State of Alaska
Department of Fish and Game
Sportfish Division

Nomination Form
Fish Distribution Database

Region: SCN | USGS Quad(s): KENAI B-4

Fish Distribution Database Number of Waterway: 244-30-10050-2024

Name of Waterway: Crooked Creek ☑ USGS Name ☐ Local Name

☐ Addition ☐ Deletion ☐ Correction ☒ Backup Information

For Office Use

Nomination #	CS-117		
Revision Year:	2008 2009	ADF&G Fisheries Scientist	Date
Revision to:	Atlas ____ Catalog ____ Both ____	ADNR OHMP Operations Mgr.	Date
		FDD Project Biologist	Date 5/8/08
Revision Code:	F-1	Cartographer	Date

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Present	Anadromous
Chinook salmon	1979 - 80, 82 - 88, 90, 91			X	☑
sockeye salmon	1982 - 84			X	☑
coho salmon	1995 - 1998			X	☑
					☐
					☐

IMPORTANT: Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including: number of fish and life stages observed; sampling methods, sampling duration and area sampled; copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments:

Inclusion of Crooked Creek (244-30-10050-2024) in AWC supported by historic data

Chinook Salmon - 1976 - 1978, 1992 - 2006
Sockeye Salmon - 1990
Coho Salmon - 1985 - 1988
Steelhead - See Jeff Breakfield, Soldotna SF

} Soldotna Comm. Fish Archives.

Name of Observer (please print): J. Johnson

Signature:

Date: 6/15/2007

Agency: ADF&G

Address: 333 Raspberry Road
Anchorage, Ak 99518

This certifies that in my best professional judgment and belief the above information is evidence that this waterbody should be included in or deleted from the Fish Distribution Database.

Signature of Area Biologist: Dave Westerman Date: 4/30/08

Name of Area Biologist (please print): Dave Westerman

Revision 02/05

ESCAPEMENT SURVEY COUNTS OF ADULT SALMON FOR SYSTEMS WHOSE CONFLUENCES WITH COOK INLET OCCUR BETWEEN POINT POSSESSION AND THE ANCHOR RIVER (EXCLUSSIVE OF THE KENAI RIVER - FILE KEN1.xls

FILENAME: KEN1.xls Revised: 1/92, 5/93, 3/94 (R.Davis); 2/96, 12/96 M.Lambdin; 8/29/00 R.Davis; 11/20/01 (Davis)

Location Code/ Stream Name/ USGS Map No.	Year	Date	Chin	Sock	Coho	Chum	Pink	Comments	Data Source
244-30-10050-2024									
Crooked Creek	1979		868					Weir count	
Kenai B-4	1980		2460					Weir count	
Keani A-3	1982		9226	1144				Weir count	ADF&G, FRED
	1983		8666	1141				Weir count	ADF&G, FRED
	1984		9101	424				Weir count	ADF&G, FRED
	1985		5861		1898				
	1986		12656		4294				
	1987		3724		3348				
	1988		5091		3200				
	1990	8/23	11000					Foot survey, includes 5% carcassas	CIAA
	1991		1341					Weir count	ADF&G, FRED

State of Alaska
Department of Fish and Game
Nomination for Waters
Important to Anadromous Fish

AWC Volume SE SC SW W AR IN USGS Quad KENAI A-4

Anadromous Water Catalog Number of Waterway 244-30-10050-2024-3058

Name of Waterway _____ USGS name ___ Local name ___

Addition ✓ Deletion ___ Correction ___ Backup Information ___

For Office Use

Nomination # 95 309
Revision Year: '95
Revision to: Atlas ___ Catalog ___
Both X
Revision Code: A-Z

Regional Supervisor — Date 11/4/95
[signature] — 12/14/94
Drafted — Date 12/23/94

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Migration	Anadromous
COHO	7/12/94	?	✓		

IMPORTANT: Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including: number of fish and life stages observed; sampling methods, sampling duration and area sampled; copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as any other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments: SEE ATTACHED MAP, FISH HABITAT SURVEY FORM, & MEMORANDUM FOR STATION 1-A4. NO APPARENT BLOCKAGE OR CHANGE IN HABITAT FOR A MINIMUM OF 2 MILES UPSTREAM.

Name of Observer (please print) MICHAEL WIEDMER
Date: ~~7~~ 9/22/94 Signature: [signature] MICHAEL WIEDMER
Address: ADF&G, HABITAT & RESTORATION DIVISION
REGION II, ANCHORAGE

This certifies that in my best professional judgement and belief the above information is evidence that this waterbody should be included in or deleted from the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes per AS 16.05.870.

Signature of Area Biologist: _____ Rev. 7/93

FISH HABITAT SURVEY FORM

Rev. 7/30/93

STATION NO: 1-A-4 DATE: 7/12/94 TIME: 1045

OBSERVERS: MW TL TEAM: (A) B STREAM NO: _____

WEATHER: CLEAR / PRT. CLDY. / (CLOUDY)

STREAM STAGE: HIGH / (MEDIUM) / LOW

PRECIP: TODAY TR; YESTERDAY TR; THIS WEEK _____

TEMP: AIR _____ WATER 10°C GRADIENT: <1 %

WATER CLARITY: (CLEAR) / STAINED / TURBID / MUDDY / MURKY

SUBSTRATE:

MUD	33
SAND	66
GRAVEL	
COBBLE	
BLDR/B-ROCK	
	100%

STREAM DIMENSIONS:

WIDTH 8

DEPTH, LEFT BANK 0

DEPTH, RIGHT BANK 0

DEPTH, MID-CHANNEL 2'

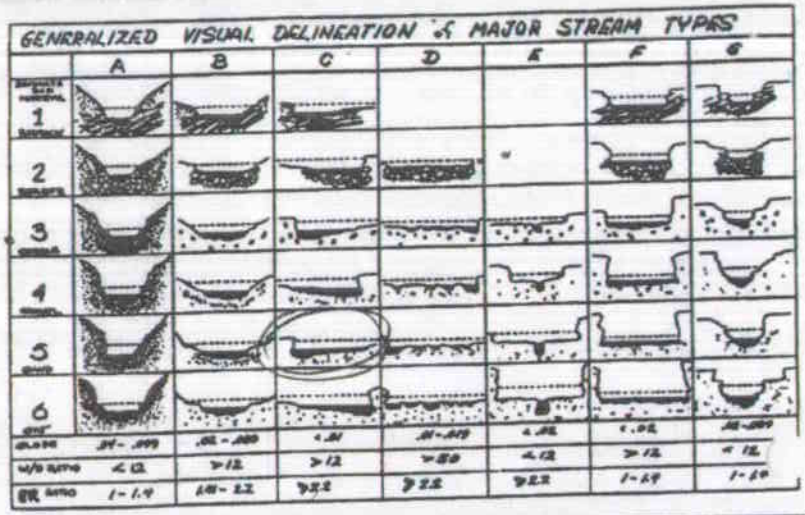
VELOCITY: None (Slow) Medium Fast

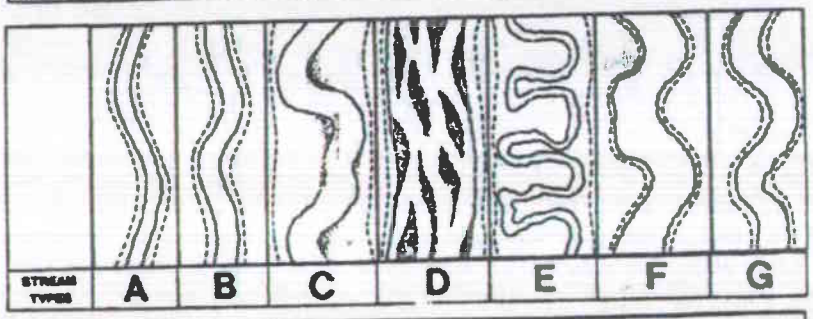
fps 0 (0-1) 1-3 3+

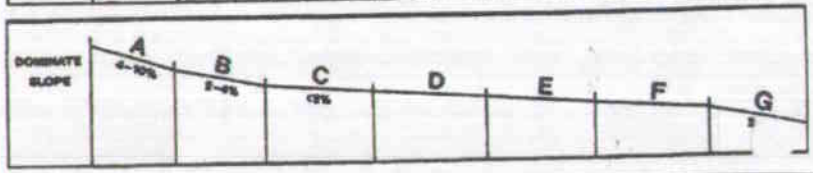
CHANNEL DIAGRAM (INCLUDE BANK & STREAM FEATURES, VEGETATION):

