Technical Report No. 14-12

Fish Presence Surveys in Proposed Timber Harvest Areas, Afognak and Kodiak Islands, 2012-2014

by

William D. Frost

Paramanof Bay, Afognak Island

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Alaska Department of Fish and Game **Division of Habitat**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in Technical Reports by the Division of Habitat. 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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FISH PRESENCE SURVEYS IN PROPOSED TIMBER HARVEST AREAS, AFOGNAK AND KODIAK ISLANDS, 2012-2014

by

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EXECUTIVE SUMMARY

In summer 2012, 2013, and 2014, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, sampled for the presence of anadromous fish on Afognak and Kodiak Islands on land owned by Afognak Native Corporation, Natives of Kodiak Incorporated, Ouzinkie Native Corporation, Uyak Natives, Incorporated, and Leisnoi Incorporated. The information gathered was used to submit official nominations for inclusion in the ADF&G *Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* and its companion Atlas (AWC).

Inclusion in the AWC will help to conserve salmon habitat by providing the 66-foot riparian retention area protection required under the Alaska Forest Resources and Practices Act. A water body listed in the AWC is also afforded protection under Alaska Statute 16.05.871.

Water bodies were sampled using a backpack electrofisher or baited minnow traps. Adult salmonids observed were counted and their spawning activity noted.

Sampling was terminated at barriers to fish passage when such barriers were present. Absent a barrier, the sampling team determined the most appropriate location to terminate sampling based on an assessment of available habitat, stream gradient, and a failure to capture fish at a given sampling location.

On Afognak Island, 10 watersheds were sampled during the 2012 season, 16 watersheds were sampled during the 2013 season, and 8 watersheds were sampled during the 2014 season. On Kodiak Island, 5 watersheds were sampled during the 2012 season, 7 watersheds were sampled during the 2013 season, and 5 watersheds were sampled during the 2014 season. Fish presence sampling resulted in 253 nominations to the AWC: 99 in 2012, 59 in 2013, and 95 in 2014. As a result of the sampling effort, 82.9 km of new anadromous fish habitat was added to the AWC.

During the sampling effort on Afognak and Kodiak Islands, 28 specified water bodies were found to support additional life stages of anadromous fish. Also, 33 specified streams on Afognak Island were determined by GPS to be mapped in the incorrect location, and the AWC was updated with accurate location information. In 2013, three new anadromous fish streams were identified on Afognak Island. The new streams are located in Kazakof Bay, Saposa Bay, and Izhut Bay.

Adult and juvenile coho salmon (*Oncorhynchus kisutch)* and Dolly Varden (*Salvelinus malma)* were the most common salmonid species captured or observed. Other adult and juvenile salmonid species captured or observed were pink salmon (*O. gorbuscha)* and rainbow/steelhead trout (*O. mykiss)*. Additional species captured or observed were threespine stickleback (*Gasterosteus aculeatus)*, ninespine stickleback (*Pungitius pungitius)*, and sculpin (*Cottus* spp).

The three year project was a successful collaboration effort between the ADF&G and the timber industry. Fish and fish habitat benefited from the additional riparian retention areas, and the land owners and operators benefited by having better information to develop their future timber harvest plans.

INTRODUCTION

The mission of the Alaska Department of Fish and Game (ADF&G) is to protect, maintain, and improve the fish, game, and aquatic plant resources of the state, and manage their use and development in the best interest of the economy and the well-being of the people of the state, consistent with the sustained yield principal. The mission of ADF&G Division of Habitat is to protect Alaska's valuable fish and wildlife resources and their habitats as Alaska's population and economy continue to expand.

In the fall of 2011, a 3-year grant was secured through the Alaska Sustainable Salmon Fund (AKSSF) for ADF&G to sample streams and lakes on Afognak and Kodiak Islands and document the presence of anadromous fish in advance of timber harvest activity. Afognak and Kodiak Islands are located about 390 km southwest of Anchorage, Alaska (Figure 1). The

information gathered will be used to submit official nominations for inclusion in the *Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* and its companion Atlas (AWC) (ADF&G 2013). Inclusion in the AWC will conserve salmon habitat by providing the 66-foot riparian retention area required under the Alaska Forest Resources and Practices Act (FRPA; 11 AAC 95.260). A specified water body listed in the AWC is also afforded protection under State law at Alaska Statute (AS) 16.05.871 (ADF&G 2012-2013).

Figure 1.–Afognak and Kodiak Islands.

ADF&G initiated this project to document anadromous fish presence prior to timber harvest occurring on Afognak and Kodiak Islands. ADF&G coordinated with three land managers in the region: Afognak Native Corporation, Koncor Forest Products, and Leisnoi Incorporated. The coordination included a review of upcoming timber harvest activities, prioritization of areas to be sampled, and field sampling logistics.

METHODS

ADF&G developed maps using Geographic Information Services (GIS) mapping software to assist with locating streams in the project area. The maps were produced by using georeferenced satellite imagery with the AWC data layer. Most streams sampled on Afognak and Kodiak Islands in 2012-2014 were small (< 8m wide) first-, second-, and third-order tributaries of known anadromous streams (Strahler 1957). Sampling was prioritized by cross-referencing the upcoming timber harvest activities with those water bodies likely to support anadromous fish. The length of each reach sampled was measured using the GIS measuring tool.

Water bodies were sampled by a team of two ADF&G staff. Sampling was conducted using a Smith-Root LR-25 backpack electrofisher. Output voltage was adjusted to the minimum level necessary to achieve taxis (forced swimming), and continuous DC was used to minimize fish

injury (NMFS 2000). A single electrofishing pass at each sample reach was completed, starting at the downstream end and working upstream.

Lakes and ponds were sampled using Gee-type minnow traps baited with betadine-treated salmon eggs. Traps soaked for a minimum of two hours. Trap size selected for smaller fish, but this outcome was considered adequate as an indicator of the presence of fish species (Bloom 1976). However, it is noted that juvenile sockeye may be missed by minnow trapping, potentially causing underestimation of sockeye distribution because of this species' tendency toward a planktivorous diet (Burgner 1991).

Captured juvenile salmon and Dolly Varden were identified to species and counted. Because of time constraints, a select number were measured to the nearest mm in fork length (FL). Stickleback and sculpin were noted as present but not measured or counted. All fish were released into a slack-water area at the point of capture. Adult salmonids observed were counted, and spawning activity was noted.

We used existing FRPA criteria (Table 1;FRPA 2013) and professional judgment to determine the upper extent of the water body to be sampled. Absent a barrier, the sampling team determined the most appropriate location to terminate sampling, based on an assessment of available habitat, stream gradient, and a failure to capture fish at a given sampling location.

Table 1.–Anadromous Fish Blockage (11 AAC 95.265(g) Table A).

Species Requirements (in feet)					
Criterion	Coho	Steelhead	Sockeye	Chinook	Pink/Chum
Maximum fall height: A blockage may be presumed if fall height in feet exceeds:	11	13	10	11	a) 4 with deep jump pool b) 3 without pool
Pool depth: A blockage may be presumed if the unobstructed water column depth in feet within the pool is less than:	1.25 x jump height, except that no minimum pool depth exists for falls as follows: a) less than 4 in the case of coho and steelhead; and b) less than 2 in the case of other anadromous fish species.				
Steep channel: A blockage may be presumed at the upper end of the reach if channel steepness in feet is equal to or greater than the following without resting places for fish:	• 225 at 12% gradient • 100 at 16% gradient • 50 at 20% gradient • 25 at 24% gradient			100 at 9% gradient	

A hand-held Garmin GPS unit was used to record the geographic information to verify or correct the actual location of water bodies or add barriers to fish passage. Number and length of fish captured or observed were recorded with the GPS device to allow for georeferencing. These data were used to submit nominations to the AWC. Nominations included new water bodies, upstream extensions of existing anadromous waters, addition of species or life stages, and corrections of water body location. Nominations were completed according to the ADF&G submission guidelines and requirements (ADF&G 2014).

RESULTS

In 2012, 7 sampling events occurred monthly on Kodiak Island from April through October, and 6 sampling events occurred on Afognak Island from May through October. In 2013, sampling events occurred each month on Kodiak and Afognak Islands from April through October. In 2014, seven sampling events occurred monthly on Kodiak Island from May through October, and seven sampling events occurred on Afognak Island from April through October.

On Afognak Island, 10 watersheds were sampled during the 2012 season. A total of 50 reaches were sampled with a total length of 23.3 km. The total length that was documented as containing anadromous fish and added to the AWC was 16.1 km (Table 2; Appendices A1–A5 and A9–12).

Table 2.–Afognak Island watersheds sampled in 2012.

Watershed Name	AWC Number	# Reaches Sampled	Total Length Sampled (meters)	Total New AWC Length (meters)
Cascade Creek	252-33-10014	4	3,575	1,960
Cold Creek	252-33-10010	6	4,650	4,560
Little Afognak Lake	252-32-10010-0020	4	1,831	1,320
Marka River	252-34-10005	1	1,970	1,210
Paramanof River	251-40-10030	5	1,400	237
Portage Creek	251-82-10050	4	2,640	2,295
Unnamed (Discoverer Bay)	251-82-10070	16	2,900	1,240
Unnamed (Discoverer Bay)	251-82-10057	4	1,877	1,660
Unnamed (Izhut Bay)	252-31-10020	4	1,810	1,109
Unnamed (Mary Anderson Bay)	252-32-10008	2	665	550
Total		50	23,318	16,141

On Afognak Island, 16 watersheds were sampled during the 2013 season. A total of 47 reaches were sampled with a total length of 23.6 km. The total length that was documented as containing anadromous fish and added to the AWC was 15.3 km (Table 3**;** Appendices A2–A12).

Table 3.–Afognak Island watersheds sampled in 2013.

Watershed Name	AWC Number	# Reaches Sampled	Total Length Sampled (meters)	Total New AWC Length (meters)
Cold Creek	252-33-10010	2	1,580	1,270
Little Afognak River	252-32-10010	7	3,118	2,650
Paramanof River	251-40-10030	7	2,200	840
Portage Creek	251-82-10050	7	5,575	4,900
Unnamed (Discoverer Bay)	251-82-10057	6	1,620	0
Unnamed (Discoverer Bay)	251-82-10060	2	2,716	2,660
Unnamed (Discoverer Bay)	251-82-10070	2	90	0
Unnamed (Duck Bay)	252-32-10040	5	2,450	590
Unnamed (Duck Bay)		1	300	0
Unnamed (Izhut Bay)		2	1,247	915
Unnamed (Izhut Bay)	252-31-10007	1	950	785
Unnamed (Kazakof Bay)		1	130	130
Unnamed (Mary Anderson Bay)		1	250	0
Unnamed (Mary Anderson Bay)		1	550	0
Unnamed (Saposa Bay)		1	615	366
Unnamed (Saposa Bay)	252-31-10010	1	220	220
Total		47	23,611	15,326

On Afognak Island, 8 watersheds were sampled during the 2014 season. A total of 59 reaches were sampled with a total length of 26 km. The total length that was documented as containing anadromous fish and added to the AWC was 16.4 km (Table 4**;** Appendices A5, A6, and A11–A16).

Table 4.–Afognak Island watersheds sampled in 2014.

Watershed Name	AWC Number	# Reaches Sampled	Total Length Sampled (meters)	Total New AWC Length (meters)
Cold Creek	252-33-10010	11	3,169	2,333
Cascade Creek	252-33-10014	3	668	668
Little Afognak River	252-32-10010	8	2,694	2,041
Unnamed (Duck Bay)	252-32-10040	1	915	915
Thorshiem River	251-30-10020	10	3,786	1,942
Portage Creek	251-82-10050	20	9,966	6,380
Little Danger Creek	252-33-10020-2005	2	3,000	208
Kazakof Bay	252-33-10005	4	2,535	1,883
Total		59	25,909	16,370

On Kodiak Island, 5 watersheds were sampled during the 2012 season. A total of 34 reaches were sampled with a total length of 17.3 km. The total length that was documented as containing anadromous fish and added to the AWC was 8.2 km (Table 5; Appendices A17–A19).

Table 5.–Kodiak Island watersheds sampled in 2012.

Watershed Name	AWC Number	# Reaches Sampled	Total Length Sampled (meters)	Total New AWC Length (meters)
Capelin Creek	259-25-10030	5	6,800	2,250
Chiniak River	259-25-10040	9	4,580	3,815
East Fork Twin Creek	259-25-10020-2001-3002	10	3,280	1,100
West Fork Twin Creek	259-25-10020	9	2,100	930
Sequel Pt. Creek	259-30-10004	1	500	117
Total		34	17,260	8,212

On Kodiak Island, 7 watersheds were sampled during the 2013 season. A total of 47 reaches were sampled with a total length of 17.5 km. The total length that was documented as containing anadromous fish and nominated to the AWC was 12.7 km (Table 6; Appendices A17-A20).

Table 6.–Kodiak Island watersheds sampled in 2013.

