

Afognak Lake Sockeye Salmon Monitoring Project Operational Plan, 2013

by

Steven E. Thomsen

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

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ABSTRACT

Afognak Lake sockeye salmon *Oncorhynchus nerka* runs declined substantially in 2001 and subsequent escapements from 2002 to 2004 were well below the escapement goal. Responding to concerns from local subsistence users, the US Fish and Wildlife Service Office of Subsistence Management provided funding to the Alaska Department of Fish and Game to begin investigations into the lake's rearing environment. After a one-year smolt abundance and mark-recapture feasibility study was successfully conducted, subsequent studies (2004–2006, 2007–2009, and 2010–2013) were funded and continued to further evaluate smolt abundance and assess rearing and spawning habitats of Afognak Lake. The continuation of smolt abundance and condition data are important factors when assessing the adult production. This operational plan provides the instruction and procedures to properly conduct the Afognak Lake smolt outmigration study, collect lake rearing juveniles for stomach evaluation and bioenergetics analysis, and operation of the adult escapement weir.

Key words: Kodiak, sockeye salmon, *Oncorhynchus nerka*, smolt, Afognak, Litnik, trap, mark-recapture, bioenergetics, limnology.

INTRODUCTION

The Afognak Lake drainage is located on the southeast side of Afognak Island, approximately 50 kilometers (km) northwest of the city of Kodiak (Figure 1). Afognak Lake (58°07' N lat, 152°55' W long) lies about 21 m above sea level, is 8.8 km long, up to 0.8 km wide, and has a surface area of 5.3 km² (Thomsen 2013). Runoff from Afognak Lake flows in an easterly direction via the 3.2 km Afognak River, emptying into Afognak Bay. The Afognak Lake system was the most productive sockeye salmon *Oncorhynchus nerka* system on Afognak Island in the 1990s. Total estimated sockeye salmon runs from the Afognak Lake system averaged 130,630 fish from 1990 through 1999 peaking at 219,126 in 1996 (Honnold and Schrof 2004).

Sockeye salmon escapements during the 1990s ranged from 66,869 (1998) to 132,050 (1997) fish and averaged 90,464 fish, well above the upper range of the Sustainable Escapement Goal (SEG; Honnold and Schrof 2004). In 2000, the sockeye salmon escapement of 54,064 was below the previous 10-year average but still fell within the SEG range of 40,000 to 60,000 fish. Lower escapement levels continued into the 2001 season resulting in commercial salmon fishing closures in the Afognak area until July and season long sockeye salmon sport fishery restrictions. Despite these restrictions, the total sockeye salmon escapement was 24,271 in 2001, far below the lower end of the SEG (40,000; Nelson and Lloyd 2001). Sockeye salmon escapements into the Afognak River failed to reach the lower end of the SEG from 2002 to 2004. During the same three-year time period, the commercial salmon fishery in Afognak Bay was closed and sport fishing for sockeye salmon was also restricted. The Alaska Department of Fish and Game (ADF&G) and U.S. Fish and Wildlife Service jointly closed much of Afognak Bay to subsistence fishing for sockeye salmon in 2002, 2003, and 2004.

In January 2005, ADF&G changed the Afognak Lake SEG of 40,000–60,000 sockeye salmon to a Biological Escapement Goal (BEG) of 20,000–50,000 (Nelson et al. 2005). The escapement goal was changed from an SEG to a BEG based on more thorough spawner-recruit data and was reduced because recent escapement trends were more reflective of sustainable production. After sockeye salmon runs continued to be weak in 2005, a five-day commercial fishery opening occurred and 356 fish were harvested. The sockeye salmon commercial fishery was closed in 2006 and 2007. The sport fishery was open through the 2005 and 2006 seasons but closed in 2007. The subsistence fishery was open throughout the 2005 and 2006 seasons with minimal harvests while a closure occurred in 2007 through the month of July.

Prior to 2003, sockeye salmon production had been assessed by adult escapement and harvest estimates; juvenile production estimates (smolt) of the Afognak Lake sockeye salmon stock had not been reliably assessed. In 2003, a sockeye salmon smolt project was initiated at Afognak Lake outlet to estimate the number, age, size, and condition of the smolt emigration. From 2004 through 2012, the smolt project was continued and the rearing environment (limnology) was monitored. A four year smolt assessment study along with a bioenergetics analysis of rearing juveniles has been conducted at Afognak Lake from 2010 through 2012 and will continue in 2013. These data are essential in determining future Afognak Lake sockeye salmon stock production, as well as the future outlook for subsistence, commercial, and sport harvesters. Additionally, smolt abundance and limnology data will assist in the development of appropriate strategies to improve returns. In addition to smolt and limnology data the operation of an adult weir will enable accurate escapement counts to be obtained as well as adult age, sex and length (ASL) data.

GOAL

The project goal is to assess lake rearing conditions, the health of juvenile sockeye salmon, and adult returns in an effort to develop in-season and long-term management strategies to maximize production of Afognak Lake's sockeye salmon stock.

OBJECTIVES

To achieve the project goal, ADF&G research personnel will collect data to:

1. Estimate the number of sockeye salmon smolt emigrating from Afognak Lake,
2. Estimate average age, weight, length, (AWL) and condition of sockeye salmon smolt emigrants from Afognak Lake,
3. Evaluate water chemistry, nutrients, zooplankton, temperature, and solar input as measured by photosynthetic active radiation (PAR) in Afognak Lake,
4. Enumerate adult salmon escapement through the weir and estimate salmon build-up below the weir, in the rivers, lagoons and bays,
5. Estimate ASL composition of sockeye salmon escapements into Afognak Lake,
6. Conduct hands on capacity building exercises and youth training with local native groups,
7. Evaluate the condition of juvenile sockeye salmon relative to diet and energy density through AWL, stomach content, and bioenergetic analysis.

TASKS

General

1. Install PAR and temperature data loggers in Afognak Lake after ice out. Target Date: 26 April–6 May.
2. Set up camp. Target date: 6–8 May.
3. Collect physical data daily: air temperature, water temperature, water level, cloud coverage, wind direction and velocity, and precipitation.
4. Collect water and zooplankton samples at stations 1 and 2 (zooplankton only) approximately every four weeks from May to September at Afognak Lake (This will be conducted by Heather Finkle and Darin Ruhl as per the Lake Assessment operational plan (Ruhl 2013 and Thomsen 2008).

5. Collaborate with Afognak Native Village and Natives of Afognak to conduct educational field seminars for youth groups attending the Dig Afognak Summer camp. Target date: July.

Smolt Monitoring

6. Install and operate a smolt trap (lower) to capture a target goal of 15% of the total sockeye salmon smolt emigrants. Target date: 8 May until the end of the smolt emigration (approximately 3 July).
7. Enumerate the daily smolt trap catch of fish by species.
8. Install and operate a second smolt trap (upper) to capture 650 sockeye salmon smolt weekly for mark-recapture, using Bismarck Brown Y (BBY) dye, to estimate trap efficiency, which is necessary to estimate the total smolt emigration. Of the 650 dyed sockeye salmon smolt, 100 will be held for a delayed mortality experiment. *An additional 50 unmarked smolt will also be held to estimate holding mortality.*
9. Collect AWL data from every 50th sockeye salmon smolt counted per day (2%) throughout the outmigration.

Adult Monitoring

10. Install, operate, and maintain an adult counting weir. Target dates: approximately 15 May–15 August.
11. Install, operate, and maintain an upstream steel head trap to enumerate and pass steelhead downstream of weir. Target dates: (approximately 15 May–15 August).
12. Enumerate adult salmon escapement through the weir and provide accurate daily escapement reports.
13. Collect representative scales (for age determination), length, and sex from 2% of the sockeye salmon escaping to Afognak Lake. Note: Moore (2013) lists the minimum of number of samples as 600. Ensure samples are collected weekly throughout the season.

Juvenile Lake Monitoring

14. Utilize a small mesh beach seine, a small mid-water trawl, a small mesh purse seine, and a cast net to collect juvenile sockeye salmon in Afognak Lake at 5 beach seine stations and 5 trawl stations on a bi-weekly basis (10 events). Target dates: 15 May–15 September. Log all activities, methods, and catches on appropriate forms.
15. Collect AWL data from the first 20 juvenile sockeye salmon encountered at each lake sampling event. From the juveniles selected for AWL sampling, select up to five fish from each of three groups and retain for stomach content and bioenergetic analysis. The three groups will be composed of a small group of fish (<45 mm) a medium group (46 to 65 mm) and a large group (>65 mm). Individually label, freeze and store each specimen in whirl pack envelopes (Figure 3).
16. Identify stomach contents from 3 of the 5 juvenile sockeye salmon samples from each of the 10 seine and trawl stations from each of the 10 sampling events. (This will be conducted by laboratory staff or as part of Natura Richardson's thesis) Target date: after 15 September.
17. Assess caloric content (bioenergetic analysis) of the remaining 2 juvenile sockeye salmon samples from each of the 10 seine and trawl stations from each of the 10 sampling events. (This will be conducted by ADF&G Soldotna Laboratory supervised by Mark Willette). Target date: mid September.

