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Chignik Late-Season DIDSON-Based Escapement Enumeration Operational Plan, 2013

by

Adam St. Saviour

July 2013

Alaska Department of Fish and Game **Division of Commercial Fisheries, Kodiak**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	log_2, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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Adam St. Saviour
Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

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Adam St. Saviour
Alaska Department of Fish and Game, Division of Commercial Fisheries
351 Research Court, Kodiak, AK 99615, USA

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ABSTRACT

The Chignik River system supports a large and healthy salmon population that is important to commercial and subsistence users. Fixed-location, side-looking hydroacoustic techniques have been established in riverine systems throughout the world as a non-invasive, cost-effective means to enumerate upstream migrating fishes. The Alaska Department of Fish and Game will use dual-frequency identification sonar (DIDSON) to enumerate late-run sockeye *Onchorynchus nerka* and coho salmon *Onchorhynchus kisutch* after removal of the Chignik River weir in September. Species will be apportioned by gillnetting and catch sampling the Chignik River and Lagoon. DIDSON counts and run apportionment methods will be validated with weir counts and apportionment in June and August. This technology will enable ADF&G to accurately characterize the run magnitude and timing of sockeye and coho in September, enumerate adults in the event of a weir blowout, and better manage the fishery.

Key words: DIDSON, species apportionment, sockeye salmon, coho salmon

INTRODUCTION

The Chignik Basin is located on the south side of the Alaska Peninsula (Figure 1). The system consists of two interconnected lakes draining through a lagoon into the Gulf of Alaska. The upper lake, Black Lake, is larger (41 km^2), extremely shallow (4 m maximum depth), and turbid, resting in a shallow tundra depression. Black Lake drains via the Black River into Chignik Lake, (22 km^2) which is relatively deep (64 m maximum depth) and is surrounded by steep mountains. The outlet of Chignik Lake flows into a semi-enclosed estuary, Chignik Lagoon, and then into the Gulf of Alaska (Dahlberg 1968; Narver 1966).

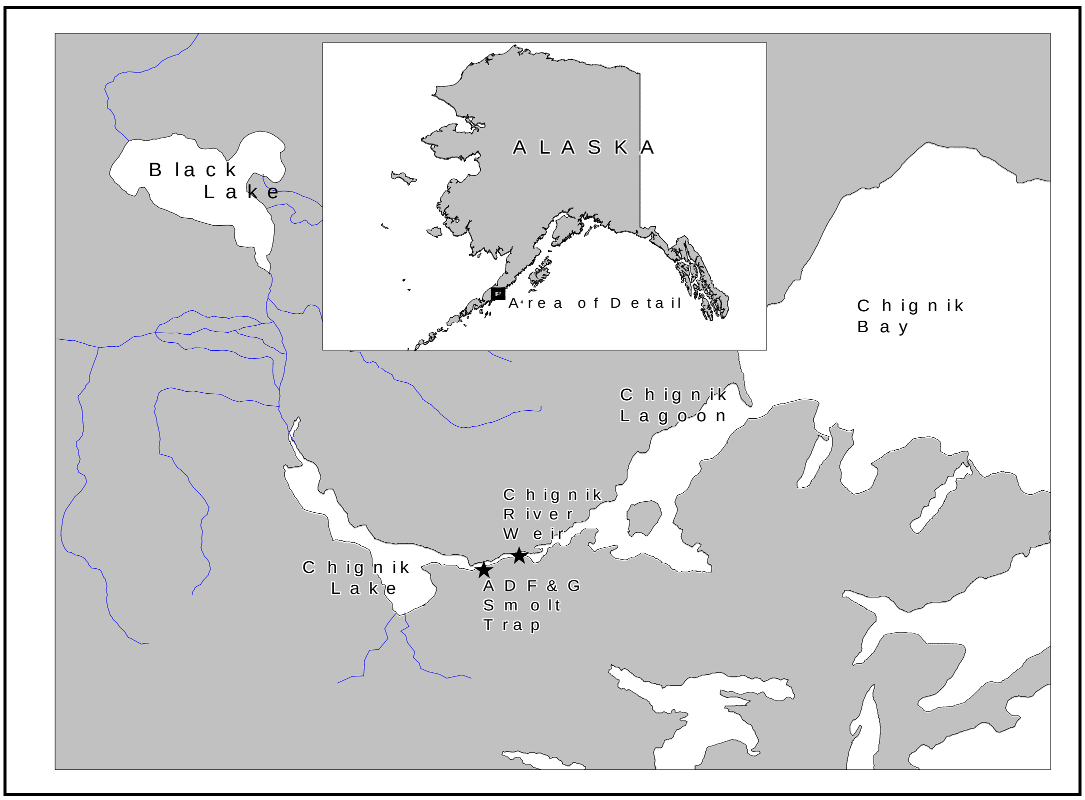

Figure 1.–The Chignik River basin located on the south side of the Alaska Peninsula.

The Chignik River system is the primary producer of sockeye salmon *Onchorynkus nerka* within the region where commercial and subsistence salmon are the economic and cultural mainstay for the villages of Chignik Lake, Chignik Lagoon, Chignik Bay, Ivanof Bay and Perryville. This system has historically been highly productive both in terms of primary production and numbers of returning sockeye salmon per unit of lake area (Burgner et al. 1969). There are two distinct runs of sockeye salmon that spawn in the watershed. The majority of the early run enters Chignik River in June and July and ascends to Black Lake and its tributaries (Narver 1966). The late run spawns primarily along the beaches and tributaries of Chignik Lake and enters the system between late June and September. Subsistence permits returned to the Alaska Department of Fish and Game (ADF&G) show late season subsistence harvests comprise more than half the harvest and occur into December in some years. Late-run fish are harvested by subsistence users as "redfish" to take advantage of cooler weather for drying and smoking.

From 2003 through 2012, the total Chignik Management Area (CMA) sockeye salmon run ranged from 1.4 million to 3.9 million fish. In the late 1990s and early 2000s, large pulses of fish did not build up in Chignik Lagoon or pass through the weir as was usually seen, thus early-season subsistence fishing opportunities were limited by the slow movement of salmon. Consequently, several subsistence users reported they had a difficult time harvesting enough early-run salmon to meet their needs (Anderson and Nichols 2012). In 2004, the Board of Fisheries (BOF) increased subsistence opportunities in the CMA, and also directed ADF&G to manage the late-run commercial salmon fishery to allow for an additional 50,000 sockeye salmon to escape into the Chignik River in August and September to facilitate late-season subsistence harvest opportunities.

Sockeye salmon returns to the Chignik River support a valuable commercial harvest for local residents. The total CMA sockeye salmon harvest has ranged from 687 thousand to 2.5 million fish during 2003-2012. A total of 69 permit holders participated in the 2012 salmon fishery generating an estimated exvessel value of $13.7 million. Most commercial fishing occurs in mid-June through mid-August, with only 7 days of commercial fishing occurring at the beginning of September 2012 (Anderson and Russell 2013).

In 2009, the most recent available subsistence data, ADF&G issued a total of 95 subsistence fishing permits in the CMA. Based on the 82 permits returned to the ADF&G Division of Subsistence, estimated subsistence harvest totaled 8,907 salmon with sockeye making up 76% of that harvest (6,785 fish). Most of the remainder were coho salmon. More than half of the total subsistence salmon harvest (about 3,900 sockeye) in the communities of Chignik Lake, Chignik Lagoon, Chignik Bay, Perryville, and Ivanof Bay was composed of late-run sockeye returning to the Chignik River. Inseason management of the entire late run is required to protect subsistence harvest and ensure future run productivity.