ROLL NO. 1 FRAME NOS. _____

CIRCLE DOMINANT CHANNEL TYPE:



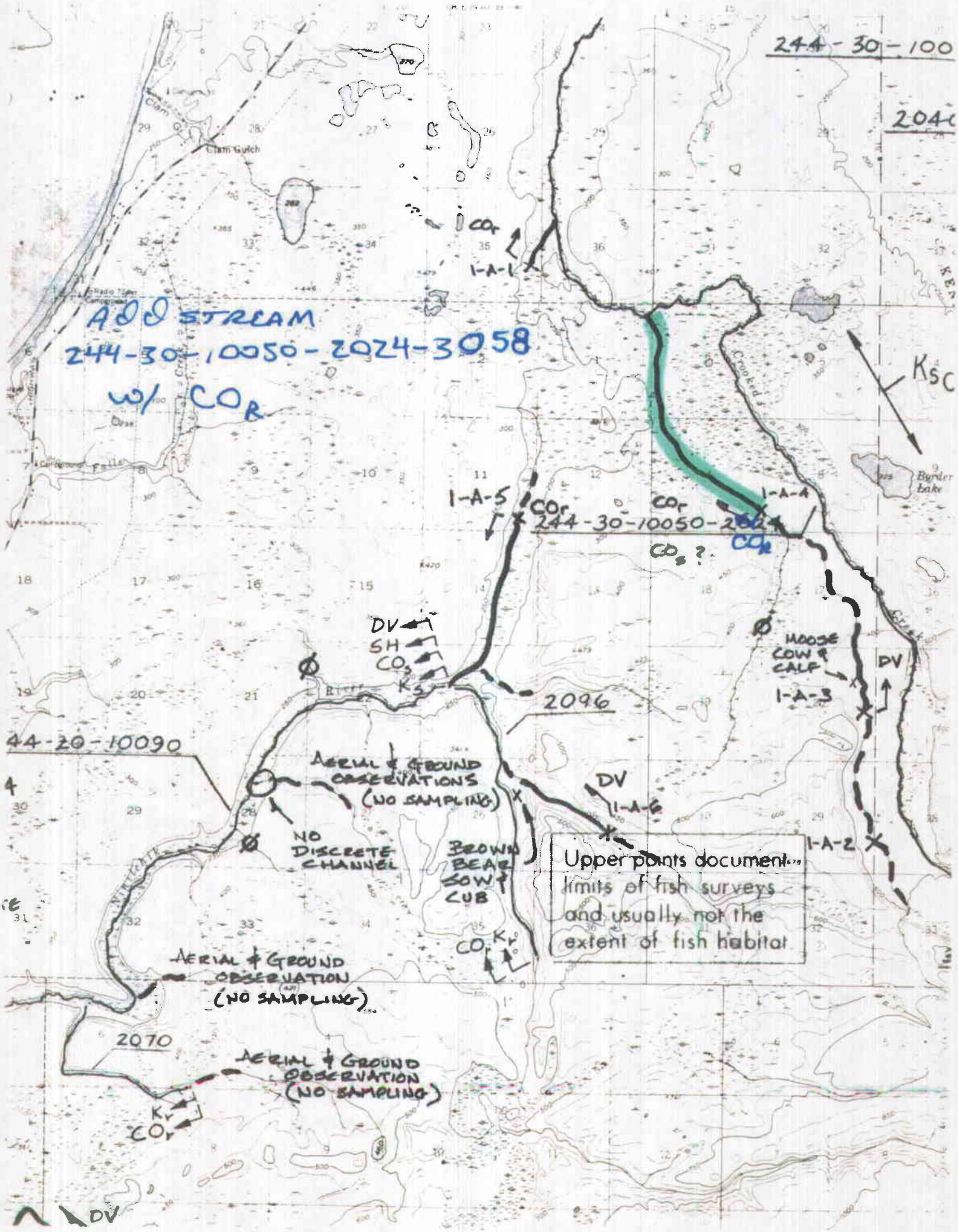




CO	35	33	37	+	20	YOY			
K									
S									
F									
CH									
DV	70								

OBSERVATIONS:

FISH SAMPLING GEAR: EF TIME: 45's AREA: 160 EFFIC: 75 %


244-30-100
204
Clam Gulch
ADD STREAM
244-30-10050-2024-3058
w/ CO_R
KS_C
Crooked
Border Lake
I-A-1
I-A-5
I-A-4
CO_R
244-30-10050-2024
CO_R
CO_R ?
DV
SH
CO_S
K_S
2096
MOOSE COW & CALF
DV
I-A-3
44-20-10090
AERIAL & GROUND OBSERVATIONS (NO SAMPLING)
DV
I-A-6
NO DISCRETE CHANNEL
BROWN BEAR SOW & CUB
I-A-2
Upper points document limits of fish surveys and usually not the extent of fish habitat
CO_R K_R
AERIAL & GROUND OBSERVATION (NO SAMPLING)
2070
AERIAL & GROUND OBSERVATION (NO SAMPLING)
K_R
CO_R
DV

MEMORANDUM

State of Alaska

DEPARTMENT OF FISH & GAME

TO: Ed Weiss
Habitat Biologist
Region II
Habitat and Restoration Division
Department of Fish and Game

DATE: September 23, 1994

TELEPHONE NO.: 267-2284

FAX NO.: 349-1723

SUBJECT: Fish Habitat Survey; Ninilchik River Drainage

FROM: Michael Wiedmer
Habitat Biologist
Region II
Habitat and Restoration Division
Department of Fish and Game

On July 12 and 13, 1994, Tom Liebscher and I (joined by Les Christian on July 13 only) conducted a helicopter-supported fish habitat survey of portions of the Ninilchik River and Crooked Creek drainages. Tom Liebscher, a U. S. Forest Service employee in the State and Private Forestry section, is working with the Department of Natural Resources, Division of Forestry (DOF) Kenai/Kodiak Area Office in the preparation of pre-harvest silvicultural prescriptions for the Falls Creek Timber Sale. Les Christian is a DOF employee also working on the Falls Creek Timber Sale. The survey was conducted to more accurately delineate and describe fish habitat within the proposed Falls Creek Timber Sale and along potential access routes.

The survey was conducted with an Evergreen Helicopters' Bell 206 on fire contract to the DOF. With a Smith-Root battery-powered backpack electrofisher and cured salmon roe baited minnow traps, we sampled 11 stations on 9 streams. The survey identified 4 previously undocumented anadromous fish streams and established the presence of resident fish in 3 streams and extended known (resident) fish habitat in 3 additional streams (in 1 stream, the lower reach was identified as anadromous fish habitat and the upper reach was identified as resident fish habitat).

Sampling sites were located near the probable upstream limit of anadromous or resident fish distribution as determined by aerial observations. However, the availability of helicopter landing sites and the limited time available for the survey frequently prevented the survey crew from sampling the actual upper limit of fish distribution. After sampling and determining fish presence, each stream was aerially surveyed upstream of the sampling point to identify blockages to fish migration or changes in fish habitat. On the attached map, the known distribution of anadromous or resident fish is identified by a solid line. The probable distribution of anadromous or resident fish is identified by a dashed line. As a result of the dry summer, water levels were slightly lower than normal. The general area was previously

surveyed by the ADF&G in 1988[1].

In addition to site sampling, at low altitudes and slow flight speeds, we aerially surveyed portions of the drainage to determine the potential distribution of anadromous and resident fish. We identified segments of 8 streams that may support anadromous fish (see attached maps). We also identified segments of 5 streams that may support resident fish. Future surveys should focus on these streams. The low-level aerial survey also determined that 4 streams that appear on the USGS 1:63,360 maps probably do not support anadromous or resident fish (see attached maps).

