A COMPLETE LIFE HISTORY MONITORING OF SALMONIDS IN McGARVEY CREEK, LOWER KLAMATH RIVER SUB-BASIN 2006 - 2009

California Department of Fish and Game
Grant Numbers P0610552 and P0510511

FINAL REPORT
April 2009

Yurok Tribal Fisheries Program
PO Box 1027
Klamath, California 95548
Phone (707) 482-2841

TABLE OF CONTENTS

4.0 RESULTS AND DISCUSSION, continued

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

This report is dedicated to Scott Gibson, who passed away unexpectedly on June 14, 2008. Scott was passionate about his work in fisheries, and loved being on the river. Scott was full of knowledge, ingenuity, and was a perfectionist when it came to writing field notes, drawing maps, or 'dialing out traps'. Scott worked for the Yurok Tribal Fisheries Program for almost ten years, during which time he trained many biologists and rescued hundreds of juvenile coho, chinook, steelhead, and cutthroat as tributaries went subsurface in the summer. Scott was one of the key people who worked on all aspects of this project. He will be greatly missed and was an irreplaceable part of our crew—he will hold a place in our hearts forever.

ACKNOWLEDGEMENTS

The Yurok Tribe would first like to acknowledge and thank the California Department of Fish and Game for funding this project under grant agreements number P0610552 and P0510511. We would like to express our gratitude to Green Diamond Resource Company for allowing us access onto their property, and specifically Darold Perry for working through the summer abundance estimates. Dana McCanne assisted in setting up sampling for the summer abundance surveys. This project could not have been completed without Andrew Antonetti, Carl Anderson, Nemechay Bates, Sarah Beesley, Gilberto Calleja, Dwayne Davis, Nick Folkins, Scott Gibson, Robert Grubbs, Delmer Jordan, Ben Laukka, Josh Lewis, Aldaron McCovey, Steven Nova Jr., Scott Silloway, Hans Voight, A.J. Webster, and David Weskamp from the Yurok Tribal Fisheries Program who spent many hours working in the field. Andrew Antonetti led the charge on this project, especially the PIT tagging and remote SPI stations, and without his oversight this project would not have happened. Special thanks to Pam Kostka for spending many hours entering data. We would also like to acknowledge Dave Hillemeier and Sarah Beesley from the Yurok Tribal Fisheries Program for their time reading and editing this report.

1.0 INTRODUCTION

The Yurok Tribe has relied on the Lower Klamath River and its fish for cultural, subsistence, and ceremonial purposes since time immemorial. Land management activities and stochastic events over the last 150 years have degraded Lower Klamath tributaries with pervasive sedimentation observed throughout spawning and rearing habitats. Concern over diminishing runs resulted in the 1997 listing of Klamath Basin coho salmon (*Oncorhynchus kisutch*) as threatened under the Federal Endangered Species Act (ESA) and 2004 listing of coho salmon under the California State Endangered Species Act (CESA). Klamath River chinook salmon (*O. tshawytscha*), steelhead (*O. mykiss*) and coastal cutthroat trout (*O. clarki clarki*) populations were also petitioned for ESA listing, and despite the listings being determined "Not Warranted", concern continues to exist over their status and long-term trends.

McGarvey Creek is a Lower Klamath tributary that has been subjected to intensive logging and associated road building, as well as the construction of a major highway across its headwaters. Upslope land management activities have critically impacted riparian areas and instream fish habitat throughout the watershed. Instream impacts include channel aggradation and siltation, and habitat simplification, which generally result in loss of spawning and rearing habitat for anadromous salmonids (Meehan 1996). As a result, McGarvey Creek is ranked third out of all 24 Lower Klamath tributaries for watershed restoration activities (Gale and Randolph 2000). YTFP, Yurok Tribal Watershed Restoration Division (YTWRD), and Green Diamond Resource Company have worked together to complete extensive road decommissioning, upslope restoration activities, and instream structure placement to improve the quantity and quality fisheries habitat in McGarvey Creek. In order for the Yurok Tribe to assess the effectiveness of watershed restoration projects in the Lower Klamath tributaries, essential baseline data must continue to be collected to assess and quantify existing conditions, monitor trends over time, and gauge the success of ongoing and future restoration projects.

In 1997, the Yurok Tribal Fisheries Program (YTFP) initiated a long-term assessment and monitoring of McGarvey Creek salmonid populations and their associated habitat out of concerns over diminishing anadromous fish runs and a need to establish baseline data from which to monitor habitat and population trends over time. YTFP began annual outmigrant trapping project in lower McGarvey Creek 1997 and has been conducting single stream summer abundance estimates in McGarvey Creek since 2002. Consistent, long term monitoring of McGarvey Creek salmonid populations allows YTFP to: 1) quantify juvenile emigration, 2) collect species/age composition data, 3) document population trends, and 4) describe life-history patterns of McGarvey Creek anadromous fish populations. This information will also allow YTFP to obtain the necessary data to guide Lower Klamath resource management planning, habitat restoration planning and implementation, cumulative effects analysis, and ESA-related issues.

2.0 STUDY AREA

McGarvey Creek is a small, low gradient coastal stream draining 8.9 square miles of moderately steep, forested lands in the Lower Klamath River (Figure 1). McGarvey Creek begins at an elevation of 5 feet at its confluence with the Klamath and extends 4.9 miles to its headwaters, located at an elevation of 600 feet. West Fork McGarvey Creek, the principle tributary in the drainage, totals 2.2 miles in length. Virtually all of McGarvey Creek is owned by Green Diamond Resource Company (GDRC) and is managed for commercial timber production.

The lower section of McGarvey Creek is sinuous, flowing through a broad floodplain as it nears the Klamath. Upper McGarvey Creek is moderately steep and confined and is dominated by "B" type channels and contains natural and anthropogenic barriers to anadromous species (Rosgen 1994). The stream substrate of the drainage consists of highly embedded gravel and cobble with approximately 30% of the streambed consisting of silt or sand substrates (YTFP habitat mapping data 1996).

McGarvey Creek's hydrology consists of the Mainstem, West Fork and some small, unnamed tributaries. These two major forks of McGarvey are low gradient (≤3%) with the exception of one 2,235 ft section of the West Fork (YTFP habitat mapping data 1996). The McGarvey Creek watershed receives high annual rainfall. Annual rainfall in the Lower Klamath sub-basin frequently averages 100 inches per year. The Yurok Tribe Environmental Program (YTEP) began operating a stream gage upstream of the outmigrant trap site in December 2001. McGarvey stream discharge data shows that streamflow is strongly related to rainfall, especially during winter when the groundwater table is elevated. Streamflow during winter months varies with rainfall, and the highest streamflow measurement taken by YTEP in McGarvey Creek is 270 cfs, although higher estimates have been made based on gage height and a rating curve generated by existing flow measurements.

Data published by YTEP for gaging records covering water years (October 1 – September 30) 2005 and 2006 indicates rainfall during November and December raise the water table enough to keep McGarvey Creek elevated. Mean daily streamflow during water year 2005 was consistently below 20 cfs during winter months and dropped to 2 – 5 cfs during periods of low flow between July and October (Hiner 2006). During water year 2006, mean daily discharge was close to 80 cfs in December and January and ranged during February through April to between 13 – 88 cfs. During periods of low flow at the end of water year 2006 (July, August, and September 2007) daily streamflow ranged between 6.9 – 3.6 cfs (Hiner 2007). McGarvey Creek affords fish access to and from the mainstem Klamath for much of the year with marginal or no access during periods of low flow in the summer months. In most years, streamflow goes subsurface for an indeterminate length during late summer, and is reflected by the boundaries of the Lower Mainstem reach (Figure 2)(Beesley and Fiori 2007).

McGarvey Creek supports populations of coho salmon, steelhead trout, cutthroat trout, chinook salmon, coastrange sculpin (*Cottus aleuticus)*, prickly sculpin (*Cottus asper*), Klamath smallscale sucker (*Catostomus rimiculus)*, speckled dace (*Rhynichthys osculus)*, three spine stickleback (*Gasterosteus aculeatus),* Pacific lamprey (*Lampetra tridentata)*, and brook lamprey (*Lampetra lethophaga*).

Vegetation of the McGarvey Creek watershed was historically comprised of old growth conifers forest, predominantly coastal redwood (*Sequoia sempervirens*), Sitka spruce (*Picea sitchensis*) and Douglas fir (*Psuedotsuga menziesii*) with cedar (*Cedrus* spp.) and western hemlock (*Tsuga heterophylla*). Presently, riparian habitats of McGarvey Creek are dominated by red alder (*Alnus rubra*), big leaf maple *(Acer macrophyllum*), vine maple (*Acer circinatum*) tan oak (*Lithocarpus densiflora*), madrone (*Arbutus menzesii*), California laurel (*Umbellularia californica*), and willow (*Salix* spp.).

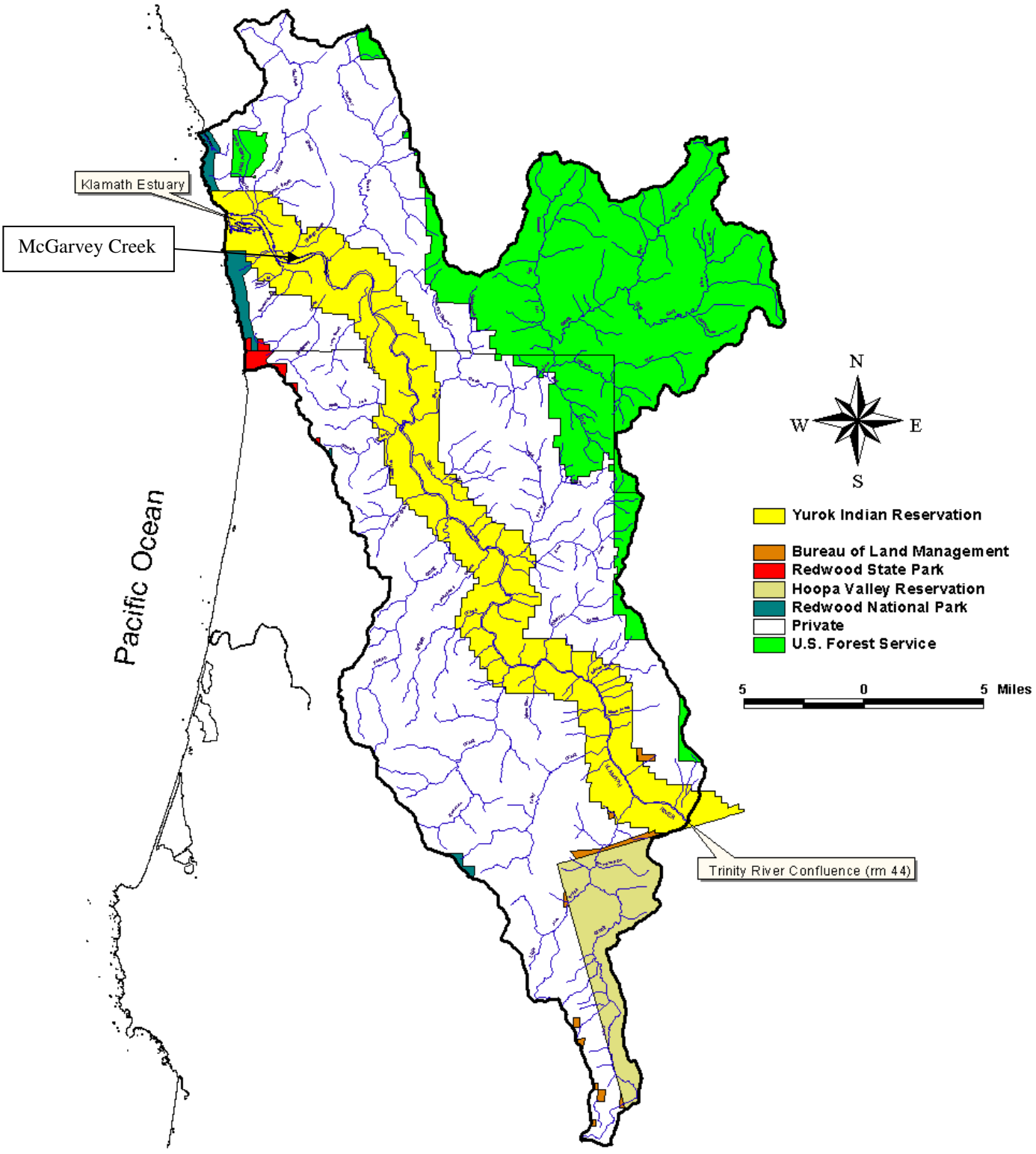

Figure 1. Lower Klamath River Sub-basin, California, with McGarvey Creek identified.

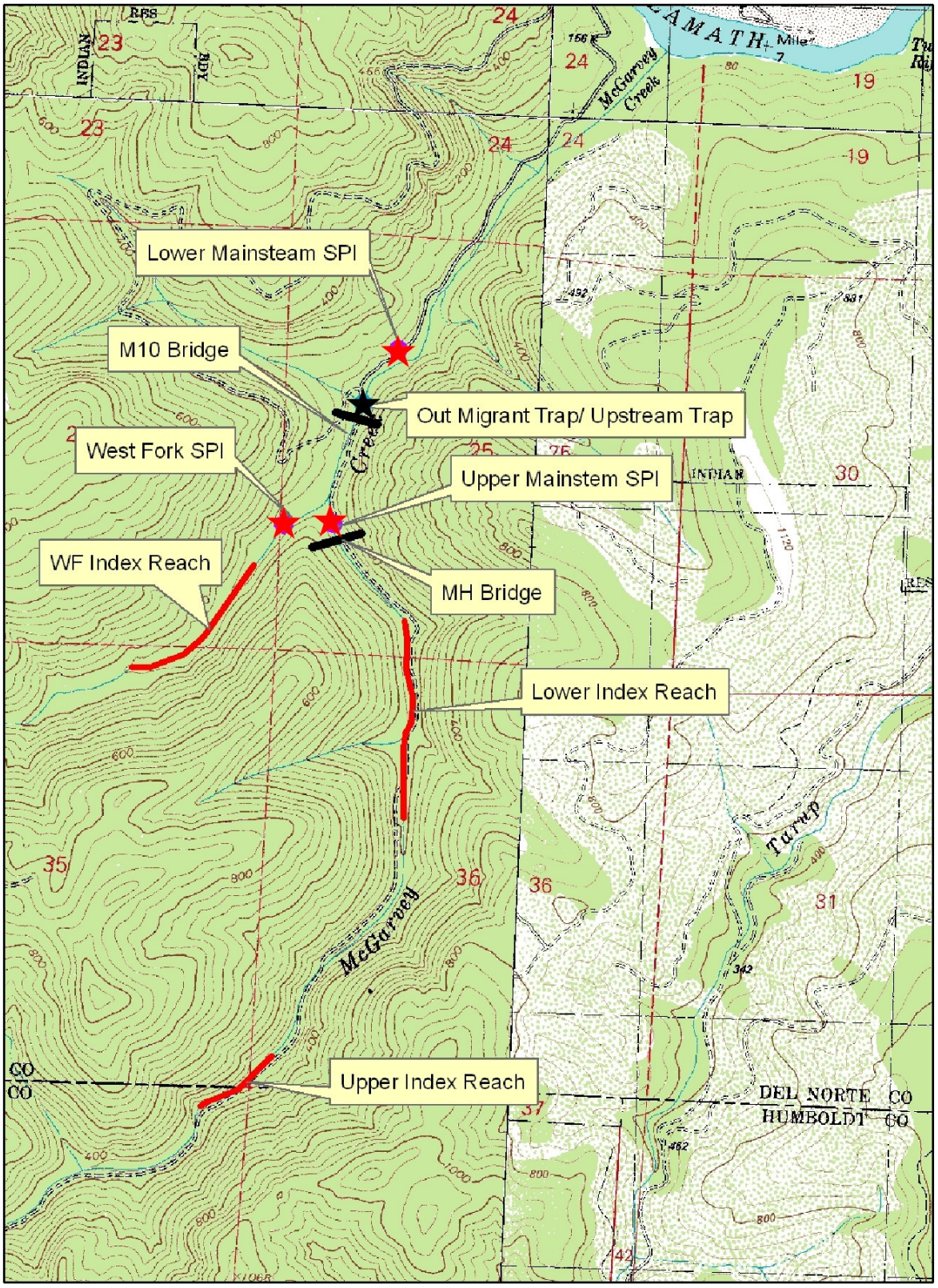

Figure 2. Map of the Lower Mainstem, Upper Mainstem, and West Fork of McGarvey Creek with trapping locations indicated.

3.0 METHODS AND MATERIALS

3.1 Adult Weir

The adult salmonid weir was located between the Lower Mainstem SPI station and the outmigrant trap in Lower McGarvey Creek (Figure 2). The weir consisted of weir panels constructed from four foot long sections of ½ inch diameter pipe, which were spaced one inch apart from each other. Each weir panel was held together by a ¼ inch cable running through each pipe. The weir panels spanned the creek with a 1 foot x 1 foot opening for the fyke entrance, which extended 8 feet upstream into the live pen (Figures 3 and 4).

The adult weir was installed during late October of both 2006 and 2007 and operated between the following dates:

- 01-Nov-06 through 30-Apr-07
- 19-Oct-07 through 24-Dec-07
- 23-Jan-08 through 30-Apr-08

The weir was operated 24 hours a day, seven days a week. Winter high flow conditions occasionally resulted in the adult weir being topped. These events resulted in a significant decrease in trapping efficiency, although the weir remained semi-functional during these high flow periods.

All adult fish captured in the weir were placed into a fish cradle for species identification, measurement, and sex determination. White 'spaghetti' floy tags were applied to adult salmonids with a six inch length of Hi-Viz Artic Flagging attached, which had the Fish ID number clearly marked on it (Figure 5)0. The use of independent identification numbers for each marked salmonid enabled field crews to identify individuals later if recaptured during spawning surveys or trapping efforts. Floy tags were inserted through the dorsal tissue midway along the dorsal fin using a 6 inch long by 1/8 inch diameter hollow needle.
.

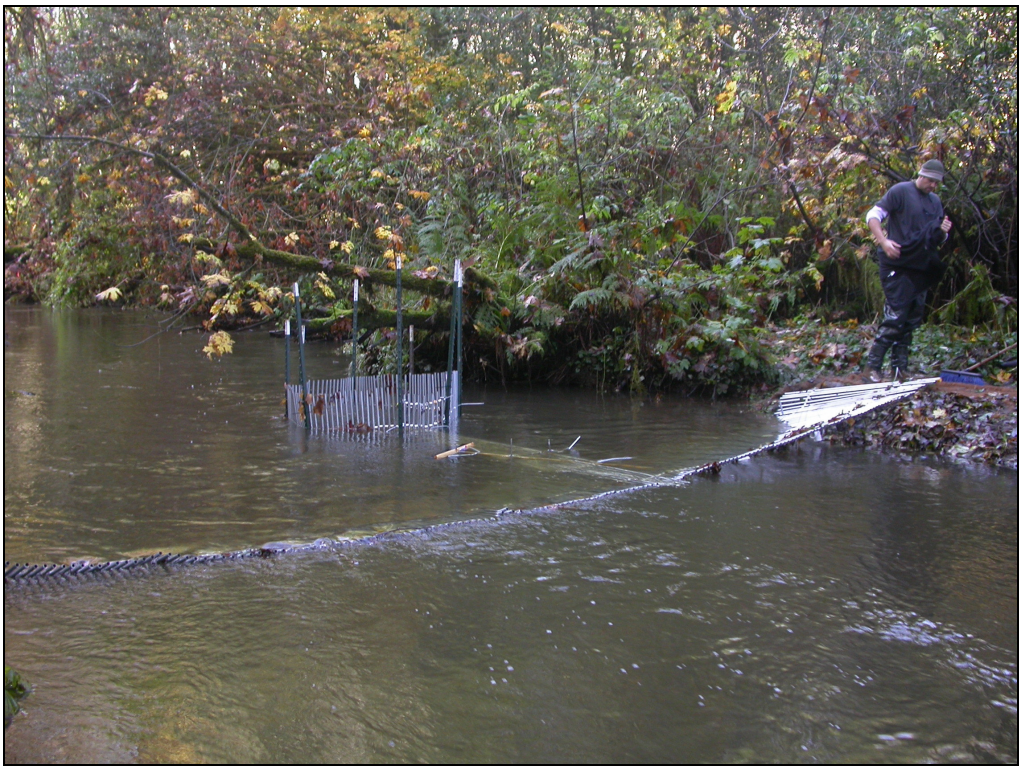

Figure 3. YTFP Biologist Andrew Antonetti working at the adult salmonid weir in McGarvey Creek, 2007.

Figure 4. Adult salmonid weir and holding pen in McGarvey Creek, 2007.

Figure 5. Marking an adult coho captured in the weir with a floy tag and Hi-Viz flagging, McGarvey Creek, 2008.

3.2 Spawning Surveys

Spawning surveys were initiated during 2006 and 2007 in conjunction with the adult weir deployment and continued through April. Streamflow in McGarvey Creek prior to November is typically too low to permit adult fish passage into the drainage. Surveys were conducted on a weekly basis as streamflows and visibility conditions permitted throughout the anadromous sections of McGarvey Creek (approximately 4 miles). The drainage was separated into three reaches for the purposes of these surveys:

Reach 1: Lower Mainstem: From the mouth of McGarvey Creek upstream to the confluence with the West Fork (1.25 miles).

Reach 2: Upper Mainstem: Upstream of the confluence with the West Fork to the anadromous barrier.

Reach 3: West Fork: Upstream of the confluence with the mainstem to the anadromous barrier.

3.3 Summer Abundance Inventory (Single Stream Population Estimate)

Prior to this project, YTFP conducted single stream abundance inventories in McGarvey Creek from 2001 – 2006 using a snorkel and electrofishing methodology based on Hankin and Reeves (1988) and Hankin and Mohr (2008). Attempts were made to use a consistent approach over time, however, reach boundaries have required modification as our knowledge of fish utilization and environmental conditions in McGarvey Creek increased. A description of reach development is available in Voight (2006).

During 2007 and 2008, summer abundance estimates were calculated for three reaches (Figure 6):

Lower Mainstem: From the mouth of McGarvey Creek upstream to the confluence with the West Fork (1.25 miles).

Upper Mainstem: Upstream of the confluence with the West Fork to the anadromous barrier.

West Fork: Upstream of the confluence with the mainstem to the anadromous barrier.

3.3.1 Sampling Rates

Surveys utilized modified Hankin-Reeves protocols (Hankin and Mohr 2008; Hankin and Reeves 1988). Survey crews first assigned habitat units to one of five categories: SP, DP (>1.1m z_{max}), RU, RI and "other" (not surveyable due to complexity, water clarity, etc). A stratified systematic sampling (STRATSYS) algorithm was used to select habitat units that were sampled (phase 1) and where applicable the sub-sample of units that were calibrated following initial dive counts (phase 2).

One phase sampling (4 pass depletion efishing) was conducted in the Lower Mainstem and West Fork reaches. A two-phase survey styled after Hankin and Reeves (1988) was conducted on the Upper Mainstem reach. Riffles (RI) were sampled consistently across all reaches, with 1/12 selected for three-pass electrofishing (Table 1). Deep pools (DP) were sampled at 100% frequency across all reaches using a single dive pass as an index to document the magnitude of fish not enumerated in shallow pools (SP), runs (RU), and RI units. The *Other* stratum contained habitat units that were not suitable for snorkeling or electrofishing, and thus no statistical inferences were made.

In the Upper Mainstem reach during *phase 1,* 33% of the SP-RU units were selected for an initial dive pass. Divers then flagged 25% of the *phase 1* sampled units to undergo *phase 2* calibration (four pass depletion electrofishing). Thus, the resulting proportion of shallow pool/run units that were calibrated within the Upper Mainstem McGarvey reach was (.33 * .25= .0825), or 8.25% (Table 1).

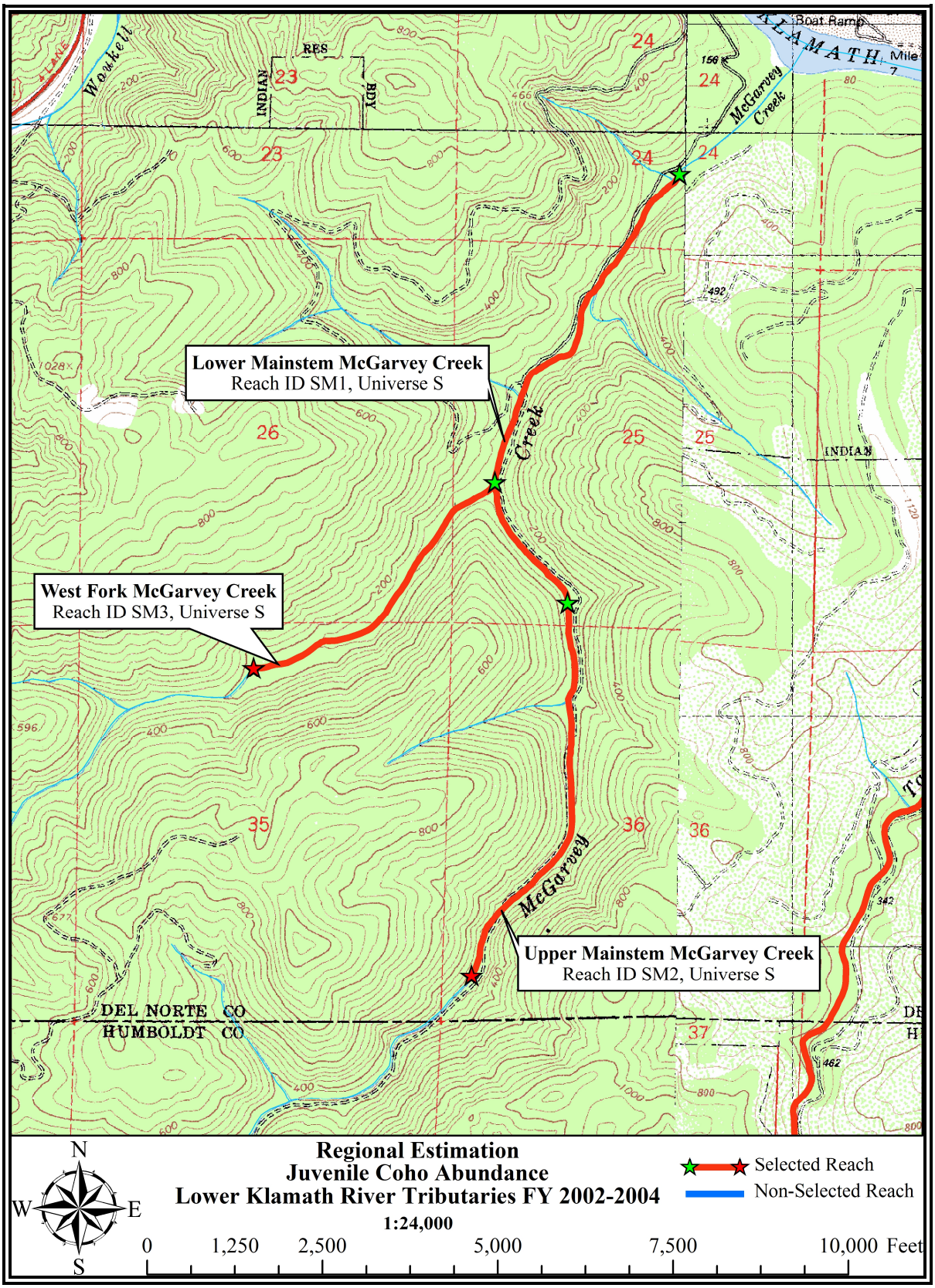

Figure 6. Reach locations sampled during 2007 – 2008 summer abundance surveys.

Table 1. Sampling rates by survey phase/habitat strata, single stream population estimates, McGarvey Creek, 2007 and 2008.

Reach Type/Location	Phase 2 SP-RU	Phase 2 SP-RU	Percent SP-RU calibration	Riffles	Deep Pools
Lower McGarvey	Efish 15%		NA	8%	1 pass dive
West Fork McGarvey	Efish 15%		NA	8%	1 pass dive
Upper McGarvey	33% 1 pass dive	25% efish	8.25%	8%	1 pass dive

Figure 7. Yurok Tribal Fisheries Program Biologist Scott Silloway and Technician Robert Grubbs conducting a multiple pass depletion electrofishing survey in the West Fork McGarvey Creek, 2008.

3.3.2 Data Analysis

Separate population estimates (with 95% confidence intervals) were made for age 0+ coho, age 0+ chinook, and age 1+ coastal cutthroat and steelhead in the RI and SP-RU habitat strata in each single stream reach. Actual counts of 0+ coho, 0+ chinook, 0+ trout, 1+ coastal cutthroat, and 1+ steelhead for all DPs are also reported. Estimation of trout numbers in deep pools is unreliable at best due to the fact that they are typically elusive and may seek cover for extended periods of time after first encountering a diver.

It is well known that habitat surface area is highly correlated with unit fish abundance, but for many single-reach surveys, the reported unit length has a higher correlation than wetted-width surface area. For estimating fish abundance within a reach, habitat unit length was incorporated as an auxiliary variable. If habitat unit information was incorporated across reaches, then wetted-width surface area would be a more suitable choice.

Jackknife Estimation for Electrofishing Sampling

Jackknife estimation was used for the electrofishing data where the total number of fish ($\hat{y}_i$) and sampling variance ($\hat{V}(\hat{y}_i)$) in unit *i* were estimated by:

$$\hat{y}_i = \sum_{j=1}^{r_i-1} c_{i\bullet j} + r_i c_{r_i}$$

$$\hat{V}(\hat{y}_i) = r_i(r_i - 1)c_{r_i}$$

where

r_i = the number of electrofishing passes in the i^{th} habitat unit

c_{r_i} = the number of fish captured in the r^{th} (last) pass in the i^{th} habitat unit

$c_{i\bullet j}$ = the number of fish captured in the j^{th} pass of the i^{th} habitat unit

Two-Phase Estimation for SP-RU Habitats in Snorkeled Reaches:

The total number of fish in SP-RU Habitats ($\hat{T}_{SP/R}$) and sampling variance $\hat{V}(\hat{T}_{SP/R})$ were estimated by:

$$\hat{T}_{SP/R} = N\bar{\hat{y}}_2\left(\frac{\bar{x}_1}{\bar{x}_2} + \frac{\bar{L}-\bar{l}_1}{\bar{l}_2}\right)$$

$$\hat{V}(\hat{T}_{SP/R}) \approx N^2\left(1-\frac{n_1}{N}\right)\left(\frac{\bar{L}}{\bar{l}_1}\right)^2 \frac{s^2_{\hat{y}|l}}{n_1} + N^2\left(1-\frac{n_2}{n_1}\right)\left(\frac{\bar{x}_1}{\bar{x}_2}\right)^2 \frac{s^2_{\hat{y}|x}}{n_2}$$

$$s^2_{\hat{y}|l} = \frac{1}{n_2-1}\sum_{i=1}^{n_2}\left(\hat{y}_i - \bar{\hat{y}}_2\frac{l_i}{\bar{l}_2}\right)^2$$

$$s^2_{\hat{y}|x} = \frac{1}{n_2-1}\sum_{i=1}^{n_2}\left(\hat{y}_i - \bar{\hat{y}}_2\frac{x_i}{\bar{x}_2}\right)^2$$

where

N = total number of SP-RU habitat units

$\hat{y}_i$ = the jackknife estimate of the true number of fish in the i^{th} habitat unit

$\bar{\hat{y}}_2$ = the average jackknife estimate of the true number of fish in all Phase II sampled SP-RU

x_i = the observed number of fish counted during the dive in the i^{th} habitat unit

$\bar{x}_1$ = Phase I mean dive count of fish in SP-RU

$\bar{x}_2$ = Phase II mean dive count of fish in SP-RU

$\bar{L}$ = average length of all SP-RU units

l_i = the length of the i^{th} habitat unit

$\bar{l}_1$ = average length of SP-RU units sampled in Phase I

$\bar{l}_2$ = average length of SP-RU units sampled in Phase II

n_1 = number of SP-RU units sampled in Phase I

n_2 = number of SP-RU units sampled in Phase II

Ninety-five percent confidence intervals can be approximated by $2\sqrt{\hat{V}(\hat{T}_{SP/R})}$. Small Phase II sample sizes might necessitate using $t_{0.025,n-1}\sqrt{\hat{V}(\hat{T}_{SP/R})}$ for the confidence interval.

