State of Alaska
Department of Fish and Game
Division of Sport Fish

Nomination Form
Anadromous Waters Catalog

ME

Region: 4 Southeast

USGS Quad(s): Port Alexander D1

AWC Number of Water Body: 109-44-10390-2003

Name of Water body: Saginaw Watershed ☒ USGS Name ☐ Local Name

☒ Addition ☐ Deletion ☐ Correction ☐ Backup Information

For Office Use

Nomination # 140369

Revision Year: 2015

Revision to: Atlas ____ Catalog ____ Both X

Revision Code: B-2

James J Hasbrouck — Fisheries Scientist — Date: 10/3/2014

[signature] — Habitat Operations Manager — Date: 10/3/14

[signature] — AWC Project Biologist — Date: 9/23/14

[signature] — GIS Analyst — Date: 10/7/14

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Present	Anadromous
Coho Salmon (JUV)	6/19/14		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

56.82600 -134.16700
SGBUC3

Add Coho Salmon Rearing to Creek
Ref Nom 14-370

Name of Observer (please print): Nicholas Glaser

Signature: [signature] Date: 9/16/14

Agency: USDA Forest Service

Address: 123 Scow Bay Loop Rd. PO Box 309
Petersburg, AK 99833

ALASKA DEPT. OF FISH & GAME
SEP 19 2014

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 Anadromous Waters Catalog.

Signature of Area Biologist: ______________________ Date: __________

Name of Area Biologist (please print):

Revision 11/13

Monitoring Plan Summary for Determining Trends in Watershed Condition and Populations of Resident Dolly Varden Char, Resident Cutthroat Trout and Coho Salmon on the Tongass National Forest

May 10, 2012

Introduction:

Dolly Varden char, cutthroat trout and coho salmon have been identified in the 1997 Tongass Land and Resource Management Forest Plan as Management Indicator Species (MIS). MIS trends ideally provide a surrogate measure of environmental quality that affects the biological community and environmental condition. This monitoring strives to characterize the ecological condition and trends of watersheds and aquatic ecosystems on the Tongass National Forest. The proposed monitoring attempts to respond to the following basic questions: Is the Tongass National Forest Plan maintaining or restoring aquatic and riparian ecosystems to desired conditions on Tongass National Forest lands? Are population trends for MIS and their relationship to habitat changes consistent with expectations.

General Design

This proposal follows the approach established for the Aquatic and Riparian Effectiveness Monitoring Plan for the Pacific Northwest Forest Plan (AREMP) with some modifications. Much of the narrative and many of the figures and tables contained within this proposal is directly quoted or paraphrased from the AREMP General Technical Report PNW-GTR-577.

The monitoring will look at the aggregate of various physical and biological indicators to evaluate watershed condition. To be meaningful, a monitoring program should provide insights into cause-and-effect relations between environmental stressors and anticipated ecosystem responses. A primary step in developing an effectiveness plan is to recognize the factors that influence the parameter of interest. An overview of the conceptual model for the aquatic and riparian ecosystems is shown in figure 1. The conceptual model illustrates the response of fundamental watershed processes, as influenced by inherent landscape patterns of climate, geology, topography, and soils, to natural and human-caused stressors.

Three physical subsystems (upslope, riparian and flood plain, and stream channel) and related biological components will be monitored. The processes occurring in the upslope subsystem (i.e., in the watershed in general) are assumed to affect the riparian and flood-plain subsystem and the stream channel subsystem. The riparian and flood-plain subsystem may, to varying degrees, buffer upslope influences on the stream channel subsystem. Stream channel and riparian and floodplain subsystems are coupled (i.e., influences are bidirectional) so changes in rates or states associated with the processes and stressors in one of these subsystems will usually affect the linked subsystem (Naiman et al. 1992). In contrast, the influence of the upslope subsystem on the flood-plain and riparian and stream channel subsystems is more strongly unidirectional (downslope). The influence of riparian and aquatic subsystems on upslope processes is assumed to be nearly, but not completely, negligible.

Processes pertinent to aquatic, riparian, and upslope ecosystems affected by the Forest Plan are shown in figure 2. Processes are grouped into those that describe general ecosystem function, with related key processes useful for designing the monitoring strategy. These key processes are further developed as indicators in table 1.

Aquatic and terrestrial habitat development and the population dynamics of aquatic and riparian biota make up a set of processes that provide a conceptual link between the physical and biotic elements of this monitoring plan. The model depicts habitat development as the composite of the ecosystem processes listed. Thus, habitat development and population or community dynamics are shown as features that integrate general and key ecosystem processes in the stream channel and riparian/flood-plain subsystems (fig. 1). Similarly, habitat distribution, diversity, complexity, and temporal and spatial connectivity comprise a composite of habitat development as affected by natural and human-caused ecosystem stressors.

An integration of processes and stressors provides the functional relations critical to developing conceptual models for monitoring (Noon et al. 1999). Specific aspects of each ecosystem process have been identified as stressors that affect the three subsystems. Although natural and human-caused stressors are often difficult to distinguish in practice, the model lists examples of both types. In keeping with the effectiveness monitoring strategy, stressors are intended to be value-neutral (i.e., they can be either positive or negative like roads, which represent both road removal and construction).

Upslope subsystem indicators —Upslope subsystem indicators such as vegetation composition, seral stage, road density and percentage of cover—reflect processes influencing the entire stream network (Naiman et al. 1992) and are relevant indicators over the entire watershed. Data can be gathered largely by existing imagery and ArcGIS.

Riparian and flood-plain indicators—Riparian and flood-plain subsystem indicators represent processes delivering structure, sediment, and nutrients to stream channels over intermediate spatial scales, and they require finer scale analysis and greater initial sampling intensity for validation than do upslope indicators. It is suggested that riparian indicators be measured throughout the stream network, which includes perennial, fishbearing as well as perennial nonfish-bearing and intermittent streams. Although materials delivered by riparian and flood-plain subsystems initially affect adjacent stream reaches, they also affect the condition of downstream reaches (Naiman et al. 1992).

In-channel subsystem indicators—In-channel indicators such as residual pool frequency volume and depth, particle size distribution, and large woody debris count will be measured at the reach scale. In-channel subsystem indicators will be measured within 8 stream sections in each watershed. Four of the measured stream sections will be in the upper watershed upstream of barriers impassable to anadromous fish and 4 will be in the lower watershed within anadromous habitat.