SUPERVISION AND TRAINING

Project Biologist: *Steven Thomsen* – Project Biologist (Fishery Biologist II)

Field Staff: *Natura Richardson* – Crew leader (Fish and Wildlife Tech. III)

Michael Bach – Crew member (Fish and Wildlife Tech. II)

The project biologist will oversee the project, provide logistical and technical assistance, and write annual and final reports. The crew leader will implement ADF&G safety guidelines, schedule daily tasks, oversee daily operations, and make sure data is complete and accurate. The crew member will assist the crew leader in all assigned tasks and field operations.

All field personnel will receive onsite training detailing salmon sampling protocols, field operations, radio and satellite communications, bear awareness, proper use of firearms, boat handling and operation, fish pass and weir operations, smolt trap installation and use, and daily facility operations.

PROCEDURES

SMOLT TRAP INSTALLATION, MONITORING, AND MAINTENANCE

A smolt trap will be located approximately 5 m upstream from the location of the Afognak River weir and 32 m upstream from the terminus of Afognak Bay. The trap will be installed so the water velocity is sufficient to force smolt into the catch box while ensuring that smolt are not injured (scale loss, pinned against the perforated sheeting, etc.). A prefabricated aluminum wing extension will be added to the trap to increase trap efficiency. If needed, perforated (1/8") aluminum sheeting (4' x 8' perf-plate), supported by a rackmaster supported pipe frame, can be placed at the entrance of the trap in a "V" configuration to further increase trap efficiency. If necessary, the perf-plate 'wings' may be lined with plastic sheeting to increase water velocity in the trap and avoid smolt scale loss.

The trap and wings will:

- Be kept free of debris to maintain consistent trap efficiency and minimize smolt mortality.
- Requires frequent monitoring and maintenance to ensure that the trap is working properly. The trap should be checked every 3–4 hours during the day and every 1–2 hours at night.
- Be fished continuously for the duration of the smolt emigration (~8 May until ~3 July) and attention to changes in migration patterns will be monitored and recorded (i.e., rain may trigger a large emigration).
- Be modified or the wings pulled from the water to allow smolt to pass safely if unforeseen conditions occur and smolt trapping must temporarily cease. If possible, any modifications to the trapping system will be discussed with the project biologist before implementation. If immediate modifications are necessary to avoid major mortality or loss of equipment, the project biologist will be notified as soon as possible.

SMOLT TRAP CATCH AND SPECIES ENUMERATION

Since smolt primarily migrate at night, a single trapping or sampling day will be the 24-hour period from noon of the first day to noon the following day and the date will correspond with the first day. All fish caught in the smolt trap will be counted. A dip net will be used to remove and release the fish as they are counted. Smolt needed for sampling will be held in a covered live-box. Smolt will be handled with care, as sockeye salmon smolt are very sensitive to any stress, and mortality can occur through the loss of just a few scales. A tally counter will be used to enumerate the smolt to ensure an accurate count. All data, including smolt mortality will be entered on the *DAILY SMOLT TRAP CATCH REPORTING FORM* (Figure 3) each time the trap is checked. Daily trapping data will be summarized on the *SOCKEYE SALMON SMOLT SUMMARY FORM* (Figure 4). Digital records of these forms will be sent into the Kodiak office on a memory stick bi-weekly or when re-supplied.

Pollard et al. (1997) provides color pictures and explanations in the *Field Identification of Coastal Juvenile Salmonids* key for species identification. Contact the project biologist with any questions regarding identification.

SMOLT TRAP EFFICIENCY AND MARK-RECAPTURE

The trap efficiency estimates are necessary to estimate the total sockeye salmon smolt emigrating from Afognak Lake. Mark-recapture trials will be conducted to determine what percentage of the outmigration the trap is catching. Bismarck Brown Y (BBY) dye will be used to mark and identify the smolt used for these trials. The dyeing process can be very stressful to smolt, so every effort should be made to minimize and avoid unnecessary handling of the smolt during the process. Excessive handling (netting), increased water temperatures, and exposure to the dye are the primary stresses. Individually, these can induce mortality.

In an attempt to reduce handling mortality, smolt for mark-recapture will be collected at the release site using a second smolt trap located approximately 1.2 km upstream from the location of the Afognak River weir. Trap installation methods will follow those previously described. If insufficient numbers of smolt are captured at the release site, the crew will capture additional smolt at the lower trap using the old methodology (Thomsen and Baer 2011). The following methods will be used for marking and releasing smolt:

- All data will be recorded on the *Smolt Dye Release Form* (Figure 4). Digital records of this form will be sent to the Kodiak office on a memory stick bi-weekly or when re-supplied.
- Once a week, 700 sockeye salmon smolt will be collected; of which 650 sockeye salmon smolt will be marked and 50 will remain unmarked. If the emigrating run strength is not sufficient to capture 700 smolt in one night, smolt will be collected and held in a live-box for up to two days. Approximately, 550 smolt will be dyed and released and 100 dyed smolt and 50 non-dyed smolt will be retained to monitor delayed mortality. The 100 dyed and 50 non-dyed smolt will be held and assessed separately under similar conditions. Smolt sampled for AWL will not be used in the dye test.
- Dye marking will take place at the release site, located approximately 1.2 km upstream from the weir site. The smolt will be captured in the upper trap at the mark/release site where they will be marked with BBY. Two identical 26-gallon insulated lidded coolers

outfitted with oxygen stones and a temperature and oxygen meter will be used to hold the dyed smolt until release.

- Sodium bicarbonate will be added to the cooler water for a 0.25% (1 g/gal or 264 mg/l) solution to maintain a stable blood pH.
- No-ionized salt will be added to the cooler water to achieve a 0.75% solution (3 g/gal or 793 mg/l) in transport water. This solution level approaches physiological levels and reduces metabolic stress and electrolyte depletion that can cause post transport mortality.
- Supplemental oxygen will be supplied continuously throughout the dye marking process. An optimal dissolved oxygen level of 9 mg/l will be targeted with percent oxygen held within a 80–100% saturation range.
- The 650 smolt will then be added to the cooler. Sufficient water to prevent crowding will be added to the cooler and the lid secured. Water temperatures and dissolved oxygen will be recorded throughout the process.
- Any mortality will be recorded and the cooler will be placed in the shade along the stream bank for a period of 30 minutes for the smolt to acclimate. Water temperatures will be monitored and stabilized with supplemental river water if a difference of 2°C is detected. Oxygen will continually be applied to achieve 9 mg/l or 100% saturation and the cooler will remain covered to eliminate ambient light to help minimize stress.
- While the smolt acclimate, the second cooler will be prepared for the dye process. A mixture of 3 mg/l of BBY dye to water will be dissolved in the second cooler designed for dye marking and holding. After the 30 minute resting period the smolt will be placed in the dye for 30 minutes and the cooler will be covered and oxygenated continuously during the dyeing process.
- Following the dyeing process, all dyed smolt will be held in the live-box for a minimum of 60 minutes. Smolt displaying “abnormal” behavior will NOT be released as part of the test or retained for delayed mortality. A fish with “abnormal” behavior may be swimming on its side, upside down, puffing or flaring gills continuously. All dead and “abnormal” fish that are discovered at this stage of the dye test must be removed from this test population, returned to the river DOWNSTREAM of the smolt trap and recorded on the Smolt Dye Release Form as mortality in its perspective cell.
- Dyed smolt displaying “normal” behavior will be counted (up to 550) and released evenly across the creek with the use of water filled buckets. The process should be timed such that smolt will be released at approximately 2200 hours. The remaining 100 dyed and 50 non-dyed smolt will be held in a live box up to four days to determine smolt survival from the dye as part of the Delayed Mortality Experiment.
- Monitor the smolt trap for marked smolt daily from the day of the release and continue until the next dye test. The number of dyed smolt observed will be recorded on the *Daily Smolt Catch Reporting Form* (Figure 2) and the *Sockeye Salmon Smolt Summary Form* (Figure 3). The daily smolt catch will include marked smolt from the upper trap but will not include those captured from the lower trap, since they were previously counted at the trap site. The trap efficiency from each dye test will be identified as a percentage of the dyed fish recovered divided by the dyed smolt released.

DELAYED MORTALITY EXPERIMENT

The delayed mortality of dyed smolt will be measured for each dye test to ensure the accuracy of mark-recapture estimates, reducing the total number of dyed smolt released to account for marking mortality. During each dye test, 100 additional smolt will be dyed simultaneously with the 550 smolt dyed that are released to test the trap efficiency. Smolt used for the mortality experiment will be handled the same way as the smolt being released, except they will not be released. Smolt dyed for the mortality experiment will be held in a covered instream live box and checked daily for mortality over a 4-day period. The number of daily mortalities will be recorded by day on the smolt dye release form (Figure 6). The delayed mortality smolt must be transported and released downstream of the lower trap and added to the outmigration estimate to prevent biasing the mark-recapture estimates.

In addition, 50 non-dyed smolt will be held during each mortality experiment. These smolt will be assessed and held separately from the dyed smolt but under similar conditions. The delayed mortality of the non-dyed smolt will be used to account for holding mortality.

MARK RETENTION EXPERIMENT

A mark retention experiment will be conducted during each dye test to ensure that dyed smolt remain visibly marked during the entire 4-day recapture period. During each dye test, the 100 dyed smolt retained for the dyed mortality experiment will be assessed daily for mark visibility. Daily, five marked smolt will be randomly chosen from the delayed mortality live box and observed for dye retention. Observations will be conducted by a crew member not associated with choosing the dyed smolt. To assess “unmarked holding mortality”, an additional 50 unmarked smolt will be held in a separate covered instream live box and checked daily for mortality over a 4-day period. “Unmarked holding mortality” will be used to adjust the delayed mortality, accounting for holding smolt in the live box. The number of daily mortalities for both marked and unmarked smolt will be recorded by day on the smolt dye release form (Figure 6).

