 5,644 | | 2,006 | | 1,932 | 9,628 | 7,749 | | 0 | | 5,867 | 500 | 3,052 | 0 | 50,038 | 197,168 |
| 2000 | 10,709 | 0 | b | | 8,819 | 5,348 | | 2,149 | | 2,058 | 9,741 | 15,399 | | 0 | | 5,119 | 1,031 | 0 | 0 | 60,373 | 265,582 |
| 2001 | 4,139 | 3,807 | b | | 8,360 c | | 5,966 | 998 | | 3,308 | 21,792 | 10,272 | | 0 | | 4,945 | 0 | 0 | 0 | 63,587 | 254,924 |
| 2002 | 3,838 | 2,000 | b | | 8,004 | 6,207 | | 1,086 | | 981 | 12,538 | 9,683 | | 0 | | 4,930 | 0 | 0 | 0 | 49,267 | 290,501 |
| 2003 | 4,040 | 1,975 | b | | 3,822 | 6,055 | | 1,190 | | 1,144 | 24,243 | 7,142 | | 0 | | 5,133 | 0 | 5,811 | 0 | 60,555 | 329,416 |
| 2004 | 4,078 | 2,302 | b | | 2,981 | 5,931 | | 1,261 | | 1,261 | 21,978 | 7,396 | | 0 | | 4,650 | 0 | 2,910 | 0 | 54,748 | 320,226 |
| 2005 | 3,925 | 3,158 | b | | 2,981 | 5,982 | | 1,100 | | 1,100 | 15,828 | 6,958 | | 0 | | 6,122 | 0 | 3,058 | 0 | 50,212 | 358,029 |
| 2006 | 0 | 25,723 d | | b | 0 | 26,277 d | | | 0 | 0 | 60,497 d | | 29,043 d | | 0 | 0 | 0 | 0 | 0 | 141,540 | 176,055 |
| 2007 | 0 | 6,500 | b | | 3,118 | 10,530 | | 1,070 | | 1,117 | 15,795 | 11,565 | | 0 | | 0 | 0 | 0 | 0 | 49,695 | 333,940 |
| 2008 | 0 | 3,375 | b | | 2,950 | 8,031 | | 1,100 | | 1,050 | 26,622 | 10,700 | | 0 | | 0 | 0 | 0 | 0 | 53,828 | 341,495 |
| 2009 | 0 | 10,190 | b | | 3,060 | 14,838 | | 921 | | 987 | 27,850 | 0 | | 0 | | 0 | 0 | 0 | 0 | 57,846 | 282,735 |
| 2010 | 0 | 0 | b | | 0 | 0 | | 0 | | 0 | 0 | 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 332,597 |
| 2011 | 0 | 0 | b | | 0 | 0 | | 0 | | 0 | 0 | 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 314,194 |
| 2012 | 1,763 | 3,830 | 1,599 | | 13,889 | 8,675 | | 2,841 | | 2,866 | 9,705 | 710 | | 0 | | 1,652 | 0 | 0 | 0 | 47,530 | 329,082 |
| 2014 | 4,220 | 1,933 | 2,889 | | 1,846 | 5,139 | | 946 | | 900 | 10,575 | 8,510 | | 0 | | 2,667 | 0 | 1,978 | 0 | 41,603 | 358,517 |
| 2015 | 4,123 | 1,980 | 4,676 | | 1,944 | 6,992 | | 1,109 | | 978 | 11,285 | 9,718 | | 0 | | 2,442 | 0 | 2,009 | 0 | 47,256 | 365,246 |

*Source*: All stocking information is from ADF&G SF hatchery records.

a “Catchable” size is about 8 inches in length.

b Discontinued stocking beginning in 2000 due to the presence of northern pike.

c An additional 24,498 Chinook salmon were stocked in Clunie Lake in 2001 but were undersized and considered “subcatchables.”

d In 2006, the Fort Richardson Hatchery had an outbreak of Bacterial Kidney Disease and Chinook salmon could not be transported to the Elmendorf Hatchery. Instead, they were stocked early into 4 local lakes. They were considered “fingerling-sized” at the time of release.