Currently, escapement is monitored via a large, unconventional weir. The weir is typically dismantled in August, as the commercial fishing season winds down, and before fall weather conditions create hazards such as debris and carcass loading and high water. September escapement is estimated using time series analysis, which estimates the rate of decay in the run and forecasts future escapement assuming that the forecasted escapement follows the same rate of decay as the run (Eggers et al. 2013). This assumption, however, may not be entirely accurate, as Scale Pattern Analysis, genetic identification information, and anecdotal evidence from local subsistence users suggest there may be significant pulses of late fish that enter the river after weir removal, as a "late-late run" of sockeye salmon, with subsistence users often harvesting sockeye salmon into December (Lisa Hutchinson-Scarborough, ADF&G Personal Communication). Many factors can confound the time series analysis, such as the dynamics of the run in August, early dismantling of the weir, a few days of high or low commercial harvest or escapement, and the relative magnitude of the last few days of escapement counted at the weir. Variation in these factors can make annual comparisons of time series results impossible. Despite the importance of September sockeye salmon as a subsistence resource, this model has never been validated by actual counts of escapement in the fall.

To address the need for sockeye and coho enumeration in September, ADFG will use dual-frequency identification sonar (DIDSON). This type of sonar was originally designed by the University of Washington's Applied Physics Laboratory for military applications such as harbor surveillance and mine detection but is now widely used throughout Alaska and other regions for enumerating adult salmon escapement (Dunbar 2010; Holmes et al. 2006), studying fish behavior and habitat use (Baumgartner et al. 2006; Rose et al. 2005), and identifying spawning populations or enumerating salmon redds (Tiffan et al. 2004). DIDSON transmits sound pulses and converts the returning echoes into digital images, much like a medical ultrasound scan. It incorporates a lens system that provides high resolution images approaching the quality achieved with conventional optics (Simmonds and MacLennan 2006). Advantages are that images can be obtained in dark or turbid water and at farther ranges than is possible with camera technologies. It can run 24-hours per day with little extra cost or monitoring. DIDSON can provide an intensive view of the fish run as it progresses through the season without the infrastructure, maintenance, and personnel hours required by traditional weirs.

DIDSON serves as a passive monitoring tool which does not deter fish passage or alter instream behavior. Fixed-location, side-looking hydroacoustic techniques have been established in riverine systems throughout Alaska as a non-invasive, cost-effective means to enumerate upstream migrating salmon (for example, Yukon River, Kenai River, Copper River, Kasilof River) (Alaska Fisheries Sonar 2011). DIDSON was used in a 2010 pilot study at Chignik. It was deployed on May 27th and run for 15 days when high water threatened to damage the weir. The DIDSON successfully ensonified fish throughout the deployment and ran continuously except when it had to be moved with changes in water level and during a brief generator malfunction (Loewen, unpublished memo 2011). It was used in the first full season of this study in 2011. During this period, the DIDSON was deployed for two periods in July to compare to weir counts. Eight full days of sonar data were recorded and analyzed at medium escapement levels. Sonar counts were found to be comparable to weir counts (mean within 9.5%, *p*-value 0.74) and 10 minute extrapolated counts were comparable to full hourly counts (mean within 1.3%, *p*-value 0.96). A total estimated 72,504 salmon migrated during the September deployment; the daily average was 3,152. Run apportionment estimates between sockeye and coho salmon by means of seining proved to be infeasible with available equipment and staffing. During the 2012 Chignik DIDSON late-season deployment, sonar counts were closer to weir counts (within 7%), and species apportionment was accomplished through increased gill-netting effort. A total of 92,488 sockeye salmon and 69,562 coho salmon were estimated to have escaped. September only sockeye and coho salmon escapement was estimated at 53,247 and 63,593 respectively. Detailed season summaries are available at: http://www.akssf.org/akssf_org/pm/Default.aspx?id=2412.

GOAL

The project goal is to evaluate the efficiency and accuracy of DIDSON escapement enumeration of sockeye and coho salmon entering the Chignik River, and obtain reliable, timely estimates of sockeye and coho salmon escapement once the Chignik weir has been dismantled.

OBJECTIVES

Objective 1: Estimate daily adult salmon escapement to the Chignik River such that the seasonal estimate is within 10% of the true (as measured by the weir) value 95% of the time.

Objective 2: Accurately characterize the population size and timing of late-run sockeye and coho salmon escapement to the Chignik River in September.

Objective 3: Obtain age, sex, and length (ASL) data from sockeye and coho salmon after removal of the Chignik River weir.

Objective 4: Evaluate the current statistical model used to estimate sockeye salmon escapement in September.

TASKS

OBJECTIVES 1 AND 2:

1. DIDSON LR, compass module, automatic rotators, and cable will be mounted to an aluminum adjustable mount (H-mount). The DIDSON(s) will be deployed at the same site as in 2011 and 2012, 400 m upstream of the Chignik weir.

2. Two DIDSONs will be operated across from each other in the Chignik River from June 5 through June 11, to compare with weir estimates and evaluated south shore passage. If available, they will then be operated from August 25 through September 30 to enumerate late-run sockeye and coho salmon escapement. If only one DIDSON is available, it will be operated on the north shore.

3. Hourly expansion of 10 minute counts has proven comparable to full hourly counts in previous years and will be used in 2013. Additionally, echogram and CSOT processing has proven comparable to direct playback and may be used with project manager approval.

4. Research and management staff will be trained to operate DIDSON and count fish images from the DIDSON files. Counting and image processing software provided with the DIDSON will be used for escapement enumeration.

5. Beginning August 26, salmon escapement will be estimated via sonar counts. Using standard DIDSON processing software, technicians and the project leader will estimate sockeye and coho escapement through September 30. All fish passage will be recorded to backup hard drives and counted daily to create an estimate of late-run salmon escapement.

6. Counts from DIDSON enumeration will be apportioned by species based from gillnet catches. Daily escapement estimates will be reported to management staff inseason for potential commercial fishery opening management decisions, and to inform stakeholders

inseason. Escapement estimates will be incorporated into the 2013 Annual Management Report (AMR).

OBJECTIVES 2 AND 3:

7. Species composition and ASL data will be collected from the weir operation until it is removed. After weir removal, technicians will capture sockeye and coho salmon throughout the Chignik River and upper lagoon using a 6'x150' gillnet. These data will be used to identify species composition and collect ASL data from these runs.

8. Commercial and subsistent-caught salmon will be opportunistically sampled.

OBJECTIVE 4:

9. A traditional time series analysis of the forecasted September escapement will be created for comparison with actual escapement counts. In all three years of this project the traditional model-forecasted escapement as well as the actual counted escapement will be assessed and reported to managers and stakeholders postseason, and used to evaluate the validity of the traditional model. The results of this will be included in AMRs.

PROJECT PERSONNEL

Project Biologists:	Adam St. Saviour – Principal Investigator, Project Manager – Westward Region Finfish Research Biologist II (PCN 11-1273)
	Todd Anderson – Co-Investigator – Westward Region Salmon Management Biologist III
Field Staff:	Kyle Shedd Fishery Biologist I (PCN 11-1410)
	Taylor Ritter Fish and Wildlife Technician II (PCN 11-5191)

METHODS

STUDY SITE

The DIDSON will be installed and operated in the Chignik River between Chignik Lake and Chignik Lagoon. The site is 400 m upstream of the Chignik field office on the north side (left) of the river at 56.26166° N; Longitude: 158.71148° W. The DIDSON will be deployed approximately 15 m offshore of a small island (Figures 2, 3, and 4). This location was selected for its favorable characteristics for deploying sonar: cobble substrate, a gradually sloping bottom, a straight, narrow section of the river. This type of channel allows a large proportion of the water column to be ensonified without acoustic shadowing effects. The river is approximately 70 m wide at this site.

