

**Operational Plan: Density reduction of rainbow trout  
in Summit Lake, 2013-2015**

by

**Klaus Wuttig**

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June 2013

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Mathematics, statistics</b>	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	$H_A$
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	$e$
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, $\chi^2$ , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient (simple)	r
		corporate suffixes:		covariance	cov
<b>Weights and measures (English)</b>		Company	Co.	degree (angular)	$^\circ$
cubic feet per second	ft <sup>3</sup> /s	Corporation	Corp.	degrees of freedom	df
foot	ft	Incorporated	Inc.	expected value	$E$
gallon	gal	Limited	Ltd.	greater than	>
inch	in	District of Columbia	D.C.	greater than or equal to	≥
mile	mi	et alii (and others)	et al.	harvest per unit effort	HPUE
nautical mile	nmi	et cetera (and so forth)	etc.	less than	<
ounce	oz	exempli gratia	e.g.	less than or equal to	≤
pound	lb	(for example)		logarithm (natural)	ln
quart	qt	Federal Information Code	FIC	logarithm (base 10)	log
yard	yd	id est (that is)	i.e.	logarithm (specify base)	log <sub>2</sub> , etc.
		latitude or longitude	lat. or long.	minute (angular)	'
<b>Time and temperature</b>		monetary symbols (U.S.)	\$, ¢	not significant	NS
day	d	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	$H_0$
degrees Celsius	°C	registered trademark	®	percent	%
degrees Fahrenheit	°F	trademark	™	probability	P
degrees kelvin	K	United States (adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
hour	h	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
minute	min	U.S.C.	United States Code	second (angular)	"
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	standard deviation	SD
<b>Physics and chemistry</b>				standard error	SE
all atomic symbols				variance	
alternating current	AC			population sample	Var
ampere	A			sample	var
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

***REGIONAL OPERATIONAL PLAN ROP.SF.3F.2013.07***

**OPERATIONAL PLAN: DENSITY REDUCTION OF RAINBOW TROUT  
IN SUMMIT LAKE, 2013-2015**

by

Klaus Wuttig

Alaska Department of Fish and Game, Division of Sport Fish, Fairbanks

Alaska Department of Fish and Game  
Division

June 2013

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**Signature Page**

Project Title: Density reduction of rainbow trout in Summit Lake, 2013-2015.

Project leader(s): *Klaus Wuttig*

Division, Region and Area Sport Fish Division, Region III, Fairbanks

Project Nomenclature: Fish and Game Fund Project

Period Covered June 1, 2013–March 30, 2016

Field Dates: ~June 9–18, annually

Plan Type: Category I

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**Approval**

Title	Name	Signature	Date
Project leader	Klaus Wuttig	<i>Klaus Wuttig</i>	5/29/13
Research Coordinator	Matt Evenson	<i>Matt Evenson</i>	5/29/13
Regional Supervisor	Don Roach	<i>Don Roach</i>	6/3/13

# TABLE OF CONTENTS

	<b>Page</b>
LIST OF FIGURES .....	II
LIST OF APPENDICES .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
PURPOSE.....	1
OBJECTIVES.....	1
METHODS.....	2
SCHEDULE AND DELIVERABLES .....	5
RESPONSIBILITIES .....	7
REFERENCE CITED.....	7

## LIST OF FIGURES

<b>Figure</b>		<b>Page</b>
1	Map of Copper River drainage and locations of Summit, Strelna, Sculpin, and Silver lakes.....	4
2	Map of Summit Lake .....	5
3	Length composition (i.e. proportion of all fish sampled), and number of fish removed from Summit Lake, 2004–2011 .....	6

## PURPOSE

This operational plan details work that will be conducted in 2013 at Summit Lake located in the Chitina River drainage (Figures 1 and 2). The purpose of this project is to continue to utilize rainbow trout in Summit Lake to supplement the stocking program in Silver Lake, and maintain the quality of the rainbow trout fisheries in both lakes. Summit Lake was barren of fish until approximately 1962 when rainbow trout *Oncorhynchus mykiss* were illegally stocked, most likely from the nearby Tebay Lakes, and a viable population of rainbow trout was established. In the absence of any natural predators, these fish grew exceptionally large in size (i.e., >32 in), and by the mid-1980s Summit Lake was well known for its trophy-sized fish. By 1999, the population had changed from a population dominated by larger-sized fish (e.g., >24 in) to a stunted population composed almost exclusively of smaller individuals (i.e., <10 in; Fleming 2000).