Attachments (2 maps, 3 photograph folders, 11 fish habitat survey forms, Seaberg memo, and 4 anadromous fish stream nomination forms)

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[1]Seaberg to McKay, October 17, 1988 ADF&G memorandum (attached).

FY04
OPERATIONAL PLAN

Crooked Creek Chinook Salmon Enhancement Project

Principal Investigator: Jeff Breakfield, Fishery Biologist I

Assisting Personnel: Vacant, Fishery Technician III
Greg Corner, Fishery Technician II

Date Submitted: May 9, 2003
Revised: May 16, 2003

APPROVED

Titles	Signature	Date
Project Leader:	Jeff Breakfield	5/22/03
Area Manager:	Mark Hamilton	5/22/03
Consulting Biometrician:		5/27/03
Regional Research Supervisor:	James J. Hasbrouck	9/20/2003
Regional Supervisor:		9/29/03
Final Biometric Review:		10/30/03

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INTRODUCTION

Crooked Creek is a tannin-stained stream flowing into the glacial waters of the Kasilof River approximately 6 miles upstream of the Kasilof River's mouth in Cook Inlet (Figure 1). Crooked Creek has a wild stock of chinook salmon, and has also been stocked with hatchery produced chinook salmon smolt of Crooked Creek origin. The stocking program began in 1974 and since then (except 1997 and 1998) escapement was monitored through a weir at the hatchery (Todd 1990). The hatchery contribution of the return was also monitored, but was discontinued after 1990. In the initial return years of monitoring the return after stocking, wild stock made up 96% of the escapement (1978), but declined in proportion as hatchery production increased during the 1980s. The Hatchery was operated by ADF&G until 1995 when Cook Inlet Aquaculture Association assumed operations. Escapement monitoring continued until 1997 when the facility was returned to ADF&G. There was no activity at the hatchery during 1997 and 1998.

In 1995 brood stock collection moved to the Homer Spit lagoon where progeny from Crooked Creek chinook salmon were returning. Adult fish were captured at Homer Spit, transported to Elmendorf Hatchery, and held for egg-takes. Spawning success was low varying from 34% in 1994 to 66% in 1995 (D. Keifer, ADFG, Elmendorf Hatchery, personal communication). Hormone ripening tests were conducted in 1997 and 1998 with generally poor results. Due to these problems and incidences of straying adult chinook salmon, egg-takes and smolt imprinting were moved back to Crooked Creek Hatchery. Specifically, in 1999, smolts were held at the hatchery for imprinting to address straying problems and egg-takes were conducted on-site to improve spawning success.

Concerns about straying resulted in other changes in stocking policy for 2000 and the future: 1) a decreased stocking level from ~200,000 smolt in 1999 to ~100,000 in subsequent years; and 2) marking all smolt with an adipose fin clip (AFC) and a coded wire tag (CWT). In previous years the marking rate was highly variable, ranging from 12.5% to 50.0%.

Over the years the Crooked Creek chinook salmon stock has been used at a number of different sites for put-and-take fisheries. Presently this stock is used to enhance Crooked Creek, and two release sites in Resurrection Bay. Enhancement of Crooked Creek supports a viable and increasing sport fishery with harvest during the first 13 years of the program increasing from 251 in 1978 to 3,127 in 1990 fish (Mills 1979-1991). More recently, mean annual harvest during 1991-2001 was 7,661 fish (Mills 1992-1994; Howe et al. 1995-1996, 2001a-2001d; Walker et al. 2003; Jennings et al. *In prep*). The hatchery component of the harvest was monitored from 1978 to 1990 and ranged from 4% to 84%. Current harvest levels of hatchery-reared fish are unknown.

The sport fishery targeting early run chinook salmon returning to Crooked Creek occurs on the Kasilof River, primarily from its confluence with Crooked Creek to its terminus at Cook Inlet, from May through the end of June. Crooked Creek is closed to fishing for chinook salmon. Initially, this was a shore-based, road accessible fishery with high levels of participation, but in recent years this fishery has expanded to the use of drift boats.

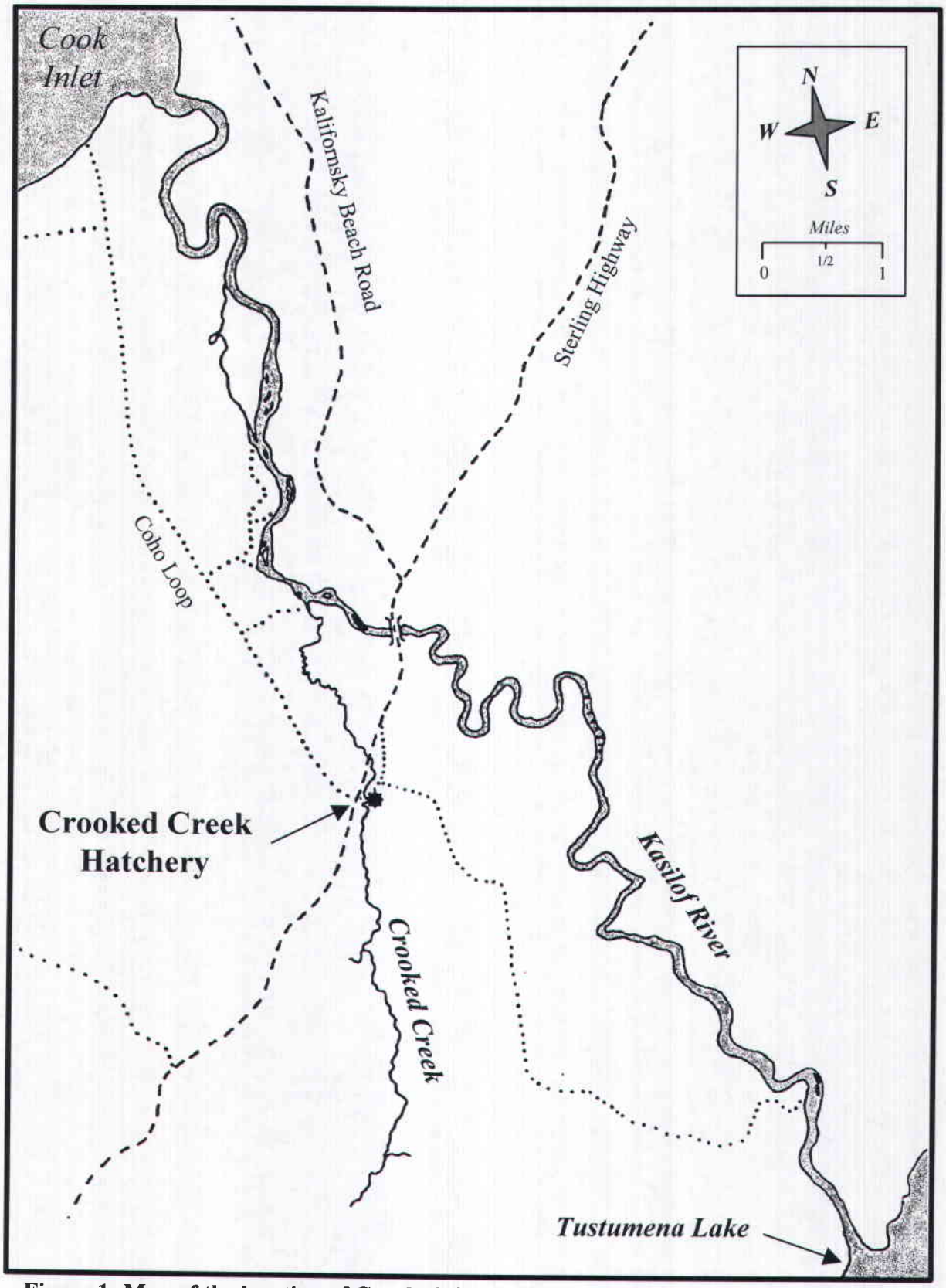

Figure 1.-Map of the location of Crooked Creek Hatchery.

The fishery objectives for this sport fishery are: 1) to produce a return approximating 3.000 early-run adult chinook salmon to the Kasilof River while ensuring a sustainable escapement goal (SEG) of 650-1,700 naturally produced adult chinook salmon spawning upstream from the hatchery, and 2) to generate approximately 17,500 angler-days of annual sport fishing opportunity.