Figure 2.–Site map.

Figure 3.–Looking to the shore of the island at the sonar site. The H-mount is in the foreground.

Figure 4.–Looking downstream from the sonar site to the weir.

DIDSON OVERVIEW

DIDSON sonars operate at two discrete frequencies: a higher frequency that produces higher resolution images, and a lower frequency that can detect targets at further ranges, but at a reduced image resolution. At high frequency DIDSON operates 96 beams at 1.2 MHz; at low frequency it operates 48 beams at 0.7 MHz. The beams are arranged radially with a field of view of 29° at both frequencies. A more detailed explanation can be found at the manufacturer's online tutorial (Sound Metrics Corporation).

DIDSON was operated concurrently with the weir at select times in the summer to compare DIDSON's passage estimates at periods of high, medium, and low salmon abundance to weir enumeration. Medium and low escapement levels were captured in 2011; high escapement was assessed in 2012. The DIDSON will be operated in the Chignik River from June 5 through June 11, 2013, to assess salmon passage on the south shore and to compare whole river DIDSON counts to weir counts. It will then be operated from August 25 through September 30 to enumerate late-run sockeye and coho salmon escapement.

DIDSON DEPLOYMENT

The sonar transducers will be mounted on a Sound Metric Corporation X2 pan and tilt rotator for precise aiming in the horizontal and vertical axes and deployed in the river on an H-style mount (Figure 6). In the horizontal plane, the sonar will be aimed perpendicular to the flow of the river current to maximize the probability of ensonifying migrating salmon from a lateral aspect. Internal attitude sensors in the DIDSON will provide measurements of compass heading, pitch, and roll. A communication cable will run from the DIDSON to the top side box and then an Ethernet cable to the data collection computer. All electronics will be powered by a 1000 watt sine wave inverter/ charger connected to four 6 Volt AGM batteries connected in series/ parallel (Figure 5). Appendix A1 depicts the DIDSON setup in a diagram and Figure 7 is a photographic example of an on-shore box with all of the components used in data collection. The batteries will be charged by two 235 watt solar panels configured with an Outback charge controller and by a 2000 watt Honda generator as needed. A list of system components is displayed in Table 1 and component power requirements in Table 2. The control box and power system will be housed in a weatherport surrounded by a bear fence. Small weirs will be constructed to prevent fish from passing behind the DIDSON.

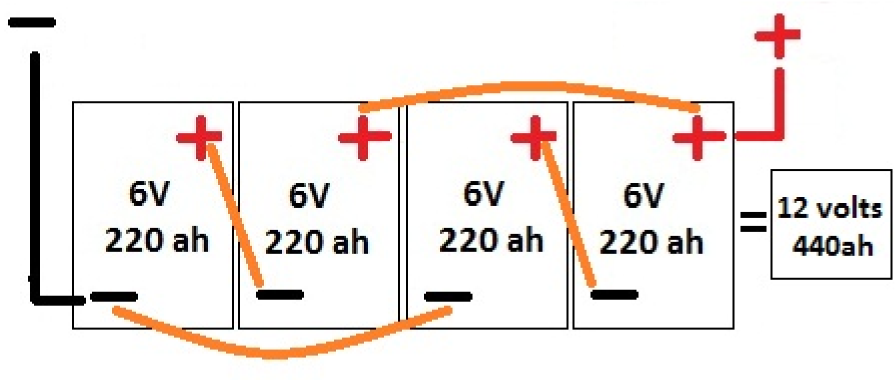

Figure 5.–Battery configuration

Figure 6.–Front view of custom fabricated H-mount, SMC rotator, and DIDSON-LR

Figure 7.–Rear view of custom fabricated H-mount, SMC rotator, and DIDSON-LR

Figure 8.–On-shore weather-proof box with DIDSON data-collection components

Table 1.–Components of the DIDSON sonar system

System Component	**Description**
Sounder	DIDSON-LR operating at 1.2 MHz
Orientation sensor	Honeywell Truepoint Compass (internal)
Lens	Concentrated Lens Assembly with ~8°x15° beam pattern
Data Collection Computer	Semi-ruggedized Dell Latitude E6410 laptop computer
Remote Pan and Tilt Aiming Unit	X2 rotator
H-mount	Custom fabricated aluminium stand to mount rotator to
Power supply	1000 watt inverter/charger, four 6 Volt batteries, Outback charge controller, two 235 watt solar panels, 2000 watt Honda generator

Table 2.–Power requirements of DIDSON system

Device	AC/DC	Volts	Amps	Watts	Hrs/Day	Amp hrs/Day	Watt hrs/Day
DIDSON	DC	24	1.3	30	24	720	30
Rotator	DC	24	0.4	10	0.1	1	1
Laptop	AC	12	3.3	40	24	960	80
External Hard drive	AC	12	0.8	10	24	240	20
Totals			5.8	90		1921	131

DIDSON SETTINGS AND DATA ACQUISITION

Data collection parameters will be entered through DIDSON software V5.25.32. The transmit power of the DIDSON is fixed and the maximum receiver gain (-40 dB) will be used during all data collection. The autofocus feature will be enabled so that the sonar automatically sets the lens focus to the mid-range of the selected display window. The DIDSON should be operated at High Frequency (HF) whenever possible for best resolution out to 15m. Rotator controls will aim the DIDSON to maximize coverage. Details on parameter set up are in Appendix C2.

Daily counting periods will be defined as a 24 hour period beginning at 00:00 (midnight) and ending at 23:59 on sequential days. Recording DIDSON images generates large data files, approximately 1 gigabyte (Gb) of data per hour of recording. While individual file size may vary based on ping rate and dropped frames, up to 30 Gb may be recorded per day. These data will be written to a laptop computer and a 1 terabyte (Tb) external hard drive. DIDSON generates images stored as .ddf files, which is proprietary to DIDSON software. Recording DIDSON files into small increments (i.e. 10 minutes) allows for easier transfer of files, manipulation and processing, and reduces the amount of data lost if a file becomes corrupted. DIDSON software will be used to set fish size thresholds, counting only fish over 35 cm.

Technicians will check the DIDSON and recording computer at least twice per day to ensure continuous operation, save data, and maintain the power system. These checks will occur at approximately 09:00 and 21:00. Date, time, sonar settings, power system information, and environmental data will be recorded on the “daily check” tab of the “2013 DIDSON daily” spreadsheet. Detailed site instructions are in Appendix A3. Data will be copied daily at 09:00 from D:\DIDSON data to a LaCie rugged external hard drive and then archived on a 1 Tb hard drive at the Chignik field office. Files will be stored in a folder by day and file type. Data from the previous day will be cleared from the data recording laptop once it has been archived. Two copies of DIDSON files will always be maintained.

DATA PROCESSING

Manual Counts

DIDSON Control and Display software will be used to track and enumerate fish. Fish above a size threshold of 35 cm observed passing upstream of the DIDSON site will be counted as salmon. Each fish trace will be counted within the DIDSON image feed. For each fish, the direction of travel will be identified and recorded. Details of fish counting procedure are in Appendices B1–B3. Data will be tallied and recorded on the “counts” tab of the “2013 DIDSON daily” spreadsheet. All tallies and transcriptions will be double checked for accuracy. The crew leader will maintain a master spreadsheet that includes which 10 minute files have been counted, counts for each file, hourly, and daily total counts. Initial enumeration and adjustments will be made in the field and reanalyzed post-season.

