Regional Operational Plan SF.3F.2013.01

Evaluation of the Overwintering Dolly Varden Population in the Noatak River

by

Corey J. Schwanke

April 2013

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

Symbols and Abbreviations

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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	ft^3/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 (negative log of)	pH
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	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	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)	$\log_2$, etc.
minute (angular)	'
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
variance	
population	Var
sample	var

REGIONAL OPERATIONAL PLAN SF.3F.2013.01

EVALUATION OF THE OVERWINTERING DOLLY VARDEN POPULATION IN THE NOATAK RIVER

by

Corey J. Schwanke

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

Alaska Department of Fish and Game
Division of Sport Fish

April 2013

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SIGNATURE PAGE

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Project leader(s):	Corey Schwanke, *Fishery Biologist II*
Division, Region, and Area	Division of Sport Fish, Region III, Fairbanks
Project Nomenclature:	FIS 12-104
Period Covered	April 2013–July 2014
Field Dates:	15–25 July 2013, 15–25 September 2013
Plan Type:	Category II

Approval

Title	Name	Signature	Date
Project leader	Corey Schwanke	Corey Schwanke	4/10/13
Biometrician	Jiaqi Huang	Jiaqi Huang	4/10/13
Research Coordinator	Matthew Evenson	Matthew Evenson	4/11/13
Regional Supervisor	Don Roach	Don Roach	4/11/13

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PURPOSE

Many northwestern Alaska residents maintain a traditional subsistence lifestyle and rely greatly on the harvest of Dolly Varden *Salvelinus malma* from the Noatak River. These fish are typically captured with gillnets or beach seines during open water periods and with hook-and-line during winter, and in some communities they outrank salmon and whitefish in importance to the subsistence economy. Along with the subsistence fishery there is a significant sport fishery, anglers averaged over 2,000 days of fishing effort in the Noatak drainage and harvested an average of over 800 Dolly Varden annually between 1999 and 2008 (Scanlon 2011). To date, there is very little information collected on the overwintering locations of Dolly Varden in the Noatak River. Also, little is known about the outmigration timing of Dolly Varden as they leave freshwater in the spring. This information is important to managers to evaluate the potential effects of habitat perturbation and can be used in the design of future studies such as mark-recapture (e.g., help define the study area and timing of capture events) or sonar based abundance estimation projects (run timing and downstream extent of overwintering fish).

OBJECTIVES

The objectives of this study during 2012–2014 are to:

1) document overwintering locations of Dolly Varden in the Noatak River during the winters of 2012/2013 and 2013/2014.

2) Document outmigration timing of Dolly Varden in spring 2013 and 2014

BACKGROUND

NOTICE OF REVISION

This is a revised Operational Plan of the original that was completed on 25 May 2012 (Schwanke 2012). The primary modifications are that all of the elements pertaining to enumeration of the outmigration (i.e., DIDSON work) have been removed, and the radiotelemetry component that was planned for 2013 will be expanded to include capturing and radiotagging spawners during the summer.

The original plan proposed to radio tag 125 nonspawning Dolly Varden in September 2012 as they migrated from the sea to overwintering areas in the mainstem Noatak River. Tagging was to take place in mid-to-late September near the mouth of the Agashashok River (about 30 miles above the ocean confluence). Telemetric monitoring of these fish was to be conducted using 4 aerial tracking surveys during winter/spring, and with 2 tracking stations placed near the Aggie River. The aerial flights were being conducted to document overwintering areas and general outmigration timing, and the tracking stations were being used to document specific outmigration timing. In June 2013 we were scheduled to begin DIDSON feasibility work and try to locate a sonar site suitable for enumerating outmigrating Dolly Varden. This was to be performed in conjunction with radiotelemetry to make sure the timing was appropriate. During fall 2013, another 125 radio tags were to be placed into nonspawning Dolly Varden as they migrated from the ocean to overwintering areas in the mainstem Noatak River. They were to be

tracked in the same manner as the first 125 fish, but the goal was to enumerate the entire population with DIDSON technology as they outmigrated to the ocean in June 2014.