Appendix .–Coho salmon stocking in Anchorage Management Area by year (1996–2015) and site.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Smolt releases | | | |
|  | Site | | |  |
| Site | Bird Creek a | Campbell Creek | Ship Creek | Total |
| 1996 | 147,618 | 75,943 | 227,914 | 451,475 |
| 1997 | 294,565 | 71,519 | 232,066 | 598,150 |
| 1998 | 164,211 | 83,317 | 232,765 | 480,293 |
| 1999 | 111,430 | 42,046 | 165,388 | 318,864 |
| 2000 | 97,409 | 63,730 | 260,070 | 421,209 |
| 2001 | 0 | 69,836 | 233,563 | 303,399 |
| 2002 | 0 | 69,836 | 212,639 | 282,475 |
| 2003 | 0 | 78,576 | 234,716 | 313,292 |
| 2004 | 109,949 | 85,790 | 241,006 | 436,745 |
| 2005 | 100,605 | 60,387 | 251,446 | 412,438 |
| 2006 | 104,974 | 78,805 | 252,775 | 436,554 |
| 2007 | 104,979 | 82,138 | 255,380 | 442,497 |
| 2008 | 113,035 | 83,421 | 245,490 | 441,946 |
| 2009 | 113,300 | 15,400 | 287,825 | 416,525 |
| 2010 | 157,534 | 50,214 | 252,319 | 460,067 |
| 2011 | 136,047 | 71,960 | 254,718 | 462,725 |
| 2012 | 70,004 | 0 b | 243,499 | 313,503 |
| 2013 | 110,297 | 83,088 | 273,173 | 466,558 |
| 2014 | 91,443 | 29,028 | 226,576 | 347,047 |
| 2015 | 132,870 | 52,110 | 249,401 | 434,381 |

*Source*: All stocking information is from ADF&G SF hatchery records, which goes back to an early as 1968 for some systems.

*Note:* Stocking of “catchable” size fish (about 8 inches in length) was discontinued in 2003.

a Bird Creek was not stocked from 2001 to 2003 due to construction of the parking area just north of the creek..

b Excessive mortality occurred during early rearing in 2012. No fish were stocked in Campbell Creek to ensure adequate fish were available for Ship Creek and future broodstock needs. Excess fish beyond Ship Creek needs were stocked in Bird Creek.