Single-Phase Estimation for RI or SP-RU in Non-Snorkeled Reaches

$$\hat{T}_{hab} = N\bar{\hat{y}}\left(\frac{\bar{L}}{\bar{l}}\right)$$

$$\hat{V}(\hat{T}_{hab}) \approx N^2\left(1-\frac{n}{N}\right)\frac{s^2_{\hat{y}ll}}{n} + \frac{N}{n}\sum_{i=1}^{n}\hat{V}(\hat{y}_i)$$

$$s^2_{\hat{y}ll} = \frac{1}{n-1}\sum_{i=1}^{n}\left(\hat{y}_i - \bar{\hat{y}}\frac{l_i}{\bar{l}}\right)^2$$

where

hab = habitat unit type, either RI from all reaches or SP-RU from non-snorkeled reaches

N = total number of *hab* habitat units in the reach

n = number of *hab* habitat units sampled

$\hat{y}_i$ = the jackknife estimate of the true number of fish in the i^{th} habitat unit

$\bar{\hat{y}}$ = the average jackknife estimate of the number of fish in all sampled *hab* units

$\bar{L}$ = average length of all *hab* habitat units

l_i = the length of the i^{th} habitat unit

$\bar{l}$ = average length of sampled *hab* units

Ninety-five percent confidence intervals can be approximated by $2\sqrt{\hat{V}(\hat{T}_{hab})}$. Small sample sizes might necessitate using $t_{0.025,n-1}\sqrt{\hat{V}(\hat{T}_{hab})}$ for the confidence interval.

3.4 Outmigrant Trapping

The trapping site is located just downstream of the lower bridge on the GDRC Road # M-10 at rm 1.25. This site was chosen based on channel characteristics and accessibility; the Klamath River routinely backs up into lower McGarvey Creek during higher flow conditions, and therefore the trap site was situated upstream of the typical inundation zone.

Outmigrant fish trap was installed and operated on the following dates:

- 24-Jan-08 through 30-Jun-08 (149 sample days)
- 05-Nov-08 through 01-Mar-09 (86 sample days)

Typically, the traps were operated 24 hours a day, 7 days a week throughout each trapping season. The trap however, was periodically dismantled or damaged during high flows or storm events, which varied trapping effort (days sampled) between years.

3.4.1 Equipment

The pipe trap was constructed of weir panels, sand bags, T-posts, and two-four 20 foot sections of 8 inch diameter PVC pipe leading from the frame net to the live box. Weir panels were made from 1 foot by 4 foot wood frames with ¼ inch hardware cloth. T-posts were used to position weir panels in a V-shaped configuration and the pipe was positioned at the vertex of this V-shape (Figures 8 and 9). The panels were positioned so that 95% of the stream channel was funneled to the pipe inlet. A 2 foot wide passage way was maintained in the weir to allow upstream fish migration. A 15 foot long frame net with a 4 foot by 6 foot opening was inserted between the weir and the pipe during high flow periods to aid in dissipating streamflow (Figure 10). This allowed the trap to be run over a wider range of discharge levels and minimized downtime associated with high flow events. Beginning in 2007, an upstream trap was installed adjacent to the weir panels (Figure 10)

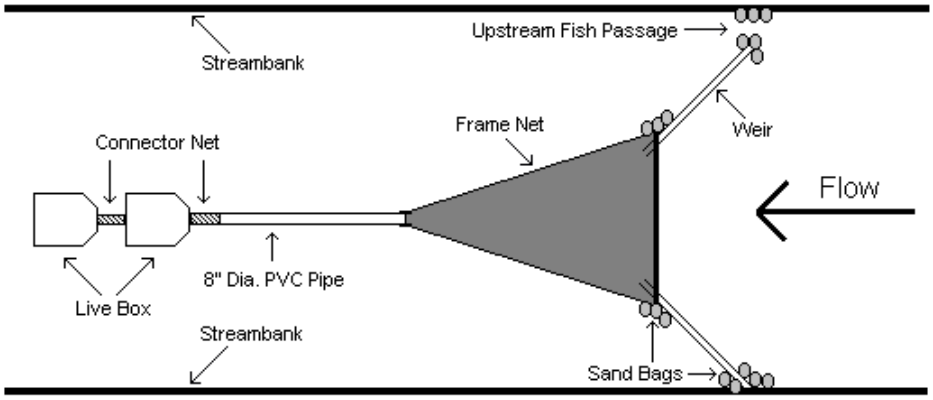

Figure 8. Schematic diagram of pipe/frame net trap deployed in McGarvey Creek, 1997-2007.

Figure 9. Live boxes used in pipe/frame net outmigrant trap, McGarvey Creek, 2008.

Figure 10. Pipe/frame net outmigrant trap deployed in McGarvey Creek, 2008.

Figure 11. Upstream fyke net trap deployed in McGarvey Creek, 2008.

3.4.2 Biological Sampling

YTFP checked the trap daily in the morning hours to reduce holding times and temperature-induced stress. Captured fish were removed from live boxes in small groups of 20-30 fish and placed in five-gallon buckets. Holding water was replenished regularly to maintain water quality. All salmonids were anaesthetized with tricane methanesulfonate (MS-222) and identified to species and age class. YTFP measured fork lengths from a random sample of up to 30 fish of each salmonid species, as well as inspected all captured salmonids for marks and PIT tags (see marking section, 3.4.3.1). Each captured salmonid was given a smolt condition factor as follows: parr (distinct parr marks), intermediate smolt (fading parr marks with some silvering), or smolt (no parr marks, distinct silver coloration and black pigment on fin margins). All non-salmonid species were enumerated and released downstream of the trap site, but results are not presented in this report.

3.4.3 Emigration Estimates

Annual emigration estimates were calculated for all salmonid species. Mark-recapture methods were utilized to estimate species-specific trapping efficiencies throughout each trapping season. These efficiencies enabled expansion of captured fish numbers to estimate the total number of emigrants by species during each season. Kennan et al. (1994) and Polos (1997) noted the following assumptions are made when conducting such a mark-recapture experiment:

(1) Marked fish continue their migration downstream after release

(2) Handling and marking fish will not affect their behavior
(3) Marked and unmarked fish are evenly distributed when they migrate past the trapping site and exhibit similar behavior (equal capture probability)
(4) Fish do not lose their marks prior to passing through trap site
(5) All marks are observed and recorded
(6) Mortality of marked fish prior to recapture is minimal

3.4.3.1 Marking

Anesthetized salmonids were marked with a partial fin clip (only the tips of selected fins were removed) using surgical scissors. To increase reliability of trap efficiency estimates, several different clips were used to enable tracking of marked fish from discrete weekly marking periods. After all marked fish recovered from the anesthesia, they were transported 500 feet upstream of the trap in buckets and released into the creek.

3.4.3.2 Trapping Efficiency Estimation

All marked and recaptured fish from the outmigrant trap were categorized by mark type and assigned discrete marking time-periods (weekly intervals). Trap efficiency estimates for each marking period were calculated using the following formula:

$E = R/M * 100$

where

M = number of fish marked from a given marking period

R = number of fish recaptured from a given marking period

Estimates from each marking period were calculated using Darroch Analysis with Rank Reduction (DARR 2.0) software (Bjorkstedt 2000, Bjorkstedt 2005).

3.5 Upstream Migration Trapping

The upstream migration trap was incorporated into the outmigrant trap in 2008 and in operation through 2009 (Figures 10 and 11). The trap was operated 24 hours a day, 7 days a week throughout each trapping season. The upstream trap was operated during the same dates as the outmigrant trap, and was subsequently periodically dismantled or damaged during high flows or storm events.

3.5.1 Equipment

A single 3 foot by 5 foot fyke net was deployed adjacent to the weir panels for the downstream migrant trap. Sandbags or weir panels were used to block fish movement around the upstream trap, ensuring that all fish moving upstream were captured in the trap (Figure 11).

3.5.2 Biological Sampling

Captured fish were removed and placed in five-gallon buckets for holding. Holding water was replenished regularly to maintain water quality. All salmonids were anaesthetized with tricane methanesulfonate (MS-222) and identified to species and age class. YTFP measured fork lengths from a random sample of up to 30 fish of each salmonid species. All salmonids were also inspected for marks and scanned for PIT tags. Each captured salmonid was given a smolt condition factor as follows: parr (distinct parr marks), intermediate smolt (fading parr marks with some silvering), or smolt (no parr marks, distinct silver coloration and black pigment on fin margins).

3.6 PIT Tag Monitoring

3.6.1 PIT Tag Marking

YTFP placed Passive Integrated Transponder (PIT) tags into salmonids in the McGarvey Creek drainage between 22-Sept-04 and 1-Mar-09 (Appendix 1). Species tagged during the study included juvenile coho, coastal cutthroat, and steelhead. All tags utilized during the study were 23 mm 134.2 kHz half duplex (HDX) for coastal cutthroat and steelhead and 13 mm 134.2 kHz full duplex tags for juvenile coho. All fish were anesthetized, measured for fork length, and weighed to the nearest 0.1 gram prior to surgery. All PIT tags were disinfected with Betadine solution and 3M Vetbond™ tissue adhesive was applied to the incision after tag insertion to promote tag retention and facilitate healing. In addition, all salmonids that were handled during trapping were scanned for PIT tags using a handheld scanner.

3.6.2 Remote PIT Tag Monitoring Stations

Three remote PIT tag monitoring systems were installed in McGarvey Creek to detect fish marked with HDX tags (Figure 2):

1. Lower mainstem downstream of the outmigrant trap
2. West Fork immediately upstream of the confluence with the mainstem
3. Upper mainstem immediately upstream of the confluence with the West Fork

The monitoring systems were designed by Oregon RFID and consisted of ruggedized, waterproof PDA readers connected to antennas configured as a pass-through rectangle (Figures 12 through 14). During 2006, PDA readers were replaced with high performance multiplexer readers also designed by Oregon RFID. However, due to multiple issues with firmware, dataloggers in the upper mainstem and west fork sites were not operational after installing the multiplexer readers. YTFP is still working with Oregon RFID to resolve the issues and attempt to salvage any stored data from the dataloggers.

Remote PIT Tag stations were installed and operational on the following dates:

Lower Mainstem

- 08-Jan-05 to 27-May-05
- 09-Nov-05 to 24-Dec-05
- 24-Mar-05 to 13-Apr-06
- 25-Apr-06 to 19-Dec-06
- 28-Jan-07 to 05-Apr-07
- 18-Dec-08 to current

Upper Mainstem

- 24-Oct-04 to 10-Nov-06

West Fork

- 14-Oct-04 to 23-Dec-04
- 01-Jan-05 to 10-Nov-06

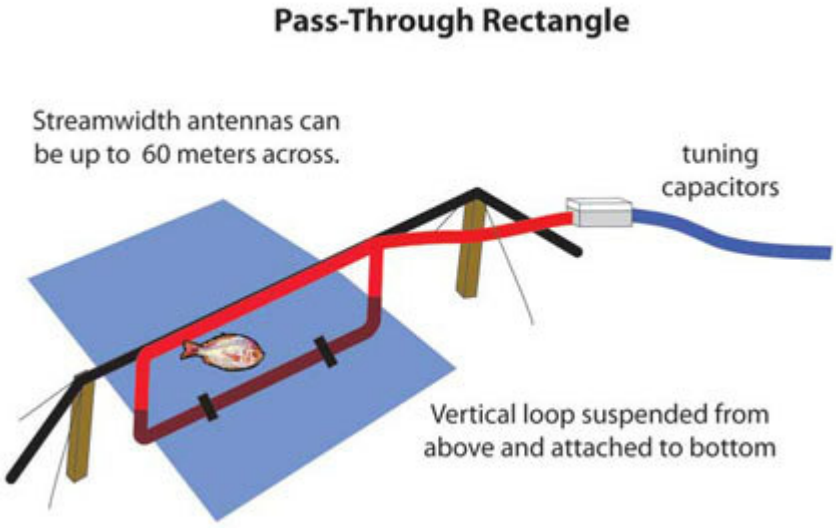

Figure 12. Diagram from Oregon RFID depicting the pass-through antenna design used in McGarvey Creek remote Passive Integrated Transponder (PIT) tag monitoring stations.

Figure 13. Looking downstream at Lower McGarvey pass-through antenna and housing box for tuning capacitor.

Figure 14. Multiplexer datalogger and handheld PDA used at all remote Passive Integrated Transponder (PIT) tag monitoring systems in McGarvey Creek.

4.0 RESULTS AND DISCUSSION

4.1 Adult Weir

During 2006, four adult salmonids (all coho) were captured between 14-Nov and 6-Dec (Table 2). All fish measured were between 28 – 32 inches in fork length, however, one escaped prior to handling. All handled fish were identified to sex (one female and two males). The three coho captured during November were moving upstream, and the coho captured in December was moving downstream and had already spawned. Two of the adults moving upstream in November were tagged with PIT tags in addition to floy tags. The coho PIT Tagged with #25873650 was detected on 22-Nov moving past the Lower McGarvey remote PIT tag detection system. None of the fish marked in the adult weir during 2006were recaptured during spawning surveys or trapping activities.

Nine adult coho were captured in the adult weir during 2007 between 30-Oct and 17-Dec (Table xx). All fish measured between 20.5 – 30 inches in length and sex was determined for six individuals (five males and one female). None of the fish were marked with additional PIT tags due to hardware problems encountered in our remote PIT tag monitoring stations. One fish marked on 8-Dec-07 was recaptured in the adult weir nine days later on 17-Dec-07.

Table 2. Summary of adult salmonids captured in the McGarvey Creek adult weir, 2006.

Fish #	Date	Species	Fork Length (inches)	Cond.	Sex	Mark Color	Floy #	PIT Tag #	Comments
1	14-Nov-07	CO	~28						Fish escaped from live pen
2	22-Nov-06	CO	31.5	1	F	Red	30	25873360	
3	22-Nov-06	CO	29	4	M	Red	36	25873650	
4	6-Dec-06	CO	32	5	M	NM			D/S heading, post spawn

Condition: **1**=*Bright Chrome* **2**=*Chome* **3**=*Bronze* **4**=*Dark* **5**=*Very Dark, poor cond*.

Table 3. Summary of adult salmonids captured in the McGarvey Creek adult weir, 2007.

Fish #	Date	Species	Fork Length (inches)	Cond.	Sex	Mark Color	Floy #	PIT Tag #	Comments
1	30-Oct-07	CO	30	1	M	Pink			
2	24-Nov-07	CO	20.5	1			97		
3	6-Dec-07	CO	28	2	M	Red	38		
4	6-Dec-07	CO	27	1	M	Red	41		
5	6-Dec-07	CO	27	1	F	Red	26		
6	6-Dec-07	CO	26	1	M	Red	32		
7	8-Dec-07	CO	25		M	Red	80		
8	17-Dec-07	CO	26			Red	40		
9	17-Dec-07	CO				Red	80		Recap
7	18-Dec-07	CO	25	1	M	Red	89		

Condition: **1**=*Bright Chrome* **2**=*Chome* **3**=*Bronze* **4**=*Dark* **5**=*Very Dark, poor cond*.

4.2 Spawning Surveys/Adult Escapement Estimation

This project revealed significant challenges associated with estimating adult escapement to McGarvey Creek. Issues that hindered mark/recapture estimation included: 1) small population sizes resulting in a low number of marked fish; and 2) the small population results in few fish (live or carcasses) being observed during spawner surveys as "recaptures". Survey conditions in McGarvey Creek were also challenging due to reduced visibility due to turbidity (i.e. suspended sediment and tannins).

YTFP observed ten adult coho and twelve redds during spawning surveys in the winter of 2006 – 2007. Three coho were observed in Reach 1 on 16-Nov-06 along with 2 new redds, and seven coho were observed on 29-Nov-06 in Reach 2. No redds were observed in Reach 2 on 29-Nov-06; however, 3 new redds were noted in Reach 1 on that date in addition to one carcass (Table 4). Seven new redds were recorded in Reach 2 on 2-Jan-07, but no fish were observed. No new redds, carcasses, or live fish were observed in McGarvey Creek after 2-Jan-07. No adult fish were observed in Reach 3 (West Fork) during the entire season. None of the adult coho marked at the adult weir during 2006 – 2007 were recaptured during spawning surveys.

During the winter of 2007 – 2008, 13 adult and jack coho were observed in McGarvey Creek between 9-Nov-07 and 2-Jan-08, with the peak count occurring during the week of 2-Jan-08 (Table 5). A total of 24 redds were observed during this time period, with a total of 14 observed in Reach 2 and five observed in both Reach 1 and 3. These redds observed prior to 2-Jan-08 were assumed to be from coho salmon because they were too early for steelhead spawning, and no chinook were observed at the weir, during spawning surveys, or as juveniles in the

downstream migrant trap the following spring. Other salmonids observed included an adult steelhead in Reach 1 on 20-Feb-08, and one adult coastal cutthroat in Reach 2 on 5-Mar, 12-Mar, and 25-Mar-08. A redd was also observed in Reach 2 on 5-Mar-08, presumably from cutthroat spawning activity. Three of the nine marked coho were observed during spawning surveys. Three coho carcasses were recovered, one of which had been marked at the adult weir. Due to the inability to read the unique fish identification number on the tag/flagging while conducting the spawner surveys, it is not known whether the marked carcass was one of the marked fish observed during the previous spawning ground surveys.

Unfortunately, because of the small number of adult fish returning to the system (resulting in small sample sizes for marked and recaptured fish), the visibility issues associated with making underwater observations in McGarvey Creek, and the use of Hi-Viz arctic flagging to mark fish, we have minimal confidence in the ability to estimate adult escapement to McGarvey Creek during the study period. The use of Hi-Viz flagging led to an increased ability to observed marked fish relative to unmarked fish during spawner surveys. This likely resulted in a violation of the assumption of mark/recapture estimation, resulting in a bias that would likely underestimate the population abundance.

Due to the multiple confounding factors in estimating adult escapement, the method that we have the most confidence in for estimating returning adults is using the number of redds that were observed during spawning surveys. Given that no adult or juvenile chinook were observed in McGarvey Creek during the study period, we assumed that all redds observed between November and January were associated with adult coho salmon. The number of redds observed was multiplied by a factor of two based on the assumption of two fish per redd. This methodology is used for generating the CDFG megatable to estimate fall chinook escapement to mid-Klamath tributaries, as well as other areas such as Horse Linto and Willow Creeks. Using this methodology, an estimated 24 adult coho spawned in McGarvey Creek during 2006 – 2007, and 50 adult coho spawned during the 2007 – 2008 season. Analysis of the mark/recapture data for 2007 - 2008 using the Lincoln-Peterson mark/recapture estimator (URL http://academic.hws.edu/bio/oldsite/Pages/Petersen2.html) pruduces an estimate of 34 adult spawners (95% confidence interval of 21 – 246 adults). Use of this methodology is less than optimal for multiple mark/recapture events but is included for comparison purposes.

Table 4. Spawning survey data by reach and McGarvey Creek discharge as reported by Yurok Tribe Environmental Program Real-Time Monitoring, 2006-2007.

Date	Reach	Chinook		Coho		Steelhead		Adult Cutthroat (>12")	New Redds	Carcasses	Discharge At Gage Station
		Adult	Jack	Adult	Jack	Adult	1/2 pounder				
2-Nov-06	1	0	0	0	0	0	0	0	0	0	18cfs
2-Nov-06	2	0	0	0	0	0	0	0	0	0	
2-Nov-06	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
9-Nov-06	1	0	0	0	0	0	0	0	0	0	16cfs
9-Nov-06	2	0	0	0	0	0	0	0	0	0	
9-Nov-06	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
16-Nov-06	1	0	0	3	0	0	0	0	2	0	32cfs
16-Nov-06	2	0	0	0	0	0	0	0	0	0	
16-Nov-06	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**2**	**0**	
29-Nov-06	1	0	0	0	0	0	0	0	3	1	45cfs
29-Nov-06	2	0	0	7	0	0	0	0	0	0	
29-Nov-06	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**3**	**1**	
7-Dec-06	1	0	0	0	0	0	0	0	0	0	14cfs
7-Dec-06	2	0	0	0	0	0	0	0	0	0	
7-Dec-06	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
14-Dec-06	1	0	0	0	0	0	0	0	0	0	200cfs
14-Dec-06	2	0	0	0	0	0	0	0	0	0	
14-Dec-06	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
19-Dec-06	1	0	0	0	0	0	0	0	0	0	70cfs
19-Dec-06	2	0	0	0	0	0	0	0	0	0	
19-Dec-06	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
2-Jan-07	1	0	0	0	0	0	0	0	0	0	23cfs
2-Jan-07	2	0	0	0	0	0	0	0	7	0	
2-Jan-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	
17-Jan-07	1	0	0	0	0	0	0	0	0	0	14cfs
17-Jan-07	2	0	0	0	0	0	0	0	0	0	
17-Jan-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
24-Jan-07	1	0	0	0	0	0	0	0	0	0	10cfs
24-Jan-07	2	0	0	0	0	0	0	0	0	0	
24-Jan-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
31-Jan-07	1	0	0	0	0	0	0	0	0	0	8cfs
31-Jan-07	2	0	0	0	0	0	0	0	0	0	
31-Jan-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
7-Feb-07	1	0	0	0	0	0	0	0	0	0	12cfs
7-Feb-07	2	0	0	0	0	0	0	0	0	0	
7-Feb-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
14-Feb-07	1	0	0	0	0	0	0	0	0	0	20cfs
14-Feb-07	2	0	0	0	0	0	0	0	0	0	
14-Feb-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Table 4, continued.

Date	Reach	Chinook		Coho		Steelhead		Adult Cutthroat (>12")	New Redds	Carcasses	Discharge At Gage Station
		Adult	Jack	Adult	Jack	Adult	1/2 pounder				
21-Feb-07	1										85cfs
21-Feb-07	2	Surveys Cancelled Due to High Flows/Poor Water Visibility									
21-Feb-07	3										
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
28-Feb-07	1	0	0	0	0	0	0	0	0	0	55cfs
28-Feb-07	2	0	0	0	0	0	0	0	0	0	
28-Feb-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
7-Mar-07	1	0	0	0	0	0	0	0	0	0	23cfs
7-Mar-07	2	0	0	0	0	0	0	0	0	0	
7-Mar-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
12-Mar-07	1	0	0	0	0	0	0	0	0	0	14cfs
12-Mar-07	2	0	0	0	0	0	0	0	0	0	
12-Mar-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
21-Mar-07	1	0	0	0	0	0	0	0	0	0	13cfs
21-Mar-07	2	0	0	0	0	0	0	0	0	0	
21-Mar-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
28-Mar-07	1	0	0	0	0	0	0	0	0	0	30cfs
28-Mar-07	2	0	0	0	0	0	0	0	0	0	
28-Mar-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
4-Apr-07	1	0	0	0	0	0	0	0	0	0	14cfs
4-Apr-07	2	0	0	0	0	0	0	0	0	0	
4-Apr-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
11-Apr-07	1	0	0	0	0	0	0	0	0	0	19cfs
11-Apr-07	2	0	0	0	0	0	0	0	0	0	
11-Apr-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
18-Apr-07	1	0	0	0	0	0	0	0	0	0	20cfs
18-Apr-07	2	0	0	0	0	0	0	0	0	0	
18-Apr-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
25-Apr-07	1	0	0	0	0	0	0	0	0	0	18cfs
25-Apr-07	2	0	0	0	0	0	0	0	0	0	
25-Apr-07	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Season Total		**0**	**0**	**10**	**0**	**0**	**0**	**0**	**12**	**1**	

Table 5. Spawning survey data by reach and McGarvey Creek discharge as reported by Yurok Tribe Environmental Program Real-Time Monitoring, 2007-2008.

		Chinook		Coho		Steelhead		Adult			Discharge At
Date	**Reach**	Adult	Jack	Adult (# marked at Weir)	Jack	Adult	1/2 pounder	**Cutthroat (>12")**	**New Redds**	**Coho Carcasses (# marked at weir)**	**Gage Station**
11/9/2007	1	0	0	0	0	0	0	0	5	0	3cfs
11/9/2007	2	0	0	0	0	0	0	0	0	0	
11/9/2007	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	
11/16/2007	1	0	0	0	0	0	0	0	0	0	14cfs
11/16/2007	2	0	0	0	0	0	0	0	0	0	
11/16/2007	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
11/24/2007	1	0	0	0	0	0	0	0	0	0	15cfs
11/24/2007	2	0	0	0	0	0	0	0	0	0	
11/24/2007	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
11/29/2007	1	0	0	0	0	0	0	0	0	0	9cfs
11/26/2007	2	0	0	0	0	0	0	0	0	0	
11/26/2007	3	0	0	0	0	0	0	0	0	0	11cfs
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
12/3/2007	1	0	0	0	0	0	0	0	0	0	16cfs
12/3/2007	2	0	0	0	0	0	0	0	0	0	
12/3/2007	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
12/14/2007	1	0	0	0	0	0	0	0	0	0	11cfs
12/13/2007	2	0	0	3 (1)	0	0	0	0	5	0	
12/13/2007	3	0	0	0	0	0	0	0	0	1 (0)	12cfs
	Total:	**0**	**0**	**3 (1)**	**0**	**0**	**0**	**0**	**5**	**1**	
12/27/2007	1	0	0	0	0	0	0	0	0	0	28cfs
12/28/2007	2	0	0	3 (1)	1	0	0	0	6	0	41cfs
12/27/2007	3	0	0	1	0	0	0	0	5	1 (0)	
	Total:	**0**	**0**	**4 (1)**	**1**	**0**	**0**	**0**	**11**	**1**	
1/2/2008	1	0	0	0	0	0	0	0	0	1 (1)	26cfs
1/2/2008	2	0	0	4 (1)	0	0	0	0	3	0	
1/2/2008	3	0	0	1 (0)	0	0	0	0	0	0	
	Total:	**0**	**0**	**5 (1)**	**0**	**0**	**0**	**0**	**3**	**1**	
1/15/2008	1	0	0	1 (0)	0	0	0	0	0	0	26cfs
1/19/2008	2	0	0	0	0	0	0	0	0	0	15cfs
1/15/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	
1/24/2008	1	0	0	0	0	0	0	0	0	0	10cfs
1/24/2008	2	0	0	0	0	0	0	0	0	0	
1/24/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
1/31/2008	1										200cfs
1/31/2008	2			Surveys Cancelled Due to High Flows/Poor Water Visibility							
1/31/2008	3										
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
2/6/2008	1	0	0	0	0	0	0	0	0	0	40cfs
2/6/2008	2	0	0	0	0	0	0	0	0	0	
2/6/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
2/13/2008	1	0	0	0	0	0	0	0	0	0	15cfs
2/13/2008	2	0	0	0	0	0	0	0	0	0	
2/13/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Table 5, continued.

Date	Reach	Chinook		Coho		Steelhead		Adult Cutthroat (>12")	New Redds	Carcasses	Discharge At Gage Station
		Adult	Jack	Adult	Jack	Adult	1/2 pounder				
2/20/2008	1	0	0	0	0	1	0	0	0	0	12cfs
2/20/2008	2	0	0	0	0	0	0	0	0	0	
2/20/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	
2/28/2008	1	0	0	0	0	0	0	0	0	0	18cfs
2/28/2008	2	0	0	0	0	0	0	0	0	0	
2/28/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
3/5/2008	1	0	0	0	0	0	0	0	0	0	14cfs
3/5/2008	2	0	0	0	0	0	0	1	1	0	
3/5/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	
3/12/2008	1	0	0	0	0	0	0	0	0	0	10cfs
3/12/2008	2	0	0	0	0	0	0	1	0	0	
3/12/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	
3/19/2008	1										56cfs
3/19/2008	2	Surveys Cancelled Due to High Flows/Poor Water Visibility									
3/19/2008	3										
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
3/25/2008	1	0	0	0	0	0	0	0	0	0	25cfs
3/25/2008	2	0	0	0	0	0	0	1	0	0	
3/25/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	
4/2/2008	1	0	0	0	0	0	0	0	0	0	20cfs
4/2/2008	2	0	0	0	0	0	0	0	0	0	
4/2/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
4/9/2008	1	0	0	0	0	0	0	0	0	0	8cfs
4/9/2008	2	0	0	0	0	0	0	0	0	0	
4/9/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
4/16/2008	1	0	0	0	0	0	0	0	0	0	7cfs
4/16/2008	2	0	0	0	0	0	0	0	0	0	
4/16/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
4/23/2008	1	0	0	0	0	0	0	0	0	0	16cfs
4/23/2008	2	0	0	0	0	0	0	0	0	0	
4/23/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
4/30/2008	1	0	0	0	0	0	0	0	0	0	8cfs
4/30/2008	2	0	0	0	0	0	0	0	0	0	
4/30/2008	3	0	0	0	0	0	0	0	0	0	
	Total:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Season Total		**0**	**0**	**13 (3)**	**1**	**1**	**0**	**3**	**25**	**3 (1)**	

4.3 Summer Abundance Inventory

4.3.1 Chinook Salmon

Chinook salmon were not observed during either year in any reach.

4.3.2 Coho Salmon

YTFP has been conducting summer abundance estimates for juvenile coho in McGarvey Creek since 2001. Data indicates that there is a strong cohort (occurring every three years) which occurred during the summers of 2002, 2005, and 2008 (Hans Voight 2006, YTFP Unpublished Data)(Figure 15). During 2007, juvenile coho estimates (+/- 95% confidence intervals) for Lower McGarvey, Upper McGarvey, and the West Fork were 931 (+/- 492), 476 (+/- 426), and 252 (+/- 190) (respectively). Estimates for 2008 for the same reaches were 1824 (+/- 1636), 1063 (+/- 1023), and 1095 (+/- 600) juvenile coho (respectively)(Figure 16). Deep pool dive results indicate that juvenile coho abundance was greatest in pools in Lower McGarvey, where 200 juvenile coho were observed in 2007 and 346 in 2008. No juvenile coho were observed during dives in Upper McGarvey during 2007 or 2008, or in the West Fork during 2007; however, 57 juvenile coho were observed in the West Fork during 2008 surveys.