OBJECTIVES

1. Enumerate marked (adipose fin clipped) and unmarked chinook salmon in the escapement into Crooked Creek from May 24 to August 31.
2. Estimate the age and sex composition of the escapement of adult chinook salmon into Crooked Creek from May 24 to August 31 such that the estimates are within 5 percentage points of the true values 95% of the time.
3. Estimate the contribution of hatchery-stocked chinook salmon to the escapement into Crooked Creek such that the estimate is within 20% of the true value 95% of the time.

TASKS

The following tasks will be conducted to achieve the fishery objectives:

1. Hold, imprint, and release ~100,000 chinook salmon smolt at Crooked Creek Hatchery in June, 2003.
2. Collect, hold, and artificially spawn a minimum of 67 male and 99 female (maximum of 116 male and 116 female) chinook salmon adults returning to Crooked Creek during July, 2003.
3. Collect sufficient fertilized eggs to release 105,000 chinook salmon smolt at Crooked Creek; 210,000 smolt at Resurrection Bay; and up to 235,000 smolt for other releases in 2004[1].
4. Minimize upstream migration of returning adult sockeye salmon.

The following tasks will be conducted as part of weir operations and evaluating this enhancement project:

5. Enumerate other fish species migrating upstream or downstream through the Crooked Creek weir from May 24 to August 31, 2003.
6. Summarize coded wire tags recovered in 2003 of chinook salmon stocked into Crooked Creek, especially recoveries outside of the Kasilof River drainage.

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1 Additional egg-take numbers from the Crooked Creek broodstock are directed only as a "back-up" source in case egg-takes from other broodstocks (e.g., Deception and Ship creeks) fail in 2003.

STUDY DESIGN AND DATA COLLECTION

ESCAPEMENT AND BIOLOGICAL SAMPLING

From May 24 to August 31 a weir will be installed and operated in Crooked Creek at the Crooked Creek Hatchery (Figure 2). One or two staff will monitor the weir "daily" through August 8. "Daily" means that staff will arrive at the weir once each day on weekdays and that staff will not be stationed at, nor fish allowed to migrate through, the weir throughout the entire day. Migration of all fish species through the weir at Crooked Creek is small enough that checking the weir once each day during all weekday days will be sufficient to count fish and sample chinook salmon without seriously hampering migration. After August 8 the weir will be monitored on alternate weekday days with staff conducting fish passage as related to high fish density downstream of the weir.

During the period of weir operation several species of fish (steelhead, *Oncorhynchus mykiss*; chinook salmon, *O. tshawytscha*; Dolly Varden, *Salvelinus malma*; coho salmon, *O. kisutch*; sockeye salmon, *O. nerka*) migrate into Crooked Creek. Fish enter the tail raceway of the hatchery via a fish ladder located downstream of the weir. These fish will be sorted and counted by species, and chinook salmon sampled, before being passed upstream of the weir (except sockeye salmon, see below). The number of fish counted and the number of mortalities observed will be recorded by date and species on the Brood Stock Collection and Weir Passage data form (Appendix A).

Each day that the weir is monitored, all chinook salmon will be examined for the presence of an adipose fin clip (AFC) and sex identified based on external characteristics. The number of marked (AFC) and unmarked fish will be recorded, by sex, on the Brood Stock Collection and Weir Passage data form (Appendix A). One-ocean chinook salmon, primarily males of hatchery origin and easily identified by their small size, will be counted by mark and sex, but will not be sampled for age (no scale samples).

All adult AFC chinook salmon will be censused for age structures (scales sampled, see below). Sample size for estimation of age of the escapement of naturally produced adult chinook salmon was determined by applying a finite population correction factor (Cochran 1977) to the sample size given by Thompson (1987) as follows:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}, \qquad (1)$$

where:

n_o = 510 adult chinook salmon (Thompson 1987), and

N = total number of adult chinook salmon that migrated past the weir.

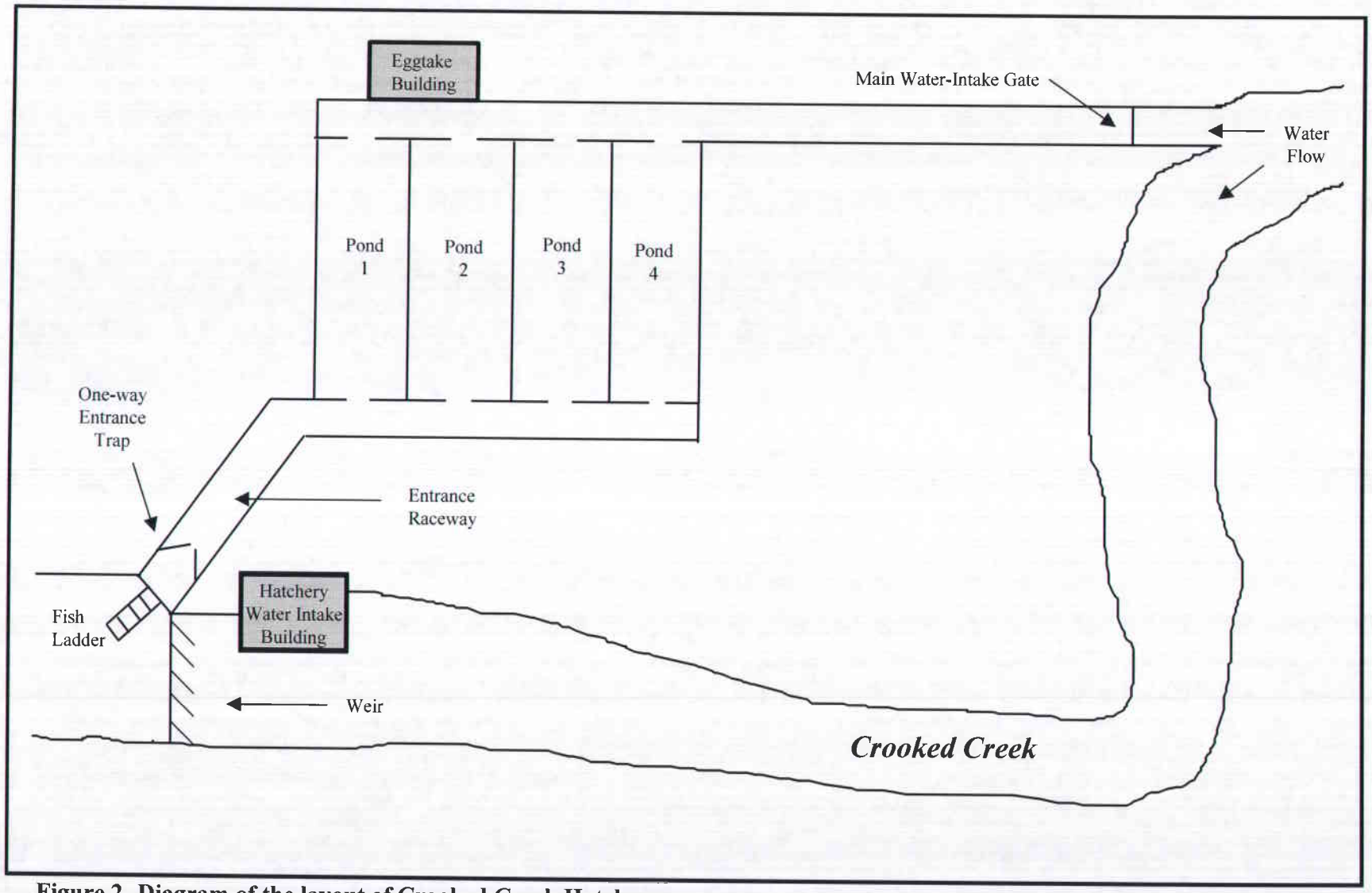

Figure 2.-Diagram of the layout of Crooked Creek Hatchery.

So assuming that minimally 3,000 naturally produced adult chinook salmon will migrate to the weir during 2003[2], then approximately 436 adult chinook salmon will need to be sampled for scales. Assuming age cannot be determined on 15% of the scale samples, sampling **513 chinook salmon** would attain the sample size necessary to meet the criteria stated in Objective 2. Accordingly, sampling will occur systematically such that **every 3,000/513 ≈ 5th non-AFC chinook salmon will be sampled for age structures** (scales sampled, see below) in chronological order.

