Regional Operational Plan SF.2A.2013.07

Deshka River Salmon Weir

by

Suzanne Hayes

May 2013

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

Symbols and Abbreviations

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

Weights and measures (metric)	
centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

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

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

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

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

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

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

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Division of Sport Fish

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SIGNATURE PAGE

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Approval

Title	Name	Signature	Date
Project leader			
Biometrician			
Research Coordinator			

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PURPOSE

The Deshka River is one of the Northern Cook Inlet Management Area's (NCIMA) most popular fishing locations. This project's purpose is, to: 1) monitor the Chinook and coho salmon escapement for inseason management decisions; 2) determine the relative accuracy and consistency of the single aerial survey for Chinook salmon and the actual weir count: 3) to collect unbiased Chinook salmon age data to be used in the development of spawner-recruit and sibling relationship models. Additionally in 2013 and 2014 a mark-recapture estimates of Susitna River drainage Chinook and coho salmon abundance will be made using the escapement past the weir at Deshka as one of the recapture locations.

BACKGROUND

The 1977 – 2011 average number of angler days spent fishing the Deshka River for all species combined has been 21,806 angler days. Only during the earliest years (1977 and 1978) of the State wide Harvest Survey and the period of 1995 – 1997 has sport fishing effort for the Deshka River been below 10,000 angler days (Table 1). Anglers fish the Deshka River primarily for Chinook salmon, *Oncorhynchus tshawytscha*, but also for coho salmon, *O. kisutch*, pink salmon, *O. gorbuscha,* rainbow trout, *O. mykiss*, Arctic grayling, *Thymallus arcticus*, and northern pike *Esox lucius.*

CHINOOK SALMON

The Deshka River (Figure 1), a tributary of the Susitna River, supports the largest Chinook salmon run in the NCIMA (Ivey et al. 2007). Prior to 1995, the Deshka River Chinook salmon fishery was managed based on the results of a single aerial survey conducted yearly after the sport fishery had taken place. Due to the popularity of the fishery, and declining escapement indices, a weir was installed in 1995 to give the Alaska Department of Fish and Game (ADF&G) managers inseason information about run size and biological composition of the escapement. Since that time the Deshka River weir has been successfully operated for 17 Chinook salmon seasons (Figure 2). Information gathered from the operation of this weir, in conjunction with historical escapement indices and sport harvest data, are used to construct spawner-recruit models for the Deshka River Chinook salmon stock. Based on these models, the ADF&G developed a biological escapement goal range (SEG) of 13,000 to 28,000 Chinook salmon counted at the weir (Bue and Hasbrouck 2001). The Deshka River weir allows the ADF&G to manage the Deshka River Chinook salmon fishery commensurate with the size of the run, by providing 1) inseason run strength information; 2) refinement of the spawner-recruit relationship for this stock; and 3) a pre-season run outlook.

COHO SALMON

Although there is no coho salmon escapement goal established for the Deshka River as of 2012, it is an important early run Susitna River coho salmon fishery. The coho salmon sport harvest from the Deshka River has been estimated through the SWHS since 1977. Coho salmon harvest from the Deshka River has been variable. The lowest estimated sport fish harvest of coho salmon was 559 in 1977, and the highest was 8,947 in 1989 (Table 1, Figure 3). Deshka River coho salmon are also harvested in Cook Inlet commercial fisheries in both the Central District drift fishery and the Northern District set gillnet fishery to an unknown degree. Because of the potential for overexploitation of the Deshka coho salmon stock, the ADF&G initiated the Deshka

River weir coho escapement program in 1995, to obtain spawning escapement information. The Deshka River coho salmon escapement has varied dramatically from year to year, from a low of 6,825 coho salmon in 2012 to a high of approximately 63,000 in 2004 (Table 2). The long term average coho salmon escaping to the weir at River mile 7 is 25,355 coho salmon (Table 2).

OBJECTIVES

The objectives for the Deshka River Chinook salmon weir project are:

1. To count the number of adult Chinook salmon in the Deshka River that pass through the weir at river mile (RM) 7 from late May through late August.
2. To estimate the age composition and sex composition of the adult Chinook salmon escapement to the Deshka River upstream of RM 7, from late May through late August; such that the estimates are within ± 7 percentage points of the true values 95% of the time.

The objectives for the Deshka River coho salmon weir project are:

1. Count the number of adult coho salmon in the Deshka River that pass through the weir at RM 7, from July 1 through approximately September 15.
2. Estimate the sex composition of the coho salmon counted at the Deshka River weir site upstream of RM 7 from July 1 through approximately September 15; such that the estimates are within ± 12 percentage points of the true values 90% of the time.

SECONDARY OBJECTIVES

1. Interview anglers sport fishing for Chinook and coho salmon upstream of the weir for harvest information.
2. Identify and count all species of fish that move through the live trap from weir installation until weir removal.
3. Estimate mean length-at-age, and age-by-sex composition for Deshka River Chinook salmon escapements.
4. Estimate mean length-by-sex for Deshka River coho salmon.
5. Collect a database of scales, sexes and lengths from the Deshka river coho salmon run.
6. Collect a baseline genetic sample from Deshka River coho salmon.
7. Record water temperature twice daily and water stage once daily for inseason management purposes.
8. Record hourly water temperatures for post season review.

STUDY DESIGN

ESCAPEMENT

A resistance-board weir similar to those described in Bartlett (1996) and Tobin (1994) will be located on the Deshka River at RM 7 to count salmon from the third week in May until early September. This weir is operated primarily to count Chinook and coho salmon, but pink salmon, sockeye salmon, chum salmon, northern pike, rainbow trout, Arctic grayling, Pacific lamprey

Lampetra tridentata, humpback whitefish *Coregonus pidschian* and longnose suckers *Catostomus catostomus* will also be counted.