An attempt was made to radiotag 125 nonspawning Dolly Varden as they migrated from the ocean to overwintering locations from 11–20 September 2012. Our staff experienced challenging conditions characterized by high muddy water. Despite intensive sampling efforts (mainly with beach seine but also hook-and-line and drift gillnet), only 19 fish were radiotagged. It is believed that the bulk of the nonspawning fish arrived after our sampling efforts, and that they were late due to the high water flow and unusually warm weather. Also, our on-ground observations of the river revealed that the chances of successfully using DIDSON technology to enumerate Dolly Varden in the mainstem Noatak River were poor.

Due to the failed attempt to deploy an adequate number of radio tags during September 2012 and the challenging nature of using DIDSON in the mainstem Noatak to enumerate outmigrating Dolly Varden, it was decided to attempt a new approach at this study to garner the most useful and cost-effective information. Therefore, we eliminated the DIDSON enumeration component and decided to concentrate on collecting information on overwintering locations and outmigration timing (i.e., radiotelemetry). To ensure that an adequate number of tags are deployed in 2013, we are expanding our tagging efforts to include both spawning and nonspawning Dolly Varden.

Even though only 19 radio tags were deployed in September 2012, we plan on tracking these fish during the winter and during spring 2013 as they migrate to the ocean as was originally planned. Our revised approach is to spread out future tagging efforts by radiotagging Dolly Varden during the summer (spawners) and the fall (nonspawners) to document overwintering areas used by the entire population and determine outmigration timing in spring 2014. The revised goal will be to radiotag 40 pre-spawn Dolly Varden in each of the Kelly, Kugururok, and Nimiuktuk rivers during mid-to-late July 2014. We will also attempt to radiotag 40 nonspawning Dolly Varden in September 2013 at the same location as the 2012 fall sampling. Tagging efforts would start later and last longer in an attempt to deploy all the tags. Assuming better water conditions and a more average run timing, we believe our chance of success with the radiotagging is worthy. Four aerial flights will take place during the winter/spring 2014 and the two tracking stations will be operating to determine outmigration timing.

INTRODUCTION

The Noatak River is 640 km long, drains 31,000 km^2 of the western Brooks Range, and is designated as a National Wild and Scenic River (Figure 1). It originates in Gates of the Arctic National Park and Preserve, and flows westward through the central portion of the preserve. The preserve covers 6,574,481 acres in northwestern Alaska. It is bordered on the west by Gates of the Arctic National Park and Preserve, to the south by Kobuk Valley National Park, and to the west by Cape Krusenstern National Monument (Figure 1). Fish species found in the Noatak River drainage include Dolly Varden, Arctic grayling *Thymallus arcticus*, round whitefish *Prosopium cylindraceum*, longnose sucker *catastomas catstomas,* humpback whitefish *Coregonus clupeaformis*, northern pike *Esox lucius*, burbot *Lota lota*, chum salmon *Oncorhynchus keta*, and pink salmon *Oncorhynchus gorbuscha*. Inconnu *Stenodus leucichthys* utilize the lowermost section of the river for seasonal feeding.

Many northwestern and North Slope Alaska residents maintain a traditional subsistence lifestyle and rely greatly on traditional harvest of Dolly Varden from the Noatak River. These fish are