SMOLT AGE, WEIGHT, AND LENGTH SAMPLING

Refer to Appendix A1 for a description of smolt AWL sampling materials and methods. Daily smolt sampling will be dependent on the number of smolt enumerated that day. A target goal of 2% of the trap catch will be sampled throughout the season. The 2% goal will be achieved by retaining every 50th sockeye salmon smolt that is counted out of the trap. The collected smolt will be placed in the river live box and held until sampling occurs. All remaining smolt will be counted and released, unless they are being held for a future dye test. All smolt sample data will reflect the sampling day when the fish were captured and recorded by day and a two-digit sampling week as identified in Appendix A2. Each sample will be comprised of a single day's catch and samples will not be mixed between days. Dyed smolt used to estimate trap efficiency will not be selected as part of this sampling schedule.

Smolt will be sampled on the day of capture. Smolt will be measured to the nearest mm from the tip of the snout to the tail fork (Appendix A3). Excess water will be removed from the smolt before weighing by using a paper towel as a blotter. Individual smolt weights will be measured to the nearest 0.1 g. A scalpel will be used to remove 5–10 scales from the preferred area of the fish (Appendix A3). The scales will be mounted on a glass slide as shown in Appendix A4. Scales from five fish will be mounted on each slide. The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers that correspond

with their place on the AWL form (Appendix A4). After sampling, the fish will be moved to the aerated recovery bucket and held until all smolt are swimming normally. Both the recovery and pre-sampling holding buckets will be covered to minimize stress on the fish.

AWL data will be collected and *recorded in a notebook dedicated to smolt sampling*. Data will then be transferred to the Rugged Digital Assistant (RDA). Instructions for using the RDA can be found in Appendices A1 and A2.

All data (slides, files) will be forwarded to the Kodiak area office and reviewed throughout the field season. Keep data and samples updated daily in the event that data must be sent to town on short notice. The crew leader will be responsible for editing all data for errors prior to sending forms to the Kodiak office.

Common mistakes to avoid include:

1. Poorly mounted scales. Too many scales in a smear or slime and debris present when mounting. The rows of scales should not be too close together to avoid confusing scales from different smolt.
2. Numbering AWL form improperly. Methods for number smolt samples changed with the introduction of RDA's. Each slide will be numbered consecutively, starting at 001. For the first day slide one will consist of fish 1-5, slide two will consist of fish 6-10, and so on. The second sampling day will again start with fish 1-5 but the slide numbers will remain consecutive, increasing throughout the season.
3. Missing or erroneous data in RDA files. Keep a write in the rain log book of smolt AWL data as a back up to correct RDA data if needed.
4. Scales removed from one fish contaminating the scale smear of the next fish. Wipe the scalpel blade off between each fish sampled.

ENUMERATION WEIR

An adult enumeration weir will be installed perpendicular to the stream flow approximately 2 meters downstream to the main cabin. The weir consists of 10 wooden tripods (each tripod consisting of three 4" x 4" x 8' spruce timbers and 2" x 6"x 6' horizontal cat walk supports), 33 aluminum pipes (2" x 10'), 44 picketed aluminum panels (1" aluminum pipe with 1" spacing totaling 30" x 6'). The wooden tripods are evenly spaced in the river with the leading leg facing upstream. The aluminum pipes are then placed horizontally (parallel to the water) across the front leg of the tripods to form two runs, one run is placed the water surface and the second run 2' above the water surface. The runs of pipe are temporarily held in place with spikes and then lashed fast with braided twine. Aluminum picket panels are then placed and supported by the two runs of pipe. The panels are held perpendicular to the pipes and flush to the bottom substrate. Care must be taken to ensure the panels sit tightly on the bottom and rocks or debris do not prevent fish tight integrity. The use of an underwater viewer is crucial in the process. As the picketed panels are set the frame work for the two counting gates are simultaneously installed in the two deepest channels of the river. Once all of the panels and gate frames are in place the entire structure can then be secured in place with wire, twine, and zip ties.

An upstream "scott trap" will be installed in front of the near shore (east bank) gate which will act as a sampling trap as well as a steel head trap. The trap consists of 6 weir panels placed horizontally in the river in the form of a diamond. The weir and trap must be monitored and

maintained several times a day. First thing every morning the front of the weir must be inspected for scouring, holes, and any possibility of unintended salmon escapement. Debris must be removed from the weir as it accumulates on the front of the weir panels.

ADULT AGE, SEX, AND LENGTH SAMPLING

Adult sockeye salmon sampling will occur weekly at the weir site throughout the adult escapement. Samples will be collected from 2% of the sockeye salmon escaping to Afognak Lake. *Ensure samples are collected weekly throughout the season and proportionate to the run.* Keep a write in the rain log book of adult ASL data as a back up to correct RDA data if needed. Details and procedures for adult sampling are outlined in the Kodiak Management Area sockeye salmon catch and escapement sampling operational plan, 2013 (Moore 2013). Note: Moore (2013) lists 600 samples as the minimum, not 2% of the escapement.

COLLECTION OF JUVENILE SAMPLES

Juvenile sockeye salmon collected in Afognak Lake are discrete from samples collected at the smolt outmigration site, *with two distinct sets of data.* Juvenile sockeye salmon will be collected from Afognak Lake for AWL, stomach content evaluation, and bioenergetic analysis. A total of five predetermined beach seining and five mid-water seine locations will be used to obtain juvenile samples bi-weekly from May through September (Figure 3). A beach seine or cast net will be utilized for the collection of fish rearing near-shore (sites 1-5) and a pelagic seine, trawl net, or cast net will be utilized offshore (sites 6-10). Daily collection of juveniles will be recorded on the *Afognak Lake Juvenile Sockeye Daily Sampling Form* (Figure 6) and summarized on the *Afognak Lake Juvenile Sampling Log* (Figure 7).

The first 20 juvenile sockeye salmon encountered at each sampling event will be sampled for AWL data. From the juveniles selected for AWL sampling, select up to five fish from each of three groups and retain for stomach content and bioenergetic analysis. The three groups will be composed of a small group of fish (<45 mm), a medium group (46 to 65 mm), and a large group (> 65 mm). The retained juvenile samples will be temporarily separated by sample location and size group, stored in water in separate Ziploc bags® and transported to the field lab where they will be individually sampled and identified as described for smolt sampling above.

Separating fish into the size groups will ensure all ages are proportionally sampled in the event the sampling locations contain mixed age and size populations, although it is assumed most of the near-shore fish will be predominately made up of young-of-the-year fish while mid-water fish could contain age-1 juveniles as well as age-1. and -2 smolt.

For AWL sampling, each slide will be numbered consecutively, starting at 001. Samples collected from each sampling site (1-10) will be placed on separate slides. For example: if 6 fish are caught at site 1, place fish 1-5 on AWL 001 and fish 6 on AWL 002. Fish caught on the next day or at the next site will be labeled as fish 1-5 on AWL 003, and so on.

Fish retained for stomach content and bioenergetic analysis must be part of the 20 juveniles sampled for AWL's and have a distinct label placed on the Whirl-Pak® bag. Samples will be labeled with an 8 digit numbering system. The first fish will be labeled 13000101. The leading 13 is for 2013, the middle four digits are for the slide number (slide 0001 above), and the last two digits are for the fish number. *Note: not all fish sampled for AWL data will be retained for stomach content and bioenergetic analysis so make sure the slide and fish numbers match the*

whirl pack numbers. All juveniles sampled for AWL's and retained for stomach content and bioenergetic analysis must be anesthetized with MS 222.

Each sample will be individually labeled and stored in Whirl-Pak® bags and frozen in the field. Samples will then be transported via aircraft to the Kodiak laboratory where three random samples from every group, sample location, and sample event will be used exclusively for stomach content analysis. The stomachs of fish selected for diet analysis will be removed and the contents examined. Zooplankton species will be identified through the same methods as described in the limnological assessment, and any other invertebrate species will be identified through taxonomic key identification (McCafferty 1983; Pennak 1989; Thorp and Covich 2001). The remaining two samples from each location and size group will be stored at or below -20°C until all samples are sent to the ADF&G laboratory in Soldotna for further processing. The energy density of each sockeye salmon sample will be determined within a precision of 0.1% through the use of a Parr model 1266 Isoperibol microbomb calorimeter as per the manufactures specifications (Parr 1999). A bioenergetics model such as the Hewitt and Johnson/Wisconsin model (Hanson et al. 1997) will be used to estimate and identify growth limitations associated with sockeye salmon freshwater condition. Physiological parameters for sockeye salmon provided by the model will be paired with the field generated data (diet, temperature, size at age, and energy density).

PHYSICAL DATA

Physical data will be collected daily between 1100 and 1200 hours. Information will be recorded on the *DAILY PHYSICAL OBSERVATION FORM* (Figure 8) and will include water temperature, air temperature, water depth, percent cloud cover, wind direction and velocity, and precipitation. A depth gauge will be placed upstream of the weir to determine the water level on a daily basis.

OTHER REQUIREMENTS

SAFETY

Prior to field deployment each employee will be CPR and First Aid Certified as required by the ADF&G Standard Operating Procedures (SOP). In addition, each employee will read each of the following sections of the ADF&G SOP guidelines.