Spaces between adjacent pickets on the weir and live trap are ≤38 mm (1.5 in); this spacing will prevent all but the smallest 0-ocean-age (jack) coho salmon and small pink salmon from passing between pickets. The picket spacing is not designed for pink salmon, and in the year 2000, technicians saw some pink salmon swimming through the space between pickets, although the majority passed through the live trap. Technicians will count fish passing through the live trap; fish that pass through the pickets will not be recorded. All species of fish will be counted through the live trap during daylight hours. The trap will be closed at night, during breaks, and while boats pass.

The majority of the Chinook salmon pass through the weir from late May to the middle of July. Coho, pink, sockeye, and chum salmon are expected to migrate past the weir from early July until early September. Pink salmon will be counted individually unless numbers are likely to exceed 30,000/day. When this happens, the crew will estimate the daily number of pink salmon by counting the number through the weir in one minute and multiplying that number by 15 after the first 15 minute period has elapsed. After expanding the count, a new one-minute count will be performed and expanded the same way. This process will continue for the remainder of the day.

High water events partially submerged the weir during the coho salmon run (e.g., 1996, 1998, 1999, 2002, Table 1). When the weir is partially submerged, it is possible that salmon pass over the weir undetected. Technicians will attempt to keep the weir floating during high water events, by removing debris that is submerging the panels. However, if this is no longer possible, technicians will record the time and date that the weir is submerged, and will record details about how much of the weir is submerged. When water stage drops, and the water turbidity decreases enough so that salmon can be positively identified and counted, the date and time will be recorded when counting has resumed.

AGE AND SEX COMPOSITIONS

Chinook Salmon

The Chinook salmon age, sex and length (ASL) sample size was calculated using the procedures outlined by Thompson (1987)[1], adjusting for a finite population and for a non-readable scale rate of 25%. The sample size goal for the objective criterion of ± 7 percentage points of the true value 95% of the time is 347 fish.

Proportional sampling will be used to obtain the 347 ASL samples per year. The sampling rate will start off each year as 1:37 unless an addendum is attached to this operational plan. One ASL sample taken for every 37 fish was derived using the lower end of the escapement goal, 13,000, as an expected run size. Because run size has varied greatly from the long term average, the long term average was not used. Rather the lower end of the escapement goal range was used as a conservative measure because managers will attempt to manage the harvest so that an escapement within the SEG goal range is achieved. However, if a pre-season escapement

[1] The procedures outlined by Thompson (1987) are generally applicable for sample size determination when the sampling design is of the simple random sample type. Our sample survey is of the stratified random sample type. This sample size procedure was used for two reasons: (1) since sample allocation is planned to be proportional the resultant sample can be treated as if collected by a simple random sampling process by ignoring strata, assuming proportional sampling is realized; and (2) sample sizes are conservative using this approach.

forecast based on sibling relationship is lower than 13,000 Chinook, then it will be used to determine the sampling rate.

The number of ASL samples to take on a given day will be derived by dividing the previous day's total Chinook salmon count by the number 37. Proportional sampling will be periodically reviewed and adjusted if obtaining too small or too large of a sample seems likely. This type of sampling design should provide a minimum sample size of 347 Chinook salmon.

Coho Salmon

The sample size goal for estimation length and sex composition is set at 50 coho salmon per sample period (7 days) with the total of 6 sample periods over the run yielding 300 samples per year. The 6 sample periods of 7 days each will begin on July 16 and end August 27. Past coho runs have ranged from 89%–100% complete by August 27. Taking 50 ASL samples per sample period will provide samples from all portions of the run with the total of 300 samples. Sampling will not be in proportion to the run, but past sampling strategies also have not yielded proportional sampling from 1995–2007. This strategy will obtain some samples from all portions of the run and rely on post-season stratification to address bias. In the worst case scenario when the entire run passes through the weir in just one week we will still be able to achieve stated precision criterion for sex composition estimates. More likely though, if the run is not that extreme, we will obtain more precise estimates by using post-season stratification.

The sample size goal for creating a genetic baseline for Deshka coho salmon is 100 coho salmon annually, axillary processes will be removed from 25 coho salmon per sample period (7 days), starting on July 23 and ending August 27.

Angler Interviews

Anglers fishing for Chinook or coho salmon upstream of the weir will be asked as they pass downstream over the weir how many Chinook or coho salmon they harvested (Secondary objective 1). The number of salmon harvested upstream of the weir will be recorded on the daily report form (Appendix A).

Non-Target Species

To the extent possible, technicians will identify, count, and record all fish species that move through the trap while the weir is operational. Fish not readily identifiable will be removed from the water and examined (Secondary objective 2).

Temperature and Water Clarity

A protected glass thermometer will be submerged in the river and attached to the trap at the beginning of the season. The thermometer will be pulled out of the river daily at 0900 and 1800 hours; temperature will be read to the nearest whole degree Celsius and recorded on the daily report form (Appendix A).

In addition, a HOBO water temperature Pro v2 ® logger made by Onset Computer Corp., will be anchored in the thalweg approximately 20 feet from the shore, just upstream of the weir, at the beginning of the season, and will log the stream temperature each hour. The temperature data from the logger will be transferred to the principal investigators' computer after weir removal.

Water clarity will be judged by the technician as excellent, acceptable, or poor each morning at 0900 hours, this observation will be recorded on the daily report form (Appendix A).

