Regional Operational Plan SF.1J.2014.02

Southeast Alaska Steelhead Trout Escapement Surveys: 2014 and 2015

by

Carol L. Coyle

May 2014

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

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

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SOUTHEAST ALASKA STEELHEAD TROUT ESCAPEMENT SURVEYS: 2014 AND 2015

by

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

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Division of Sport Fish

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SIGNATURE PAGE

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Plan Type:	Category I

Approval

Title	Name	Signature	Date
Project leader	Carol L. Coyle	Carol L Coyle	7 Jan 2014
Biometrician	Daniel J. Reed	D.J. Reed	6 January 2014
Research Coordinator	Jeff Nichols		5/29/14
Management Coordinator	Bob Chadwick		1-27-14
Fisheries Biologist III	Roger Harding		1/7/2014

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ABSTRACT

Snorkel surveys have been conducted annually since 1997 to monitor the spawning abundance of steelhead *Oncorhynchus mykiss* in 10 index streams in Southeast Alaska, and will be conducted again during 2014 and 2015. These index streams are surveyed by a 2- or 3-person team using snorkel gear between mid April and early June. Snorkel crews will survey index streams to observe as many peak counts (highest count bracketed by lower counts) as possible in 10 of the index streams during 2014 and 2015; these counts will be used as inseason indices of peak steelhead abundance for Southeast Alaska and will be compared to archived indices. As in 2013, Ward Creek in Ketchikan will be surveyed instead of McDonald Lake. These surveys are intended to provide a long-term data set for evaluating trends in escapement and formulating subsequent management action.

Key words: steelhead, *Oncorhynchus mykiss*, emigration, abundance, Eagle Creek, Harris River, Humpback Creek, Ketchikan Creek, McDonald Lake Creek, White River, Slippery Creek, Petersburg Creek, Sitkoh Creek, Ford Arm Creek, Peterson Creek, Pleasant Bay Creek, weir, sex, length, abundance indices, snorkel survey, index stream.

PURPOSE

To obtain inseason indices of peak steelhead abundance in 10 streams in Southeast Alaska during 2014 and 2015 for comparison to archived indices. These surveys are intended to provide a long-term data set for evaluating trends in escapement and formulating subsequent management action.

BACKGROUND

Steelhead *Oncorhynchus mykiss* are found in coastal streams of Alaska from Dixon Entrance to the Cold Bay area on the Alaska Peninsula. Southeast Alaska (SEAK) has 309 watersheds known to support annual escapements of steelhead. Most of the known steelhead streams in SEAK are believed to contain 200 or fewer adults. However, some of the larger systems, like Karta River, may have once supported annual escapements >1,000 adult steelhead, and the Thorne River watershed is still believed to have an annual escapement >1,000. The largest known steelhead producer in SEAK is the Situk River near Yakutat, which has annual kelt counts (adult emigrants) that vary from 3,000 to just over 15,000 adults.

Steelhead harvests in SEAK generally increased from the late 1970s through 1989 (Howe et al. 1999), then began to decline until in 1994 the Alaska Board of Fisheries (board) passed conservative regulations that limited steelhead sport harvest to two fish per angler per year with a minimum size limit of 36 inches. Further, the board adopted regulations in 2009 that prohibited the retention of steelhead in drainages hosting fall runs, as well as Ward Creek, Thorne River and Karta River and all streams crossed by the Juneau road system.

From 1994 through 2012, annual harvest of steelhead in fresh water in SEAK (including the Situk River) averaged 95% less than harvest in years prior to the regulatory action (1994–2012 average = 164 steelhead harvested per year vs. 1982–1992 average = 3,274 steelhead harvested per year; Jennings et al. *in prep*). Steelhead harvest during 1993 was also significantly reduced because 48 streams were closed to retention through emergency order (EO) action. Since 1994, annual harvests have remained low.

Between 2000 and 2012, the estimated average number of steelhead caught in freshwater during the SEAK sport fishery was 14,766 fish, the estimated average number of steelhead caught and released was 13,766 fish, and the estimated average number of steelhead harvested was 100 fish (Jennings et al. *in prep*.). Incidental hooking mortality is not thought to have a detrimental impact on steelhead stocks and the use of bait is prohibited during the spring fishing season in all

systems, and similarly prohibited year around in 24 recognized fall-run steelhead streams as well as all streams crossing the Juneau road system. Hooking mortality for steelhead caught with artificial gear is estimated to be 2–3% (Hooton 1987).

Historically, little emphasis has been placed on annual evaluations of steelhead escapement in SEAK. However, in light of the stock declines observed in the early 1990s, a cost-effective method to monitor steelhead stock status and trends became necessary. This study is a continuation of a study designed to monitor steelhead escapements in a number of index systems located throughout SEAK. Foot surveys were conducted from 1994 to 1996, and snorkel surveys began in 1997. Repeated snorkel survey counts of steelhead escapement are made each year at each index stream to provide a count of peak steelhead escapement. These surveys are intended to continue indefinitely to provide a long-term data set for describing trends in escapement. Standardization of methodology began in 1997, and this data set now provides important information regarding steelhead trends in abundance to fisheries managers and to the board (Harding and Coyle 2011). From 2003 to 2006 snorkel index counts were, on average, similar or higher than those during 2000 to 2002, and 6 of the 10 index streams had record high snorkel counts from 2004 to 2007 (Table 1). The 2008–2012 counts showed a slight decrease in numbers from the recent high years; however, there was a slight increase in 2013. The recent index counts are still generally higher than the late 1990s counts (Table 1 and Figure 1). The median trend line for index counts in SEAK was slightly negative from 2005 through 2012, but rose again in 2013 (Figure 1). Record high peak counts in southern SEAK index streams (White River, Eagle Creek, and Harris River) drove the median trend line upwards. Peterson Creek on the Juneau road system also rebounded from the lowest peak count on record (12 steelhead in 2012) to a peak count of 29 steelhead in 2013.

There are no substantive changes in the methods of the survey program planned for 2014 and 2015. However, Ward Creek in Ketchikan will replace McDonald Lake due to the high cost and variable accessibility of that system. A minor change in stream reach will also be made at Eagle Creek on Prince of Wales Island due to safety issues: Reach area 4 will be eliminated, data from that reach will be removed from counts in previous years, and the regional trend line will be adjusted. This operational plan (2014 and 2015) will cover the 20th and 21st year of the steelhead survey project. The index streams to be surveyed in 2014 and 2015 are well dispersed across SEAK (Figure 2).

OBJECTIVE

The objective of this project in 2014 and 2015 is to count the number of steelhead in established index sections of 10 stream systems in Southeast Alaska from late April through early June. The counts will be made once a week for a minimum of three weeks, until a peak is detected using snorkel surveys conducted by trained observers.

METHODS

Snorkel surveys will provide inseason indices of peak steelhead abundance in 10 streams in SEAK during 2014 and 2015 (Table 2). Weir data from seven streams across the region suggest instream abundance peaks in May (Table 3). Tagging studies at weirs (Hoffman et al. 1990; Love and Harding 2008) and information on instream abundance over time (Table 3) suggest residence time for individuals and instream abundance "peaks" usually last a week or more. Thus, effort will be made to survey index streams weekly from late April through early June.

Surveys of early-system streams have started 10-14 days prior to the later systems, which start during the first week of May. An early starting date in such early-system streams is particularly critical during years with warm early spring temperatures if the surveys are to successfully bracket peak instream abundance. At a minimum, each stream will be surveyed 3 times. If the peak count occurs during the last survey, an additional survey will be conducted. Snorkel surveys will be conducted using dry suits and snorkel gear. If a scheduled survey is missed because of unsuitable weather, the missed survey will be performed as soon as conditions permit. If an entire survey is not completed, the reaches surveyed will be marked on maps (Appendix A) and the distances surveyed will be estimated using a Geographic Information System (GIS) in the Douglas office. The survey schedule will be adjusted such that a near-weekly counting interval is maintained. In addition to the base index streams, other streams may be evaluated by management staff for potential use as index systems as time and funding permit.

There are several underlying assumptions when using snorkel counts as an index of population abundance. It is assumed that there is no interannual variation in observer efficiency, arrival timing, or duration of time that spawners spend in the system (Korman et al. 2002). Even if all of these assumptions hold, one still has to assume that there is no change in detection probabilities as changes in absolute abundance occur. No objective quantitative tools are available to evaluate these assumptions for systems when only snorkel counts are available.

Objective evaluation of snorkel surveys on an individual stream requires a series or collection of annual paired observations of peak snorkel count and either total escapement count or scientifically estimated escapement. The collection of these data was completed at Sitkoh Creek in the Sitka area from 2003 to 2006 and 2008–2009 (Harding 2012), and was completed at Peterson Creek in the Juneau area from 2010 to 2011 (Coyle 2012). Expansions factors can be developed from these paired counts (snorkel survey vs. a more precise measurement of abundance such as a weir count) which can produce a snapshot of what a snorkel count can actually mean relative to a more precise form of measurement (i.e., enumeration based on a weir) in a particular index stream. The average expansion factor for Sitkoh Creek is 2.29, whereas the average expansion factor for Peterson Creek is 4.09. (Therefore a peak count of 12 fish in Peterson Creek most likely represents a peak abundance of 16 fish in the whole stream). No other snorkel survey streams have yet been identified in the strategic plan (Harding et al. *unpublished*[1]) as candidates for collection of this more detailed information, therefore no expansion factors will be developed in 2014 and 2015. In the absence of objective measures, evaluation of the utility of snorkel counts as indices of population abundance is largely dependent on the experience, perceptions, and opinions of survey personnel. At a minimum, the surveys can serve as a red flag to identify catastrophic declines in steelhead escapement in the systems where they are conducted. The surveys also provide management biologists with a minimal amount of "hands-on" steelhead information that is useful when discussing steelhead management and the health of steelhead stocks with members of the public.

[1] Harding, R. D., A.P. Crupi, D.J. Reed. *Unpublished*. Strategic Plan for Southeast Alaska Steelhead Research and Monitoring Program. Alaska Department of Fish and Game, Division of Sport Fish. Douglas, AK.

Snorkel surveys provide fisheries managers with the first snapshot of steelhead abundance, and inseason management action (i.e., system closed to fishing and/or retention of steelhead) has been initiated when surveys suggested drastically low levels of steelhead abundance. However, there are no escapement goals and thus no steelhead management plans for any steelhead system in SEAK. The snorkel surveys also provide information for postseason evaluation of abundance and when combined with harvest information, may assist state and federal managers in establishing guidelines in subsequent years. Results from the snorkel survey project are routinely provided to the board as background information for regulatory proposals.