Stunting is a commonly observed in salmonid populations, yet this phenomenon has been studied little, particularly in Alaska where a number of stunted populations of rainbow trout have been documented in Southeast Alaska. The removal of rainbow trout from Summit Lake since 2003 has provided a unique opportunity to monitor changes in a population's length composition to a large-scale reduction in density.

A total of ~55,500 rainbow trout have been removed and out-stocked from Summit Lake during 2003–2011 and the population structure has changed markedly over this period (Figure 3). The removal and stocking of fish has created very attractive recreational fisheries for both Silver and Summit lakes. Silver Lake is the most popular stocked rainbow trout fishery in the Copper Drainage and consistently produces high catch rates and trophy-sized fish (i.e.,  $\geq 18$  inches), which in part is attributed to stocking fish that have not been raised in a hatchery environment. Similarly, in Summit Lake, the reduction in fish densities has resulted in a population structure very attractive to anglers where once again fish up to 24 inches can be caught. This study continues the removal and stocking efforts and provides data for monitoring the changes in length composition for rainbow trout in Summit Lake in 2013, and during 2014–2015 if additional funding is acquired.

## OBJECTIVES

1. capture and remove 4,000–7,000 rainbow trout from Summit Lake over a 9-day (8-night) period during mid-June 2011;
2. describe the length composition (10-mm length categories) of all rainbow trout captured in Summit Lake; and,
3. out-stock rainbow trout  $\leq 425$  mm FL captured from Summit Lake into Silver Lake.