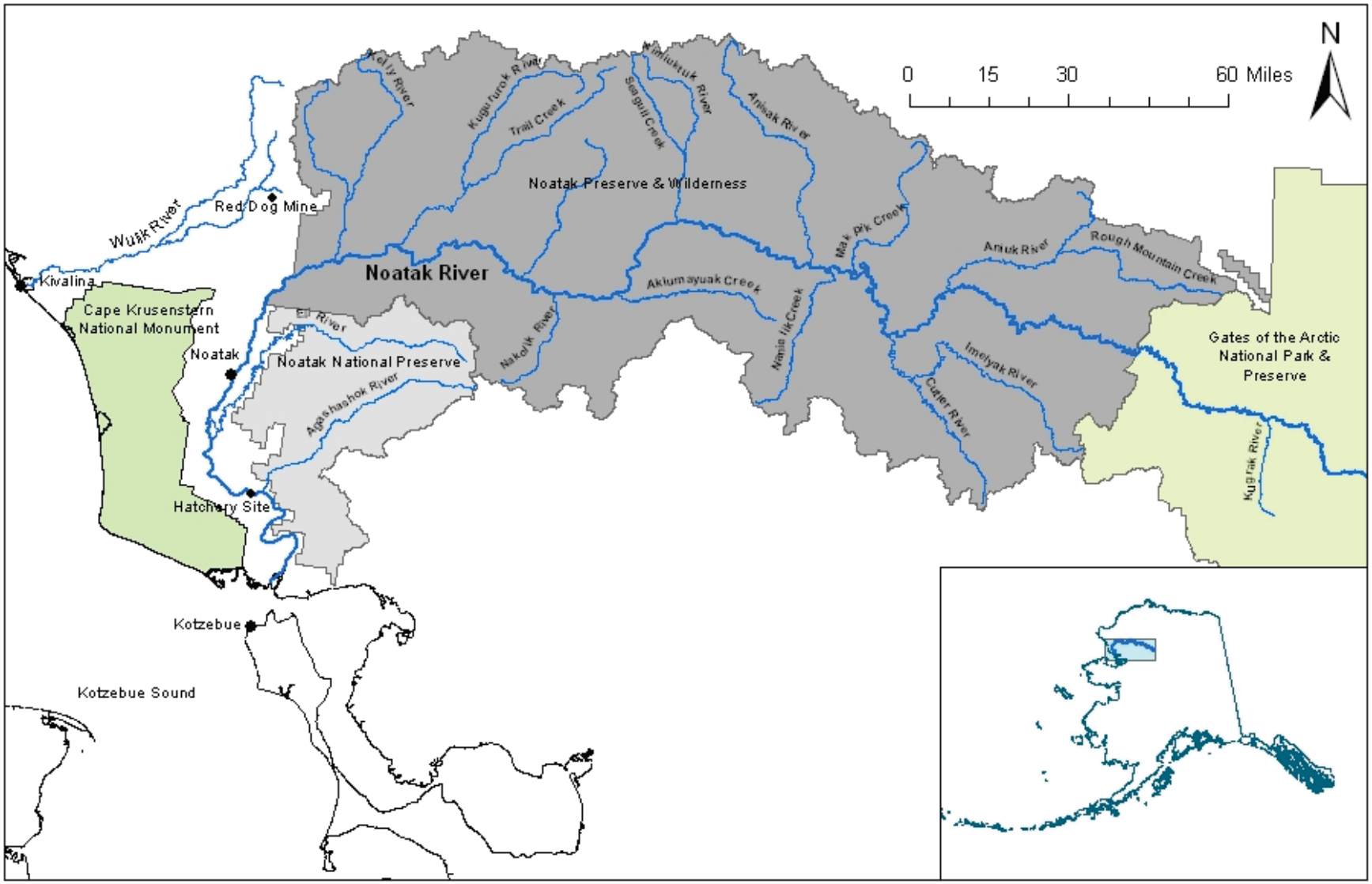

Figure 1.–Map of the Noatak River drainage.

captured with gillnets or beach seines during open water periods and with hook-and-line during winter, and in some communities they outrank salmon and whitefish in importance to the subsistence economy. Currently, fisheries managers have little defensible information relative to habitat and abundance for the overwintering population of Dolly Varden in the Noatak River, which is needed to sustain subsistence harvest levels, evaluate the potential effects of habitat perturbations, and address regulatory proposals or climatic change.

The number of Dolly Varden harvested for subsistence purposes are largely undocumented in northwestern Alaska, but vastly exceeds the number taken by sport anglers. Intermittent community subsistence harvest estimates dating to 1959 for the villages of Kivalina and Noatak (Scanlon 2011) and personal observations suggest that 15,000 to 30,000 Dolly Varden are harvested annually in this area (Brendan Scanlon, ADF&G Area Management Biologist, Fairbanks; James Magdanz, ADF&G Commercial Fish Biologist, Kotzebue, personal communications). In 2007, the residents of Kivalina harvested 67,739 pounds of Dolly Varden, second only to bearded seal in terms of pounds of harvested subsistence foods, and in Noatak, 33,771 pounds of Dolly Varden were harvested, second only to caribou (Magdanz et al. 2010). While the sport harvest is much smaller in comparison, anglers averaged over 2,000 days of fishing effort in the Noatak drainage and harvested an average of over 800 Dolly Varden annually between 1999 and 2008 (Scanlon 2011).