Surveys will be conducted by at least two employees, and one surveyor will always be a senior, trained observer. In the most challenging systems, teams will consist of two snorkelers and one person walking with safety equipment and a firearm. Data for each survey in each stream will be recorded by discrete reaches of the river (numbers of reaches are tabulated in Table 2; stream reaches and access to reaches are described in Table 4 and are mapped in Appendix A). The observers will count all steelhead observed within each of the index reaches of each stream, and record counts by reach. If a shoreline third party is available, they will record the counts by reach on survey forms (Figure 3) as the survey progresses. If a shoreline party is not available, one or both snorkelers will record the counts by reach on a small plastic diver's slate using a waterproof marker until data forms are accessible.

Observers will count adult steelhead as a team during the survey. The surveyors should attempt to stay abreast of each other in the stream and coordinate their observations to obtain maximum coverage. The total number of steelhead seen will be temporarily recorded on either hand counters (tallywackers) or on a small plastic diver's slate using a waterproof marker. When passing through high concentrations of steelhead, both observers will count the number of steelhead in their area of responsibility before consulting with each other on their counts. If either or both surveyors feel that a questionable count was made in a particular pool or stretch of river, the reach will be recounted. Counts agreed upon by both observers will be recorded at the end of each reach. In addition, steelhead redds may also be counted and recorded at the discretion of the local management biologist. However, redd counts are not required and there are no current plans to catalogue or use this information on a regional basis. Particular attention should be given to observing steelhead along wide, brushy-edged habitats where fish commonly seek shelter. Steelhead tend to remain in the pools or reaches where they are encountered, generally schooling towards the downstream end of a pool bounded by a riffle.

Habitat variables that will be recorded on the form at the beginning of each survey include surface water temperature in degrees Celsius, and weather conditions (cloud cover, wind, and precipitation). Water clarity will be measured at some point in the survey using a Secchi disk. The Secchi disk will be held underwater by one observer approximately 8 inches below the surface. The second snorkel observer will then back away underwater keeping visual contact with the disk and feeding out the line while continuing backwards. The point at which the Secchi disk disappears and then reappears is the distance that should be recorded on data form (Figure 4). Effort should be taken to be consistent; on sunny days snorkelers should try to do this in the shade or with the sun at their backs. Some streams may not be wide enough to accommodate this method, but crews are encouraged to attempt to find a wide enough spot to conduct the measurement.

A permanent benchmark for water levels was established on each index system in 1997 and 1998 (description in Table 4), but some have been lost in the transition to new staff. During the period

of this operational plan, the intention is to reestablish benchmarks at Sitkoh Creek, Ward Creek, Harris River, and Eagle/ Luck Creek. The purpose of the permanent benchmark was to allow water levels to be compared from one year to the next. On each steelhead survey during 2014 and 2015, the difference in height between the current water level and the permanent benchmark will be recorded to the nearest cm.

If rain, wind, or turbidity obscure subsurface visibility, the survey will be halted temporarily until conditions improve. In addition, if the conditions are such that any member of the snorkel team is uncomfortable with conducting or continuing the survey, it will be postponed until conditions are more favorable. If conditions continue to deteriorate or do not improve, the survey will be postponed and repeated in its entirety as soon as possible. Safety is a primary consideration and observers should train with experienced personnel before conducting surveys. A safety class in swiftwater rescue is required for all snorkelers.

DATA REDUCTION

Survey personnel will be responsible for checking forms for accuracy following each survey. Counts by discrete survey reaches will be compared to the total counts to ensure counts by reach are correctly totaled. Environmental data will be compared with expected and historical trends to insure correct recording (degrees Celsius vs. degrees Fahrenheit, etc.). The area management biologist, if not a member of the survey team, will later inspect data for legibility and completeness. Survey forms will be forwarded biweekly to the Douglas office, preferably by electronic mail, to be included in the regional steelhead survey database, after initial data entry into Excel™[2] spreadsheets.

ANALYSIS

Counts for each river will be tabulated by stream reach and date. All environmental data collected will also be tabulated by date to facilitate interpretation of the relative quality of count data by stream. Counts over time will be compared with environmental data collected over time to bracket dates of peak inriver abundance, as possible.

SCHEDULE AND DELIVERABLES

2014 AND 2015 SCHEDULES AND REPORTS

Week of April 14–23	Complete the first weekly survey on each of the early systems (Table 2)
Week of April 28	Complete the first weekly survey on each of the later systems (Table 2)
Late May to early–June	Complete all snorkel surveys
Weekly	Ensure survey data are forwarded to Douglas office
September, 2016	Draft summary report covering 2014 and 2015

[2] Product names are included for completeness and do not constitute product endorsement.

This project will produce a draft Fishery Data Series report with counts for each of the survey reaches summarized for the 2-year reporting period (2014 and 2015) by September 2016.

RESPONSIBILITIES

Carol Coyle, Fishery Biologist II.

Duties: Prepare operational plan, enter survey results into the regional steelhead survey database, write report, and assist with snorkel surveys.

Roger Harding, Fishery Biologist III.

Duties: Assist with operational plan preparation, research oversight, review and edit report. Assist with snorkel surveys

Jeff Nichols, Habitat Biologist III, Regional Research Coordinator (acting).

Duties: Research oversight, assist with plan preparation and with snorkel surveys; review operational plan and data analysis, and review all reports.

Dan Reed, Biometrician III.

Duties: Provide input to sampling design and evaluation. Assist in data analysis and report writing. Review operational plan and data analysis.

Bob Chadwick, Fishery Biologist IV, Regional Management Coordinator.

Duties: Management oversight, operational planning, and coordinate index surveys in all management areas.

Kelly Piazza, Fishery Biologist III, Ketchikan Area Management Biologist.

Duties: Conduct and/or supervise staff who conduct index surveys in the Ketchikan Management Area.

Mike Wood, Fish and Game Technician IV

Duties: Assist with snorkel surveys.

Todd Johnson, Fishery Biologist II

Duties: Assist with snorkel surveys.

Micah Sanguinetti, Fish and Game Technician IV

Duties: Assist with snorkel surveys.

Craig Schwanke, Fishery Biologist III, Prince of Wales (POW) Area Management Biologist

Duties: Conduct and/or supervise staff who conduct index surveys in the POW Management Area.

Doug Fleming, Fishery Biologist III, Petersburg Area Management Biologist.

Duties: Conduct and/or supervise staff who conduct index surveys in the Petersburg Management Area.

Vera Goudima, Fish and Game Technician III

Duties: Assist with index surveys in the Petersburg Management Area.

Troy Tydingco, Fishery Biologist III, Sitka Area Management Biologist

Duties: Conduct and/or supervise staff who index surveys in the Sitka Management Area.

Patrick Fowler, Fishery Biologist II, Assistant Sitka Area Management Biologist

Duties: Conduct index surveys in the Sitka Management Area.

Dan Teske, Fishery Biologist III, Juneau Area Management Biologist.

Duties: Conduct and/or supervise staff who index surveys in the Juneau Management Area.

Judy Lum, Fishery Biologist IV, Regional Enhancement Biologist

Duties: Assist with snorkel surveys.

Dave Love, Fishery Biologist II.

Duties: Assist with snorkel surveys.

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Table 1.–Steelhead snorkel surveys conducted in Southeast Alaska, 1997 – 2013, by stream and management area. Peak count (bold) is defined as a bracketed count or a count having a lower count before and after the high or "peak" count; high count (italicized) defined as an unbracketed count and is the highest count for that year/system.

Management area	Stream name	1997 **Peak** / *high*	1998 **Peak** / *high*	1999 **Peak** / *high*	2000 **Peak** / *high*	2001 **Peak** / *high*	2002 **Peak** / *high*	2003 **Peak** / *high*	2004 **Peak** / *high*
Ketchikan									
	White River	*84*	**93**	*60*	**38**	**48**	**37**	**77**	*35*
	Ward Creek		*41* [a]					*143*[a]	
Prince of Wales									
	Harris River	*104*	**156**	**192**	**79**	*53*	*200*	*195*	**124**
	Eagle/Luck Creek	*90*	*56*	*118*	**82**	ND	**36**	*95*	*67*
Petersburg									
	Petersburg Creek	*123*	**152**	**115**	*68*	*64*	*41*	**146**	**330**
	Slippery Creek	ND	ND	ND	ND	*41*	*31*	*76*	*92*
Sitka									
	Ford Arm Creek	*296*	*103*	*89*	**134**	*28*	*122*	**181**	**379**
	Sitkoh Creek	*329*	*154*	*120*	*112*	*115*	*65*	**296**	**354**
Juneau									
	Pleasant Bay (Seymour)	*155*	**81**	*132*	**48**	*48*	**36**	**50**	**51**
	Peterson Creek	**26**	*29*	*38*	*27*	**41**	**13**	**36**	*39*

Table 1.–Page 2 of 2.

Management area	Stream name	2005 **Peak** / *high*	2006 **Peak** / *high*	2007 **Peak** / *high*	2008 **Peak** / *high*	2009 **Peak** / *high*	2010 **Peak** / *high*	2011 **Peak** / *high*	2012 **Peak** / *high*	2013 **Peak** / *high*
Ketchikan										
	White River	*67*	**41**	**85**	**45**	**45**	**42**	**47**	*73*	**110**
	Ward Creek									*35*
Prince of Wales										
	Harris River	**122**	**92**	**128**	*122*	**90**	**95**	*58*	**84**	**166**
	Eagle-Luck Creek	*102*	*154*	*134*	*8*	**137**	**69**	*54*	**116**	**154**
Petersburg										
	Petersburg Creek	**369**	**241**	**289**	**251**	**198**	**221**	**131**	**72**	**215**
	Slippery Creek	ND	*79*	**68**	**46**	**86**	**66**	*52*	**83**	ND
Sitka										
	Ford Arm Creek	**459**	**428**	**673**	**266**	**194**	**99**	**169**	**125**	**154**
	Sitkoh Creek	**259**	**213**	*70*	**167**	**201**	*35*	**68**	**69**	**99**
Juneau										
	Pleasant Bay (Seymour)	*47*	*59*	**94**	**53**	**64**	**51**	**94**	**76**	*77*
	Peterson Creek	**22**	**36**	**26**	**26**	**22**	**35**	**27**	**12**	**29**

Note: Petersburg Creek cabin hole is surveyed for local management, and is not included in the regional trend line or peak counts.