Watershed Name	AWC Number	# Reaches Sampled	Total Length Sampled (meters)	Total New AWC Length (meters)
Capelin Creek	259-25-10030	6	817	630
Chiniak River	259-25-10040	3	4,320	3,825
East Fork Twin Creek	259-25-10020-2001-3002	8	1,640	325
West Fork Twin Creek	259-25-10020	11	2,525	1,468
Roslyn Creek	259-25-10010	15	7,300	5,900
Sawmill Lake		2	370	0
Sequel Pt. Creek	259-30-10004	2	505	505
Total		47	17,477	12,653

On Kodiak Island, 5 watersheds were sampled during the 2014 season. A total of 71 reaches were sampled with a total length of 21.5 km. The total length that was documented as containing anadromous fish and nominated to the AWC was 14.2 km (Table 7; Appendices A18 - A21).

Table 7.–Kodiak Island watersheds sampled in 2014.

Watershed Name	AWC Number	# Reaches Sampled	Total Length Sampled (meters)	Total New AWC Length (meters)
Unnamed Stream	259-24-10051	8	1,818	1,306
Chiniak River	259-25-10040	1	400	400
Roslyn Creek	259-25-10010	43	12,850	8,248
East Fork Twin Creek	259-25-10020-2001-3002	1	400	400
West Fork Twin Creek	259-25-10020	18	5,985	3,863
Total		71	21,453	14,217

During the 2012 - 2014 sampling effort, 33 known anadromous streams on Afognak and Kodiak Island were determined by GPS to be mapped in the wrong location. The stream mapping has been revised and corrections were submitted to the AWC (Table 8).

Table 8.–Anadromous streams on Afognak and Kodiak Island corrected in 2012 - 2014.

Streams Corrected 2012	Streams Corrected 2013	Streams Corrected 2014
252-32-10004*	251-40-10030-2008	252-33-10010-2006-3001
251-82-10057-2005	251-40-10030-2036	251-30-10020
251-82-10057-2009	251-40-10030-2020-3020	251-82-10050-2021*
252-33-10010-2007	252-32-10040-2012	251-82-10050-2005*
251-40-10030-2014	252-32-10010-2019	252-32-10040
252-33-10010-2004	252-32-10010-2019-3012	252-33-10010-2006-3001
252-33-10010-2004-3020	252-32-10010-2015	252-32-10010-2021
	252-31-10007	251-30-10020
	252-31-10010	252-32-10010-2039
	251-82-10050-2033	252-33-10024
	251-82-10060	252-33-10025
		252-33-10027
		252-33-10005
		259-25-10010
		259-25-10020

*Note: Stream Nos. 252-32-10004, 251-82-10050-2021, and 251-82-10050-2005 were revised because of a barrier blocking fish passage.

In 2013, 3 new streams that support anadromous fish were located on Afognak Island and nominated to the AWC. These 3 streams are located in Kazakof Bay, Saposa Bay, and Izhut Bay (Appendices A3, A8, and A9).

From 2012-2014, there were 253 nominations submitted to the AWC: 99 in 2012, 59 in 2013, and 95 in 2014. All of the nominations were accepted for inclusion into the AWC, except for 11 that will be reviewed for the 2016 AWC revision. Juvenile and adult coho salmon (*Oncorhynchus kisutch*) and Dolly Varden (*Salvelinus malma*) were the most common salmonid species captured or observed. Other adult and juvenile salmonid species captured or observed were pink salmon (*O. gorbuscha*) and rainbow/steelhead trout (*O. mykiss*). Additional species captured or observed were threespine stickleback (*Gasterosteus aculeatus*), ninespine stickleback (*Pungitius pungitius*), and sculpin (*Cottus* spp).

From 2012 to 2014, 28 known anadromous water bodies were found to support additional species or life stages (Table 9). The streams were updated in the AWC.

Table 9.–Additional species or life stages located on Afognak and Kodiak Islands.

Afognak Stream No.	Species Added	Life Stage Added
252-33-10010-2006-3007	Coho Salmon	Rearing
251-30-10020	Sockeye, Coho Salmon/Steelhead	Rearing
251-30-10020-2005	Pink Salmon/Dolly Varden	Rearing
251-30-10020-2025	Steelhead/Dolly Varden	Rearing
252-33-10010-2004	Coho Salmon	Rearing
251-82-10050-2033	Coho Salmon	Spawning
251-82-10050-2039	Coho Salmon	Rearing/Spawning
251-82-10050-2005	Pink Salmon/Dolly Varden	Spawning
251-82-10060	Coho Salmon	Rearing
252-31-10010	Dolly Varden	
252-31-10007	Pink Salmon/Dolly Varden	Spawning
251-40-10030-2008	Pink Salmon	
252-33-10010-2007	Dolly Varden	
252-31-10020	Pink Salmon	
252-33-10014	Pink/Coho Salmon	Rearing
252-33-10005	Coho Salmon	Rearing
252-33-10020-2005	Coho Salmon	Rearing
Kodiak Stream No.	**Species Added**	**Life Stage Added**
259-24-10051	Coho/Pink Salmon	Rearing
259-25-10030	Pink Salmon	Rearing
259-25-10010	Coho Salmon	Rearing/Spawning
259-25-10010-2041	Coho Salmon	Rearing
259-25-10020	Coho/Pink Salmon	Rearing
259-25-10020-2001-3002-4005	Pink Salmon	
259-25-10030	Coho Salmon	
259-25-10030-2004	Pink Salmon	Spawning
259-25-10040-2022	Pink Salmon	
259-25-10040-2010	Pink Salmon	Spawning
259-25-10010	Coho Salmon	Rearing

Length measurements were taken for a portion of the juvenile salmon, Dolly Varden, and rainbow trout that were captured (Tables 10-15).

Table 10.–2012 Afognak length measurements.

	Length Range (mm)		
Month	Coho	Pink	Dolly Varden
May	35–135 (*n* = 55)	15-20 (*n* = 28)	35–200 (*n* = 54)
June	20–85 (*n* = 25)	ND	30–100 (*n* = 46)
July	25–75 (*n* = 6)	ND	25–95 (*n* = 10)
August	40–110 (*n* = 43)	ND	20–110 (*n* = 55)
September	40–90 (*n* = 55)	ND	70–200 (*n* = 80)
October	45–110 (*n* = 13)	ND	30–175 (*n* = 23)

ND = no data

Table 11.–2012 Kodiak length measurements.

	Length Range (mm)			
Month	Coho	Pink	Dolly Varden	Rainbow Trout
April	ND	ND	ND	ND
May	60–115 (*n* = 12)	15–20 (*n* = 43)	20–110 (*n* = 50)	180 (*n* = 1)
June	15–70 (*n* = 4)	15–35 (*n* = 11)	45–145 (*n* = 31)	ND
July	25–80 (*n* = 5)	ND	ND	ND
August	40–95 (*n* = 35)	ND	25–145 (*n* = 75)	ND
September	ND	ND	ND	ND
October	50–90 (*n* = 38)	ND	40–90 (*n* = 20)	ND

ND = no data

Table 12.–2013 Afognak length measurements.

	Length Range (mm)			
Month	Coho	Pink	Dolly Varden	Rainbow Trout
April	55–110 (*n* = 6)	ND	70–120 (*n* = 11)	70 (*n* = 1)
May	55–90 (*n* = 20)	ND	40–90 (*n* = 19)	ND
June	70–90 (*n* = 2)	ND	70–80 (*n* = 25)	ND
July	45–70 (*n* = 5)	ND	25–250 (*n* = 17)	ND
August	45–95 (*n* = 58)	ND	45–115 (*n* = 47)	ND
September	45–65 (*n* = 9)	ND	85–250 (*n* = 10)	90 (*n* = 1)
October	55–115 (*n* = 41)	ND	60–155 (*n* = 13)	ND

ND = no data

Table 13.–2013 Kodiak length measurements.

	Length Range (mm)		
Month	Coho	Pink	Dolly Varden
April	40–110 (*n* = 61)	ND	40–90 (*n* = 15)
May	ND	ND	63–100 (*n* = 3)
June	20–110 (*n* = 25)	ND	ND
July	60–80 (*n* = 5)	ND	ND
August	45–70 (*n* = 10)	ND	ND
September	40–100 (*n* = 15)	ND	ND
October	40–100 (*n* = 16)	ND	70–250 (*n* = 12)

ND = no data

Table 14.–2014 Afognak length measurements.

	Length Range (mm)			
Month	Coho	Pink	Dolly Varden	Rainbow Trout
April	40-108 (*n*=31)	ND	22-155 (*n*=16)	ND
May	50-75 (*n*=18)	ND	65-135 (*n*=47)	ND
June	110-130 (*n*=8)	40-45 (*n*=2)	35-150 (n=16)	80-100 (*n*=12)
July	55-90 (*n*=13)	ND	55-125 (*n*-15)	45-90 (*n*=5)
August	45-95 (*n*=48)	ND	60-275 (*n*=15)	ND
September	45-90 (*n*=73)	ND	55-120 (*n*=38)	ND
October	60-80 (*n*=7)	ND	50-150 (*n*=14)	ND

ND = no data

Table 15.–2014 Kodiak length measurements.

	Length Range (mm)		
Month	Coho	Pink	Dolly Varden
May 1	23-95 (*n*=39)	25-37 (*n*=16)	15-120 (*n*=19)
May	35-106 (*n*=58)	31-33 (*n*=7)	35-118 (*n*=7)
June	30-110 (*n*=26)	ND	25-90 (*n*=5)
July	55-95 (*n*=9)	ND	45-65 (*n*=5)
August	50-65 (*n*=26)	ND	40-90 (*n*=10)
September	70-95 (*n*=38)	ND	45-120 (*n*=33)
October	65-90 (*n*=20)	ND	ND

ND = no data

DISCUSSION

Sampling conducted in 2012, 2013, and 2014 on Afognak and Kodiak Islands identified new anadromous water bodies, extended existing anadromous waters, added species or life stages to existing anadromous waters, and corrected existing anadromous water body locations. Nominations were completed according to ADF&G submission guidelines and requirements. All nominations submitted in 2012 and 2013 were included in the AWC 2013 and 2014 revisions. All nominations submitted prior to the 2014 nomination deadline have been accepted, approved, and scheduled for inclusion in the 2015 AWC revision. Eleven nominations submitted after the 2014 deadline will be reviewed by the ADF&G and, if accepted, included in the 2016 AWC revision.

Inclusion in the AWC affords the water body protection under AS 16.05.871 by requiring notification and ADF&G approval for proposed activities below ordinary high water, in order to provide proper protection of fish and game. This project resulted in the addition of 82.9 km of new anadromous fish habitat to the AWC, plus the addition of species and life stages to listed water bodies.

Inclusion in the AWC also results in a 66-foot riparian retention area under 11 AAC 95.260. Streams that were sampled on Kodiak Island and Afognak Island in 2012, 2013, and 2014 that did not result in the capture or observation of anadromous fish but flowed into a specified water body were voluntarily given a 66-foot riparian retention area by the landowner up to the point where a physical blockage was determined by FRPA criteria. Thus, this project resulted in more water bodies being protected than just the 82.9 km added to the AWC.

Riparian habitat provides streambank stability, filters pollutants, and maintains water quality for fish and wildlife habitat. To function properly, buffers must have an effective vegetative cover and sufficient width and continuity along the stream. Vegetative cover filters sediment and pollutants reducing the amount of material that may enter a stream. The rate of surface erosion is closely correlated with vegetative cover on the soil surface, such as plant litter. Litter and the stems of vegetation reduce the downslope movement of surface soils. Accelerated surface erosion occurs when these barriers are removed (Strahler et al. 1971).

Riparian vegetation provides shade to help maintain air and water temperature and prevent excessive algal blooms. Reduced shade leads to increased water temperatures. Increased water temperatures can obstruct adult migration and limit spawning success, trigger early juvenile outmigration resulting in decreased survival rates, change juvenile sheltering behavior, reduce disease resistance, and increase metabolic requirements (Taylor 1988). Riparian vegetation also provides allochthonous input to the base of the food web, terrestrial insects for fish consumption, and cover for aquatic vertebrates.

This project has been a successful example of collaboration between the timber industry and ADF&G. By sampling in advance timber harvest operations, ADF&G has provided the operators with information for planning the layout of proposed timber harvest units. Additionally, the operators and land owners support of this project has been invaluable to identifying and prioritizing waters to sample, which has resulted in aquatic habitat protections required by ADF&G statutes and FRPA requirements.