DATA COLLECTION

Escapement

The following information will be collected each day, and reported to the Palmer ADF&G Office before 8:00 a.m. the following day:

1. The number of salmon by species counted through the live trap;
2. The number of salmon by species harvested above the weir;
3. The number of salmon by species sampled for age, length, and sex;
4. The number of female fish in the age sample;
5. The number of other fish, by species, that passed through the live trap;
6. Instantaneous water stage and water temperature;
7. The number of boats that passed upstream over the weir;
8. Any comments regarding the ability to accurately count salmon through the live trap.

The information detailed above will be recorded on the daily report form (Appendix A). In addition, daily and cumulative values of salmon counted and sampled will be recorded in a Rite-In-the-Rain® notebook that will be turned into the principle investigator at the end of the season.

The crew will clean and inspect the weir for gaps that would allow salmon to pass through the weir undetected, at least daily and more frequently if conditions warrant. The crew will monitor the weir closely during daylight hours, and pass fish in a timely fashion, to minimize impeding the upstream migration of salmon.

Age, Sex, and Length

Once the technicians observe enough coho or Chinook salmon in the trap to make sampling worthwhile, the trap will be closed. All fish in the trap will be sampled even if the number of fish exceeds the ratio or sample period goal. This is to prevent any type of selection bias.

Sampling crews will attempt to sample Chinook salmon daily to meet the ratio, as stated in the Study Design section of this operational plan. Varying combinations of water level, water temperature, water clarity, cloud cover, rain, date, run progression, and boat traffic influence the number of fish that can be trapped in a day. If sufficient samples are not obtained on a given day, extra fish will be sampled in subsequent days so that the cumulative sample: weir count ratio stays at 1:37.

Coho salmon do not have to be sampled daily, as only 50 ASL samples are required per 7-day period. Technicians will determine the time during the period when the 50 ASL samples can be taken, so as to take advantage of fish movement while minimizing the disruption to the upstream migration of salmon.

Sampled fish will be measured from mid-eye to fork-of-tail to the nearest 0.5 cm. Sex will be determined by external physical characteristics, such as kype development or a protruding ovipositor. Length and sex will be recorded in Rite-In-the Rain® notebooks while sampling and later transferred to standard age, weight, and length (AWL) version 1.2 mark-sense forms (Heineman unpublished; Appendix B).

Three scales from each sampled fish, will be taken from the preferred location on the left side of the body, at a point on a diagonal line from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, and two rows above the lateral line (Welander 1940, Scarnecchia 1979) . If the preferred scales cannot be obtained, another scale will be taken from as close to the preferred scale as possible, and always from the first or second row above the lateral line, in order to capture the early life history portion of the age. If no scales are available in the preferred area on the left side of the fish, scales will be collected from the preferred area on the right side of the fish. If scales are not obtainable from a given fish, that fish will not be sampled at all and sampling will continue with the next available fish.

The axillary process will be taken from every other coho salmon sampled for Age, sex and length from July 23 – August 27. The sample will be cleaned of sand and slime and will be placed in a small numbered plastic vial (please see Appendix C for complete instructions). The vial number will be recorded in the Rite-In-the Rain® notebooks while sampling. The vial number will be recorded as a tag number, on the back of the standard age, weight, and length (AWL) version 1.2 mark-sense form, for each fish that is sample for genetic tissue (Heineman unpublished; Appendix B,).

Scales will be mounted on gum cards and impressions made in cellulose acetate as described in Clutter and Whitesel (1956) and Scarnecchia. (1979). The corresponding litho-code and line numbers from the mark-sense form will be recorded on the gum card along with the date, collector name, and location. The impressions will be magnified and viewed on a microfiche reader and the ages will be determined from the growth patterns of the circuli. Ages will be reported in European notation (Jearld Jr. 1983) and recorded on AWL forms.

DATA REDUCTION AND ANALYSIS

Escapement

The field crew will maintain the daily report form (Appendix A) and a field notebook of daily information (detailed in Data Collection-Escapement above) at the weir field camp. Daily information received over the telephone will be entered into the Inseason Excel® spreadsheet at the Palmer ADF&G office. At the end of the season, the data in the daily report form will be reconciled with the data that was recorded via telephone during the season. If discrepancies occur, the project biologist and field crew will confer to determine the appropriate values. The fields in the Deshka inseason worksheet will be: date, Chinook daily count, Chinook harvest above weir, cumulative escapement, proportion of BEG, Chinook run projection, Chinook sampled, percent of Chinook sample that are female, the sample ratio, daily count of coho salmon, cumulative coho escapement, coho run projection, coho daily sampled, daily harvest of coho above the weir, daily count of sockeye salmon, daily count of chum salmon, daily count of pink salmon, daily count of northern pike, daily count of rainbow trout, daily count of longnose suckers, daily count of lampreys, water stage, water temperatures, water clarity, boats, rafts, and canoes through the weir, and comments. If floods or weir breakdowns allow fish to pass uncounted, no adjustment will be made to the final escapement abundance. Instead it will be noted how many hours of data are missing and that the counts are biased low. The Deshka River Chinook salmon escapement data will be archived in ASCII format in Sport Fish Division's Docushare repository (http://docushare.sf.state.ak.us). A copy of the Inseason spreadsheet will also be maintained in the Palmer ADF&G office. Hourly water temperature data will be stored

on the Palmer ADF&G local area network, along with past years records of water temperature data.