- Safety Policy Standards
- Building Safety
- Field Camp Safety
- Aircraft Passenger Safety
- Boating Safety
- Vehicle Safety
- Laboratory Safety
- Small Tool Handling
- Firearm and Bear Safety
- Emergency Survival Equipment Required in Aircraft

The ADF&G safety policies will be reviewed and followed by each field crewmember at the beginning of the season and referenced throughout the field season. In the event of a life or limb emergency contact should be made directly to USCG emergency

rescue at **1-800-478-5555** or VHF Channel 16. The Afognak Lake Cabin is located at **58°4.5' N lat and 152°49.3' W long**.

The Afognak Lake project is in bear country, and trash produced from this camp will be handled in a responsible manner. All organic matter will be disposed of in the river. All burnable materials will be burned in the barrel on-site with the grated spark arrestor over the top of the barrel and closely monitored to prevent grass fires. All inorganic or unburnable materials will be doubled-bagged with trash bags and shipped to town via the next available chartered plane.

TRAINING

In addition to mandatory CPR and First Aid training, all field personnel will receive training in proper use of firearms and bear awareness before departing from town or at the field camp. Field personnel will also receive hands-on training specific to data collection, weir and trap installation, and sampling procedures in the field.

RADIO SCHEDULE

During the smolt season (May–June), Kodiak Research office personnel will contact field camps by satellite phone on the dispatch service every day of the week between 1300 and 1315 (1:00–1:15 PM) hours. After the smolt trap is removed and smolt operations are over, the daily communication schedule will change; consisting of daily radio communication with Kodiak Management staff every morning between 0810–0830 (8:10–8:30 AM) and daily communication with Kodiak Research office personnel every morning between 0845–0900 (8:45–9:00 AM) via Single Side Band (SSB) radio on frequency 3.230 kHz. Instructions on the operation and transmission of the satellite phone are provided in Appendix B. The emergency Coast Guard frequency for the SSB is **4.125 kHz**.

The morning radio communication is an important tool which provides local air charter pilots with the current weather conditions and provides the most recent escapement data to fishery managers who utilize this information to make daily management decisions. The Commercial Fishery Management Section also maintains an afternoon radio schedule for their management weirs at 1630 hr (4:30 PM) which is an optional radio communication. If contact to the Kodiak office is necessary at other times, information can be transmitted via the satellite telephone, with the satellite dispatch service or with the SSB radio.

REPORTING

The crew leader will be responsible for compiling biological data onto data sheets, drafting bi-weekly reports, providing daily radio reports, photo documentation, and maintaining a camp journal, although some of these responsibilities may be delegated. Hard copies of data forms, log books, and daily journal will be completed on a daily basis, recording key events (i.e., equipment installation and removal dates, problems, or concerns). Electronic duplicates of the weekly reports and data forms will be completed, saved on the lap top computer provided, and copied to a memory stick to be sent to the Kodiak office bi-weekly. *“Rite in the rain” logbooks will be used for the collection of mark-recapture tests, lake juvenile sampling, ASL and AWL sampling, and the daily journal.* After completing the sampling and/or tests and upon returning to the cabin

the data will be transferred to the corresponding data forms. On a daily basis the current weather conditions, escapement numbers, smolt trap catches, juvenile lake sampling, and mark recovery test results will be reported to the Kodiak office via satellite phone or SSB radio. **MAKE SURE TO CHECK NUMBERS BEFORE PASSING THEM ON TO TOWN.** In addition a brief report of project activities will be sent to town bi-weekly, via resupply/mail plane (Appendix C). In preparation for bi-weekly resupply flights the electronic data and biweekly reports will be saved to portable flash drives and the adult and juvenile scale samples will be properly packaged and clearly labeled with *ADF&G Attn: Steven Thomsen 486-1872*. At the end of the season a crew leader report summarizing key activities, such as equipment installation and removal dates, problems, or concerns will be provided to the project biologist

TIMESHEETS

Forward timesheets to the KODIAK OFFICE by the 15th and last day of each month! Plan ahead to ensure that timesheets arrive in town on time. To ensure that timesheets are properly filled out, instructions are contained in Appendix D1 and an example of a properly filled out timesheet is provided (Appendix D2). Plan work activities to be completed in a 7.5-hour day; work overtime only if pre-authorized by the project biologist.

Crew leaders should take the time to look over each crewmember's timesheet before sending them to town to ensure that they are properly filled out.

RESUPPLY

Resupply items (e.g., groceries, fuel, mail, etc.) will be sent via chartered float plane or delivered to Anton Larson Bay for pickup on a bi-weekly basis. All air charter flights will be set up through the Kodiak office staff. Appropriate information in regard to flight logistics and times will be relayed via the daily radio communications. Small lists can be relayed over the Single Side Band radio or satellite phone; however, these lists should be limited to just a few items. Blank grocery lists will be available in the field so the crew can place orders 2 weeks in advance for preparation of the next supply flight. It should also be remembered that the grocery budget allocates \$25/day/person and this allocation will not be exceeded. If it becomes apparent the grocery budget is being surpassed the project leader will notify staff so appropriate reductions can be made. When planning for the resupply flights it will be import to prepare back haul items and maximize the use of the chartered aircraft. Items to send back to town will include empty fuel containers, non-burnable trash, and biological data and reports. When back hauling items it will be important to notify office personnel of the expected items.

CAMP INVENTORY AND CLOSURE

The Afognak Lake project equipment will be inventoried prior to camp closure. All project equipment possessing state inventory stickers will be included on the camp inventory with a brief description and its location, whether left at camp or brought back to town. All state inventory equipment will be logged out when departing for camp and logged back in at camp closure. All communication equipment (SSB, Satellite phone, and VHF's) and safety equipment (EPIRB, AED, and guns) will be returned to their designated locker in Kodiak.

All laboratory equipment (meters) will be returned to the Near Island Lab. A list will be made of the equipment needed for the next field season. All food items will be removed from the facility and all water drained from any lines and containers. Water pumps must be drained, fuels are to be treated with winterizing fuel additives, and batteries disconnected from any loads. The cabin and facilities will be locked and secured prior to the field crew leaving the camp site for the season.

PARTNERSHIPS AND CAPACITY BUILDING

ADF&G in collaboration with Afognak Native Corporation (ANC) and Afognak Native Village (ANV) will work together on an annual educational project. The collaborative effort is designed to cross educate and train native student interns in fisheries management and research practices and educate ADF&G staff about subsistence harvesting methods and traditional ways of life.

- Afognak Native Corporation will bring up to four high school or college interns to the Afognak Lake monitoring station for up to 2 days during each of the summers. During their trip, the students will work side by side with the biologists learning about the importance of monitoring fish stocks. Afognak Native Corporation will cover the transportation, food and housing required for the interns (estimated costs: \$3,600).
- Native Village of Afognak will bring Dig Afognak participants at the Traditional Harvesting Camp to the ADF&G monitoring station for a half a day. ADF&G staff will teach the students about how and why fish stocks are monitored and how this activity relates to subsistence fishing. ADF&G will have the students help them count and sample fish. Native Village of Afognak will provide the transportation to and from the monitoring station.
- ADF&G will send their Afognak Lake site staff to Dig Afognak for half a day during the traditional harvesting camp so they can learn hands-on, from Elders and other subsistence gatherers about why subsistence foods are important to the Alutiiq people. Ideally, they will not only participate in some subsistence activities but also listen to stories from Elders about the importance of our food.
- In a communal effort, all three groups will participate in a subsistence fishery in which all aspects, from net sewing and mending, fishing, processing, drying and smoking will occur within Afognak Bay.

The collaboration and consultations described above will help develop partnerships and build the capacity of individuals, agencies, and organizations to meaningfully participate in traditional harvests, and for the management of federal subsistence fisheries. Additionally, ADF&G will give preference to local residents, including qualified residents of the Villages of Port Lions and Ouzinkie, when hiring field crews. Local employees will be trained in various biological data collection techniques and will be educated in many research applications that assist with salmon management. The study site is located in an area of high recreational use, and frequent interaction with the public will occur. Employees will be encouraged to provide accurate information to the public regarding the goals and objectives of the project, which will promote increased interaction among subsistence users, organizations, the community, and agencies. This will, in turn, encourage information gathering and information sharing, which will help capacity building.