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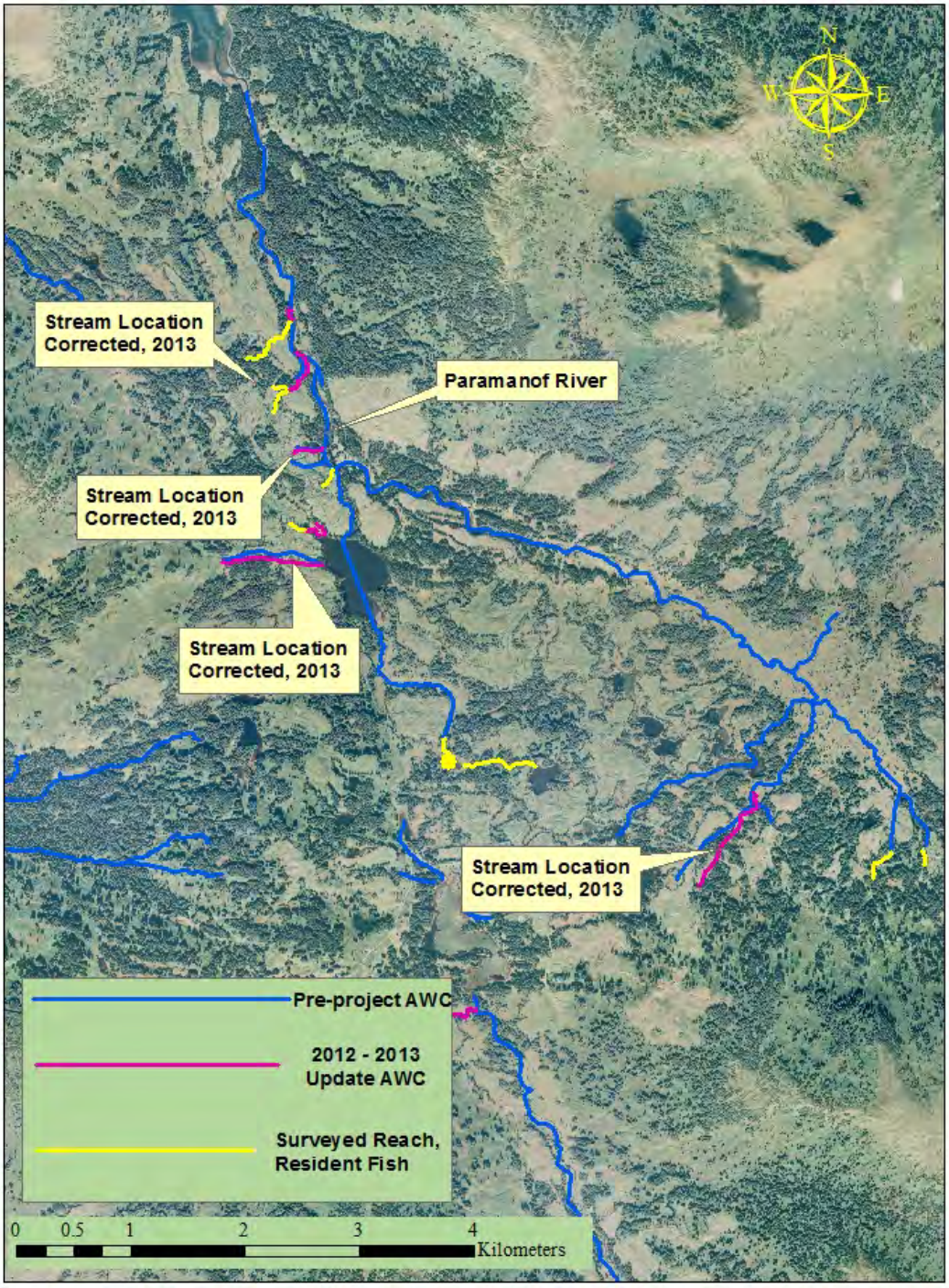
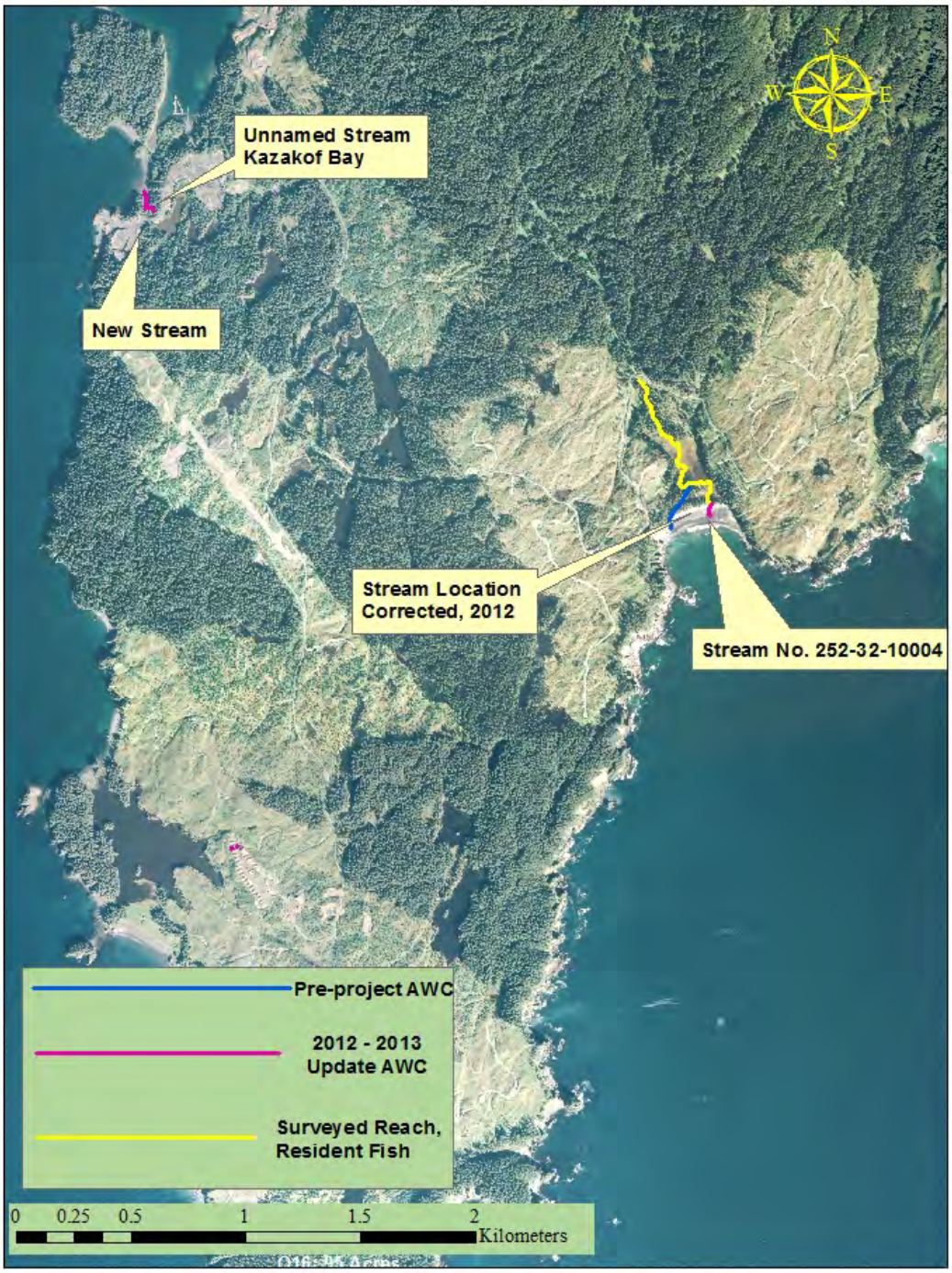
APPENDIX A: STATUS OF SURVEYED REACHES

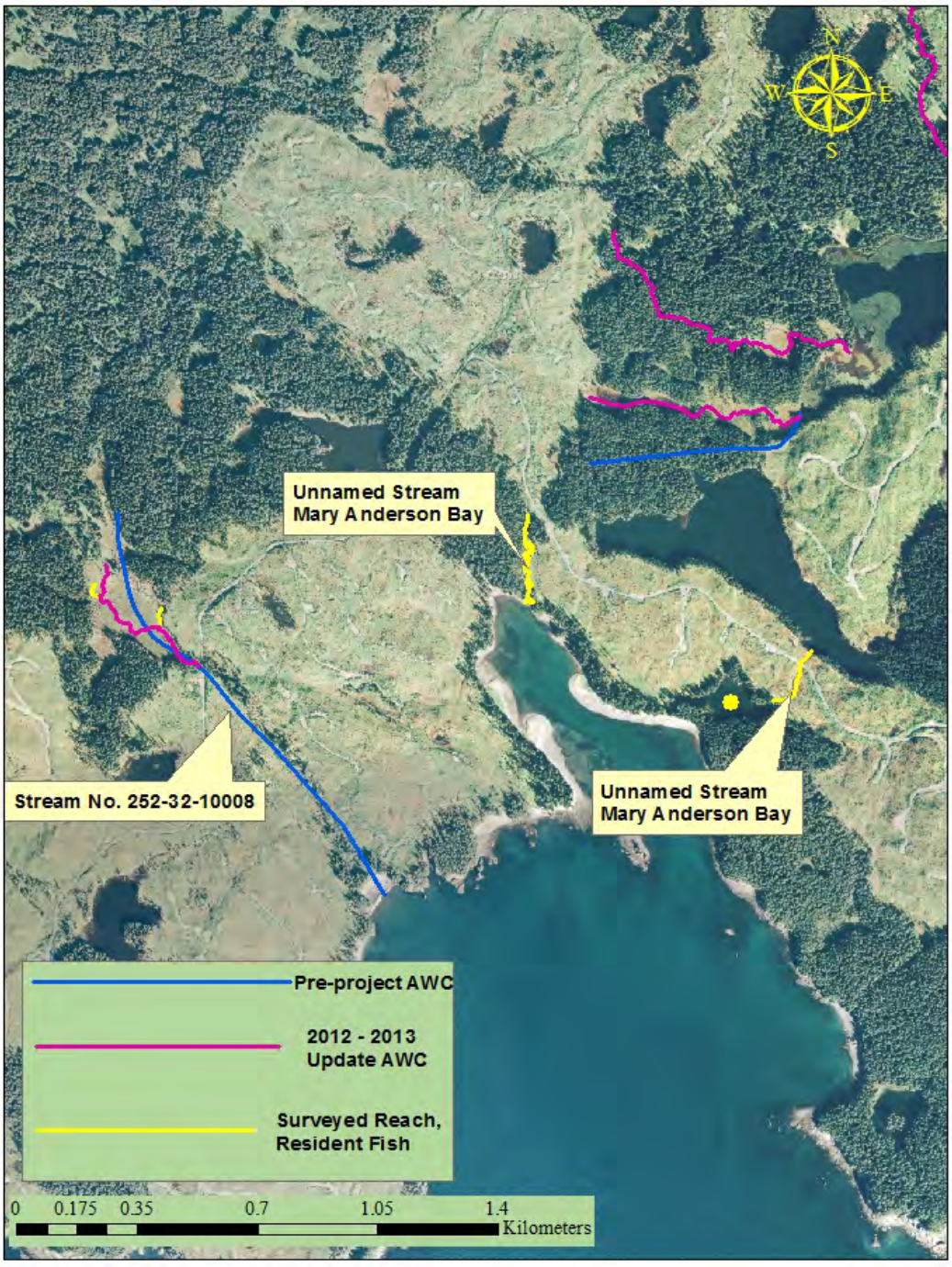
Appendix A1.–Status of surveyed reaches within the Marka River, Afognak Island.



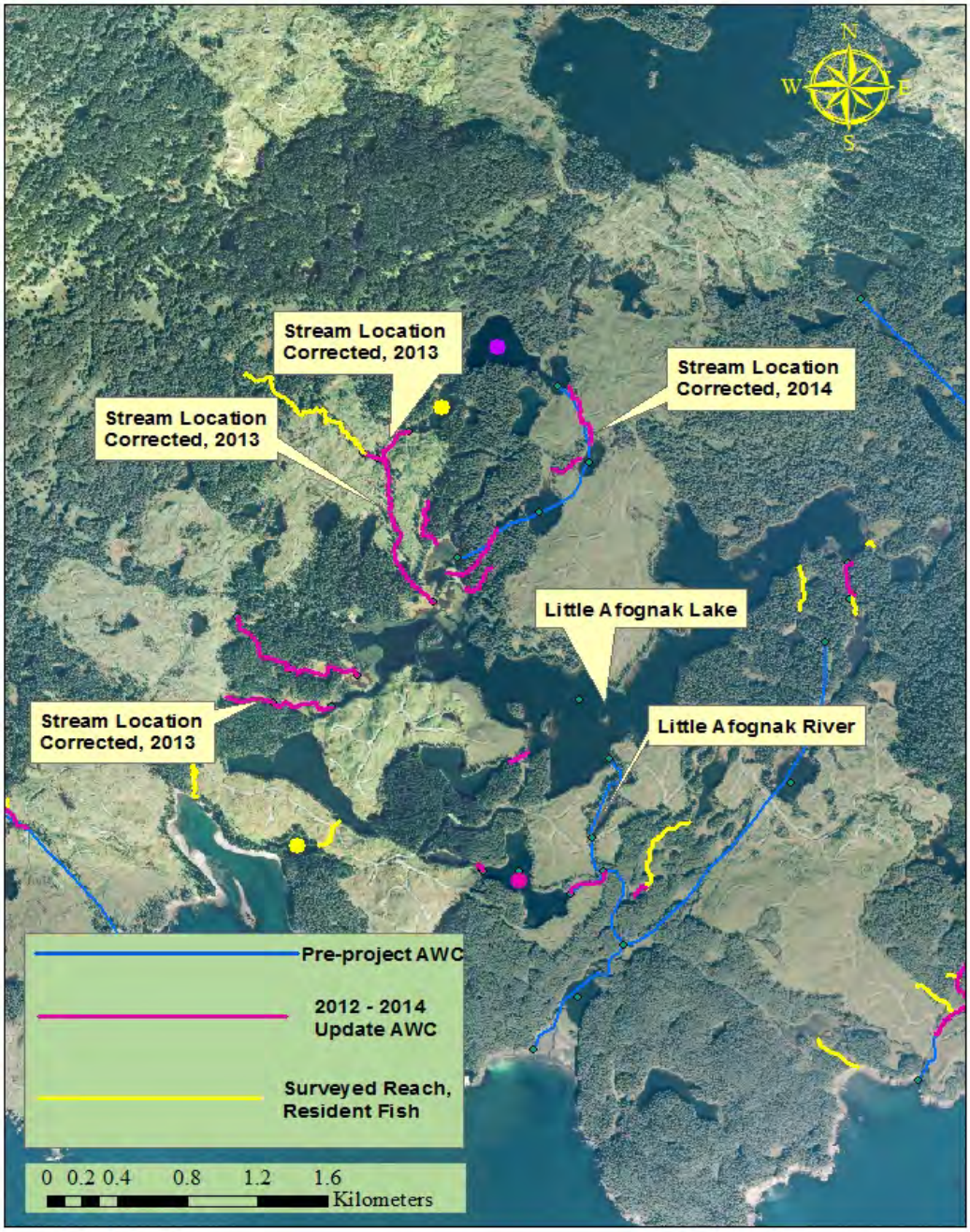
Appendix A2.–Status of surveyed reaches within the Paramanof River, Afognak Island.