Age and Sex Compositions

Field crews will record data in a Rite-In-the-Rain® notebook while sampling, and then transfer the data onto AWL forms in the field. The assistant project biologist will correct any errors and enter the ages on the forms. The AWL forms will be sent to Sport Fish Division Research and Technical Services, scanned into an electronic text file, and the resulting file will be archived in Sport Fish Division's Docushare repository (http://docushare.sf.state.ak.us) with data fields and formats conforming to Heineman (unpublished). A copy of the text file will also be maintained in the Palmer ADF&G office. The text file will be imported into an Excel spreadsheet and all analysis done from that spreadsheet.

The sampling protocol for Chinook salmon is one that attempts proportional sampling of the total escapement. If the proportional sampling is achieved, then all collected samples will be pooled and unstratified estimates will be calculated for both age and sex compositions. If proportional sampling is not achieved, then the entire run will be split into four temporal strata based on the daily escapement counts such that each stratum represents approximately a quarter of the total run. The decision whether to use stratified or unstratified estimator for age composition and sex composition will be based on the results of the likelihood ratio test (G-test) (Sokal and Rohlf, 1995). The likelihood ratio test statistic, G-statistic, will be calculated as:

$$G = 2\sum_i f_i \ln\left(\frac{f_i}{\hat{f}_i}\right) \tag{1}$$

where f_i is the observed number of fish in the i^{th} cell of the age-by-time or sex-by-time contingency table, and $\hat{f}_i$ is the expected number of fish in the i^{th} cell calculated under the independence condition (i.e. age and sex proportions don't change over time). G-statistic has an approximate χ^2-distribution with $(r\text{-}1)(c\text{-}1)$ degrees of freedom, where r is the number of rows and c the number of columns in the table.

For clarity, the following description and formulae were developed in terms of estimating the age composition, however estimating the sex composition is treated exactly identical.

Applied to the age counts by time strata G-test will determine (with $\alpha = 0.05$) if the age composition is dependent on time. If independent of time, age proportions for the escapement ($\hat{p}_z$), as well as the number of fish per age class ($\hat{N}_z$) and their estimated variances, will be calculated using equations (2) through (5) with the pooled data. If not, then the stratified estimates will be calculated as described below.

The age proportions of the Chinook salmon escapement by sampling stratum will be estimated as:

$$\hat{p}_{tz} = \frac{n_{tz}}{n_t} \tag{2}$$

where $\hat{p}_{tz}$ is the estimated proportion of salmon passing the weir during sampling stratum t from age category z, n_{tz} equals the number of fish sampled during sampling stratum t that were

classified as age category *z*, and n_t equals the number of Chinook salmon sampled for age determination during sampling stratum *t*.

The variance of $\hat{p}_{tz}$ will be calculated by:

$$\text{var}\left[\hat{p}_{tz}\right] = \left(1 - \frac{n_t}{N_t}\right) \frac{\hat{p}_{tz}\left(1 - \hat{p}_{tz}\right)}{n_t - 1} \tag{3}$$

where N_t is the number of Chinook salmon passing the weir during sampling stratum *t*.

The estimates of escapement by age categories in each sampling stratum will be calculated by:

$$\hat{N}_{tz} = N_t \hat{p}_{tz} \tag{4}$$

with its variance estimated as:

$$\text{var}\left[\hat{N}_{tz}\right] = N_t^2 * \text{var}\left[\hat{p}_{tz}\right] \tag{5}$$

The total escapement abundance by age category and its variance will then be estimated by summation:

$$\hat{N}_z = \sum_{t=1}^{L} \hat{N}_{tz} \qquad \text{var}\left[\hat{N}_z\right] = \sum_{t=1}^{L} \text{var}\left[\hat{N}_{tz}\right] \tag{6}$$

where: L equals the number of sampling strata.

Finally, the total proportion of the escapement by age categories and its variance will be estimated by:

$$\hat{p}_z = \frac{\hat{N}_z}{N} \qquad \text{var}\left[\hat{p}_z\right] = \frac{\text{var}\left[\hat{N}_z\right]}{N^2} \tag{7}$$

For coho, sex composition estimates and their variances will be calculated by using equations (2) through (7) with L equals six time strata.

Estimates of age-by-sex composition for Chinook sampled from the escapement will also be calculated by using equations (2) and (3) with the subscript *z* representing age-by-sex categories (Secondary objective4).

Mean length at age

For Chinook mean length at age class *k* will be estimated by:

$$\bar{l}_k = \frac{1}{n_k} \sum_{i=1}^{n_k} l_i \tag{8}$$

where

l_i = the length of fish *i* in a sample n_k and

n_k = the number of Chinook of age class *k*.

The variance of the mean length-at-age class *k* will be estimated by:

$$\text{var}(\bar{l}_k) = \frac{1}{n_k} \frac{\sum_{i=1}^{n_k} (l_i - \bar{l}_k)^2}{n_k - 1} \quad \textbf{(9)}$$

Genetic Sample

The project biologist or the assistant project biologist will sort the Age, Sex and Length file by vial number and will forward this information in an excel spreadsheet along with the samples to the Commercial Fisheries Genetic Lab in Anchorage.

SCHEDULES AND DELIVERABLES

Dates of sampling events and other field and office activities are summarized below. Results will be published in a Report to the Board of Fisheries (FMR), in 2014, and data from 2014 and 2015 will be reported in the Area Management Report for the recreational fisheries of Northern Cook Inlet, 2014 and 2015. An annual Deshka River weir summary memo will also be prepared for the Area Management Biologist.