Several investigators have provided life history information on anadromous Dolly Varden (Craig and McCart 1976; Dempson and Kristofferson 1987; DeCicco 1989, 1997 and 2001). These fish spawn in freshwater streams and young fish will rear for 2 to 5 years before first migrating to saltwater during summer. During the brief open-water season (June to mid-September), Dolly Varden disperse along a nearshore, relatively warm (5°C to 10°C), narrow band of brackish water. Thereafter, they feed annually in saltwater during summer and migrate to freshwater systems each fall to overwinter or spawn. Mature fish ready to spawn enter rivers in mid-to-late summer and migrate directly to spring-fed areas in headwater streams where they spawn in August and September. The nonspawning, overwintering fish return to freshwater in September. For winter, post-spawning fish will drop back downstream to the preferred overwintering areas already occupied by nonspawners. Dolly Varden return to natal streams to spawn but do not necessarily return to natal streams to overwinter, and therefore, various stocks commonly mix during the winter (DeCicco 1985 and 1992). For example, overwintering aggregations in the Noatak, Wulik, and Kivalina rivers are composed of a mixture of stocks from the immediate area, Norton Sound, and as far as the Russian Far East (DeCicco 1985 and 1989).

Dolly Varden move downstream soon after breakup and enter the sea, but their migration can be impeded by sea ice until early July (DeCicco 1989). The exact timing of the downstream migrations relative to breakup has not been fully described. In the nearby Wulik River, Dolly Varden are still present in large numbers two weeks after breakup when water levels have dropped and visibility is high (William Morris, Habitat Biologist, ADF&G, Fairbanks, personal communication). In 2002, 24 spawning Dolly Varden were radiotagged in the Kugururok River drainage to describe overwintering habitats (Scanlon 2004). Nearly all of these fish overwintered near the mouths of major tributary streams (e.g., Kelly and Kugururok rivers), upstream of the Village of Noatak in the mainstem where popular wintering subsistence fishing areas exist, and a few fish remained within tributary streams.

To date, there is no additional information collected on the overwintering locations of Dolly Varden in the Noatak River. The water conditions in the Noatak River are not conducive to

aerial surveys, which are relatively effective in the neighboring smaller, clearer drainages such as the Kivalina and Wulik rivers where over 100,000 fish have been counted in some years. Also, little is known about the outmigration timing of Dolly Varden as they leave freshwater in the spring.

To date, there is no information collected on the overall overwintering locations of Dolly Varden in the Noatak River. The water conditions in the Noatak River are not conducive to aerial surveys, which are relatively effective in the neighboring smaller, clearer drainages such as the Kivalina and Wulik rivers where over 100,000 fish have been counted in some years. Also, little is known about the outmigration timing of Dolly Varden as the leave freshwater in the spring. This information is important to managers to evaluate the potential effects of habitat perturbations. More importantly, this information can be used in the design of future studies such as mark-recapture or sonar based abundance estimation projects.

METHODS

STUDY AREA

The study area includes upper sections of the Kelly, Kugururok, and Nimiuktuk rivers where it is known that spawning occurs. Also included is the Noatak River mainstem from the Nimiuktuk River confluence to the ocean (Figure 2).

EXPERIMENTAL AND SAMPLING DESIGN

Fish capture

As previously stated, 19 nonspawning Dolly Varden were radiotagged from 11–20 September 2012 in the vicinity of the Agashashok River. Beach seines, hook-and-line and gillnets were used to attempt to capture Dolly Varden in 2012, but all 19 fish were sampled with beach seine. Our tagging locations were downstream of all overwintering Dolly Varden during a telemetry study in 2003 (Scanlon 2004), were downstream of the traditional winter subsistence fishing locations, and were far enough upriver to avoid fish that may be milling near the mouth of the Noatak River. It is not known exactly how long Dolly Varden typically migrate through the planned sampling area to overwintering areas, but it is believed that the dates of 10–25 September encompass the core of the run during normal conditions (F. Decicco, retired ADF&G Sport Fish Biologist, Fairbanks, personal communication). It is also believed the core of run will be representative of the entire run in regards to length composition and overwintering location selection. In 2013, a crew of 4 people will radiotag Dolly Varden from 15–25 September with flexibility on the back end in case the fish are late to arrive. Sampling gear will be primarily beach seine with some hook-and-line effort (spinners and jigs) being used in places that cannot be seined. The number of tags planned on being deployed in the nonspawning component was reduced from 125 to 40 for 2013.

