

Regional Operational Plan CF.1J.14-04

Operational Plan: Northern Boundary Area Chum Salmon Monitoring, 2014–2016

by

Andrew W. Piston

June 2014

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Mathematics, statistics	
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, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient (multiple)	R
milliliter	mL	west	W	correlation coefficient (simple)	r
millimeter	mm	copyright	©	covariance	cov
		corporate suffixes:		degree (angular)	$^\circ$
Weights and measures (English)		Company	Co.	degrees of freedom	df
cubic feet per second	ft ³ /s	Corporation	Corp.	expected value	E
foot	ft	Incorporated	Inc.	greater than	>
gallon	gal	Limited	Ltd.	greater than or equal to	\geq
inch	in	District of Columbia	D.C.	harvest per unit effort	HPUE
mile	mi	et alii (and others)	et al.	less than	<
nautical mile	nmi	et cetera (and so forth)	etc.	less than or equal to	\leq
ounce	oz	exempli gratia (for example)	e.g.	logarithm (natural)	ln
pound	lb	Federal Information Code	FIC	logarithm (base 10)	log
quart	qt	id est (that is)	i.e.	logarithm (specify base)	log ₂ , etc.
yard	yd	latitude or longitude	lat. or long.	minute (angular)	'
		monetary symbols (U.S.)	\$, ¢	not significant	NS
Time and temperature		months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	H_0
day	d	registered trademark	®	percent	%
degrees Celsius	°C	trademark	™	probability	P
degrees Fahrenheit	°F	United States (adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	α
degrees kelvin	K	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	β
hour	h	U.S.C.	United States Code	second (angular)	"
minute	min	U.S. state	use two-letter abbreviations (e.g., AK, WA)	standard deviation	SD
second	s			standard error	SE
Physics and chemistry				variance	
all atomic symbols				population sample	Var var
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				

REGIONAL OPERATIONAL PLAN CF.1J.14-04

**OPERATIONAL PLAN: NORTHERN BOUNDARY AREA CHUM
SALMON MONITORING, 2014–2016**

by

Andrew W. Piston

Alaska Department of Fish and Game, Division of Commercial Fisheries, Ketchikan

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Division of Commercial Fisheries

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Signature Page

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Plan Type: Category I

Approval

Title	Name	Signature	Date
Project leader	Andrew W. Piston		06/09/2014
Research Coordinator	Steven C. Heintz		06/09/2014

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PURPOSE

The primary purpose of this project is to conduct helicopter surveys of summer chum salmon on currently monitored, large mainland river systems east of Ketchikan. Helicopter surveys will allow surveyors to obtain improved views of these streams, validate observations of chum and pink salmon abundance, identify peak chum salmon spawning periods and primary spawning areas, and improve managers' ability to identify chum salmon during routine, fixed-wing aerial surveys of other index streams in the area.

Keywords: aerial survey, chum salmon, foot survey, helicopter survey, *Onchorynchus keta*, Southeast Alaska

OBJECTIVES

1. Compare fixed-wing aerial survey counts of chum salmon to helicopter survey counts conducted on five large mainland chum salmon index streams east of Ketchikan.
2. Compare fixed-wing aerial survey counts of chum salmon to foot survey counts conducted on two smaller chum salmon index streams east of Ketchikan and one proposed index stream on Prince of Wales Island.
3. Document peak spawning periods and primary chum salmon spawning areas in targeted chum salmon index streams.

BACKGROUND

The Alaska Department of Fish and Game (ADF&G) currently monitors summer chum salmon spawning abundance in 13 index streams in the Boundary Area of southern Southeast Alaska that are assessed primarily through aerial survey methods (Eggers and Heintz 2008, Piston and Heintz 2011). Annual peak survey counts at these streams provide a meaningful indicator of trends in relative abundance and form the basis of the current lower-bound sustainable escapement goal for southern Southeast Alaska summer chum salmon (Piston and Heintz 2011). High pink salmon abundance in many of these chum salmon index streams, however, can make it difficult to identify chum salmon during routine fixed-wing aerial surveys (Van Alen 2000). This is particularly true of the large mainland river systems where the size of the rivers also makes it difficult to ground-truth aerial survey counts. Although there is broad overlap in run timing of pink and summer-run chum salmon in these rivers, chum salmon tend to spawn earlier in the season than pink salmon (Van Alen 2000), which tend to hold in deeper areas in the lower portions of the river prior to spawning later in the summer.