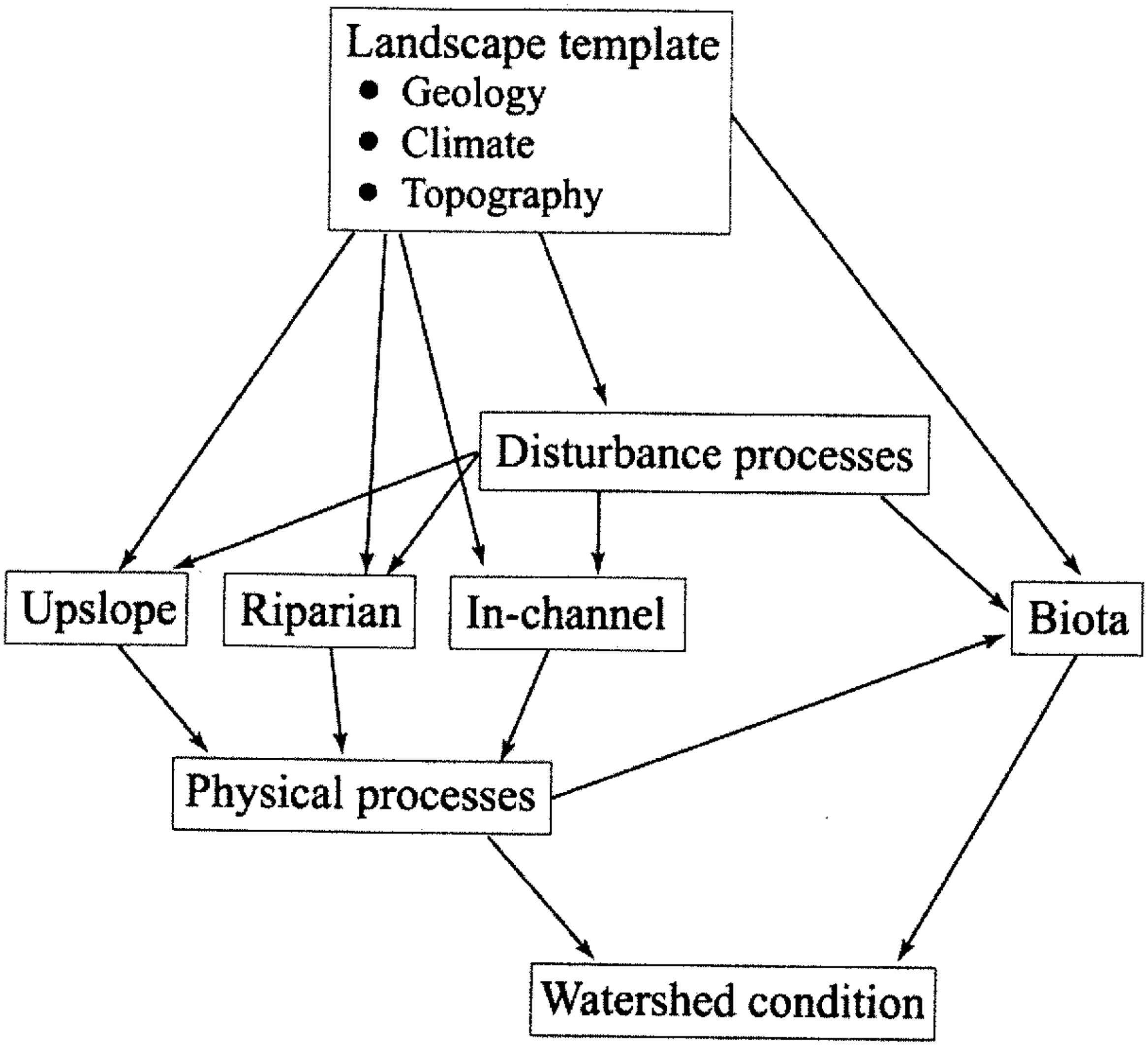
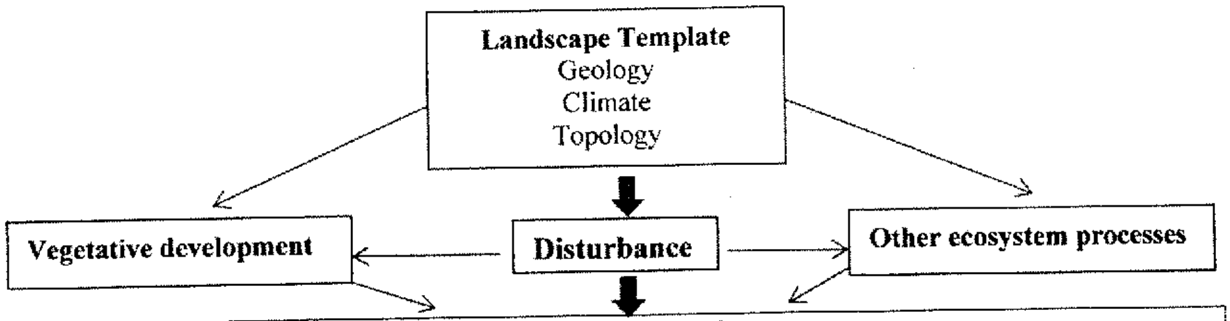


Figure 1: Overview of the conceptual framework



Watershed processes by subsystem				
Ecosystem process		**Stressors**		**Consequences**
General process	Key process	Natural influences	Human induced	
Upslope subsystem				
Vegetative succession growth and mortality	Wood Production and transport	Windthrow, insects and pathogens	Windthrow, timber harvest, thinning	Fragmentation, debris and nutrient cycling
Soil cycle	Sediment production and transport	Mass wasting, erosion, and debris flows	Roads, mining, and timber harvest	Nutrient cycling, soil moisture, formation rates, and sediment regime
Hydrologic cycle	Water storage and yield	Precipitation, flooding and drought	Roads, mining, timber harvest and climate change	Change in runoff timing, magnitude, and water storage
Riparian flood-plain subsystem				
Vegetative succession growth and mortality	Wood production and transport, seral stage, and community structure	Windthrow, insects and pathogens	Forest management, thinning and recreation	Fragmentation, debris, nutrient cycling and changes in nutrient cycling
Soil cycle	Sediment production and transport	Mass wasting, erosion, and debris flows	Roads, mining, forest management and recreation	Nutrient cycling, soil moisture, formation rates, and sediment regime
Hydrologic cycle	Water storage and yield	Precipitation, flooding and drought	Roads, mining, timber harvest and climate change	Change in runoff timing, magnitude, and water storage
Energy Exchange	Heat delivery	Insolation and shading	Forest management	Changes in microclimate and water temperature
Chemical/nutrient turnover	Chemical/nutrient delivery	Deposition, erosion, transport and storage	Forest management	Changes in nutrient production and toxins
Stream channel subsystem	**Habitat Development**			**Habitat Connectivity**
Hydrologic cycle	Water storage and yield	Precipitation, flooding and drought	Roads, mining, timber harvest and climate change	Change in runoff timing, magnitude, and water storage
Energy Exchange	Heat delivery	Insolation and shading	Forest management	Changes in microclimate and water temperature
Channel structure	Sediment and wood delivery, habitat formation	Scour, deposition, debris transport, and channel migration	Forest management, recreation, restoration	Habitat loss, change in stream channel form and sediment regime

Figure 2: Conceptual framework of watershed condition monitoring

Table 1—Core indicators by ecologic process with preferred measures and data fields

Watershed Subsection and Process	Key Process	Indicator	Protocol	Evaluated Data
Upslope Subsystem				
Vegetative succession, growth & mortality	Wood Production and transport	Vegetation seral stage and series	Cover by composition and structure class	Proportion of watershed in early-mid, and late seral stages
Soil Cycle	Sediment production and transport	Stream crossing density	Density of stream crossings per square mile	Density of stream crossings per square mile
Soil Cycle	Sediment production and transport	Road density	Length and proportion of road network hydrologically connected to the stream channel	Miles of road per square mile within 300 meters of streams
Soil Cycle	Sediment production and transport	Landslides	Protocol from Swanson addressing frequency, type, and location	Frequency, by type, size and location of landslide
Riparian flood-plain Subsystem				
Vegetative succession, growth & mortality	Wood delivery, community structural development	Vegetation seral stage and association	Cover by composition and structure class	Proportion of watershed in early-mid, and late seral stages
Soil Cycle	Sediment production and transport	Stream crossing density	Density of stream crossings per square mile	Density of stream crossings per square mile
Soil Cycle	Sediment production and transport	Road density	Length and proportion of road network hydrologically connected to the stream channel	Miles of road per square mile within 300 meters of streams
Soil Cycle	Sediment production and transport	Landslides	Protocol from Swanson addressing frequency, type, and location	Frequency, by type, size and location of landslide

Table 1—Core indicators by ecologic process with preferred measures and data fields (continued)

Watershed Subsection and Process	Key Process	Indicator	Protocol	Evaluated Data
In-channel Subsystem				
Channel structural dynamics	Sediment and wood delivery	Channel cross section	Monumented cross-sectional profile	Bankfull width and mean depth
Channel structural dynamics	Sediment and wood delivery	Channel movement	Monumented channel longitudinal proflie	Water surface slope
Channel structural dynamics	Sediment and wood delivery	Channel sinuosity	Stream length/valley length from aerial photos.	Stream length/valley length
Channel structural dynamics	Sediment and wood delivery	Channel pools	Survey of residual pool volume, depth, and frequency in sample reaches	Pool depth, volume and frequency
Channel structural dynamics	Sediment and wood delivery	Structural complexity	Survey of LWD counts in sample reaches	LWD counts per lineal measure
Channel structural dynamics	Sediment and wood delivery	Substrate composition	Wolman pebble count	Percentage of fines and D50
Energy Exchange	Heat delivery	Water Temperature	Temperature recorder	Water temperature change
Hydrologic cycle	Water delivery	Water quantity	Stage recorder	Discharge change
Biotic Community	Biotic integrity	MIS species density and condition factor	Removal method using minnow traps in closed system sample reaches	Species density and condition factor change

True watersheds (6th-field hydrological unit) forms the basic geographic unit for monitoring. Fourteen watersheds will be sampled over an 8 year period. Two of the watersheds will be sampled annually (Fixed watersheds) and 12 watersheds will be grouped into four separate panels (Panel watersheds) of 3 watersheds each and sampled on a rotating basis once every four years (table 2).