Activity	Dates
Approximately May 21 – September 15	Data Collection
November 30.	Scale Reading
December 15.	Data analysis
December 31.	Data Archiving
December 31	Summary Memo

RESPONSIBILITIES

List of personnel and duties is as follows:

Fishery Biologist II: Suzanne Hayes. Oversees project by writing operational plan, preparing and tracking budgets, hiring and supervising crewmembers, tracking implementation of operational plan, providing assistance and direction when needed, overseeing daily reporting and summarization of data.

Biometrician III: Anton Antonovich. Provides statistical supervision and shares design and writing of the operational plan with the Principle Investigator. Reviews and provides statistical support for the data analysis.

Fishery Biologist I: Daryl Lescanec. Establishes safe field camp and coordinates weir installation and removal. Maintains daily contact with the field crew, routinely visits with the crew to observe activities, provides assistance and discusses weir operation with the field crew. Ages scales, edits forms, performs data analysis, and provides a summary memo to the NCI Area Management Biologists.

Fish and Wildlife Technician III: Crew Leaders Collects all field data as outlined in the operational plan, including capture and biological sampling of fish. Train the crew members in how to operate the weir, operate boats safely, record data, identify fish, and perform biological sampling. Decide when and how to modify field sampling in response to water conditions and fish movements. Ensure that they or crew they assign report to the Palmer office daily, perform daily maintenance of the weir, routine maintenance of the field camp and all equipment assigned to the project, purchase all routine and expected supplies, provide the office administrator receipts for purchases, and turn in completed timesheets on the 1st and 16th of each month. Lead the inventory, organizing, repair and storage of all gear at the completion of the season.

Fish and Wildlife Technician II : Crew Members: Collect all field data as outlined in the operational plan and demonstrated by crew leaders. The crew is responsible for reporting to the Palmer office daily, daily maintenance of the weir, routine maintenance of the field camp and all equipment assigned to the project, purchasing all routine and expected supplies, providing the office administrator receipts for purchases, and turning in completed timesheets on the 1st and 16th of each month.

BUDGET SUMMARY

FY13 Chinook Allocation

Line Item	Category	Budget (x$1,000)
100	Personnel	104.9
200	Travel	0.10
300	Contractual	17.4
400	Commodities	36.3
500	Equipment	0
Total		158.70

FY 14 Coho (Susitna coho abundance)

Line Item	Category	Budget (x$1,000)
100	Personnel	70.1
200	Travel	0.
300	Contractual	0.0
400	Commodities	4.8
500	Equipment	0.0
Total		75.0

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Table 1.- Deshka River angler effort and sport harvest by species.

Year	Angler Days	Chinook salmon	Coho salmon	Pink salmon	Rainbow Trout	Arctic Grayling	Northern Pike
1977	3,852	1,017	559	391	1,556	631	0
1978	9,111	850	1,789	697	3,634	579	0
1979	13,236	2,811	973	109	3,182	1,463	0
1980	19,364	3,685	2,290	689	4,305	1,817	0
1981	13,248	2,769	632	19	3,631	1,255	0
1982	18,391	4,307	2,463	377	3,804	1,457	0
1983	23,174	4,889	1,036	21	2,434	1,280	0
1984	20,561	5,699	1,646	748	2,120	1,110	0
1985	29,322	6,407	2,637	87	3,104	1,335	0
1986	29,739	6,490	4,256	882	3,038	938	0
1987	30,008	5,632	2,789	652	3,006	942	0
1988	32,160	5,474	7,458	800	4,075	1,164	0
1989	39,432	8,062	8,947	152	1,676	457	0
1990	32,082	6,161	4,959	297	707	152	0
1991	38,011	9,306	8,111	98	1,275	333	0
1992	37,056	7,256	7,110	513	459	105	0
1993	30,643	5,682	6,530	84	452	89	0
1994	19,267	624	5,511	564	415	61	78
1995	4,808	0	2,275	77	183	0	0
1996	5,246	11	4,615	236	321	97	161
1997	5,110	42	1,169	11	264	68	137
1998	11,574	3,384	3,630	702	218	8	18
1999	20,088	3,496	4,034	67	561	11	283
2000	30,997	7,076	8,687	799	205	122	462
2001	23,734	5,007	6,556	291	270	139	400
2002	20,362	4,508	3,616	185	417	60	226
2003	24,904	6,605	4,946	24	368	35	143
2004	28,653	9,050	4,440	249	938	79	336
2005	26,638	7,332	3,616	77	60	0	240
2006	30,958	7,753	6,042	76	523	0	505
2007	34,726	5,696	2,550	70	185	172	277
2008	15,514	2,036	3,426	78	419	268	168
2009	10,532	723	4,060	23	562	35	455
2010	17,867	3,381	5,690	77	122	67	1,120
2011	13,206	3,139	2,282	56	0	0	258

Table 2.-**Operational periods, coho salmon counts, and interruptions for the Deshka River weir during 1995-2012.**