Appendix .–Rainbow trout stocking in the Anchorage Management Area by year (1996–2005) and site.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Year | | | | | | | | | |
| Release type | Site | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 a |
| Catchable b |  |  |  |  |  |  |  |  |  |  |  |
|  | Airstrip/Willow Pond | 985 | 1,050 | 1,181 | 1,018 | 1,497 | 1,938 | 2,200 | 1,866 | 1,671 | 1,281 |
|  | Alder Pond | 5,081 | 2,592 | 4,002 | 2,608 | 2,072 | 1,906 | 2,019 | 2,455 | 2,185 | 1,098 |
|  | Beach Lake | 4,410 | 4,244 | 4,056 | 10,312 | 10,487 | 8,087 | 10,095 | 9,614 | 11,920 | 7,527 |
|  | Campbell Creek | 5,104 | 2,686 | 2,462 | 3,030 | 4,563 | 3,909 | 2,291 | 4,264 | 1,560 | 1,697 |
|  | Campbell Pt Lake | 5,114 | 2,906 | 2,172 | 3,027 | 5,652 | 5,533 | 2,561 | 2,456 | 5,829 | 1,442 |
|  | Cheney Lake c | 10,254 | 8,946 | 5,795 | 10,963 | 14,473 | 0 | 0 | 0 | 0 | 0 |
|  | Chester Creek d | 4,975 | 2,611 | 1,000 | 1,000 | 852 | 2,335 | 2,036 | 1,779 | 976 | 613 |
|  | Clunie Lake | 9,244 | 7,662 | 4,152 | 9,346 | 4,669 | 7,804 | 3,932 | 4,613 | 6,027 | 4,895 |
|  | Delong Lake | 10,246 | 6,207 | 5,684 | 9,904 | 16,589 | 13,190 | 1,231 | 10,182 | 17,205 | 11,363 |
|  | Dishno Lake | 512 | 515 | 125 | 483 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Eagle River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Edmonds Lake | 985 | 1,017 | 1,195 | 1,009 | 500 | 1,000 | 1,723 | 1,967 | 1,474 | 943 |
|  | Fire Island L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Fish Lake | 0 | 1,054 | 1,500 | 2,473 | 1,135 | 300 | 250 | 532 | 309 | 370 |
|  | Goose L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Green Lake | 3,345 | 2,729 | 2,088 | 2,870 | 3,151 | 2,546 | 1,500 | 1,359 | 1,005 | 889 |
|  | Gwen Lake | 4,993 | 5,299 | 3,929 | 3,969 | 4,807 | 5,153 | 2,073 | 4,994 | 5,001 | 3,002 |
|  | Hillberg Lake | 3,393 | 3,054 | 2,984 | 4,014 | 4,802 | 1,645 | 1,532 | 1,889 | 1,840 | 1,744 |
|  | Jewel Lake | 13,621 | 10,189 | 8,986 | 16,794 | 15,946 | 24,622 | 14,057 | 17,344 | 20,060 | 12,656 |
|  | Lake Otis | 1,573 | 1,155 | 1,000 | 1,000 | 500 | 500 | 500 | 250 | 554 | 458 |
|  | Lower Explorer Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Lower Fire Lake | 5,170 | 3,081 | 3,350 | 2,956 | 3,000 | 3,018 | 2,976 | 2,713 | 2,109 | 1,663 |
|  | Mirror Lake | 12,789 | 13,281 | 7,032 | 11,299 | 12,469 | 20,195 | 9,299 | 7,402 | 10,812 | 9,855 |
|  | Otter Lake | 9,329 | 12,767 | 6,994 | 10,886 | 10,941 | 10,159 | 5,418 | 7,342 | 3,738 | 3,618 |
|  | Rabbit Lake | 2,553 | 0 | 0 | 1,994 | 0 | 0 | 920 | 0 | 0 | 400 |
|  | Sand Lake | 6,069 | 3,646 | 1,098 | 3,022 | 4,096 | 6,201 | 3,074 | 2,105 | 4,983 | 2,680 |
|  | Spring Lake | 1,063 | 917 | 500 | 500 | 500 | 0 | 500 | 500 | 505 | 370 |
|  | Sundi Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 |
|  | Taku Campbell Lake c | 4,213 | 3,022 | 1,898 | 3,948 | 7,942 | 0 | 2,869 | 1,804 | 3,490 | 2,225 |

-continued-

Appendix 3.–Page 2 of 3.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Year | | | | | | | | | |
| Release type | Site | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 a |
| Catchable b |  |  |  |  |  |  |  |  |  |  |  |
|  | Tangle Pond | 3,004 | 1,247 | 1,181 | 1,733 | 1,000 | 1,713 | 1,031 | 1,021 | 1,607 | 1,075 |
|  | Thompson Lake | 1,979 | 1,020 | 978 | 939 | 0 | 977 | 0 | 0 | 0 | 0 |
|  | Triangle Lake | 1,448 | 989 | 1,000 | 1,007 | 707 | 0 | 500 | 500 | 505 | 218 |
|  | University–APU Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Upper Six Mile Lake | 3,110 | 3,000 | 2,234 | 4,103 | 5,066 | 2,256 | 2,001 | 2,241 | 1,898 | 1,210 |
|  | Waldon Lake | 2,006 | 2,034 | 1,005 | 1,275 | 1,000 | 4,615 | 3,208 | 1,149 | 0 | 864 |
|  | Total | 138,564 | 110,917 | 81,579 | 129,481 | 140,416 | 131,603 | 81,798 | 94,344 | 109,267 | 74,156 |
| Subcatchable e |  |  |  |  |  |  |  |  |  |  |  |
|  | Beach Lake | 0 | 0 | 0 | 29,844 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Campbell Pt Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Cheney Lake c | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Chester Creek d | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Clunie Lake | 0 | 0 | 0 | 46,138 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Delong Lake | 0 | 51,088 | 0 | 2,769 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Dishno Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Eagle River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Edmonds Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Eklutna Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Fish Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Green Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Gwen Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Hillberg Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Jewel Lake | 0 | 53,919 |  | 6,772 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Lake Otis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Lower Fire Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Mirror Lake | 0 | 0 | 0 | 38,254 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Otter Lake | 0 | 0 |  | 49,936 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Sand Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Spring Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Year | | | | | | | | | |
| Release type | Site | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 a |
| Subcatchable e |  |  |  |  |  |  |  |  |  |  |  |
|  | Taku Campbell Lake c | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Tangle Pond | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Thompson Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Triangle Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Upper Six Mile Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | University–APU Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Waldon Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Total | 1,996 | 107,004 | 1,998 | 175,712 | 2,000 | 2,001 | 2,002 | 2,003 | 2,004 | 0 |