One of the annually sampled watersheds is within an unmanaged condition currently and into the perceivable future while the other will be representative of past, present and proposed future active management activities. The annually sampled fixed watersheds will allow for the assessment of trends more rapidly as well as provide information on natural variability.

The watersheds sampled on a rotating panel basis will ideally represent the range of ecological conditions and forest management across the Forest. The relatively small sample size will not allow for extensive stratification.

Table 2—Number of Sample Watersheds and Periodicity of Sampling:

Watershed	2012	2013	2014	2015	2016	2017	2018	2019
1 (Managed)				Fixed 1				Fixed 1
2 (Unmanaged)				Fixed 2				Fixed 2
3								
4								
5								
6								
7								
8								
9								
10								
11								
12				Panel 4				Panel 4
13				Panel 4				Panel 4
14				Panel 4				Panel 4

Selected watersheds have populations of: 1) resident Dolly Varden char and/or cutthroat trout upstream of impassable and permanent barrier(s) and coho salmon young-of-the-year and parr in downstream sections. Four resident fish populated stream sections and four coho populated stream sections of approximately 100 meters in length will be sampled within each of the 14 selected watersheds.

Sample reaches will be in FP0, FPS, MM0, or MMS channels (See Channel Type Users Guide for description). These less constrained, lower gradient (<6%), smaller and mostly alluvial channels support relatively greater numbers of fish, contact a greater area of the flood-plain and riparian area, these reaches generally have greater variation in bed and bank materials, hydraulics, and therefore habitats, and they are considered to reflect the integration of upstream watershed process (Reeves et al. 1998).

Since the lakes probably provide quality over-wintering habitat and are thought to be little affected by forest management, we believe trends in fish populations may be less likely in streams connected to lakes. Therefore, selected sample stream sections will ideally not be associated with lakes.

Methods for Fish Population Estimates:

Resident Dolly Varden, resident cutthroat trout and juvenile coho salmon will be monitored for population trends by repeat population estimates in permanently marked closed reaches of stream. A three-pass to four pass removal method using minnow traps baited with disinfected salmon eggs. Temporary block nets will be deployed on the upstream and downstream ends of the sample reach to restrict fish movement while sampling. Previous experience indicates that between 25 to 50 minnow traps are required to saturate the reach and allow for adequate capture rates. Appendix A provides a publication containing more detail on the removal method.

Natural obstructions, like shallow riffles or small waterfalls over large wood, should be used as upper and lower boundaries for the study reaches. Where possible, these natural obstructions should be relatively permanent to increase the probability of persistence for the life of the monitoring project. In any case, the ends of the selected study reaches should be permanently marked. Metal tags nailed to trees are recommended as permanent markers. Surveyors flagging and notations on aerial photos are suggested to help relocate the metal tags. GPS coordinates will be recorded also to relocate study sites.

Minnow traps should be set for approximately 1.5 hours at which time all captured fish will be transferred to buckets. It is suggested the buckets have holes drilled in the sides and be placed in the stream for water exchange to keep the fish aerated. The traps should be rebaited and reset for another 1.5-hour period. While the second set is fishing, fish captured during the first set should be processed. This can be repeated for three to four cycles. Data collected for each set should include the number of fish captured by species and their fork lengths and weight. The recommended anesthetic is MS-222. All captured fish will be released unharmed within the reach of capture.

Population estimates and associated confidence intervals will be determined using CAPTURE software program (White, 1978).

Minnow trap funnel openings will be enlarged if necessary and maintained at a 1" opening size. Openings will also be coated with silicone to avoid the possibility of injuring fish upon entry into the minnow trap.

Fish capture will occur during the months of June through August and sampling will not be completed during high flows.

Literature Cited

Naiman, R.J.; Beechie, T.J.; Benda, L.E. [et al.]. 1992. Fundamental elements of healthy watersheds in the Pacific Northwest coastal ecoregion. In: Naiman, R.J., ed. Watershed management: balancing sustainability and environmental change. New York: Springer-Verlag: 127-188.

Reeves, G.H.; Bisson, P.A.; Dambacher, J.M. 1998. Fish communities. In: Naiman, R.J.; Bilby, R.E., eds. River ecology and management: lessons from the Pacific coastal ecoregion. New York: Springer-Verlag: 200-234.

Reeves, G.H et al., 2003. Aquatic and Riparian Effectiveness Monitoring Plan for the Northwest Forest Plan. Forest Service, General Technical Report PNW-GTR-577

White, G.C.et al., 1978. Capture program - Computes estimates of capture probability and population size for "closed" population capture-recapture data. User's Manual for Program CAPTURE, Utah State Univ. Press,Logan, Utah.

Appendix A

Estimating Fish Populations by Removal Methods with Minnow Traps in Southeast Alaska Streams

MASON D. BRYANT*

United States Forest Service, Pacific Northwest Research Station, 2770 Sherwood Lane 2A, Juneau, Alaska 99801, USA

Abstract.— Passive capture methods, such as minnow traps, are commonly used to capture fish for mark–recapture population estimates; however, they have not been used for removal methods. Minnow traps set for 90-min periods during three or four sequential capture occasions during the summer of 1996 were used to capture coho salmon *Oncorhynchus kisutch* fry and parr, Dolly Varden *Salvelinus malma*, cutthroat trout *O. clarki*, and juvenile steelhead *O. mykiss* to estimate population size with the Zippin or generalized removal method. More than 45% of the total catch was obtained during the first capture occasion, and in most cases, the catch during the fourth occasion was less than 15% of the total catch. In most pools, the probability of capture was greater than 0.4 but was lower for coho salmon fry than for coho salmon parr and other species. Mean population estimates for coho salmon parr made with concurrent mark–recapture and removal methods differed significantly in small streams. Estimates from mark–recapture and removal methods were not significantly different for coho salmon fry and Dolly Varden, but mark–recapture estimates were higher than removal estimates in most cases. My results show that removal estimates can be obtained with minnow traps if sampling procedures conform to the assumptions required for the method.

Obtaining precise and accurate estimates of fish abundance in streams continues to challenge fishery biologists, despite the development of sophisticated mathematical models. Commonly used methods include mark–recapture experiments (Ricker 1975; Zubik and Fraley 1988) and removal estimates (Moran 1951; Zippin 1958; White et al. 1982). Though snorkel surveys are also used to estimate fish abundance (Northcote and Wilke 1963; Schill and Griffith 1984; Thurow 1994), they require a separate estimate of the population to calibrate the counts (Hankin 1986). Mathematical models for both mark–recapture and removal estimates are well-tested, but present substantial logistical challenges to meet the assumptions.

Mark–recapture estimates are commonly used in southeast Alaska and elsewhere to estimate populations of juvenile salmonids, most commonly coho salmon *Oncoryhnchus kisutch* and Dolly Varden *Salvelinus malma*, in small (4-m-wide) second-to third-order streams (Elliott and Hubartt 1978; Dolloff 1983; Bryant 1984; Young et al. 1999). Sample reaches in streams wider than 4 m and with higher water flows are difficult to isolate, and mark–recapture methods are not reliable because of movement between sample periods. High flows, common in southeast Alaska, also affect movement and catchability between sample peri

* E-mail: mdbryant@fs.fed.us Received April 12, 1999; accepted March 30, 2000

ods. Removal methods or snorkel surveys are often used in these streams, yet even these methods are limited. Low conductivity and patches of complex habitat with large woody debris make the removal method of electrofishing impractical. Snorkel surveys also are impractical because of complex habitat and poor visibility in the dark waters of many southeast Alaska streams.

Removal methods have several advantages over mark–recapture methods to estimate fish numbers. Fish are captured only once, which eliminates bias due to behavioral responses to a trap. Fish do not need to be marked, which removes assumptions that all marks are identified and that negligible mortality occurs due to marking. The stream section can be sampled in 1 d, which substantially reduces the probability of movement by fish into and out of the sample area in cases in which the stream section cannot be isolated for the duration of the mark–recapture sequence. In addition, a 1d sampling effort simplifies logistics for those locations that are difficult to reach and eliminates any differences in sampling efficiency due to changes in flow regimes (i.e., high-water events that occur after marking and before or during recapture).