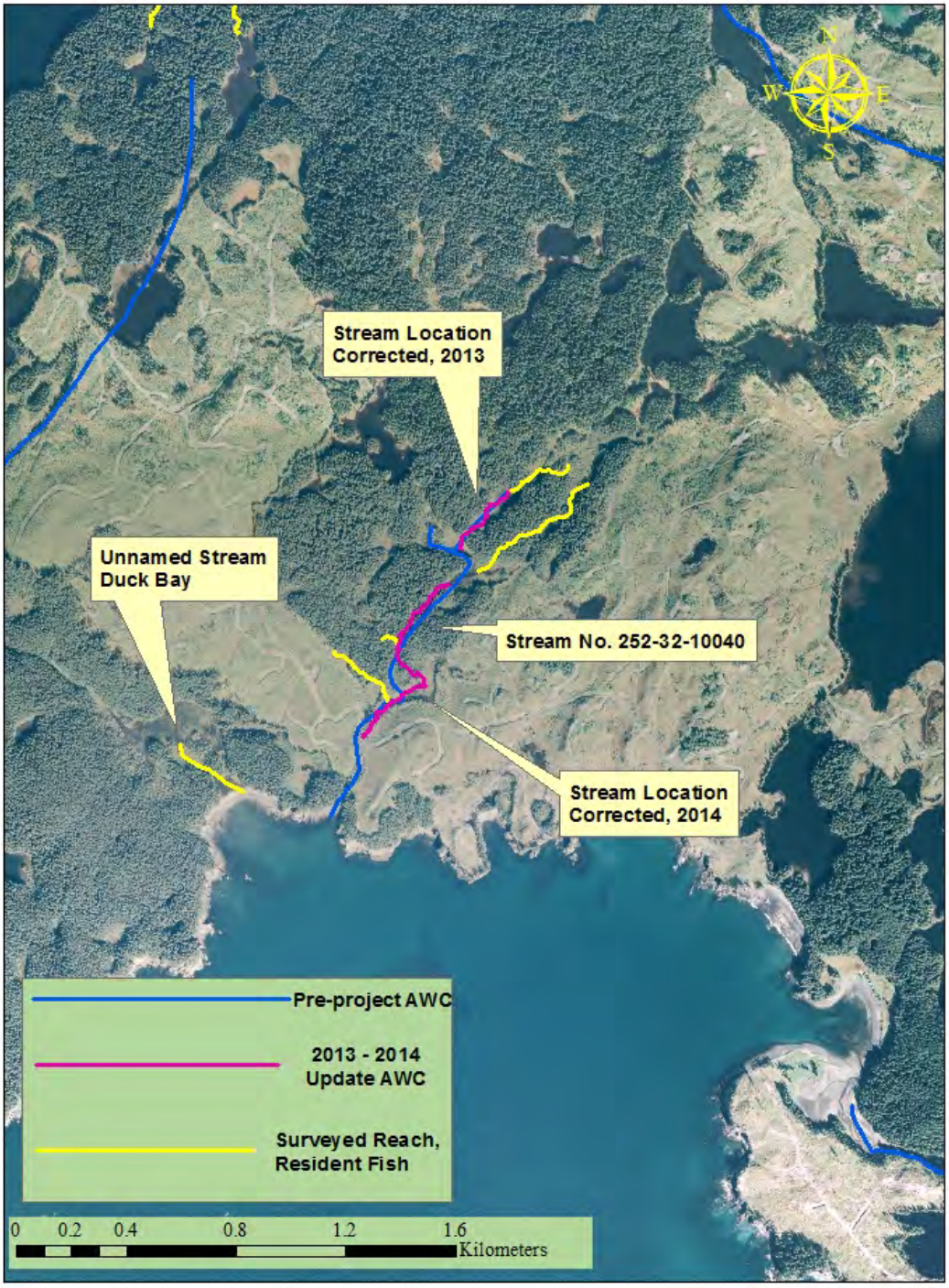
Appendix A3.–Status of surveyed reaches within an unnamed stream, Kazakof Bay and Stream No. 252-32-10004, Afognak Island.



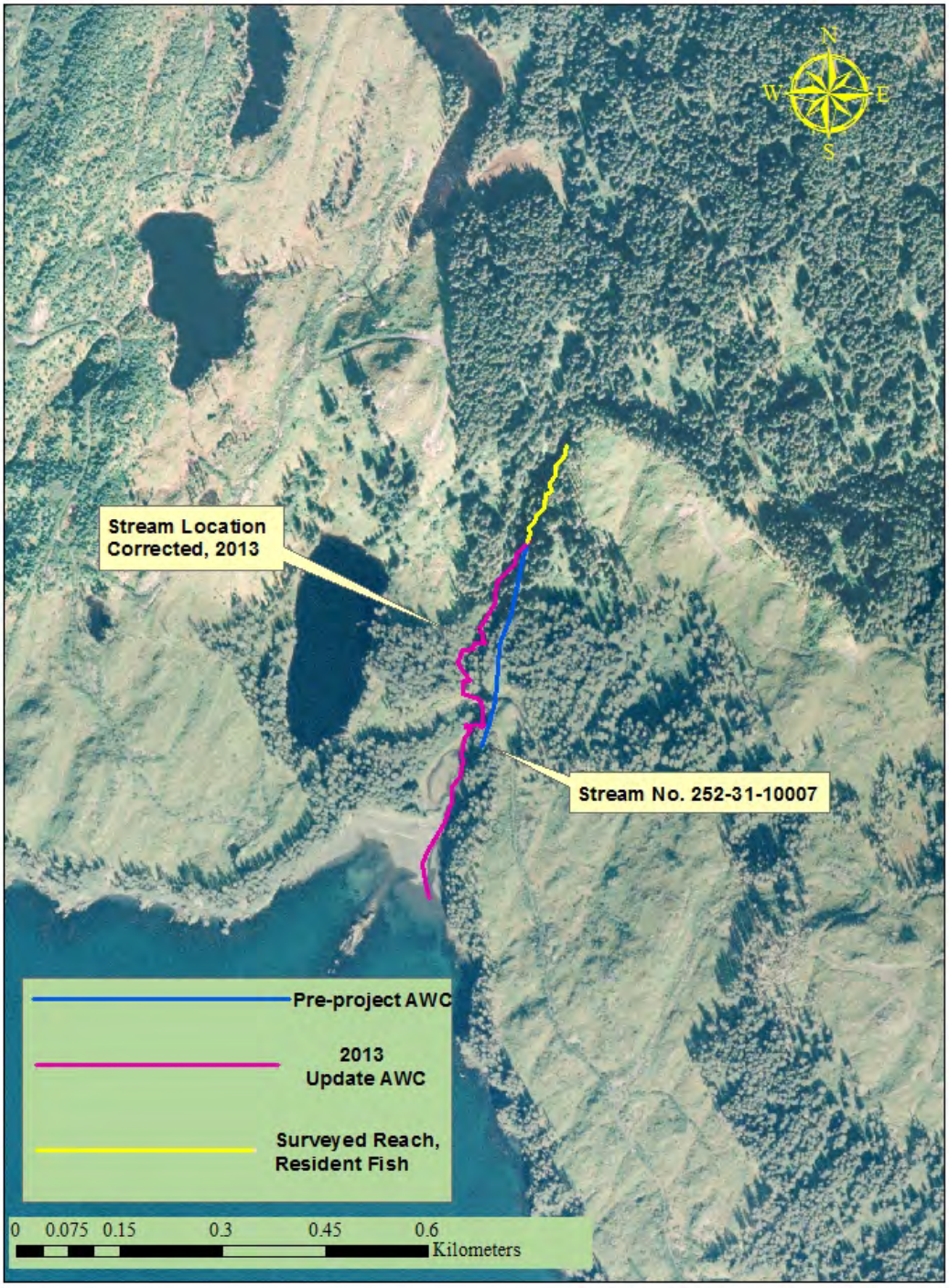
Appendix A4.–Status of surveyed reaches within unnamed streams, Mary Anderson Bay and Stream No. 252-32-10008, Afognak Island.



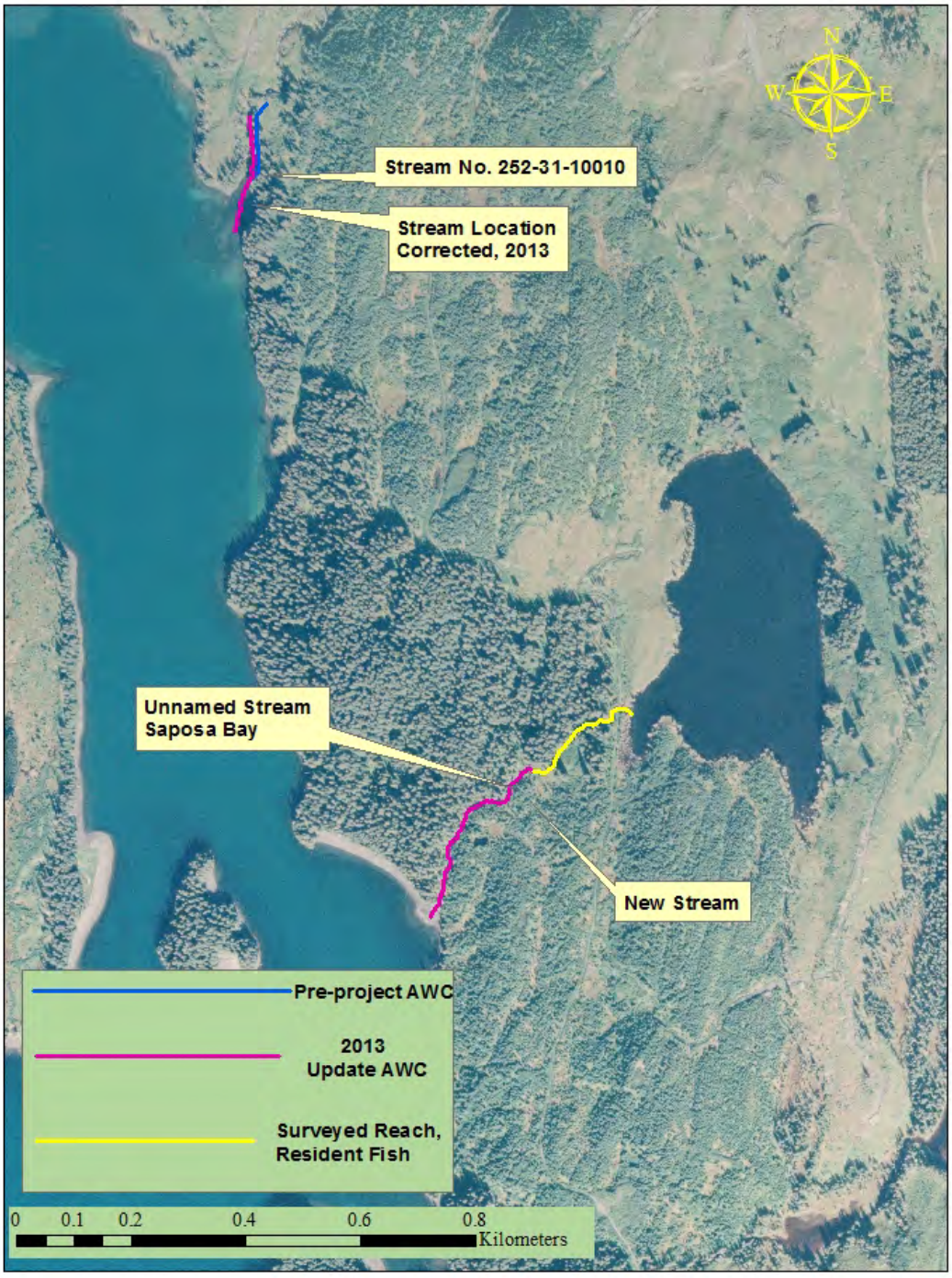
Appendix A5.–Status of surveyed reaches within Little Afognak Lake and Little Afognak River, Afognak Island.