Convolved Samples Over Threshold (CSOT)

The convolved samples over threshold (CSOT) feature included in the DIDSON Control and Display software has been evaluated using 2011 deployment data. This feature uses an algorithm to select only those frames where movement is detected with user-selected parameters of sample size (pixel cluster) and threshold (in decibels) and exports them to a separate file. In other words, all “blank space” is removed from the files. This feature can often substantially reduce file size and consequently reviewer time. The magnitude of file size reduction is dependent on the number and frequency of fish passing the site. For the CSOT feature, the user specifies the number of samples (non-contiguous) greater than a dB threshold value that is of interest, and only frames that contain a greater number of samples with targets strengths above the specified threshold are recorded. The background subtraction value sets the rate at which stationary objects are removed from the image. CSOT settings can have a significant impact on the final fish counts; therefore, testing is required to determine which settings are appropriate for any particular study location. CSOT output can be adjusted for sensitivity based on image quality, turbidity, and flow rates. Running the CSOT process can produce a new file of shorter duration but also retains the original file. Detailed instructions for implementing this feature and selecting appropriate parameters are given in Appendix B4. Except under very low escapement, the CSOT process does not seem to substantially reduce the file sizes in Chignik.

Auto Counts

Auto-counting software such as Echoview or software developed by Carl Pfisterer (ADF&G, Fairbanks) will be investigated as a potential means of enumeration. Echoview requires that DIDSON files are pre-processed with CSOT. The Chignik DIDSON site should be suitable for this type of software because the fish pass straight through without milling. Auto-counts will be compared with manual DIDSON and video counts post-season if suitable software can be obtained.

Comparison with Weir Counts

Using the data from the June deployment, the first 10 minute file of each hour will be counted from both the north and south banks. The total number of salmon passing for each 10 minute period will be tallied and entered into the DIDSON daily spreadsheet. Within the spreadsheet, these counts will be expanded to full hour, six hour, 12 hour, and 24-hour increments. We will compare these increments to the same incremental weir counts to determine the best counting method. Each of the time increment and recording types will be compared using two sample *t*-tests.

SPECIES APPORTIONMENT

Drift and beach seine gillnetting will be used to obtain species apportionment and age, sex, and length (ASL) data for adult sockeye and coho using a 6’x150’ gillnet with 5 5/8” mesh from the time of weir removal until approximately September 30 (Appendix C). Technicians will capture migrating salmon throughout the Chignik River and collect species composition and ASL data from coho and sockeye salmon. Gillnetting efforts will be target migrating salmon and avoid salmon spawning in the river. The number of each species desired per statistical week is dependent on the previous weeks’ apportionment and will be determined by the project manager. Apportionment from commercial catch in Chignik Lagoon will also be investigated. A small skiff will be used to deploy the gillnet and adjust its drift. Fish that can be released alive from the net will be identified by species, counted, sampled for ASL, and released. Others will be euthanized and handled in the same manor. Euthanized fish will be bled by cutting the gill. Once sampling is complete, these fish will be given to local charity or frozen with the head removed for transport to another charity.

For each fish, species will be identified, sex determined by morphological characteristics, and length measured. ASL data will be recorded with a ruggedized digital assistant (RDA) and saved to a laptop at the weir facility. Individual fish will be selected randomly from the catch for sampling. ASL sampling guidelines are in described in Appendix C.

DIDSON-based apportionment approaches may also be investigated such as migration route (mid-river vs. near shore), schooling behavior, echo size, and tail-beat pattern post-season.

REPORTING

The crew leader will keep a daily log describing activities. This log will describe difficulties encountered, possible remedies, accomplishments, and crew hours. The log will be turned into the project leader at the end of the field season.

The crew leader will maintain a master spreadsheet containing all DIDSON recording days, file names, which files have been counted, and counts. The updated spreadsheet will be e-mailed to the project manager daily.

It is desirable for the field crews to photograph all aspects of the fieldwork. Photographs will be taken with a digital camera and downloaded to the research field computer for editing and storage.

SAFETY

Safety is the highest priority of this project. State safety regulations and Standard Operating Procedures (SOP) will be followed at all times. All staff are personally responsible for assessing unsafe situations and will exercise caution when weighing safety issues. Employees may be subject to disciplinary action without warning, including termination, for noncompliance to state safety regulations.

Employees will be provided the following SOPs and are expected to review them before beginning work:

Safety Policies and Standards

111-710 Office/Warehouse Safety

111-720 Field Camp Safety

111-730 Aircraft Safety for Passengers

111-740 Boating Safety

111-750 Vehicle Safety

111-760 Laboratory Safety

111-780 Firearm/Bear Safety

In addition, all employees are expected to hold a current American Red Cross First Aid/CPR certification. The department will hold First Aid/CPR classes in Kodiak prior to the field season; if the employee is unable to attend the classes in Kodiak, obtaining the proper instruction will be the employee’s responsibility.

A U.S. Coast Guard approved personal flotation device will be worn at all times while boating. Staff should maintain a full spare gas tank in the skiff at all times. A survival kit including matches, a hand-held VHF radio, a flare gun, air horn, a GPS unit, spare motor parts, and a first aid kit will also be in the boat at all times. Technicians will carry bear spray when walking or working on the river banks.

TIMESHEETS

The crew leader is responsible for scheduling daily tasks. Tasks will be scheduled to minimize overtime. Overtime is limited to 30 hours/month (7.5 hours/week) per person, unless otherwise pre-authorized. A proposed work schedule is described in Appendix D1. The crew leader will document, as part of the daily log, all tasks that are performed and the actual hours worked to complete those tasks.

Timesheets will be completed and e-mailed to Kodiak on the 15^{th} and the last day of each month. If timesheets must be sent in early, amended timesheets can be sent to the Kodiak office if the hours actually worked differ from the hours submitted on the original timesheet.

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APPENDIX A. DIDSON FIELD PROTOCOL

Appendix A1.–Diagram of DIDSON system.

DIDSON
50' transducer cable
DIDSON Topside Box - 24 V
Ethernet and BNC cables
Power (24-->120 V)

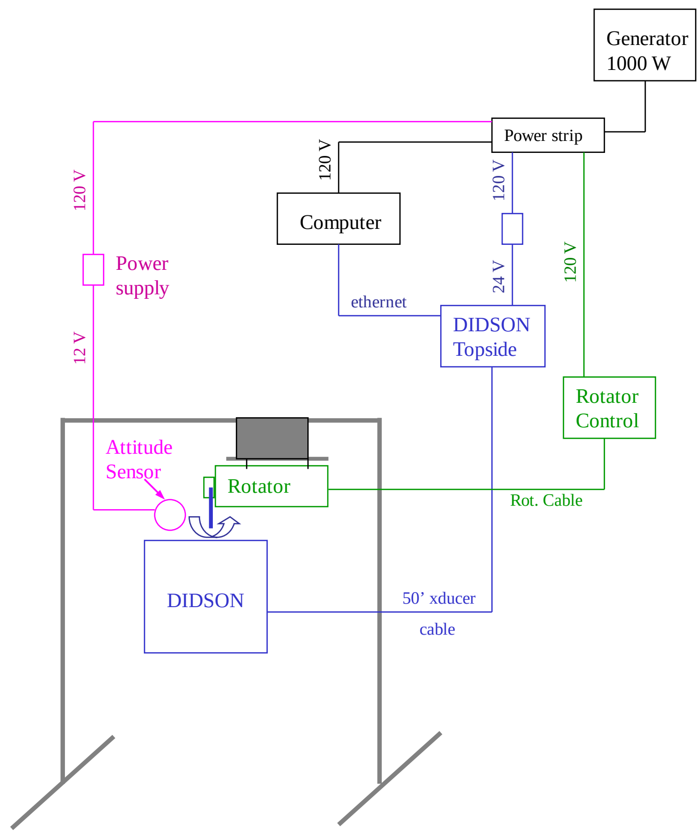
Rotator (single axis)
Attach to mount
Rotator cable
Rotator Control Box
120 V AC power

Attitude Sensor
Attach to transducer
Sensor cable
Serial or USB Cable

Mount

Computer
Ethernet ports
120 V AC power

Power
1000 W generator



Appendix A2.–DIDSON parameter set up in software program DIDSON control and display V5.25.