Passive capture methods are commonly used for mark–recapture experiments but are seldom used for removal estimates. Minnow traps baited with salmon eggs are an effective method for capturing juvenile salmonids and have been used in numer ous studies throughout southeast Alaska (Bloom 1976; Elliott and Hubartt 1978; Dolloff 1983; Bryant 1985). Minnow traps have not been used for removal population estimates but have several advantages over electrofishing: they are less harmful to the fish, disturb the stream less, can be used efficiently in complex habitats, and are not dependent on the water chemistry of the stream (Mesa and Schreck 1989; Riley and Fausch 1992; Hollender and Carline 1994; Habera et al. 1996; Reynolds 1996). Although minnow traps are not effective in riffle or fast-water habitats, they offer a less-intrusive alternative to electrofishing in streams with pools or slow-moving water. However, their use as a removal method for population estimates has not been studied.

My purpose is to determine if minnow traps can be used as a removal method to estimate population sizes of fish in streams. My first objective is to determine if minnow traps capture a sufficient part of the population on each capture occasion to estimate population size of juvenile salmonids using a removal method and to examine probabilities of capture in natural streams. My second objective is to determine if concurrent mark–recapture estimates and removal estimates through the use of minnow traps differ significantly.

Methods

The study was conducted on five small second-to third-order streams, Convenience, Picnic, Switzer, Twiw, and Tye creeks, and three medium-size fourth-to fifth-order streams, Painted, Sal, and Trap creeks, in southeast Alaska during the summer of 1996. The small streams were all less than 4 m in bank-full width and had summer mean flows of less than 0.5 m^3/s. The medium-size streams were greater than 4 m but less than 30 m in bank-full width and drained into salt water. All streams supported populations of coho salmon and Dolly Varden. Steelhead *Onchorhynchus mykiss* and cutthroat trout *O. clarki* were found in some streams and were not sympatric in any stream that was sampled. Coastrange sculpins *Cottus aleuticus* were occasionally captured but not included in the estimates. The three medium-size streams were sampled with the removal estimate only. Concurrent mark–recapture and removal experiments were completed on all five small streams.

Mark–recapture and removal methods require closed populations; therefore, sample reaches were selected to minimize emigration or immigration during the sample period. In the five small streams, the sample reaches ranged from 100 to 350 m and were blocked by nets, weirs, or barriers at both ends for the duration of the experiment, usually 3–4 d. In the three medium-size streams, nets could not be used; natural barriers were used to isolate the reach and pools within the reach. These included long, shallow riffles (5 cm depth) or submerged logs that fully spanned the stream, forming a dam. While complete isolation was not achieved, fish movement across these barriers was not observed during sampling, which usually lasted no longer than 8 h at each site.

The removal experiment was completed in 1 d on each medium-size stream. Three capture occasions were used in Painted Creek, the first stream sampled with the removal method. Four capture occasions were used on Trap and Sal creeks. Reaches ranged in length from about 200 to 300 m. Individual pools were identified and counted in each reach. At least 50% of the pools were randomly selected and population estimates were computed for fish in each pool. The size of the pools ranged from 9.7 to 1,480 m^2, the average size being 288 m^2. One to three pools were sampled concurrently, depending upon their size and complexity. Once a pool was selected, sample locations for the minnow traps (3.2-mm mesh size: 19 cm diameter and 35.5 cm long) were selected. Distances between traps depended upon habitat complexity, but generally traps were separated by about 2 m. Traps were set more densely in complex habitats (i.e., pools with large amounts of woody debris) than in more open pools. Between 40 and 50 traps were set for each removal experiment.

Traps were baited with salmon eggs (disinfected for 10 min with 1:100 betadyne to water solution) held in perforated "whirlpaks." Traps were set on the stream bottom next to suspected habitat of juvenile salmonids, such as woody debris, rootwads, or undercut banks, but were distributed to completely sample the pool. Traps were left undisturbed for 90 ± 10 min and then were picked up in the same order in which they were set. Fish were removed, and fresh bait was placed in each trap. Traps were set again in the same locations. Fish from each pool and capture occasion were processed separately. While the second set was fishing, the fish from the first set were identified, counted, measured (mm), and weighed (nearest 0.1 g). Data from each capture occasion were identified by number (1, 2, 3, or 4), each of which identified the capture occasion. The procedure was repeated three to four times, depending upon the desired number of capture occasions. Fish from each capture occasion were placed in a holding net (or blocked minnow traps) until the last capture occasion was completed, at which time all fish were returned to the same area from which they were captured. Population size was estimated for each species in each pool. Coho salmon were classified as fry (age 0) or parr (age 1+) based on analysis of length–frequency data. Coho salmon were considered to be fry if they were less than 50 mm in June, less than 55 mm in July, or less than 60 mm in August.

The same procedures for the removal estimate in the medium-size streams were used in the small streams during the concurrent mark–recapture and removal experiments. Sample reaches, which were 100 to 300 m long and ranged in area from 68 to 274 m^2, could be easily sampled with 40–50 traps. The entire reach was sampled during one experiment, and population size was estimated for the entire reach. All fish were marked during four capture occasions in the removal estimate, which served as the mark sample in a single-census Peterson mark–recapture estimate determined by the Chapman modification (Ricker 1975). The recapture sample was completed during one capture occasion 3–4 d after the fish were released. All fish were identified by species and measured. Recaptured marked fish were recorded.

Removal estimates and probabilities of capture (P_c) were computed by the capture program (White et al. 1982). If four capture occasions were used, population size was estimated by the generalized removal estimate in the capture program: both equal P_c among occasions and unequal P_c between the first and subsequent occasions. The program also tested whether P_c was constant, based on a chi-square test (0=0.05). The Zippin method, which assumes equal probabilities of capture, was used for Painted Creek where three capture occasions were completed.

A paired *t*-test (0=0.05) was used to compare the probability of capture from the first capture occasion to subsequent capture occasions in pools where a variable probability of capture was used to estimate populations. A paired *t*-test (0=0.05) was also used to examine differences in population estimates and probabilities of capture between three or four capture occasions for coho salmon fry, coho salmon parr, Dolly Varden, and steel-head. Estimates from individual pools that had valid estimates for four capture occasions were used as the sample unit. Estimates for three capture occasions were made by recomputing the first three capture occasions from estimates with four capture occasions.

Depletion and mark–recapture estimates from reaches in the five small streams were compared by a paired *t*-test (0=0.05). The test was completed separately for coho salmon fry, coho salmon parr, and Dolly Varden. Cutthroat trout and steel-head were not captured in all streams and were not included in the analysis. Normality and homogeneity of variance was tested before use of the *t*-tests (SAS Institute 1988).

Results

Removal Estimates

Abundance of coho salmon parr was estimated for 47 pools in Painted, Sal, and Trap creeks. Estimates were not computed (defined as "failures" by the computer program) in three pools for coho salmon fry and Dolly Varden when less than 10 fish were caught during all capture occasions. For two of the pools, failures occurred when more coho salmon fry were caught during either the second or third capture occasion than during the first capture occasion. For the third pool, no Dolly Varden were captured during the first two capture occasions, 16 were captured during the third capture occasion, and 3 were captured during the fourth capture occasion. Steelhead were captured only in Sal Creek, and 3 failures occurred out of the 10 pools sampled.

For all species, more than 45% of the total catch in all reaches of Painted, Sal, and Trap creeks were taken during the first capture occasion (Figure 1). In most cases, the number of fish captured during the fourth capture occasion was less than 15% of the total catch. For all species except coho salmon fry, the probability of capture was greater than 0.3 for at least 80% of the pools sampled when it was assumed constant for all capture occasions (Figure 2). Probability of capture was greater than 0.4 in more than 90% of the pools for cutthroat trout and steelhead. Coho salmon fry and parr had the lowest probability of capture, but more than 50% of the pools exceeded 0.4. In most cases, however, substantially fewer coho salmon fry and parr were caught upon each successive sampling occasion, even with lower probabilities of capture. For example, in one pool, 123, 95, and 51 coho salmon fry were captured during successive capture occasions. The probability of capture calculated to

0.344. The 95% confidence interval ranged from 324 to 472 fish around the population estimate of 374 fish. While the lower probability of capture resulted in less precision, the lower confidence interval was within 13% and the upper confidence interval within 26% of the estimate.