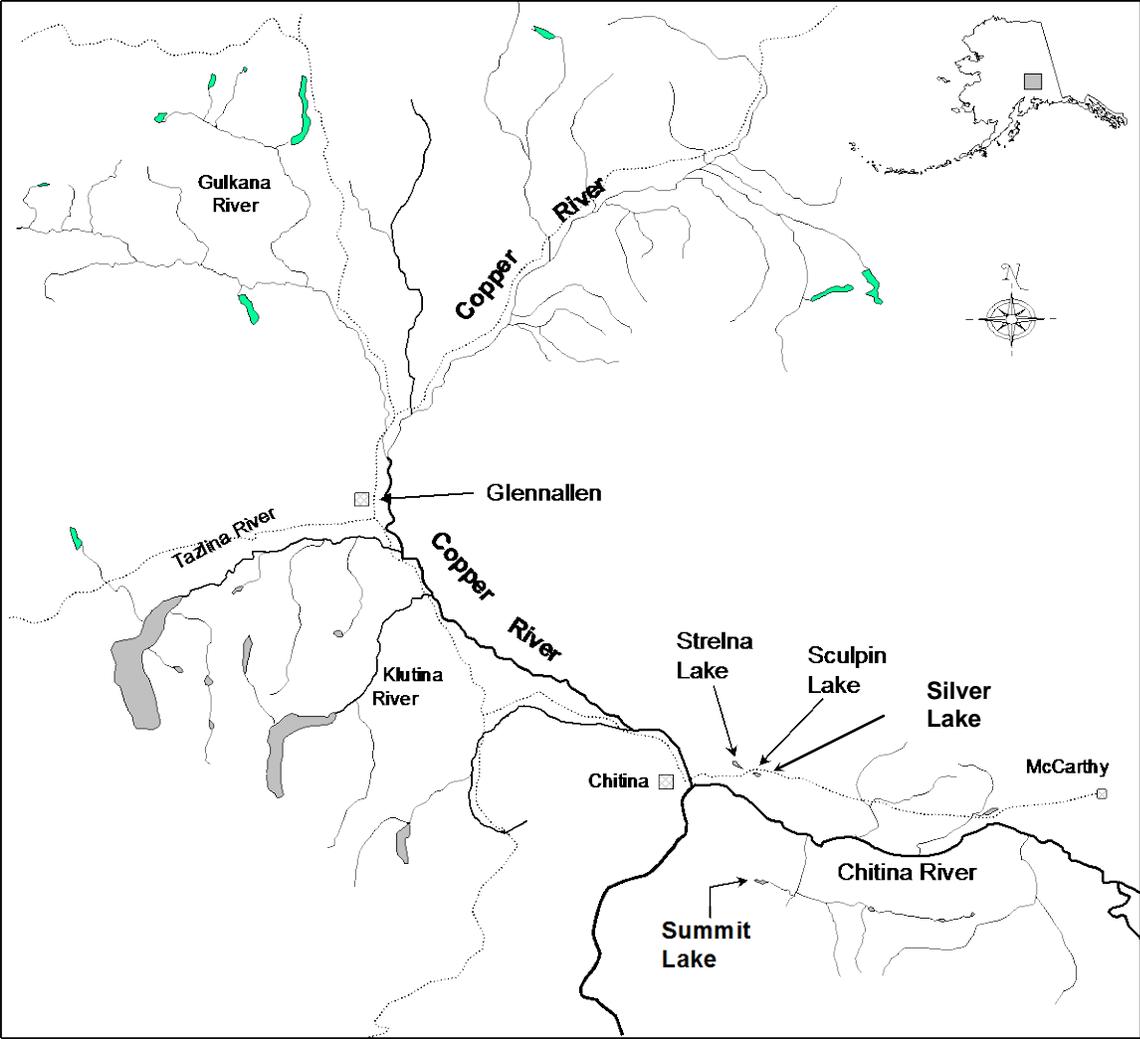


Figure 1.—Map of Copper River drainage and locations of Summit, Strelna, Sculpin, and Silver lakes.

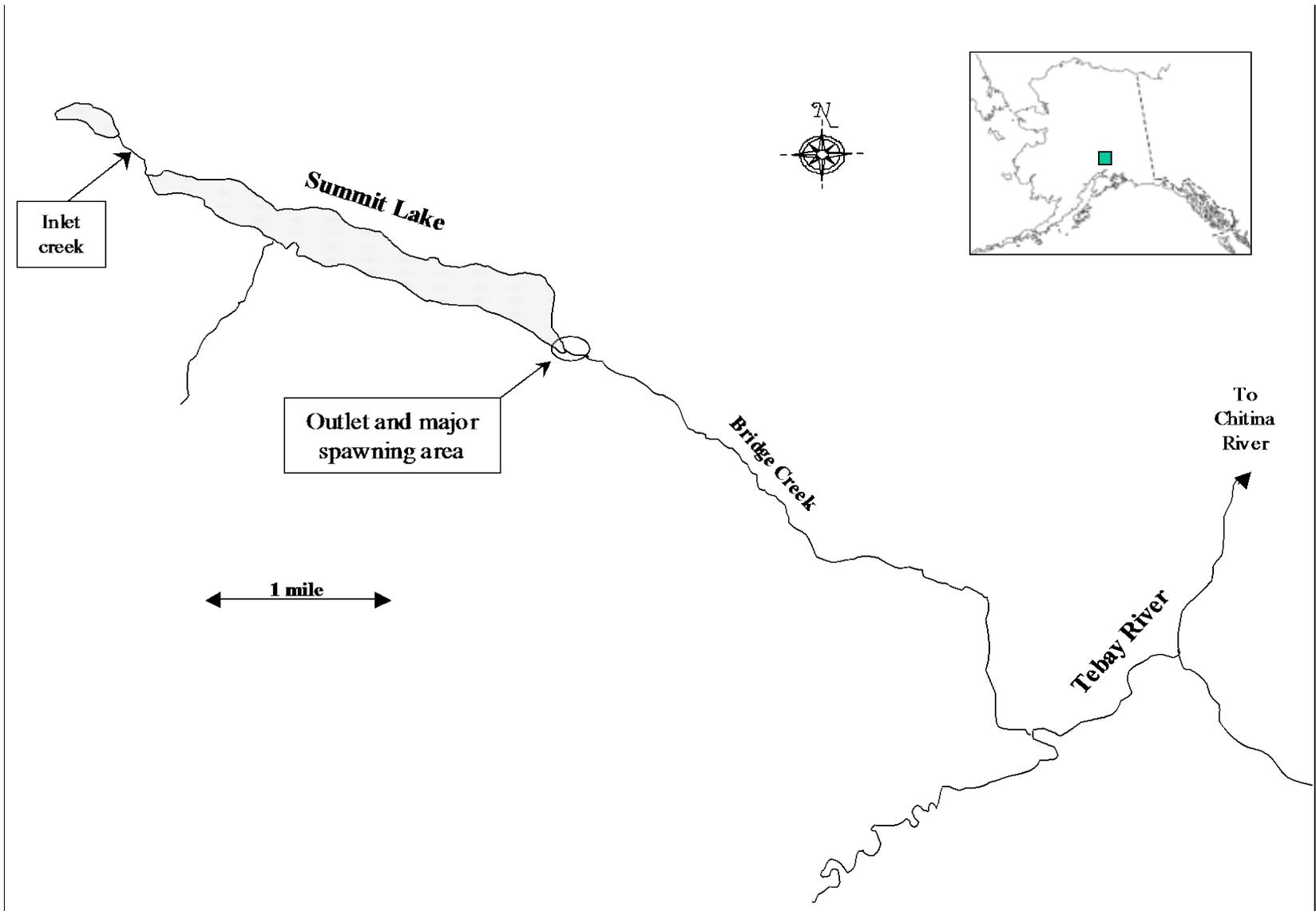


Figure 2.—Map of Summit Lake.