DIDSON setup: Do in the lab before field.

- First set IP address to match DIDSON specs: Start\control panel\ network and internet\view network status and tasks\change adapter settings\Local area connection\ Internet protocol (TCP/ IPv4)/ Properties: check “use the following address” enter address info. IP address: 128.95.97.225 Subnet mask: 255.255.255.0 default gateway: nothing or 128.95.97.1 ; leave DNS server addresses blank.
- Disable wireless

DIDSON program: “DIDSON control and display V5.32”

- Turn off some defaults: Edit\mode\uncheck demo; Edit\sonar\uncheck broadcast commands (not necessary)
- Setup parameters: Edit\sonar\ini-setup parameters: configure according to specs, check Enable update, IP address, sound speed (a function of water temp, use calculator), set water temp, salinity (fresh), OK
- Sonar controls (left side of screen): Frame rate- relative to window length, set at 10 for close (<10 m), 4 or 6 for long range. Reciever gain: usually set at max of 40, but may need to turn down under reflective conditions. Window start ~ 1m, Window length: one strata at 10 m and one at 40ish m. Focus: changes automatically. Check auto Freq, auto Rate, and HF. Display controls are for processing.
- Didson has a timer setting: Image\capture\timer data entry. Enter desired recording time-scheme hourly. Reset sonar controls and timer data entry for each sampling strata. Turn on: Image\capture\timer recording (check)

At DIDSON site:

Turn off bear fence.

Make sure the transducer is submerged and check DIDSON display (operation and settings).

Record the date, time, tilt, and compass position in the DIDSON daily spread sheet under the "daily check" tab.

Check to see that all files have been written and there are no duplicates.

Record environmental data (water temp, water level, and tide stage).

Check the batteries and record voltage.

Fuel and turn on the generator if batteries are less than 12.5 volts; record generator usage.

Copy recent files from D:\DIDSON data to the Lacie hard drive and delete the previous days' files from the data collection computer **only after they have been backed up**.

Close laptop and action packer.

Turn the bear fence on.

Clear any salmon carcasses from diversion weir and immediate vicinity of the weatherport.

At office:

Save a copy of DIDSON files to the backup external hard drive. Files will be stored in folders by date and file type (raw, echogram, CSOT, CSUT).

E-mail the DIDSON daily sheet including counts and DIDSON status information to the Project Manager each day. Information on counting (file processing) is in Appendix B.

Ongoing:

Change generator oil while warm every 100 hours of use.

Dust off electronics and spray keyboard periodically w/ canned air.

Sweep floor of weatherport.

Check bolt connections of DIDSON, mount, and batteries.

APPENDIX B. DIDSON FILE PROCESSING

DIDSON FISH-COUNTING TRAINING

The DIDSON control and display (Figure 1) will be used to view the recorded 10 minute DIDSON files to obtain upstream and downstream fish counts. Counts will be entered into the DIDSON Daily spreadsheet under the appropriate tab (north bank or south bank). Open files through the DIDSON program, not through Windows Explorer.

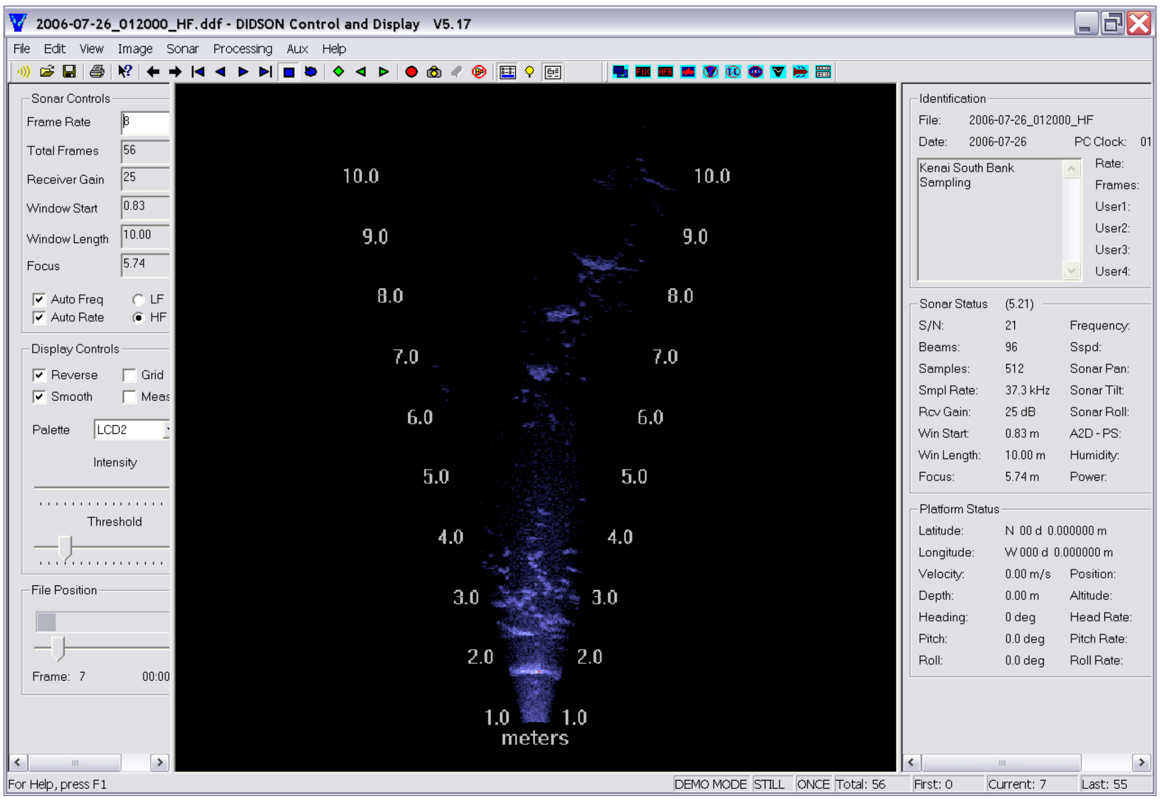


Figure 1.–The DIDSON display used to view recorded files to obtain fish counts. A 10m range file is shown in the viewing window with rocks visible and two fish between 1-3m.