*Source*: All stocking information is from ADF&G SF hatchery records.

a Hatchery switched to cold water rearing, so it took 2 years to rear a catchable-sized rainbow trout.

b Catchable releases include catchable-sized and brood stock rainbow trout. “Catchable size” is about 8 inches in length.

c Cheney and Taku Campbell Lakes were not stocked starting in 2001 due to illegal introduction of northern pike.

d Includes fish stocked in University (Alaska Pacific University) Lake.

e Subcatchable releases include fry, smolt, subcatchable-sized fish, and eyed eggs.

Appendix .–Rainbow trout stocking in the Anchorage Management Area by year (2006–2015) and site.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Year | | | | | | | | | |
| Release type | Site | 2006 a | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Catchable b |  |  |  |  |  |  |  |  |  |  |  |
|  | Airstrip/Willow Pond | 616 | 500 | 313 | 200 | 0 | 0 | 2,017 | 1,534 | 1,640 | 2,308 |
|  | Alder Pond | 507 | 0 | 0 | 0 | 0 | 0 | 1,889 | 1,444 | 1,493 | 1,766 |
|  | Beach Lake | 2,802 | 0 | 0 | 0 | 0 | 0 | 18,125 | 14,479 | 10,747 | 12,075 |
|  | Campbell Creek | 1,522 | 0 | 0 | 0 | 0 | 0 | 3,139 | 2,354 | 4,465 | 3,559 |
|  | Campbell Pt Lake | 837 | 4,050 | 6,200 | 25,271 | 3,675 | 919 | 12,175 | 8,223 | 8,880 | 7,056 |
|  | Cheney Lake c | 0 | 0 | 0 | 9,942 | 497 | 124 | 5,933 | 10,162 | 7,100 | 5,895 |
|  | Chester Creek d | 326 | 0 | 0 | 0 | 0 | 0 | 935 | 1,000 | 1,000 | 902 |
|  | Clunie Lake | 2,060 | 14,857 | 9,136 | 12,259 | 0 | 0 | 10,135 | 4,273 | 10,569 | 3,617 |
|  | Delong Lake | 4,319 | 15,483 | 11,596 | 30,883 | 3,323 | 962 | 9,088 | 8,828 | 6,489 | 4,856 |
|  | Dishno Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Eagle River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Edmonds Lake | 395 | 0 | 2,256 | 0 | 0 | 0 | 990 | 1,500 | 999 | 902 |
|  | Fire Island L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Fish Lake | 100 | 842 | 1,004 | 806 | 0 | 0 | 1,423 | 1,000 | 1,748 | 2,067 |
|  | Goose L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Green Lake | 408 | 900 | 1,188 | 1,990 | 100 | 100 | 3,765 | 2,094 | 2,735 | 2,330 |
|  | Gwen Lake | 1,364 | 6,526 | 4,644 | 5,973 | 0 | 0 | 6,551 | 2,880 | 4,301 | 2,948 |
|  | Hillberg Lake | 676 | 2,588 | 3,116 | 4,843 | 0 | 0 | 4,797 | 2,000 | 2,701 | 1,774 |
|  | Jewel Lake | 4,999 | 20,397 | 13,089 | 36,946 | 5,970 | 973 | 25,886 | 13,120 | 15,461 | 10,254 |
|  | Lake Otis | 275 | 1,856 | 2,648 | 771 | 0 | 0 | 1,789 | 1,500 | 1,627 | 1,635 |
|  | Lower Explorer Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Lower Fire Lake | 846 | 0 | 0 | 0 | 0 | 0 | 3,854 | 997 | 1,017 | 0 |
|  | Mirror Lake | 4,424 | 19,131 | 7,880 | 0 | 0 | 0 | 15,332 | 16,058 | 13,758 | 12,907 |
|  | Otter Lake | 1,827 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Rabbit Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 997 | 0 |
|  | Sand Lake | 2,098 | 5,400 | 572 | 0 | 12,791 | 916 | 5,999 | 11,681 | 6,039 | 5,871 |
|  | Spring Lake | 180 | 687 | 621 | 741 | 0 | 0 | 500 | 500 | 500 | 482 |
|  | Sundi Lake | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Taku Campbell Lake c | 2,674 | 0 | 0 | 0 | 0 | 0 | 5,415 | 5,000 | 4,625 | 4,440 |