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FIGURES

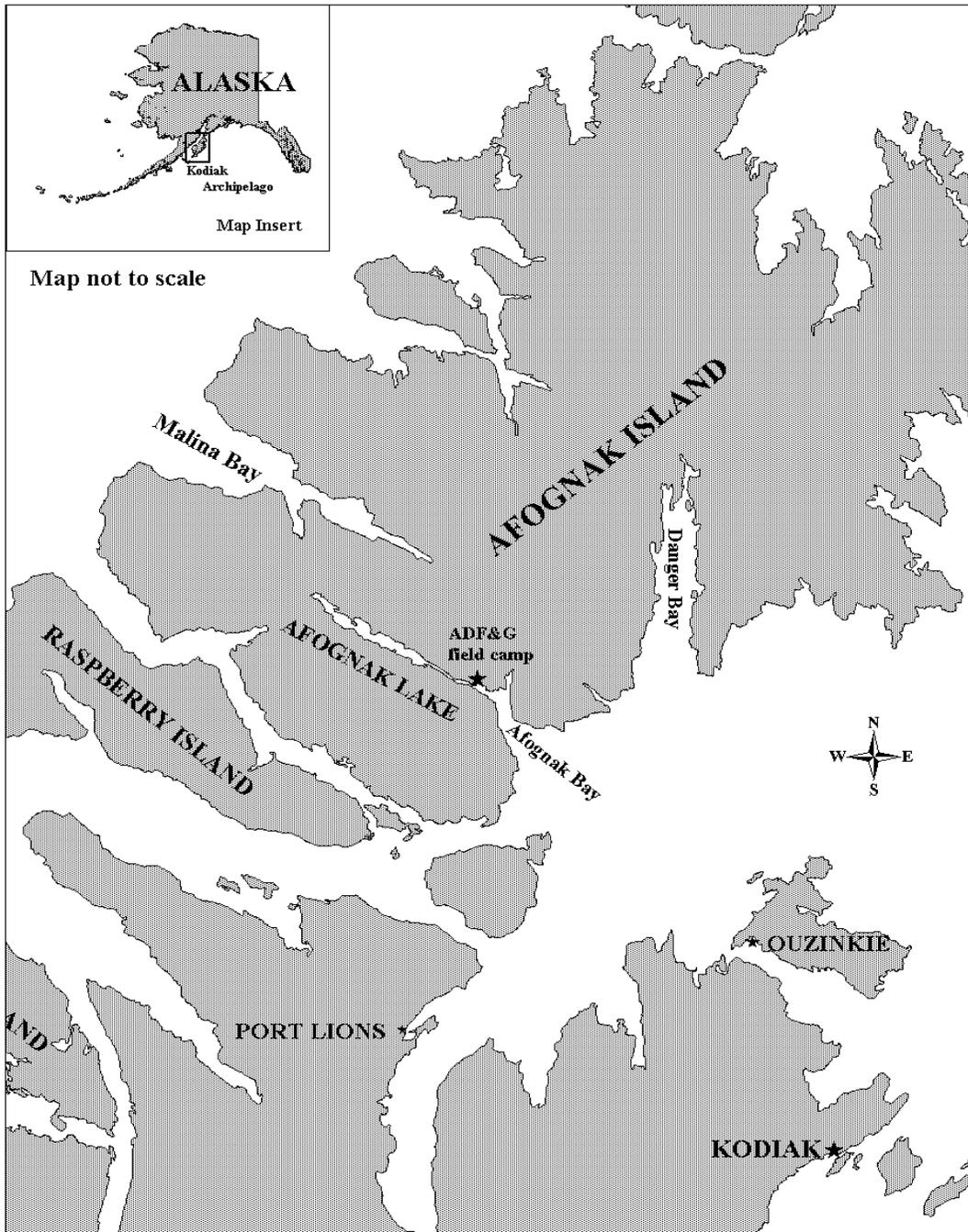


Figure 1.—Location of the ADF&G camp along the Afognak River and Afognak Lake on Afognak Island.

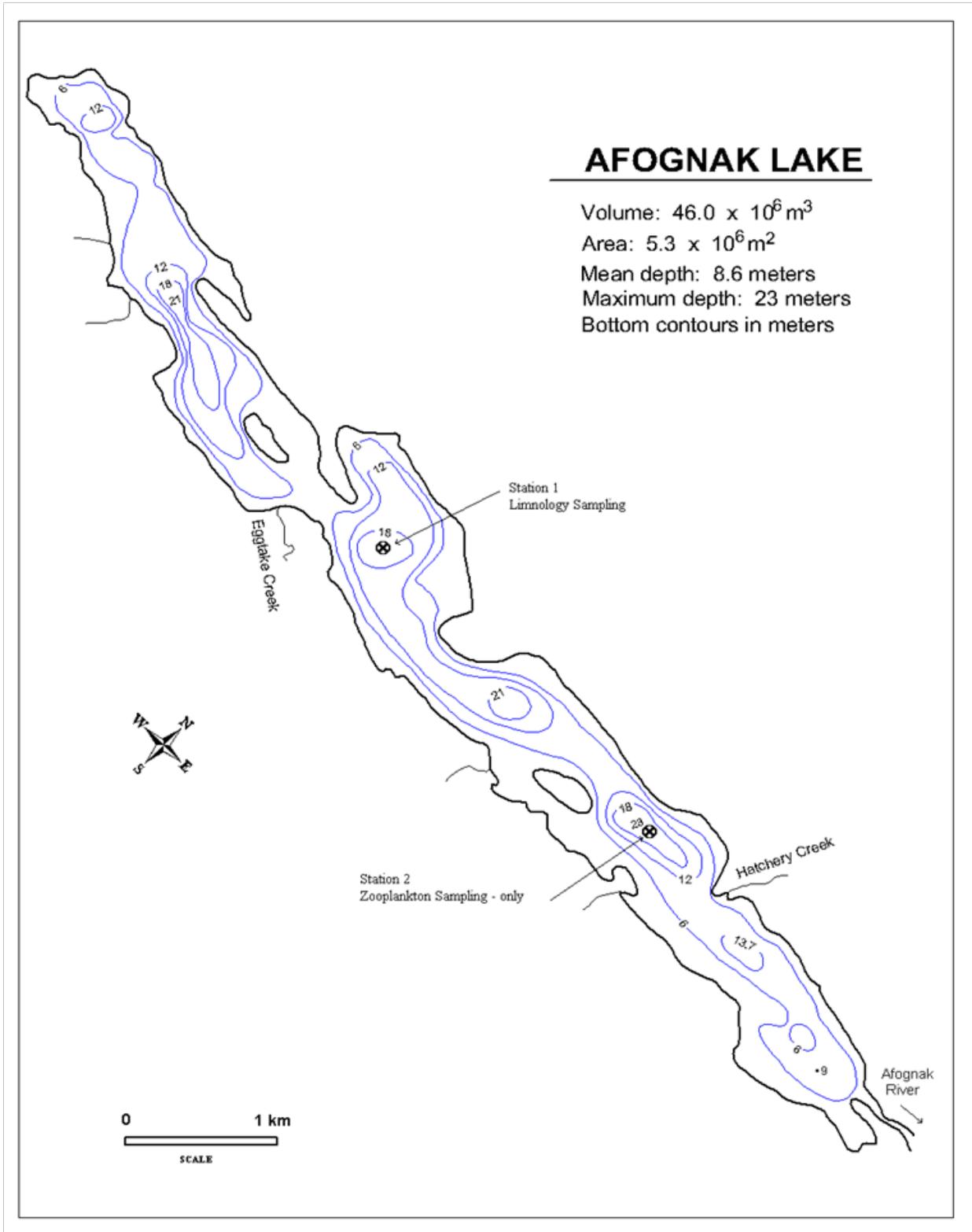


Figure 2.–Bathymetric map of Afognak Lake depicting limnology stations.

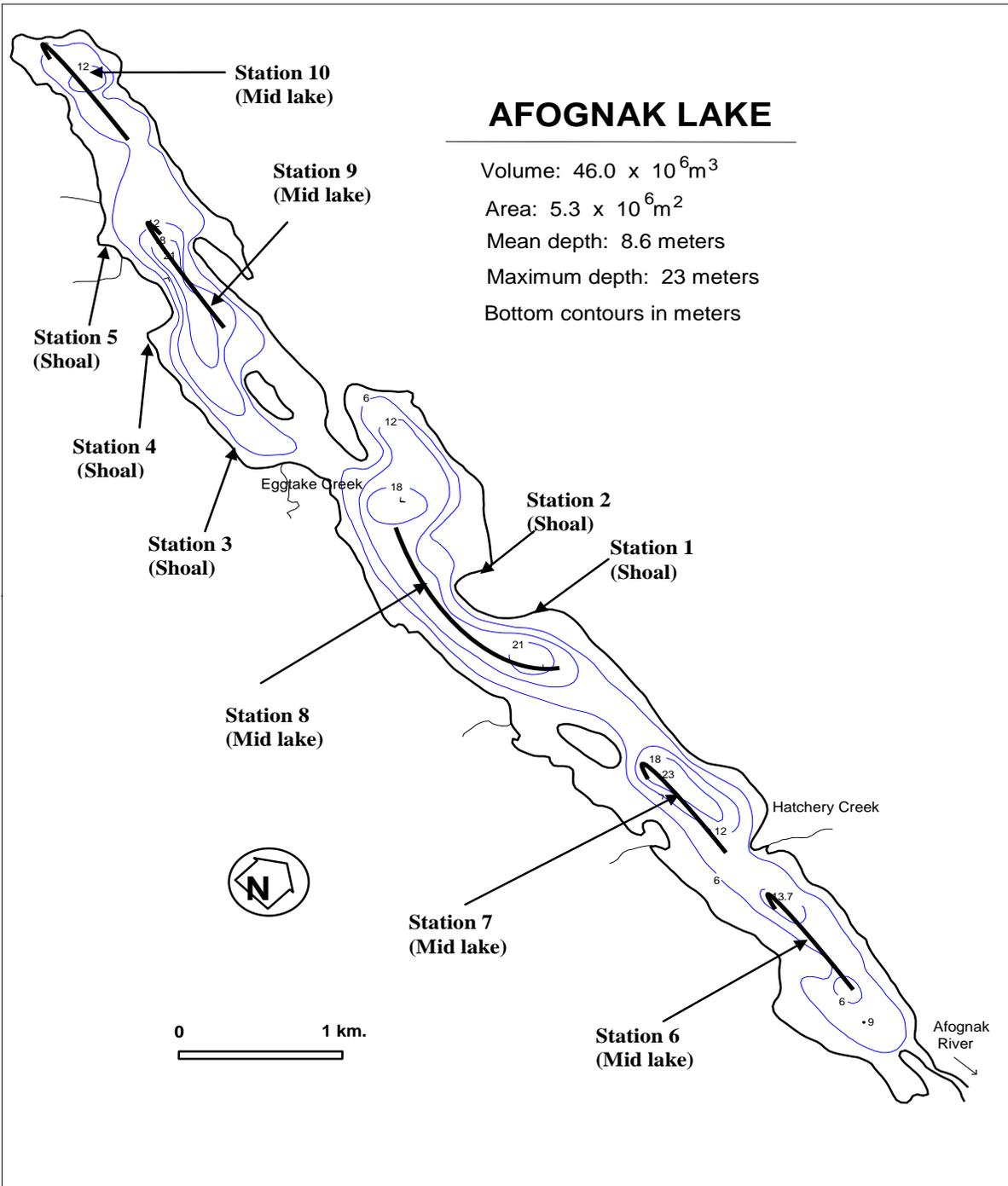


Figure 3.—Bathymetric map of Afognak Lake depicting the ten juvenile smolt collection stations.