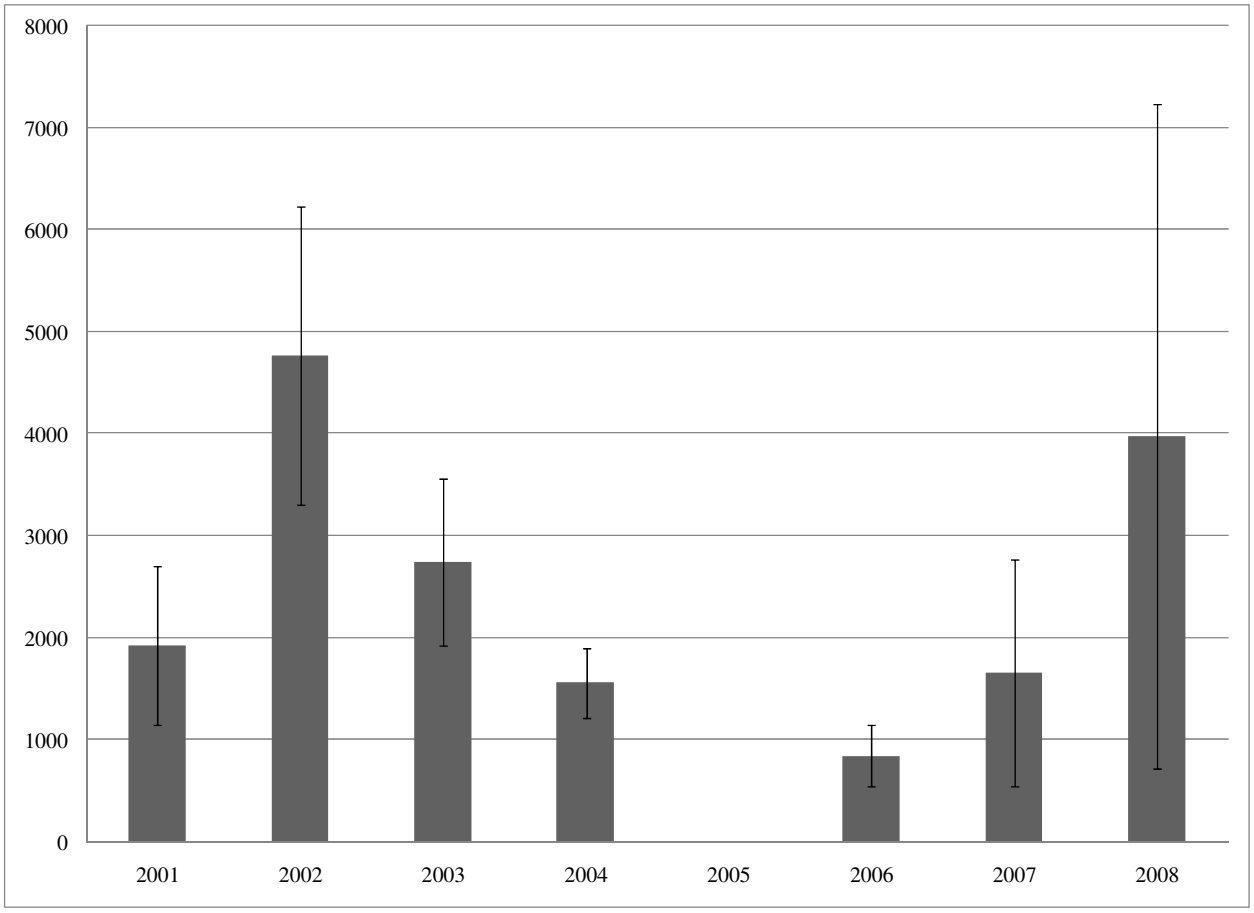

Figure 15. Estimated abundance of juvenile coho in McGarvey Creek (all reaches combined) for 2001 – 2004 and 2005 – 2008.

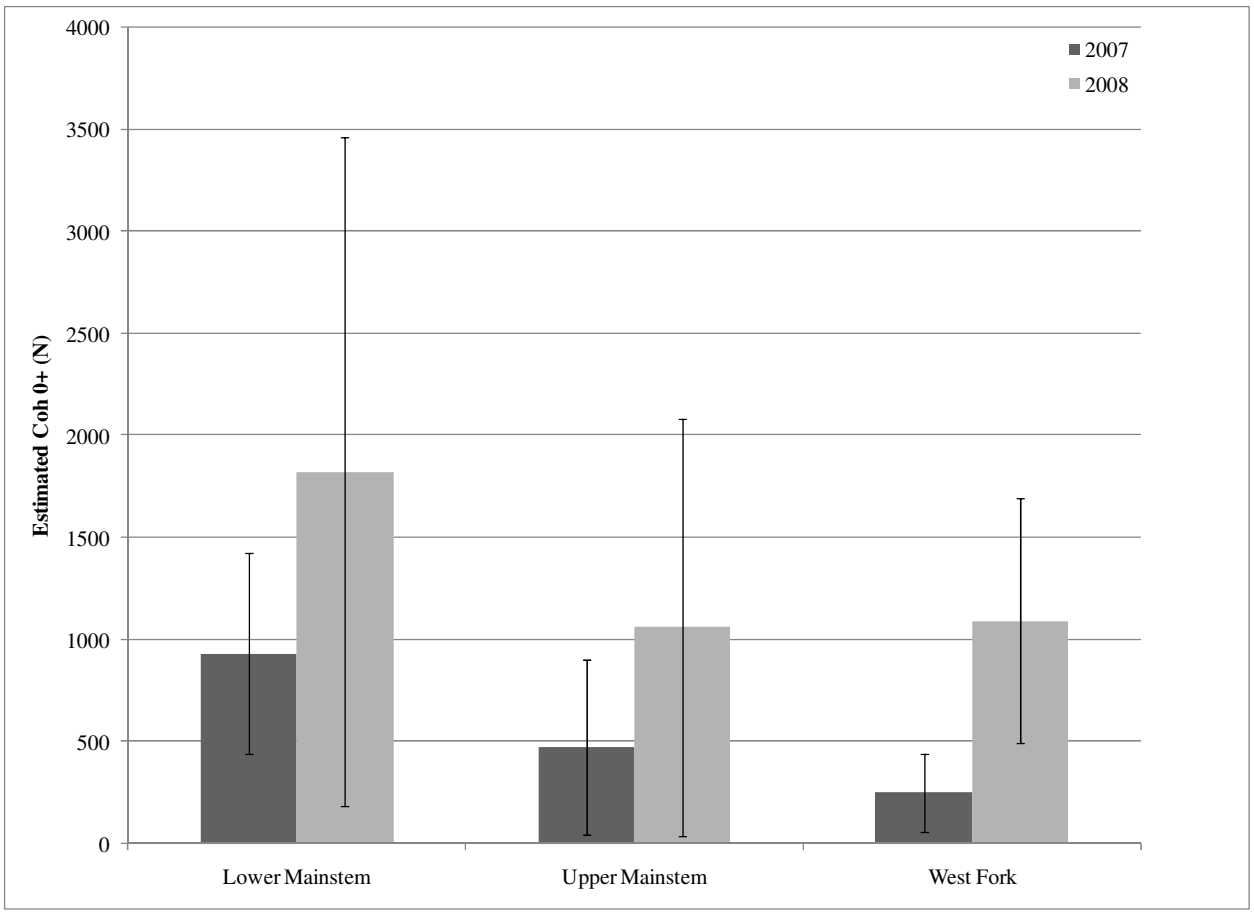

Figure 16. Estimated abundance of juvenile coho in Lower Mainstem, Upper Mainstem, and West Fork during 2007 and 2008.

4.3.3 Coastal Cutthroat and Steelhead Trout

Total estimated abundance of age 1+ trout in the McGarvey Creek watershed during late summer of 2007 and 2008 was slightly less than previously reported results (Voight 2006). In 2007, McGarvey Creek held an approximate 706 age 1+ trout +/- 441 (95% confidence interval). Results from 2008 were similar, with an estimated 542 +/- 373 age 1+ trout utilizing McGarvey Creek. Previous results from 2002 – 2006 has shown trout 1+ estimates to vary between approximately 800 and 1,300 individuals in McGarvey Creek (Voight 2006).

Results from 2007 and 2008 were separated into three categories: 1) 1+ steelhead, 2) 1+ cutthroat, and 3) 0+ trout. A total of 200 1+ steelhead +/- 111 (95% confidence interval) utilized McGarvey Creek during 2007, with approximately equal numbers estimated for the Lower and Upper Mainstem reaches and none estimated to be in the West Fork. Results from 2008 showed fewer 1+ steelhead utilizing McGarvey Creek, with only 85 (+/- 109) individuals estimated, with 64 estimated for the Lower reach, 21 estimated in the Upper reach, and none estimated to be utilizing the West Fork (Figure 17). Observations during DP dives during 2007 and 2008 only resulted in fifteen 1+ steelhead being observed—all during 2008 in the Lower Mainstem.

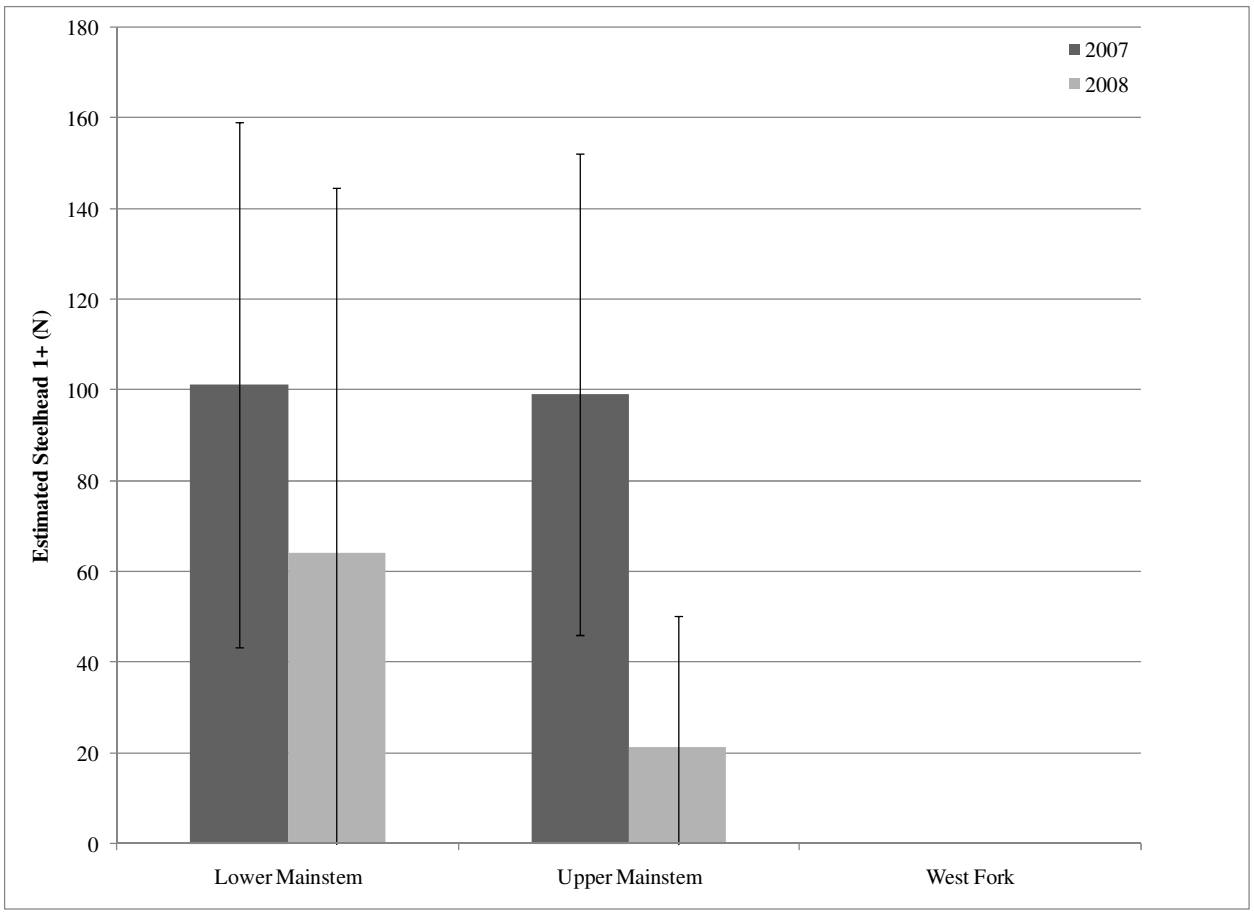

Figure 17. Estimated abundance of 1+ steelhead in Lower Mainstem, Upper Mainstem, and West Fork during 2007 and 2008.

Coastal cutthroat were more abundant in McGarvey Creek during 2007 and 2008 than steelhead. Abundance estimates for age 1+ coastal cutthroat were 505 (+/- 331) during 2007 and 456 (+/- 264) during 2008. Spatial distribution between 2007 and 2008 was similar, with the highest abundance of 1+ coastal cutthroat estimated to be residing in the Upper Mainstem, followed by the Lower Mainstem, and the lowest abundance in the West Fork (Figure 18). Observations in DP dive counts resulted in the highest observations of 1+ coastal cutthroat in the Lower Mainstem during 2007, with 36 individuals observed. Divers in the Upper Mainstem observed 18 age 1+ coastal cutthroat in 2007, and none were observed in the West Fork during that year. During 2008, divers sampling DPs observed 4 coastal cutthroat age 1+ in the Lower Mainstem, 18 individuals in the Upper Mainstem, and 9 in the West Fork.

Abundance estimates for age 0+ trout were not calculated for 2007 and 2008, and very few were observed during DP dives. Only three age 0+ trout were observed during DP dives, all in the Lower Mainstem during 2008.

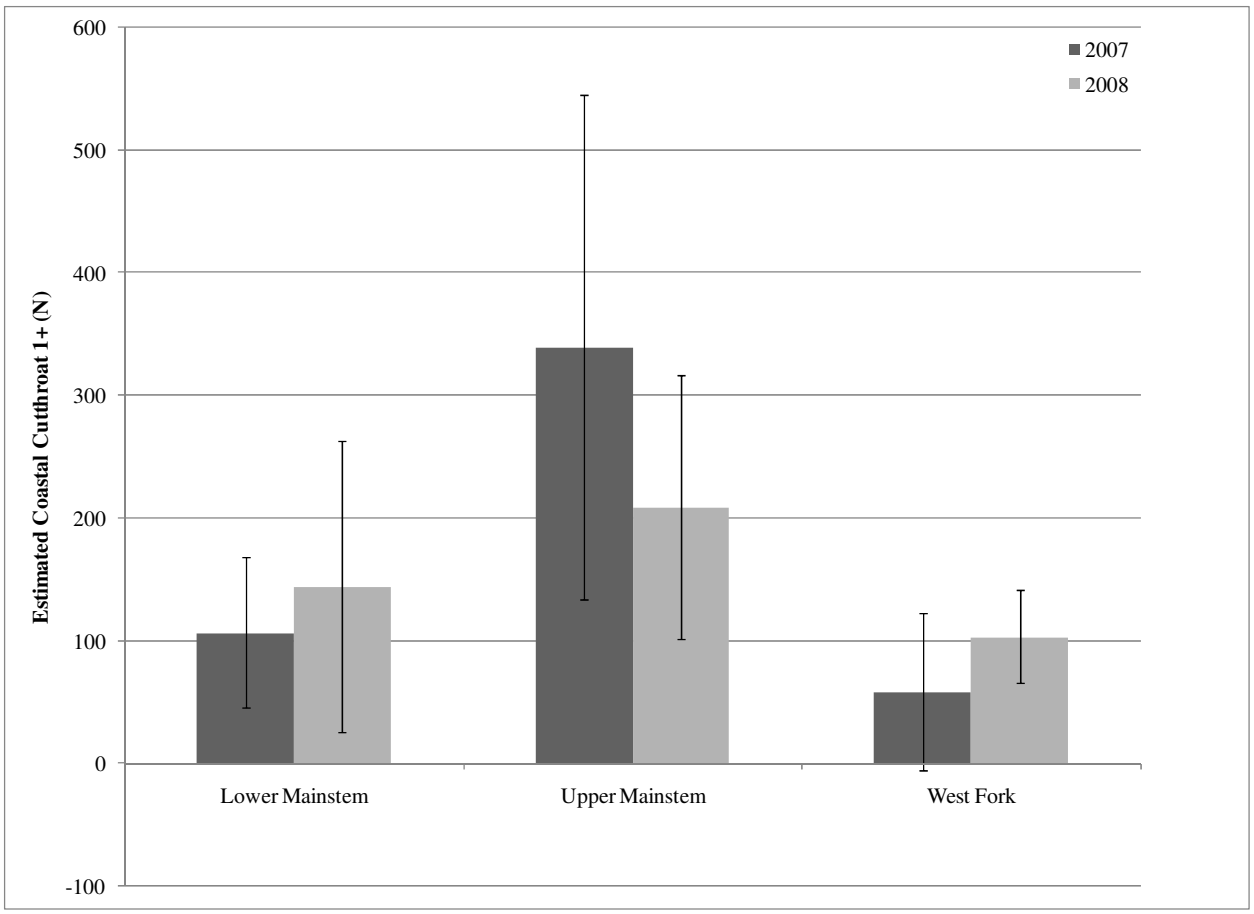

Figure 18. Estimated abundance of 1+ coastal cutthroat in Lower Mainstem, Upper Mainstem, and West Fork during 2007 and 2008.

4.4 Outmigrant Trapping

Past sampling efforts in McGarvey Creek has indicated that substantial upstream and downstream fish movement was occurring prior to the typically assumed emigration period. A major component of this life cycle monitoring project was to test the ability of comparing population estimates between various life stages of each salmonid species to analyze between-life stage survival. As a result, YTFP felt it was important to better understand how much movement was occurring between summer abundance inventories and outmigrant trapping the following spring since significant movement into/out of the system during this time period could invalidate such a comparison. Table 6 and Figure 19 summarize fish captured and emigration estimates from outmigrant trapping between January and June of 2008.

Table 6. Total number of juvenile salmonids captured by week in the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

	# Days		Trout	Steelhead	Coho		
Week Ending	Sampled	Chinook	YOY	1+ & Older	YOY	Yearling	Cutthroat
27-Jan-08	4	0	0	199	0	6	10
03-Feb-08	4	0	0	179	0	8	14
10-Feb-08	3	0	0	69	0	9	23
17-Feb-08	7	0	0	132	2	10	20
24-Feb-08	7	0	0	148	0	12	22
2-Mar-08	7	0	0	145	16	19	33
9-Mar-08	7	0	0	97	23	17	25
16-Mar-08	6	0	0	157	40	18	66
23-Mar-08	6	0	0	24	34	4	60
30-Mar-08	7	0	0	35	381	3	42
6-Apr-08	7	0	0	217	429	7	155
13-Apr-08	7	0	0	403	212	21	329
20-Apr-08	7	0	0	174	9	13	122
27-Apr-08	7	0	0	115	11	68	155
4-May-08	7	0	0	124	12	90	102
11-May-08	7	0	0	169	20	118	106
18-May-08	7	0	0	94	2	43	36
25-May-08	7	0	0	17	3	40	6
1-Jun-08	7	0	0	6	0	22	0
8-Jun-08	7	0	0	4	2	3	4
15-Jun-08	7	0	0	0	11	3	4
22-Jun-08	7	0	0	0	0	0	0
29-Jun-08	7	0	0	0	2	0	0
Trap pulled on 30-June-08 due to low fish capture							
Total:	149	0	0	2,508	1,209	534	1,334

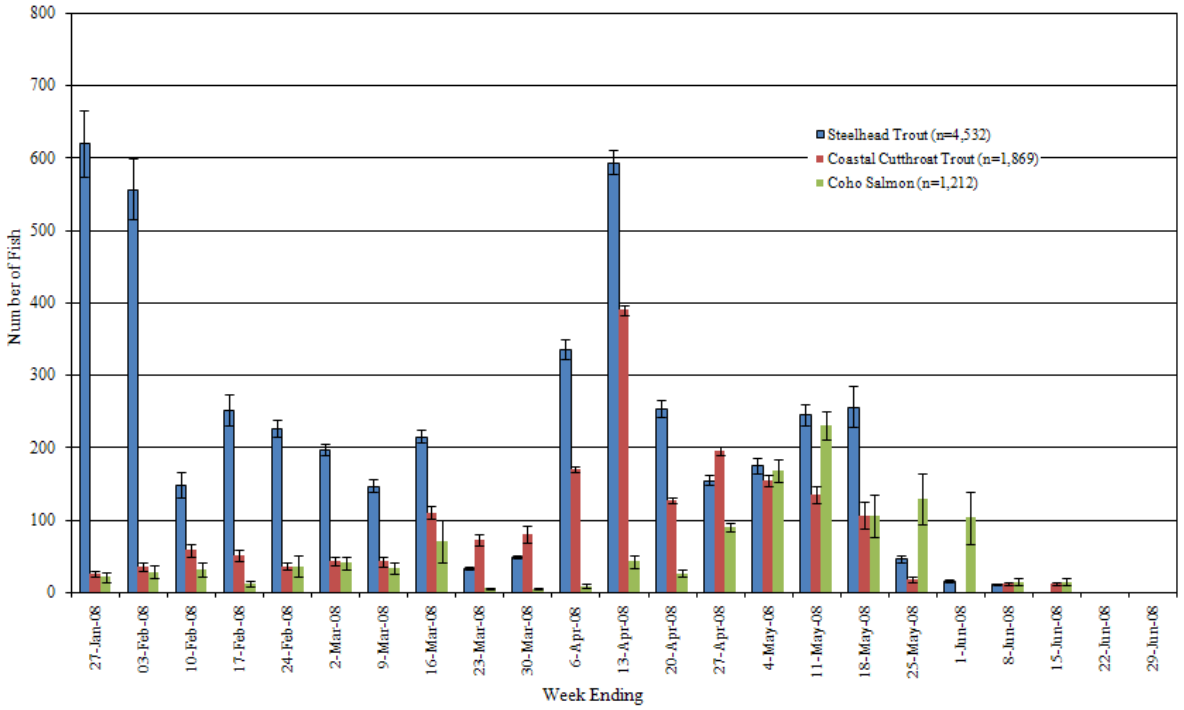

Figure 19. Estimated weekly number (+/- SD) of age 1+ and older coho salmon, steelhead, and coastal cutthroat trout emigrating past the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

YTFP re-installed the outmigrant trap on 05-Nov-2008 in conjunction with the onset of fall rain and resumed streamflow in lower McGarvey Creek. The trap was run continuously through the end of February 2009 (the end of contract period), with the exception of a three-week down period beginning 29-Dec-2008 when the trap was heavily damaged by flood flows and had to be rebuilt (Table 7, Figure 20). YTFP is continuing to operate these traps through the end of the spring emigration season with non-CDFG funding but contractual deadlines require that this report be written before this trapping effort can be completed and data included for comparative purposes.

Table 7. Total number of juvenile salmonids captured by week in the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

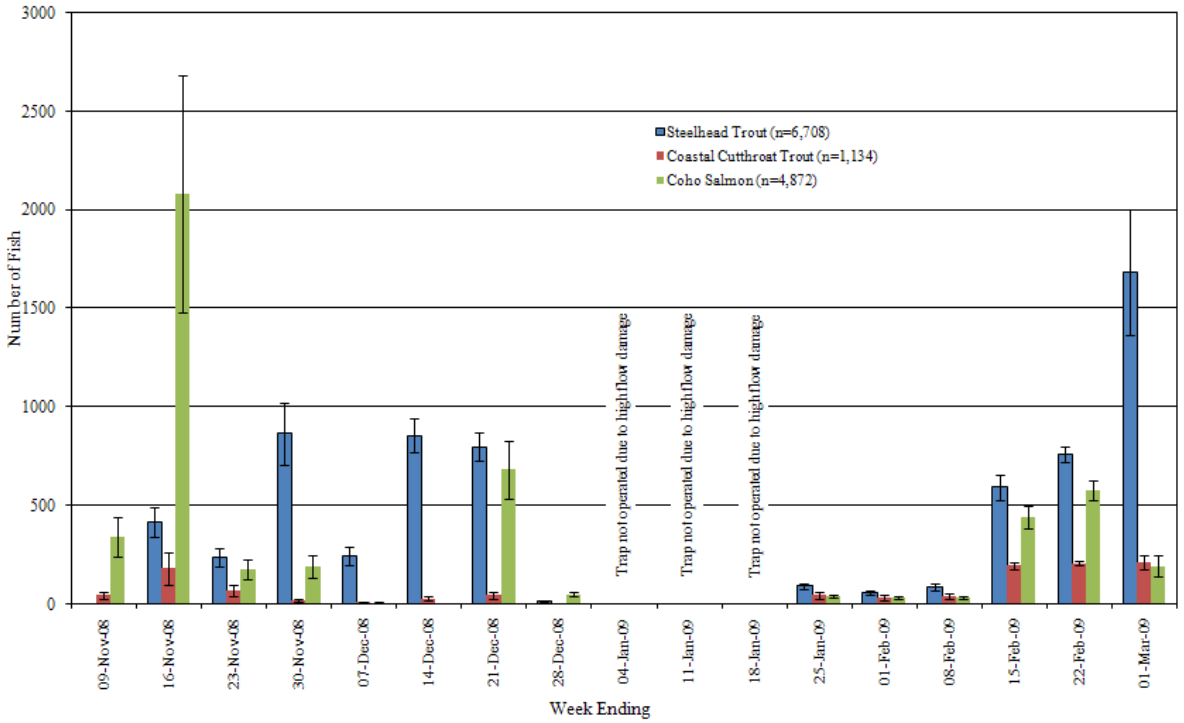

Figure 20. Estimated weekly number (+/- SD) of BY07 and older coho salmon, steelhead, and coastal cutthroat trout emigrating past the outmigrant trap, McGarvey Creek, Fall 2008 -Winter 2009.

This was the 12th consecutive season that YTFP has conducted spring outmigrant trapping in lower McGarvey Creek (Figure 21). Relatively consistent numbers of age 1+ and older steelhead and coastal cutthroat trout emigrated past the trap each year (Figure 21). Coho salmon yearling emigrants were present every year, although their estimated numbers varied significantly throughout the study period. Estimated numbers of emigrant chinook salmon young-of-the-year (YOY) varied widely, with alternating periods of high abundance and extremely low or no abundance observed throughout the study period (Figure 21). Detailed results and discussion are presented below by species.

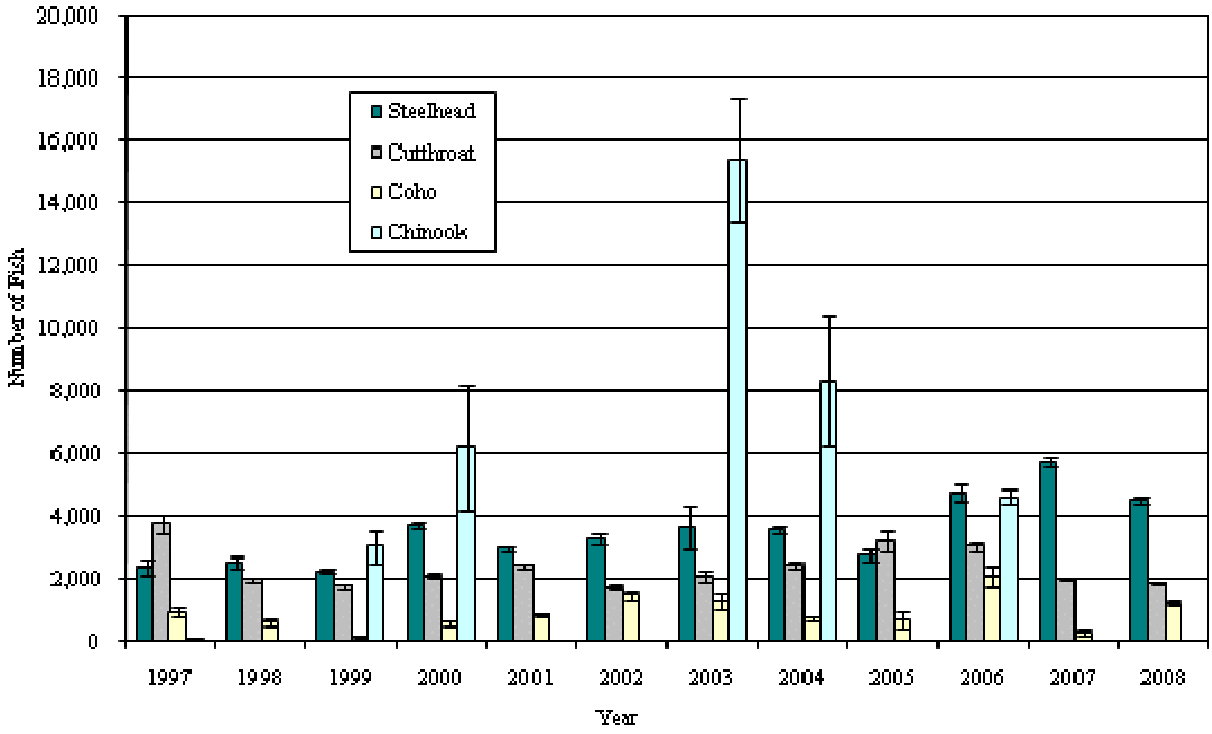

Figure 21. Estimated number of yearling and older steelhead, coastal cutthroat trout, coho salmon and chinook salmon emigrating past the lower M-10 bridge in McGarvey Creek, 1997 - 2008.

4.4.1 Coho Salmon

The estimated number of coho salmon yearlings emigrating during the spring trapping period has varied substantially over the 12 year period of record (Figure 22). Peak yearly emigration was documented during 2006 (N estimate =2,085 +/-309), while the lowest annual emigration estimate was in 1999 (N estimate =146 +/-47). The estimated number of coho yearling emigrants for 2008 (N estimate =1,212 +/-73) was above the estimated 12-year average observed during outmigration trapping (Figure 22).

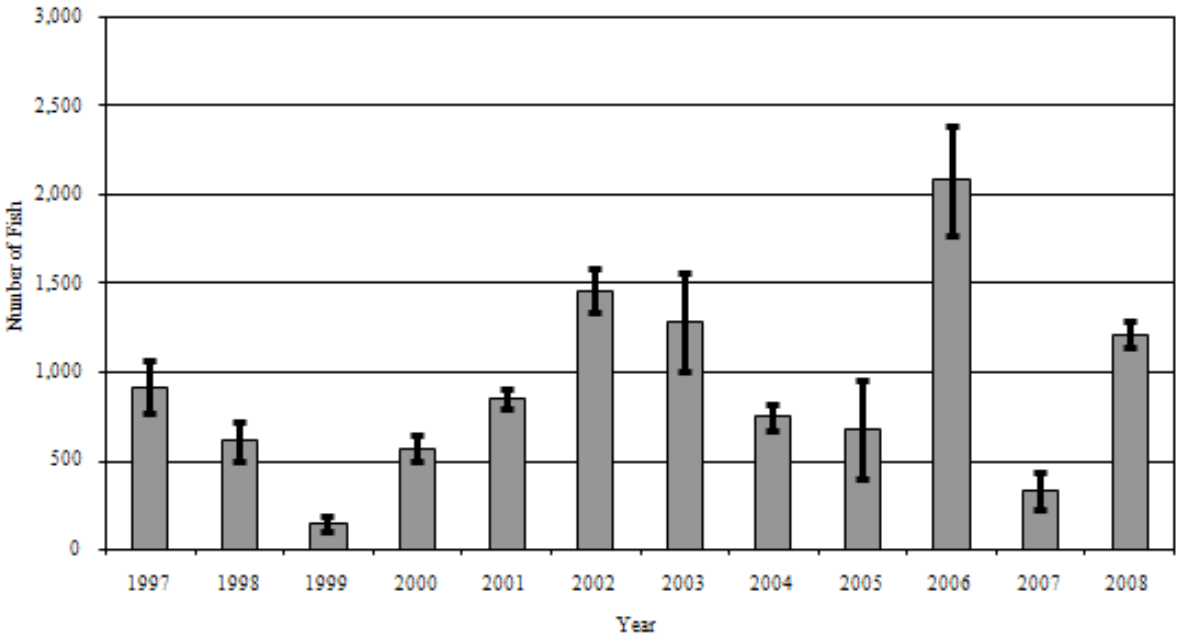

Figure 22. Estimated number (+/- S.D.) of coho salmon yearlings emigrating past the outmigrant trap, McGarvey Creek, 1997 - 2008.