[a] This count represents only 1 snorkel survey that year.

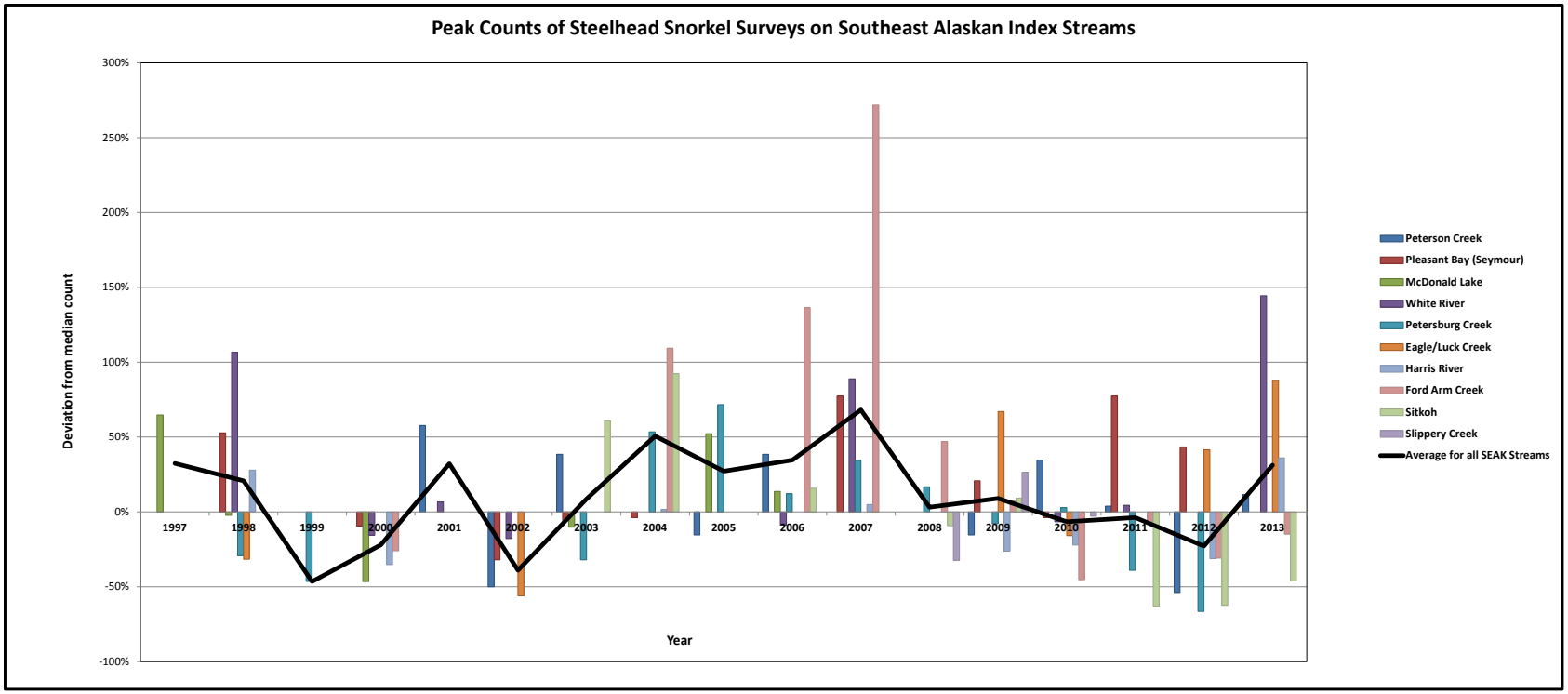


Figure 1.–The deviation of peak snorkel counts from the median count for steelhead index streams in Southeast Alaska, 1997–2013.

Note: Petersburg Creek cabin hole is surveyed for local management, and is not included in the regional trend line or peak counts.

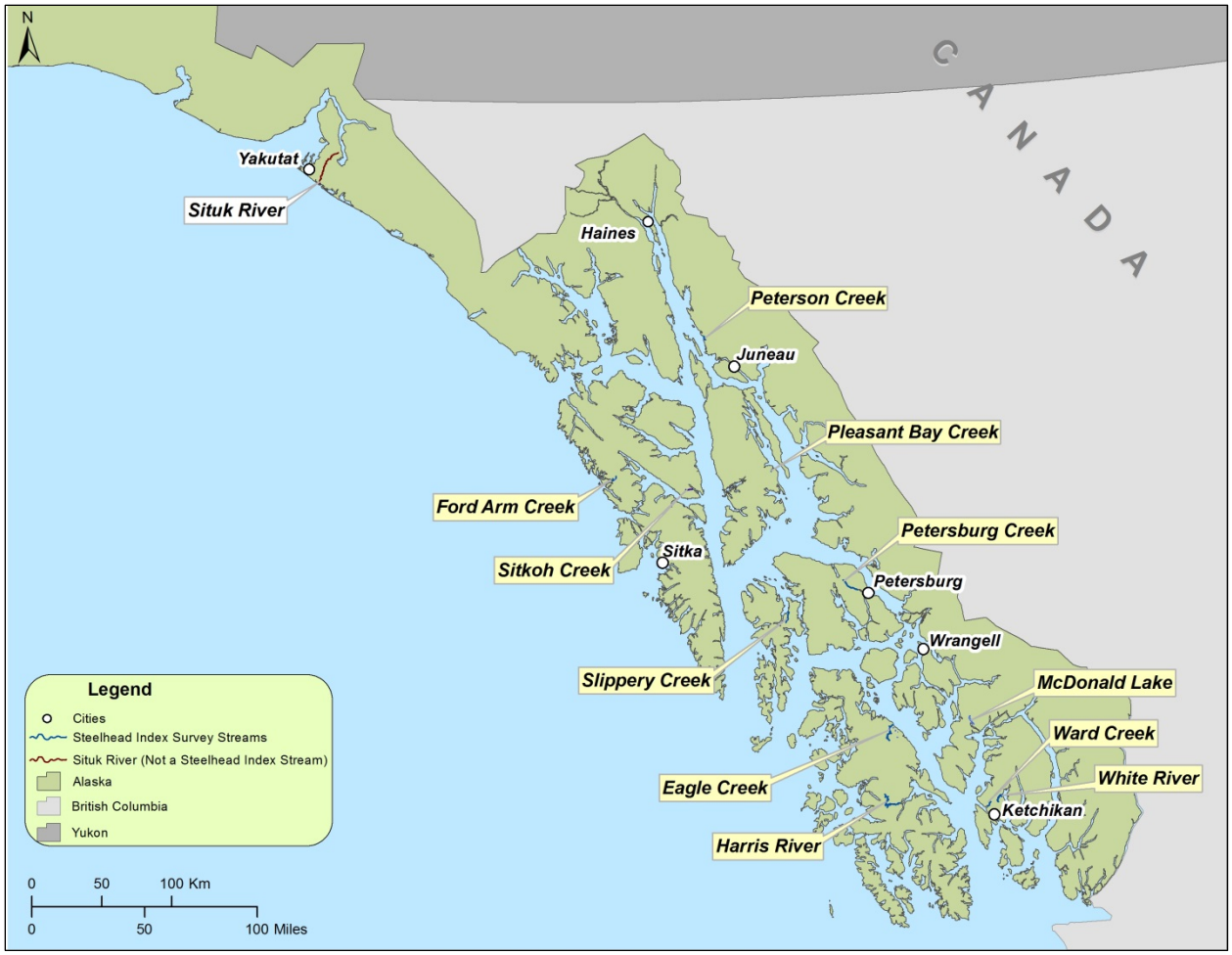


Figure 2.–Location of the ten survey streams in Southeast Alaska and McDonald Lake (now replaced by Ward Creek) and the Situk River near Yakutat.

Table 2.–Index stream name, stream number, length and percent of stream surveyed, number of survey reaches, and dates for start of weekly surveys for steelhead in 2014 and 2015.

Index Stream Name	Anadromous stream number	Area	Distance to be surveyed in meters[a]	Number of reaches[b]	Target survey start[c]
White River[e]	101-45-10240	Ketchikan	5,778	3	16–23Apr
Ward Creek[e]	101-47-10150	Ketchikan	4,219	3	16–23Apr
Harris River[e]	102-60-10820	POW	12,514	5	16–23 Apr
Eagle Creek[e, f]	106-10-10300	POW	9,238	4	16–23 Apr
Petersburg Creek[d]	106-44-10600	Petersburg	5,403	3	30 April
Slippery Creek[d]	109-43-10030	Petersburg	2,453	2	30 April
Ford Arm Creek[d]	113-73-10030	Sitka	1,364	2	30 April
Sitkoh Creek[d]	113-59-10040	Sitka	5,345	3	30 April
Peterson Creek[d]	111-50-10100	Juneau	2,559	1	30 April
Pleasant Bay Creek[d]	111-12-10050	Juneau	2,295	2	30 April

[a] This distance was measured using stream arcs in GIS and does not include tributaries or lakes – only linear mainstem stream length. This differs from previous operational plans for this project, but the survey reaches remain the same, but the distance is considered more accurate.

[b] See Appendix A for maps showing reach boundaries.

[c] Additional surveys are required if highest counts occur during last of 3 surveys.

[d] Considered “late” run systems. The surveys should begin during the week where this day falls.

[e] Considered “early” run systems. The surveys should begin during the week where this day falls

[f] Reach area 4 for Eagle Creek will be dropped due to safety concerns. Numbers in summary tables and figures will be corrected for this change and will differ from past operational plans and reports.

Table 3.–Steelhead run timing past weirs in Southeast Alaska including dates when 75% and 90% of the upstream immigrations were complete and, where available, the estimated peak of inriver abundance (immigration counts minus emigration counts).