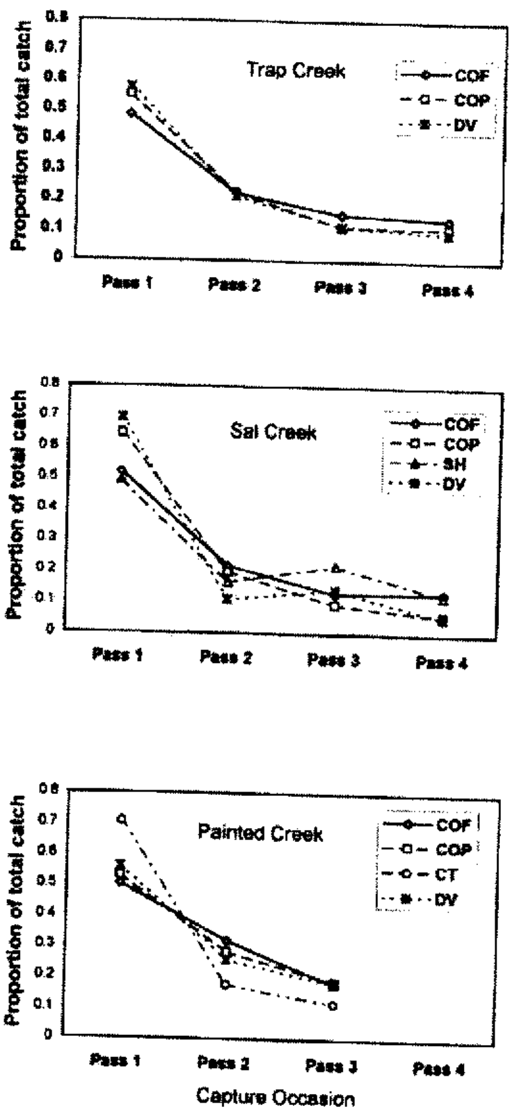


FIGURE 1.—The proportionofcohosalmonfry(COF), coho salmon parr (COP), Dolly Varden (DV), cutthroat trout (CT), and steelhead (SH) captured during each capture occasion in Trap, Sal, and Painted creeks for the removal experiment in southeast Alaska, 1996.

In Sal and Trap creeks, both of which had four capture occasions, the capture program compared constant-capture probability and variable-capture probability. In most pools, the probabilities of capture were constant. The constant-probability-ofcapture model was selected for all species in 88% of the pools in Sal Creek and in 93% of the pools in Trap Creek (chi-square. 0=0.05; White et al. 1982). The constant-probability-of-capture model was selected for Dolly Varden and steelhead in all pools of Sal Creek (Table 1). In Trap Creek, the constant-probability-of-capture model was selected for Dolly Varden in 81% of the pools. A variable-probability-of-capture model was used to estimate population size for coho salmon fry in five pools, for coho salmon parr in eight pools, and for Dolly Varden in four pools. Only for coho salmon fry was the probability of capture significantly greater for the first capture occasion than for subsequent capture occasions (Table 2).

Population estimates and probabilities of capture for three sample occasions were generally lower than those computed for four sample occasions (Table 3). Population estimates for three and four capture occasions were significantly different for coho salmon parr (P =0.013), but differences were not observed for population estimates of coho salmon fry and Dolly Varden. Differences between the probabilities of capture for three and four capture occasions were observed for coho salmon fry, coho salmon parr, and Dolly Varden. The probabilities of capture for three capture occasions were greater than that estimated for four capture occasions (Table 3). The population estimates or probabilities of capture for steelhead were not significantly different between three and four capture occasions (Table 3).

Mark–Recapture and Removal Estimates

Comparisons of population estimates for the two methods showed mixed results among species, but generally estimates from the mark–recapture method were higher than those from the removal method. Mark–recapture and removal estimates were significantly different for coho salmon parr (P =0.049) but were not significantly different for Dolly Varden and coho salmon fry (Figure 3). Mark–recapture estimates were higher in all streams and for all species except coho salmon fry in Twiw Creek and Dolly Varden in Picnic Creek. In both cases, removal estimates had wider confidence intervals than the mark–recapture estimates. Removal estimates for both streams had low probabilities of capture and a high number of fish captured during the final capture occasion.

Discussion

Probabilities of capture were generally high, and in most cases, 50–65% of the population was captured during the first sample occasion. However, even with high probabilities of capture, underestimation of the population may be a problem be

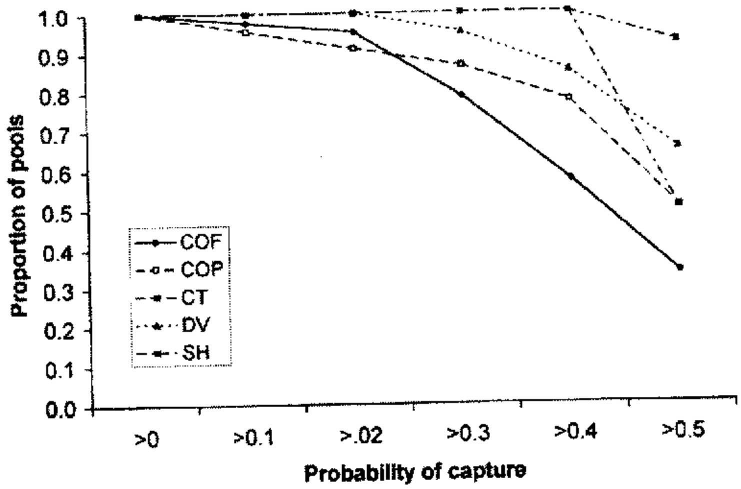


FIGURE 2.—The relationship between probability of capture of all five species and the number of pools expressed as a proportion of total pools sampled in Trap, Sal, and Painted creeks for the removal experiment in southeast Alaska, 1996.

cause of differences in probabilities of capture between sample occasions (Riley and Fausch 1992). Underestimation would occur if the probability of capture was higher during the first sample occasion and lower during subsequent sampling occasions (Riley and Fausch 1992). The bias can be accounted for if the differences between probability of capture can be detected during the estimation through the use of four capture occasions and the generalized removal method (White et al. 1982). Results from this study agree with the recommendation of Riley and Fausch (1992) that four capture occasions be used for removal estimates whenever possible.

Riley and Fausch (1992) and the numerous studies they cite report decreasing catchability after the first capture occasion during electrofishing and suggest that it is important to maintain equal effort among all samples. However, not only does the process of electrofishing impose a considerable disturbance upon the stream and influence fish behavior during subsequent samples, but it also imposes a physiological response in fish that influences behavior on those that were shocked but not captured during the first attempt (Mesa and Schreck 1989). Minnow traps are a passive capture method and impose a much lower degree of disturbance than electrofishing. This eliminates the effects of disturbances if care is used when the traps are set and retrieved.

Regardless of the method used to capture fish, assumptions of removal estimates must be met that include isolation of the sample area during the sample period. Recruitment into the sample area during the estimate will result in an upward bias in the estimate; however, recruitment was not observed in study sections of the larger streams during 6–7 h sample periods. If the pool within the

TABLE 1.—Percent of pools with constant and variable probabilities of capture for coho salmon fry, coho salmon parr, Dolly Varden, and steelhead captured in two streams in southeast Alaska, 1996.

Stream	Type of probability Coho salmon Parr Fry Dolly Varden				Stee l- hea d	A l l
						8
Sal Creek	Constant	78	80	100	100	8
						l

TABLE 2.—Comparison (paired t-test) between probabilities of capture (P_C) on first and subsequent capture occasions in pools where a variable probability of capture was used to estimate populations for coho salmon fry and parr and Dolly Varden in two streams in southeast Alaska, 1996.

Mean P_C

Species	First capture	Subsequent captures	df	P
Coho salmon	0.523			0.01
Fry Parr Dolly	0.574	0.302 0.546	4 7	0.85
Varden	0.435	0.232	3	0.06

TABLE 3.—Comparison (paired *t*-test) between 3-sample and 4-sample removal estimates of population and probabilities of capture for coho salmon fry and parr, Dolly Varden, and steelhead in Trap and Sal creeks, southeast Alaska, 1996.