Year	Location	Season Total Coho Salmon	Date Weir Removed	Days Operation: 7/1-9/15	Down Days	Dates Partially Submerged or Flooded
1995	RM 17	12,824	9/1/95	63	0	None
1996	RM 17	1,394	7/28/96	28	>40	Most of coho season
1997	RM 7	8,063	9/8/97	70	2	9/1- 9/2
1998	RM 7	6,773	9/6/98	60	8	8/8 – 12, 8/23 – 8/25
1999	RM 7	4,563	8/27/99	50	8	7/31 - 8/2, 8/14 - 8/17
2000	RM 7	26,387	9/13/00	75	0	None
2001	RM 7	29,927	9/13/01	75	0	None
2002	RM 7	24,612	9/9/02	72	0	8/9-8/15, 8/22-8/24
2003	RM 7	17,305	9/8/03	70	0	None
2004	RM 7	62,940	9/9/04	70	0	None
2005	RM 7	47,887	9/22/05	68	0	9/6-9/22
2006	RM 7	59,419	9/7/06	46	>20	Flooded 8/16
2007	RM 7	10,575	9/5/07	67	0	None
2008	RM 7	12,724	9/8/08	70	0	None
2009	RM 7	27,348	9/7/09	69	0	None
2010	RM 7	10,393	9/6/10	68	0	None
2011	RM 7	7,326	9/6/11	61	6	8/9-8/14
2012	RM 7	6,825	9/4/12	67	0	None

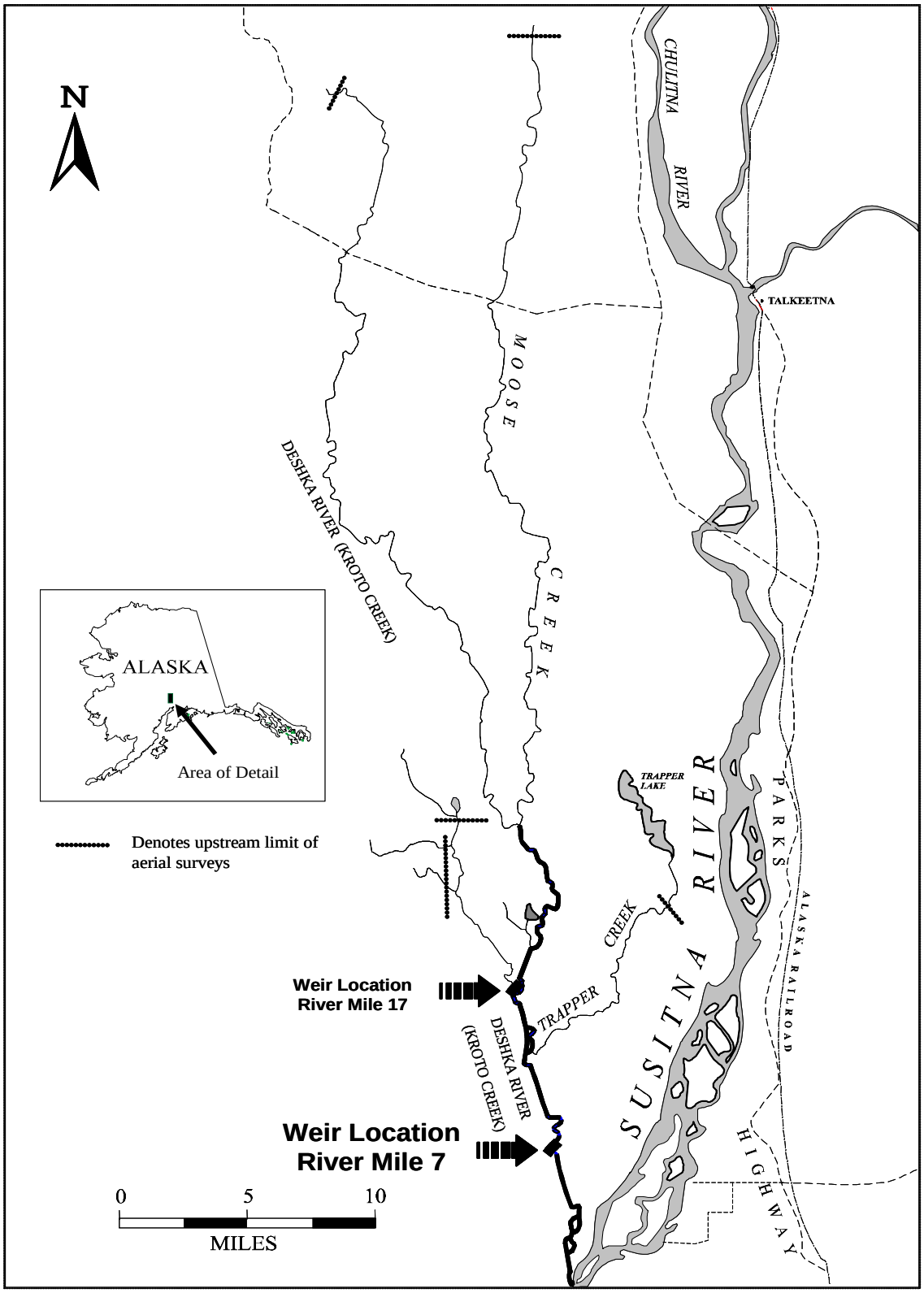


Figure 1.-Deshka River drainage and weir locations.