		Immigration		Peak of inriver
Stream	Year	75%	90%	abundance
Karta River	1989[a]	30–Apr	11–May	16–May
	1992[b]	1–May	9–May	2–May
	2005[c]	30–Apr	15–May	5–May
Ward Creek	1993[d]	10–May	15–May	17–May
	1994	8–May	20–May	21–May
Sitkoh Creek	1936[e]	19–May	23–May	ND
	1937[e]	23–May	28–May	ND
	1982[f]	17–May	22–May	ND
	1990[g]	11–May	17–May	15–May
	1993[h]	11–May	18–May	19–May
	1996[i]	15–May	24–May	19–May
	2003[j]	7–May	18–May	11–May
	2004[j]	8–May		17–May
	2005[k]	8–May	17–May	9–May
	2006[k]	21–May	26–May	26–May
	2007[l]	24–May	31–May	20–May
	2008[l]	22–May	28–May	23–May
	2009[m]	14–May	27–May	27–May
Peterson Creek	1989[n]	16–May	25–May	21–May
	1990[o]	20–May	26–May	24–May
	1991[p]	16–May	20–May	22–May
	2010[cc]	6–May	11–May	12–May
	2011[cc]	20–May	30–May	20–May
Petersburg Creek	1973[q]	ND	ND	25–May
	1974[r]	18–May	24–May	25–May
	1975[s]	21–May	28–May	29–May
Ratz Creek	2010[bb]	7–May	19–May	24–April
	2011[bb]	13–May	23–May	14–May
Situk River	1994[t]	ND	ND	21–May
	1996[u]	ND	ND	18–May
	1997[v]	ND	ND	5–May
Windfall Creek	1997[w]	8–May	12–May	24–May
12 Mile Creek	2004[x]	18–Apr	26–April	ND
Natzuhini Creek	2007[y]	11–May	20–May	ND
Cable Creek	2006[z]	1–May	8–May	ND
Eagle/Luck Creek	2006[z]	12–May	19–May	ND
Harris River	2005[aa]	27–Apr	12–May	ND

-continued-

Table 3.—Page 2 of 2.

[a] Hoffman et al. (1990)
[b] Harding and Jones (1993)
[c] Hoffman (2008)
[d] Freeman (1995)
[e] Reported in 5-day intervals (Chipperfield, W.A. *Unpublished*. Report on Dolly Varden trout research Sitkoh Bay stream. U.S.Forest Service, Juneau, AK)
[f] Jones (1983)
[g] Jones et. al. (1991)
[h] Harding and Jones (1994)
[i] Yanusz (1997)
[j] Love and Harding (2008)
[k] Love and Harding (2009)
[l] Love et al. (2012a)
[m] Love et al. (2012b)
[n] Harding and Jones (1990)
[o] Harding and Jones (1991)
[p] Harding and Jones (1992)
[q] Petersburg Creek, Jones (1972–1974)
[r] Jones (1975)
[s] Jones (1976)
[t] Float counts used to identify peak run timing, Johnson (1996)
[u] Bain et al (2003)
[v] Float counts used to identify peak run timing, Johnson and Jones (1998)
[w] Yanusz (1998)
[x] Hoffman (2007)
[y] Piazza (2009a)
[z] Piazza (2009b)
[aa] Piazza et al. (2008)
[bb] David Love, , ADF&G fisheries biologist, Douglas, Alaska, personal communication
[cc] Coyle (2012)

Table 4.–Site specific information for steelhead index systems.

Management area: Stream name (Streams in **Bold** are annual index streams)	**Description of index area and directions for access**
Ketchikan: **White River**	Obtain key from Cape Fox Corporation to access locked gate. Drive out Ward Lake Road to locked gate accessing Cape Fox property. Area 1 starts in upper reach of creek at merger of three forks and continues downstream to second large logjam going downstream. The top of this reach is reached by walking down first right hand spur road driving down into this drainage. Area 2 runs from log jam downstream to pulled logging bridge. Area 3 runs from pulled bridge downstream to ¼ mile below lower bridge crossing of White River. Survey is facilitated by leaving second vehicle at lower bridge crossing of White River. The water level is measured from the lower bridge crossing of White River located in Area 3.
Ketchikan: **Ward Creek**	Drive to Grassy Point parking area to drop off a second vehicle and proceed to Connell Lake Dam parking area. Walk down the footpath to the base of the dam and start survey. Area 1 begins at the base of the dam and continues to the top of the gorge located downstream from Last Chance Campground. Pull out there and walk the Ward Creek trail approximately 0.4 miles until you see large waterfall. Return to the creek at the corner pond located at the bottom of the gorge and resume survey. Area 2 starts here and continues to the hole just above the old swinging bridge. Near the end of area 2, you will reach a large Y in the creek, proceed downstream along river-left until till the two channels come together. Walk the other stream channel upstream to the falls and survey downstream. Area 3 starts at the old swinging bridge hole and continues to the Ward Lake. End survey.
POW: **Harris River**	Using two vehicles drive to the Rec Bridge and park one vehicle. Drive the second vehicle to Hydaburg Bridge where survey crew #1 hikes two pools upstream or approximately 300 yards to begin survey of reach 5. Reach 5 continues downstream to the Hydaburg Bridge. Area 4 starts at the bridge and continues for approximately 1.5 hours to the reach break for Area 4/3 which a small unnamed creek. Area 3 continues to the Blown Out Bridge where survey crew #1 exits the stream and walk to vehicle parked nearby. After dropping off survey crew #1 at the Hydaburg Bridge, survey crew #2 drives to the Blown Out Bridge, parks vehicle and begins survey of Area 2. Area 2 continues downstream to the Rec Bridge. Area 1 is a short reach from the Rec Bridge continuing a few hundred yards downstream. Hike back to vehicle parked at the Rec Bridge and drive to Blown Out Bridge to meet survey crew #1. Survey crews consist of 2 people for each crew for a total of 4 crew members to complete the Harris River survey as it is very long. Currently the crews consist of a mixture of experienced surveyors from ADF&G DSF and the US Forest Service.
POW: **Eagle Creek**	Drive to upper Luck Creek to bridge on road 30334 and survey downstream to Luck Lake. Area 1 begins at the road bridge and continues to the base of the second large falls. Area 2 begins at the base of second large falls to Luck Lake. Drive around Luck Lake, stage rig or have driver drop off surveyors at the Luck Lake Campground and walk the beach to the outlet of Luck Lake. Area 3 begins at the outlet and continues downstream to the top of the canyon. End survey. Hike out along fisherman's trail back to vehicle. *Note:* Area 4 was dropped in 2014 for safety concerns.

-continued-

Table 4.–2 of 2.

Management area: Stream name	**Description of index area and directions for access**
Petersburg: **Petersburg Creek**	The best option is to jet skiff upstream at high tide to Hammer Slough (the upper extent of tide water), adjacent to two cabins the day prior to the survey. Leave the jet boat overnight and return to town via a second jet skiff. Fly to the lake the next day. Reach 1 begins approximately 0.5 mi below the lake outlet at the confluence with a tributary stream entering from river-right, and ends at the confluence with Shakey Frank's Creek 2.7 miles downstream. Within this reach, a 0.6 mi portion of this reach is not surveyed for safety reasons, and bypassed using the foot trail. Reach 2 extends 1.4 mile to the large stable logjam blocking upstream boat traffic. Reach 3 extends 1.8 mi downstream ending at Hammer Slough, where three cabins are located. A benchmark includes a metal spike driven into a vertical bedrock wall on river-left, 100 meters upstream from the survey's end. When survey is completed, Jet boat back to town. Total surveyed distance is 5.3 miles. *Note:* Cabin hole is surveyed for local management , and is not included in the regional trend line or peak counts.
Petersburg: **Slippery Creek**	Fly-in from Petersburg via floatplane to the outlet creek at Slippery Lake on Kuiu Island. Survey reach 1 downstream .5 mile to the smolt trap site. Survey reach 2 (1.5 miles) from the smolt trap to the fish pass (note any upstream fish passage problems). Record depth at the staff gauge located on the fishpass bulkhead. Hike one mile to beach for saltwater floatplane pick up in Port Camden.
Sitka: **Sitkoh Creek**	Survey area starts at the lake outlet and extends to tidewater. The stream reach boundary between 1 and 2 is the logjam just above the canyon where the trail adjacent to the stream bypasses about ½ mile of high gradient water. Reach 2 extends between the area where the trail again meets the stream and a tributary enters on the left as the ridge on the left going downstream is approached. Reach 3 continues from the end of reach 2 downstream to saltwater. The benchmark for this stream is in bedrock near tidewater on river left, but has not been recorded at least since 2009.
Sitka: **Ford Arm Creek**	Survey area starts at the lake outlet and extends to tidewater. The boundary between the two stream reaches is the tributary that enters on river right about halfway through the survey. The permanent benchmark is a rock located on river right just below weir site at the outlet of the lake.
Juneau: **Pleasant Bay Creek**	Charter in to the lake and hike downstream through muskeg meadows on the right side of the stream facing downstream. Survey starts at the barrier falls and continues downstream to the break between Area 2 and Area 3 (approximately 3,000 ft above tidewater). The permanent benchmark is on the large bedrock outcropping on the right side of the stream going downstream between area #1 and area #2.
Juneau: **Peterson Creek**	Peterson Creek is located at 25 mile on Glacier Highway. Park at the main highway bridge and hike upstream to the barrier falls. Survey area goes from the falls downstream to the highway bridge. The permanent benchmark is on the steel piling under the main highway bridge.