In 2013 efforts will expand to include tagging pre-spawn Dolly Varden in the Kelly, Kugururok, and Nimiuktuk rivers during the spawning migration period (mid-to-late July). We chose this approach to ensure an appropriate sample size to adequately assess overwintering areas for the entire Dolly Varden population (i.e., spawners and nonspawners) and to diversify our efforts in case the fall sampling proves to be difficult again. Multiple spawning tributaries were chosen to guard against the possibility that overwintering locations may be influenced by spawning tributary locations (i.e., fish spawning in the Niumiuktuk overwinter at the same places as the

Kelly River spawners or the nonspawning fish). Our sample size of 40 fish for each tributary is in near equal ratios as the aerial survey index counts for these tributaries (Scanlon 2011).

For the Kelly River, a crew of 3 people will base out of Red Dog Mine and will be flown daily in a helicopter to the lower portion of the known spawning areas (Figure 2) looking for concentrations of fish, landing near them, and using hook-and-line to capture them. It is assumed that 10–15 fish a day will be captured and that the tagging efforts should last 3–4 days (40 tags total). Angling gear will consist of flies, spinners and/or jigs.

A crew of 3 people will be used for sampling in each the Kugururok and Nimiuktuk rivers. Crews will access the rivers by Cessna 206 planes flying out of Kotzebue during mid-to-late July. The planes will be equipped with wheels and landings will take place on gravel bars. Crews will float through the lower end of the known spawning areas (Scanlon 2011; Figure 2) and sample Dolly Varden with hook-and-line gear consisting primarily of spinners, jigs, and flies. It is anticipated that 40 radio tags can be deployed in each river within a four day period. Sampling crews will be flown out of their respective tributaries from predetermined locations approximately 20 miles below the drop-off locations. Any tags not deployed in the tributary streams will be added to the September sampling in the mainstem.

Telemetric Procedures (2012 and 2013)

The minimum size of fish to be radiotagged for this study will continue to be 400 mm FL to ensure that they meet the criteria of 2% of the live weight of the fish recommended by Winter (1983). It is suspected that smaller sized nonspawners will be captured but all mature fish will be >400 mm FL. Transmitters used in this study will operate on 4 frequencies (150.500, 150.510, 150.530 and 150.540 MHz) with individual transmitters digitally coded for identification. The radio transmitters weigh about 11 g in the air and will be 54 mm long and 12 mm in diameter. Transmitters will be operational over a 2-year period and will be programmed to operate continuously at a pulse rate of 14–17 pulses per minute. Motion sensors will indicate when there is no movement for 24 hours or more, which would be indicative that the fish died or the transmitter was expelled. Radio transmitters will be surgically implanted following the basic surgical methods detailed by Brown (2006) and Morris (2003).

Radio transmitters will be located using a combination of ground-based tracking stations and aerial surveys. As of mid-March 2013, one aerial survey has been flown tracking the 19 fish radiotagged in September 2012. This was an opportunistic situation where Park Service employees were flying for other purposes but took some time to track the fish. The data has not been downloaded from the receiver as of yet, but the initial thought was fish were concentrated in two locations. More comprehensive flights will be dedicated to this study during the planned periods of early March, mid-April, early June, and early July for both 2013 and 2014. The March flight will be used to identify overwintering areas. The April flight will be used to ensure all radiotagged fish have been located. The last two flights will be to examine general outmigration timing. Specifically, the early June (after ice-out) flight should coincide with downstream movements and the July flight will provide a final accounting of fish still in river. If additional flights can be performed, they should be done in June during the outmigration period.

Two tracking stations were erected during early March and will track fish leaving for the ocean in spring 2013 and 2014. One tracking station was placed about 13 miles above the Agashashok River and another about 8 miles downstream of the Agashashok River at the old ADF&G sonar