Three scales from the preferred area[3] will be collected from each adult chinook salmon selected for age sampling (see above). Scales will be mounted on adhesive coated scale cards; postseason the scales will be pressed such that impressions are made on acetate cards to allow aging, following procedures described by Mosher (1969). Body color (bright, pink, or red), sex, and mark status will be recorded for each fish by date on the Scale Sampling data form (Appendix A). All adult chinook salmon will receive a hole punch on its dorsal fin to eliminate duplicate sampling.

This sample design, the data collected at the Crooked Creek weir in 2002, and expectations in regards to the composition of escapement to the weir anticipated for 2003 were used to evaluate the expected relative precision of the estimate of hatchery contribution to the adult escapement into Crooked Creek in 2003. The expected number of adult AFC chinook salmon observed by age in 2003 was estimated using the number of adult AFC chinook salmon observed by age at the weir in 2002 and the number marked with an AFC in each release group that returned in 2002 and are expected to return in 2003 (Table 1). The expected contribution of hatchery-stocked chinook salmon to the adult escapement into Crooked Creek will then be estimated by (Bernard and Clark 1996):

$$\tilde{r}_s = N\psi_s^{-1}\left(\frac{m_s}{\lambda n}\right) = \frac{m_s}{\lambda\psi_s}, \qquad (2)$$

where:

N = total number of adult chinook salmon counted at the weir,

ψ_s = proportion of adult chinook salmon in release group, or cohort, s marked and released with an AFC (Loopstra et al. 2000a, 2000b, 2003; Loopstra and Hansen *In prep*),

m_s = number of adult chinook salmon observed with an AFC from cohort s,

n = number of adult chinook salmon examined for a missing adipose fin (= N), and

λ = proportion of adult chinook salmon with an AFC for which age can be determined.

Because the escapement (N) and proportion marked with an AFC at release (ψ_s) will be known without error the large sample approximation of the expected variance is (Bernard and Clark 1996):

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2 The anticipated exploitation rate for 2003 on AFC fish and projections on the production of wild fish were used to project that about 600 AFC fish and 4,500 wild fish are expected at the weir this year. However, we conservatively set the number expected at the weir downwards to maximize the sample size (in case the escapement falls short of the expectations).

3 The preferred area for scale sampling is on the left side of the fish at a point on a diagonal line from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, two rows above the lateral line (Welander 1940).

$$\widetilde{V}(\widetilde{r}_s)=\frac{\widetilde{r}_s}{\lambda\phi\psi_s}(1-\lambda\phi\psi_s)=\frac{\widetilde{r}_s}{\lambda\psi_s}(1-\lambda\psi_s) \quad (3)$$

where:

$$\phi=\frac{n}{N}=1$$

The expected total number of hatchery-stocked chinook salmon in the escapement and its variance will be estimated by summing the respective estimates over all adult ages, ignoring covariance's (Table 1). Based on the study design of this project and the known marking rates of returning adults, the estimated contribution of hatchery-stocked chinook salmon to the escapement should attain the level of relative precision stated in Objective 3.

By the time the weir is installed steelhead will be migrating downstream so we will not conduct a census of this stock; however, the weir acts as a downstream barrier so modifications to the weir will be made to better facilitate downstream movement, thus reducing mortality. A daily count will be kept of any steelhead mortalities and fish that may be trapped, requiring assistance to pass the weir. Dolly Varden and coho salmon will be migrating upstream in Crooked Creek during the time that the weir is operational. We will count and pass upstream all Dolly Varden and coho salmon observed; however, this will not census the escapement because fish of these two species will continue migrating upstream after the weir is removed in August.

Sockeye salmon arrive at Crooked Creek from late July into September. Due to concern for disease, no sockeye salmon will be passed upstream of the weir. Historically, a small number of sockeye salmon returned to Crooked Creek, but in recent years the number of returning sockeye salmon has increased substantially. High density of sockeye salmon on spawning grounds can increase the potential spread of IHN virus, commonly found in sockeye salmon. Should Crooked Creek chinook salmon stocks become infected with IHN virus, the ability to use them for brood stock for chinook salmon enhancement projects would be compromised. Therefore, no sockeye salmon will be passed upstream of the weir. After fish of other species are sorted, counted, and passed upstream, the sockeye salmon remaining in the tail raceway will be destroyed and then flushed downstream of the weir. They cannot be held downstream of the weir because they will still be viable at the end of August when the weir is removed; thus, being able to pass upstream. A small number of sockeye salmon may migrate into Crooked Creek after the weir is removed, but the risk of disease transmittal will be minimized.

SMOLT IMPRINTING AND RELEASE

In early June, raceways at Crooked Creek Hatchery will be cleaned using high-pressure hoses. Once debris and sediments are removed, the raceways will be disinfected with betadyne. This will be done on a sunny day to increase the effectiveness of the betadyne treatment. Raceway #1 will then be flooded with water such that the water level is maintained within one foot of the top of the raceway. One technician and the project leader will be involved in the preparation.

Chinook salmon smolt (~100,000 fish with 100% mark- AFC and CWT) will be transported from Fort Richardson Hatchery to Crooked Creek Hatchery in early June (4-6). To protect the imprinting smolt from feeding activities of birds, a network of string will be hung over the raceway. A technician will be on duty to daily feed the smolt and monitor operations. Smolt will be held for 7 days for imprinting. A daily smolt mortality census will be conducted and recorded

on a Smolt Imprinting and Release data form (Appendix A). If mortality levels become a concern, the smolt may be released after 5 days.

After smolt release, the raceways will be cleaned and disinfected in preparation for holding adult chinook salmon brood stock.

Brood Stock Collection and Egg-Takes

Brood stock collection will begin approximately on June 16. Initially one raceway will be used to hold brood stock. If we find these fish are not ripening and there are sufficient numbers of other adults returning, then a second raceway will be opened to hold brood stock. Fish in the first raceway will then be allowed to pass upstream. No more than 50 adult chinook salmon will be held in a raceway. Prior to July 8, brood stock will be held no more than 3 consecutive days before being passed upstream. We will use this "alternating holding" approach to try to minimize mortality associated with holding fish. Any bright fish will be immediately passed upstream as they have higher mortality rates when held. As the date for an egg-take approaches, we will hold fish in two raceways, for a total of 100 adult chinook salmon. A minimum of 67 males and 99 females (maximum of 116 males and 116 females) will be used for egg takes. While fish are being held, we will partially cover each raceway with tarps to provide shelter from environmental conditions. Two technicians will be employed from June 16 to July 31 to assist with brood stock collection and egg-takes.

Technicians will conduct biological sampling (described in the Escapement and Biological Sampling section) on all adult chinook salmon before transferring them to raceways for holding as brood stock.

Adult chinook salmon being held for brood stock will be examined to determine sexual maturity; this will assist in setting dates for egg-takes, which are tentatively scheduled for July 15 and 24. Elmendorf and Fort Richardson Hatchery staff (3) and Soldotna staff (3) will conduct the egg-takes. Elmendorf Hatchery will provide necessary equipment for the egg-takes. Eggs will be taken on-site following a limited sockeye salmon egg-take protocol (FRED Staff 1983). Fish used for the egg-take will be wiped with betadyne and eggs will be hardened in well water provided by Elmendorf Hatchery and then placed on ice in coolers for transport to Elmendorf Hatchery the same day. Fish used for egg takes will be sampled for IHN; ovarian fluid samples from females and liver/kidney samples from males will be sent to the Pathology Lab. Any marked (AFC) fish used for the egg take will have their head removed and a cinch strap attached. These heads will be frozen and shipped to the Tag Lab for verification of the smolt release location. CWT Recovery forms (Appendix B) will also be completed and submitted to the Tag Lab.

At the completion of the egg-takes, we will dispose of the chinook salmon carcasses at the land fill. One technician will remain on duty until August 8. This individual will continue to monitor fish passage at the weir, clean and disinfect the raceways, and prepare the facility for winter.