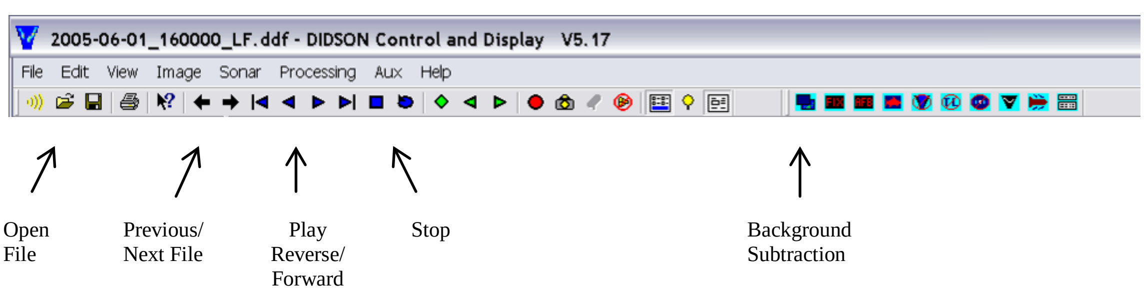


Figure 2.–DIDSON display toolbar with buttons used for fish counting highlighted.

Instructions

1. **Open the DIDSON program** by clicking on the DIDSON desktop icon.
2. **Open a DIDSON file** for playback under *File>Open* or use the button in the toolbar (Figure 2) and navigate to the appropriate directory. Double-click on the file to open it. The files are named with the date, time, and frequency (i.e. 2006-05-13_130000_LF.ddf). **Check file name each time a file is opened to make sure you on the right day and hour.
3. **Adjust the frame rate** in the upper left of the window under Sonar Controls to what is predetermined depending on fish passage rates. Maximum rate is three times recorded speed, displayed near the upper right portion of the screen. You cannot exceed the rate but you may go slower.
4. **Turn on the background subtraction** function (optional) under *Processing> Background> Background Subtraction* or use the toolbar button.
5. **Set the Intensity and Threshold** located on the left side of the window under Display Controls to the predetermined setting. Set Display controls (left side of screen) to high intensity (max typically) and low threshold (3-5).
6. **Click Play** (Forward) and let the background subtraction adjust then rewind to the start of the file using the reverse triangle in the toolbar, click play again, and begin counting fish.
7. **Count upstream and downstream fish** using two tally counters.
8. **Hot Keys:** Controls on the keyboard can be used in place of some of the display control buttons which makes counting easier during playback because you don't have to take your eyes off the image (spacebar = stop; up and down arrows = increase/decrease frame rate; left and right arrows = play reverse/forward). Additional keyboard controls can be found under *Help>Help Topics>Toolbar*.
9. **Record counts**, intensity, threshold, frame rate settings, and comments on the counts worksheet. Comment on debris, ice, holders, large fish, behavioral changes, etc.
10. **Advance to the next file** by clicking on the forward arrow on the toolbar. The file name will appear at the top of the display; make sure it is the next file you want to count.
11. **Open the electronic spread sheet** and enter all data recorded on the worksheet after all the files have been played back. Double check the count numbers entered into the spreadsheet.
12. **Interpolate** where necessary for missed DIDSON files. Highlight interpolations in red.

Appendix B2.–Instructions and settings for implementing the Convolved Samples Over Threshold (CSOT) feature of the DIDSON Control and Display Software Version 5.25.32.

What is CSOT?

The CSOT feature uses an algorithm to select only those frames where movement is detected and exports them to a separate file. In other words, all "blank space" is removed from the files. The CSOT process creates a set of new files, one for each original file. The new files have the prefix "CSOT_" and are subsequently referred to as "CSOT files. This feature is often executed as a batch process (using the "Batch Mode" feature) that processes all .ddf files within a folder.

CSOT can be combined with Background Subtraction (BS) to remove background, like the river bottom, from the image.

Why use CSOT?

This feature can often substantially reduce file size and consequently reviewer time. It is most effectively used under circumstances where there is little/no milling or holding by fish. CSOT will not help a great deal under conditions where there are holding fish, as this constant motion just creates a second file equivalent in size to the original. This is true also of conditions where there is persistent current noise, debris, or any activity that creates constant motion in the image.

Before using CSOT

Each monitoring site requires testing of CSOT parameters to ensure migrating fish are being captured for each unique situation (fish size, flow conditions, etc.). The first step is to choose a set of CSOT processing parameters appropriate for the study site characteristics.

Begin with a test run of the CSOT processing parameters on the original .ddf files. It is best to start by working with small batches of data which enables the user to re-run the CSOT program faster in case parameter changes are required. Suggested "starting" parameters are as follows:

Min cluster area (cm^2) = 200

Min threshold (db) = 4.9

Persistence (frames) = 4 (# of frames inserted before/after motion activated frames)

There is trial and error involved with finding the optimal parameters. If the resulting CSOT file has many fish blinking in and out, lower the threshold and\or decrease the cluster area.

CSOT instructions:

1. Select original .ddf files for each range stratum and move them into a temporary folder.
2. Open the first file in the temporary folder using the DIDSON software.
3. Set CSOT parameters (last icon on right of the DIDSON 'Image Processing' toolbar) using the 'Basic' and 'Advanced' tabs.

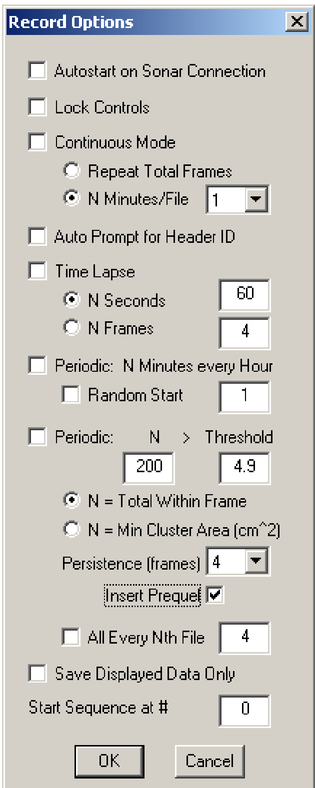
-continued-

4. From the File menu, choose Set Save Dir/Name and save to a new file created for CSOT originals. Make sure the destination folder (save dir) has enough space to accommodate the new files. You will be prompted about file naming; select NO for 'Replace HHMMSS with #NNN in filenames?' and YES for 'Append frequency designation (_LF, _HF) to filenames?'

5. From the File menu, go to Set Aux File Dir and make sure Image Save Dir is checked.

6. Check CSOT settings under Image/Capture/Record Options,

   check Periodic N > threshold where N=Sample size or cluster in cm² and Threshold = brightness in db. Check N = Min cluster Area (cm²)). You will be prompted to turn on background subtraction and motion detection. Click Yes for both.



7. Set Processing parameters (Processing/CSOT – check Batch mode and Export CSOT frames).

8. Processing will begin. Red clusters will appear on the screen. These are the clusters that meet your criteria set in the CSOT parameters. It is helpful to watch the actual processing initially and note the statistics displayed in the lower right portion of the DIDSON screen. Area = the cluster size of the currently displayed cluster. Pk = the peak cluster size for the file being processed. By watching the processing, you can get a good idea of how cluster size relates to the actual acoustic returns. See the DIDSON Operation Manual for more details on CSOT processing.

APPENDIX C. ADULT SALMON SAMPLING

Appendix C1.–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

Place the salmon flat on its right side (the head should be toward the left).

Measure the length (in mm)

Adult salmon length is measured from mid-eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand. Flatten and spread the tail against the board with your right hand. Read and record the mid-eye to tail fork length to the nearest millimeter. Please look at Figure 1.