4.4.1.1 Winter 2007 - Spring 2008

A total of 534 coho salmon yearlings were captured during 149 days of sampling between January and June of 2008 (Table 8). The peak weekly capture of emigrating coho yearlings occurred during the week ending 11-May-08 (n=118). Smaller numbers of emigrating coho were observed throughout the trapping period. Coho salmon fry were first captured during the week ending 17-Feb-08 (Table 7). The peak weekly capture of coho fry occurred during week ending 06-Apr-08 (n=429). Coho fry continued to be captured in small numbers through the end of the trapping season.

Trap efficiency for coho salmon yearlings during the 2008 trapping season ranged from 21% during the first half of June to 71% during the last half of March (Table 8). Based on these efficiencies, an estimated 1,212 (+/-83) coho salmon yearlings emigrated past the trap site, and comprised 16% of all age 1+ and older salmonids emigrating past the McGarvey Creek trap during the sampling period.

Relatively small but consistent capture numbers during the first weeks of trapping suggest that coho salmon yearlings were emigrating past the trap site prior to trap installation on 24-Jan-2008. Emigration peaked noticeably during the month of May with a lesser peak occurring during the middle of March (Table 8; Figure 23).

Table 8. Mark-recapture summary for coho salmon yearlings captured in the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

Mark Period	Week Ending	# of Days Marked	# Captured	# Marked	# Recaptured	Trap Efficiency (%)	Estimated # Outmigrants	Variance	Standard Deviation
1	27-Jan-08	4	6	5	0	0.29[1]	21	714.0[P]	26.7[P]
2	03-Feb-08	4	8	7	1	0.29[1]	28	714.0[P]	26.7[P]
3	10-Feb-08	3	9	9	5	0.29[1]	32	714.0[P]	26.7[P]
4	17-Feb-08	7	10	10	7	0.86	12	22.4	4.7
5	24-Feb-08	7	12	12	4	0.33	36	192.0	13.9
6	2-Mar-08	7	19	19	9	0.47	40	73.0	8.5
7	9-Mar-08	7	17	17	9	0.51	33	53.8	7.3
8	16-Mar-08	6	18	17	4	0.26	70	877.5	29.6
9	23-Mar-08	6	4	4	3	0.71[2]	6	2.7[P]	1.6[P]
10	30-Mar-08	7	3	3	2	0.71[2]	4	2.7[P]	1.6[P]
11	6-Apr-08	7	7	7	5	0.80	9	8.9	3.0
12	13-Apr-08	7	21	21	12	0.49[3]	42	181.6[P]	13.5[P]
13	20-Apr-08	7	13	13	6	0.49[3]	26	181.6[P]	13.5[P]
14	27-Apr-08	7	68	68	50	0.75	90	31.5	5.6
15	4-May-08	7	90	90	48	0.53	168	238.0	15.4
16	11-May-08	7	118	118	60	0.51	230	370.2	19.2
17	18-May-08	7	43	43	17	0.41	106	843.3	29.0
18	25-May-08	7	40	40	12	0.31	128	1209.0	34.8
19	1-Jun-08	7	22	22	4	0.21[4]	103	2,133.2[P]	46.2[P]
20	8-Jun-08	7	3	3	1	0.21[4]	14	2,133.2[P]	46.2[P]
21	15-Jun-08	7	3	3	1	0.21[4]	14	2,133.2[P]	46.2[P]
22	22-Jun-08	7	0	0	0	-	0	-	-
23	29-Jun-08	7	0	0	0	-	0	-	-
			Trap pulled on 30-June-08 due to low fish capture						
	Totals:	149	534	531	260	0.49	1,212	6,951.1	83.4

[#] - Estimated trap efficiency for pooled marking periods

[P] - Estimated variance and standard deviation for pooled marking periods

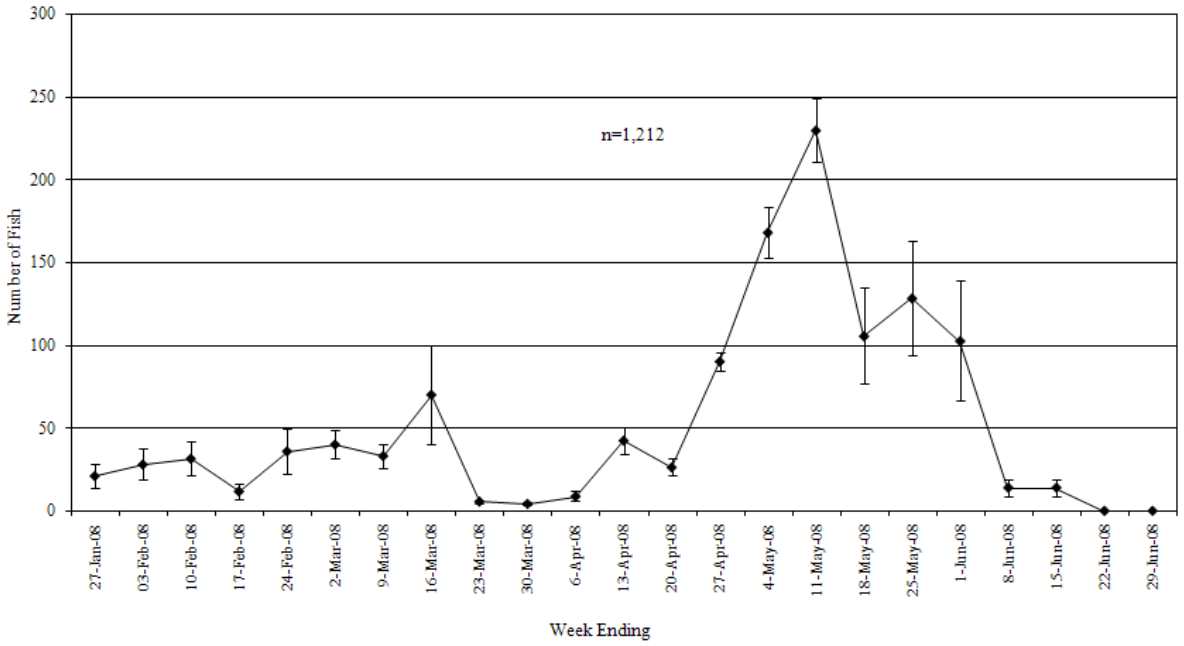

Figure 23. Estimated weekly number (+/- SD) of coho salmon yearlings emigrating past the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

Mean weekly fork lengths of coho salmon yearlings ranged between 81.5 mm (week ending 27-Jan-08) to 114 mm (week ending 18-May-08)(Table 9). Coho yearling size increased gradually throughout the trapping season until mid-May, at which time the average size of captured fish leveled off for the remainder of the spring trapping season (Figure 24).

Mean fork length of captured young-of-the-year (YOY) coho salmon remained relatively stable between their initial capture in late February and mid-April, ranging from 36.2 – 38.2 mm (Table 9). A steady increase in growth of captured YOY coho was observed throughout the remainder of the trapping season (Figure 25). Mean fork length was largest for fish captured in late June at approximately 67 mm (Table 10).

Table 9. Weekly mean fork length, standard deviation, 95% confidence interval, and sample size of coho salmon yearlings captured in the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

Week #	Week Ending	FL (mm)	Standard Deviation	95% C.I.	# Sampled
1	27-Jan-08	81.5	7.78	10.78	2
2	03-Feb-08	84.1	7.92	5.49	8
3	10-Feb-08	93.0	7.04	4.60	9
4	17-Feb-08	90.9	11.53	6.81	11
5	24-Feb-08	88.7	11.58	6.29	13
6	2-Mar-08	89.9	16.17	7.69	17
7	9-Mar-08	86.4	17.01	6.67	25
8	16-Mar-08	92.6	7.86	3.74	17
9	23-Mar-08	92.5	12.61	12.36	4
10	30-Mar-08	88.7	19.55	22.13	3
11	6-Apr-08	101.7	2.87	2.13	7
12	13-Apr-08	100.6	9.29	3.72	24
13	20-Apr-08	107.6	8.85	4.63	14
14	27-Apr-08	109.2	11.33	2.65	70
15	4-May-08	109.4	7.29	1.51	90
16	11-May-08	111.2	8.19	1.50	115
17	18-May-08	114.7	7.15	2.16	42
18	25-May-08	112.7	6.60	2.07	39
19	1-Jun-08	110.9	9.10	3.80	22
20	8-Jun-08	112.3	8.74	9.89	3
21	15-Jun-08	108.0	7.79	7.63	4
22	22-Jun-08	-	-	-	0
23	29-Jun-08	-	-	-	0

- Trap Pulled on 30-Jun-2008 Due to Low Fish Numbers -

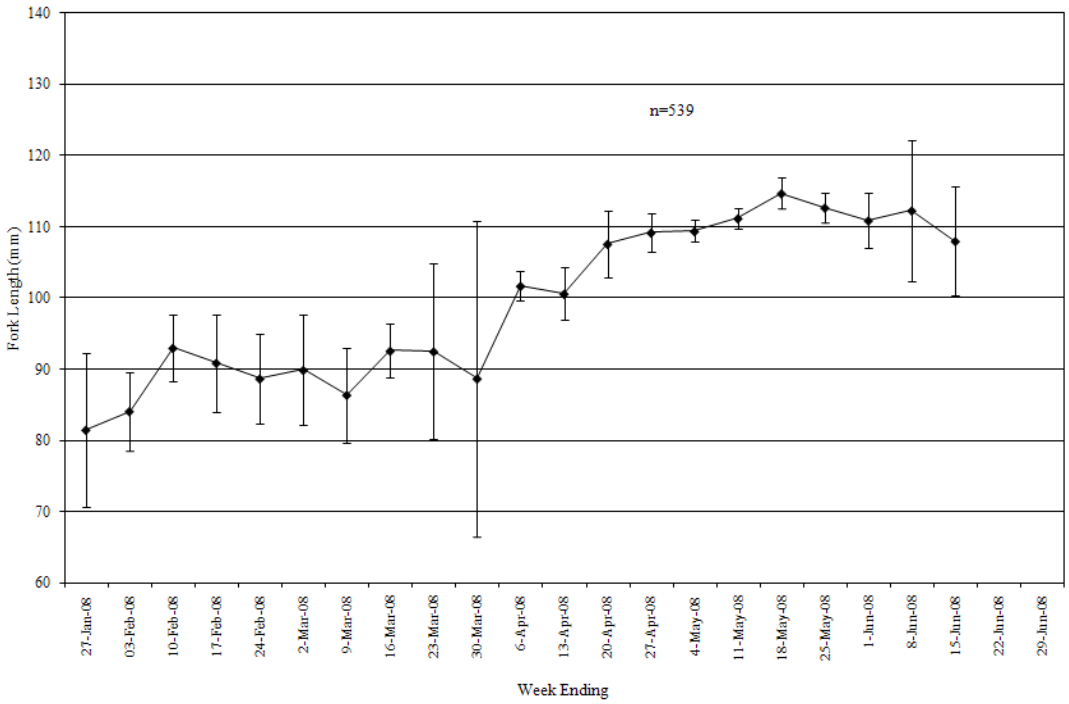

Figure 24. Mean weekly fork length (+/- 95% CI) of coho salmon yearlings sampled in the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

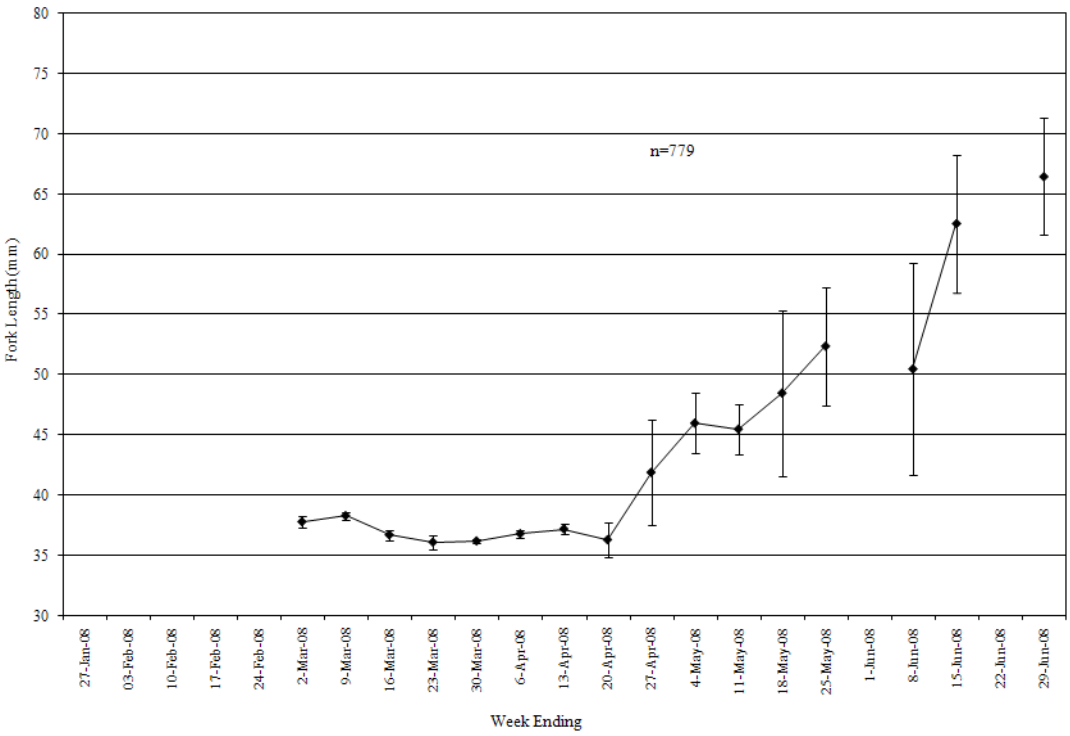

Figure 25. Mean weekly fork length (+/- 95% CI) of young-of-the-year coho salmon sampled in the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

Table 10. Weekly mean fork length, standard deviation, 95% confidence interval, and sample size of coho salmon young-of-the-year captured in the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

Week #	Week Ending	FL (mm)	Standard Deviation	95% C.I.	# Sampled
1	27-Jan-08	-	-	-	0
2	03-Feb-08	-	-	-	0
3	10-Feb-08	-	-	-	0
4	17-Feb-08	-	-	-	0
5	24-Feb-08	-	-	-	0
6	2-Mar-08	37.8	0.91	0.45	16
7	9-Mar-08	38.3	0.86	0.35	23
8	16-Mar-08	36.7	1.22	0.39	38
9	23-Mar-08	36.1	1.73	0.57	35
10	30-Mar-08	36.2	1.38	0.16	292
11	6-Apr-08	36.8	2.03	0.32	160
12	13-Apr-08	37.2	2.42	0.40	139
13	20-Apr-08	36.3	2.18	1.42	9
14	27-Apr-08	41.9	7.44	4.39	11
15	4-May-08	46.0	4.22	2.49	11
16	11-May-08	45.5	5.12	2.09	23
17	18-May-08	48.5	4.95	6.86	2
18	25-May-08	52.4	5.59	4.90	5
19	1-Jun-08	-	-	-	0
20	8-Jun-08	50.5	6.36	8.82	2
21	15-Jun-08	62.6	9.66	5.71	11
22	22-Jun-08	-	-	-	0
23	29-Jun-08	66.5	3.54	4.90	2

- Trap Pulled on 30-Jun-2008 Due to Low Fish Numbers -

Uncertainties about the magnitude and annual variability in both non-natal upstream migrants and also emigrants prior to the annual installation of the outmigrant trap bring into question the comparability of these annual estimates. It is imperative that further upstream and downstream migrant trapping be conducted throughout the wet season (October through June) to provide a better understanding of fish movement and non-natal trends outside of the typical spring outmigrant trapping period. This will provide further clarity into the most effective and valid monitoring approach for the McGarvey Creek drainage. In addition, it will provide better insight into these trends for other entities conducting similar monitoring throughout northern California and the Pacific Northwest where similar non-natal and/or non-typical migrational trends may also draw into question the validity of outmigrant trapping data collected only during late winter and spring months, especially if this information is being used to compare survival rates between life history stages.

4.4.1.2 Fall 2008 - Winter 2009

A total of 936 coho salmon yearlings resulting from Brood Year (BY) 2007 were captured during 90 days of sampling during fall 2008-winter 2009 (Table 11). The peak weekly capture of emigrating coho yearlings occurred during the week ending 16-Nov-08 (n=249; estimated emigration = 2,081 fish), with smaller spikes in emigration occurring in mid-December and mid-February (Table 11). Smaller numbers of emigrating coho were observed throughout the trapping period. No coho salmon YOY (BY 2008) were captured during the sampling period, as the sampling period was prior to the typical emergence of coho in McGarvey Creek. A major flood event beginning on 29-Dec-08 caused major damage to the upstream and downstream migrant traps and resulted in three weeks of down time while flows receded and the traps were rebuilt. As a result, no capture data exists for the first three weeks of January, therefore an unknown additional quantity of coho salmon yearlings (BY 2007) likely emigrated past the trap during this time period.

Trap efficiency for yearling coho salmon (BY 2007) during the fall 2008-winter 2009 trapping period ranged from 12% during November and early December to 86% during the week ending 14-Dec-2008 (Table 11). Based on these efficiencies, an estimated 4,872 (+/-834) yearling coho salmon (BY 2007) emigrated past the trap site and comprised 38% of all age 1+ and older salmonids (i.e. coho salmon, cutthroat trout, and steelhead) emigrating past the McGarvey Creek trap during the fall-winter sampling period.

Consistent capture numbers throughout the trapping period document that yearling coho salmon (BY 2007) began migrating downstream with the onset of fall freshets and continued emigrating at varying levels throughout the fall and winter months (Table 11, Figure 26). Emigration peaked noticeably during the middle of November, in conjunction with the first substantial flow events of the season, with smaller peaks occurring during mid-December and throughout February (Table 11; Figure 26). It is unknown how many fish emigrated past the trap during the three-week period in January while the trap was repaired, but this down time results in the emigration estimate being a conservative assessment of the total emigration that occurred throughout the fall and winter months.

Given the substantial coho emigration that we documented during the fall and winter months, in conjunction with substantial non-natal immigrant coho observed during the same time period (see section 4.5), it is clear that solely trapping outmigrants during the typical spring sampling period is not giving an accurate enumeration of juvenile coho production for the drainage. In order to provide a valid and effective means to assess juvenile coho production for the drainage, it is imperative that both upstream and downstream migrant trapping occur throughout the wet season (from the onset of fall rains/freshets through the cessation of emigration in late spring/early summer). Entities conducting similar spring outmigrant trapping efforts in northern California and watersheds in the Pacific Northwest should at a minimum conduct sufficient additional monitoring to confirm or refute the occurrence of similar migrational trends since they may be confounding the validity of their emigration estimates and subsequent survival rate estimates from one life stage to another.

Table 11. Mark-recapture summary for coho salmon yearlings (Brood Year 2007) captured in the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Mark Period	Week Ending	# of Days Marked	# Captured	# Marked	# Recaptured	Trap Efficiency (%)	Estimated # Outmigrants	Variance	Standard Deviation
Trap installed on 04-Nov-08 in conjunction with onset of fall rain and resumption of streamflow									
1	09-Nov-08	5	41	0	0	0.12[1]	343	653,453.4[P]	808.4[P]
2	16-Nov-08	7	249	64	2	0.12[1]	2,081	653,453.4[P]	808.4[P]
3	23-Nov-08	7	21	15	5	0.12[1]	176	653,453.4[P]	808.4[P]
4	30-Nov-08	7	23	19	6	0.12[1]	192	653,453.4[P]	808.4[P]
5	07-Dec-08	7	1	1	0	0.12[1]	8	653,453.4[P]	808.4[P]
6	14-Dec-08	7	7	7	6	0.86	8	0.4	0.6
7	21-Dec-08	7	116	90	14	0.17[2]	684	33558.6[P]	183.2[P]
8	28-Dec-08	6	9	9	0	0.17[2]	53	33558.6[P]	183.2[P]
9	04-Jan-09	0	*Trap not operated due to high flow damage*						
10	11-Jan-09	0	*Trap not operated due to high flow damage*						
11	18-Jan-09	0	*Trap not operated due to high flow damage*						
12	25-Jan-09	4	7	5	2	0.17[2]	41	33558.6[P]	183.2[P]
13	01-Feb-09	7	6	6	2	0.17[2]	35	33558.6[P]	183.2[P]
14	08-Feb-09	7	6	6	4	0.17[2]	35	33558.6[P]	183.2[P]
15	15-Feb-09	7	`188	116	48	0.42	443	3294.4	57.4
16	22-Feb-09	7	209	197	71	0.36	577	2765.2	52.6
17	01-Mar-09	5	53	33	9	0.27	194	2910.4	53.9
Trap operation continued but data summarized through end of funding contract period									
	Totals:	90	936	568	169	0.30	4,872	695,982.4	834.3

[#] - Estimated trap efficiency for pooled marking periods

[P] - Estimated variance and standard deviation for pooled marking periods

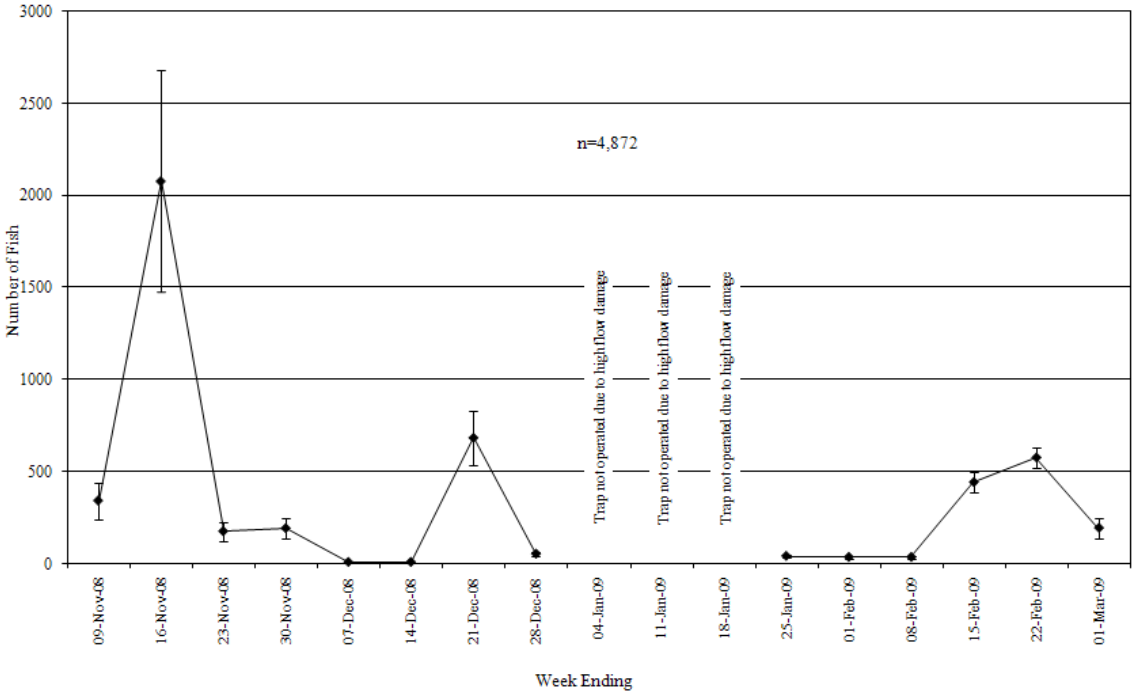

Figure 26. Estimated weekly number (+/- SD) of coho salmon yearlings (BY07) emigrating past the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Mean weekly fork lengths of yearling coho salmon (BY 2007) ranged between 78 mm during the week ending 25-Jan-09 to 99 mm during the week ending 14-Dec-08 (Table 12). Coho yearling size was relatively consistent during November-December 2008, ranging between 85 - 99 mm (Table 12, Figure 27). Following the late-December flood event and subsequent three-week down time for trap repairs, mean weekly fork lengths were again fairly consistent but noticeably smaller then the emigrants captured prior to the flood event Table 11, (Figure 27). During this late January through February period, coho emigrants ranged from 78 – 86 mm fork length.

Table 12. Weekly mean fork length, standard deviation, 95% confidence interval, and sample size of Brood Year 2007 coho salmon captured in the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Week #	Week Ending	FL (mm)	Standard Deviation	95% C.I.	# Sampled
Trap installed on 04-Nov-08 in conjunction with onset of fall rain and resumption of streamflow					
1	09-Nov-08	91.9	8.18	2.42	44
2	16-Nov-08	85.2	10.87	1.50	203
3	23-Nov-08	88.0	10.39	4.44	21
4	30-Nov-08	96.0	9.93	4.35	20
5	07-Dec-08	89.0	-	-	1
6	14-Dec-08	99.0	5.08	2.76	13
7	21-Dec-08	91.9	9.41	1.74	113
8	28-Dec-08	92.3	9.03	5.90	9
9	04-Jan-09	*Trap not operated due to high flow damage*			
10	11-Jan-09	*Trap not operated due to high flow damage*			
11	18-Jan-09	*Trap not operated due to high flow damage*			
12	25-Jan-09	78.0	4.62	3.42	7
13	01-Feb-09	83.3	4.32	3.46	6
14	08-Feb-09	82.7	5.32	4.25	6
15	15-Feb-09	84.5	7.94	1.23	159
16	22-Feb-09	86.2	7.50	1.02	206
17	01-Mar-09	86.0	10.85	3.36	40
Trap operation continued but data summarized through end of funding contract period					

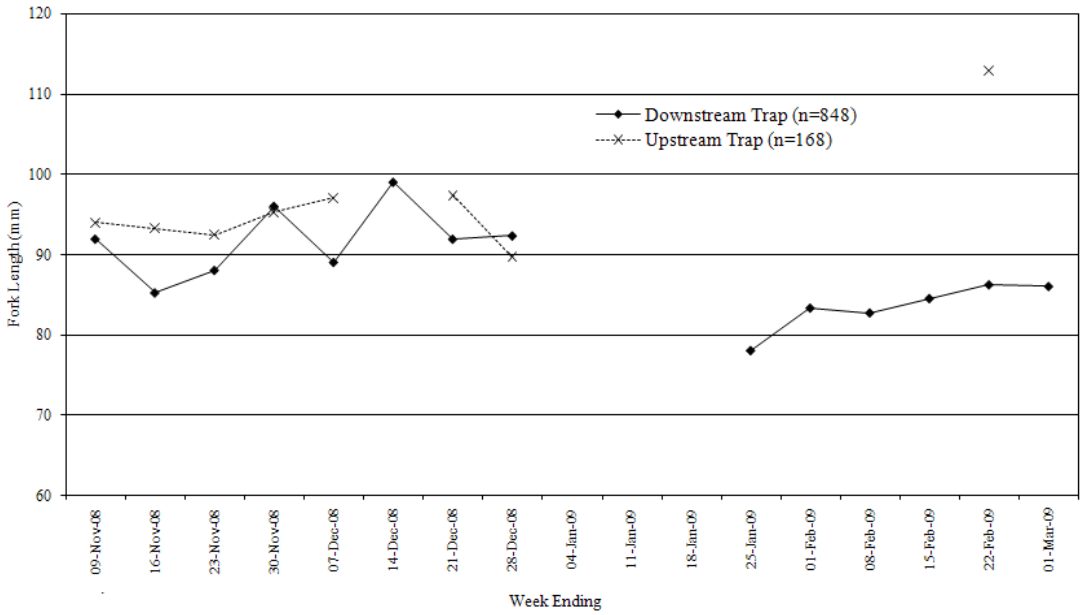

Figure 27. Mean weekly fork length (+/- 95% CI) of Brood Year 2007 coho salmon sampled in the upstream and downstream migrant traps, McGarvey Creek, Fall 2008 - Winter 2009.

4.4.2 Steelhead Trout

4.4.2.1 Winter 2007 - Spring 2008

During the 2008 spring outmigrant trapping season, YTFP captured a total of 2,508 age 1+ and older steelhead trout (Table 13). Peak capture of 403 steelhead occurred during the week ending 13-Apr-2008.

Table 13. Mark-recapture summary for age 1+ and older steelhead trout captured in the outmigrant frame net-pipe trap, McGarvey Creek, 2008.

Mark Period	Week Ending	# of Days Marked	# Captured	# Marked	# Recaptured	Trap Efficiency (%)	Estimated # Outmigrants	Variance	Standard Deviation
1	27-Jan-08	4	199	199	66	0.32[1]	620	7,654.9[P]	87.5[P]
2	03-Feb-08	4	179	154	48	0.32[1]	557	7,654.9[P]	87.5[P]
3	10-Feb-08	3	69	67	31	0.46	149	305.3	17.5
4	17-Feb-08	7	132	123	67	0.53	251	465.1	21.6
5	24-Feb-08	7	148	143	94	0.65	227	128.3	11.3
6	2-Mar-08	7	145	140	103	0.74	196	59.2	7.7
7	9-Mar-08	7	97	95	63	0.66	147	72.5	8.5
8	16-Mar-08	6	157	152	104	0.73[2]	215	156.4[P]	12.5[P]
9	23-Mar-08	6	24	20	15	0.73[2]	33	156.4[P]	12.5[P]
10	30-Mar-08	7	35	34	29	0.73[2]	48	156.4[P]	12.5[P]
11	6-Apr-08	7	217	216	140	0.65	336	203.3	14.3
12	13-Apr-08	7	403	395	269	0.68	594	276.8	16.6
13	20-Apr-08	7	174	171	118	0.69	254	129.0	11.4
14	27-Apr-08	7	115	112	83	0.74	155	39.0	6.2
15	4-May-08	7	124	123	84	0.71	176	111.9	10.6
16	11-May-08	7	169	166	108	0.69	246	217.2	14.7
17	18-May-08	7	94	93	33	0.37[3]	256	1,358.5[P]	36.9[P]
18	25-May-08	7	17	17	6	0.37[3]	46	1,358.5[P]	36.9[P]
19	1-Jun-08	7	6	6	3	0.37[3]	16	1,358.5[P]	36.9[P]
20	8-Jun-08	7	4	4	3	0.37[3]	11	1,358.5[P]	36.9[P]
21	15-Jun-08	7	0	0	0	-	0	-	-
22	22-Jun-08	7	0	0	0	-	0	-	-
23	29-Jun-08	7	0	0	0	-	0	-	-
			Trap pulled on 30-June-08 due to low fish capture						
	Totals:	149	2,508	2,430	1,467	0.60	4,532	11,177.3	105.7

[#] - Estimated trap efficiency for pooled marking periods

[P] - Estimated variance and standard deviation for pooled marking periods

Trapping efficiency for age 1+ and older steelhead trout fluctuated between 32% and 74% during the trapping season (Table 13). Based on these efficiencies, an estimated 4,532 (**+/-**106) yearling and older steelhead migrated past the McGarvey Creek trap site during late winter through spring 2008. Steelhead comprised 59% of the overall salmonid emigration during this time period. Peak emigration occurred during the first two weeks of trap operation in late January and early February, with a similar-sized peak occurring during mid-April (Table 13, Figure 28). Emigration subsided for the season by the first week of June, with no yearling or older steelhead caught during the remaining three weeks of the trapping season. The peak emigration occurring during the first two weeks of sampling indicates that substantial numbers of older age class steelhead were already actively emigrating at prior to trap installation in the latter part of January.