	Mean population estimate (number of fish)				Mean probability of capture		
Species	Number of pools	Three-sample	Four-sample	*P*	Three-sample	Four-sample	*P*
Coho salmon							
Fry Parr	24 24	54 22	61 25	0.087 0.013	0.559 0.655	0.445 0.573	0.001 7 0.008 5 0.006
Dolly							

reach is not saturated with traps; fish from within the pool may be recruited into nearby traps during subsequent sampling occasions. Evidence of recruitment during the sample period may be observed when more fish are captured in later sample occasions than during the first or second sample occasions. Effort should be made to capture the greatest number of fish from the pool while completely sampling the pool and maintaining equal sampling effort among capture occasions.

Minnow traps have physical limitations that limit their use as a capture method. They do not adequately sample riffle habitat; therefore, the method is limited to pool habitats. Stream depth must be sufficient to submerge the opening of the trap. The effective range or orientation of baited minnow traps has not been systematically tested, but traps are usually set parallel to the flow or in pools with minimal flow. Extensive field experience in southeast Alaska suggests that minnow traps are effective at a radius of at least 2 m; a downstream bias may extend the range depending on

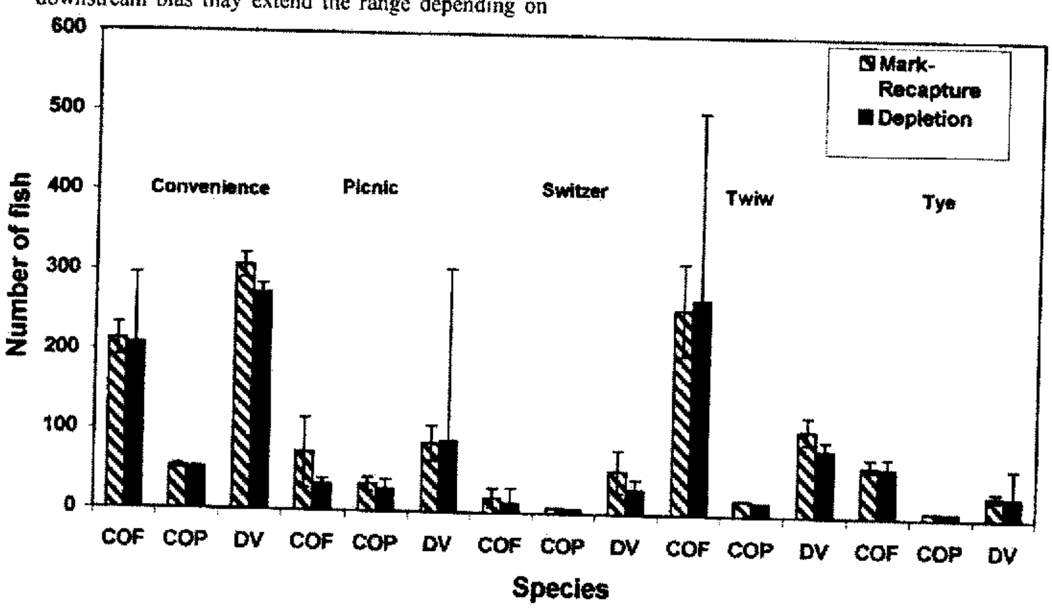


FIGURE 3.—The comparison of population estimates from mark–recapture and removal methods by species for five small streams in southeast Alaska, 1996.

flow. Complex habitats, such as large, dense debris jams, may require a higher density of traps than open pools. Fish behavior and habitat preferences will determine the distribution of traps. Large scour pools with little cover and high flows generally did not yield large numbers of juvenile salmonids. They also did not require as many traps as pools with large rootwads and several smaller connected pools.

Although removal and mark–recapture estimates in small streams were not significantly different for coho salmon fry and Dolly Varden, mark–recapture mean estimates were 13–17% greater than removal mean estimates. Violations of at least two assumptions, equal vulnerability of marked-to-unmarked fish (trap-shy) and greater mortality of marked fish, could account for higher mark–recapture estimates. Removal estimates were often lower than mark–recapture estimates. Mahon (1980) and Peterson and Cederholm (1984) generally attributed this to decreasing probability of capture upon successive capture occasions. Their estimates, however, were derived from electrofishing and not by less-obtrusive methods, such as minnow traps. The generalized removal program used a constant probability of capture for all five of the streams rather than a variable probability of capture, which suggests the minnow traps did not affect fish behavior.

Removal methods have several advantages over mark–recapture methods, including the ability to complete sampling in a single day and requiring fewer assumptions. Minnow traps impose less stress on fish than electrofishing, though care must be taken when fish are held for several hours. In streams that cannot be completely blocked, the shorter time interval needed for the removal estimate reduces the probability of movement and more closely satisfies the closure assumption than is possible for mark–recapture experiments that require several days between the mark and recapture. The assumption of closure can seldomly be accomplished in large streams with greater flow volumes, but short-term movement can be reduced during a removal estimate through the use of sample reaches that are separated by naturally occurring obstructions. Minnow traps, carefully placed in a stream and left undisturbed, are also less likely to disturb fish than during electrofishing or seining when several people move through the stream during each sample occasion. Minnow traps offer an attractive alternative for conducting removal estimates for juvenile salmonids. Similar methods may be applicable to other species that are susceptible to passive capture methods.

Acknowledgments

Brian Davies, Mark Lukey, Brenda Wright, and others provided valuable field assistance and advice throughout the study. John Caouette contributed significant statistical advice. Terry Quinn, Brenda Wright, and Michael Young gave constructive and helpful reviews of the paper. Alyre Chiasson and two anonymous reviewers provided thorough and helpful reviews. The use of trade names in this paper is for the information and convenience of the reader. Such use does not constitute official endorsement by the U.S. Department of Agriculture of any product to the exclusion of other that may be suitable.

References

Bloom, A. M. 1976. Evaluation of minnow traps for estimating populations of juvenile coho salmon and Dolly Varden. Progressive Fish-Culturist 38:99–
101.

Bryant, M. D. 1984. Distribution of salmonids in the Trap Bay basin, Tenakee Inlet. Pages 17–31 *in* W. R. Meehan, T. R. Merrell, and T. A. Hanley, editors. Fish and wildlife relationships in old-growth forests: proceedings of a symposium. American Institute of Fishery Research Biologists, Juneau, Alaska.

Bryant, M. D. 1985. The role of beaver dams as coho salmon habitat in southeast Alaska streams. Pages 183–192 *in* J. M. Walton and D. B. Houston, editors. Proceedings of the Olympic wild fish conference. Peninsula College and Olympic National Park, Fisheries Technology Program, Port Angeles, Washington.

Dolloff, C. A. 1983. The relationships of wood debris to juvenile salmonid production and microhabitat selection in small southeast Alaska streams. Doctoral dissertation. Montana State University, Bozeman.

Elliott, S. T., and D. Hubartt. 1978. A study of land use activities and their relationship to sport fish resources in southeast Alaska. Alaska Department of Fish and Game, Federal Aid in Sport Fish Restoration, D-1, volume 19, Juneau, Alaska.

Habera, J. W., R. J. Strange, B. D. Carter, and S. E. Moore. 1996. Short-term mortality and injury of rainbow trout caused by three-pass AC electrofishing in a southern Appalachian stream. North American Journal of Fisheries Management 16:192–200.

Hankin, D. G. 1986. Sampling designs for estimating total number of fish in small streams. U.S. Forest Service, Research Paper PNW-360, Portland, Oregon.

Hollender, B. A., and R. F. Carline. 1994. Injury to brook trout by backpack electrofishing. North American Journal of Fisheries Management 14:643–649.

Mahon, R. 1980. Accuracy of catch–effort methods for estimating fish density and biomass in streams. Environmental Biology of Fishes 5:343–360.

Mesa, M. G., and C. B. Schreck. 1989. Electrofishing mark–recapture and depletion methodologies evoke behavioral and physiological changes in cutthroat trout. Transactions of the American Fisheries Society 118:644–658.

Moran, P. A. 1951. A mathematical theory of animal trapping. Biometrika 38:307–311.