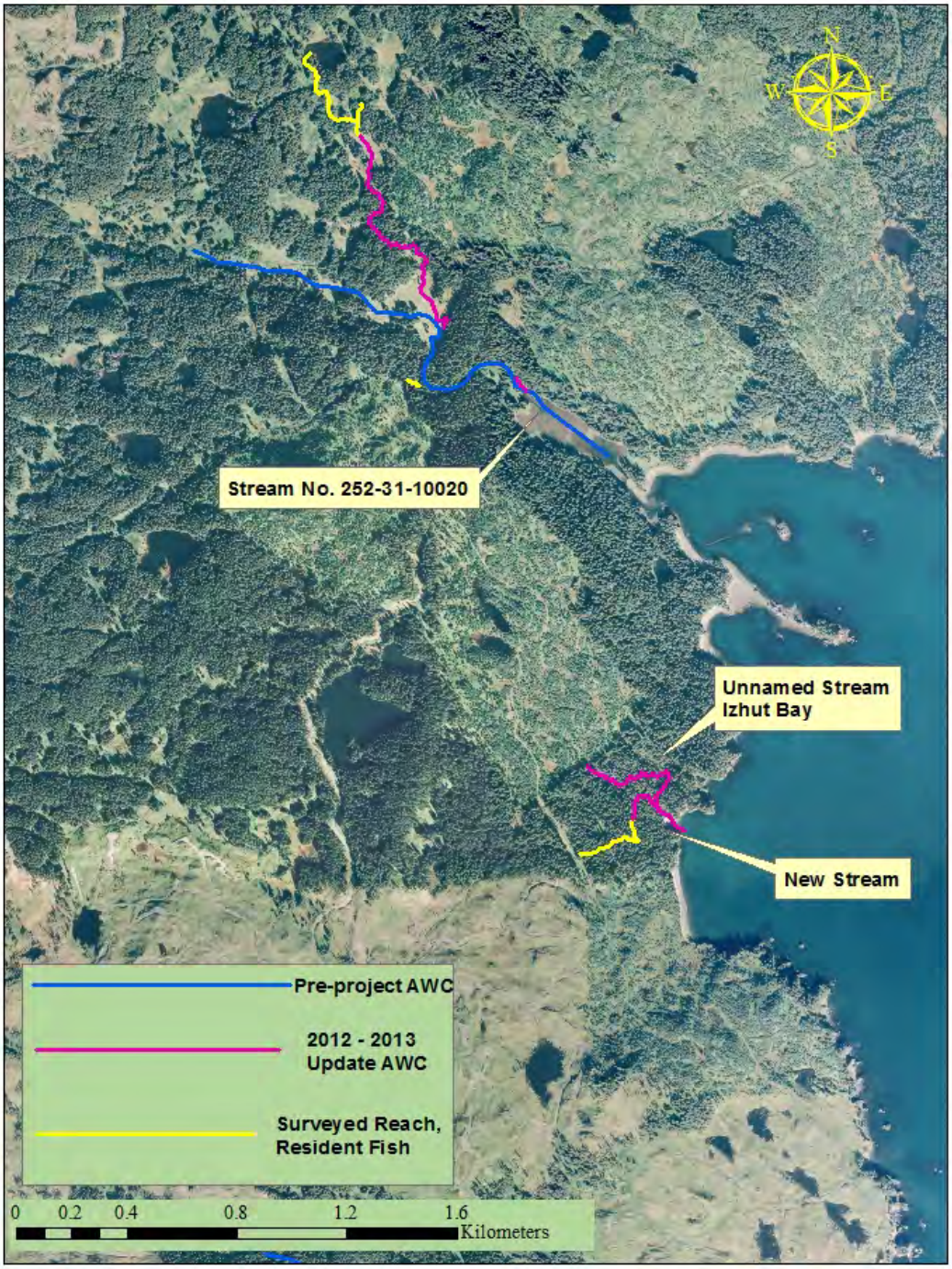
Appendix A6.–Status of surveyed reaches within an unnamed stream, Duck Bay and Stream No. 252-32-10040, Afognak Island.



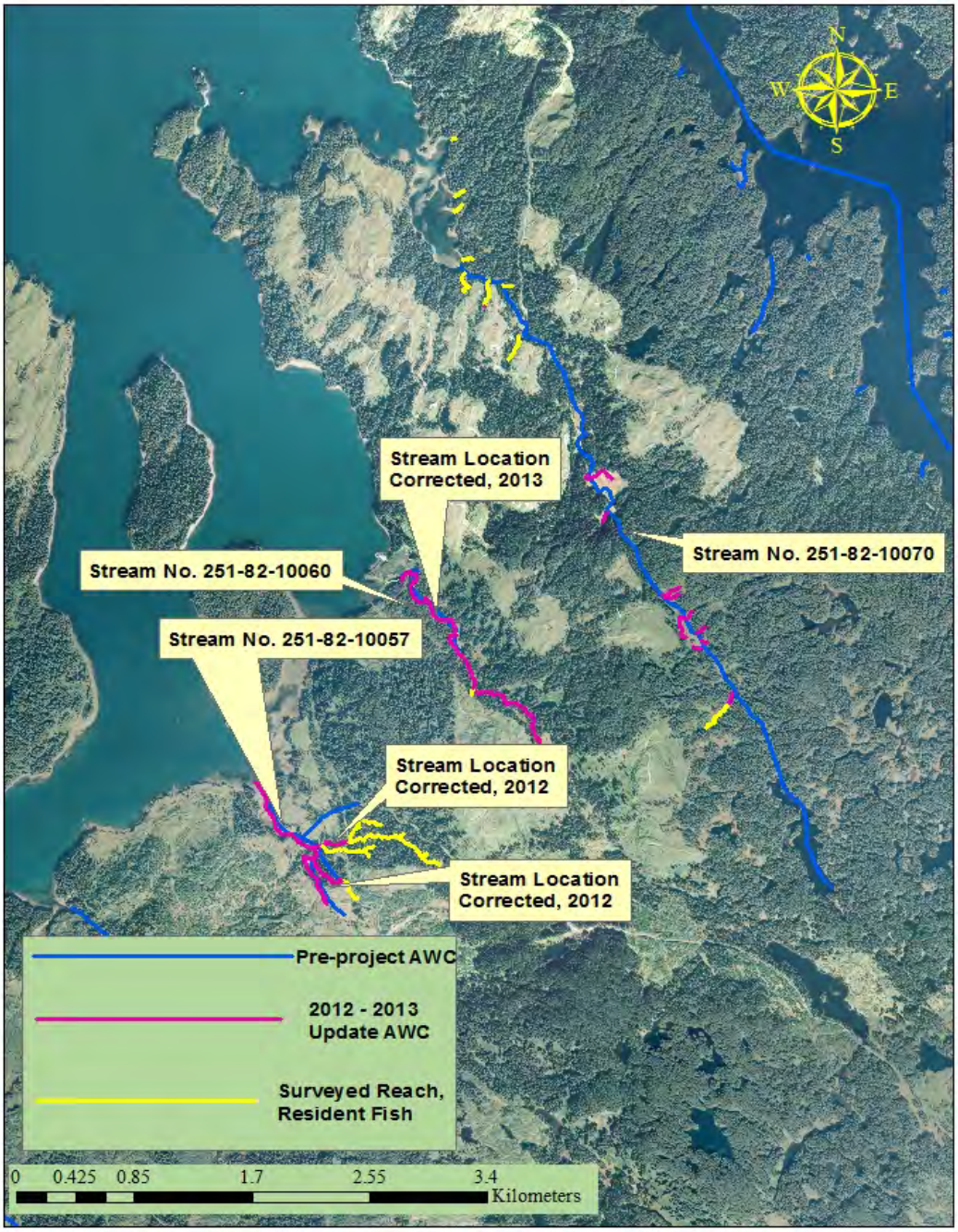
Appendix A7.–Status of surveyed reaches within Stream No. 252-31-10007, Afognak Island.



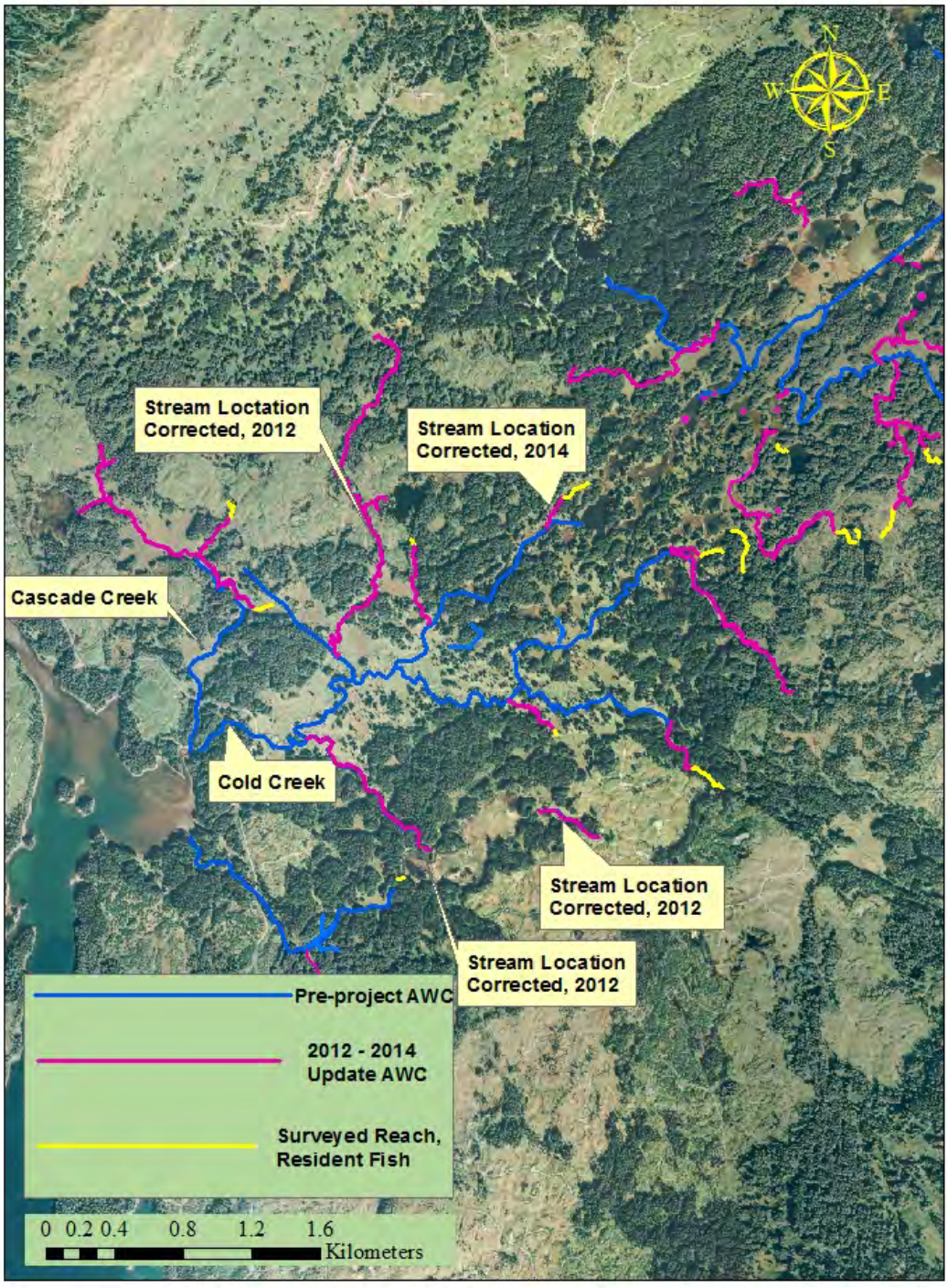
Appendix A8.–Status of surveyed reaches within an unnamed stream, Saposa Bay and Stream No. 252-31-10010, Afognak Island.