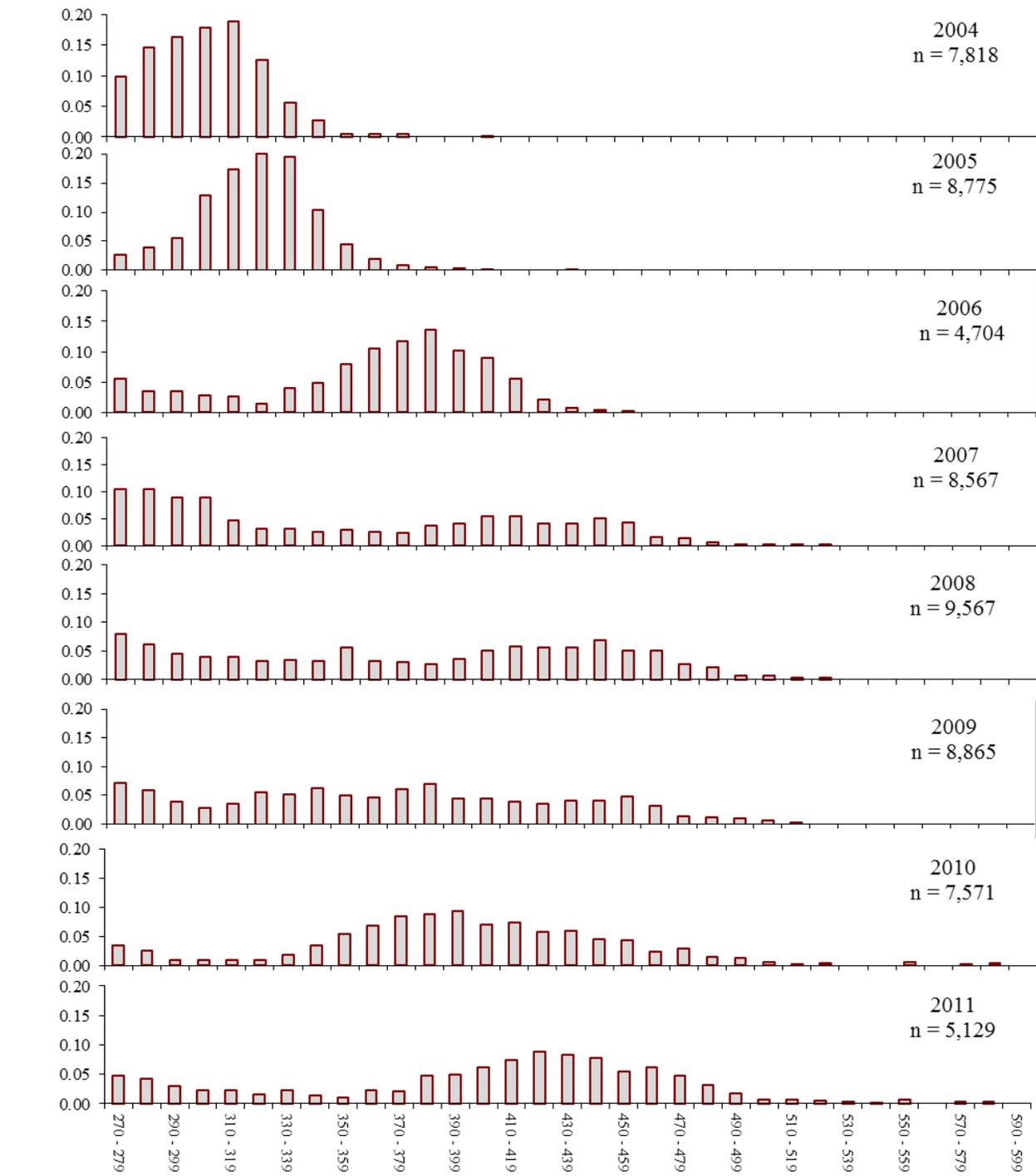


Figure 3.—Proportional length composition, and number of fish removed from Summit Lake, 2004–2011.

## **METHODS**

### **FISH REMOVAL AND OUT-STOCKING**

In 2013, and possibly 2014 and 2015, 9 days (8 gear nights) of effort will be used. In 2011, this duration resulted in ~5,975 fish being captured. Rainbow trout will be captured in Summit Lake using a combination of fyke nets and beach seines.