SMOLT DYE RELEASE FORM

DATE: _____

CREW NAMES: _____

PROJECT LOCATION: **Afognak** _____

NUMBER OF FISH COLLECTED: _____
(from live box)

	COLLECTION LIVE BOX	TRANSPORT CONTAINER	DYE TUB	RECOVERY CONTAINER	STREAM RELEASE
START TIME (military)					
START TEMP (degree celsius)					
END MORTALITY (number of fish)					
OXYGEN SUPPLEMENT O ₂ or aerator					

DYE SOLUTION (mixture): 3.5g DYE (grams); 25 WATER (gallons)

TOTAL NUMBER OF MORTALITES (NOT RELEASED OR TESTED): _____

TOTAL NUMBER OF DYED FISH RELEASED: _____

COMMENTS:

DELAYED MORTALITY/ MARK RETENTION TESTING

Date	Unmarked	Marked		Marked
	Morts	Morts	Marked	# Fish Tested:
				Total Morts:
				% Mortality:
				Unmarked
				# Fish Tested:
				Total Morts:
				% Mortality:

Figure 6.–Smolt dye release form.

Afognak Lake Juvenile Sockeye Daily Sampling Form

Date _____

Personnel _____

Sampling Method (town net, seine, or cast net) _____

Site # or Location _____

Form # _____

Time _____

AWL #	Fish #	Bag Label #, if needed	TL (mm)	Wt (g)
	1	1200 _____		
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

Total Catch by Species (#)	
Sockeye	
Coho	
Stickleback	
Other Species	

Tow Net Information	
Tow Depth	
Tow Speed	
Start Time	
End Time	
Start Coordinates	
End Coordinates	

COMMENTS

(weather, water and air temp., wave hight etc.):

Note: complete a new form for each site.

AWL sampling will be conducted on the first 20 juveniles encountered.

From juveniles selected for AWL sampling, select up to five fish from each of three groups (<45mm), (46-65mm), and (>65mm) and place in bags for later analysis.

Figure 7.-Afognak Lake daily juvenile sampling form.

APPENDIX A. SMOLT SAMPLING

Appendix A1.–Statistical (sampling) weeks and associated calendar dates.

Week	Calendar Dates	Week	Calendar Dates
10	1-Mar – 7-Mar	28	5-Jul – 11-Jul
11	8-Mar – 14-Mar	29	12-Jul – 18-Jul
12	15-Mar – 21-Mar	30	19-Jul – 25-Jul
13	22-Mar – 28-Mar	31	26-Jul – 1-Aug
14	29-Mar – 4-Apr	32	2-Aug – 8-Aug
15	5-Apr – 11-Apr	33	9-Aug – 15-Aug
16	12-Apr – 18-Apr	34	16-Aug – 22-Aug
17	19-Apr – 25-Apr	35	23-Aug – 29-Aug
18	26-Apr – 2-May	36	30-Aug – 5-Sep
19	3-May – 9-May	37	6-Sep – 12-Sep
20	10-May – 16-May	38	13-Sep – 19-Sep
21	17-May – 23-May	39	20-Sep – 26-Sep
22	24-May – 30-May	40	27-Sep – 3-Oct
23	31-May – 6-Jun	41	4-Oct – 10-Oct
24	7-Jun – 13-Jun	42	11-Oct – 17-Oct
25	14-Jun – 20-Jun	43	18-Oct – 24-Oct
26	21-Jun – 27-Jun	44	25-Oct – 31-Oct
27	28-Jun – 4-Jul	45	1-Nov – 7-Nov

Sampling Procedures

Label Slides

The left portion of each slide should be labeled prior to sampling using a fine point permanent marker with the slide number, species, area sampled, date, and fish numbers of the sample (Figure 1).

Slide number

Write the number of the slide.

Species

Write out completely (e.g., Sockeye).

Area sampled

Write the area where the fish were collected.

Sampling date

The sampling day is the 24-hour period from noon of the first day to noon the following day, and is identified by the calendar date corresponding to noon on the first day.

Fish numbers

Fish should be sequentially numbered, beginning with 1 each sampling event. By starting with 1 each sampling event, it is possible to track how many fish have been sampled. Five fish are placed on each slide.

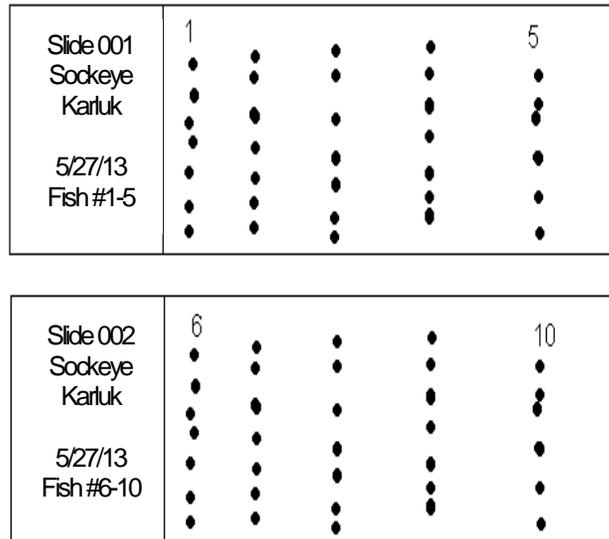


Figure 1.–Properly labeled smolt slide.

Sample ASAP

Sample smolt as soon as possible after they are captured.

Mix anesthetizing solution

Wearing latex gloves to prevent direct exposure to the anesthetic, dissolve a small amount (approximately of 1 g) of Tricane Methanesulfate (MS-222) and baking soda in about 2 L of cold water in a dish pan. The amount of anesthetic needed will vary depending on the water temperature, freshness of the chemical, and size of the smolt.

Set up recovery bucket

Set up an additional bucket of water to be used as a recovery bucket. This bucket should be filled with fresh water, aerated, and covered to avoid stress on the fish.

Transport smolt to sampling area

Transport smolt, using clean 5-gallon buckets, to the sampling area. Buckets containing smolt should be filled with fresh water, aerated, and covered to avoid stress on the fish. Fish can be placed into the bucket using a dip net, or by dipping the bucket into the live box.

Anesthetize smolt a few at a time

Place a few smolt in the anesthetic solution until they become subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2–3 minutes.

Lightly dry preferred area

After the fish are anesthetized, carefully remove a fish from the dish pan and gently pat dry with a paper towel.

Sample smolt

Place the fish on its right side to sample the left side. Quickly and carefully take length and weight measurements, and remove 5–10 scales from the preferred area of the smolt using a scalpel (Figure 2). On salmon species, the preferred scale is located where a straight line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin crosses the second scale row dorsal to the lateral line. If scales are not present in this area then scales should be taken from the secondary location, which is the same area on the right side of the fish.

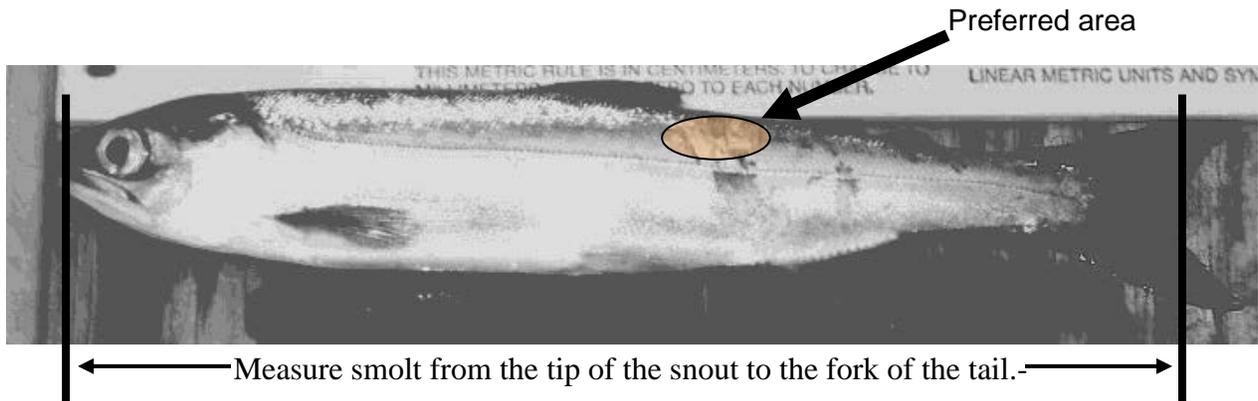


Figure 2.–Smolt with proper length measurement and preferred area highlighted.