White River Stream 101-45-10240. Survey Date:_____ ____/____/2014

Reach No. Code	Initials - Primary Observer	Reach Name or Description	Survey Type Code	Distance Surveyed (miles)	Tide Code	Visibility Code	Water Level Code	Weather Code	Staff Gauge Level/Depth (cm)	Secchi Disk (meters)	Water Surface Temp. (cel)	Remark Codes	Steelhead live	Steelhead dead	# Redds	Rainbow	Dolly Varden	Cutthroat	Coho	Comments

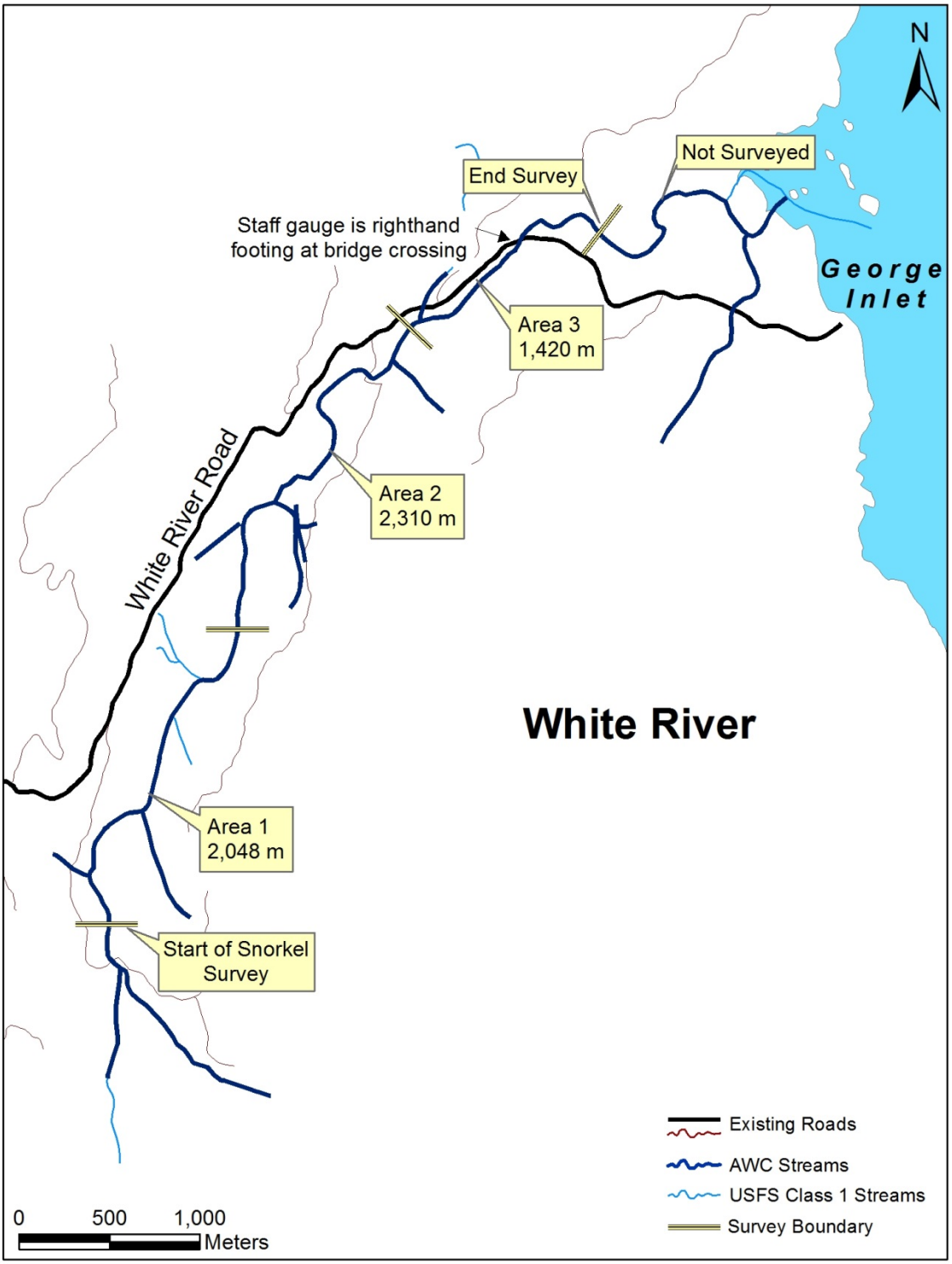
Survey Type Codes	Tide Codes	Visibility Codes	Water Level Codes	Weather Codes	Remark Codes
F = Foot	41 = High	21 = Excellen	31 = High	C = Clear	11 = Fish present but not counted at mouth
S = Snorkel	42 = Low	22 = Normal	32 = Normal	O = Overcast	12 = Fish present but not counted in tidal
B = Boat	43 = Interme	23 = Poor	33 = Low	R = Raining	13 = Fish present but not counted in stream
				W = Wind on Water surface	

Observer Names: _____

Figure 3.–Sport Fish Steelhead Escapement Survey Form (White River used as an example).

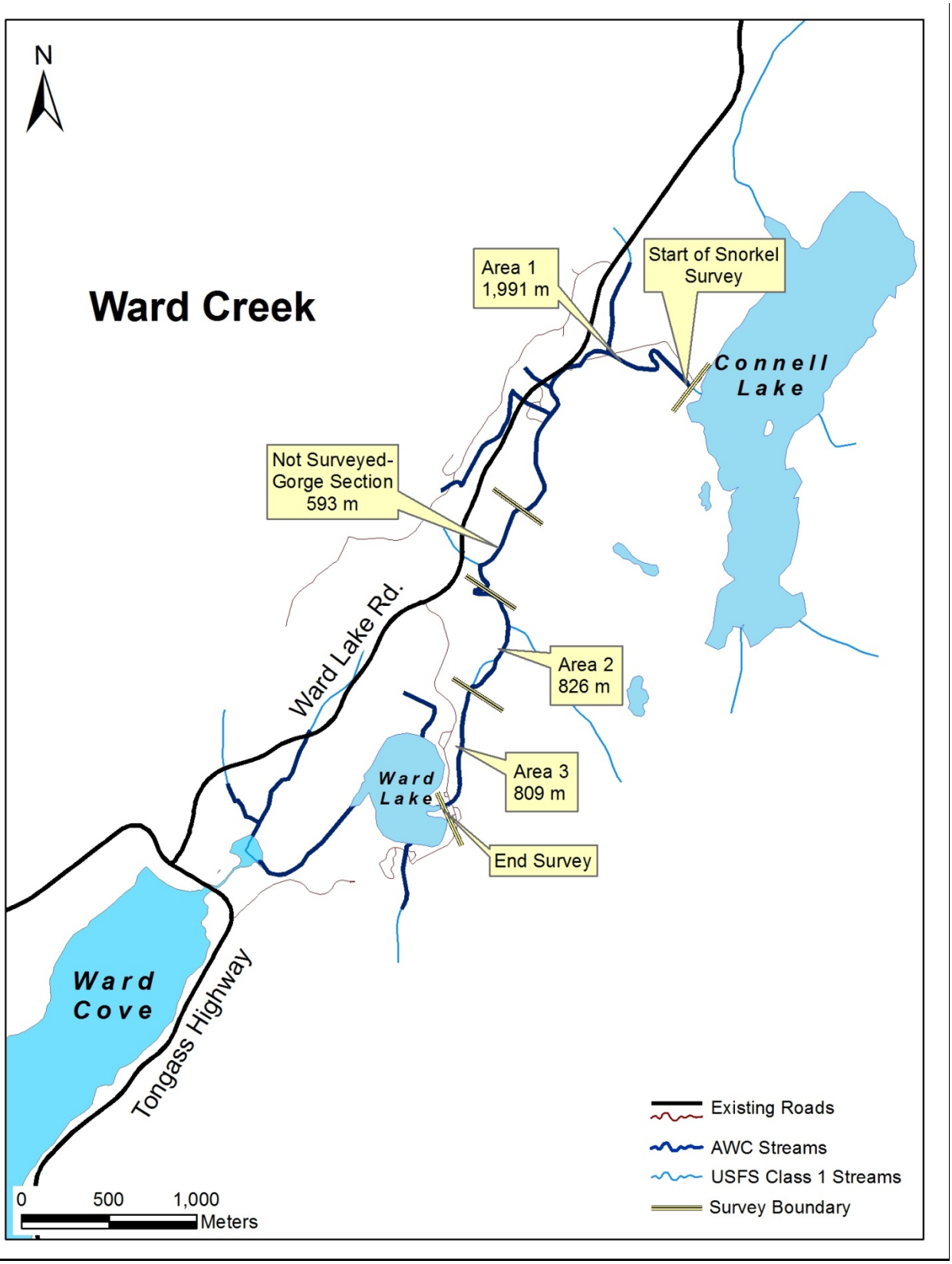
APPENDIX A: STREAM MAPS SHOWING DISCRETE COUNTING REACHES

Appendix A1.–White River, Ketchikan Index Stream: AWC # 101-45-10240.



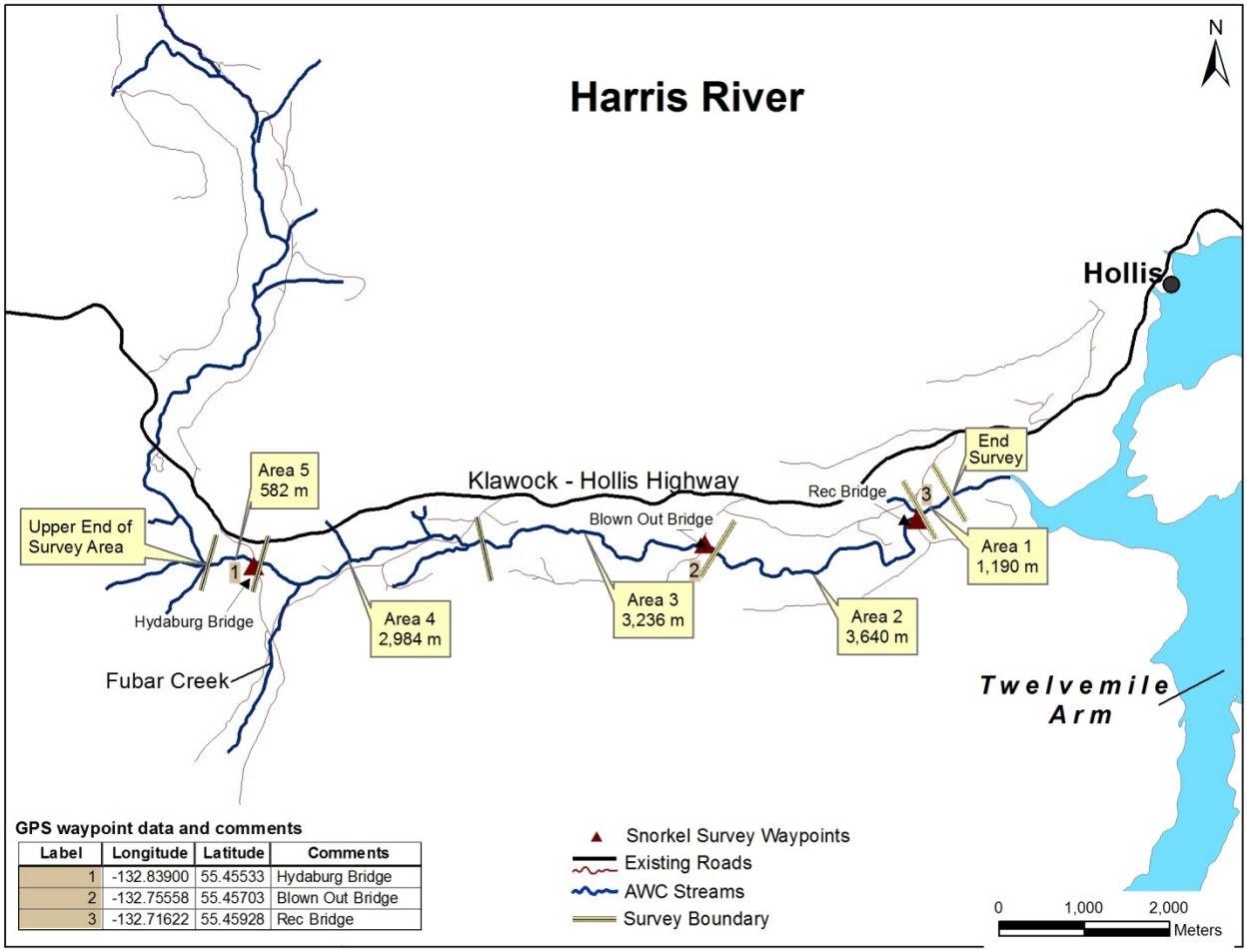
Note: GPS waypoints will be collected for the start and end of the survey and for the area breaks during 2014.