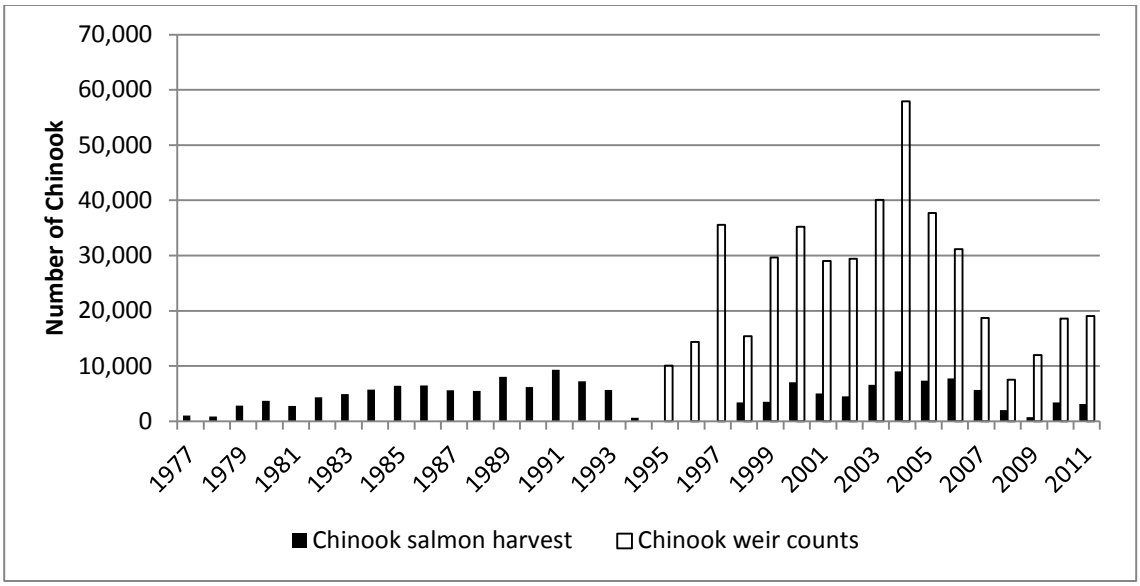


Figure 2.-Deshka River Chinook salmon sport harvest and weir counts.

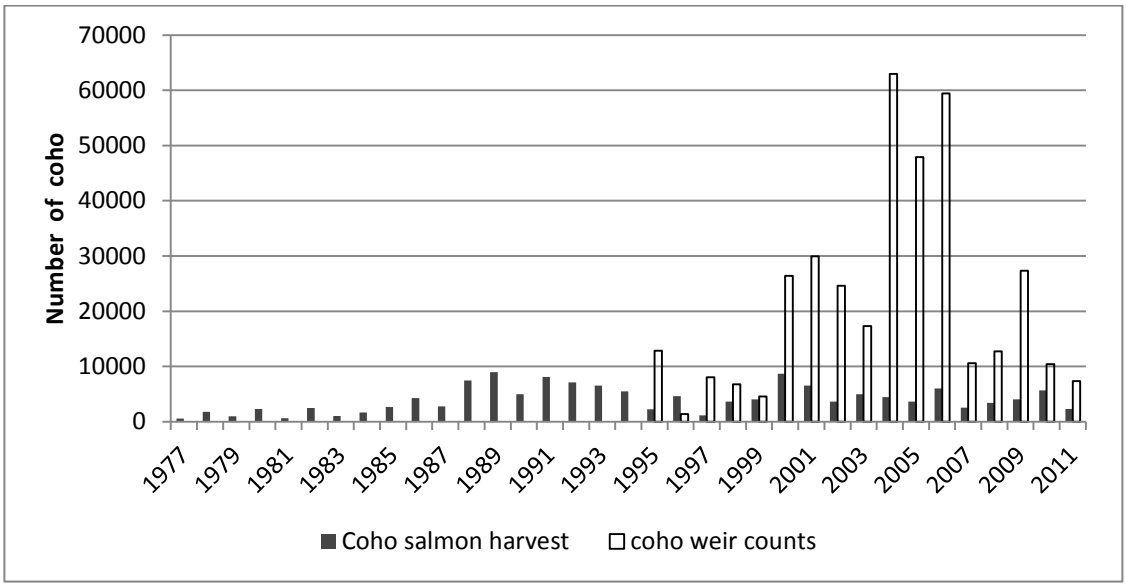


Figure 3.-Deshka River coho salmon sport harvest and weir counts.