Straying of Crooked Creek Chinook Salmon of Hatchery Origin

In past years CWT chinook salmon stocked into Crooked Creek have been recovered at locations outside of the Crooked Creek and Kasilof River drainages. In the fall, we will query the Tag Lab database for all CWT recoveries in 2003 of chinook salmon originally released at Crooked Creek. These records will provide information about the location of the fish at the time of tag

recovery and about potential problems of chinook salmon stocked into Crooked Creek straying into other systems.

DATA REDUCTION

All weir count and ALS information will be recorded on a specialized field data form (Appendix A). Survey technicians will return their field data to the Soldotna office daily. The Project Biologist will examine the forms for obvious errors and omissions.

As time permits, Survey Technicians will enter field data into the EXCEL spreadsheet under the supervision of the Project Biologist. Upon completion of data entry for the season, Survey Technicians will edit the electronic files by checking entries as a pair, one reading from the field form, and the other viewing the electronic files. Entry errors will be corrected to match the field forms. Problems deciphering the field forms will be referred to the Project Biologist. Any edits to the original field forms will include name of editor, date, description of the interpretation or change. This information should be attached to the original data sheet. Substantive editorial issues should also be documented in the comments field of the Data Map electronic file.

Postseason, the project biologist will determine age by reading the scales and enter the data into the EXCEL spreadsheet. The Project Biologist will also edit the data to ensure values of age, and length-at-age are within regular bounds. Any edits to the original field forms will include name of editor, date, description of the interpretation or change. This information should be attached to the original data sheet.

A final edited copy of all data files along with a data map will be preserved on the Soldotna Server backup, and forwarded to RTS for archiving. EXCEL spreadsheets will be converted to .CSV ASCII files. Each file will have a similarly named data map file in the .CSV format. The data map file will include column headings, definitions, notes, and comments.

DATA ANALYSIS

Data summaries will be produced utilizing the database and reporting facilities of EXCEL.

The proportion of adult chinook salmon in the escapement of age/sex class j and its variance will be estimated as a binomial proportion (Cochran 1977) by:

$$\hat{p}_j = \frac{n_j}{n_i}, \quad and \tag{4}$$

$$\hat{V}(\hat{p}_j) = \left[1 - \frac{n_i}{N}\right] \frac{\hat{p}_j((1-\hat{p}_j)}{(n_i - 1)} \tag{5}$$

where:

n_j = the number of adult chinook salmon of age/sex class j,

n_i = the total number of adult chinook salmon scale samples that could be aged, and

N = the number of adult chinook salmon in the weir count.

The number of adult chinook salmon in age/sex class j will be estimated as the product of a constant (N) and a random variable (p_j). The variance of this estimate will be calculated as:

$$\hat{V}\left(\hat{N}_j\right) = N^2\left[\hat{V}\left(\hat{p}_j\right)\right] \quad (6)$$

Hatchery and Wild Stock Contribution

The contribution of hatchery-stocked chinook salmon of each adult age class to the escapement into Crooked Creek and associated variances will be estimated using equations (2) and (3) where "~" will be replaced by "^". The total number of hatchery-stocked chinook salmon in the adult escapement and its variance will be estimated by summing the respective estimates over all adult ages, ignoring covariance's. Based on the study design and sampling of adult chinook salmon, we expect covariance's will be negligible.

These same equations will be used to estimate the number of one-ocean chinook salmon in the escapement. Because these fish will not be sampled for age, we will assume λ_s = 1.0. This estimate will be compared to the weir count of one-ocean chinook salmon to verify that one-ocean fish are primarily of hatchery origin.

The wild stock contribution to the adult escapement will be estimated for each age class by subtracting the hatchery contribution from the estimated total number of each age class. The variance of these estimates by age will be the same as those of the hatchery contribution estimates. The total number of spawners will be defined as the total escapement passed through the weir minus all one-ocean fish. The total number of adults that returned to the weir will be the sum of the total number of spawners, the number of adult chinook salmon that died during holding, and the number used for egg-takes.

SCHEDULES

TASK TARGET DATES

1. Install Crooked Creek weir….	May 24	(Breakfield)
2. Census all fish passed upstream of weir and sample adult chinook salmon	May 24 – August 31	(Breakfield) (Corner) (Vacant)
3. Clean and disinfect raceways.	June 1 – 2	(Breakfield) (Corner)
4. Hold chinook salmon smolt for imprinting and release	June 4 – June 10	(Corner)
5. Clean and disinfect raceways for brood stock collection	June 10-12	(Corner)
6. Brood stock collection.	July 12 – 25	(Corner) (Vacant)
7. Egg takes	July 15 - 25	(Breakfield) (Corner) (Vacant) (Elmendorf Hatchery Staff – 3 personnel)
8. Hatchery cleanup and winterization	July 26 – August 15	(Corner)
9. Monitor weir and provide upstream passage of Dolly Varden and coho salmon	August 9 – 31	(Breakfield)
10. Weir removal	August 31	(Breakfield) (Others)
11. Scale aging	November 1	(Berkhahn)
11. Data analyses and results	February 31	(Breakfield)
12. F.D.S. Report	March 31	(Breakfield)
13. 2004 Operational Plan	April 15	(Breakfield)

REPORTING

The results of this project will be presented in an Alaska Department of Fish and Game, Sport Fish Division, Fisheries Data Series report.

RESPONSIBILITIES

Jeff Breakfield, Fishery Biologist I,: 7/1/03 - 6/30/04:

This position will serve as the project biologist for this project. The position will be responsible for hiring and training any new personnel. He will be responsible for in season data editing and reduction, postseason data analysis, and summary of the enhancement program, to be reported in an F.D.S. report. He will be responsible for appropriate submittal of paperwork and chinook salmon heads to the CWT Lab. He will also ensure all data is in proper RTS format and archived with RTS at the completion of the field season.

It will also be the responsibility of this position to keep his supervisor informed of any problems with equipment and/or personnel affecting the completion of this project. This individual will oversee crew activities involved with winterizing field equipment and the hatchery facility at the end of the season.

This position will write the project operational plan as well as manage the budget.

This position also interacts with Anchorage hatchery staff in evaluation of the Crooked Creek enhancement program and coordinating activities associated with chinook salmon smolt release and the adult egg take at Crooked Creek.

Vacant, Fish and Wildlife Technician III, 7/1/03 - 8/15/03, 6/1/04 – 6/30/04:

This position will assist with (1) preseason cleaning and disinfecting of raceways, (2) counting all fish passed upstream of the weir by species, (3) monitoring smolt during the imprinting period, (4) sampling and holding adult chinook salmon for egg takes, and (5) egg takes. This individual will also be responsible for conducting in season Crooked Creek escapement counts and postseason cleaning and disinfecting of raceways, to include preparation of the hatchery facility for winter.

In season, as daily fish sampling responsibilities are completed, this individual will prepare scales for aging, and enter data into an EXCEL spreadsheet.

As time allows, this individual may be involved in some hatchery maintenance activities, such as painting buildings and vegetation control.

Greg Corner, Fish and Wildlife Technician II, 7/01/03 - 7/31/03, 6/25/04 – 6/30/04:

This individual will assist with all activities related to the chinook salmon egg takes. This includes conducting the census of fish passed upstream of the weir during July, holding and sampling adults, and assisting with egg-take operations. This individual will also be responsible for conducting in season Crooked Creek escapement counts and may be involved with some postseason cleanup activities occurring in July.

As time allows, this individual may be involved in some hatchery maintenance activities, such as painting buildings and vegetation control.

BUDGET SUMMARY

Line 100: Personnel/Services

PCN	Class	R	S	Name	Dates	MM	Total MM	Total $K
4125[1]	FB I	14	F	Breakfield	7/01/03 – 6/30/04			
5171	FWT III	11	F	Vacant	7/01/03 – 8/15/03	1.5	2.5	9.8
					6/01/04 – 6/30/04	1.0		
4072	FWT II	9	K	Corner	7/01/03 – 7/31/03	1.0	1.2	4.8
					6/25/04 – 6/30/04	0.2		

[1] Funding for this position occurs in another budget.