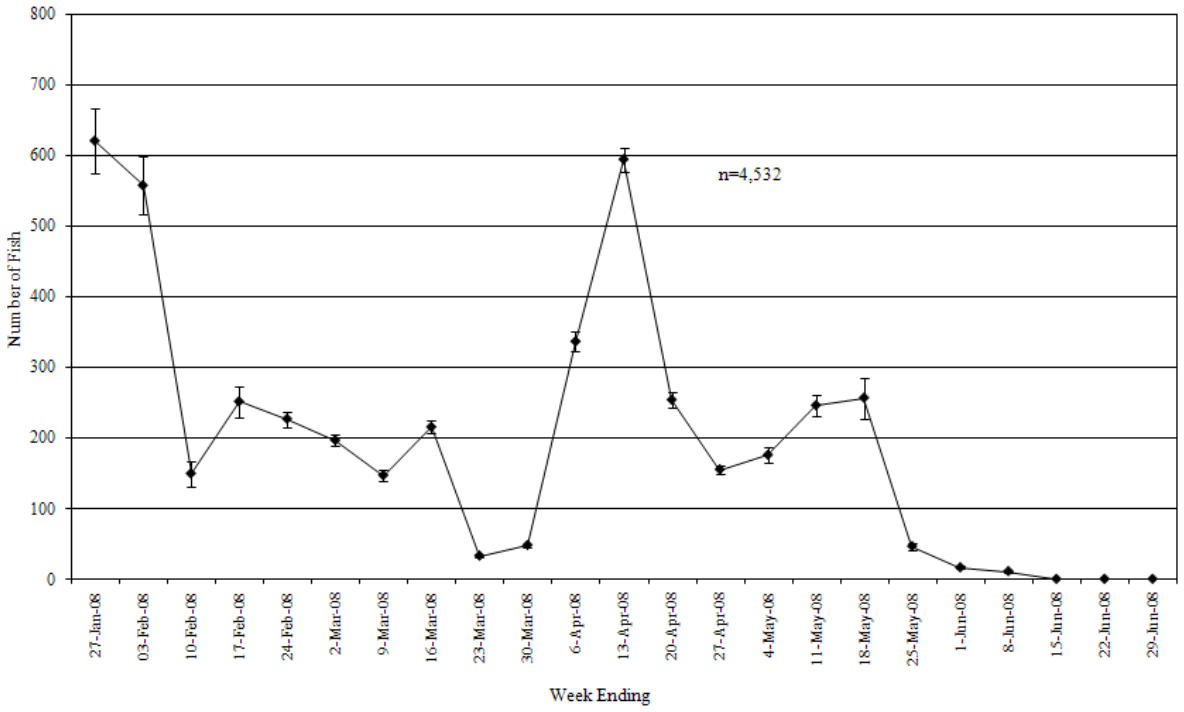

Figure 28. Estimated weekly number (+/- SD) of age 1+ and older steelhead trout emigrating past the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

No young of the year trout (coastal cutthroat or steelhead) were captured during the late winter-spring 2008 outmigrant trapping (Table 6). No adult steelhead were observed spawning in McGarvey Creek during winter 2007 through spring 2008, so it is not surprising that no fry were in turn observed. Differentiating between steelhead and coastal cutthroat trout fry is not possible in the field, so given that numerous adult cutthroat were observed on a presumed spawning migration during this time period, it might still be expected that trout fry would have been captured in the trap. The lack of fry capture is likely more indicative of the lack of emerging redds in the near vicinity of the trap then it is necessarily an indicator of low trout spawning abundance or success in the drainage.

Mean weekly fork length of captured 1+ and older steelhead peaked from the beginning of the trapping season through early February and gradually decreased until early April, after which it remained at or near a constant 100 – 105 mm for the remainder of the season (Table 14, Figure 29). The larger smolts captured during the first half of the trapping season are presumed to be almost exclusively non-natal fish that had immigrated into the system earlier in the fall or winter. YTFP has routinely observed large numbers of steelhead smolts suddenly present in the creek following fall and early winter freshets, yet virtually all of the trout observed during summer juvenile abundance inventories are YOY. Age 1+ and older steelhead are rarely sampled during summer surveying in McGarvey Creek (i.e. fish that would be age 2+ during the following outmigrant trapping season). Additional upstream migrant trapping and PIT-tagging is necessary to improve our understanding of the relative composition of natal vs. non-natal steelhead juveniles in the watershed, although existing data suggests that a substantial percentage of these fish are non-natal in origin.

Table 14. Weekly mean fork length, standard deviation, 95% confidence interval, and sample size of age 1+ and older steelhead captured in the outmigrant trap, McGarvey Creek, 2008.

Week #	Week Ending	FL (mm)	Standard Deviation	95% C.I.	# Sampled
1	27-Jan-08	138.8	63.94	25.58	24
2	03-Feb-08	181.4	58.48	8.45	184
3	10-Feb-08	158.0	60.08	14.18	69
4	17-Feb-08	130.2	64.56	11.10	130
5	24-Feb-08	135.5	65.78	10.53	150
6	2-Mar-08	140.7	56.74	11.23	98
7	9-Mar-08	102.1	28.85	5.83	94
8	16-Mar-08	129.7	48.09	7.52	157
9	23-Mar-08	111.8	32.55	13.92	21
10	30-Mar-08	112.6	28.52	8.73	41
11	6-Apr-08	103.0	21.10	3.07	182
12	13-Apr-08	98.2	19.07	1.86	405
13	20-Apr-08	97.7	13.85	2.06	173
14	27-Apr-08	100.6	13.95	2.58	112
15	4-May-08	99.6	12.12	2.14	123
16	11-May-08	102.2	14.08	2.15	164
17	18-May-08	103.6	11.98	2.44	93
18	25-May-08	106.0	10.12	4.96	16
19	1-Jun-08	115.0	14.13	11.30	6
20	8-Jun-08	102.0	6.93	7.84	3
21	15-Jun-08	-	-	-	0
22	22-Jun-08	-	-	-	0
23	29-Jun-08	-	-	-	0

- Trap Pulled on 30-Jun-2008 Due to Low Fish Numbers -

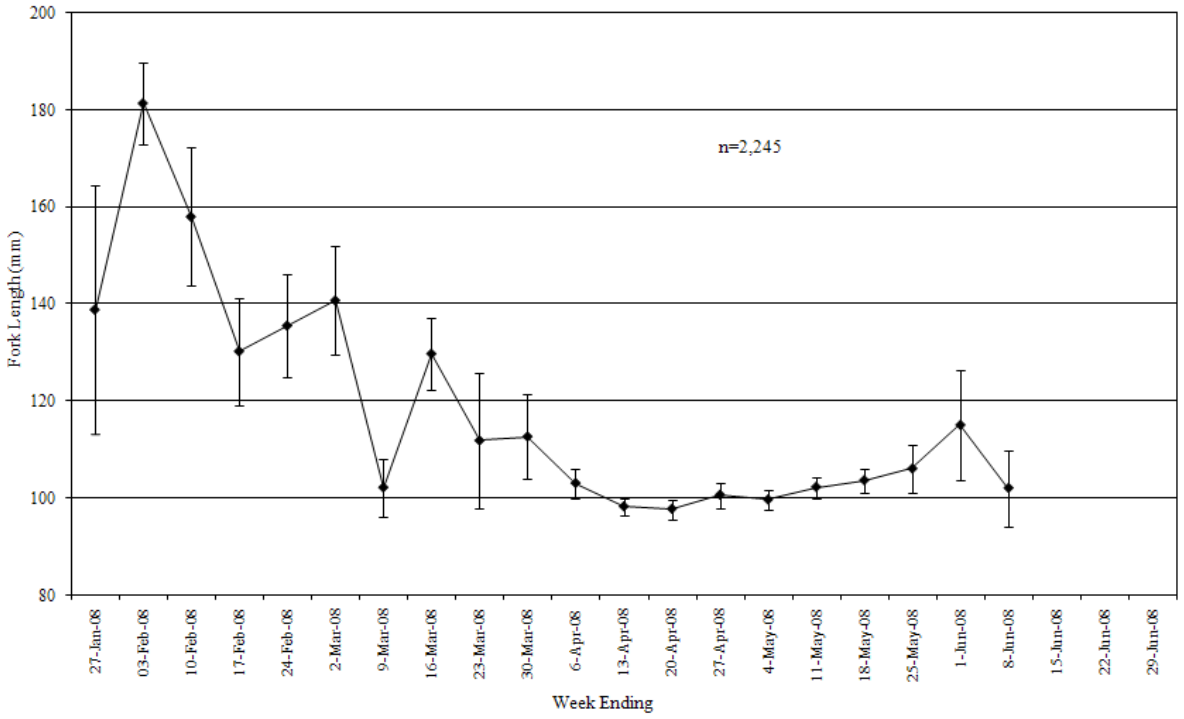

Figure 29. Mean weekly fork length (+/- 95% CI) of age 1+ and older steelhead trout sampled in the outmigrant trap, McGarvey Creek, 2008.

The estimated number of age 1+ and older steelhead emigrating during the spring trapping period has gradually increased over the 12 year period of record (Figure 30). Peak yearly emigration was documented during 2007 (n=5,716 +/-148), while the lowest annual emigration estimate was in 1999 (n=2,249 +/-88). The estimated number of yearling and older steelhead emigrants for 2008 (n=4,532 +/-102) was the third highest estimate over the 12 year period of record (Figure 30).

As was noted for coho salmon yearlings (see section 4.4.1.1), there are uncertainties about the magnitude and annual variability in both non-natal upstream migrants and also emigrants prior to the annual installation of the outmigrant trap. These variables bring into question the comparability of these annual estimates for the purpose of estimating juvenile production from the system and population trends over time. It is essential that trapping activities continue to be expanded to allow for the quantification of upstream and downstream migrants throughout the wet season.

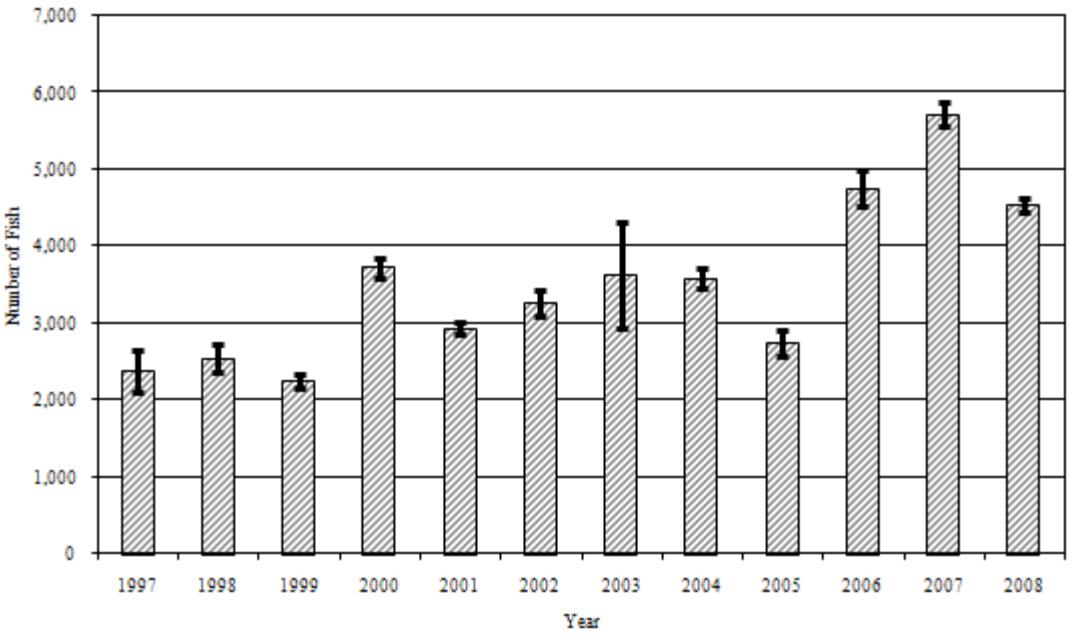

Figure 30. Estimated number (+/- S.D.) of age 1+ and older steelhead emigrating past the outmigrant Trap site, McGarvey Creek, 1997 - 2008.

4.4.2.2 Fall 2008 - Winter 2009

YTFP captured 2,101 age 1+ and older steelhead trout during 90 days of outmigrant sampling during fall 2008 - winter 2009 (Table 14). The peak weekly capture of emigrating steelhead occurred during the week ending 22-Feb-09 (n=457), with smaller peaks occurring in mid-December and late November (Table 15). Substantial numbers of emigrating steelhead were observed throughout the trapping period. No trout fry (BY 2008) were captured during the sampling period, as the sampling period was prior to the typical emergence of steelhead or coastal cutthroat trout alevins in McGarvey Creek. A major flood event beginning on 29-Dec-2008 caused major damage to the upstream and downstream migrant traps and resulted in three weeks of down time while the traps were rebuilt. As a result, no capture data exists for the first three weeks of January and as a result an unknown additional quantity of yearling and older steelhead (BY 2007 and earlier) likely emigrated past the trap during this time period.

Trap efficiency for BY 2007 and older steelhead during the fall 2008-winter 2009 trapping period ranged from 13% in late February to 67% during the week ending 15-Feb-2009 (Table 14). Based on these efficiencies, an estimated 6,708 (+/-476) BY 2007 and older steelhead emigrated past the trap site and comprised 53% of all age 1+ and older salmonids emigrating past the McGarvey Creek trap during the fall-winter 2008 sampling period.

Capture numbers throughout the trapping period indicate that BY 2007 and older steelhead began migrating downstream with the onset of fall freshets and continued emigrating at varying levels throughout the fall and winter months (Table 15, Figure 31). Emigration peaked noticeably during late November, mid-December, and during February (Table 15; Figure 31). It is unknown how many fish emigrated past the trap during the three-week period in January

Table 15. Mark-recapture summary for BY07 and older steelhead trout captured in the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Mark Period	Week Ending	# of Days Marked	# Captured	# Marked	# Recaptured	Trap Efficiency (%)	Estimated # Outmigrants	Variance	Standard Deviation
Trap installed on 04-Nov-08 in conjunction with onset of fall rain and resumption of streamflow									
1	09-Nov-08	5	0	0	0	0.14[1]	0	106,735.9[P]	326.7[P]
2	16-Nov-08	7	58	56	5	0.14[1]	418	106,735.9[P]	326.7[P]
3	23-Nov-08	7	33	28	14	0.14[1]	238	106,735.9[P]	326.7[P]
4	30-Nov-08	7	120	114	15	0.14[1]	865	106,735.9[P]	326.7[P]
5	07-Dec-08	7	34	27	10	0.14[1]	245	106,735.9[P]	326.7[P]
6	14-Dec-08	7	409	117	55	0.48	856	7,536.5	86.8
7	21-Dec-08	7	260	233	76	0.33	797	5,096.2	71.4
8	28-Dec-08	6	6	6	0	0.42[2]	14	693.8[P]	26.3[P]
9	04-Jan-09	0	*Trap not operated due to high flow damage*						
10	11-Jan-09	0	*Trap not operated due to high flow damage*						
11	18-Jan-09	0	*Trap not operated due to high flow damage*						
12	25-Jan-09	4	39	37	22	0.42[2]	93	693.8[P]	26.3[P]
13	01-Feb-09	7	25	24	7	0.42[2]	60	693.8[P]	26.3[P]
14	08-Feb-09	7	43	43	24	0.49	88	446.7	21.1
15	15-Feb-09	7	394	308	183	0.67	591	3,960.5	62.9
16	22-Feb-09	7	457	305	176	0.60	761	1,765.2	42.0
17	01-Mar-09	5	223	181	24	0.13	1,682	100,765.5	317.4
Trap operation continued but data summarized through end of funding contract period									
	Totals:	90	2,101	1,479	611	0.41	6,708	227,000.2	476.4

[#] - Estimated trap efficiency for pooled marking periods

[P] - Estimated variance and standard deviation for pooled marking periods

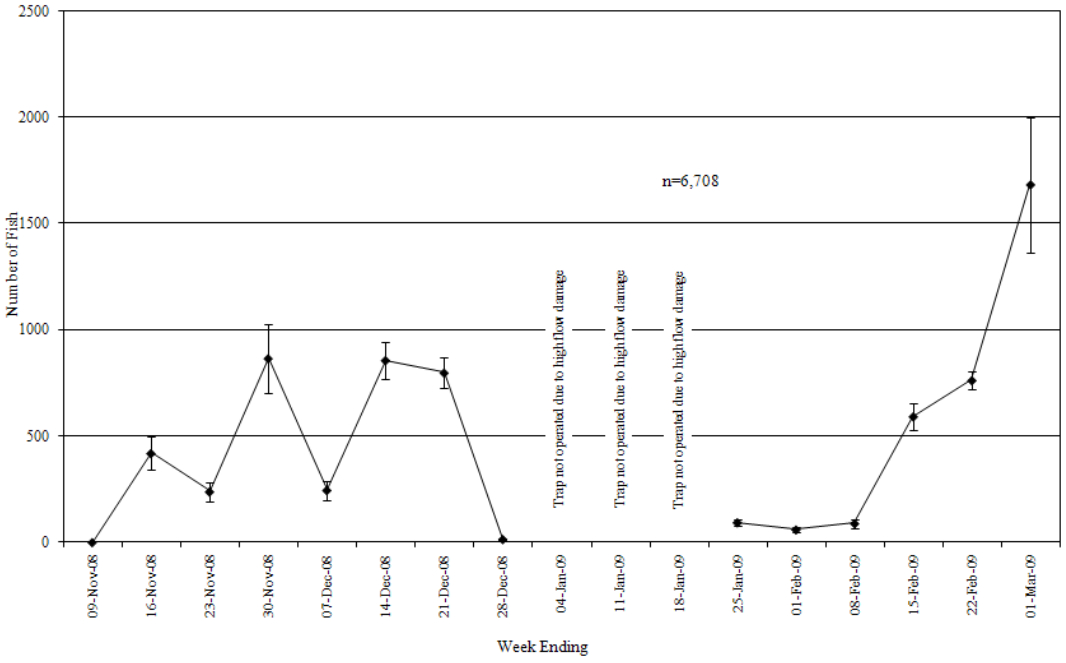

Figure 31. Estimated weekly number (+/- SD) of BY07 and older steelhead emigrating past the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

while the trap was repaired, but this down time likely resulted in an underestimation of emigration occurring during fall and winter months.

YTFP documented a large and persistent downstream migration of steelhead throughout the fall and early winter months, as well as the substantial numbers of upstream migrants observed during the same time period (see Section 4.5). As was noted for coho salmon (see Section 4.4.1.2), this data brings significant concerns regarding the validity of using outmigrant data collected only during spring-summer to track population numbers and trends. Future trapping efforts need to encompass both upstream and downstream trapping from the onset of fall freshets through the cessation of migration in early summer to properly quantify emigration of a given species from the drainage, understand the magnitude and variability of non-natal rearing, and discern what percentage of emigrants are natal vs. non-natal for a given species. The answers to these questions not only are significant in McGarvey Creek but in similar watersheds located throughout northern California and the Pacific Northwest. Practitioners in these geographic regions should likely address these concerns to ensure the data they are collecting during typical 'outmigration trapping' is not confounded by the presence of fish utilizing the streams for non-natal rearing.

Mean weekly fork lengths of BY 2007and older steelhead ranged between 94 mm during the week ending 08-Feb-09 to 193 mm during the week ending 22-Feb-09 (Table 16). Steelhead emigrant size varied significantly throughout the sampling period, with smaller sized fish dominating during periods of lower emigration and large smolts dominating during peak emigration periods (Table 16, Figure 32). This same trend was observed following the late-December flood event and subsequent three-week down time for trap repairs. During the three sampling weeks following the down time, much smaller number of emigrants occurred and their size consistently averaged < 100 mm (Table 16, Figure 32). Emigrant numbers increased substantially for the remainder of February and in turn mean size jumped to 175 – 195 mm.

As was noted in Section 4.4.2.1, the vast majority of these large emigrating smolts are presumed to be non-natal fish, as steelhead older than age 0+ are rarely observed during summer abundance inventories. Substantial numbers of non-natal steelhead smolts were captured in the upstream trap during this same sampling period (see Section 4.5), further validating YTFP's past assertions that the steelhead smolts routinely captured during the early months of annual outmigrant trapping are non-natal in origin. Additional upstream trapping and PIT-tagging should be undertaken throughout the fall and winter months to provide additional insight into natal vs. non-natal steelhead population numbers in the watershed.

Table 16. Weekly mean fork length, standard deviation, 95% confidence interval, and sample size of BY07 and older steelhead captured in the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Week #	Week Ending	FL (mm)	Standard Deviation	95% C.I.	# Sampled
Trap installed on 04-Nov-08 in conjunction with onset of fall rain and resumption of streamflow					
1	09-Nov-08	123.7	40.82	15.69	26
2	16-Nov-08	176.2	39.54	7.60	104
3	23-Nov-08	130.6	48.42	16.28	34
4	30-Nov-08	165.1	47.19	8.41	121
5	07-Dec-08	153.7	41.95	14.10	34
6	14-Dec-08	188.6	34.70	5.79	138
7	21-Dec-08	191.6	38.79	5.26	209
8	28-Dec-08	194.2	16.96	13.57	6
9	04-Jan-09	*Trap not operated due to high flow damage*			
10	11-Jan-09	*Trap not operated due to high flow damage*			
11	18-Jan-09	*Trap not operated due to high flow damage*			
12	25-Jan-09	96.3	31.21	9.67	40
13	01-Feb-09	95.7	36.95	14.48	25
14	08-Feb-09	94.2	29.94	8.95	43
15	15-Feb-09	176.5	67.84	6.42	429
16	22-Feb-09	193.0	57.86	5.29	460
17	01-Mar-09	189.3	56.08	8.51	167
Trap operation continued but data summarized through end of funding contract period					

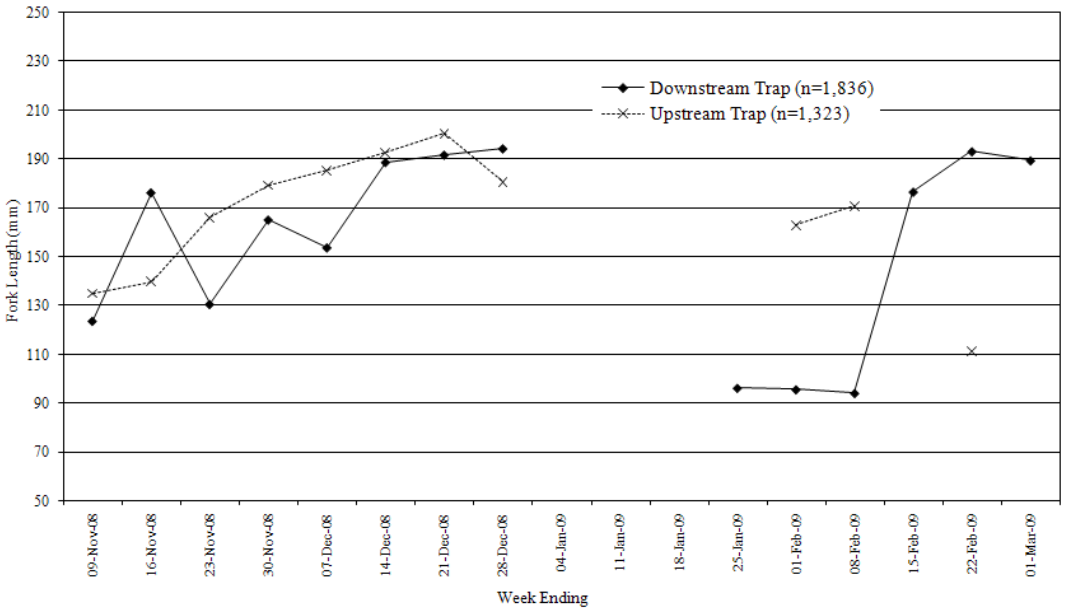

Figure 32. Mean weekly fork length (+/- 95% CI) of BY2007 and older steelhead sampled in the upstream and downstream migrant traps, McGarvey Creek, Fall 2008 - Winter 2009.

4.4.3 Coastal Cutthroat Trout

4.4.3.1 Winter 2007 - Spring 2008

A total of 1,334 age 1+ and older coastal cutthroat trout were captured during 149 days of outmigrant sampling during winter-spring 2008 (Table 17). The peak weekly capture of age 1+ and older cutthroat emigrants occurred during the week ending 13-Apr-08 (n=329). No trout fry were captured during the 2008 spring emigration sampling.

Trapping efficiency for age 1+ and older cutthroat fluctuated between 34% and 96% during the trapping season (Table 17). Based on these efficiencies, an estimated 1,869 (**+/-**46) yearling and older cutthroat migrated past the McGarvey Creek trap site during late winter through spring 2008. Coastal cutthroat trout comprised 25% of the overall salmonid emigration during this time period. Peak emigration occurred during mid-April (Table 17, Figure 33).

Table 17. Mark-recapture summary for age 1+ and older coastal cutthroat trout captured in the outmigrant trap, McGarvey Creek, 2008.

Mark Period	Week Ending	# of Days Marked	# Captured	# Marked	# Recaptured	Trap Efficiency (%)	Estimated # Outmigrants	Variance	Standard Deviation
1	27-Jan-08	4	10	10	0	0.40[1]	25	706.1[P]	26.6[P]
2	03-Feb-08	4	14	12	4	0.40[1]	35	706.1[P]	26.6[P]
3	10-Feb-08	3	23	19	6	0.40[1]	58	706.1[P]	26.6[P]
4	17-Feb-08	7	20	19	15	0.40[1]	50	706.1[P]	26.6[P]
5	24-Feb-08	7	22	21	13	0.62	36	23.5	4.8
6	2-Mar-08	7	33	30	22	0.77	43	30.2	5.5
7	9-Mar-08	7	25	22	13	0.59	42	39.0	6.2
8	16-Mar-08	6	66	66	40	0.60	110	79.8	8.9
9	23-Mar-08	6	60	54	43	0.83	72	48.53	7.0
10	30-Mar-08	7	42	42	24	0.52	80	127.50	11.3
11	6-Apr-08	7	155	150	135	0.91	170	15.5	3.9
12	13-Apr-08	7	329	287	242	0.84	390	58.32	7.6
13	20-Apr-08	7	122	121	111	0.96	127	18.42	4.3
14	27-Apr-08	7	155	154	122	0.79	195	28.9	5.4
15	4-May-08	7	102	101	67	0.66	154	70.5	8.4
16	11-May-08	7	106	104	74	0.79	135	140.6	11.9
17	18-May-08	7	36	36	13	0.34[2]	106	742.6[P]	27.3[P]
18	25-May-08	7	6	6	2	0.34[2]	18	742.6[P]	27.3[P]
19	1-Jun-08	7	0	0	0	-	0	-	-
20	8-Jun-08	7	4	4	2	0.34[2]	12	742.6[P]	27.3[P]
21	15-Jun-08	7	4	4	0	0.34[2]	12	742.6[P]	27.3[P]
22	22-Jun-08	7	0	0	0	-		-	-
23	29-Jun-08	7	0	0	0	-		-	-
			Trap pulled on 30-June-08 due to low fish capture						
	Totals:	149	1,334	1,262	948	0.75	1,869	2,129.4	46.1

[#] - Estimated trap efficiency for pooled marking periods

[P] - Estimated variance and standard deviation for pooled marking periods

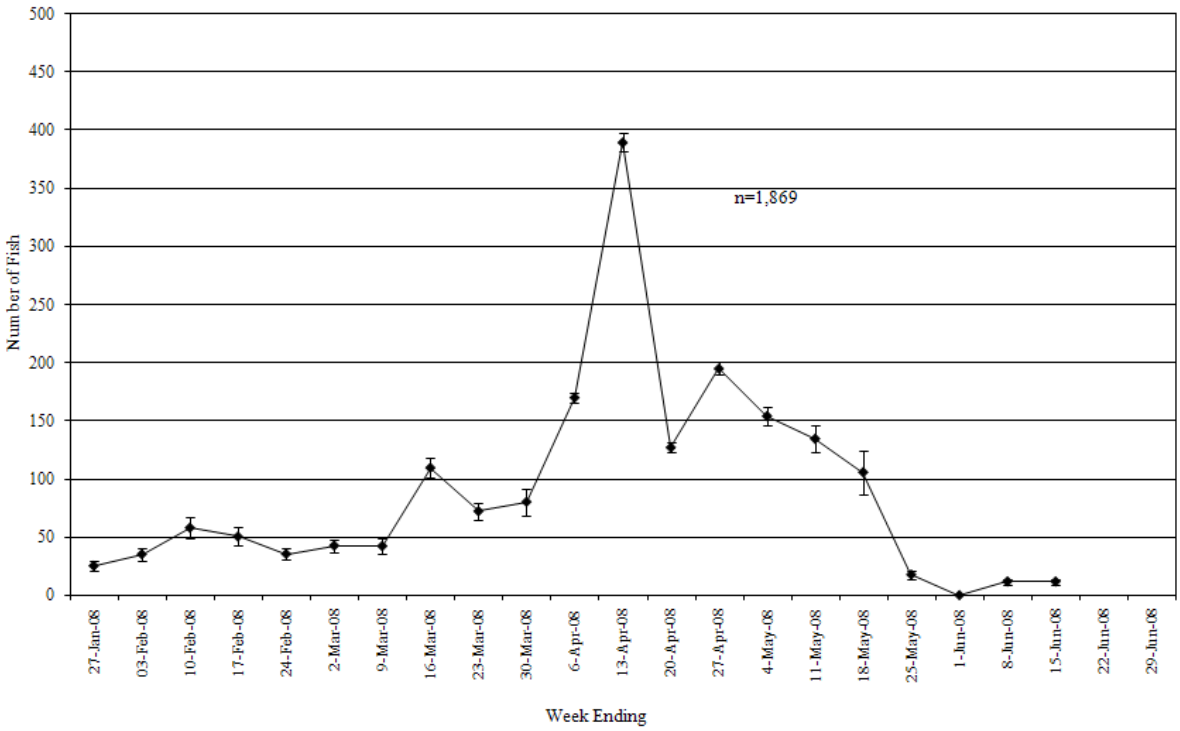

Figure 33. Estimated weekly number (+/- SD) of age 1+ and older coastal cutthroat trout emigrating past the outmigrant trap, McGarvey Creek, Winter - Spring 2008.