Appendix A2.–Ward Creek, Ketchikan Index Stream: AWC #101-47-10150.



Note: GPS waypoints will be collected for the start and end of the survey and for the area breaks during 2014.

Appendix A3.–Harris River, Prince of Wales Index Stream: AWC # 102-60-10820.

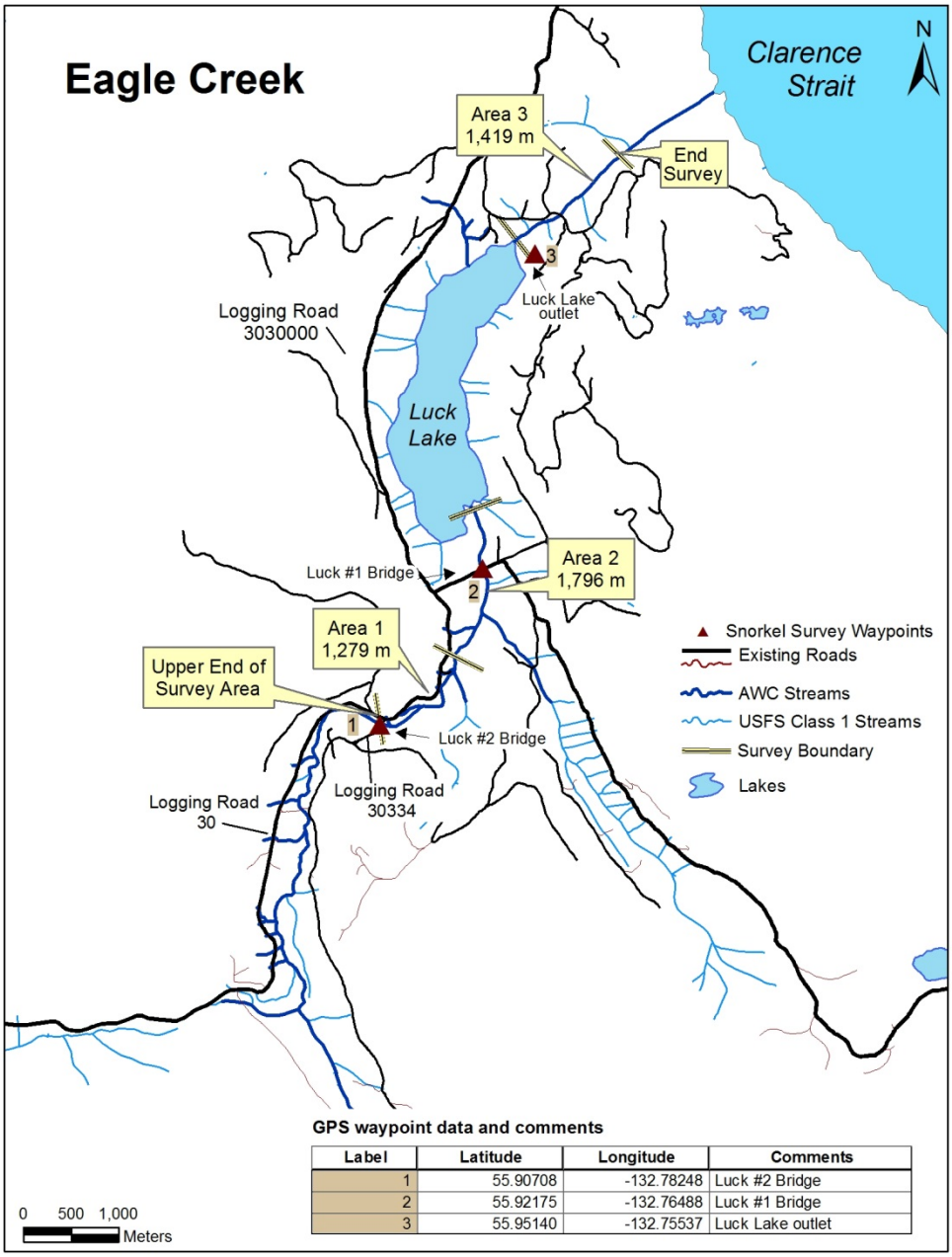


GPS waypoint data and comments

Label	Longitude	Latitude	Comments
1	-132.83900	55.45533	Hydaburg Bridge
2	-132.75558	55.45703	Blown Out Bridge
3	-132.71622	55.45928	Rec Bridge

Note: GPS waypoints for the upper end of the survey area, area reach break for 3-4, and end of survey will be collected during 2014.

Appendix A4.–Eagle Creek, Prince of Wales Index Stream: AWC # 106-10-10300.

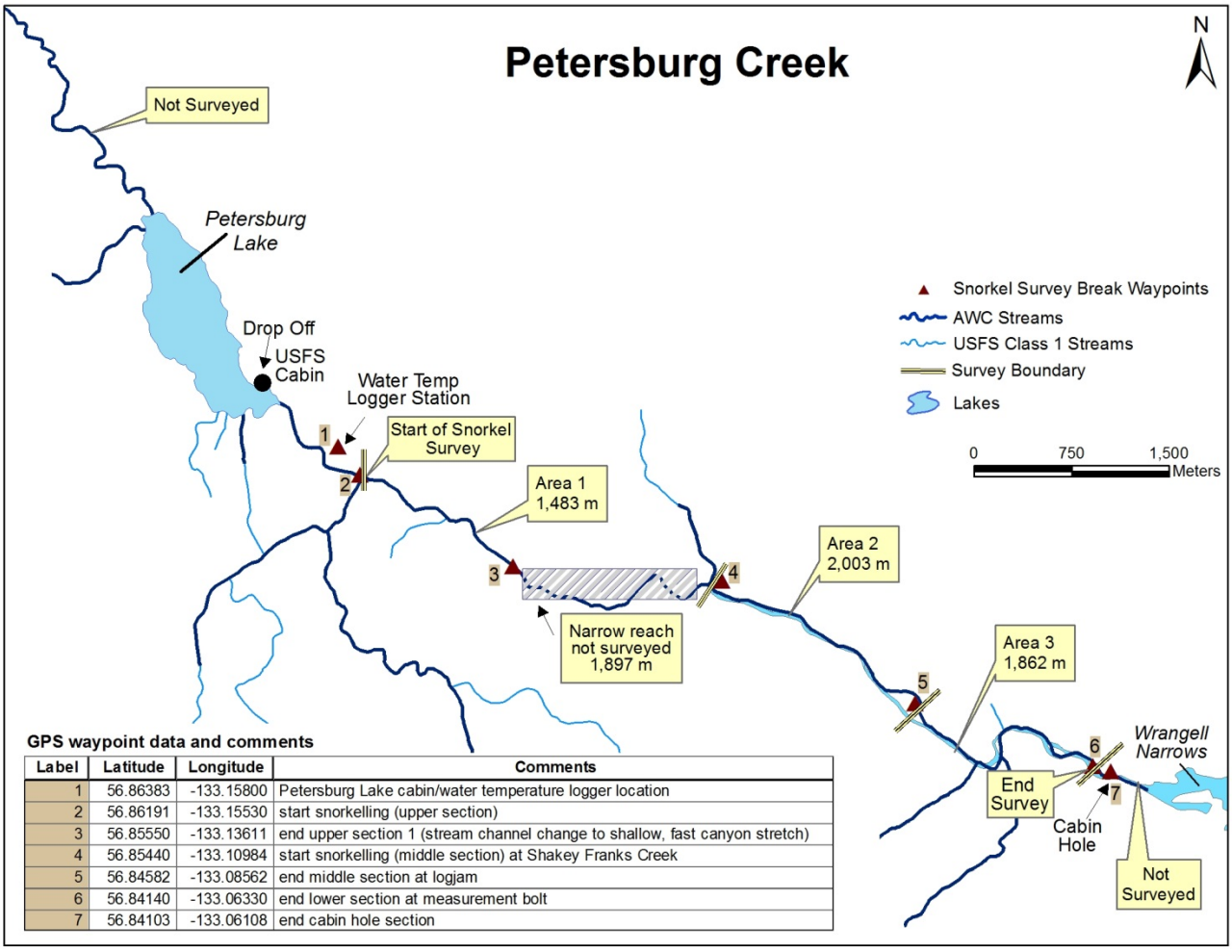


GPS waypoint data and comments

Label	Latitude	Longitude	Comments
1	55.90708	-132.78248	Luck #2 Bridge
2	55.92175	-132.76488	Luck #1 Bridge
3	55.95140	-132.75537	Luck Lake outlet

Note: Area 4 will be eliminated in 2014 and 2015 due to safety concerns. Associated counts for regional trend line will need to be adjusted for comparison. GPS waypoints for Area 1-2 reach break and end of survey will be collected during 2014.

Appendix A5.–Petersburg Creek, Petersburg Index Stream: AWC # 106-44-10600.