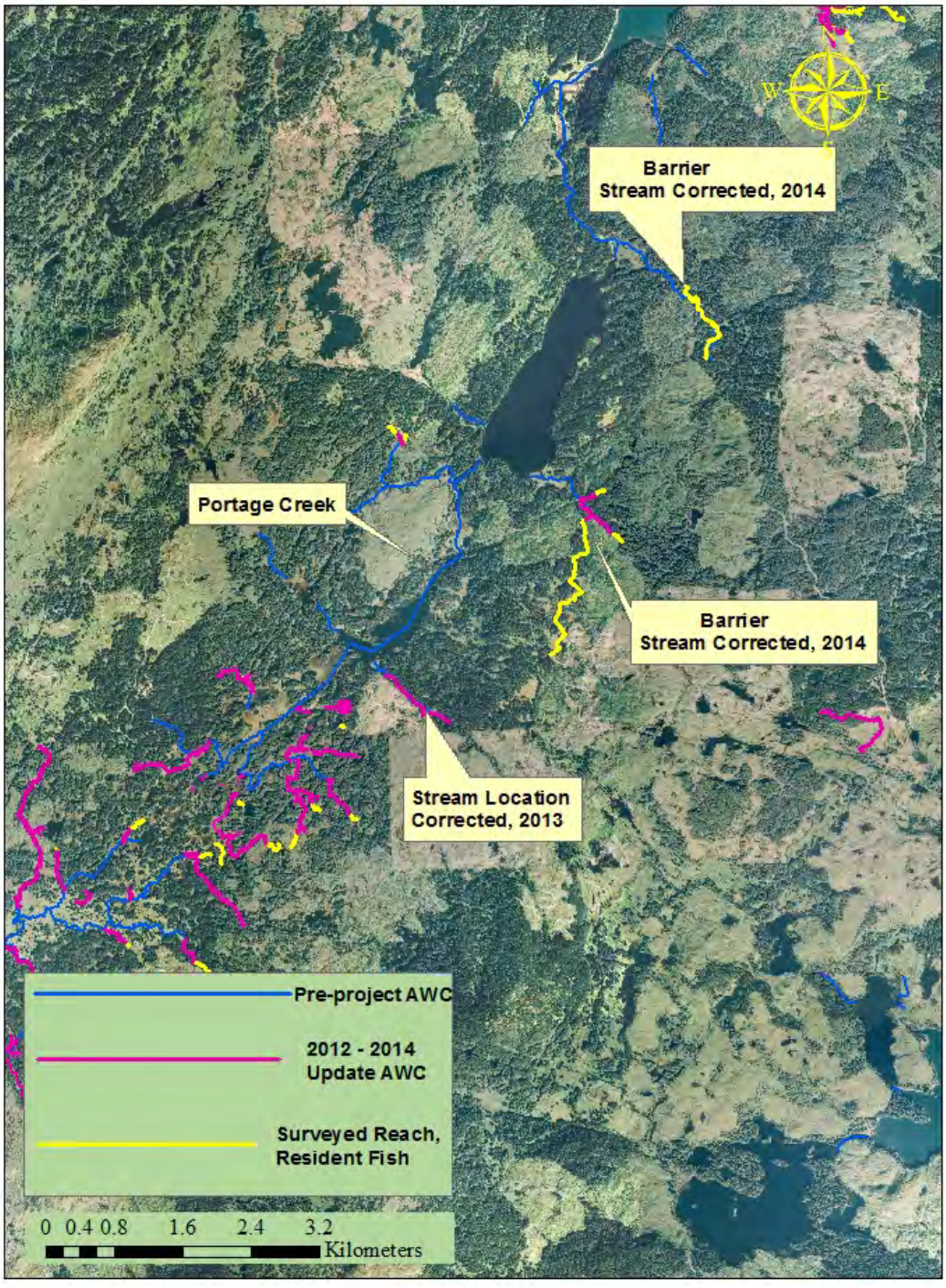
Appendix A9.–Status of surveyed reaches within an unnamed stream, Izhut Bay and Stream No. 252-31-10020, Afognak Island.



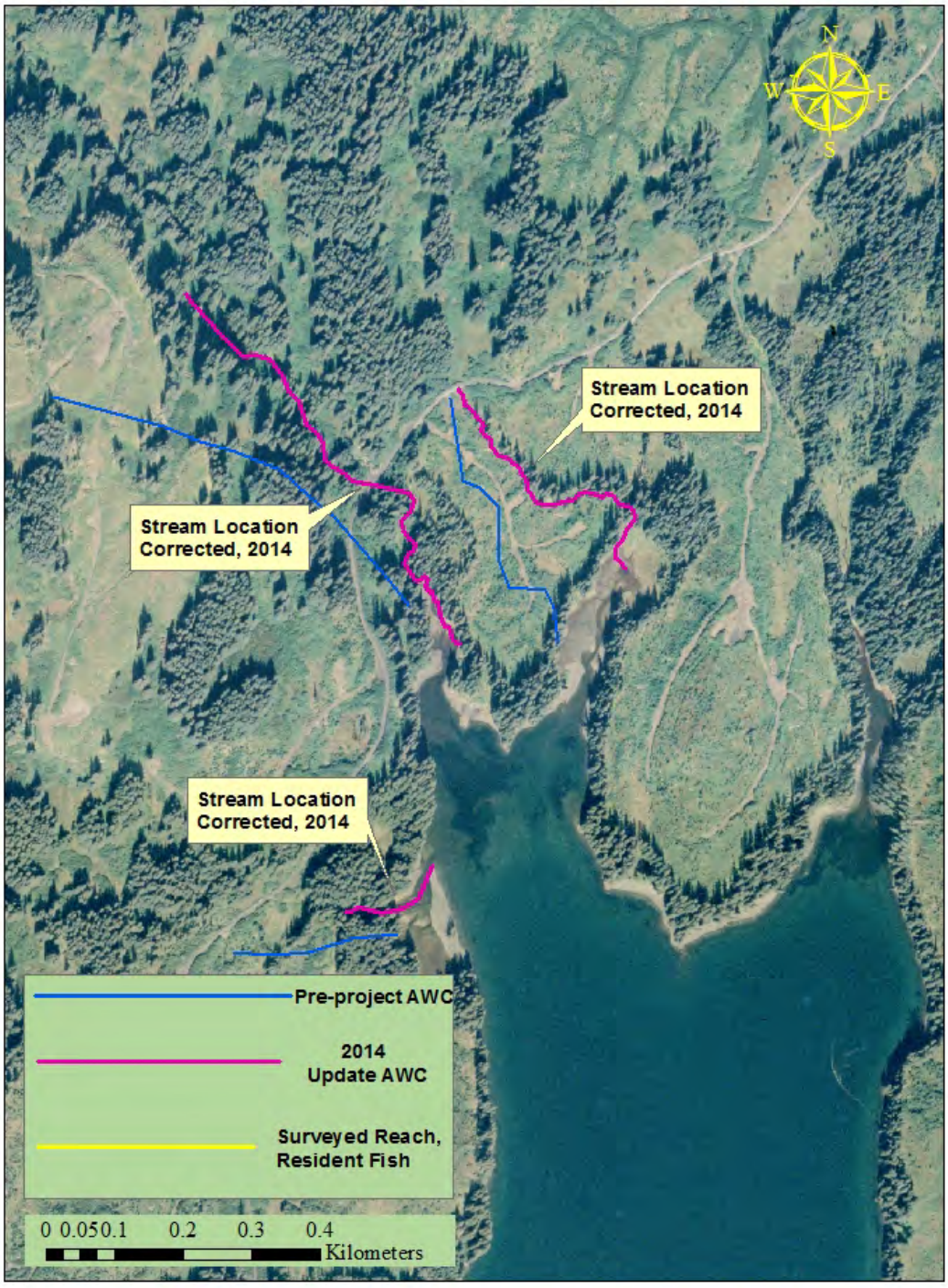
Appendix A10.–Status of surveyed reaches within Stream Nos. 251-82-10057, 251-82-10060, and 251-82-10070, Discoverer Bay, Afognak Island.



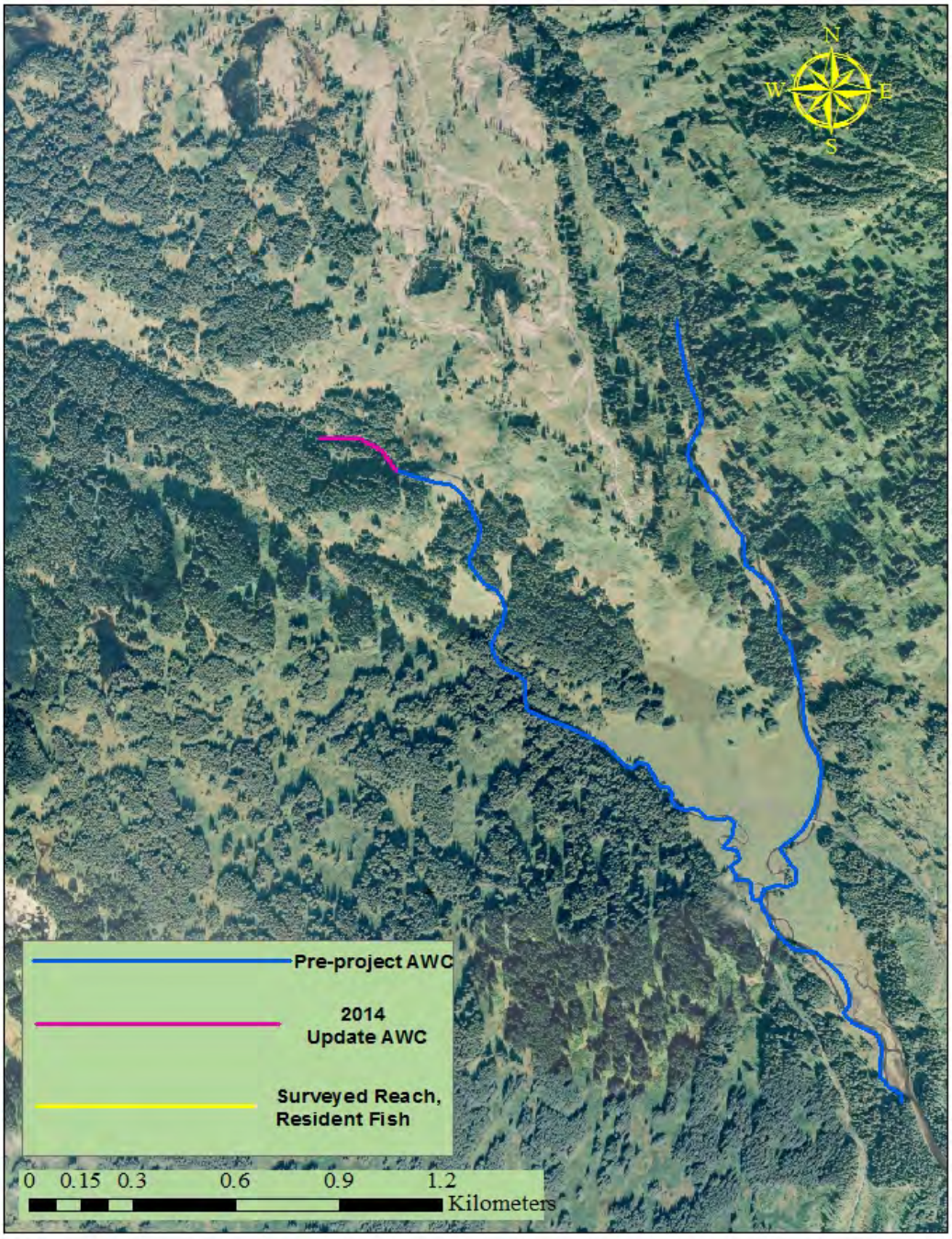
Appendix A11.–Status of surveyed reaches within Cascade Creek and Cold Creek, Afognak Island.