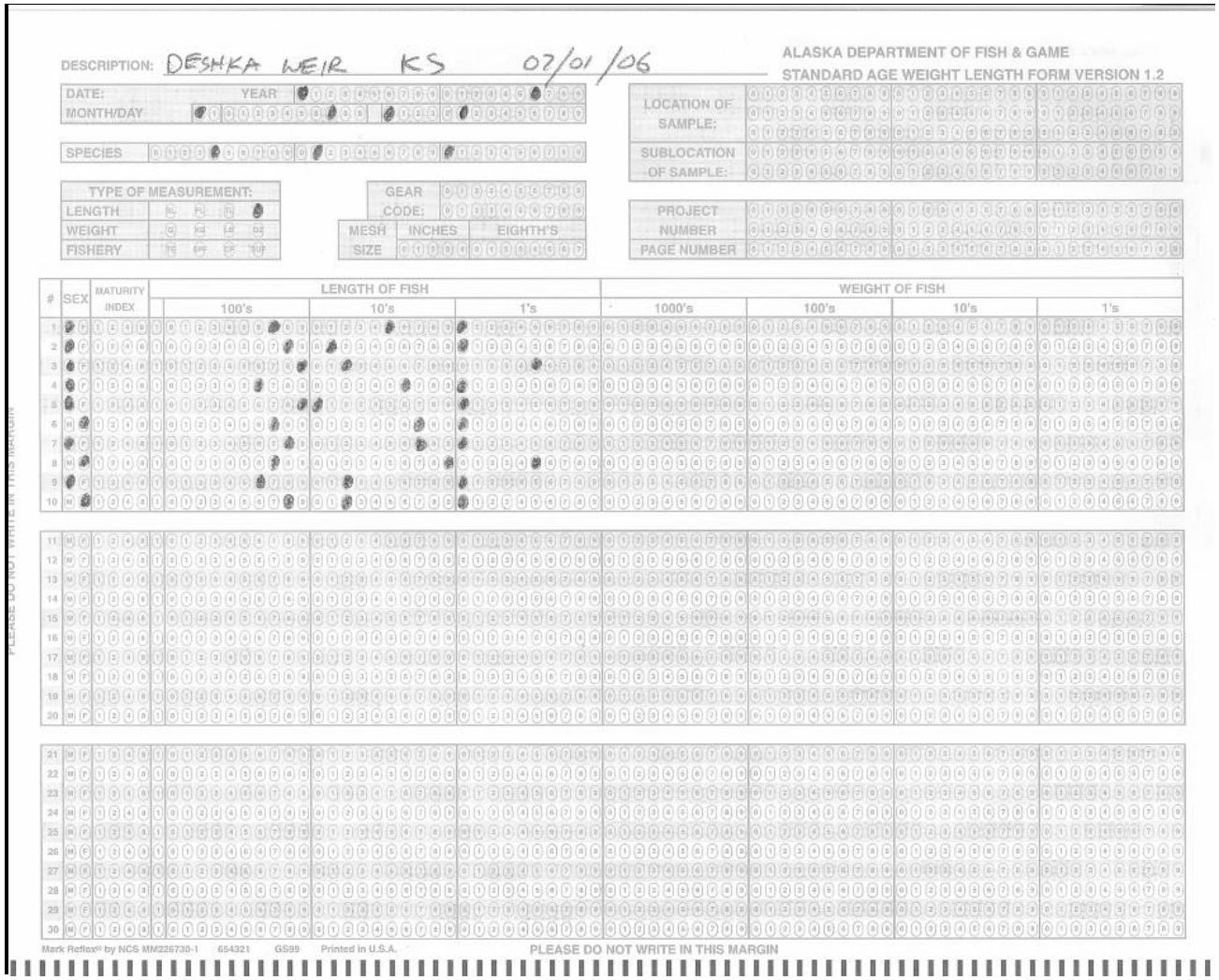
APPENDIX A: DESHKA WEIR, DAILY REPORT FORM

Appendix A1.- Deshka Weir , Daily Report Form Year:_____Page _____ of _____.

Date		Chinook Salmon				Coho Salmon			Pink Salmon		Chum	Sockeye	NP	RBT	LNS	Stream Conditions				Boats	Rafts	Notes
Day	Date	Count	Harvest	Scales	# F	Count	Harvest	Scale/Genetic	Count	Count method	Counts		Counts			Stg.	AM Temp	PM Temp	Clarity			

APPENDIX B: EXAMPLE OF A COMPLETED STANDARD AGE WEIGHT LENGTH FORM

Appendix B1.- Example of a completed Standard Age Weight Length form, front side contains date, sex and length information.



APPENDIX C: INSTRUCTIONS FOR COLLECTING AXILLARY PROCESS TISSUE SAMPLES FOR DNA ANALYSIS

Appendix C1.-Instructions for collecting axillary process tissue samples for DNA analysis.

Non-lethal Sampling Finfish Tissue for DNA Analysis

ADF&G Gene Conservation Lab, Anchorage

I. General Information

We use axillary tissue samples from individual fish to determine the genetic characteristics and profile of a particular run or stock of fish. The most important thing to remember in collecting samples is that **only quality tissue samples give quality results**. If sampling from carcasses: tissues need to be as "fresh" and as cold as possible and recently moribund, do not sample from fungal fins.

Sample preservative: Ethanol (EtOH) preserves tissues for later DNA extraction without having to store frozen tissues. Avoid extended contact with skin.

II. Sample procedure:

1. Tissue type: Axillary process; clip one axillary process from each fish (see attached print out).
2. Prior to sampling, fill the tubes half way with EtOH. Fill only the tubes that you will use for a particular sampling period. The squirt bottle is for day use only since it will leak if unattended.
3. To avoid any excess water or fish slime in the vial, wipe the axillary process dry prior to sampling. Using the dog toe nail clipper or scissors, clip off axillary process (**1/2 -1" max**) to fit into the cryovial.
4. Place axillary process into EtOH. The ethanol/tissue ratio should be **slightly less than 3:1** to thoroughly soak the tissue in the buffer.
5. Top up tubes with EtOH and screw cap on securely. Invert tube twice to mix EtOH and tissue. Periodically, wipe or rinse the clippers so not to cross contaminate samples.
6. Data to record: Record each vial number to **paired data** information, electronic copy preferred.
7. Discard remaining ethanol from the 500ml bottles before shipping. **Tissue samples must remain in 2ml ethanol**, these small quantities require HAZMAT paperwork. Please follow packing instructions for HAZMAT items. Store vials containing tissues at room temperature, but away from heat. In the field: keep samples out of direct sun, rain and store capped vials in a dry, cool location. Freezing not required.

III. Supplies included with sampling kit:

1. Clippers - used for cutting the axillary process.
2. Cryovial - 2.0ml pre-labeled plastic vial or tube.
3. Caps – cap for each vial.
4. Sampling rack- plastic box for holding cryovials during sampling.
5. Ethanol (EtOH) – in Nalgene bottle(s).
6. Squirt bottle – to fill and/or "top off" each cryovial with EtOH
7. Sampling instructions
8. Laminated "return address" labels

IV. Shipping: HAZMAT paperwork is required for return shipment of these samples and is included in the kit.

Return shipping code: _____

Ship samples to:

ADF&G – Genetics
333 Raspberry Road
Anchorage, Alaska 99518

Lab staff: 1-907-267-2247
Judy Berger: 1-907-267-2175