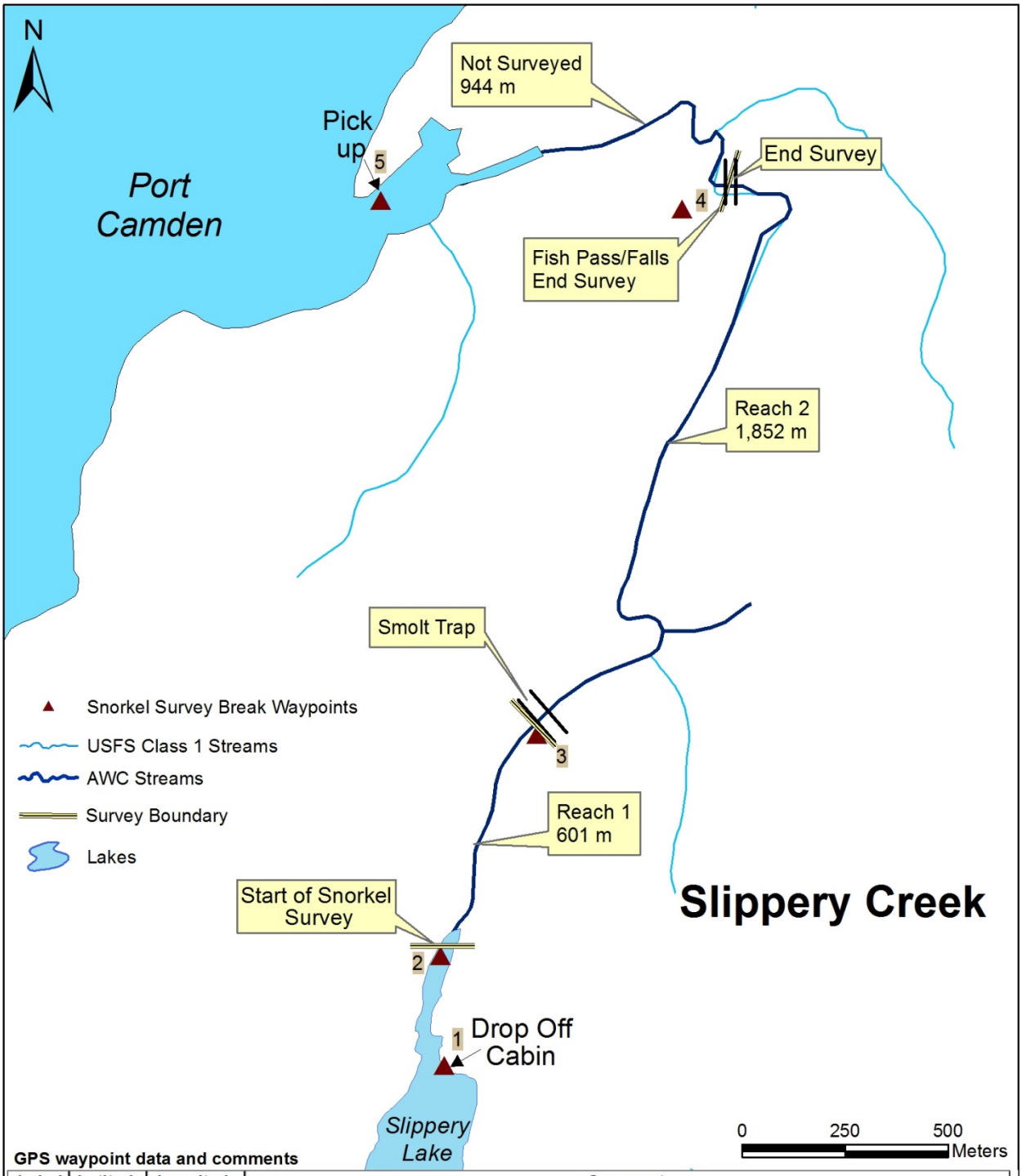


GPS waypoint data and comments

Label	Latitude	Longitude	Comments
1	56.86383	-133.15800	Petersburg Lake cabin/water temperature logger location
2	56.86191	-133.15530	start snorkelling (upper section)
3	56.85550	-133.13611	end upper section 1 (stream channel change to shallow, fast canyon stretch)
4	56.85440	-133.10984	start snorkelling (middle section) at Shakey Franks Creek
5	56.84582	-133.08562	end middle section at logjam
6	56.84140	-133.06330	end lower section at measurement bolt
7	56.84103	-133.06108	end cabin hole section

Note: Cabin hole is surveyed for local management, and is not included in the regional trend line or peak counts.

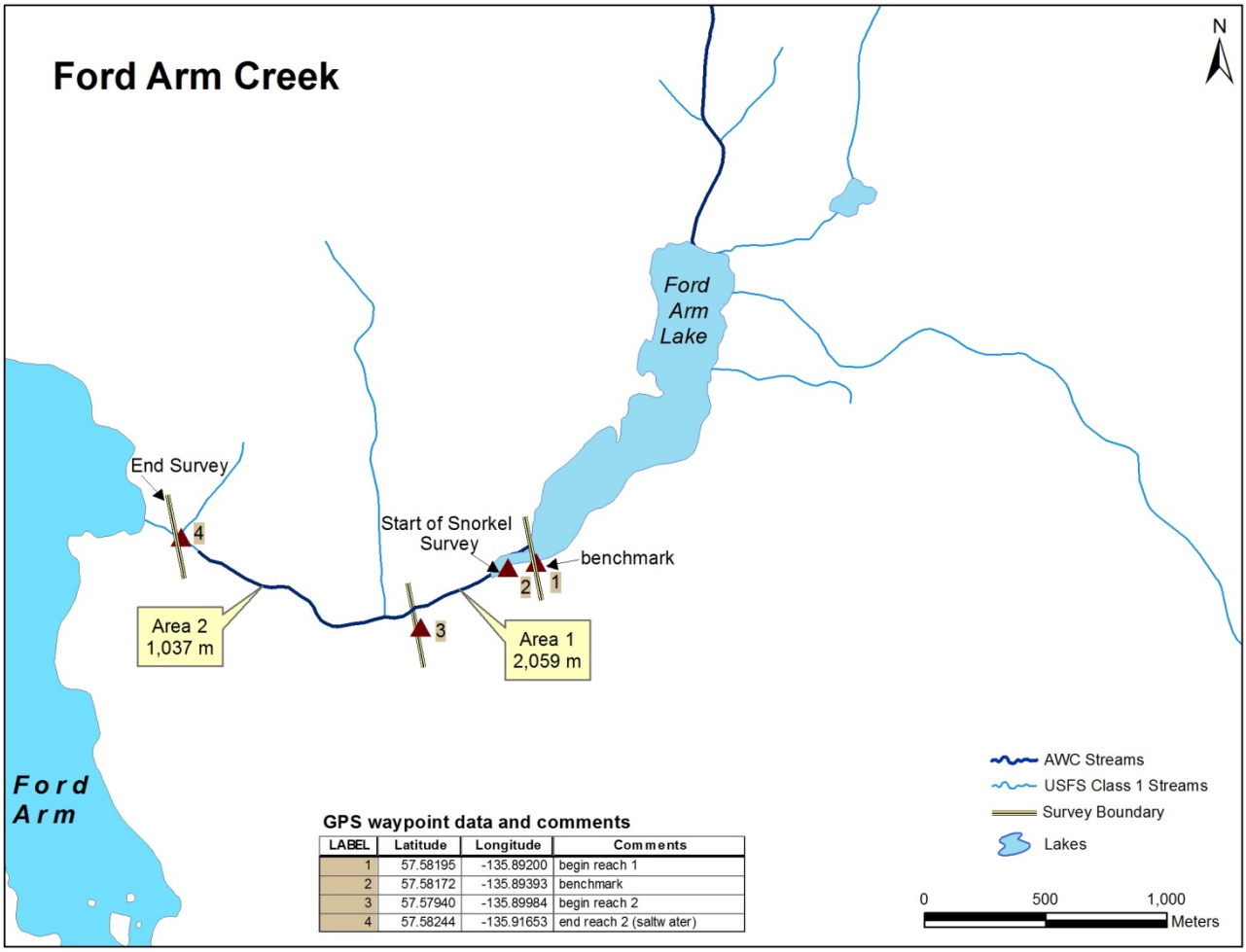
Appendix A6.–Slippery Creek, Petersburg Index Stream: AWC # 109-43-10030.



GPS waypoint data and comments

Label	Latitude	Longitude	Comments
1	56.6964	-133.88034	Fly to Slippery Lake cabin
2	56.6988	-133.88051	hike to lake outlet to start snorkel survey
3	56.7036	-133.87671	end snorkel upper section at smolt shack, water temperature logger here., start next section
4	56.7151	-133.87102	end survey section 2 at fish pass
5	56.7152	-133.88297	hike around bypassed lowermost section to tidewater; pick up at mouth Slippery Creek in Port Camden

Appendix A7.–Ford Arm Creek, Sitka Index Stream: AWC # 113-73-10030.

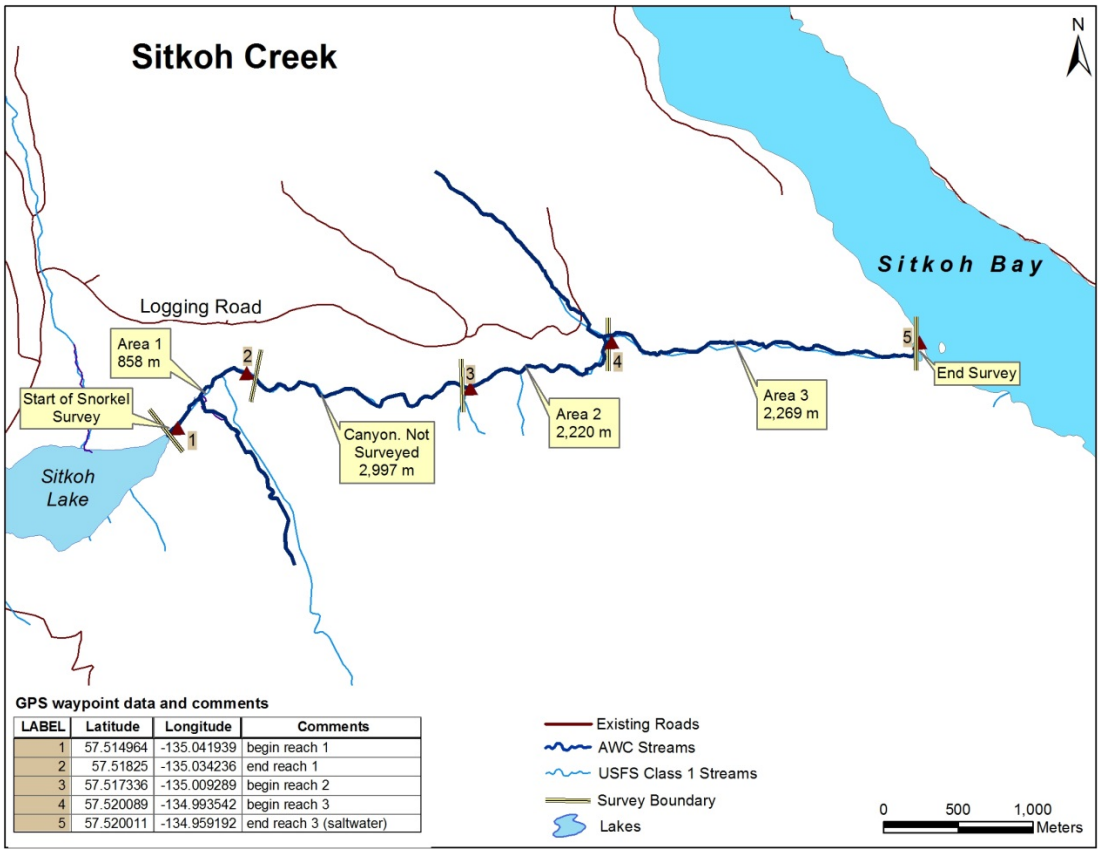


GPS waypoint data and comments

LABEL	Latitude	Longitude	Comments
1	57.58195	-135.89200	begin reach 1
2	57.58172	-135.89393	benchmark
3	57.57940	-135.89984	begin reach 2
4	57.58244	-135.91653	end reach 2 (saltw ater)

Note: These waypoints estimated using Google Earth and will be verified during 2014 with a GPS.