Move smolt to recovery bucket

Transfer sampled smolt from the sampling station to the recovery bucket. It is important to sample as quickly as possible and immediately place smolt into the recovery bucket to prevent mortality.

Align scales on slide

Using the dissecting probe, line up and spread out the scales on the slide under the correct fish number (Figure 1).

Clean sampling supplies

Wipe off the scalpel and dissecting probe to remove scales and slime before another smolt is sampled.

Continue sampling

Continue sampling smolt until sampling goals are met, or all available smolt have been sampled. Depending on how long it takes to complete the sample, the water in all buckets (holding, recovery, and anesthetizing) may need to be refreshed.

Release smolt

Once the sampled fish have recovered and are swimming normally in the recovery bucket, they should be released downstream of the trapping location.

-continued-

Data Entry/Management

Data obtained while sampling, is recorded using a Meazure Rugged Digital Assistant (RDA). The RDA is a waterproof device used to digitally record sampling data. Sample information is transferred from the device to a netbook after each sample. A USB flash drive is used to save and transfer data from the netbooks located in field camps, to the office, throughout the season. An RDA is shown in Figure 3.

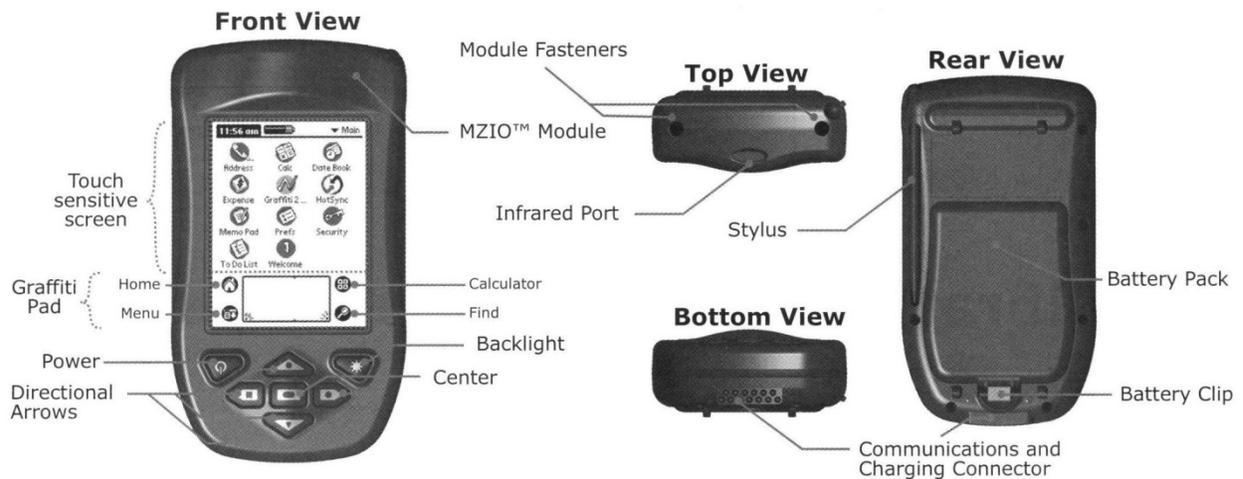


Figure 3.–Rugged Digital Assistant (RDA).

Entering Data Into The RDA

To begin using the RDA, turn it on by pressing the power button (Table 1). Using the stylus, tap the home icon in the bottom portion of the screen to bring up the main menu. It may be necessary to press the home icon several times to bring up the entire main menu. Next, tap the Forms 5.1 icon. Pendragon Forms (Forms 5.1) is the program that you will use to enter all of the sample data. After the icon is selected, the Pendragon Forms screen will appear. If a form was left open by a previous user, it may be necessary to hit the Quit or Done button to get to the main list of forms. Highlight the appropriate sampling form (Smolt_2013.XX) and select New, which is found in the lower left corner of the screen. The four main buttons of the form will now be visible: Enter Background Info, Sample Next Fish, Review, and Quit.

-continued-

Table 1.–Buttons and icons addressed in the text.

Image	Description
	Power Button - Button you will press on the RDA itself
	Home Icon - Use the stylus to navigate to the home screens
 Forms 5.1	Forms 5.1 Icon - Use the stylus to open pendragon forms 5.1
	This is an example of a button within pendragon forms. Use the stylus to select these buttons.

Enter Background Info

Background information must be entered at the start of each sampling event. A new day always constitutes a new sampling event, so it will be necessary to enter new background information typically once per sampling day. It is important to edit background information when any change in sampling information occurs. The following topics constitute sampling information. If information in one of the following categories changes, it is necessary to change the background information.

Species

Select the appropriate species from the drop down list on the RDA.

Management Area

Choose the relevant management area from the dropdown list. Samples collected from Kodiak Island statistical areas must have Kodiak selected as the proper management area.

Area Sampled

Select the area that best represents where the fish were sampled, such as Ayakulik River, from the dropdown list.

Location ID (N/A for some areas)

Enter the site where the fish being sampled are from. For Karluk Lake sockeye salmon smolt sampling, Site 1 is the outlet site and Site 2 is further downstream.

Location Type

Indicate the type of area in which the fish were captured.

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Gear Type

Select the type of gear in which the smolt were caught.

Date of Sample

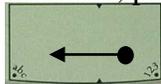
For smolt, the sampling day is the 24-hour period from noon of the first day to noon the following day, and is identified by the calendar date corresponding to noon on the first day.

Sampler Initials

Enter the initials of the sampling crew (up to 3 persons). This can be done by writing in the box on the bottom of the screen, or by using the pop up keyboard.

Notes

1. When entering text, tap on the dot by the abc icon to bring up a keyboard.
2. To delete a character, place the stylus in the text box and draw a small straight line from right to left.



Sample Next Fish:

After entering background information, the RDA is ready to collect individual fish data. The Sample Next Fish button is used to enter the details of each fish sampled. It is not necessary to click on the Sample Next Fish button when entering the first fish of a new sample. After entering the background information, the form automatically knows to go to the sample next fish section of the form. As you continue to sample, simply tap Sample Next Fish or Next to enter individual fish data. This option is used when continuing to the next fish of a sample where no background information has changed. Fish data that is entered here is associated with the current background information logged. The following constitute fish data and should be entered for each fish.

Scale Slide (Card) Number

Slides are numbered sequentially by date throughout the season starting with 1. A separate numbering sequence will be used for each species or major location change. Consult your crew leader for the current slide number. It is crucial to make sure the number written on the slide matches the slide (card) number entered into the RDA. The slide number will automatically advance to next number after five fish have been sampled.

Fish Number

The fish number is a sequential numbering system that begins with the number 1 for each sampling event. This allows samplers to keep track of the number of fish sampled each day (or since the background was changed). By default, the fish number in the RDA will automatically advance after each fish is sampled.

Length in mm

Enter the length of the smolt from tip of snout to tail fork in millimeters (i.e., 108). If for some reason you do not collect a length measurement, enter 999.

Fin Clip and Genetics

Select the Skip Fin Clip and Genetics button if appropriate. If sampling involves fin clips or genetics you can enter the optional fin clip and genetics information.

Sample Next Fish

Select Sample Next Fish to continue sampling.

Review/Edit

The review button can be a very useful tool during sampling. It can be used to ensure data being entered is accurate, or it can be used for editing fish data during a sample. The review portion of the form displays slide number, fish number, length, and weight. The most recently sampled fish appear first. To enter the review screen, tap on the Review button on the main screen of the form. After the data has been reviewed and edited, tap the Done button on the bottom right of the screen to return to the main screen of the form. If Sample Next Fish is selected after leaving the review screen, the auto-increment will continue as if the review screen was never entered.

Reviewing Data

To review the last data entered, tap the Review button on the main screen of the form. Use the scroll bar on the right side of the screen to look at the fish that have been entered.

Editing Data

If fish data needs to be edited, tap on it using the stylus. Tap on the Sample Next Fish button to go through the fish data that was previously entered for that fish. Changes can be made as needed. Buttons chosen prior to the review are highlighted with asterisks. After a fish has been edited, the main review screen appears. If a fish is accidentally selected from the main review screen, click the button that has the slide#-fish# to return to the main review screen without going through the fish data. As mentioned above, tap Done to exit the review portion of the form and return to the main screen.

Quit

When sampling is complete, tap Quit to exit the form.

Data Management

After sampling is done for the day, the data must be backed up on the RDA itself and then transferred (by HotSync) to the netbook.

Backing up data

After each sample the RDA should be backed up so that data is stored on both of the compact flash drives. Turn the RDA on, and tap the home icon in the bottom portion of the screen to bring up the main menu. Tap the CardBkup icon if it is present, and then the Backup Now button at the top left of the screen. The data will now be on both flash drives. If the RDA does not have a CardBkup icon, it will back up automatically.