ADF&G Commercial Fisheries managers have expressed concern regarding their ability to obtain reliable counts of chum salmon in some of the large mainland rivers where chum salmon may be masked by high densities of pink salmon, particularly in years of low chum salmon abundance. Improved stock assessment is needed to ensure that perceived low chum salmon abundance is not simply the result of limitations in the methods used to monitor chum salmon, and to provide biologists confidence in their ability to effectively separate chum salmon from more numerous pink salmon on the spawning grounds. The primary objective of this project is to conduct helicopter surveys of summer chum salmon on currently monitored, large mainland river systems east of Ketchikan. Helicopter surveys will allow surveyors to obtain improved views of these streams, validate observations of chum and pink salmon abundance, identify peak spawning periods and primary chum salmon spawning areas, and improve managers' ability to

identify chum salmon during routine aerial surveys of other index streams in the area. Additional foot and aerial surveys conducted concurrently on three smaller chum salmon systems will similarly allow for direct comparison to aerial survey estimates. Results from these surveys will guide future chum salmon monitoring in the boundary area.

STUDY SITE

Surveys will be conducted at ADF&G summer chum salmon index streams in the Southern Southeast Subregion (SSE) of Southeast Alaska, which extends from Sumner Strait south to the Canadian border—a distance of approximately 240 km (Figure 1). The SSE Subregion includes 13 chum salmon index streams, many of which are located on the mainland east of Ketchikan, Alaska. Fixed-wing aircraft and helicopter surveys will be conducted at the five largest mainland index streams: the Tombstone (ADF&G stream no. 101-15-019), Keta (ADF&G stream no. 101-30-030), Marten (ADF&G stream no. 101-30-060), Wilson (ADF&G stream no. 101-55-020), and Blossom (ADF&G stream no. 101-55-040) rivers (Figure 1). Fixed-wing aircraft and foot surveys will be conducted at three smaller chum salmon index streams: Hidden Inlet (ADF&G stream no. 101-11-101), Carroll River (ADF&G stream no. 101-45-078), and Harris River (proposed index stream; ADF&G stream no. 102-60-082).

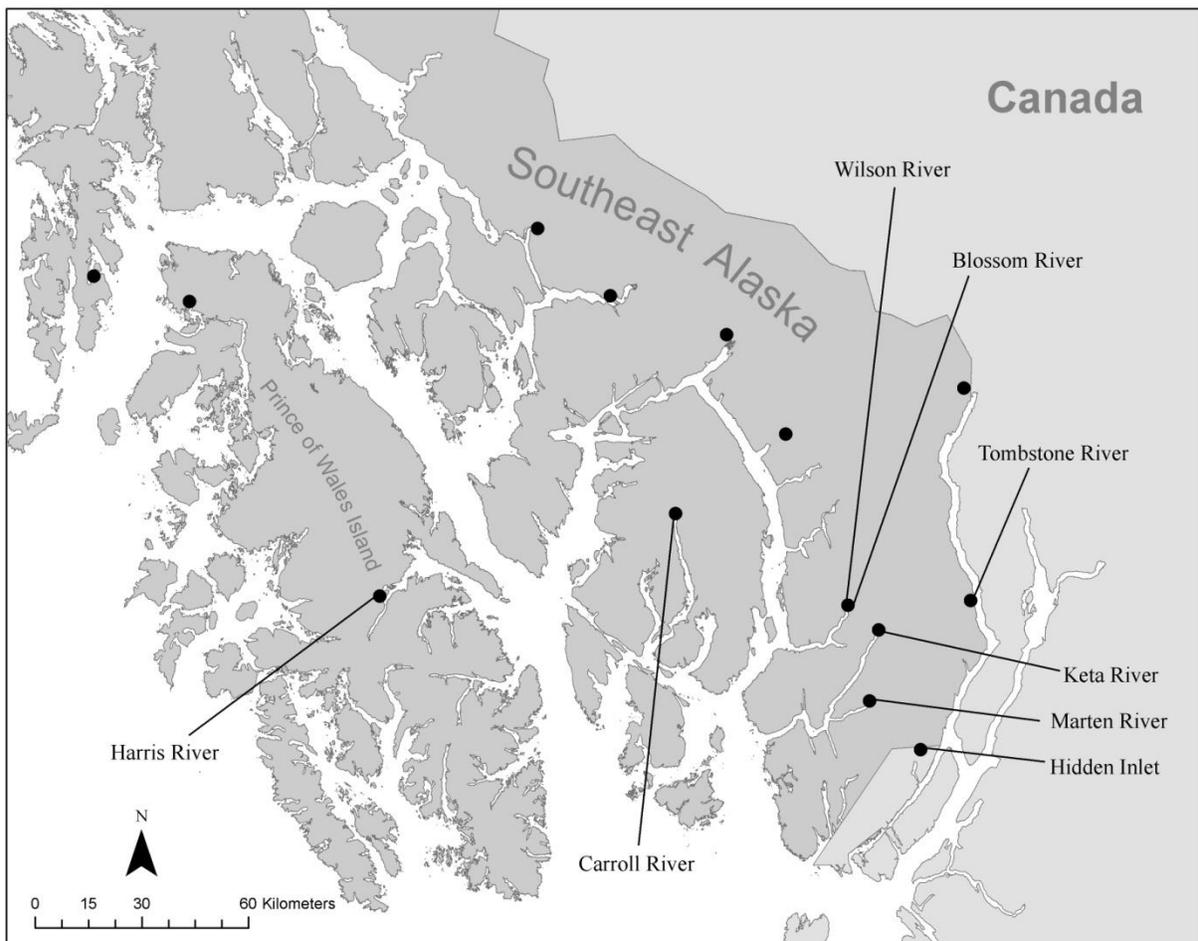


Figure 1.—Southern Southeast Subregion summer chum salmon index streams and index streams targeted for helicopter and foot surveys in 2014–2016.