Northcote, T. G., and D. W. Wilke. 1963. Underwater census of stream fish populations. Transactions of the American Fisheries Society 92:146–151.

Peterson, N. P., and C. J. Cederholm. 1984. A comparison of the removal and mark–recapture method of population estimation for juvenile coho salmon in a small stream. North American Journal of Fisheries Management 4:99–102.

Reynolds, J. B. 1996. Electrofishing. Pages 221–253 *in*
B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
Ricker. W. E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada Bulletin 191.
Riley, S. C., and K. D. Fausch. 1992. Underestimation of trout population size by maximum likelihood removal estimates in small streams. North American Journal of Fisheries Management 12:768–776.
SAS Institute. 1988. SAS/STAT user's guide. Release
6.03 edition. SAS Institute, Cary, North Carolina.
Schill, D. J., and J. S. Griffith. 1984. Use of underwater observations to estimate cutthroat trout abundance in the Yellowstone River. North American Journal of Fisheries Management 4:479–487.
Thurow, R. F. 1994. Underwater methods for study of salmonids in the intermountain west. U.S. Forest Service. General Technical Report GTR-307.
White, G. C., D. R. Anderson, K. P. Burnham, and D.
L. Otis. 1982. Capture–recapture and removal methods for sampling closed populations. Los Alamos National Laboratory, Los Alamos, New Mexico.
Young, K. A., S. G. Hinch, and T. G. Northcote. 1999. Status of resident cutthroat trout and their habitat twenty-five years after riparian logging. Transactions of the American Fisheries Society 19:901–
911.
Zippin, C. 1958. The removal method of population estimation. Journal of Wildlife Management 22:82–
90.
Zubik, R. J., and J. J. Fraley. 1988. Comparison of snorkel and mark–recapture estimates for trout populations in large streams. North American Journal of Fisheries Management 8:58–62.

FID	Shape *	site	lat	long	stream	date	observer	method	species
9335	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9336	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9337	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9338	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9339	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9340	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9341	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9342	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9343	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9344	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9345	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9346	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9347	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9348	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9349	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9350	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9351	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9352	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9353	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9354	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9355	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9356	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9357	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9358	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9359	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9360	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9361	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9362	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9363	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9364	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9365	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9366	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9367	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9368	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9369	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9370	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9371	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9372	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9373	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9374	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9375	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9376	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9377	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9378	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9379	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9380	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9381	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9382	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9383	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon

life_stage	mm
juvenile	45
juvenile	48
juvenile	38
juvenile	42
juvenile	44
juvenile	38
juvenile	54
juvenile	44
juvenile	45
juvenile	48
juvenile	39
juvenile	38
juvenile	41
juvenile	50
juvenile	42
juvenile	47
juvenile	43
juvenile	49
juvenile	42
juvenile	64
juvenile	50
juvenile	57
juvenile	40
juvenile	54
juvenile	54
juvenile	36
juvenile	40
juvenile	40
juvenile	37
juvenile	50
juvenile	40
juvenile	41
juvenile	41
juvenile	46
juvenile	45
juvenile	46
juvenile	91
juvenile	80
juvenile	46
juvenile	55
juvenile	52
juvenile	46
juvenile	41
juvenile	54
juvenile	38
juvenile	44
juvenile	48
juvenile	35
juvenile	49

FID	Shape *	site	lat	long	stream	date	observer	method	species
9384	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9385	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9386	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9387	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9388	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9389	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9390	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9391	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9392	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9393	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9394	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9395	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9396	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9397	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9398	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9399	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9400	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9401	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9402	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9403	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9404	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9405	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9406	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9407	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9408	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9409	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9410	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9411	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9412	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9413	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9414	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9415	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9416	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9417	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9418	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9419	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9420	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9421	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9422	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9423	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9424	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9425	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9426	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9427	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9428	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9429	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9430	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9431	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9432	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon

life_stage	mm
juvenile	40
juvenile	38
juvenile	39
juvenile	45
juvenile	44
juvenile	40
juvenile	45
juvenile	53
juvenile	49
juvenile	67
juvenile	47
juvenile	44
juvenile	51
juvenile	49
juvenile	52
juvenile	63
juvenile	44
juvenile	39
juvenile	64
juvenile	67
juvenile	63
juvenile	55
juvenile	50
juvenile	63
juvenile	41
juvenile	57
juvenile	70
juvenile	43
juvenile	63
juvenile	65
juvenile	47
juvenile	42
juvenile	45
juvenile	40
juvenile	65
juvenile	47
juvenile	52
juvenile	43
juvenile	54
juvenile	71
juvenile	72
juvenile	77
juvenile	64
juvenile	55
juvenile	45
juvenile	57
juvenile	63
juvenile	42
juvenile	54

FID	Shape *	site	lat	long	stream	date	observer	method	species
9433	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9434	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9435	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9436	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9437	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9438	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9439	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9440	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9441	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9442	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9443	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9444	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9445	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9446	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9447	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9448	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9449	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9450	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9451	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9452	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9453	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9454	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9455	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9456	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9457	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9458	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9459	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9460	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9461	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9463	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9464	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9465	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9466	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9467	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9468	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9469	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9471	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9472	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9473	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9474	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9475	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9478	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9480	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9481	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9482	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9483	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9484	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9485	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9488	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon

life_stage	mm
juvenile	63
juvenile	41
juvenile	66
juvenile	70
juvenile	44
juvenile	39
juvenile	62
juvenile	85
juvenile	38
juvenile	43
juvenile	67
juvenile	38
juvenile	77
juvenile	60
juvenile	41
juvenile	67
juvenile	76
juvenile	54
juvenile	63
juvenile	45
juvenile	68
juvenile	61
juvenile	58
juvenile	70
juvenile	72
juvenile	69
juvenile	38
juvenile	44
juvenile	65
juvenile	60
juvenile	89
juvenile	56
juvenile	68
juvenile	68
juvenile	74
juvenile	48
juvenile	67
juvenile	53
juvenile	52
juvenile	49
juvenile	47
juvenile	67
juvenile	88
juvenile	49
juvenile	45
juvenile	62
juvenile	75
juvenile	49
juvenile	65

FID	Shape *	site	lat	long	stream	date	observer	method	species
9494	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9495	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9496	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9497	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9498	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9499	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9500	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9501	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9502	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9503	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9504	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9505	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9506	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9507	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9508	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9509	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9510	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9511	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9512	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9513	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9514	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9515	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9516	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9517	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9518	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9520	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9521	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9522	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9523	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9524	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9525	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9526	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9527	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9528	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9529	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9530	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9531	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9532	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9533	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9534	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9535	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9536	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9537	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9538	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9539	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9540	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9541	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9542	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9543	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon

life_stage	mm
juvenile	40
juvenile	54
juvenile	48
juvenile	48
juvenile	59
juvenile	60
juvenile	37
juvenile	42
juvenile	39
juvenile	47
juvenile	46
juvenile	51
juvenile	49
juvenile	49
juvenile	60
juvenile	53
juvenile	46
juvenile	62
juvenile	69
juvenile	50
juvenile	44
juvenile	39
juvenile	41
juvenile	49
juvenile	74
juvenile	56
juvenile	44
juvenile	41
juvenile	51
juvenile	53
juvenile	55
juvenile	49
juvenile	41
juvenile	42
juvenile	38
juvenile	46
juvenile	40
juvenile	77
juvenile	51
juvenile	47
juvenile	48
juvenile	45
juvenile	42
juvenile	42
juvenile	40
juvenile	40
juvenile	48
juvenile	44
juvenile	44

FID	Shape *	site	lat	long	stream	date	observer	method	species
9544	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9546	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9548	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9549	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9550	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9551	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9553	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9554	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9555	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9556	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9557	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9558	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9561	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9562	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9563	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9564	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9565	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9566	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9567	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9568	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9569	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9570	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9571	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9572	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9573	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9574	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9575	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9576	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9577	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9578	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9579	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9580	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9582	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9583	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9584	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9585	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9586	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9587	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9588	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9589	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9590	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9591	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9592	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9593	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9594	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9595	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9596	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9597	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9599	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon

life_stage	mm
juvenile	42
juvenile	78
juvenile	61
juvenile	35
juvenile	41
juvenile	46
juvenile	48
juvenile	46
juvenile	39
juvenile	55
juvenile	40
juvenile	45
juvenile	51
juvenile	43
juvenile	46
juvenile	37
juvenile	50
juvenile	50
juvenile	41
juvenile	52
juvenile	46
juvenile	41
juvenile	37
juvenile	42
juvenile	41
juvenile	48
juvenile	42
juvenile	53
juvenile	34
juvenile	49
juvenile	68
juvenile	44
juvenile	63
juvenile	58
juvenile	42
juvenile	68
juvenile	48
juvenile	39
juvenile	71
juvenile	56
juvenile	41
juvenile	39
juvenile	42
juvenile	47
juvenile	53
juvenile	41
juvenile	40
juvenile	50
juvenile	39