Emigration subsided for the season by the middle of June, with no 1+ or older cutthroat caught during the remaining two weeks of the trapping season. Relatively small but consistent numbers of cutthroat were estimated to be emigrating past the trap site during the first seven weeks of sampling (Table 17, Figure 33). This suggests that cutthroat also are exhibiting emigration behavior in McGarvey Creek prior to the standard outmigrant trapping season, although at least in 2008 they did so to a much smaller degree than steelhead (Table 13, Figure 28).

Mean weekly fork length of captured 1+ and older cutthroat peaked from the beginning of the trapping season through early March and gradually decreased from 140 – 120 mm over the remainder of the trapping season (Table 18, Figure 34). The larger mean size and wider range observed during the first seven weeks of the trapping season is primarily due to the presence of larger adults moving throughout the system on a spawning migration during this time period. After early March, data from captured cutthroat showed a mean decrease in size and narrower size range, implicating that these fish were likely emigrating and natal to McGarvey Creek. The presence over the years of some smaller fish seemingly ripening and on a spawning migration confound YTFP's ability to readily partition definitely emigrating juveniles from less predictable adult migrants simply based on size.

Table 18. Weekly mean fork length, standard deviation, 95% confidence interval, and sample size of age 1+ and older coastal cutthroat trout captured in the outmigrant trap, McGarvey Creek, 2008.

Week #	Week Ending	FL (mm)	Standard Deviation	95% C.I.	# Sampled
1	27-Jan-08	152.0	-	-	1
2	03-Feb-08	175.2	103.47	56.25	13
3	10-Feb-08	137.9	76.09	34.21	19
4	17-Feb-08	195.0	106.64	38.81	29
5	24-Feb-08	166.2	115.58	49.43	21
6	2-Mar-08	181.5	111.61	42.10	27
7	9-Mar-08	172.3	104.21	35.03	34
8	16-Mar-08	138.7	39.67	9.72	64
9	23-Mar-08	148.0	73.80	18.67	60
10	30-Mar-08	131.8	31.61	9.56	42
11	6-Apr-08	145.2	41.99	6.96	140
12	13-Apr-08	134.6	22.89	2.63	290
13	20-Apr-08	132.8	31.09	5.49	123
14	27-Apr-08	136.6	28.42	4.50	153
15	4-May-08	122.7	16.14	3.15	101
16	11-May-08	125.5	21.78	4.17	105
17	18-May-08	125.3	30.09	9.97	35
18	25-May-08	130.3	14.40	11.53	6
19	1-Jun-08	114.0	-	-	1
20	8-Jun-08	133.0	14.07	13.79	4
21	15-Jun-08	124.7	28.01	31.69	3
22	22-Jun-08	-	-	-	0
23	29-Jun-08	-	-	-	0

- Trap Pulled on 30-Jun-2008 Due to Low Fish Numbers -

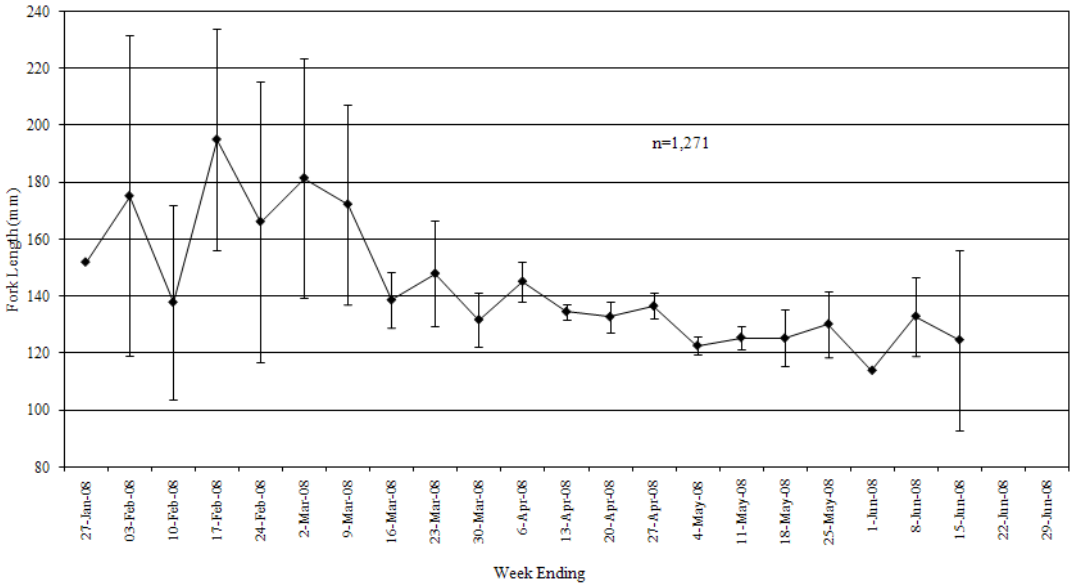

Figure 34. Mean weekly fork length (+/- 95% CI) of age 1+ and older coastal cutthroat trout sampled in the outmigrant trap, McGarvey Creek, 2008.

The estimated number of age 1+ and older cutthroat emigrating during the spring trapping period has fluctuated over the 12 year period of record, with a slight downward trend overall (Figure 35). Peak yearly emigration was documented during 1997 (n=3,784 +/-300), while the lowest annual emigration estimate was in 2002 (n=1,735 +/-78). The estimated number of yearling and older cutthroat emigrants for 2008 (n=1,869 +/-40) was the third lowest estimate over the 12 year period of record (Figure 35).

As was noted for coho and steelhead emigrants (see section 4.4.1.1 and 4.4.2.1), there are uncertainties about the magnitude and annual variability in both non-natal upstream migrants and also emigrants prior to the annual installation of the outmigrant trap. These variables bring into question the comparability of these annual estimates for the purpose of estimating juvenile production from the system and salmonid population trends over time, however the non-natal rearing does emphasize the importance of this system to populations from throughout the Klamath Basin. It is essential that trapping activities continue to be expanded to try and quantify upstream and downstream migrants throughout the wet season and not just the standard accepted spring outmigrant trapping period. In addition, difficulties in separating captured cutthroat by age classes (i.e. sexually mature adults vs. juvenile) and the corresponding behavioral differences of migratory spawning adults further confound the ability to reliably enumerate cutthroat trout production from McGarvey Creek.

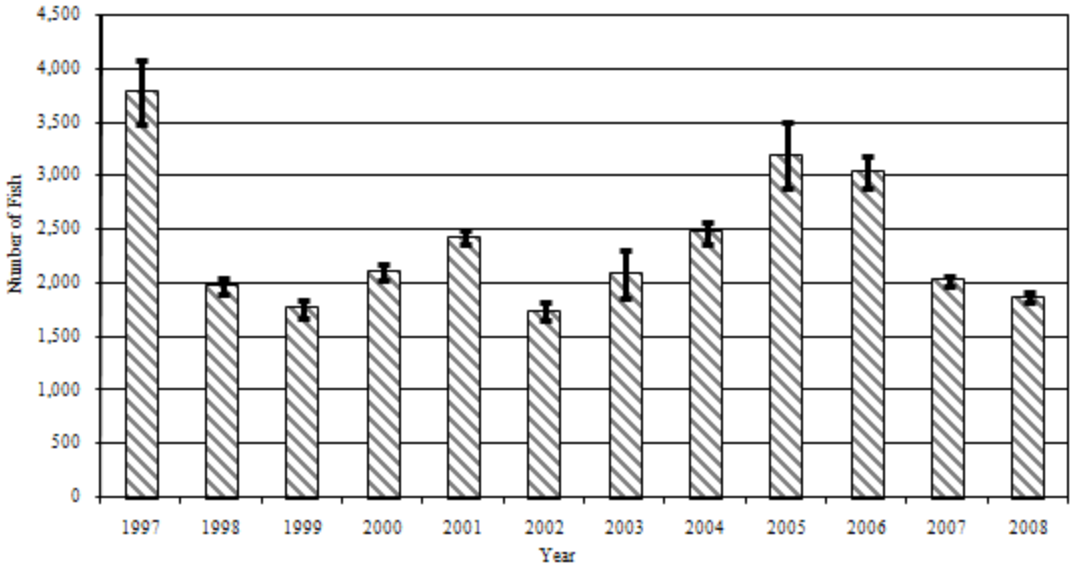

Figure 35. Estimated number (+/- S.D.) of age 1+ and older coastal cutthroat trout emigrating past the outmigrant trap, McGarvey Creek, 1997 - 2008.

4.4.3.2 Fall 2008 - Winter 2009

YTFP captured 474 age 1+ (BY 2007) and older coastal cutthroat trout during 90 days of outmigrant sampling during fall 2008-winter 2009 (Table 19). The peak weekly capture of emigrating cutthroat occurred during the week ending 22-Feb-09 (n = 138), with a smaller peak occurring in mid-November (Table 19). Outside of these peak periods, small numbers of emigrating steelhead were consistently captured throughout the trapping period. No trout fry (BY 2008) were captured during the sampling period, as the sampling period was prior to the typical emergence of steelhead or coastal cutthroat trout alevins in McGarvey Creek. A major flood event beginning on 29-Dec-2008 caused major damage to the upstream and downstream migrant traps and resulted in three weeks of down time while the traps were rebuilt. As a result, no capture data exists for the first three weeks of January and as a result an unknown additional quantity of yearling and older cutthroat (BY 2007+) likely emigrated past the trap during this time period.

Trap efficiency for BY 2007 and older cutthroat during the fall 2008-winter 2009 trapping period ranged from 20% throughout most of November 2008 to 66% during mid-February 2009 (Table 19). Based on these efficiencies, an estimated 1,134 (+/-147) BY 2007 and older cutthroat emigrated past the trap site and comprised 9% of all age 1+ and older salmonids emigrating past the McGarvey Creek trap during the fall-winter sampling period.

Consistent capture numbers throughout the trapping period document that BY 2007 and older cutthroat began migrating downstream with the onset of fall freshets and continued emigrating at varying levels throughout the fall and winter months (Table 19, Figure 36). Emigration peaked noticeably during mid-November, as well as throughout February (Table 19; Figure 36). It is unknown how many fish emigrated past the trap during the three-week period in January while

the trap was being repaired, but this down time results in the emigration estimate being a conservative assessment of the total emigration occurring during fall through winter.

YTFP documented a persistent downstream migration of cutthroat throughout the fall and early winter months, as well as small but consistent numbers of non-natal upstream migrants observed during the same time period (see Section 4.5). Cutthroat migrant numbers were smaller than those observed for steelhead and coho during the fall-winter sampling periods. While fall-winter movement numbers for cutthroat are not as substantial relative to those for steelhead and coho, this data still questions to the validity of using standard outmigrant trapping protocols to track population numbers and trends. This is further complicated for cutthroat due to the difficulty in accurately identifying spawning adults from rearing juveniles actively migrating throughout the system. Since the behavior of these two age classes is likely different, it is critical to differentiate these groups for the purposes of mark-recapture trap efficiency experiments and subsequent outmigration enumeration. As was noted for the other species, future trapping efforts need to encompass both upstream and downstream trapping from the onset of fall freshets through the cessation of migration in early summer to properly quantify emigration of a given species from the drainage, understand the magnitude and variability of non-natal rearing, and discern what percentage of emigrants are natal vs. non-natal for a given species.

Table 19. Mark-recapture summary for age 1+ and older coastal cutthroat trout captured in the outmigrant trap, McGarvey Creek, Fall 2008 – Winter 2009.

Mark Period	Week Ending	# of Days Marked	# Captured	# Marked	# Recaptured	Trap Efficiency (%)	Estimated # Outmigrants	Variance	Standard Deviation
Trap installed on 04-Nov-08 in conjunction with onset of fall rain and resumption of streamflow									
1	09-Nov-08	5	9	0	0	0.20[1]	45	17,169.0[P]	131.0[P]
2	16-Nov-08	7	36	7	1	0.20[1]	180	17,169.0[P]	131.0[P]
3	23-Nov-08	7	14	`13	3	0.20[1]	70	17,169.0[P]	131.0[P]
4	30-Nov-08	7	5	5	3	0.25[2]	20	1,668.6[P]	40.9[P]
5	07-Dec-08	7	2	1	0	0.25[2]	8	1,668.6[P]	40.9[P]
6	14-Dec-08	7	7	3	0	0.25[2]	28	1,668.6[P]	40.9[P]
7	21-Dec-08	7	12	10	2	0.25[2]	48	1,668.6[P]	40.9[P]
8	28-Dec-08	6	1	1	0	0.25[2]	4	1,668.6[P]	40.9[P]
9	04-Jan-09	0	*Trap not operated due to high flow damage*						
10	11-Jan-09	0	*Trap not operated due to high flow damage*						
11	18-Jan-09	0	*Trap not operated due to high flow damage*						
12	25-Jan-09	4	17	16	6	0.39	44	303.1	17.4
13	01-Feb-09	7	11	10	1	0.31[3]	35	760.5[P]	27.6[P]
14	08-Feb-09	7	12	12	8	0.31[3]	38	760.5[P]	27.6[P]
15	15-Feb-09	7	128	74	48	0.66	195	340.9	18.5
16	22-Feb-09	7	138	98	65	0.66	208	154.2	12.4
17	01-Mar-09	5	82	49	19	0.39	211	1,311.6	36.2
Trap operation continued but data summarized through end of funding contract period									
	Totals:	90	474	286	156	0.55	1,134	21,707.8	147.3

[#] - Estimated trap efficiency for pooled marking periods

[P] - Estimated variance and standard deviation for pooled marking periods

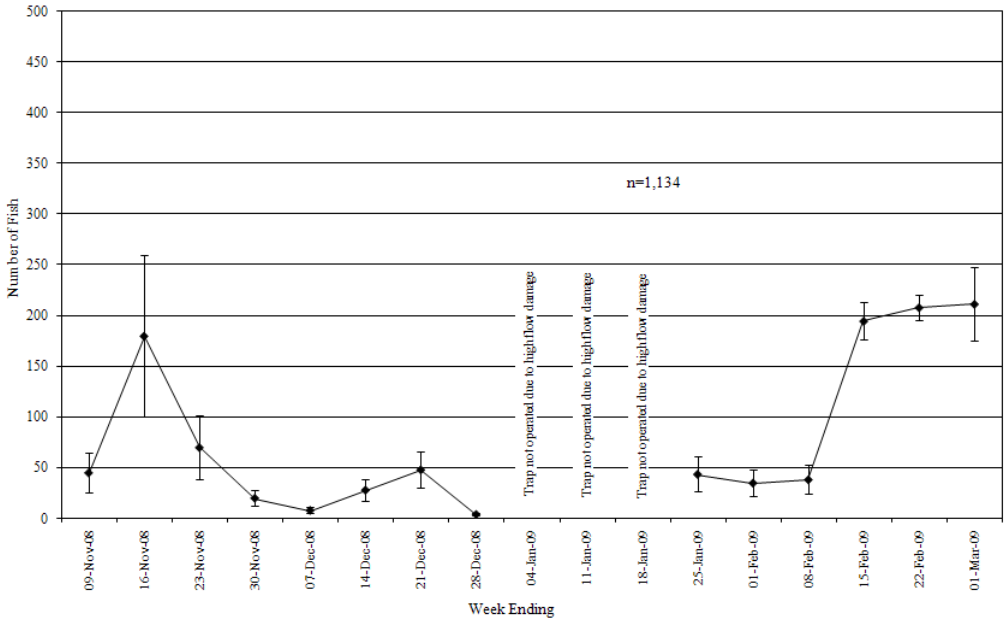

Figure 36. Estimated weekly number (+/- SD) of age 1+ and older coastal cutthroat trout emigrating past the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Mean weekly fork lengths of age 1+ and older coastal cutthroat trout ranged between 82 mm during the week ending 25-Jan-09 to 427 mm during the week ending 07-Dec-09 (Table 20). Cutthroat downstream migrant size varied substantially throughout the sampling period. Size fluctuations observed during this time were primarily attributed to the presence of large adults actively migrating throughout system during spawning activities (Table 15, Figure 39).

Figure 37. Adult coastal cutthroat trout captured in downstream migrant trap, McGarvey Creek, Late Fall 2008.

Figure 38. Large non-natal steelhead smolt captured in downstream migrant trap, McGarvey Creek, Late Fall 2008.

Table 20. Weekly mean fork length, standard deviation, 95% confidence interval, and sample size of age 1+ and older coastal cutthroat trout captured in the outmigrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Week #	Week Ending	FL (mm)	Standard Deviation	95% C.I.	# Sampled
Trap installed on 04-Nov-08 in conjunction with onset of fall rain and resumption of streamflow					
1	09-Nov-08	197.3	127.21	45.52	30
2	16-Nov-08	199.5	118.89	48.59	23
3	23-Nov-08	97.0	18.94	14.03	7
4	30-Nov-08	132.8	41.74	40.90	4
5	07-Dec-08	426.5	44.55	61.74	2
6	14-Dec-08	298.9	99.17	32.40	36
7	21-Dec-08	190.5	98.99	79.21	6
8	28-Dec-08	-	-	-	0
9	04-Jan-09	*Trap not operated due to high flow damage*			
10	11-Jan-09	*Trap not operated due to high flow damage*			
11	18-Jan-09	*Trap not operated due to high flow damage*			
12	25-Jan-09	82.0	13.59	6.66	16
13	01-Feb-09	167.7	117.77	69.59	11
14	08-Feb-09	126.3	89.35	50.55	12
15	15-Feb-09	214.3	121.93	20.96	130
16	22-Feb-09	148.1	91.77	15.26	139
17	01-Mar-09	163.0	88.03	20.06	74
Trap operation continued but data summarized through end of funding contract period					

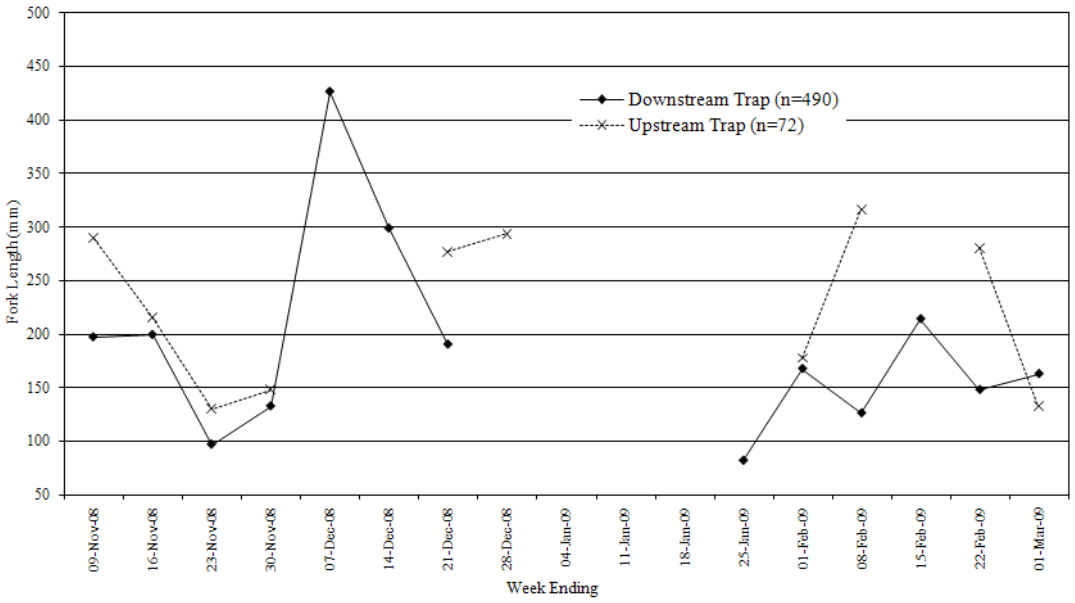

Figure 39. Mean weekly fork length (+/- 95% CI) of age 1+ and older coastal cutthroat trout sampled in the upstream and downstream migrant traps, McGarvey Creek, Fall 2008 - Winter 2009.

4.4.4 Chinook Salmon

No juvenile chinook salmon migrants were captured during either the winter-spring 2008 or fall 2008-winter 2009 sampling efforts. Estimated numbers of emigrant chinook salmon YOY have varied widely over the 12 year outmigrant trapping period in McGarvey Creek, with alternating periods of high abundance and extremely low or no abundance observed throughout the study period (Figure 40). Emigrant abundance of juvenile chinook in McGarvey Creek appears directly correlated with adult spawner presence the previous fall. YTFP has not detected any evidence of non-natal rearing by juvenile chinook in McGarvey Creek. However, they may rear in more habitats located closer to the confluence with the Klamath River.

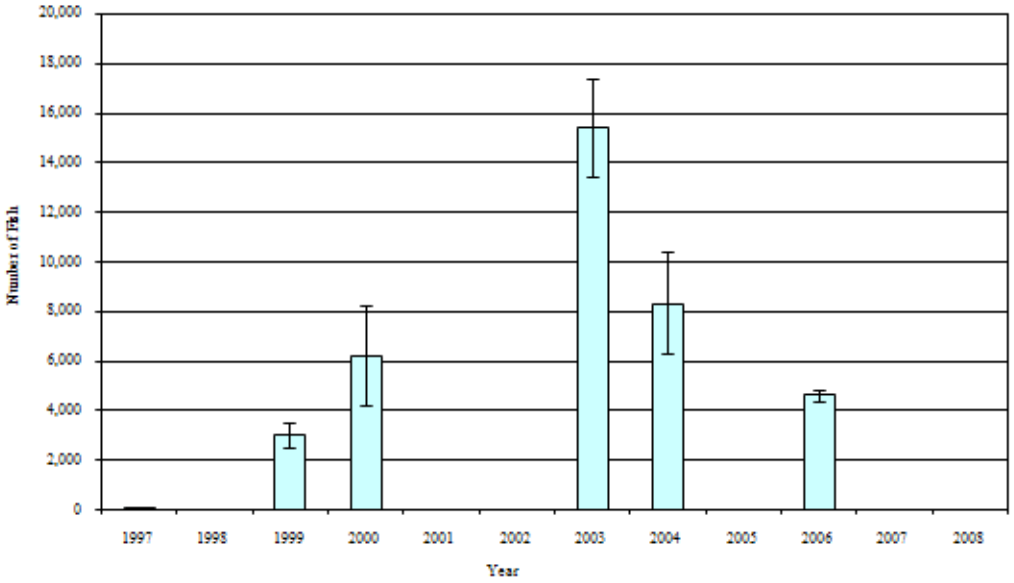

Figure 40. Estimated number of young-of-the-year chinook salmon emigrating past the outmigrant trap, McGarvey Creek, 1997 - 2008.

4.5 Upstream Migration Trapping

In an effort to further our understanding of upstream and downstream fish movement trends, YTFP also operated an upstream juvenile fish trap in conjunction with the outmigrant trap during the same time periods (24-Jan-08 through 30-Jun-08 and 05-Nov-08 through 01-Mar-09). YTFP has observed substantial non-natal fish immigration in McGarvey Creek during the wet season during previous sampling efforts (Tables 21 and 22). This upstream trapping was an effort to more thoroughly document the relative abundance and trends of fish moving upstream past the outmigrant trapping site during the fall-spring period. This allowed YTFP to better understand when such non-natal migration was occurring and to what magnitude such immigration may invalidate a desired comparison between summer abundance inventories and spring outmigrant trapping for each species.

Table 21. Total number of juvenile salmonids captured by week in the upstream migrant trap, McGarvey Creek, Winter - Spring 2008.

Week Ending	# Days Sampled	Chinook	Trout YOY	Steelhead 1+ & Older	Coho YOY	Coho Yearling	Cutthroat
27-Jan-08	4	0	0	0	0	0	0
03-Feb-08	4	0	0	0	0	0	0
10-Feb-08	3	0	0	0	0	0	0
17-Feb-08	7	0	0	12	0	1	14
24-Feb-08	7	0	0	7	0	3	10
2-Mar-08	7	0	0	1	0	0	11
9-Mar-08	7	0	0	0	0	0	1
16-Mar-08	6	0	0	3	0	0	11
23-Mar-08	6	0	0	0	0	0	0
30-Mar-08	7	0	0	0	0	0	0
6-Apr-08	7	0	0	1	0	0	0
13-Apr-08	7	0	0	0	0	1	4
20-Apr-08	7	0	0	0	0	0	5
27-Apr-08	7	0	0	0	0	0	0
4-May-08	7	0	0	0	0	0	1
11-May-08	7	0	0	0	0	1	0
18-May-08	7	0	0	0	0	0	0
25-May-08	7	0	0	0	0	0	0
1-Jun-08	7	0	0	0	0	6	0
8-Jun-08	7	0	0	0	0	14	0
15-Jun-08	7	0	0	0	0	22	0
22-Jun-08	7	0	0	0	0	0	0
29-Jun-08	7	0	0	0	0	0	0
Trap pulled on 30-June-08 due to low fish capture							
Total:	149	0	0	24	0	48	57

Table 22. Total number of juvenile salmonids captured by week in the upstream migrant trap, McGarvey Creek, Fall 2008 - Winter 2009.

Week Ending	# Days Sampled	Chinook	Trout YOY	Steelhead BY07 & Older	Coho Fry (BY08)	Coho Yearling (BY07)	Cutthroat
Trap installed on 04-Nov-08 in conjunction with onset of fall rain and resumption of streamflow							
09-Nov-08	5	0	0	117	0	38	1
16-Nov-08	7	0	0	11	0	16	7
23-Nov-08	7	0	0	223	0	53	21
30-Nov-08	7	0	0	210	0	32	5
07-Dec-08	7	0	0	200	0	19	3
14-Dec-08	7	0	0	108	0	0	0
21-Dec-08	7	0	0	526	0	8	9
28-Dec-08	6	0	0	78	0	6	5
04-Jan-09	0	*Trap not operated due to high flow damage*					
11-Jan-09	0	*Trap not operated due to high flow damage*					
18-Jan-09	0	*Trap not operated due to high flow damage*					
25-Jan-09	0	*Trap not operated due to high flow damage*					
01-Feb-09	7	0	0	6	0	0	2
08-Feb-09	7	0	0	3	0	0	1
15-Feb-09	7	0	0	0	0	0	0
22-Feb-09	7	0	0	2	0	1	2
01-Mar-09	5	0	0	0	0	1	1
Trap operation continued but data summarized through end of funding contract period							
Total:	86	0	0	1,484	0	174	57

Operating upstream and downstream traps concurrently revealed substantial upstream migration of non-natal salmonids, particularly during the fall following the onset of fall freshets (Tables 20 and 21). Steelhead smolts dominated the upstream migrants, with smaller but substantial numbers of coho smolts (172 fish caught prior to late December) also migrating upstream during the same time period. Only small numbers of coastal cutthroat trout immigrants were captured and were predominantly larger adults probably migrating to spawning grounds. YTFP has not yet determined a valid means to calculate trapping efficiency for the upstream trap and as a result all observations in fish abundance and trends are based on raw capture numbers. Major channel changes at the trap site following the 29-Dec-08 flood event made effective reinstallation of the upstream trap difficult. As a result it is unknown if the small number of upstream migrants observed after trap re-installation in late January is due to a reduction in trap efficiency and/or a reduction in upstream migrants during this time. Similar trends were observed in the upstream trap during the same time period in 2008 (Table 21), suggesting the bulk of upstream migration occurring in fall and early winter.

4.6 PIT Tag Monitoring

4.6.1 Half Duplex PIT Tag Data

4.6.1.1 Number of Fish Marked

In 2004, 74 fish were marked with HDX PIT tags during nine tagging events between 20-Sept and 30-Dec (Appendix 1). A total of 52 coastal cutthroat were tagged in six different locations: Upper Index Reach, West Fork Index Reach, Lower Index Reach, Upper McGarvey, Below the M10 Bridge, and Above the MH Bridge. Fork length of tagged cutthroat ranged between 108 – 380 mm. A total of 22 steelhead, ranging between 142 – 292 mm, were tagged at the following locations: McGarvey Creek mouth, Lower McGarvey, Below the M10 Bridge, and Above the MH Bridge (Table 23).

YTFP PIT tagged 152 fish during 2005 between 21-Jan and 15-Dec (Appendix 1). Eight coho were tagged including seven smolts ranging between 120 – 167 mm tagged in April at the outmigrant trap; and one adult coho tagged moving upstream in Lower McGarvey in December. A total of 86 cutthroat ranging between 105 - 404 mm were tagged between 21-Jan and 15-Dec at various locations; and 57 steelhead ranging between 119 – 290 mm were also tagged throughout 2005 at various locations.

A total of 115 fish were PIT tagged by YTFP in 2006 between 27-Feb and 6-Jun. Fish tagged included 1 brown trout (98 mm), 35 coho (105 – 125 mm), 53 cutthroat (124 – 378 mm), and 27 steelhead (127 – 314 mm) (Appendix 1). All fish tagged were captured in the outmigrant trap, with the exception of one cutthroat tagged on 12-Apr in Upper West Fork.

During 2007, a total of 91 fish were PIT tagged by YTFP, all of which were captured in the outmigrant trap (Appendix 1). Nine juvenile coho ranging between 115 – 145 mm were tagged between 9-Feb and 9-May. Sixty three cutthroat (122 – 330 mm) were tagged between February and late-April; and 19 steelhead (121 – 261 mm) were tagged between 9-Feb and 10-May.

The most tags were deployed during 2008, when 289 tags were implanted in 21 coho (120 – 155 mm), 192 cutthroat (127 – 434 mm), and 76 steelhead (156 – 280 mm) (Appendix 1). All coho were captured in the outmigrant trap between 11-Feb and 27-May. A majority of the cutthroat tagged (164) were captured in the outmigrant trap, while the remaining cutthroat tagged (28) were captured in the upstream migrant trap. Eleven steelhead captured in the outmigrant trap were PIT tagged, while 65 steelhead captured in the upstream migrant trap were tagged between 3-Dec and 23-Dec.

During early 2009, 49 tags were deployed between 23-Jan and 1-Mar (Appendix 1). A total of 31 cutthroat (133 – 470 mm) were tagged, 26 were captured in the outmigrant trap and five were captured in our upstream trap. Eighteen steelhead, ranging between 135 – 280 mm, were tagged, 13 were captured in the outmigrant trap and five were captured in our upstream trap.

4.6.1.2 Recaptures

During recapturing efforts, a total of 395 of the 770 fish PIT tagged were recaptured either in the migrant traps or at one of the remote PIT tag monitoring stations. A total of 225 fish were recaptured once; 121 fish were recaptured twice; 41 fish were recaptured three times; six fish were recaptured four times; and two fish were recaptured five or more times during this study. It should be noted that for purposes of discussion, a 'recapture' at a remote PIT tag monitoring station could either consist of one detection or multiple detections during on or consecutive days.