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|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Year | | | | | | | | | |
| Release type | Site | 2006 a | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Catchable b |  |  |  |  |  |  |  |  |  |  |  |
|  | Tangle Pond | 510 | 0 | 0 | 0 | 0 | 0 | 1,023 | 1,054 | 1,195 | 1,255 |
|  | Thompson Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Triangle Lake | 180 | 687 | 527 | 741 | 0 | 0 | 1,304 | 1,150 | 1,737 | 1,007 |
|  | University/APU Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Upper Six Mile Lake | 480 | 0 | 0 | 0 | 0 | 0 | 2,079 | 2,000 | 2,262 | 1,780 |
|  | Waldon Lake | 375 | 2,250 | 2,150 | 0 | 0 | 0 | 5,788 | 2,083 | 2,206 | 1,969 |
|  | Total | 34,800 | 98,161 | 68,948 | 133,375 | 28,366 | 6,005 | 151,943 | 118,927 | 118,305 | 95,670 |
| Subcatchable e |  |  |  |  |  |  |  |  |  |  |  |
|  | Beach Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Campbell Pt Lake | 0 | 0 | 0 | 0 | 10,462 | 0 | 0 | 0 | 0 | 0 |
|  | Cheney Lake c | 0 | 0 | 0 | 0 | 28,421 | 0 | 0 | 0 | 0 | 0 |
|  | Chester Creek d | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Clunie Lake | 0 | 0 | 0 | 0 | 21,125 | 0 | 0 | 0 | 0 | 0 |
|  | Delong Lake | 0 | 0 | 0 | 0 | 25,293 | 0 | 0 | 0 | 0 | 0 |
|  | Dishno Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Eagle River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Edmonds Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Eklutna Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Fish Lake | 0 | 0 | 0 | 0 | 2,025 | 0 | 0 | 0 | 0 | 0 |
|  | Green Lake | 0 | 0 | 0 | 0 | 16,755 | 0 | 0 | 0 | 0 | 0 |
|  | Gwen Lake | 0 | 0 | 0 | 0 | 7,375 | 0 | 0 | 0 | 0 | 0 |
|  | Hillberg Lake | 0 | 0 | 0 | 0 | 19,455 | 0 | 0 | 0 | 0 | 0 |
|  | Jewel Lake | 0 | 0 | 0 | 0 | 24,956 | 0 | 0 | 0 | 0 | 0 |
|  | Lake Otis | 0 | 0 | 0 | 0 | 2,970 | 0 | 0 | 0 | 0 | 0 |
|  | Lower Fire Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Mirror Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Otter Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Sand Lake | 0 | 0 | 0 | 0 | 36150 | 180 | 0 | 0 | 0 | 0 |
|  | Spring Lake | 0 | 0 | 0 | 0 | 1,015 | 0 | 0 | 0 | 0 | 0 |