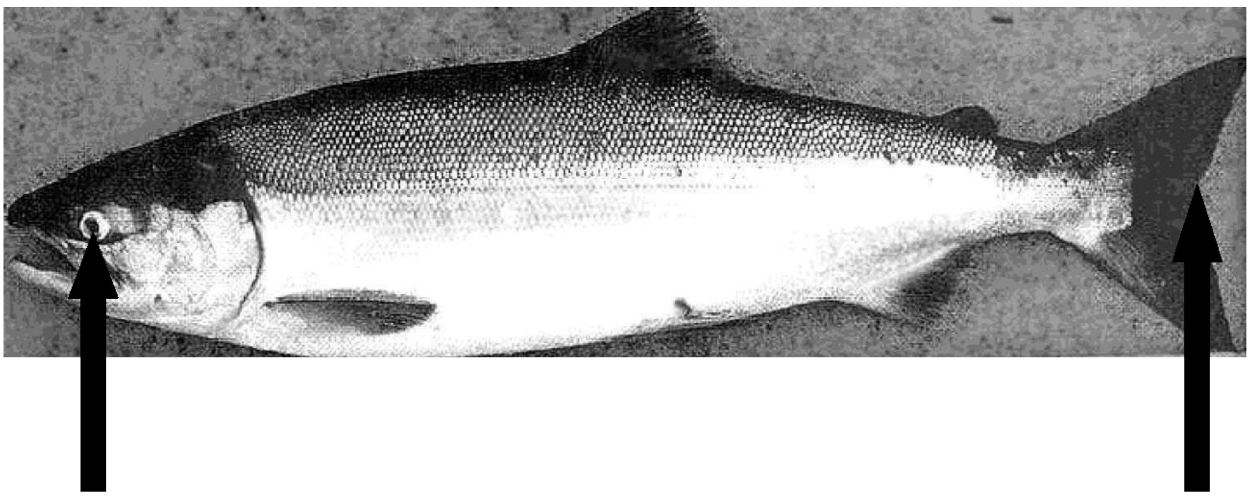


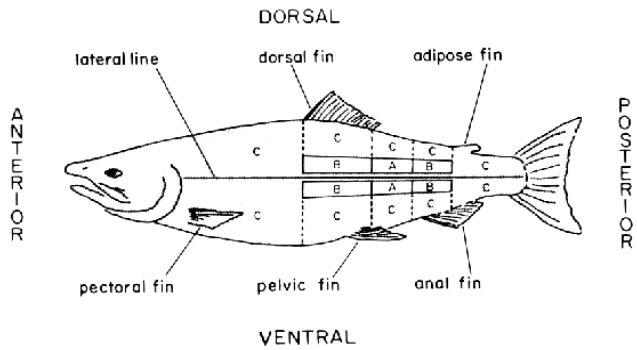
Figure 1.–Measuring fish length from mid-eye to tail fork.

Determine the sex of the fish (escapement sampling only).

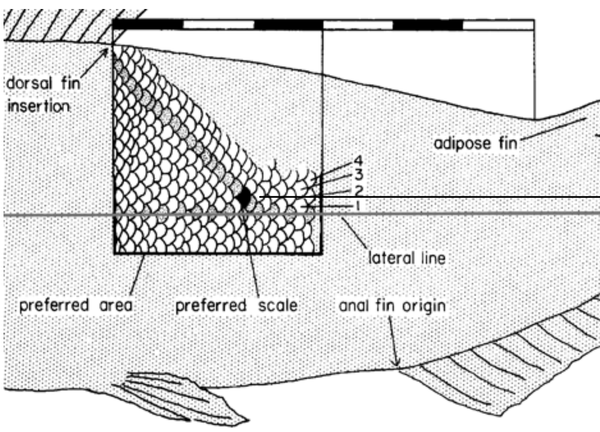
Remove the preferred scale and place on scale card

The preferred scale should be properly placed on a labeled scale (gum) card (Figures 2 and 3). Scale cards should be labeled as soon as possible. If sampling commercial catch, write the date the fish were caught on the card instead of the sampling date. The preferred scale is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin toward the origin of the anal fin (Figure 2). Samplers should be careful to make sure that the scale is not flipped over before it is placed on the scale card**.**

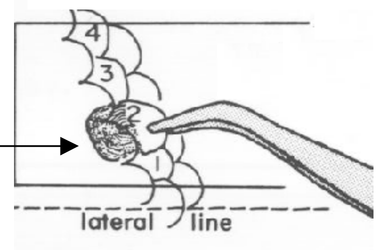
-continued-

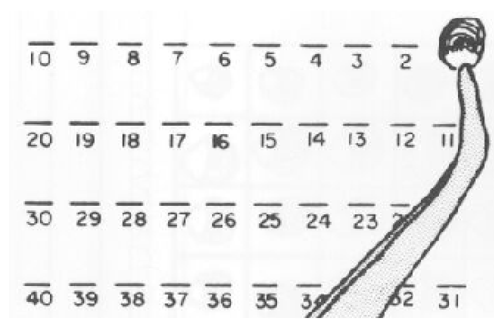


Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in Area A on either side of the fish. Area C designates non-preferred areas.



Do not turn scale over.

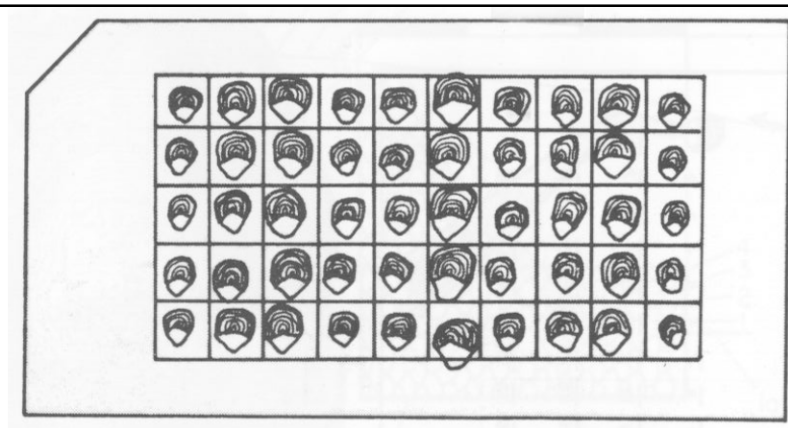




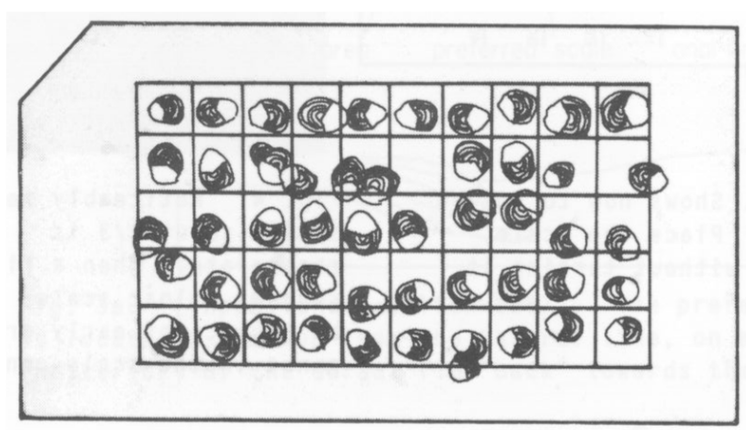
The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

Figure 2.–Removal and placement of the preferred salmon scale onto the scale card.