Premium Pay: (none)	
Permanent Full Time Salaries	0.0
Seasonal Salaries	14.6
TOTAL 3.8	14.6

Line 200: Travel

72250	Field Travel	0.1
72280	Administrative Travel	0.2
72310	Conventions and Meetings	0.0
72340	Boards, Committees, and Legislature	0.0
72500/72600	Perdiem	0.1
TOTAL		0.4

Line 300: Contractual

73100	Professional Services	0.1
73300	Communication	0.1
73400	Transportation	1.0
73500	Advertising, Printing	0.0
73600	Utility Services	0.0
73700	Minor Repairs and Maintenance	0.2
73800	Space Expense	0.0
TOTAL		1.4

Line 400: Commodities

74200	Office Supplies	0.1
74400	Operating Supplies	0.0
74500	Scientific Supplies	0.4
74600	Other Operating Supplies	0.7
74700	Other Repair and Maintenance Supplies	0.4
74800	Small Tools and Other Minor Equipment	0.1
TOTAL		1.7

Line 500: Equipment

75700	Machines and Equipment	0.0
TOTAL		0.0
TOTAL Lines 200-700		3.5
GRAND TOTAL		18.1

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Table 1.-Expected number of adipose fin-clips observed ($m_{s,2003}$) and contribution (r_s), with associated variance [$v(r_s)$] and percent relative precision [$RP(r_s)$], of each release group (s) of hatchery-stocked chinook salmon to the escapement at Crooked Creek in 2003 based on the number of fin-clipped chinook salmon observed at the Crooked Creek weir in 2002 ($m_{s,2002}$) and the number marked with an adipose fin-clip returning at age in each respective year, and adjusted for expectations in regards to the Kasilof River chinook salmon fishery in 2003.

Marine age	$m_{s,2002}$	Total Number released in returning marine age		$m_{s,2003}$	λ[a]	ψ	r_s	$v(r_s)$	$RP(r_s)$ at alpha= 0.05
		2002	2003						
2	444	108,507[b]	109,740[c]	242	0.85	1.000[c]	285	50	5%
3	1,659	193,257[d]	108,507[b]	314	0.85	1.000[b]	369	65	4%
4	86	137,338[e]	193,257[d]	44	0.85	0.226[d]	229	963	27%
		Total hatchery:		600[f]			883	1,079	7%

[a] Expected proportion of marked chinook salmon for which age can be determined.

[b] (Loopstra et al. 2002).

[c] (Loopstra and Hansen *In prep*).

[d] (Loopstra et al. 2000b).

[e] (Loopstra et al. 2000a).

[f] Number of AFC chinook salmon expected in 2003 substantively reduced from previous years due to changes in regulations governing the Kasilof River early run fishery (in which only AFC chinook salmon can be retained, whereas non-AFC fish must be released).

APPENDIX A-FISH ENUMERATION DATA FORMS

CROOKED CREEK CHINOOK SALMON ENHANCEMENT PROJECT

Smolt Imprinting and Release

	Raceway #1	Raceway #2
Smolt arrival date:		
No. of smolt:		
Smolt release date:		

				MORTALITIES						
				Raceway # 1			Raceway # 2			Daily
Date	Observer	Water Temp (C)	Water Level (cm)	No AFC	AFC	Total	No AFC	AFC	Total	Total

CROOKED CREEK CHINOOK SALMON ENHANCEMENT PROJECT

Brood Stock Collection and Weir Passage

Date: _____

Collectors: _____

	Raceway #1 *(chinook brood stock)*				**Raceway #2** *(chinook brood stock)*				**Raceway #3** *(upstream passage)*						
	Begin holding date:				Begin holding date:										
	Passage date:				Passage date:				Chinook Salmon						Other Species
	Eggtake date:				Eggtake date:										
	No AFC		AFC		No AFC		AFC		No AFC		AFC		1-Ocean (males)		
	M	F	M	F	M	F	M	F	M	F	M	F	No AFC	AFC	
Subtotals															
Total															
Mortalities															
Total															

APPENDIX B-CWT DATA FORMS

ALASKA DEPARTMENT OF FISH AND GAME
CODED WIRE TAG SAMPLING PROGRAM
DETAILED SAMPLING INSTRUCTIONS
RACK and ESCAPEMENT

2003
SOUTH CENTRAL (COOK INLET), WESTWARD (KODIAK), AND AYK REGIONS

Introduction

Coded wire tags (CWT) recovered from properly designed and conducted studies can provide scientists, fishery managers and hatchery operators with data for evaluating and managing salmon stocks. The use of this stock identification tool has increased dramatically in the years since it was first introduced.

Sampling fish at hatchery racks, at weirs or during escapement surveys is the last of a series of sampling programs designed to look for, identify and collect heads of coded wire tagged fish. Tags recovered in commercial and sport fishery sampling programs expanded by catch/sample and release/tag ratios are coupled with tags recovered and expanded by escapement/sample ratios to produce overall survival estimates and to determine commercial and sport fishery exploitation rates.

General Instructions

All species of salmon and steelhead have been tagged in various areas of the state. Which species you check for missing adipose fins, the external mark indicating the presence of a CWT, is dependent on location and your project's goals, objectives and sampling design. **Individual project objectives, sampling design criteria and specific instructions for how, when, and where you conduct your sampling will be provided by the project leader or your supervisor.** When you observe an adipose clipped fish you must: complete a CWT Sampling Form; insert a uniquely numbered cinch strap through the mouth and out the operculum; and collect the head. In some instances, your supervisor may instruct you to remove the heads of only a portion of the adipose clipped observed. **You should only sub-sample adipose clipped fish if specifically instructed to do so by your supervisor and if fewer heads collected randomly will provide you with data within acceptable confidence limits.**

Specific Instructions for Completion of CWT Sampling Form

Note: Specific data items listed on the CWT Sampling Form (sampling form) are identified in these instructions by the use of all capital letters. The sampling form and the specific instructions are divided into five major sections: General Information; Sampling Information; Area Information; Head Recovery Information and Comments. One sampling form (Figure 1) will be completed for each head or group of heads recovered at a hatchery rack, weir, or stream survey site.

Only a single value for each requested data item is allowed. Only heads recovered from a single day at a single site should be recorded on one sampling form. **Samples from multiple**

days or locations cannot be listed on the same sampling form. You may, however, have multiple pages for a single sample. Heads not listed on a sampling form will not be processed by the Tag Lab.

General Sample Information Section

- **SAMPLE NUMBER:** This number identifies each unique sampling form in the CWT database. The supervisor has been given a sample number series to assign. If you do not know what sample number series to assign, please contact the Tag Lab.

- **PAGE____OF____PAGES:** additional pages will be required if more than 15 heads are recovered on a single day at a single site. Page numbers are specific to each individual sample; eg., a sample with 17 heads will have page 2 of 2 with the same sample number assigned to both sheets.

- **SOURCE:** circle one—if unsure, check with your supervisor or the Tag Lab for clarification.

  hatchery-rack (for sampling at a hatchery)—sometimes used if returning fish were produced at a hatchery.

  escapement-survey (for sampling at a weir, stream, river, lake or spawning grounds)

- **SURVEY SITE:** name of hatchery, stream, lake or weir surveyed

- **SAMPLE TYPE:** circle one

  Random samples are those samples where you actually count and inspect all or part of the returning fish for the presence of CWTs. If all returning fish are not inspected for CWTs, the data from the fraction of the return sampled can be used to make inferences about the unsampled return. Detailed instructions for random sampling procedures for your location will be given to you by the project leader or your supervisor. To ensure that a reliable estimate of marked and unmarked fish is attained, sampling must be done in the following two-step manner:

  First - **select fish you are going to inspect, count it**
  Second - **determine if the adipose fin is absent**

  You must first choose a fish to inspect, then look to see if the adipose fin is absent. Turn fish over if fin is not visible. Fish with partially regenerated adipose fins or poor quality marks should be set aside and treated as if coded wire tagged. **Complete a sampling form for each day and location sampled even if no adipose clips were observed.**

  Select samples are those heads that have been recovered from a source outside of a random sampling program. These heads would not have been recovered in your random sampling activities. For example, you are walking along a stream and happen to look down at a fish

and see that it is clipped, then take the head. You are not actually looking for tagged fish. These recoveries cannot be used to make inferences about a larger unsampled population. Fish that have been sampled previously in the same year in the same system for CWT should be marked select so that they are not accounted for twice.