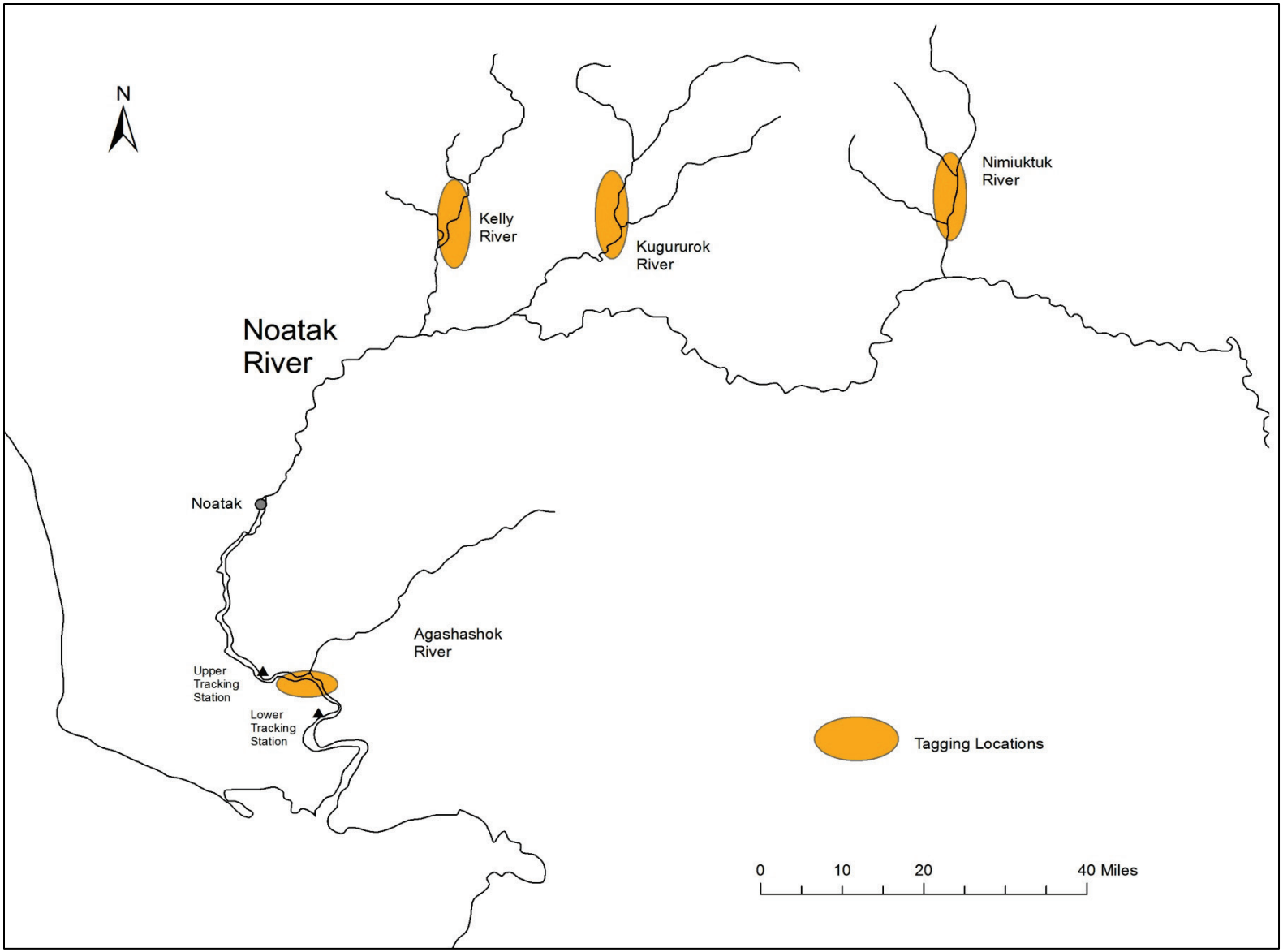

Figure 2.–Map of the radiotagging and fixed tracking station locations.

site. Each station includes 2 deep-cycle batteries, a solar array, an antenna switch box, a steel housing box, 2 Yagi antennas, a receiver, and a Globalstar™ satellite modem. The tracking stations will be operational between mid March and late September. The receiver will monitor the frequencies continuously and receive from all antennas simultaneously. When a signal of sufficient strength is encountered, the receiver will pause for 8 s on each antenna, and then transmitter frequency and code, signal strength, date, time, and antenna number (used for determining direction of travel) will be recorded on the data logger. The relatively short pause rate will minimize the chance that radiotagged fish on the other 3 frequencies will migrate past the receiver site without being detected. Recorded data will be periodically downloaded using a satellite modem.