-continued-



The scales are correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion (the portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spend to age samples.

Figure 3.–Scale orientation on scale card.

-continued-

DATA ENTRY/MANAGEMENT

Data obtained while sampling is recorded using a Meazura 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 4.

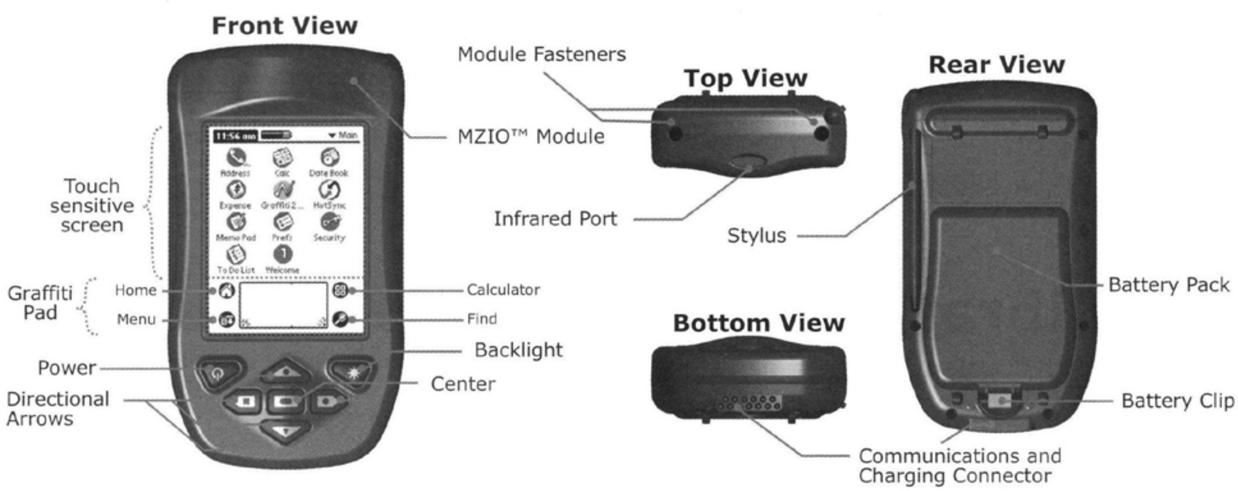


Figure 4.–Rugged Digital Assiatant (RDA).

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 (**ASL_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 visable: ***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
Quit	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. For most projects, changing the background information each day will consist of updating the date only. 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, such as Sockeye.

Project

Indicate the pertinent project from the dropdown list. For example, if sampling adult sockeye escapement at a weir, choose Escapement.

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 Type

Indicate the type of area in which the fish were sampled. For example, if the fish were sampled at the Upper Station weir, choose Weir from the drop down menu.

-continued-

Gear

Select the type of gear in which the fish were caught, such as Trap.

Type of Length Measurement

Designate the type of length measurement taken. Adult salmon lengths are typically measured from mid-eye to tail fork.

Date of Sample

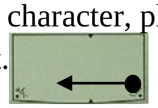
Escapement sampling: Use the date the fish are sampled.

Catch sampling: Use the date the fish were caught, even if this differs from the sample date.

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 Card Number

Scale (gum) cards 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 card number. It is crucial to make sure the number written on the scale card matches the scale card number entered into the RDA. The Scale card number will automatically advance to the next number after fish number 40 is recorded.

Fish Number

The fish number is the number of the fish on a particular scale card. This must be a number between 1 and 40. By default, the fish number in the RDA will automatically advance after each fish is sampled. It will also automatically go from 40 to 1.

-continued-

Sex

Select the sex of the fish.

Length in mm

Enter the length of the fish from mid-eye to tail fork in millimeters (i.e., 534). If for some reason you do not collect a length measurement, enter 999.

Fin Clip and Tag Color

Select the Skip Fin Clip and Tag Color button if appropriate. If sampling involves fin clips or tags you can enter the optional fin clip and tag information. Indicate the type of fin clip (e.g., axillary process) or tag color using the drop down menus.

Sample Next Fish

Select Sample Next Fish to continue sampling.

Review

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 card number, fish number, sex, and length. 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 accidently selected from the main review screen, click the button that has the Card#-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.

-continued-

DATA MANAGEMENT

After sampling is done for the day, it is required that the data 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 5). Please make sure the RDA is dry before downloading any data to the netbook.

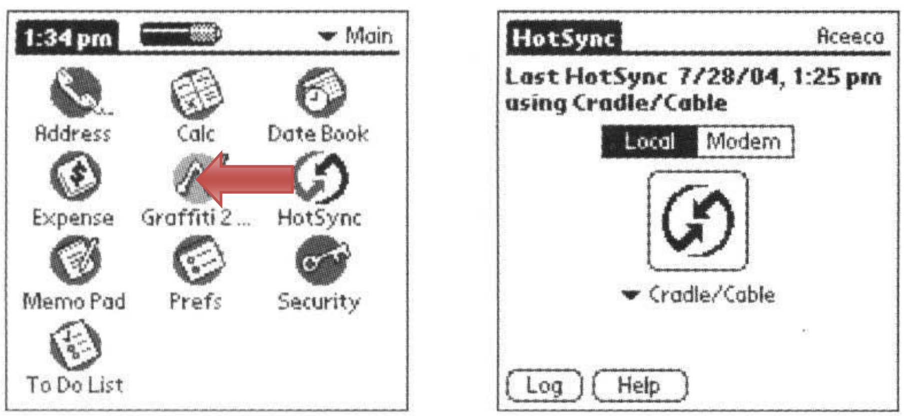


Figure 5.–HotSync Screens Found on RDA

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 (ASL_2013.XX), and click Edit/View under Data Functions on the right side of the window. All data will now be visible. Make the necessary changes here and exit out of the window to save. It is important to correct the numbers under the proper column and 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_YYYYMMDD.csv (e.g., Afognak_River_20130614.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.

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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, sex, 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. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card (Figure 3).
5. Never put data from different dates onto one gum card, and always enter new background information. Even if only one scale is collected that day, enter new background information and begin a new gum card the next day.
6. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Use a pencil when filling out gum cards, because ink will come off during pressing.
7. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data or gum cards will be returned to individual collectors for correction.
8. Ensure that all equipment is well kept. Electronics should be stored in a clean safe place. Dry off the RDA with a paper towel after sampling events. The RDA must be 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 edited 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.

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HOTSYNC ERROR MESSAGE

HotSync message includes "Exceeded user storage space limit of 500KB in form 'ASL_ #.##'

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"
8. Hotsync the RDA and the Netbook

APPENDIX D. CREW WORK SCHEDULE

Appendix D1.–Proposed work schedule for Chignik DIDSON technicians.

	Start	Stop	Start	Stop	Start	Stop	Hrs worked	
Monday	8:00	12:00	13:00	15:30	20:30	21:30	7.5	
Tuesday	8:00	12:00	13:00	15:30	20:30	21:30	7.5	
Wednesday	8:00	12:00	13:00	15:30	20:30	21:30	7.5	
Thursday	8:00	12:00	13:00	15:30	20:30	21:30	7.5	
Friday	8:00	12:00	13:00	15:30	20:30	21:30	4.5	
Saturday	8:00	9:00	14:30	15:30	20:30	21:30	3.0	
Sunday							0.0	
							37.5	total

The Tech III's proposed schedule is depicted. The Tech II will work the same schedule Monday through Friday and work the hours listed for Saturday on Sunday to keep the DIDSON running.