Two fyke nets will be placed across the entrance to the lake's outlet spawning area to provide a barrier between the outlet stream and the lake and to capture fish attempting to enter and leave the outlet spawning area. To set the fyke nets across the outlet, nets will be lashed together at the frame, with one trap facing upstream (cod end pointed downstream), one downstream, and leads extending to the shorelines. The upstream cod end will be held in position using a burlap bag filled with rocks and the stream current will maintain the position of the downstream cod end. Because of the current, trap frames and leads will be supported with 5/8-in rebar driven into the streambed at approximately 0.5-m intervals.

An additional eight fyke traps will be fished around the lakes perimeter: four along the eastern shoreline, two along the western, and one each along the northern and southern shorelines. This distribution of fyke traps has maximized catches in previous years. All fykes are fished overnight and sampled once daily.

Beach seining will be conducted near the lake's outlet and is very effective because the outlet fykes inhibit fish from moving into the outlet stream and tend to congregate in a large school. For example, in 2011, ~1,100 fish were captured in 2 seine hauls combined. The beach seine is ~90 m x 2.5 m with 2.45-cm mesh.

All captured fish will be transported to a compound of net pens positioned along the eastern shoreline near camp and held until they are out-stocked. Two out-stocking flights are planned with up to four trips to Silver Lake on a given day (see Schedules and Deliverables section). To ensure the availability of the airplane, a fixed schedule was established.

Based on catches from 2011 and a similar level of fishing effort in 2013, it is anticipated that between 4,000 and 7,000 fish of all sizes (i.e. 80 - 425 mm FL) will be removed from Summit Lake over the 9 days (8 nights) of sampling in 2013. In 2011, the 425-mm length criterion resulted in 733 fish being returned to the lake out of approximately 5,950 total captured. All fish returned will receive a left-pectoral fin clip to prevent resampling. Catches of larger-sized fish will be tallied daily along with the length criterion.

### **DESCRIPTION OF LENGTH COMPOSITION**

To expedite the processing of numerous fish, every 3<sup>rd</sup> fish will be systematically sampled for a length measurement. Every fish that has an old internal anchor tag (Floy<sup>TM</sup>) will also be sampled for length and its tag number and color will be denoted. If a tagged fish is selected, and its ordinal rank is not a multiple of three, then it will be denoted as such and will not be used in describing the length composition of fish removed. CPUE by gear type will also be tabulated.

The length composition (i.e. proportions) of rainbow trout captured in Summit Lake will be described using 10-mm length categories. Only those fish from the systematic sample (i.e. every

third fish) will be used to describe the length composition. Because of the expected large sample size (e.g.  $\geq 6,000$  fish captured and  $\geq 2,000$  fish measured for length) any error about the associated proportions is considered negligible relative to the information needed, which is a gross description of the size composition of fish that will be out-stocked into Silver Lake.

## **SCHEDULE AND DELIVERABLES**

Results of work completed in 2013–2015 will be summarized in an FDS report submitted to the Research Supervisor by March 1, 2016. The field schedule and key project milestones for 2013 are listed below. Similar dates  $\pm 2$  days will be used if this project is funded in 2014 or 2015.

~Date(s)	Sampling Activity/Milestone
April 1, 2011	Detailed operational plan completed.
June 9	Travel to Chitina, stay at Chitina Bunkhouse.
June 10	Travel to Silver Lake, fly 4-person and equipment into Summit Lake, set up camp, deploy all fykes.
June 11–13	Collect and sample fish from fyke nets and beach seine.
June 14	Exchange crewmembers (if needed), out-stock fish, collect and sample fish from all areas.
June 15–17	Collect and sample fish from fyke nets and beach seine.
June 18	Out-stock fish, dismantle camp, transport crew and gear to Silver Lake, transit to Glennallen or Fairbanks.

## **RESPONSIBILITIES**

Klaus Wuttig	Fishery Biologist III; write operational plan, assist in field operations, data analysis, and report writing.
Matt Evenson:	Research Supervisor, review operational plan and report. Assist with fish capture, sampling, and data collection.
Matt Albert:	Fisheries Biologist I, Supervise and assist with field preparations, fish capture, sampling, and data collection.
Brian Collyard:	Fish and Wildlife Technician III, Supervise and assist with field preparations, fish capture, sampling, and data collection.
Matt Robinson:	Fish and Wildlife Technician III, assist with field preparation, fish capture, sampling, and data collection.
Chad Bear:	Fish and Wildlife Technician II, assist with field preparation, fish capture, sampling, and data collection.

## **REFERENCE CITED**

Fleming, D. F. 2000. Stock assessment of rainbow trout in Summit Lake and surveys of rainbow and steelhead trout in the Gulkana River drainage, 1999. Alaska Department of Fish and Game, Fishery Data Series No. 00-33, Anchorage.