The original sample size of 125 radio tags a year was based on finding a location for which at least 90% of the overwintering populating resides above. It was assumed that at least 85 tags would survive the overwintering period and that would provide an estimate of the proportion of fish upstream of this point that is within 10% percentage points of the true proportion 90% of the time (Cochran 1977). In 2013 we plan on deploying a total of 160 radio tags in four river segments (i.e., the Kelly, Kugururok, and Nimiuktuk tributary rivers in July and the mainstem Noatak in the vicinity of the Agashashok River in September). These sample sizes are based more on what we feel we can deploy within a reasonable amount of time at a reasonable cost. Assuming all spawning and nonspawning fish utilize similar overwintering areas and outmigration timing (this was the belief with the original OP), this sample size is sufficient to characterize overwintering areas and outmigration timing. If spawning location and maturity do influence overwintering locations, these sample sizes will be sufficient to document this. Other than the minimum size requirement of 400 mm FL, there will be no partitioning of radio tags into length classes of fish. Instead, the first 40 healthy fish captured in each tagging section will be radiotagged to achieve a random sample.

DATA COLLECTION AND REDUCTION

For each Dolly Varden captured, data collected will include: 1) measurement of fish length to the nearest 5 mm FL; 2) type of terminal gear used; 3) location (river kilometer and GPS coordinate); 4) number printed on the internal-anchor tag; and, 5) date. For all fish receiving a radio tag, additional data collected will include the radio transmitter frequency, code, and internal anchor tag number (Appendix A).

Each tracking station will record date, time, frequency, code, signal strength, and antenna number for each time a signal of sufficient strength is encountered. Tracking stations will be periodically downloaded using a laptop computer. During each aerial tracking survey, data collected for each fish will include frequency, code, latitude, longitude, and a general description of its location (e.g., approximately 1 mile upstream from the Kelly River).

During the fieldwork, data will be recorded into all-weather field notebooks and field data forms. Following all fieldwork, data items will be transcribed into an EXCEL workbook. Specifically, an EXCEL worksheet will be made with column headings related to the field data form and comments. Additional column headings may be added to provide for greater detail if deemed necessary. A brief project description in a text box will be provided for added clarity.

Coordinates of located fish will be plotted on USGS maps (represented in Alaska NAD27 Datum) using Arcview™. Water temperature will be downloaded annually and converted into an Excel Spreadsheet. Final copies of the Excel and Arcview files will be provided with the completed report when it is submitted for review to be archived in the Sport Fish Division Docushare website. The file name and directory location will be presented in the final report and can be made available upon request.

DATA ANALYSIS

To facilitate data analysis, all radiotagged Dolly Varden will be assigned a "fate" (Table 1). The known fates of all radio transmitters are required to attain unbiased parameter estimates. Fates will be assigned based on a combination of information collected from tracking stations, aerial tracking surveys and reports of harvested fish.

Because Dolly Varden are highly migratory, mortality will be easily inferred using the mortality sensor and failure to move a significant distance (e.g., 10 km) when expected, such as during June. Non-reporting of harvest by sport fishers will be considered negligible because the chance that a radiotagged fish is harvested and not reported is very small. Non-reporting of a radiotagged Dolly Varden in the subsistence fishery is likely to occur and can be easily deduced during aerial surveys. Radio transmitters removed from the water have a sharp increase in their signal strength and range, and a non-reported harvest will be inferred if such a signal is located within a village, established fish camp, or cabin, either from the air or during boat tracking surveys.

To further aid in accounting for all fates, radio transmitters and external anchor tags will have return information printed on them and a monetary reward will be offered. Local residents have voiced their support for this project and good cooperation and reporting is expected if tags are caught. Informational flyers and posters describing the project and encouraging tag returns will be posted in all villages where harvests may occur and announcements will be made at appropriate stakeholder meetings and over the radio.

Overwintering areas will be defined annually by the locations of fish in March. Based on the availability of aircraft, surveys in addition to the early-March flight may be conducted. Significant overwintering areas will be identified by clustering of radiotagged fish (e.g., 3 or more within a one-mile radius). A downstream run-timing profile at the tracking station location will be constructed where the cumulative proportion of surviving tags is presented as a function of time. Profiles will be presented annually and for both years pooled.

Table 1.–Fate assignment of Dolly Varden radiotagged in the Noatak River, 2012–2014.