In addition to recapturing fish in our McGarvey Creek traps and remote PIT tag stations, we also recaptured four coastal cutthroat outside of the McGarvey Creek drainage during other sampling efforts. All four fish were tagged in the spring of 2008 in the outmigrant trap and recaptured during May of 2008. One cutthroat was tagged on 12-Mar and recaptured in YTFP's Lower Waukell Creek site moving upstream on 23-May and downstream on 24-May. Another fish showed similar behavior after being tagged on 14-Apr and subsequently recaptured moving upstream in Lower Waukell Creek on 9-May and downstream on 10-May. A cutthroat tagged on 7-Apr was recaptured moving upstream into YTFP's Waukell Swamp site on 29-May and back downstream on 30-May. Waukell Creek drains to the Klamath River Estuary 3.5 miles upstream of the Pacific Ocean. Recent YTFP fisheries studies indicate that this watershed provides critical over-winter rearing habitat for non-natal salmonids eminating from throughout the Klamath Basin (Soto et al. 2008). One fish tagged in McGarvey Creek on 22-Apr was recaptured during our weekly electrofishing sampling of the Klamath River Estuary on 29-May. A majority of the fish PIT tagged in McGarvey Creek (352) were recaptured in the outmigrant trap.

Recapture rate of PIT tagged fish varied by year but progressively increased to 69% during 2008 (Table 23). The majority of fish were recaptured within 30 days of being PIT tagged; however, 14 fish were recaptured from 200 to 340 days after being marked. Eleven of the 14 fish recaptured showed substantial growth (i.e. from 93 mm at marking event to 215 mm at recapture event). One of these recaptured fish gained over 270 g in weight during period between marking and recapture (Table 24). These fish tended to be marked in the outmigrant trap during spring and recaptured the following winter or early spring in either the upstream weir or outmigrant trap.

A total of 245 individuals were recaptured by our remote PIT tag monitoring systems. There were 2,648 individual tag detections, with the majority of these detections (1,779 detections and 160 individuals) occurring at the Lower Mainstem site. Thirty nine individuals logged a total of 150 detections at the Upper Mainstem site, and 46 individual fish logged 719 recapture events at the West Fork site. The high frequency of recapture events was mostly due to individuals repeatedly moving past the antenna or residing in nearby habitats. Movement patterns observed thus far include those individuals that outmigrate immediately following the marking event at the outmigrant trap. Fish marked during summer abundance surveys or other electrofishing marking events were predominantly recaptured by remote stations the following spring (March or April).

Table 23. Number of cutthroat, steelhead, and coho marked and recaptured in the McGarvey Creek outmigrant trap between 22-Sept-04 and 1-Mar-09.

	Number of Fish Tagged			Number of Fish Recaptured			
Tag Year	**CT**	**SH**	**CO**	**CT**	**SH**	**CO**	**Overall Recapture Rate (%)**
2004	52	22	0	2	2	0	5.4%
2005	86	57	8	19	9	1	19.1%
2006	53	27	35	20	6	12	33.0%
2007	63	19	9	28	5	0	36.3%
2008	192	76	21	152	38	8	68.9%
2009	31	18	0	12	6	0	36.7%

Data collected by our remote PIT tag monitoring systems indicated that 17 fish (16 cutthroat and one steelhead) left McGarvey Creek as outmigrants in the spring and then returned to the drainage in late fall – early winter (November – December). These observations support similar results observed during trapping of PIT tagged fish. In addition, several fish were also detected the following March, hypothetically leaving McGarvey during outmigration (Table 25).

Table 24. Days at liberty and growth data for fish recaptured in the McGarvey Creek outmigrant trap more than 30 days after being PIT tagged.

PIT Tag #	Species	Mark Date	Mark Location	Recapture Date	Recapture Location	Days at Liberty (DAL)	FL at Marking (mm)	FL at Recapture (mm)	Change in FL (mm)	WT at Marking (g)	WT at Recapture (g)	Change in WT (g)
Fish PIT Tagged in 2004												
25875060	CT	9/22/2004	Lower Mainstem Index Reach	4/14/2005	Outmigrant Trap	204	128	160	32	20.7	43.1	22.4
25873691	SH	12/28/2004	Below M10 Bridge	3/1/2005	Outmigrant Trap	63	170	170	0	52.7	39.3	-13.4
25874453	SH	12/29/2004	Below M10 Bridge	3/2/2005	Outmigrant Trap	63	164	164	0	45.8	41.8	-4
25874416	CT	12/29/2004	Above MH Bridge	3/9/2005	Outmigrant Trap	70	142	150	8	33.1	43.8	10.7
Fish PIT Tagged in 2005												
25873988	CT	24-Aug-05	West Fork	1-Apr-06	Outmigrant Trap	220	106	116	10	15.1	13.00	-2.1
25874603	CT	15-Dec-05	Lower Mainstem Index Reach	24-Mar-06	Outmigrant Trap	99	240	257	17	155	195.50	40.5
Fish PIT Tagged in 2006												
25875259	CT	27-Feb-06	Outmigrant Trap	29-Apr-06	Outmigrant Trap	61	149	163	14	30.5	39.2	8.7
25875162	SH	18-May-06	Outmigrant Trap	12-Feb-07	Outmigrant Trap	270	142	239	97	31	---	---
Fish PIT Tagged in 2007												
25873226	CT	10-Apr-07	Outmigrant Trap	11-Mar-08	Upstream Trap (Adult)	336	157	312	155	37.7	290	252.3
25873144	CT	25-Apr-07	Outmigrant Trap	23-Feb-08	Outmigrant Trap (Adult)	341	156	341	185	36.7	> 300	> 263
Fish PIT Tagged in 2008												
25874370	CT	11-Feb-08	Outmigrant Trap	13-Mar-08	Outmigrant Trap	31	205	202	-3	91	---	---
25874037	CT	15-Feb-08	Upstream Trap (Adult)	11-Dec-08	Outmigrant Trap (Adult)	300	302	395	93	268.3	> 300	> 32
25875169	CT	28-Feb-08	Upstream Trap	23-Apr-08	Outmigrant Trap	55	152	162	10	37.2	39.5	2.3
25874248	CT	29-Feb-08	Upstream Trap (Adult)	31-Mar-08	Outmigrant Trap (Adult)	31	297	285	-12	240	---	---
25873642	CT	11-Mar-08	Outmigrant Trap (Adult)	18-Apr-08	Outmigrant Trap (Adult)	38	371	388	17	> 300	> 300	---
25873740	CT	12-Mar-08	Outmigrant Trap	13-Apr-08	Outmigrant Trap	32	141	148	7	26.1	---	---
25873422	CT	12-Mar-08	Outmigrant Trap	29-May-08	Lower Waukell Upstream	78	147	168	21	33	41.4	8.4
25874963	CT	12-Mar-08	Outmigrant Trap	14-Dec-08	Outmigrant Trap (Adult)	277	145	360	215	30.8	> 300	> 269
25874524	CT	18-Mar-08	Outmigrant Trap	29-Apr-08	Outmigrant Trap	42	153	173	20	40.6	---	---
25873500	CT	19-Mar-08	Outmigrant Trap	28-Apr-08	Outmigrant Trap	40	166	170	4	47.2	---	---
25874835	CT	19-Mar-08	Outmigrant Trap	27-Jan-09	Outmigrant Trap (Adult)	314	141	287	146	29.9	> 300	> 270
25874304	CT	24-Mar-08	Outmigrant Trap	9-May-08	Outmigrant Trap	46	144	140	-4	28.1	---	---
25873888	CT	25-Mar-08	Outmigrant Trap	28-Feb-09	Outmigrant Trap (Adult)	340	164	320	156	44.8	> 300	> 255
25875227	CT	27-Mar-08	Outmigrant Trap	15-Nov-08	Outmigrant Trap (Adult)	233	143	238	95	32.5	> 300	> 267
26968832	CT	7-Apr-08	Outmigrant Trap	29-May-08	Lower Waukell Swamp Upstream	52	165	188	23	45.6	64.1	18.5
26969175	CT	7-Apr-08	Outmigrant Trap	15-Nov-08	Upstream Trap	222	171	328	157	49.2	> 300	> 250
26967513	CT	14-Apr-08	Outmigrant Trap	18-Nov-08	Upstream Trap (Adult)	218	154	145	-9	35	> 300	> 265
26968399	CT	14-Apr-08	Outmigrant Trap	24-Dec-08	Upstream Trap (Adult)	254	160	333	173	37.5	> 300	> 262
26966503	CT	21-Apr-08	Outmigrant Trap	17-Nov-08	Upstream Trap (Adult)	210	139	335	196	26.5	> 300	> 273

Table 24, continued.

Tag #	Species	Mark Date	Mark Location	Recapture Date	Recapture Location	Days at Liberty (DAL)	FL at Marking (mm)	FL at Recapture (mm)	Change in FL (mm)	WT at Marking (g)	WT at Recapture (g)	Change in WT (g)
Fish PIT Tagged in 2008, continued												
25873648	CT	22-Apr-08	Outmigrant Trap	29-May-08	Estuary Efishing Transect #4	37	178	175	-3	38.6	55.6	17.0
25874343	SH	3-Dec-08	Upstream Trap	12-Feb-09	Outmigrant Trap	71	208	212	4	96.7	98.0	1.3
25874771	SH	12/15/2008	Upstream Trap	26-Feb-09	Outmigrant Trap	73	217	225	8	98.7	---	---
25874621	SH	12/16/2008	Upstream Trap	16-Feb-09	Outmigrant Trap	62	252	252	0	182.4	178.4	-4
25873182	SH	12/17/2008	Upstream Trap	14-Feb-09	Outmigrant Trap	59	211	215	4	98.5	89.5	-9
25873523	SH	12/18/2008	Upstream Trap	18-Feb-09	Outmigrant Trap	62	196	198	2	80.4	76.6	-3.8
25875263	SH	12/18/2008	Upstream Trap	23-Feb-09	Outmigrant Trap	67	219	219	0	105.5	105.2	-0.3
25873185	SH	12/19/2008	Upstream Trap	23-Feb-09	Outmigrant Trap	66	276	277	1	239.9	> 300	> 60
25874356	CT	12/20/2008	Upstream Trap	15-Feb-09	Outmigrant Trap	57	268	264	-4	202.3	179.0	-23.3
25873711	SH	12/21/2008	Upstream Trap	14-Feb-09	Outmigrant Trap	55	199	195	-4	79.7	82.8	3.1
25873157	SH	12/21/2008	Upstream Trap	23-Feb-09	Outmigrant Trap	64	238	236	-2	142.3	128.5	-13.8
25874441	SH	12/23/2008	Upstream Trap	22-Feb-09	Outmigrant Trap	61	214	216	2	114.6	109.6	-5
25875291	CT	12/24/2008	Upstream Trap	22-Feb-09	Outmigrant Trap	60	353	345	-8	> 300	> 300	---

Table 25. Recapture data for coastal cutthroat and steelhead trout from remote PIT tag detection systems in Lower Mainstem, Upper Mainstem, and West Fork McGarvey.

PIT Tag #	Species	Mark Date	Mark Location	1st Recapture Date	Recapture Location	2nd Recapture Date	Recapture Location	3rd Recapture Date	Recapture Location	4th Recapture Date	Recapture Location	Time Between Marking and Last Recapture (Days)
25873281	CT	22-Mar-06	Outmigrant Trap	14-May-06	Lower SPI	17-Nov-06	Lower SPI	2-Mar-07	Lower SPI	5-Apr-07	Lower SPI	379
25873349	CT	18-Apr-06	Outmigrant Trap	30-Apr-06	Lower SPI	28-Jan-07	Lower SPI					285
25873605	CT	2-May-06	Outmigrant Trap	22-Mar-07	Lower SPI							324
25874322	CT	17-Dec-04	West Fork	27-Mar-05	Lower SPI	9-Nov-05	Lower SPI	20-Nov-05	Lower SPI			338
25874344	CT	25-Feb-05	Outmigrant Trap	22-Mar-05	Lower SPI	20-Apr-05	Lower SPI	9-Nov-05	Lower SPI	25-Nov-05	Lower SPI	273
25874463	CT	22-Mar-06	Outmigrant Trap	9-Nov-06	Lower SPI	10-Nov-06	Upper SPI					233
25874726	CT	12-Apr-06	Outmigrant Trap	13-Apr-06	Lower SPI	8-Nov-06	Lower SPI	8-Nov-06	Upper SPI			210
25874791	CT	18-May-06	Outmigrant Trap	10-Mar-07	Lower SPI	18-Mar-07	Lower SPI					304
25874976	CT	12-Apr-06	Outmigrant Trap	13-Apr-06	Lower SPI	9-Nov-06	Lower SPI					211
25875125	CT	22-Mar-06	Outmigrant Trap	11-Dec-06	Lower SPI							264
25875265	SH	26-Apr-05	Outmigrant Trap	27-May-05	Lower SPI	19-Nov-05	Lower SPI					207
25875347	CT	5-Apr-05	Outmigrant Trap	9-Nov-05	Lower SPI	26-Nov-05	Lower SPI					235
25874463	CT	22-Mar-06	Outmigrant Trap	9-Nov-06	Lower SPI	10-Nov-06	Upper SPI					233
25875347	CT	5-May-05	Outmigrant Trap	9-Nov-05	Lower SPI	27-Dec-05	Upper SPI					236
25874791	CT	18-May-06	Outmigrant Trap	8-Nov-06	West Fork SPI	10-Nov-06	West Fork SPI	18-Mar-07	Lower SPI			304
25874976	CT	12-Apr-06	Outmigrant Trap	13-Apr-06	Lower SPI	9-Nov-06	Lower SPI	10-Nov-06	West Fork SPI			212

4.6.2 Full Duplex PIT Tag Data

4.6.2.1 Number of Fish Marked

A total of 729 YOY coho were marked with FDX PIT tags in McGarvey Creek between 31-Aug-07 and 27-Jan-09 (Table 26). The majority of the coho tagged were captured in the outmigrant trap (359), but coho were also marked during summer abundance surveys, in the upstream trap, and during miscellaneous electrofishing surveys. The advantage of FDX PIT tags is the ability to mark smaller fish (i.e. > 60 mm fork length). Unfortunately, the remote PIT tag monitoring systems in McGarvey Creek cannot detect FDX PIT tags. Therefore, YTFP had to rely on handheld PIT tag scanners to recapture coho marked with FDX PIT tags.

Table 26. Juvenile coho PIT tagged with full duplex tags in McGarvey Creek between 31-Aug-07 and 27-Jan-09.

PIT Tagging Location	Dates	Number of Coho Tagged
West Fork McGarvey Electrofishing Survey	13-Aug-07	15
McGarvey Adult Weir	01-Nov-07 to 02-Dec-07	41
Lower McGarvey (Below M10)	04-Sept-08, 08-Sept-08	47
McGarvey Outmigrant Trap	05-Nov-08 to 27-Jan-09	359
McGarvey Upstream Trap	07-Nov-08 to 27-Dec-08	124
Lower McGarvey Summer Abundance Reach	12-Aug-08 to 14-Aug-08	78
Upper McGarvey Summer Abundance Reach	25-Aug-08, 26-Aug-08	9
West Fork Summer Abundance Surveys	09-Sept-08 to 11-Sept-08	56

4.6.2.2 Recaptures

A total of 109 YOY coho were recaptured during YTFP trapping events and at remote PIT tag monitoring stations operated in YTFP's Lower Waukell Creek and Salt Creek monitoring sites (Table 27, Table 28). Waukell Creek drains to the Klamath River estuary 3.5 miles upstream of the Pacific Ocean. Recent YTFP data indicates that the Waukell Creek watershed provides substantial overwinter rearing habitat for non-natal salmonids emigrating from throughout the Klamath Basin. Salt Creek is the lowermost tributary to the Klamath River (RM 0.75) and also provides crucial overwintering habitat for juvenile salmonids (Soto et al. 2008).

The majority of recaptures occurred in McGarvey drainage in either upstream or outmigrant traps, however, thirteen fish were recaptured in Lower Waukell Creek either at our PIT tag monitoring system or in our upstream/downstream fyke nets. In addition, one fish marked in the adult weir during the winter of 2007 was recaptured outmigrating from Junior Pond (a tributary of Waukell Creek) on 29-Apr-08. Two fish were also recaptured moving past our remote PIT tag monitoring system in Salt Creek. The first fish was marked in the outmigrant trap on 14-Dec-08 and detected in Salt Creek on 18-Dec-08, and the second was marked during the Upper

Mainstem summer abundance surveys and detected moving upstream in Salt Creek on 24-Dec-08 (Table 27).

Three juvenile coho PIT tagged by the Karuk Tribe in the Middle Klamath Basin were also recaptured in McGarvey Creek during trapping efforts. Two coho marked on 12-Sept-07 at Independence Creek, located at RM 95 on the Klamath River were recaptured during two separate trapping events. The first (PIT Tag #48752E134C) was captured in the upstream adult weir on 08-Nov-07 and the second (PIT Tag #486A404241) was in the outmigrant trap on 27-May-08. A juvenile coho (PIT Tag #486A7A5472) captured in the rotary screw trap at Big Bar in the mainstem Klamath (RM 51) on 18-Dec-07 was also captured in the outmigrant trap on 4-May-08.

Table 27. Number and location of juvenile coho full duplex PIT tag recaptures.

PIT Tagging Location	Number of Recaptures	Recapture Locations
West Fork McGarvey Electrofishing Survey	0	N/A
McGarvey Adult Weir	4	Adult Weir (1); Junior Pond (1); Outmigrant Trap (2)
Lower McGarvey (Below M10)	7	Outmigrant Trap (6); Lower Waukell (1)
McGarvey Outmigrant Trap	50	Outmigrant Trap (38); Lower Waukell (11)
McGarvey Upstream Trap	41	Outmigrant Trap (17); Upstream Trap (2)
Lower McGarvey Summer Abundance Reach	5	Outmigrant Trap (3); Fish Rescue (2)
Upper McGarvey Summer Abundance Reach	1	Outmigrant Trap/Salt Creek
West Fork Summer Abundance Surveys	5	Outmigrant Trap (4); Lower Waukell (1)

Table 28. Days at liberty and growth data for juvenile coho PIT tagged in McGarvey Creek and recaptured more than 30 days later.

PIT Tag #	Mark Date	Mark Location	WT (g) at Mark	Recapture Date	Recapture Location	Days at Liberty (DAL)	FL (mm) at Mark	FL (mm) at Recapture	Growth (mm)	WT at Recapture (g)	Growth (g)
47080B0B05	11/1/2007	Upstream Trap	7.8	4/26/2008	Outmigrant Trap	177	91	108	17	12.8	5
47063F183A	11/2/2007	Upstream Trap	9.3	5/4/2008	Outmigrant Trap	184	94	115	21	16.1	6.8
4706623E55	11/16/2007	Upstream Trap	6.8	4/29/2008	Jr. Pond-Downstream	165	86	122	36	19.3	12.5
985121014042894	8/12/2008	Lower McGarvey Creek (single stream)	6.7	11/15/2008	Outmigrant Trap	95	88	100	12	11.5	4.8
985121013382856	8/13/2008	Lower McGarvey Creek (single stream)	9.1	11/15/2008	Outmigrant Trap	94	87	95	8	9.3	0.2
985121013770215	8/13/2008	Lower McGarvey Creek (single stream)	6.4	12/16/2008	Outmigrant Trap	125	83	91	8	7.9	1.5
985121013384297	8/25/2008	Upper McGarvey Creek (single stream)	5.8	12/17/2008	Outmigrant Trap	114	78	88	10	8.0	2.2
985121013394710	9/4/2008	Lower McGarvey Creek (below bridge)	9.7	1/18/2009	Outmigrant Trap	136	89	98	9	11	1.3
985121013393616	9/4/2008	Lower McGarvey Creek (below bridge)	6.3	11/11/2008	Outmigrant Trap	68	81	86	5	7.2	0.9
985121013384188	9/4/2008	Lower McGarvey Creek (below bridge)	10.2	11/12/2008	Outmigrant Trap	69	98	100	2	12.2	2
985121013752903	9/4/2008	Lower McGarvey Creek (below bridge)	8.8	11/13/2008	Outmigrant Trap	70	90	96	6	10.6	1.8
985121013741648	9/4/2008	Lower McGarvey Creek (below bridge)	10.5	12/14/2008	Outmigrant Trap	101	95	102	7	11.5	1
985121013393703	9/4/2008	Lower McGarvey Creek (below bridge)	6.4	12/15/2008	Outmigrant Trap	102	80	101	21	10.2	3.8
985121014016980	9/9/2008	West Fork McGarvey Creek (single stream)	4.6	11/13/2008	Outmigrant Trap	65	84	N/A	N/A	9.1	4.5
985121013760092	9/10/2008	West Fork McGarvey Creek (single stream)	8.9	11/15/2008	Outmigrant Trap	66	86	95	9	9.3	0.4
985121013395175	9/11/2008	West Fork McGarvey Creek (single stream)	6.2	11/11/2008	Outmigrant Trap	61	81	87	6	7.3	1.1
985121013382718	9/11/2008	West Fork McGarvey Creek (single stream)	8.7	11/12/2008	Outmigrant Trap	62	90	96	6	9.4	0.7
985121014042553	11/8/2008	Upstream Trap	7.6	12/15/2008	Outmigrant Trap	37	90	91	1	8.2	0.6
985121014002112	11/8/2008	Upstream Trap	13.7	12/16/2008	Outmigrant Trap	38	102	102	0	11.3	-2.4
985121014045800	11/10/2008	Outmigrant Trap	12.6	12/16/2008	Lower Waukell (upstream)	36	103	108	5	14.5	1.9
985121013384038	11/13/2008	Outmigrant Trap	7.3	12/16/2008	Outmigrant Trap	33	82	85	3	7.0	-0.3
985121013738770	11/15/2008	Outmigrant Trap	4.3	12/16/2008	Outmigrant Trap	31	76	78	2	5.1	0.8

5.0 CONCLUSIONS/RECOMMENDATIONS

- **Survival rate issues**: Calculation of survival rates between life history stages was a primary objective of this study. The ability to assess survival rates between life stages, by comparing population estimates for YOY summer abundance relative to the abundance of smolts migrating the following spring, is based upon the assumption that the stream is a closed system between these sampling periods. This study, as well as other assessments the Yurok Tribe has recently conducted (e.g. Soto et al, 2008; Hiner personal communication), document that McGarvey Creek (and other Lower Klamath tributaries) is not a closed system. In fact, there is substantial downstream migration of juvenile salmonids (especially coho salmon and steelhead) during the fall/early winter prior to the typical emigration period in the spring, as well as substantial upstream migration by non-natal fish during the late-fall/early winter.

  Juvenile emigration prior to late winter/spring months
  As noted previously, due to contractual and funding restrictions imposed by CDFG, we were not able to use project funds to operate the outmigrant trap for the spring of 2009, which is the final monitoring period for tracking the BY07 fish. However, following discussions with CDFG, this provided an opportunity to use project funds to trap emigrants during the fall of 2008 through early winter of 2009. These efforts showed substantial numbers of fish migrating downstream during the fall months. For example an estimated 2,081 juvenile coho salmon migrated past the trap during the week of November 16, 2008 and more than 3,500 coho salmon and 3400 steelhead juveniles were estimated to emigrate prior to January. The final fate of these fish is unknown; however, given that they were fairly large fish (weekly mean fork lengths ranged between 85 - 99 mm) it seems likely that many survived. Also, the detection of juvenile coho marked in McGarvey and later detected in Waukell and Salt Creeks indicates that at a portion of these fish are rearing elsewhere.

  Non-natal rearing
  Operation of the upstream migrant trap in McGarvey Creek during the fall and early winter months revealed that substantial immigration of salmonids (especially coho salmon and steelhead) occurs in McGarvey Creek. More than 170 yearling coho and 1,400 steelhead were captured in the upstream migrant trap from early November through December; no expansion to estimate the population abundance is possible because the efficiency of the upstream trap is unknown. It is likely that the coho are non-natal fish as suggested by recaptures of fish marked in the Mid-Klamath Basin; however, it is unknown whether the steelhead and coastal cutthroat are native to the drainage and returning or are truly 'non-natal'. Similar upstream migration and subsequent over-winter rearing has been documented in several other Lower Klamath tributaries; typically in conjunction with precipitation events and increased streamflow (Soto et al, 2008; Hiner personal communication). It is likely that other streams in the Pacific Northwest experience similar types of non-natal rearing during winter months, especially coastal streams in the lower portions of large systems.

***Recommendations*:**

- Prior to estimating survival rates from one life stage to another (in the Lower Klamath as well as other systems), a thorough assessment of whether a closed system exist should be conducted. It should be determined how many natal fish leave and non-natal fish enter the system during the fall and early winter.
- Future efforts to assess survival rates from one life stage to another in McGarvey Creek (and other areas where non-natal rearing occurs) should include attempts to calculate efficiencies at upstream migrant traps. This would allow estimation of the abundance of non-natal upstream migrants that enter the system, which would allow estimation of the number of smolts native to McGarvey Creek that emigrate. This could be accomplished by operating two sets of traps (i.e. upstream and downstream) migrant traps in conjunction with each other at two separate locations. The lower upstream trap could be used to mark fish that would be used to estimate the efficiency of the upper upstream trap. The upper downstream trap could be used to mark fish that would be used to estimate the efficiency at the lower downstream trap. In addition, juvenile trapping efforts should occur from the fall through late spring to assess all the juvenile salmonids that leave and enter the system.

- **Adult Escapement Estimates:** Significant challenges were encountered with conducting a mark/recapture study to estimate adult escapement in McGarvey Creek. These were primarily attributable to the following factors: 1) the overall population is relatively small, resulting is few fish being marked, 2) the small population results in few fish (live or carcasses) being observed during spawner surveys as "recaptures", and 3) survey conditions in McGarvey Creek are typically hampered due to reduced visibility from turbidity during high flow conditions and water staining from natural tannins during low flow conditions. Furthermore, the method used which marked adults with Hi-Viz arctic flagging made it so marked fish were more readily observed while conducting spawning surveys than unmarked fish, especially during low visibility conditions; resulting in the mark/recapture estimator being biased.

  ***Recommendations*:**

  - In light of the problems associated with conducting a mark-recapture study to estimate adult escapement in McGarvey Creek, we recommend that efforts instead be focused on conducting intensive spawning ground surveys to count redds and recover carcasses (for species composition information). Carcasses should be marked so that a carcass mark-recapture is possible, however during most years the sample size of recovered carcasses will likely be too small for such an estimate.

- **Contractual/Funding Restrictions:** Contractual and funding restrictions imposed by CDFG prevented YTFP from being able to use the project funds to run the outmigrant trap for spring 2009, which is the final monitoring period for tracking the BY07 fish. Following discussions with CDFG staff, we agreed to operate our outmigrant trap from fall 2008 through February 2009 in an effort to further quantify fish movement during this time period between summer abundance inventories and spring outmigrant trapping. YTFP secured additional non-CDFG funding to then run the outmigrant trap during spring 2009 to continue the typical outmigrant trapping effort. The ability to assess between life-stage survival by comparing population

estimates between summer abundance inventories and outmigrant trapping the following spring relies on the assumption that McGarvey Creek is a closed system between these sampling periods.

- **PIT Tag Incompatibilities:** When this project was funded, coastal cutthroat and steelhead were primarily being PIT tagged, which allowed for the use of larger half duplex tags. Recently, a multi-agency Basin wide effort has been undertaken with regard to juvenile coho. Due to the small size of the fish, a different type of tag (full duplex) was necessary. Unfortunately, full duplex tags are more expensive. Differences between the full and half duplex tags does not allow interchangeable use of remote PIT tag monitoring systems—each system is specific to one type of tag. Therefore, our half duplex remote monitoring sites in the Lower Mainstem, Upper Mainstem, and West Fork could not detect PIT tagged coho.

  ***Recommendations*:**
  - In future studies, employ full duplex tags to increase compatibility with other projects in the Klamath Basin.
  - Install at least one full duplex remote PIT tag monitoring system in McGarvey Creek. This will also be useful in recapturing returning adults who were tagged in McGarvey Creek and other creeks in the Klamath Basin who are utilizing McGarvey Creek for spawning.

6.0 LITERATURE CITED

Beesley, S. and R. Fiori. 2007. Lower Klamath River Tributary Delta and Subsurface Flow Study, Lower Klamath River Sub-basin, California. Yurok Tribal Fisheries Program. Klamath, CA. 93 p.

Bjorkstedt E. P. (2000) Stock-recruitment relationships for life cycles that exhibit concurrent density dependence. Canadian Journal of Fishery and Aquatic Sciences 57(2): 459-467.

Bjorkstedt E. P. (2005) DARR 2.0: updated software for estimating abundance from stratified mark-recapture data. U.S. Depart. Commer., NOAA Technical Memorandum NMFS-SWFSC-368, 13 p.

Gale, D.B., and D.B. Randolph. 2000. Lower Klamath River sub-basin watershed restoration plan. Yurok Tribal Fisheries Program, Klamath CA 95548.

Hankin, D. G. and M. Mohr. 2008. Improved two-phase survey designs for estimation of fish abundance in small streams. Department of Fisheries Biology, Humboldt State University, Arcata, California 95521.

Hankin, D. G. and G. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 45: 834-844.

Hiner, M. 2006. Hydrologic monitoring in the Lower Klamath Basin, WY 2005. Yurok Tribal Environmental Program. Klamath, CA 95548.

Hiner, M. 2007. Hydrologic monitoring in the Lower Klamath Basin, WY 2006. Yurok Tribal Environmental Program. Klamath, CA 95548.

Kennen, J.G., S.J. Wisniewski, N.H. Ringler, and H.M. Hawkins. 1994. Application and modification of an auger trap to quantify emigrating fishes in Lake Ontario tributaries. North American Journal of Fisheries Management 14:828-836.

Meehan, William R. 1996. Influence of riparian canopy on macroinvertebrate composition and food habits of juvenile salmonids in several Oregon streams. Res. Pap. PNW-RP-496. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 14 p.

Polos, J.C. 1997. Estimation of the number of juvenile chinook salmon (*Oncorhynchus tshawytscha*) migrating downstream from Blue Creek, California, 1989-1992. Master's Thesis. Humboldt State University, Arcata, California.

Rosgen, D. 1996. Applied River Morphology, Second Edition. Pagosa Springs, Colorado: Wildland Hydrology.

Soto, T., A. Corum, H. Voight, D. Hillemeier, and L. Lestelle. 2008. The role of the Klamath River mainstem corridor in the life history and performance of juvenile coho salmon (*Oncorhynchus kisutch*). Phase I Report submitted to the United States Bureau of Reclamation. Klamath Falls, Oregon 97603.

Voight, H. 2007. Estimates of juvenile salmonid abundance in McGarvey Creek, tributary to the Lower Klamath River, California, Summer 2006. Yurok Tribal Fisheries Program, Klamath CA.