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|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Year | | | | | | | | | |
| Release type | Site | 2006 a | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Subcatchable e |  |  |  |  |  |  |  |  |  |  |  |
|  | Taku Campbell Lake c | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Tangle Pond | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Thompson Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Triangle Lake | 0 | 0 | 0 | 0 | 2,025 | 0 | 0 | 0 | 0 | 0 |
|  | Upper Six Mile Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | University–APU Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Waldon Lake | 0 | 0 | 0 | 0 | 2,375 | 0 | 0 | 0 | 0 | 0 |
|  | Total | 0 | 2,007 | 2,008 | 2,009 | 202,412 | 2,191 | 2,012 | 2,013 | 2,014 | 2,015 |

*Source*: All stocking information is from ADF&G SF hatchery records.

a Hatchery switched to cold water rearing, so it took 2 years to rear a catchable-sized rainbow trout.

b Catchable releases include catchable-sized and brood stock rainbow trout. “Catchable size” is about 8 inches in length.

c Cheney and Taku Campbell Lakes were not stocked starting in 2001 due to illegal introduction of northern pike.

d Includes fish stocked in University (Alaska Pacific University) Lake.

e Subcatchable releases include fry, smolt, subcatchable-sized fish, and eyed eggs.

Appendix .–Arctic char stocking in the Anchorage Management Area by year (1996–2015) and lake.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Lake | | | | | | | |  |  |
| Year | Campbell Point | Cheney | Clunie | Delong | Jewel | Mirror | Sand | Tangle Pond | Airstrip pond | Total |
| 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1997 | 1,000 | 0 | 1,000 | 0 | 0 | 2,000 | 0 | 0 | 0 | 4,000 |
| 1998 | 852 | 40 | 2,133 | 0 | 0 | 3,908 | 0 | 0 | 0 | 6,933 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2000 | 1,027 | 0 | 0 | 0 | 0 | 2,012 | 0 | 0 | 0 | 3,039 |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 2,094 | 0 | 4,387 | 14,820 | 4,000 | 4,845 | 2,522 | 503 | 0 | 33,171 |
| 2003 | 1,796 | 0 | 4,496 | 4,400 | 4,035 | 6,117 | 4,522 | 503 | 0 | 25,869 |
| 2004 | 2,096 | 0 | 0 | 0 | 0 | 0 | 2,603 | 0 | 0 | 4,699 |
| 2005 | 1,928 | 0 | 0 | 0 | 0 | 0 | 2,194 | 0 | 0 | 4,122 |
| 2006 | 2,904 | 0 | 0 | 0 | 1 | 0 | 4,332 | 0 | 0 | 7,237 |
| 2007 | 1,142 | 0 | 0 | 0 | 258 | 0 | 6,121 | 0 | 0 | 7,521 |
| 2008 | 2,102 | 0 | 0 | 0 | 0 | 0 | 3188 | 0 | 0 | 5,290 |
| 2009 | 2,017 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,017 |
| 2010 | 1,533 | 0 | 0 | 0 | 0 | 0 | 7,434 | 0 | 0 | 8,967 |
| 2011 | 1,301 | 0 | 769 | 0 | 0 | 0 | 2,481 | 0 | 150 | 4,701 |
| 2012 | 1,372 | 0 | 1,011 | 0 | 2,814 | 0 | 1,606 | 0 | 0 | 6,803 |
| 2013 | 2,133 | 0 | 1,100 | 0 | 0 | 0 | 2,665 | 0 | 0 | 5,898 |
| 2014 | 1,796 | 0 | 988 | 0 | 0 | 0 | 2,233 | 0 | 0 | 5,017 |
| 2015 | 1,940 | 0 | 999 | 0 | 0 | 0 | 2,170 | 0 | 0 | 5,109 |

*Source*: All stocking information is from ADF&G SF hatchery records.

*Note:* Unless otherwise noted, releases are of catchable-sized Arctic char.