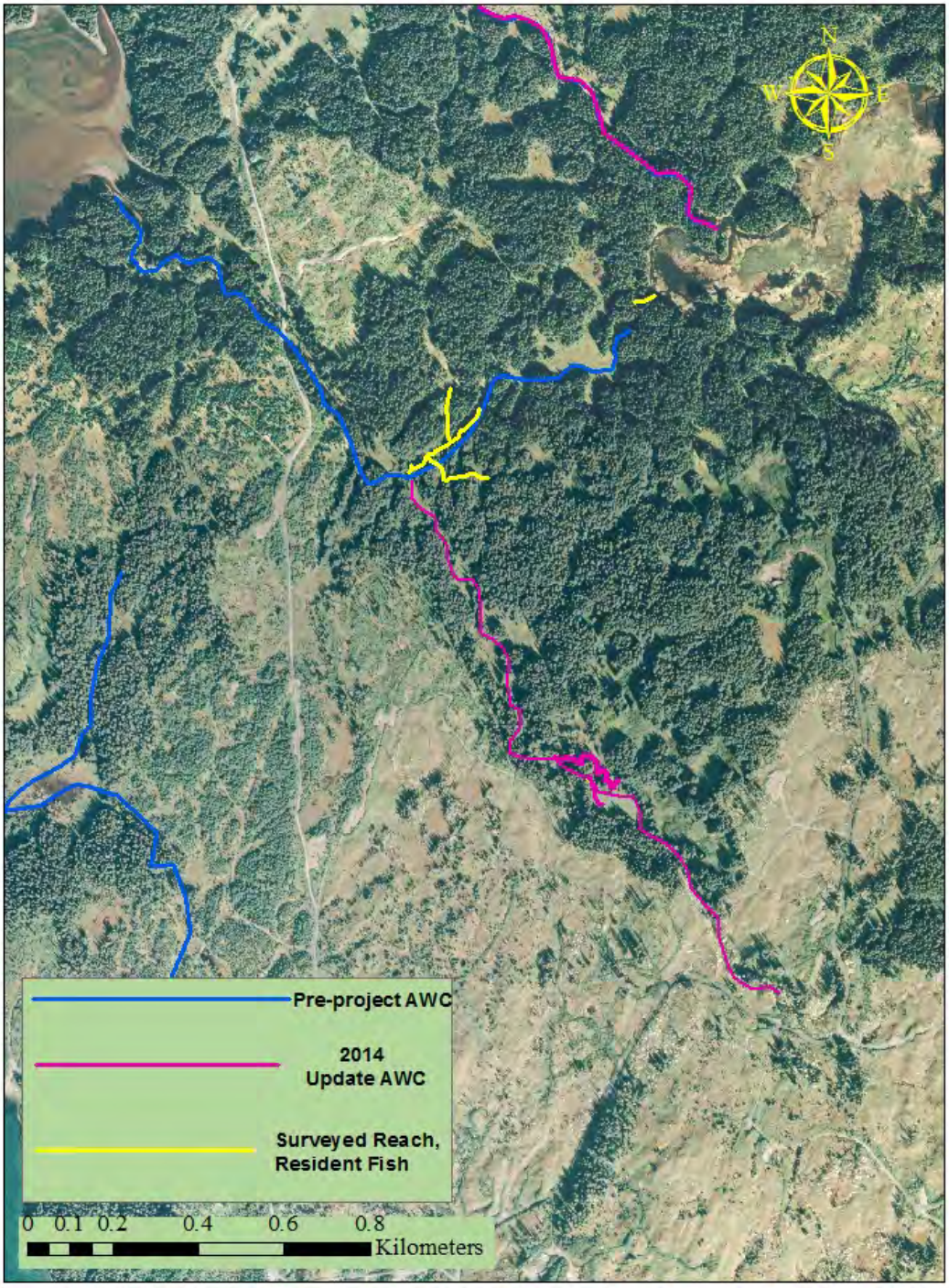
Appendix A12.–Status of surveyed reaches within Portage Creek, Afognak Island.



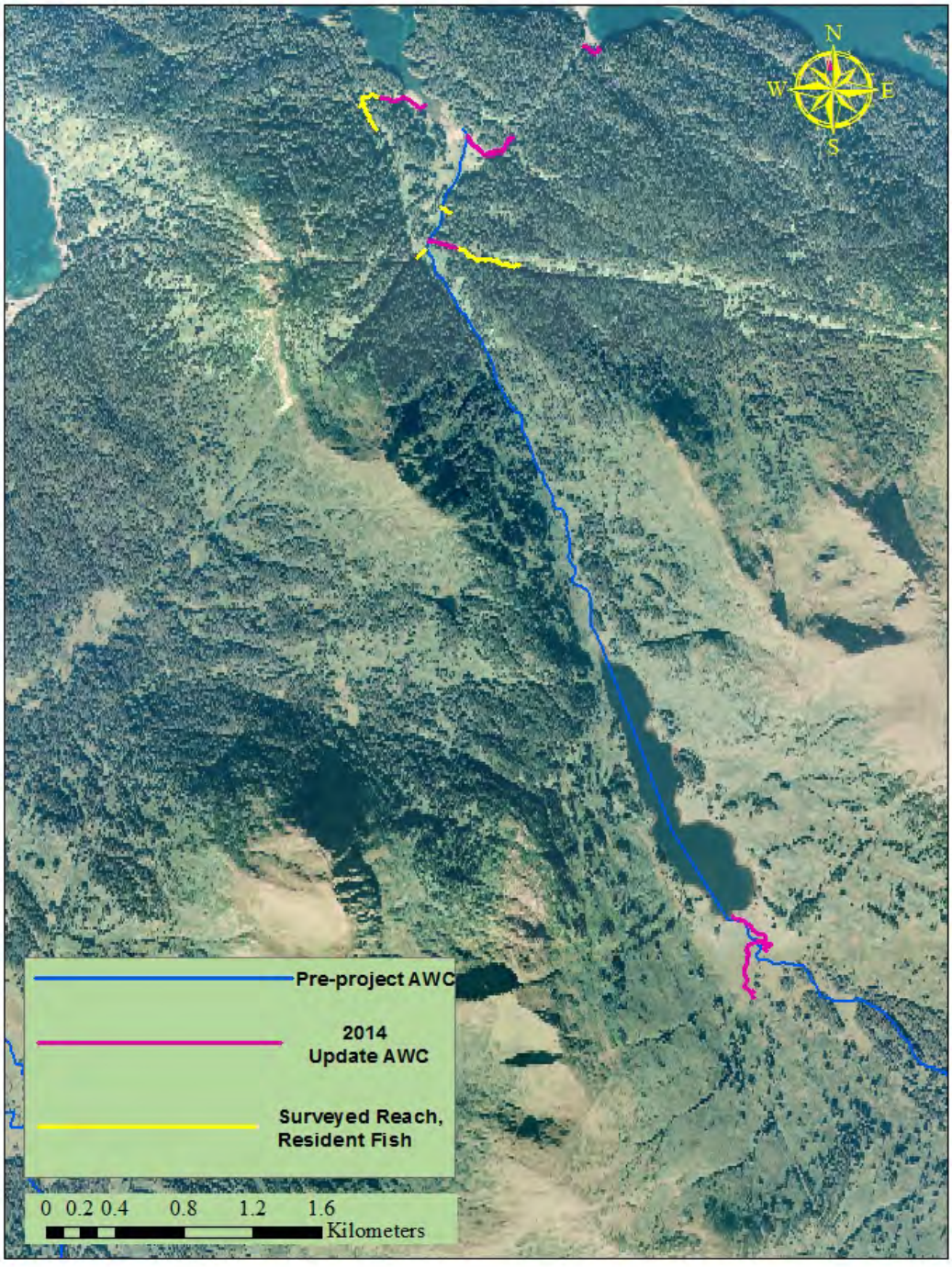
Appendix A13.–Status of surveyed reaches within Stream Nos. 252-33-10024, 252-33-10025, and 252-33-10027, Afognak Island.



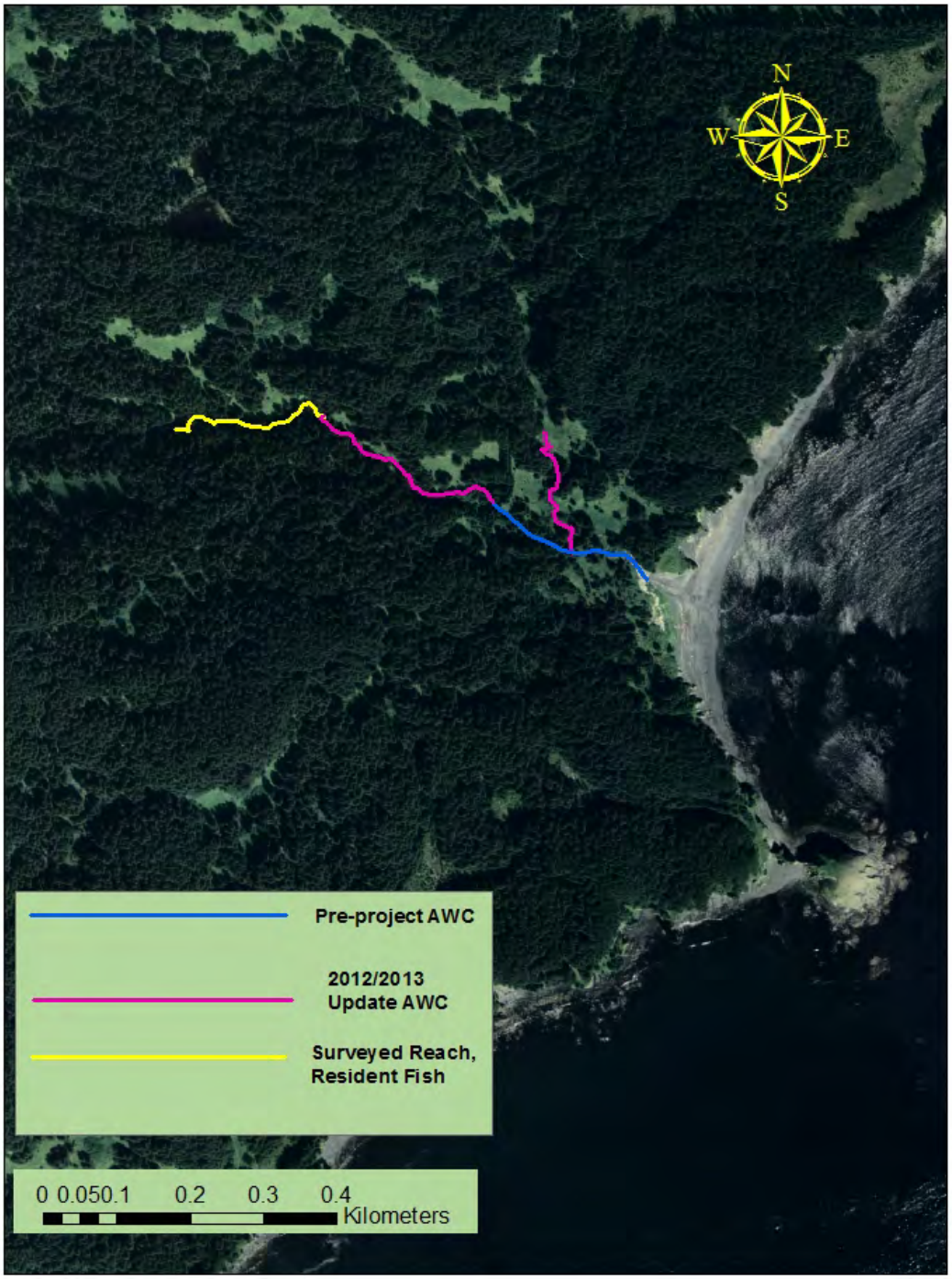
Appendix A14.–Status of surveyed reaches within Stream No. 252-33-10020-2005, Afognak Island.



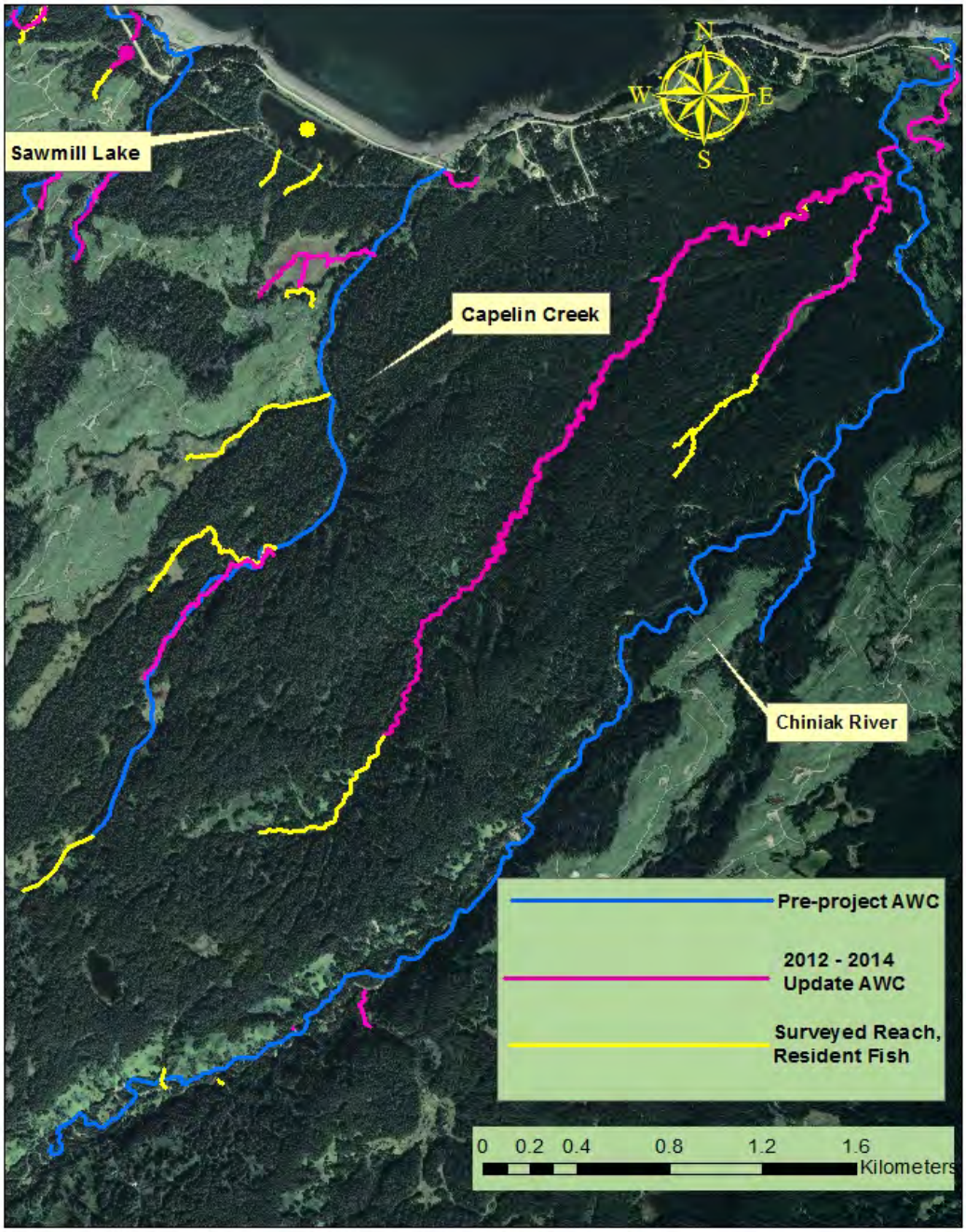
Appendix A15.–Status of surveyed reaches within Stream No. 252-33-10005, Afognak Island.