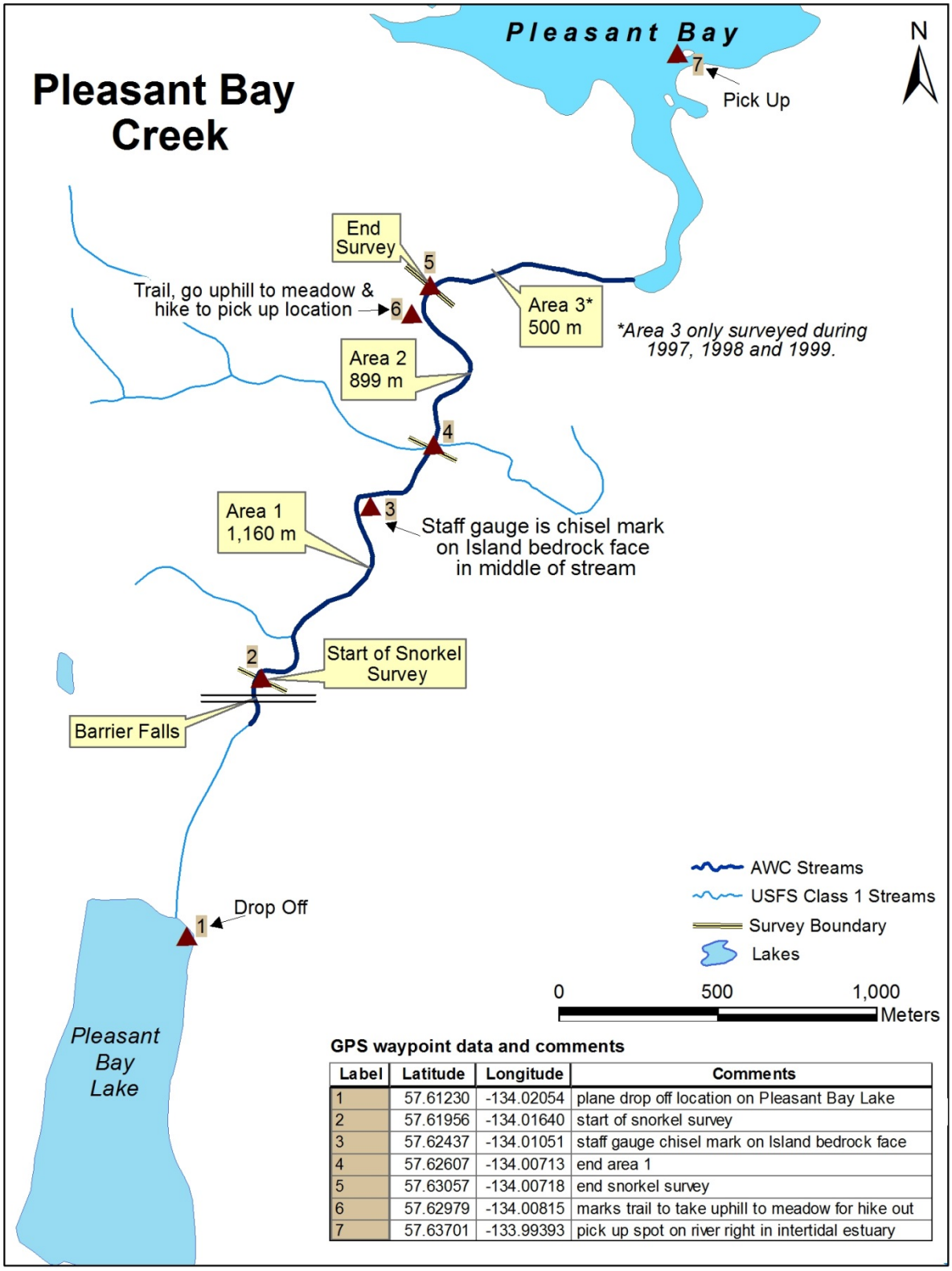
Appendix A8.–Sitkoh Creek, Sitka Index Stream: AWC # 113-59-10040.



LABEL	Latitude	Longitude	Comments
1	57.514964	-135.041939	begin reach 1
2	57.51825	-135.034236	end reach 1
3	57.517336	-135.009289	begin reach 2
4	57.520089	-134.993542	begin reach 3
5	57.520011	-134.959192	end reach 3 (saltwater)

Note: These waypoints were estimated using Google Earth and will be verified during 2014 with a GPS.

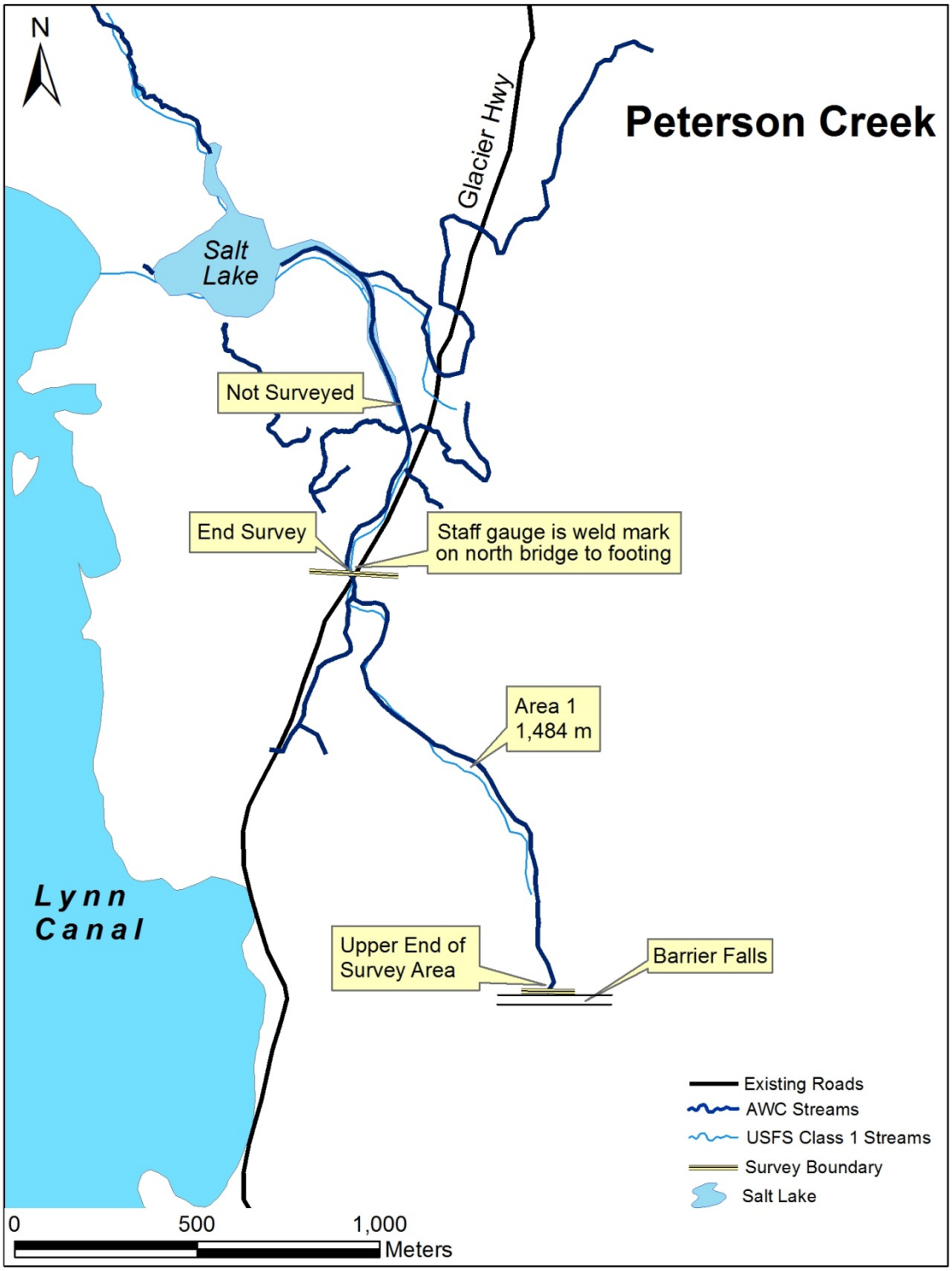
Appendix A9.–Pleasant Bay Creek, Juneau Index Stream: AWC # 111-12-10050.



GPS waypoint data and comments

Label	Latitude	Longitude	Comments
1	57.61230	-134.02054	plane drop off location on Pleasant Bay Lake
2	57.61956	-134.01640	start of snorkel survey
3	57.62437	-134.01051	staff gauge chisel mark on Island bedrock face
4	57.62607	-134.00713	end area 1
5	57.63057	-134.00718	end snorkel survey
6	57.62979	-134.00815	marks trail to take uphill to meadow for hike out
7	57.63701	-133.99393	pick up spot on river right in intertidal estuary

Appendix A10.–Peterson Creek, Juneau Index Stream: AWC # 111-50-10100.



Note: GPS waypoints will be collect for the start and end of the survey and for the area breaks during 2014.