Fate	Description
Failure (F)	A fish that is never located because of transmitter failure or could never be located after tagging. Fish with this fate will be culled from the data set.
Tagging Mortality (TM)	A fish that dies in response to tag implantation prior to the first aerial survey. Fish with this fate will be culled from the data set.
Fishing Mortality (FM)	In a given year, a fish reported harvested in one of the fisheries prior to passing the tracking station. Fish with this fate will not be used for identifying overwintering locations, downstream
Unkown (U)	A fish that was never located after tagging or any subsequent survey because of tag failure or because it migrated outside the search area of the survey. Fish with this fate will not used in the analysis once this fate is assigned.
Overwintering fish (OW)	A fish that survived through the OW period (Early March) but died prior its outmigration.
Downstream migrant (DM)	A fish that survived through the OW period (Early March) and migrated out of the Noatak River.

SCHEDULE AND DELIVERABLES

Dates of sampling events, milestones, and other activities for 2012–2015 are summarized in the following table.

Date(s)	Sampling activity/Milestone
25 May 2012	Original Operational Plan completed
10–21 September 2012	Deployed 19 radio tags, staged radiotracking equipment
13 March 2013	Set up tracking stations
March 2013	Aerial tracking survey
Late March 2013	Revised Operational Plan completed
31 March 2013	OSM Performance Report complete
Mid-April 2013	Aerial tracking survey
Early June 2013	Aerial tracking survey
30 June 2013	OSM Annual report complete
Early July 2013	Aerial tracking survey
Mid-to-late July 2013	Radio tag 40 fish in the Kelly, Kugururok, and Nimiuktuk rivers
15–25 September 2013	Deploy 40 radio tags in mainstem Noatak
Early March 2014	Aerial tracking survey
Mid-March 2014	Check tracking stations/ replace batteries
31 March 2014	OSM Performance Report complete
Mid-April 2014	Aerial tracking survey
Early June 2014	Aerial tracking survey
Early July 2014	Aerial tracking survey
1 May 2015	Draft of FDS/OSM Final report complete
31 October 2015	FDS/OSM Final report complete

RESPONSIBILITIES

List of Personnel and Duties:

ADF&G

Corey Schwanke:	Fishery Biologist II;	Overall supervision of project. Coordinate sampling schedules with project personnel. Analyze data and prepare reports with technical assistance.
Brendan Scanlon:	Fishery Biologist III;	Coordinate sampling schedules with summer sampling 2013. Assist with capture, sampling, and data collection for summer and fall sampling.
Jiaqi Huang:	Biometrician II;	Assist in preparation of statistical design of field investigation for operational plan, and review data analysis and final report.
Klaus Wuttig:	Fishery Biologist III;	Supervise project leader, assist with capture, sampling, data collection and review all reports.
Matt Evenson:	Fishery Biologist IV;	Assist with capture, sampling, and data collection.
Tom Taube:	Fishery Biologist IV;	Assist with capture, sampling, and data collection.
Tim Viavant:	Fishery Biologist III;	Assist with capture, sampling, and data collection.
James Savereide:	Fishery Biologist III;	Assist with capture, sampling, and data collection.
Andy Gryska:	Fishery Biologist II;	Assist with capture, sampling, and data collection.
David Stoller:	Habitat Biologist I;	Assist with capture, sampling, and data collection.
Mark Schlenker:	Fishery Technician III;	Assist with capture, sampling, and data collection.
Loren St.Amand:	Fishery Technician III;	Assist with capture, sampling, and data collection.
Matt Robinson	Fishery Technician II;	Assist with capture, sampling, and data collection.

NPS

Marci Johnson:	Fishery Biologist;	Assist with logistics and various sampling, Coordinate and conduct the aerial surveys.

Other

Local Hire	Fishery Technician;	Assist with capture, sampling, and data collection.

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APPENDIX A

Appendix A1.–Example of the field form for Dolly Varden sampling, Noatak River 2013.

Noatak River Dolly Varden Radiotelemetry

Date:_____ Samplers:_____ Page:_____

Time of Capture	Length (FL)	Capture Gear	General Location (outlet, by camp, etc)	Latitude	Longitude	Radio-Tagged (Y or N)	Floy Tag #	Frequency/Code and any comments
14:00	375	H&L	~ 1 rkm below Camp	67.4552	163.1236	N	NA	----------
15:30	520	H&L	~1.5 rkm below Camp	67.4875	163.0654	Y	0795	162.31875/ 01