Appendix .–Arctic grayling stocking in the Anchorage Management Area by year (1996–2015) and site.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Site | | | | | | | |  |
| Year | APU Lakea | Beach Lake | Lower Fire Lakeb | Tangle Pondc | Sand Lake | Walden Lakec | Airport–Willow Pondd | Symphony Lake | Total |
| 1996 |  | 8,000 | 7,500 |  | 0 |  |  | 0 | 15,500 |
| 1997 |  | 0 |  |  | 0 |  |  | 0 | 0 |
| 1998 |  | 0 |  |  | 0 |  |  | 0 | 0 |
| 1999 |  | 1,048 |  |  | 0 |  |  | 0 | 1,048 |
| 2000 |  | 0 |  |  | 0 |  |  | 0 | 0 |
| 2001c |  | 4,749 |  |  | 0 |  |  | 2,936 | 7,685 |
| 2002c |  | 4,199 |  |  | 0 |  |  | 0 | 4,199 |
| 2003 |  | 7,081d |  |  | 0 |  |  | 4,239 | 11,320 |
| 2004 |  | 4,489 |  |  | 0 |  |  | 0 | 4,489 |
| 2005 |  | 279 |  |  | 0 |  |  | 0 | 279 |
| 2006 |  | 4,080 |  |  | 0 |  |  | 0 | 4,080 |
| 2007 |  | 5,668 |  |  | 0 |  |  | 0 | 5,668 |
| 2008 |  | 0 |  |  | 0 |  |  | 0 | 0 |
| 2009 |  | 3,192 |  |  | 0 |  |  | 0 | 3,192 |
| 2010 |  | 3,034 |  |  | 7,885 |  |  | 0 | 10,919 |
| 2011 |  | 215 |  |  | 6,753 |  |  | 0 | 6,968 |
| 2012 |  | 4,694 |  |  | 1,218 |  |  | 0 | 5,912 |
| 2013 |  | 1,000 |  |  | 1,477 |  |  | 0 | 2,477 |
| 2014 |  | 1,559 |  |  | 1,385 |  |  | 0 | 2,944 |
| 2015 |  | 1,402 |  |  | 1,591 |  |  | 0 | 2,993 |

*Source*: All stocking information is from ADF&G SF hatchery records.

*Note:* 2013 was the first year of releases that came from the WJHSF Hatchery.

*Note*: Unless otherwise noted, all releases are fingerlings.

a “APU” is Alaska Pacific University. Stocking was discontinued in this Lake in 1991.

b Stocking was discontinued in 1997.

c Stocking was discontinued in 1995.

d Stocking was discontinued in 1993.

**LAKE SAMPLING DATASHEETS**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Water Quality Sampling Data** | | | |  | **Location:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
| *Anchorage Stocked Lake Assessment* | | | | | **Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
| *Alaska Department of Fish and Game* | | | | | **Time:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
|  |  |  |  |  | **Sampler(s):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
| Weather:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | Snow Depth (cm):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |  |
| Wind:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | Ice Thickness (cm):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | |
| Air Temp (°C):\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | |  |  |  |  |  |
| Secchi Depth (m):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | Water Color:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |  |
| **Depth** | | **Bar Pressure** | **Temp** | | **[D.O.]** | | **pH** | **Comments** |
| **(m)** | | **(mmHg)** | **(°C)** | | **(mg/L)** | **% Saturation** |  |
| **Surface** | |  |  | |  |  |  |  |
| **0.5** | |  |  | |  |  |  |  |
| **1** | |  |  | |  |  |  |  |
| **1.5** | |  |  | |  |  |  |  |
| **2** | |  |  | |  |  |  |  |
| **2.5** | |  |  | |  |  |  |  |
| **3** | |  |  | |  |  |  |  |
| **3.5** | |  |  | |  |  |  |  |
| **4** | |  |  | |  |  |  |  |
| **4.5** | |  |  | |  |  |  |  |
| **5** | |  |  | |  |  |  |  |
| **5.5** | |  |  | |  |  |  |  |
| **6** | |  |  | |  |  |  |  |
| **6.5** | |  |  | |  |  |  |  |
| **7** | |  |  | |  |  |  |  |
| **7.5** | |  |  | |  |  |  |  |
| **8** | |  |  | |  |  |  |  |
| **8.5** | |  |  | |  |  |  |  |
| **9** | |  |  | |  |  |  |  |
| **9.5** | |  |  | |  |  |  |  |
| **10** | |  |  | |  |  |  |  |
| **10.5** | |  |  | |  |  |  |  |
|  | |  |  | |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