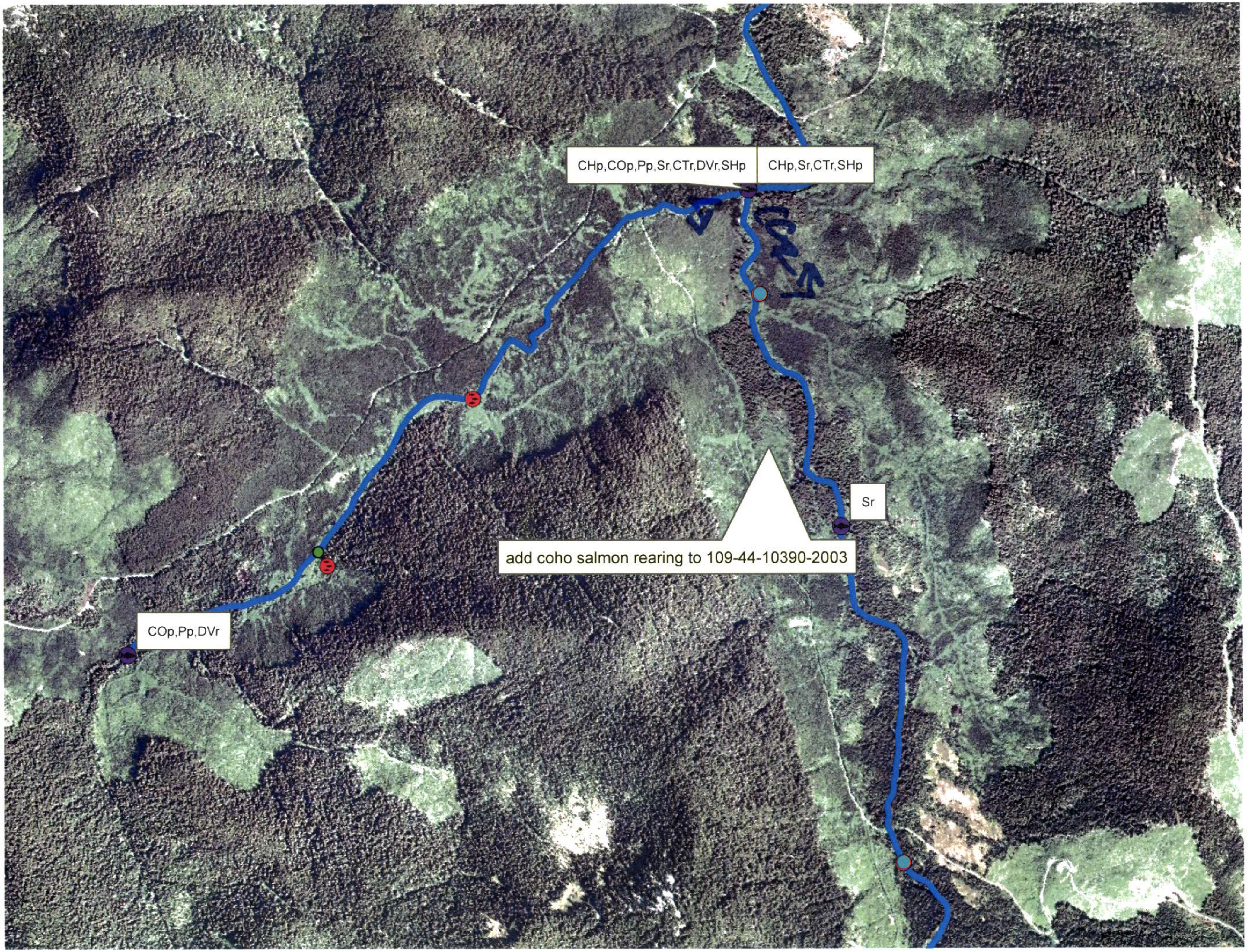
FID	Shape *	site	lat	long	stream	date	observer	method	species
9600	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9601	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
9602	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	coho salmon
5733	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5734	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5736	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5743	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5744	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5745	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5751	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5754	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5760	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5761	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5771	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5772	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5775	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5776	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5777	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5778	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
9552	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	cutthroat trout
5735	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5737	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5738	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5739	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5740	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5741	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5742	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5746	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5747	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5748	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5749	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5750	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5752	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5753	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5755	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5756	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5757	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5758	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5759	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5762	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5763	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5764	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5765	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5766	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5767	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5768	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5769	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5770	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5773	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden

life_stage	mm
juvenile	42
juvenile	68
juvenile	51
juvenile/adult	117
juvenile/adult	106
juvenile/adult	102
juvenile/adult	67
juvenile/adult	110
juvenile/adult	87
juvenile/adult	108
juvenile/adult	71
juvenile/adult	78
juvenile/adult	59
juvenile/adult	93
juvenile/adult	61
juvenile/adult	68
juvenile/adult	71
juvenile/adult	95
juvenile/adult	68
juvenile/adult	135
juvenile/adult	74
juvenile/adult	88
juvenile/adult	82
juvenile/adult	70
juvenile/adult	67
juvenile/adult	69
juvenile/adult	62
juvenile/adult	99
juvenile/adult	88
juvenile/adult	67
juvenile/adult	105
juvenile/adult	85
juvenile/adult	95
juvenile/adult	84
juvenile/adult	78
juvenile/adult	82
juvenile/adult	75
juvenile/adult	72
juvenile/adult	63
juvenile/adult	116
juvenile/adult	91
juvenile/adult	112
juvenile/adult	79
juvenile/adult	82
juvenile/adult	78
juvenile/adult	81
juvenile/adult	63
juvenile/adult	68
juvenile/adult	104

FID	Shape *	site	lat	long	stream	date	observer	method	species
5774	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5779	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5780	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5781	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5782	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
5783	Point	STTRR2	55.72496	-132.956378	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
9462	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
9476	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
9479	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
9545	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
9547	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	Dolly Varden
9581	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	rainbow trout
9519	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9470	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9477	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9486	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9487	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9489	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9490	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9491	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9492	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9493	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9559	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9560	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9598	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9603	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified
9604	Point	STHYC2	55.779425	-133.06671	Staney	7/24/2014	John, E, Cleveland	Minnow Trap	sculpin-unspecified

life_stage	mm
juvenile/adult	79
juvenile/adult	69
juvenile/adult	85
juvenile/adult	85
juvenile/adult	69
juvenile/adult	71
juvenile/adult	89
juvenile/adult	93
juvenile/adult	91
juvenile/adult	109
juvenile/adult	87
juvenile/adult	48
juvenile	84
juvenile/adult	104
juvenile/adult	91
juvenile/adult	77
juvenile/adult	96
juvenile/adult	94
juvenile/adult	83
juvenile/adult	88
juvenile/adult	85
juvenile/adult	99
juvenile/adult	59
juvenile/adult	121
juvenile/adult	80
juvenile/adult	76
juvenile/adult	93


CHp,COp,Pp,SHp
COp,CTp,DVp
COp
103-90-10310-2025
COp
COp,DVp,SHp
COp
COp
Ps
Pp
COp
COp
SHp
Ps
COr,DVr,SHr
COr,DVr,SHr
COp,DVp
DVp
COp
COp
COp
COp
COp
COr,DVr
COr,DVr
COp
COp
COp,DVp
COsr
COp,DVp
COp
COp
COsr
COp
COsr
COsr


CHp,COp,Pp,Sr,CTr,DVr,SHp
CHp,Sr,CTr,SHp
Sr
add coho salmon rearing to 109-44-10390-2003
COp,Pp,DVr