METHODS

FIXED-WING AIRCRAFT AND HELICOPTER SURVEY COMPARISONS

Fixed-wing and helicopter surveys will be conducted at the five largest mainland chum salmon index streams east of Ketchikan: the Tombstone, Keta, Marten, Wilson, and Blossom rivers. Each of the three Ketchikan Area Management Biologists will fly at least one complete fixed-wing aerial survey of all five systems, followed the next day (or as soon as possible) by a complete helicopter survey of the same systems. Aerial surveys will be conducted in a Cessna 185 airplane flown at an altitude of 150 to 200 meters and a speed of approximately 110 km/hour. Helicopter surveys will be conducted in a Hughes 500 helicopter following standard survey protocols (Pahlke 1996; Shaul and Tydingco 2006). Managers will conduct the first round of surveys in late July, when chum salmon abundance is reaching a peak, and prior to the first large influx of pink salmon onto spawning areas. Two additional surveys will be conducted through at least mid-August to allow for observations under different densities and distribution of pink and chum salmon, and to ensure that the peak of chum salmon abundance was captured in late July–early August surveys. Observers will wear polarized glasses during surveys to reduce glare off the water and optimize visibility. Survey counts will be recorded on standardized escapement survey forms, along with survey conditions (visibility, water levels, weather, and tide stage) and other pertinent observations. Survey data will be entered into the Southeast Alaska Integrated Fisheries Database.

FIXED-WING AIRCRAFT AND FOOT SURVEY COMPARISONS

Comparison of fixed-wing and foot surveys will be conducted at two smaller chum salmon index streams east of Ketchikan: Hidden Inlet and Carroll River, and a proposed new index stream (Harris River) on eastern Prince of Wales Island. These three systems are easily surveyed on foot and offer good visibility from the ground. Foot surveys at Hidden Inlet and Carroll River will be conducted by research staff and available management staff on three different dates following a regularly scheduled fixed-wing aircraft survey to provide direct comparison and ground-truthing of aerial surveys. Each of these three sets of surveys will be conducted over an approximately three-week period during the peak of the run, from late July through mid-August, and spaced at least a week apart to allow for observations under different densities and distribution of pink and chum salmon. A paired aerial/foot survey of the Harris River will be conducted once in the third week of August. A foot survey conducted on 22 August 2013 was perfectly timed to capture the peak abundance of this later returning island stock. Observers will wear polarized glasses during surveys to reduce glare off the water and optimize visibility. Survey counts will be recorded on standardized escapement survey forms, along with survey conditions (visibility, waters levels, weather, and tide stage) and other pertinent observations. Survey data will be entered into Southeast Alaska Integrated Fisheries Database.

PEAK SPAWN TIMING

Peak spawning periods in targeted chum salmon index streams will be documented during the helicopter and foot surveys. Each river will be surveyed at least three times over the course of the season, which should allow for identification of peak periods of abundance and will allow for future standardization in the timing of chum salmon surveys in these streams. Surveyors will also carry a handheld Global Positioning System unit to mark areas of high chum salmon spawning

abundance if situations are encountered where fish are highly concentrated in specific areas of a river.

SCHEDULE AND DELIVERABLES

Helicopter fuel will be barged to an ADF&G fuel storage site near the Blossom River in late July or August. Helicopter, fixed-wing aircraft, and foot surveys will be conducted from late July through mid-August. Information derived from this project will also be used in a stock status report on chum salmon in the form of a Special Publication produced at 3-year intervals (next due in fall 2014). These reports will be co-authored by Piston and Heidl; other co-authors may be added.

RESPONSIBILITIES

Andrew W. Piston, FB IV, Project Leader. Oversight of all aspects of project, including planning, budgeting, sample design, permits, equipment, personnel, and training. Analyzes data and reports project results. Assists with fieldwork.

Malika T. Brunette, FB II. Assists with all aspects of the project, including operational planning, field work, data analysis, and technical report writing.

Scott Walker, FB III. Conducts fixed-wing aircraft and helicopter surveys and assists with operational planning and preparation.

Justin Breese, FB II. Conducts fixed-wing aircraft and helicopter surveys and assists with operational planning and preparation.

Bo Meredith, FB II. Conducts fixed-wing aircraft and helicopter surveys and assists with operational planning and preparation.

Kimberly A. Vicchy, Fish & Game Program Technician. Provides administrative support to the project and assists with field work.

Steven C. Heidl, Regional Research Coordinator. Assists with project operational planning, field work, and review of project report.

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