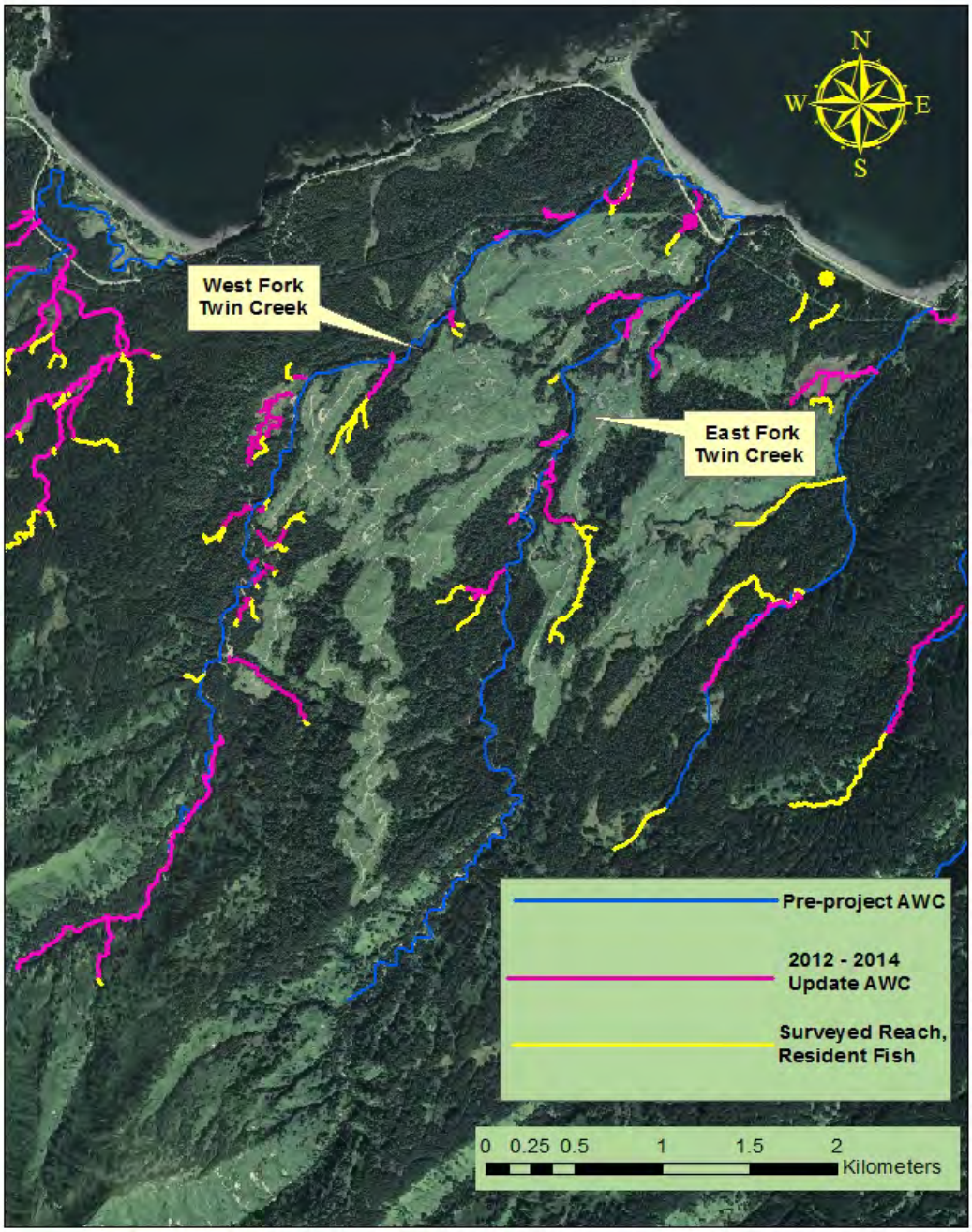
Appendix A16.–Status of surveyed reaches within Thorshiem River (Stream No. 251-30-10020), Afognak Island.



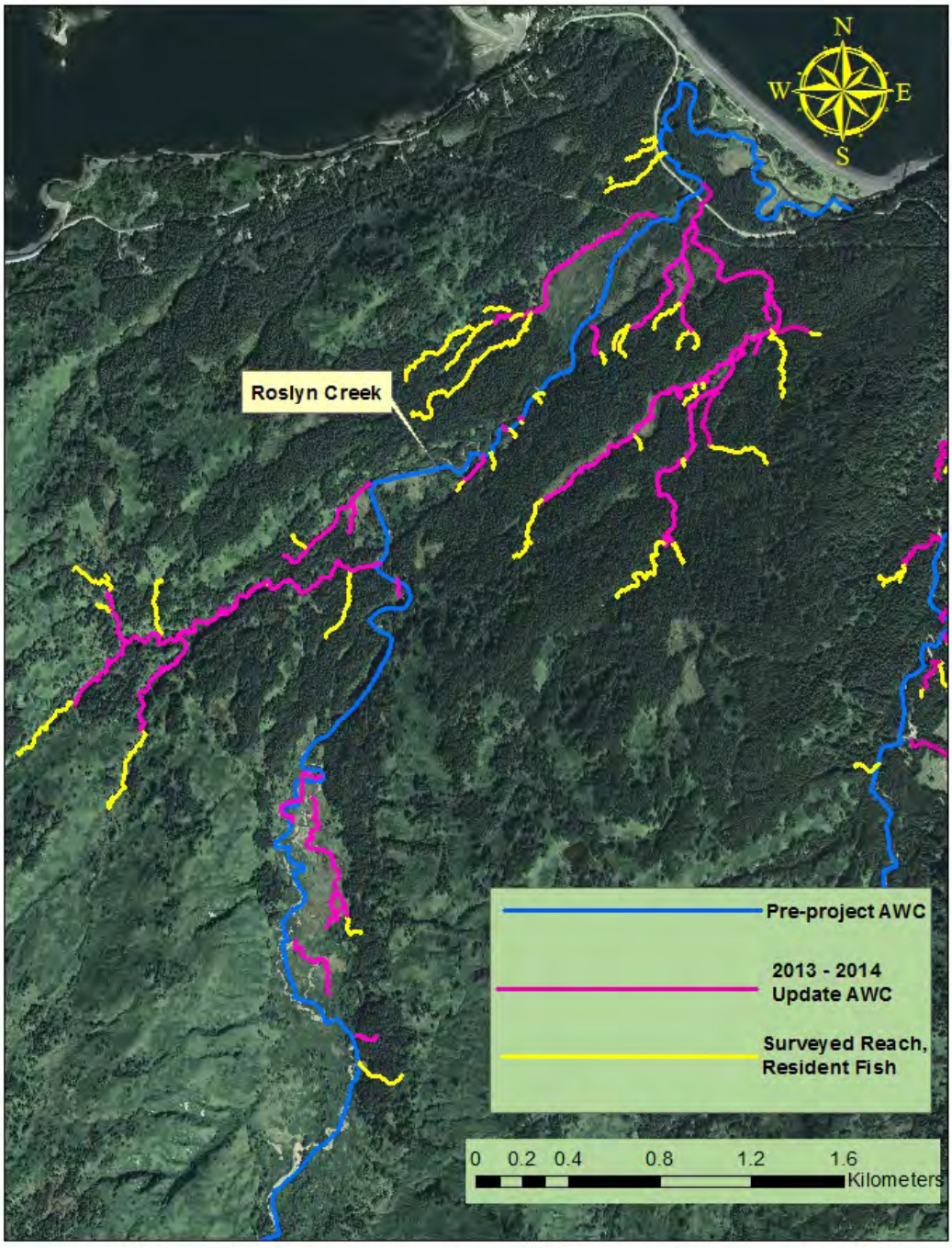
Appendix A17.–Status of surveyed reaches within Sequel Point Creek, Kodiak Island.



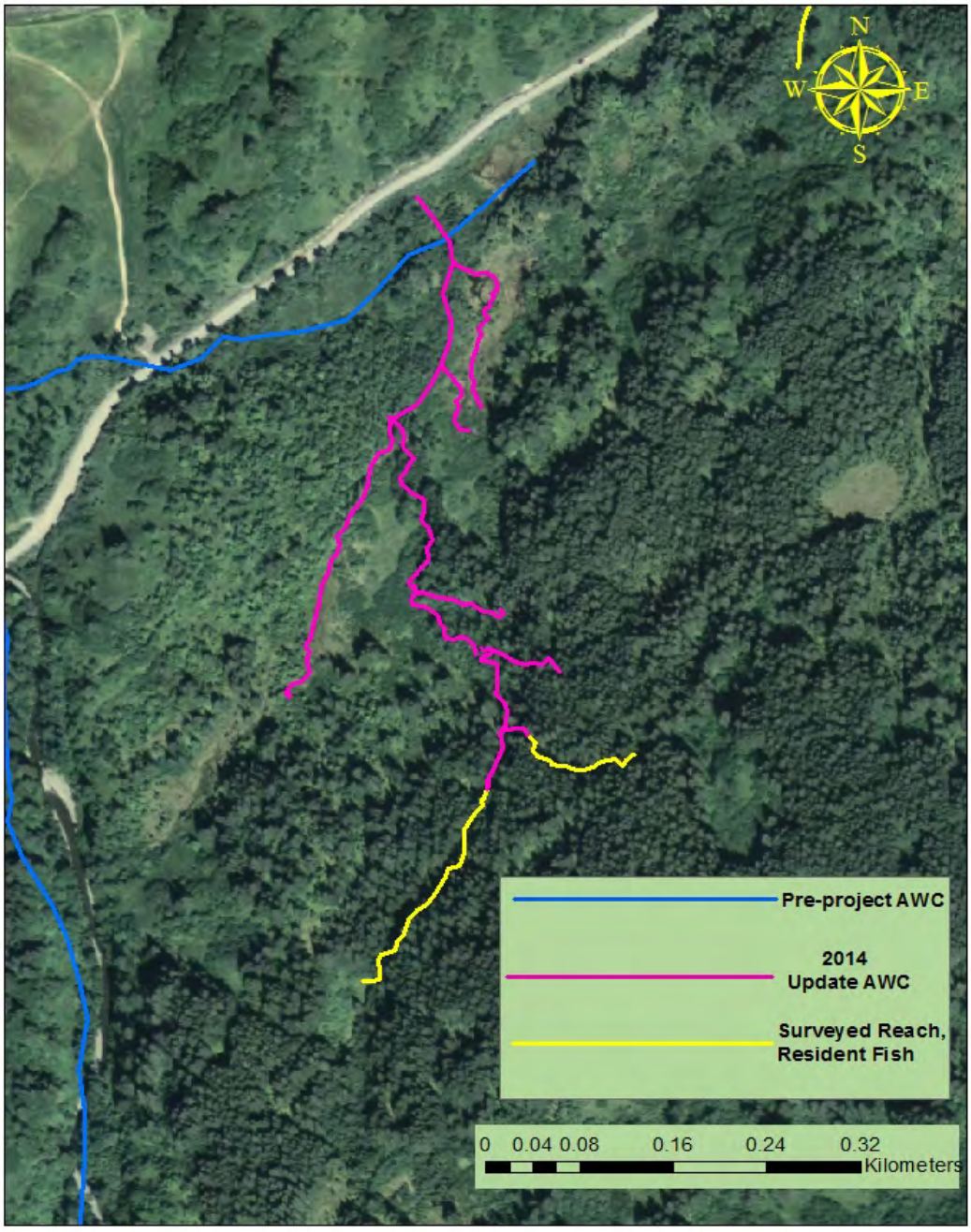
Appendix A18.–Status of surveyed reaches within Chiniak River, Capelin Creek, and Sawmill Lake, Kodiak Island.



Appendix A19.–Status of surveyed reaches within East Fork Twin Creek and West Fork Twin Creek, Kodiak Island.



Appendix A20.–Status of surveyed reaches within Roslyn Creek, Kodiak Island.



Appendix A21.–Status of surveyed reaches within Stream No. 259-24-10051, Kodiak Island.