- **SAMPLER:** your last name.

- **DATE SAMPLED:** date fish are sampled by you. Heads sampled from only one day at one location can be listed on a single sampling form.

Sampling Information Section

For random samples only, a sampling form must be completed for each day and location fish were sampled even if no adipose clipped fish were observed. Random and select recoveries can not be listed on the same sampling form. Record for each species:

- **TOTAL # FISH COUNTED: count and record each fish, by species, you choose to inspect.** Included in that count will be both unclipped and adipose clipped fish. **Count only those fish you are sure either have or do not have an adipose fin. If you did not get a good look at the fin do not count that fish.**

- **# ADIPOSE CLIPS SEEN:** record by species the number of fish counted that are missing adipose fins. "Zero" adipose clips seen is a valid observation and must be recorded.

Note: If your supervisor instructed you to collect only a portion of the heads of adipose clipped fish observed and counted (sub-sampling the heads) you should record the number of adipose clips observed and make a clear note in the COMMENTS section about the your sub-sampling activities. (For example you sampled 21 coho on August 23 at Elmendorf Hatchery (Ship Creek) and observed 8 adipose clipped coho. You were instructed by your supervisor to remove heads from only 3 fish. The remaining 5 adipose clipped fish were allowed to pass through the weir.) For this example you would record the following (see Figure 2):

TOTAL # FISH COUNTED = 21
ADIPOSE CLIPPED OBSERVED = 8*
COMMENTS: **Sub-Sampled**
3 heads taken
5 heads not taken
*8 total adipose clipped fish observed

Tag Lab staff will assign phantom head numbers to the remaining 5 heads and list them as LOST (adipose clipped fish observed but not received at the Tag Lab for processing). This is still a **Random Sample** because you are accounting for all fish observed and counted and listing the ones that did not actually have the head removed.

- **WERE ALL SAMPLED?** circle **yes** or **no** (for each species). It is vital that you count only those fish you are sure have or do not have an adipose fin, that you have actually determined this by visual sight. If you circle yes, you are stating that you looked at every single fish that possibly went by you in the stream, the weir, etc., and that you positively determined that

each fish did or did not have a clip. This does not refer to the number of heads taken. Circle yes or no.

Area Information Section

- **AREA INFORMATION (DISTRICT-SUBDISTRICT):** for saltwater recoveries record commercial fishing district and subdistrict where fish were sampled/recovered. For freshwater samples, record the first five digits of the ANADROMOUS STREAM #. (e.g.; Wasilla Creek is 247-50, Nancy Lake is 247-41, Little Susitna River is 247-41, Kenai River is 244-30, etc.).

- **NAME of PLACE SURVEYED (HATCHERY OR STREAM):** location of facility, weir, stream, lake or spawning ground.

- **WATER TYPE:** were fish collected in saltwater or freshwater? Circle one.

- **ANADROMOUS STREAM # (freshwater-only):** if these fish were sampled/recovered in freshwater, please enter the Anadromous Stream Catalog number listed in the latest edition of the "Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes" published by the Department's Habitat and Restoration Division. This will be at least a ten digit number but could have as many as thirty-eight digits. If a catalog is unavailable, please call your local Habitat and Restoration Division office or the Tag Lab for assistance or be as descriptive as possible when you record the NAME OF HATCHERY OR STREAM. See attached list for ANADROMOUS STREAM #s.

Head Recovery Information Section

- ☑: each fish head should be checked off as it is boxed for shipment to the Tag Lab.

- **HEAD NUMBER*:** insert a pre-numbered cinch strap through the mouth and out the operculum (gill plate) of each head identified as bearing a CWT. Insert these so that the number can be read when the head is frozen. A series of cinch straps have been assigned to you for this specific project. Use them in numerical order. Cinch-up the strap and record its imprinted 6-digit number under HEAD NUMBER on the sampling form. If a cinch strap is missing from the sequence assigned to you, list that number(s) on the sampling form on which it should have appeared. The number along with the word "**Void**" should be written in the comments section of the sampling form.

*Note: If you are using a cinch strap with only five digits or numbers simply insert a leading zero for the first digit.

- **SPECIES CODE:** Record species code of each adipose clipped fish using the following codes:

  410 = CHIN - king or chinook salmon

  411 = JACK - king or chinook salmon only; check with your site sampling supervisor for length criteria prior to selection and entry as a JACK (generally < 28 inches total length). Many projects do not use this designation and later sort the data based on length and age.

420 = SOCK - sockeye or red salmon
430 = COHO - coho or silver salmon
440 = PINK - pink or humpback salmon
450 = CHUM - chum or dog salmon
540 = STHD - steelhead trout

- **MID-EYE TO FORK LENGTH:** record the length (mid-eye to the fork-of-tail), if measured, to the nearest millimeter (mm). See Figure 3.

- **CLIP:** note quality of adipose clip using the following codes:
  1 - OK (fish must be observed)
  2 - Questionable - partially regenerated or poor quality clip (fish must be observed)
  3 - Unknown (use for select samples where the fish is not observed by the sampler)

- **SEX:** record the sex of the fish using the following codes: (Note: Completion of this item is optional, however it is recorded on the CWT database if reported on the sampling form.)
  F - female
  M - male

Comments Section

- **COMMENTS:** Record any comments you may have about the sample, or its irregularities in the comments section of the sampling form or on the back of the sampling form. If you write notes on the back, please indicate that we should "see back of the sampling form."

Head Preparation and Shipment Instructions

1. At the end of each day, check sampling forms.
   - Be sure that **all** data items have been completed.
   - Be sure all heads recovered are accounted for on the sampling forms for that day.
   - Be sure that all heads listed on sampling forms were retrieved, bagged, and are in a freezer.

2. Heads should be shipped to the Tag Lab periodically during the season, as often as once a week.

3. When collected, heads must be placed in an individual plastic bag, provided by the Tag Lab. Heads must be frozen (if a freezer is not available, preserved in borax or salt). Place individually bagged heads in large garbage bags inside a box (wet lock boxes not required if heads are double bagged). If time permits, please thoroughly rinse or remove gills from escapement fish. Residual sand and debris from the ground can cause problems with the magnetic detectors and false signals can occur when trying to dissect the tags.

4. Place all **original** sampling forms in a single plastic bag and place in the box with heads.

5. The person in charge of shipping heads to the Tag Lab will complete the HEAD SHIPMENT SUMMARY FORM and include it with the head shipment. Instructions for completion of that form will be sent to the person in charge of each project. In order to ensure that all heads are sent to Juneau, check off heads on sampling form as they are being boxed for shipment.

6. If your shipment includes more than one box, put data in one box and write **Data Enclosed** on the outside of the box.

7. Please number the boxes you ship to us. If you number the boxes 1 of 5, 2 of 5, etc. we can be sure that the air carrier gives us your complete shipment. It is also helpful to call or email the Tag Lab with the AWB number, number of boxes and estimated time of arrival into Juneau if you have access to a phone or computer.

8. Label the box sides with the words **Keep Frozen** or use **Keep Frozen** labels provided by the air carrier.

9. If you live in a community served by Alaska Airlines, send heads and data directly to the Tag Lab on that carrier. If you work in a community not served directly by Alaska Airlines send shipments to Juneau on a regularly scheduled commuter flight that transfers to Alaska Airlines.

10. Use shipping labels provided. Send heads **Prepaid** (see exception in #11 below) to:

Alaska Department of Fish and Game
CF Division, Mark, Tag, and Age Lab
P.O. Box 25526
Juneau, Alaska 99802-5526

CALL UPON ARRIVAL IN JUNEAU
(907) 465-3483

11. Heads recovered by the Northern Cook Inlet Urban Area Salmon Stocking Project and by the Kenai River Salmon Stock Assessment Project should send their heads to the Tag Lab **Freight Collect**. All other projects should send heads to us Prepaid.

12. **Heads shipped without data will not be processed.**

13. Please call if you have questions or if you need additional supplies. Thanks for your hard work and cooperation. Have a good season.