**Individual Fish Sampling Data Sheets: Page \_\_\_\_ of \_\_\_\_ Net/Trap #:\_\_\_\_\_\_\_**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | **Samplers:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | **Lat:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | |
| **Lake:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | **Gear Type:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | **Long:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | |
| Start Time:\_\_\_\_\_\_\_\_\_\_ | | Set Date:\_\_\_\_\_\_\_\_\_\_\_\_ | |  | |  | |
| End Time: \_\_\_\_\_\_\_\_\_\_ | | Pull Date:\_\_\_\_\_\_\_\_\_\_\_ | | **Total Fishing Time (hrs) :\_\_\_\_\_\_\_\_** | | | |

Depth (m):\_\_\_\_\_\_ Weather:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Water Temperature (°C):\_\_\_\_\_\_

Remarks:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **Species** | **Length (FL)** | **Weight (grams)** | **Card#/ Scale#** | **Floy Tag Number** | **Notes**  **(Health, Abnormalities, etc.)** |
| **1** |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |
| **8** |  |  |  |  |  |  |
| **9** |  |  |  |  |  |  |
| **10** |  |  |  |  |  |  |
| **11** |  |  |  |  |  |  |
| **12** |  |  |  |  |  |  |
| **13** |  |  |  |  |  |  |
| **14** |  |  |  |  |  |  |
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| **Fish Species Codes** Rainbow Trout- RT | Coho salmon- CS | Longnose Sucker- CC | Nine-Spined Stickleback- NSS |  |  |
| Chinook Salmon- KS | Northern Pike- NP | Arctic Grayling- AG | Three-Spined Stickleback- TSS |  |  |
| Arctic Char- AC | Alaska Blackfish- BF | Sculpins- SCL |  |  |  |

**Individual Fish Sampling Data Sheets: Page \_\_\_\_ of \_\_\_\_ Net/Trap #:\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| **Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | **Samplers:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | **Lat:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **Lake:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | **Gear Type:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | **Long:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

|  |  |  |  |
| --- | --- | --- | --- |
| Start Time:\_\_\_\_\_\_\_\_\_\_ | Set Date:\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |
| End Time: \_\_\_\_\_\_\_\_\_\_ | Pull Date:\_\_\_\_\_\_\_\_\_\_\_ | **Total Fishing Time (hrs) :\_\_\_\_\_\_\_\_** | |

Depth (m):\_\_\_\_\_\_ Weather:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Water Temperature (°C):\_\_\_\_\_\_

Remarks:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Sample**  **No.** | **Species** | **Length (FL)** | **Weight (grams)** | **Card#/ Scale#** | **Floy Tag Number** | **Notes**  **(Health, Abnormalities, etc.)** |
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| Chinook Salmon- KS | Northern Pike- NP | Arctic Grayling- AG | Three-Spined Stickleback- TSS |  |  |
| Arctic Char- AC | Alaska Blackfish- BF | Sculpins- SCL |  |  |  |

# Tables

Table .–Sampling schedule

|  |  |  |  |
| --- | --- | --- | --- |
| **Objective 1 Water Quality Monitoring** | | **Objective 2 Lake Mapping and Physical Features** | **Objective 3  Basic Population Information** |
| Sand | | Rabbit | Sand |
| Jewel | | Lower Six Mile | Jewel |
| Campbell Point | | Sundia | Campbell Point |
| Delong | | Upper Firea | Delong |
| Cheney | | Psalma | Lower Firea |
| Mirror | | Reflectionsa |  |
| Lower Firea,b | |  |  |
| Waldrona,b | |  |  |
| Gravel Pita,b | |  |  |
| a-       Not Currently Stocked | |  |  |
| b- Water Quality Monitoring will only be conducted on a monthly basis. | | |  |
|  | |  | | | |

Table .– Prescribed netting effort according to lake size.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hectares (Acres) | Days | Fyke Nets | Gillnets | Minnow Traps |
| 0-10 (25) | 1 | 4 | 4 | 4 |
| >10-20 (50) | 1 | 4 | 4 | 6 |
| >20-40(100) | 1 | 6 | 4 | 8 |
| <40 (100) | 1 | 8 | 4 | 10 |