Downloading Data to Netbook

Connect the communications cable into the RDA and a USB port on the netbook. Press the power button to turn on the RDA and begin a HotSync by tapping the home icon, and then the HotSync icon found on the main menu. Tapping the large icon in the center of the screen will start the HotSync operation (Figure 4). Please make sure the RDA is dry before downloading any data to the netbook.

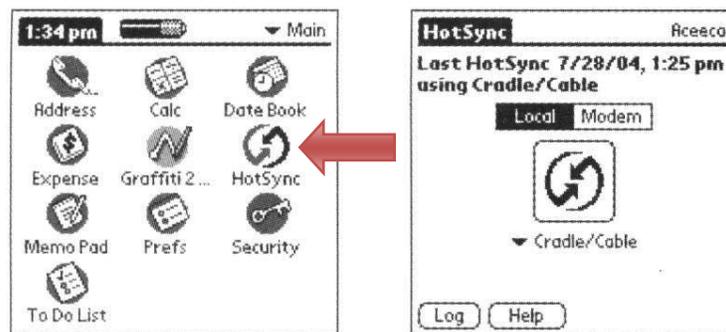


Figure 4.–HotSync Screens Found on RDA.

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Editing, Naming, and Saving Data

If a mistake is realized during a sample it is often easiest to document the mistake and send the correction in with the USB flash drive for the Kodiak office to fix. If a mistake is made during the sample it can be changed using the review portion of the form in the RDA. Data can also be changed after it is downloaded onto the netbook, but is not recommended unless the Kodiak office is consulted first. A HotSync operation after changes have been made on the netbook will update the RDA.

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To view data, HotSync the RDA and open Pendragon Forms Manager (a shortcut should be located to the right of the start menu) on the netbook. Select the form (Smolt_2013.XX), and click Edit/View under Data Functions on the right side of the window. All data will now be visible. Simply make the necessary minor changes here and exit out of the window to save. It is important to change the correct the numbers under the proper column which is where it is best to consult the Kodiak office. Hotsync the RDA to the netbook after any changes are made on the netbook to update the RDA with all changes.

After data has been edited and verified, a copy of the database will need to be exported from the Pendragon software and saved on the netbook. In Pendragon Forms Manager under Data Functions on the right side of the window, click To ASCII. Navigate to the folder in which the data is being saved. Type in the file name and then save. The file name should follow this format: Area_Sampled_Smolt_YYYYMMDD.csv (e.g., Afognak_River_Smolt20130614.csv). After saving, a window will pop up stating the file has been created. Each .csv file will contain all of the data that has been collected up to that point in the season. Do not edit or save the .csv file as an excel file or it will be difficult or impossible to upload the data into the database.

Transferring Data from Netbook onto USB Flash Drive

Up to date data should be sent into the main office as often as possible (e.g., with the grocery plane). Insert a USB flash drive into an appropriate port on the netbook. Double click on MyComputer, which is found on the desktop of the netbook. Navigate to the folder where your data is saved and highlight the most recent file (determined by the date) by single clicking. With the file highlighted, click on edit at the top of the window and then copy. Open up MyComputer and double click on the USB flash drive (often called “Removable Disk”) found under the heading “Devices with Removable Storage.” Click on edit at the top of the window, and then paste. The .csv file that was copied earlier will appear in the window indicating it was copied to the flash drive. Exit out of all windows and single click on the safely remove hardware button on the bottom right corner of the desktop in the quick start menu. Click on “Safely remove USB Mass Storage Device.” A pop-up will verify that it is now safe to remove the flash drive from the system.

Powering the Netbook and RDA

1. The RDA can be charged with either the AC or DC powering options. It is the crew leaders responsibility to keep it charged
2. The netbook can only be charged with the AC power adaptor, therefore plan accordingly for generator use. The charging light on the netbook is red when charging, and green when fully charged.
3. If there are powering problems, please contact the office immediately.

Some Notes and Reminders

1. Connect the AC adaptor to the bottom of the communications cable to charge the RDA batteries. If using the DC charger, connect the charger into the communications port.
2. If a mistake is noticed before moving onto the next fish, the previous button can be used to make changes in the RDA without having to go to the review screen or alter the data on the netbook.
3. Each length, weight, and scale must correspond to a single fish! It is the responsibility of the crew leader to be sure the data has been entered correctly.
4. Never put data from different dates onto one slide, and always enter new background information. Even if only one fish is sampled that day, enter new background information and begin with a new slide the next day.
5. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data or slides will be returned to individual collectors for correction.
6. Ensure that all equipment is well kept. Electronics should be stored in a clean safe place. The RDA must be completely dry before transferring data to the netbook. RDA batteries must be charged to make certain sampling is not hampered. It is the responsibility of the crew leader to make sure that all data is carefully examined and before returning it to their supervisor.

Troubleshooting

Resetting the RDA

If problems are encountered with the RDA, a soft reset can be done without losing data. To perform a soft reset hold the power and backlight button down together, and release at the same time. If a soft reset does not work, the office should be contacted about other options for resetting.



Press and release Power and Backlight button together

Hotsync Error Message

HotSync message "Exceeded user storage space limit of 500KB in form 'Smolt_2013.XX'

1. Open Pendragon Forms Manager
2. Under Form Function click on "Properties"
3. Click on "Advanced Properties"
4. Click on the "Synchronization Tab"
5. Change the Storage Limit (KB) to 5000 instead of 500.
6. Click "OK"
7. Under Form Functions Click on "Distribute"

**APPENDIX B. SATELLITE TELEPHONE AND DISPATCH
INSTRUCTIONS**

The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

Under no circumstances may you use this satellite phone system for personal calls, unless a family or personal emergency exists. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. **ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.**

The primary purpose for having this satellite phone is for secure, reliable communications between remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

INSTRUCTIONS

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and pointed in a general east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

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This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for ‘dispatch’, unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the ‘AlaskaNet’ dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20 but will work down to 8). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished. Once a strong signal is acquired push the “*” button for 2 seconds. Wait until there is a “beep” and the LCD screen displays ‘00:DN ??’, then dial the number.

Alaska Dispatch System

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP. Once a strong signal is acquired push the “*” button for 2 seconds. Wait until there is a “beep”.

On the microphone display, below the signal strength, there should be a query, ‘00:DN ??’. This is asking you to ‘dial’ in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps (“bird chirps”) and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL THE SAME FORMALITIES AS WHEN CALLING ON A SSB RADIO. For example, say “Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir”. When you release the microphone key, the unit will beep again.

BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display. This is a private conversation, unlike the previous dispatch service.

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Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read ‘Unable to Connect’ or ‘Not Available’.

Phone System

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you’ve used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

IN CASE OF EMERGENCY:

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at 800-478-5555. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

APPENDIX C. WEEKLY REPORT EXAMPLE

Appendix C1.—An example of a weekly report.

To: Steven Thomsen
Alaska Department of Fish and Game
Fishery Research Biologist
Kodiak, Alaska

Date: May 20, 2006

From: Jason Fox
Alaska Department of Fish and Game
Fish and Wildlife Technician III
Litnik Field Camp

Subject: Activity Report for May 14–20, 2006

Smolt Counts & Sampling

The smolt trap here has been fishing since May 10th, but we saw our first smolt on May 16th. Our cumulative catch thru this week is 83. The run seems to have started later this year due to lake freezing and winter-like conditions in the Kodiak/Afognak area until early May. We also sampled 20 smolt on May 19th as an introductory example for new crewmate Josephine Deguzman. The smolt we sampled had an average length of 81.2mm and an average weight of 4.0g.

Dye Test and Trap Efficiency

We have not yet had enough fish to do a dye release test. As far as putting in the smolt trap is concerned, we were not originally able to get the incline into “optimal” position due to high water conditions at the time of installation. As we found out last year, this may be a problem when *low* water conditions occur, as the catch box may not be able to be lowered any further than a potential high spot that it is currently over. This will be addressed as the season goes on.

Adult Weir Counts

The adult sockeye weir was installed and fish tight at 7pm on the evening of May 19th. Surveys of the lagoon and lower river below the weir revealed no signs of returning adults yet. We have not counted any adults upstream as of yet.

Miscellaneous

River otters have been a very significant nuisance so far this season. We have installed a protective cage around the area between the cod end of the incline where fish drop into the catch box. Last year, this seemed effective. However, the chicken wire tends to gather a significant amount of river debris in high water conditions. This debris buildup also tends to cause an increase in smolt mortality because the smolt have to get through the debris to the catch box.

Anticipated Activities

Crew will have to maintain a clean trap to reduce mortality in smolt. We also are going to monitor adult steelhead out-migration this spring to experiment with effective ways to pass them downstream. We also need to fill sand bags to add to weir and smolt trap to make them more secure and fish tight.

APPENDIX D. TIMESHEET INSTRUCTIONS

Appendix D1.–Instructions for filling out a timesheet.

All ADF&G employees must fill out a time sheet biweekly, and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

Pay period: pay periods start on the 1st or 16th of each month and end on the 15th or end of the month (example: June 1-15 or June 16-30).

SSN: your social security number

Name: full name

Division: Commercial Fish

In the actual timesheet table fill in the following:

Day: Monday, Tuesday, etc.

Date: 6/16, 6/17, etc.

Hours worked box: start and stop time in military time

Code 1: fill in the number of hours worked for that day (see example in Appendix D.2.).

Work hours and Code 1 Totals should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

Charge to Table located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Comments Table located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Employee's signature and date: Be sure to sign and date your timesheet.

Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.