APPENDIX 1

LIST OF FISH IMPLANTED WITH HALF DUPLEX (HDX) PIT TAGS

2004 – 2008

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
20-Sep-04	Upper Index Reach	CT	113	14.3	25875096
20-Sep-04	Upper Index Reach	CT	159	49.4	25874336
20-Sep-04	Upper Index Reach	CT	113	14.9	25874499
20-Sep-04	Upper Index Reach	CT	132	23.3	25873191
20-Sep-04	Upper Index Reach	CT	126	21.5	25873789
20-Sep-04	Upper Index Reach	CT	213	83.2	25873924
20-Sep-04	Upper Index Reach	CT	120	16.5	25874656
20-Sep-04	Upper Index Reach	CT	124	19.2	25875348
20-Sep-04	Upper Index Reach	CT	138	24.6	25874626
21-Sep-04	West Fork Index Reach	CT	117	19.3	25874582
21-Sep-04	West Fork Index Reach	CT	157	34.7	25873505
21-Sep-04	West Fork Index Reach	CT	115	15.2	25873881
21-Sep-04	West Fork Index Reach	CT	120	16.4	25874097
21-Sep-04	West Fork Index Reach	CT	128	22.9	25874551
21-Sep-04	West Fork Index Reach	CT	114	15.6	25874796
21-Sep-04	West Fork Index Reach	CT	137	25.5	25875297
21-Sep-04	West Fork Index Reach	CT	131	23.9	25874970
22-Sep-04	Lower Main Index Reach	CT	115	14.4	25874510
22-Sep-04	Lower Main Index Reach	CT	141	28.1	25874702
22-Sep-04	Lower Main Index Reach	CT	120	16.8	25874620
22-Sep-04	Lower Main Index Reach	CT	128	20.7	25875060
22-Sep-04	Lower Main Index Reach	CT	115	15.5	25873942
22-Sep-04	Lower Main Index Reach	CT	118	14.2	25873137
22-Sep-04	Lower Main Index Reach	CT	122	18.9	25873819
22-Sep-04	Lower Main Index Reach	CT	144	29.9	25873667
22-Sep-04	Lower Main Index Reach	CT	118	16.9	25873490
22-Sep-04	Lower Main Index Reach	CT	135	21.7	25875055
22-Sep-04	Lower Main Index Reach	CT	109	15.3	25874871
22-Sep-04	Lower Main Index Reach	CT	120	17.7	25874872
22-Sep-04	Lower Main Index Reach	CT	132	21.5	25874921
13-Oct-04	Mouth of McG in Klamath	SH	292	262.3	25874695
11-Nov-04	Upper McGarvey	CT	140	23.7	25874240
11-Nov-04	Upper McGarvey	CT	162	31.4	25874511
11-Nov-04	Upper McGarvey	CT	132	23.5	25873918
11-Nov-04	Upper McGarvey	CT	108	8.9	25873794
11-Nov-04	Upper McGarvey	CT	202	92.6	25873262
11-Nov-04	Upper McGarvey	CT	138	25	25874708
11-Nov-04	Upper McGarvey	CT	202	53	25874459
11-Nov-04	Upper McGarvey	CT	162	43.4	25873737
11-Nov-04	Upper McGarvey	CT	116	16	25875136

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
11-Nov-04	Upper McGarvey	CT	148	31.7	25873462
15-Nov-04	Lower McGarvey	SH	160	45.1	25873710
15-Nov-04	Lower McGarvey	SH	217	117.2	25875916
17-Dec-04	WestFork	CT	154	37.2	25874322
28-Dec-04	Below M10 Bridge	SH	238	148.7	25874271
28-Dec-04	Below M10 Bridge	SH	230	129	25873448
28-Dec-04	Below M10 Bridge	SH	215	109.6	25874892
28-Dec-04	Below M10 Bridge	SH	204	100	25873868
28-Dec-04	Below M10 Bridge	SH	194	70.3	25873184
28-Dec-04	Below M10 Bridge	SH	182	64.8	25873456
28-Dec-04	Below M10 Bridge	SH	205	96.8	25873996
28-Dec-04	Below M10 Bridge	CT	380	300+	25873193
28-Dec-04	Below M10 Bridge	CT	307	307.5	25873939
28-Dec-04	Below M10 Bridge	CT	302	274.8	25875240
28-Dec-04	Below M10 Bridge	SH	235	140.2	25874044
28-Dec-04	Below M10 Bridge	SH	178	64.5	25873622
28-Dec-04	Below M10 Bridge	SH	170	52.7	25873691
28-Dec-04	Below M10 Bridge	SH	165	48.7	25874261
29-Dec-04	Above MH Bridge	CT	138	28.9	25873954
29-Dec-04	Above MH Bridge	SH	257	176.7	25875215
29-Dec-04	Below M10 Bridge	SH	164	45.8	25874453
29-Dec-04	Above MH Bridge	SH	153	37.9	25873181
29-Dec-04	Above MH Bridge	SH	142	31.2	25873602
29-Dec-04	Above MH Bridge	SH	146	42.4	25873684
29-Dec-04	Above MH Bridge	CT	156	38.7	25874067
29-Dec-04	Above MH Bridge	CT	329	340	25875047
29-Dec-04	Above MH Bridge	SH	212	98.7	25873960
29-Dec-04	Above MH Bridge	CT	167	48.7	25874995
29-Dec-04	Above MH Bridge	CT	183	68.7	25874909
29-Dec-04	Above MH Bridge	SH	218	114.6	25873466
29-Dec-04	Above MH Bridge	CT	142	33.1	25874416
29-Dec-04	Above MH Bridge	CT	340	350+	25874068
30-Dec-04	Above MH Bridge	CT	342	350+	25874496
30-Dec-04	Above MH Bridge	SH	242	151.4	25874282
21-Jan-05	Above MH Br.	CT	148	32.4	25874877
21-Jan-05	Large pool below trap site	CT	283	199.9	25875153
21-Jan-05	Above MH Br.	CT	330	290	25873948
21-Jan-05	B/W MH and M10 Bridges MH Br.	SH	121	98.5	25873885
21-Jan-05	B/W MH and M10 Bridges MH Br.	SH	155	41.9	25874546
21-Jan-05	Above MH Br.	SH	173	55	25873173

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
21-Jan-05	B/W MH and M10 Bridges MH Br.	SH	194	80.2	25873850
21-Jan-05	Large pool below trap site	SH	208	90.2	25874247
21-Jan-05	B/W MH and M10 Bridges MH Br.	SH	222	114.7	25873700
21-Jan-05	B/W MH and M10 Bridges MH Br.	SH	228	116.2	25873364
21-Jan-05	Above MH Br.	SH	229	116	25873584
21-Jan-05	Large pool below trap site	SH	234	125.5	25873994
21-Jan-05	B/W MH and M10 Bridges MH Br.	SH	242	135.5	25874351
21-Jan-05	Large pool below trap site	SH	290	239	25875260
18-Feb-05	Outmigrant Trap	CT	149	30.4	25873836
18-Feb-05	Outmigrant Trap	CT	150	30.9	25874580
18-Feb-05	Outmigrant Trap	CT	300	295.1	25874237
18-Feb-05	Outmigrant Trap	SH	154	35	25874181
18-Feb-05	Outmigrant Trap	SH	201	90.4	25873738
24-Feb-05	Outmigrant Trap	SH	178	57	25873269
25-Feb-05	Outmigrant Trap	CT	205	76.5	25874344
25-Feb-05	Outmigrant Trap	SH	196	76.8	25875023
25-Feb-05	Outmigrant Trap	SH	198	77.6	25874973
25-Feb-05	Outmigrant Trap	SH	207	82.5	25873213
25-Feb-05	Outmigrant Trap	SH	210	87.8	25873421
27-Feb-05	Outmigrant Trap	CT	398	350+	25873768
27-Feb-05	Outmigrant Trap	SH	189	65.7	25873280
28-Feb-05	Outmigrant Trap	CT	133	24.4	25874768
28-Feb-05	Outmigrant Trap	CT	136	23.8	25873443
28-Feb-05	Outmigrant Trap	CT	150	30.9	25874580
28-Feb-05	Outmigrant Trap	CT	157	32.4	25874733
28-Feb-05	Outmigrant Trap	CT	170	45.8	2587488
28-Feb-05	Outmigrant Trap	CT	205	76.5	25874344
28-Feb-05	Outmigrant Trap	SH	154	35	25874181
28-Feb-05	Outmigrant Trap	SH	180	55	25873713
28-Feb-05	Outmigrant Trap	SH	182	50.4	25874681
28-Feb-05	Outmigrant Trap	SH	188	67.7	25873478
28-Feb-05	Outmigrant Trap	SH	198	77.6	25874937
28-Feb-05	Outmigrant Trap	SH	199	72.3	25873353
28-Feb-05	Outmigrant Trap	SH	203	75.3	25874988
28-Feb-05	Outmigrant Trap	SH	206	87.5	25874168
1-Mar-05	Outmigrant Trap	CT	301	189	25874578
1-Mar-05	Outmigrant Trap	SH	154	38.2	25874414
1-Mar-05	Outmigrant Trap	SH	167	49	25874889
1-Mar-05	Outmigrant Trap	SH	172	52	25873905
1-Mar-05	Outmigrant Trap	SH	178	54.9	25874684

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
1-Mar-05	Outmigrant Trap	SH	188	69.5	25874415
1-Mar-05	Outmigrant Trap	SH	196	76.8	25875023
1-Mar-05	Outmigrant Trap	SH	198	78	25874467
1-Mar-05	Outmigrant Trap	SH	200	67.4	25874703
1-Mar-05	Outmigrant Trap	SH	201	90.4	25873738
1-Mar-05	Outmigrant Trap	SH	202	79.2	25875004
1-Mar-05	Outmigrant Trap	SH	215	108.2	25874479
2-Mar-05	Outmigrant Trap	CT	262	147.7	25873229
2-Mar-05	Outmigrant Trap	CT	271	193.4	25875010
3-Mar-05	Outmigrant Trap	CT	291	245.7	25874622
3-Mar-05	Outmigrant Trap	CT	328	305.2	25874658
3-Mar-05	Outmigrant Trap	CT	404		25874546
4-Mar-05	Outmigrant Trap	CT	137	23.8	25874107
4-Mar-05	Outmigrant Trap	CT	295	199.4	25874151
4-Mar-05	Outmigrant Trap	CT	319	255.2	25874666
4-Mar-05	Outmigrant Trap	SH	134	24.6	25874032
4-Mar-05	Outmigrant Trap	SH	179	50.8	25874780
4-Mar-05	Outmigrant Trap	SH	194	63.7	25873283
4-Mar-05	Outmigrant Trap	SH	232	120.9	25875105
10-Mar-05	Outmigrant Trap	CT	300	295.1	25874237
5-Apr-05	Outmigrant Trap	CT	134	23.9	25873438
5-Apr-05	Outmigrant Trap	CT	139	27.1	25873993
5-Apr-05	Outmigrant Trap	CT	147	33	25873839
5-Apr-05	Outmigrant Trap	CT	154	38	25873334
5-Apr-05	Outmigrant Trap	CT	155	38.3	25873633
5-Apr-05	Outmigrant Trap	CT	157	41.1	25875347
5-Apr-05	Outmigrant Trap	CT	158	39.3	25873390
5-Apr-05	Outmigrant Trap	CT	273	72.1	25874186
18-Apr-05	Outmigrant Trap	CO	125	20.4	25874789
18-Apr-05	Outmigrant Trap	CO	137	25.1	25873581
18-Apr-05	Outmigrant Trap	CO	167	48.2	25874757
18-Apr-05	Outmigrant Trap	CT	147	34.1	25875069
18-Apr-05	Outmigrant Trap	CT	156	39	25874196
18-Apr-05	Outmigrant Trap	CT	157	39.6	25874430
18-Apr-05	Outmigrant Trap	CT	157	41.8	25874381
18-Apr-05	Outmigrant Trap	CT	159	40.1	25875165
18-Apr-05	Outmigrant Trap	SH	135	27.2	25874996
18-Apr-05	Outmigrant Trap	SH	143	32.3	25874861
26-Apr-05	Outmigrant Trap	CO	120	17.8	25873295

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
26-Apr-05	Outmigrant Trap	CO	122	19.9	25873342
26-Apr-05	Outmigrant Trap	CO	126	21.8	25874171
26-Apr-05	Outmigrant Trap	CO	135	24	25873661
26-Apr-05	Outmigrant Trap	CT	126	19.9	25874839
26-Apr-05	Outmigrant Trap	CT	127	29	25874550
26-Apr-05	Outmigrant Trap	CT	127	19.7	25873351
26-Apr-05	Outmigrant Trap	CT	128	20.9	25875274
26-Apr-05	Outmigrant Trap	CT	131	21.8	25873579
26-Apr-05	Outmigrant Trap	CT	132	23.3	25874234
26-Apr-05	Outmigrant Trap	CT	134	23.2	25874033
26-Apr-05	Outmigrant Trap	CT	136	23.4	25874265
26-Apr-05	Outmigrant Trap	CT	139	27.4	25873785
26-Apr-05	Outmigrant Trap	CT	140	26.3	25873276
26-Apr-05	Outmigrant Trap	CT	147	31.3	25874649
26-Apr-05	Outmigrant Trap	CT	148	33.9	25873585
26-Apr-05	Outmigrant Trap	CT	152	35.9	25873555
26-Apr-05	Outmigrant Trap	CT	153	35	25873838
26-Apr-05	Outmigrant Trap	CT	157	37.8	25873644
26-Apr-05	Outmigrant Trap	CT	163	41.1	25873566
26-Apr-05	Outmigrant Trap	CT	174	54.1	25874063
26-Apr-05	Outmigrant Trap	SH	124	20.7	25873491
26-Apr-05	Outmigrant Trap	SH	129	22.8	25875140
26-Apr-05	Outmigrant Trap	SH	129	20.1	25873733
26-Apr-05	Outmigrant Trap	SH	136	47.4	25875265
26-Apr-05	Outmigrant Trap	SH	145	31.2	25873275
28-Apr-05	Outmigrant Trap	SH	130	23.5	25875140
23-Aug-05	West Fork	CT	110	15.2	25875064
23-Aug-05	West Fork	CT	119	17.1	25874177
23-Aug-05	West Fork	CT	125	22.2	25874263
23-Aug-05	West Fork	CT	127	20.4	25873228
23-Aug-05	West Fork	CT	137	25	25875346
23-Aug-05	West Fork	CT	143	29	25875302
23-Aug-05	West Fork	CT	155	36.2	25875048
23-Aug-05	West Fork	CT	172	57.2	25874443
24-Aug-05	West Fork	CT	106	15.1	25873988
24-Aug-05	West Fork	CT	110	14.8	25873178
24-Aug-05	West Fork	CT	110	13.3	25874690
24-Aug-05	West Fork	CT	125	19.6	25873593
24-Aug-05	West Fork	CT	130	25.8	25873197

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
24-Aug-05	West Fork	CT	138	23.2	25875180
24-Aug-05	West Fork	CT	145	31.2	25873617
24-Aug-05	West Fork	SH	119	19.2	25873863
24-Aug-05	West Fork	UT	130	22.1	25873361
25-Aug-05	West Fork	CT	105	13.3	25875041
25-Aug-05	West Fork	CT	112	14.2	25873814
25-Aug-05	West Fork	CT	119	14.7	25874778
25-Aug-05	West Fork	CT	123	17.5	25873995
25-Aug-05	West Fork	CT	124	19.1	25874709
25-Aug-05	West Fork	CT	129	21.9	25873361
25-Aug-05	West Fork	CT	134	24.2	25874824
25-Aug-05	West Fork	CT	141	28.3	25874407
2-Sep-05	Upper McGarvey	CT	119	23.2	25874587
2-Sep-05	Upper McGarvey	CT	120	17.9	25874992
2-Sep-05	Upper McGarvey	CT	122	17.5	25874884
2-Sep-05	West Fork	CT	139	23.9	25873348
28-Nov-05	Upper McGarvey	CT	120	19.7	25873692
15-Dec-05	Lower McGarvey	CO	A		25875029
15-Dec-05	Lower McGarvey	CT	240	144.7	25874117
15-Dec-05	Lower McGarvey	CT	240	155	25874603
15-Dec-05	Lower McGarvey	CT	255	180.5	25873797
15-Dec-05	Lower McGarvey	CT	334	400+	25873171
15-Dec-05	Lower McGarvey	SH	165	150.3	25874555
15-Dec-05	Lower McGarvey	SH	193	91	25874115
15-Dec-05	Lower McGarvey	SH	198	82.7	25873271
15-Dec-05	Lower McGarvey	SH	211	112.2	25874559
15-Dec-05	Lower McGarvey	SH	216	110.3	25875034
15-Dec-05	Lower McGarvey	SH	237	143.7	25873590
27-Feb-06	Outmigrant Trap	CT	149	30.50	25875259
27-Feb-06	Outmigrant Trap	CT	156	34.90	25874218
27-Feb-06	Outmigrant Trap	CT	187	57.90	25874267
27-Feb-06	Outmigrant Trap	CT	279	187.10	25874235
27-Feb-06	Outmigrant Trap	SH	162	42.70	25873307
27-Feb-06	Outmigrant Trap	SH	191	69.70	25873312
27-Feb-06	Outmigrant Trap	SH	204	89.70	25873441
27-Feb-06	Outmigrant Trap	SH	204	79.70	25873597
27-Feb-06	Outmigrant Trap	SH	208	85.40	25873640
27-Feb-06	Outmigrant Trap	SH	210	95.40	25874436
27-Feb-06	Outmigrant Trap	SH	213	93.00	25873961

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
27-Feb-06	Outmigrant Trap	SH	225	117.50	25875182
27-Feb-06	Outmigrant Trap	SH	225	104.10	25874435
27-Feb-06	Outmigrant Trap	SH	225	104.10	25874435
27-Feb-06	Outmigrant Trap	SH	237	122.90	25873308
27-Feb-06	Outmigrant Trap	SH	237	132.60	25874418
27-Feb-06	Outmigrant Trap	SH	237	105.80	25874598
27-Feb-06	Outmigrant Trap	SH	238	130.30	25874420
27-Feb-06	Outmigrant Trap	SH	252	172.20	25874942
27-Feb-06	Outmigrant Trap	SH	252	172.20	25874942
27-Feb-06	Outmigrant Trap	SH	298	275.80	25874197
27-Feb-06	Outmigrant Trap	SH	298	275.80	25874197
27-Feb-06	Outmigrant Trap	SH	303	297.90	25874730
27-Feb-06	Outmigrant Trap	SH	303	297.90	25874730
27-Feb-06	Outmigrant Trap	SH	314		25874969
1-Mar-06	Outmigrant Trap	CT	155	23.30	25875214
1-Mar-06	Outmigrant Trap	CT	158	40.60	25874746
1-Mar-06	Outmigrant Trap	CT	172	51.80	25873437
1-Mar-06	Outmigrant Trap	CT	190	70.80	25874013
1-Mar-06	Outmigrant Trap	CT	280	174.90	25873431
1-Mar-06	Outmigrant Trap	CT	308	254.70	25874560
1-Mar-06	Outmigrant Trap	CT	378	-	25874424
1-Mar-06	Outmigrant Trap	SH	200	83.10	25873705
1-Mar-06	Outmigrant Trap	SH	205	106.00	25873311
22-Mar-06	Outmigrant Trap	CO	105	12.20	25874334
22-Mar-06	Outmigrant Trap	CT	129	23.50	25875083
22-Mar-06	Outmigrant Trap	CT	136		25873281
22-Mar-06	Outmigrant Trap	CT	142	28.30	25873862
22-Mar-06	Outmigrant Trap	CT	144	28.90	25874170
22-Mar-06	Outmigrant Trap	CT	150	37.00	25873270
22-Mar-06	Outmigrant Trap	CT	156	39.00	25874808
22-Mar-06	Outmigrant Trap	CT	161	40.50	25874463
22-Mar-06	Outmigrant Trap	CT	165	46.80	25874994
22-Mar-06	Outmigrant Trap	CT	167	44.70	25875125
24-Mar-06	Outmigrant Trap	CT	130	20.50	25873452
24-Mar-06	Outmigrant Trap	CT	140	28.20	25872867
24-Mar-06	Outmigrant Trap	CT	145	32.00	25873532
24-Mar-06	Outmigrant Trap	CT	165	45.70	25874213
24-Mar-06	Outmigrant Trap	CT	257	195.50	25874603

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
24-Mar-06	Outmigrant Trap	CT	300	350	25874603
25-Mar-06	Outmigrant Trap	CT	136	27.20	25873355
25-Mar-06	Outmigrant Trap	CT	151	33.00	25873572
25-Mar-06	Outmigrant Trap	CT	152	35.70	25874967
25-Mar-06	Outmigrant Trap	CT	155	37.30	25874127
25-Mar-06	Outmigrant Trap	CT	169	47.60	25875256
25-Mar-06	Outmigrant Trap	CT	178	45.90	25874206
28-Mar-06	Outmigrant Trap	CO	112	17.30	25873680
31-Mar-06	Outmigrant Trap	CO	112		25873769
7-Apr-06	Outmigrant Trap	CO	111	14.20	25874480
10-Apr-06	Outmigrant Trap	CO	110	14.70	25873801
10-Apr-06	Outmigrant Trap	CO	111	14.60	25874330
10-Apr-06	Outmigrant Trap	CT	158	36.40	25873764
11-Apr-06	Outmigrant Trap	CO	115	16.50	25873629
12-Apr-06	Outmigrant Trap	CO	116	16.80	25874319
12-Apr-06	Outmigrant Trap	CT	124	20.10	25874316
12-Apr-06	Upper West Fork McGarvey	CT	140	27.00	25874460
12-Apr-06	Outmigrant Trap	CT	141	25.80	25874976
12-Apr-06	Outmigrant Trap	CT	149	32.60	25873808
12-Apr-06	Outmigrant Trap	CT	150	36.50	25874566
12-Apr-06	Outmigrant Trap	CT	152	53.30	25873403
12-Apr-06	Outmigrant Trap	CT	158	37.70	25874726
13-Apr-06	Outmigrant Trap	CT	153	37.90	25873749
13-Apr-06	Outmigrant Trap	CT	208	95.10	25875294
18-Apr-06	Outmigrant Trap	BT	98		25873931
18-Apr-06	Outmigrant Trap	CO	110	15.00	25875031
18-Apr-06	Outmigrant Trap	CT	130	23.70	25874627
18-Apr-06	Outmigrant Trap	CT	133	21.90	25873349
18-Apr-06	Outmigrant Trap	CT	152	38.40	25873730
18-Apr-06	Outmigrant Trap	SH	155	35.80	25874533
1-May-06	Outmigrant Trap	CO	111	12.70	25874783
1-May-06	Outmigrant Trap	CO	111	14.10	25873731
1-May-06	Outmigrant Trap	CO	111	13.80	25873983
1-May-06	Outmigrant Trap	CO	114	14.60	25874012
1-May-06	Outmigrant Trap	CO	116	16.00	25873138
1-May-06	Outmigrant Trap	CO	121	18.90	25873659
2-May-06	Outmigrant Trap	CO	122	19.80	25873389
2-May-06	Outmigrant Trap	CT	144	30.50	25873605

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
2-May-06	Outmigrant Trap	CT	156	39.10	25874682
2-May-06	Outmigrant Trap	CT	158	38.20	25873744
2-May-06	Outmigrant Trap	CT	160	37.70	25874318
2-May-06	Outmigrant Trap	CT	176	55.50	25874637
5-May-06	Outmigrant Trap	CO	111	13.50	25875104
5-May-06	Outmigrant Trap	CO	115	14.80	25874396
5-May-06	Outmigrant Trap	CT	144	29.40	25875080
5-May-06	Outmigrant Trap	SH	127	22.40	25873313
5-May-06	Outmigrant Trap	SH	130	23.40	25873782
8-May-06	Outmigrant Trap	CO	118	15.60	25875012
18-May-06	Outmigrant Trap	CO	112	14.80	25875336
18-May-06	Outmigrant Trap	CO	114	15.70	25875319
18-May-06	Outmigrant Trap	CO	114	16.50	25873976
18-May-06	Outmigrant Trap	CO	115	16.80	25873396
18-May-06	Outmigrant Trap	CO	116	15.50	25874847
18-May-06	Outmigrant Trap	CO	124	18.80	25874466
18-May-06	Outmigrant Trap	CT	128	19.50	25874791
18-May-06	Outmigrant Trap	SH	142	31.00	25875162
24-May-06	Outmigrant Trap	CO	111	15.50	25874308
24-May-06	Outmigrant Trap	CO	118	15.30	25873215
27-May-06	Outmigrant Trap	CO	118	17.80	25874136
27-May-06	Outmigrant Trap	CO	124	20.50	25873278
27-May-06	Outmigrant Trap	CO	125	19.30	25873707
2-Jun-06	Outmigrant Trap	CO	123	18.30	25874145
2-Jun-06	Outmigrant Trap	CO	125	19.80	25873379
2-Jun-06	Outmigrant Trap	CO	125	20.40	25874556
2-Jun-06	Outmigrant Trap	CT	124	19.60	25874966
6-Jun-06	Outmigrant Trap	CO	117	16.00	25873306
6-Jun-06	Outmigrant Trap	CO	120	13.90	25873762
9-Feb-07	Outmigrant Trap	CO	122	20.3	25874818
9-Feb-07	Outmigrant Trap	CT	178	47.1	25874862
9-Feb-07	Outmigrant Trap	CT	291	237	25873381
9-Feb-07	Outmigrant Trap	CT	323	284	25874425
9-Feb-07	Outmigrant Trap	CT	330	361	25875200
9-Feb-07	Outmigrant Trap	SH	189	70.4	25873380
9-Feb-07	Outmigrant Trap	SH	191	74.5	25873772
9-Feb-07	Outmigrant Trap	SH	198	81.3	25874461

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
9-Feb-07	Outmigrant Trap	SH	198	88	25873461
9-Feb-07	Outmigrant Trap	SH	203	80.3	25873463
9-Feb-07	Outmigrant Trap	SH	212	96.3	25873818
9-Feb-07	Outmigrant Trap	SH	245	149.2	25873709
9-Feb-07	Outmigrant Trap	SH	260	166	25874553
13-Feb-07	Outmigrant Trap	CT	148	57.2	25874204
13-Feb-07	Outmigrant Trap	CT	156	40.3	25875143
13-Feb-07	Outmigrant Trap	SH	261	186.2	25874452
12-Mar-07	Outmigrant Trap	CT	148	30.8	25873846
12-Mar-07	Outmigrant Trap	CT	152	33.5	25873434
12-Mar-07	Outmigrant Trap	CT	153	35.8	25873394
12-Mar-07	Outmigrant Trap	CT	258	135.3	25875216
12-Mar-07	Outmigrant Trap	CT	321	270	25875315
12-Mar-07	Outmigrant Trap	SH	158		25873583
12-Mar-07	Outmigrant Trap	SH	160	39.6	25873201
12-Mar-07	Outmigrant Trap	SH	180	59.3	25874179
12-Mar-07	Outmigrant Trap	SH	186	62.8	25873748
12-Mar-07	Outmigrant Trap	SH	223	111.2	25874274
12-Mar-07	Outmigrant Trap	SH	223	105.6	25873734
14-Mar-07	Outmigrant Trap	CO	117	16.8	25873899
14-Mar-07	Outmigrant Trap	CO	120	18.8	25875049
14-Mar-07	Outmigrant Trap	CT	122	18.4	25874451
14-Mar-07	Outmigrant Trap	CT	123	17.3	25874698
19-Mar-07	Outmigrant Trap	CO	123	20.1	25873802
25-Mar-07	Outmigrant Trap	CT	126	20.4	25875020
25-Mar-07	Outmigrant Trap	CT	130	22.4	25874413
25-Mar-07	Outmigrant Trap	CT	131	20.3	25874321
25-Mar-07	Outmigrant Trap	CT	135	24.3	25874979
25-Mar-07	Outmigrant Trap	CT	147	29.9	25874349
28-Mar-07	Outmigrant Trap	CT	132	23.1	25874385
28-Mar-07	Outmigrant Trap	CT	141	27.4	25873858
28-Mar-07	Outmigrant Trap	CT	148	31.8	25875267
28-Mar-07	Outmigrant Trap	CT	155	32.7	25873940
28-Mar-07	Outmigrant Trap	CT	159	41.9	25873822
28-Mar-07	Outmigrant Trap	CT	166	41.4	25874203
28-Mar-07	Outmigrant Trap	CT	167	47	25874882
29-Mar-07	Outmigrant Trap	CT	129	27.3	25874252
29-Mar-07	Outmigrant Trap	CT	150	35.7	25875320
29-Mar-07	Outmigrant Trap	CT	172	35	25874980

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
29-Mar-07	Outmigrant Trap	SH	121	19.6	25875239
1-Apr-07	Outmigrant Trap	CT	140	25.3	25874189
8-Apr-07	Outmigrant Trap	CT	155	35.3	25875138
8-Apr-07	Outmigrant Trap	CT	162	41.4	25873248
8-Apr-07	Outmigrant Trap	CT	165	47.2	25873628
8-Apr-07	Outmigrant Trap	CT	168	45.1	25875270
10-Apr-07	Outmigrant Trap	CT	136	23.3	25873681
10-Apr-07	Outmigrant Trap	CT	144	29.8	25874156
10-Apr-07	Outmigrant Trap	CT	157	37.7	25873226
10-Apr-07	Outmigrant Trap	CT	170	47.1	25874387
10-Apr-07	Outmigrant Trap	CT	200	69.5	25874840
16-Apr-07	Outmigrant Trap	CT	142	31.3	25874515
16-Apr-07	Outmigrant Trap	CT	148	32.8	25875323
16-Apr-07	Outmigrant Trap	CT	153	31	25873365
16-Apr-07	Outmigrant Trap	CT	162	39.2	25873682
16-Apr-07	Outmigrant Trap	SH	143	29	25875323
17-Apr-07	Outmigrant Trap	CT	132	23.6	25873833
17-Apr-07	Outmigrant Trap	CT	133	22.9	25873598
17-Apr-07	Outmigrant Trap	CT	144	31	25875070
17-Apr-07	Outmigrant Trap	CT	147	31	25873473
17-Apr-07	Outmigrant Trap	CT	148	32.4	25875323
18-Apr-07	Outmigrant Trap	CT	141	26.6	25874491
18-Apr-07	Outmigrant Trap	CT	151	34.1	25874549
18-Apr-07	Outmigrant Trap	CT	162	40.6	25873386
18-Apr-07	Outmigrant Trap	CT	179	56.8	25875148
18-Apr-07	Outmigrant Trap	SH	175	50.9	25873913
19-Apr-07	Outmigrant Trap	CT	147	30.1	25874731
19-Apr-07	Outmigrant Trap	CT	179	55.1	25875148
19-Apr-07	Outmigrant Trap	CT	182	59.8	25875186
22-Apr-07	Outmigrant Trap	CO	127	22.4	25874801
23-Apr-07	Outmigrant Trap	CO	115	16	25873192
23-Apr-07	Outmigrant Trap	CT	129	21.5	25875196
23-Apr-07	Outmigrant Trap	CT	135	23.5	25874503
23-Apr-07	Outmigrant Trap	CT	155	35	25873398
23-Apr-07	Outmigrant Trap	CT	174	48	25874891
24-Apr-07	Outmigrant Trap	CT	137	25.9	25873664
24-Apr-07	Outmigrant Trap	CT	175	49.6	25873875
25-Apr-07	Outmigrant Trap	CT	145	27.6	25874735

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
25-Apr-07	Outmigrant Trap	CT	147	30.6	25873548
25-Apr-07	Outmigrant Trap	CT	156	36.7	25873144
7-May-07	Outmigrant Trap	CO	134	27.4	25874864
8-May-07	Outmigrant Trap	CO	145	27	25874837
9-May-07	Outmigrant Trap	CO	123	21.1	25873187
10-May-07	Outmigrant Trap	SH	132	24.6	25873504
30-Jan-08	Outmigrant Trap	SH	156	41.3	25873946
30-Jan-08	Outmigrant Trap	SH	205	85.1	25873363
11-Feb-08	Outmigrant Trap	CO	120	18.7	25873540
11-Feb-08	Outmigrant Trap	CT	131	19.9	25873717
11-Feb-08	Outmigrant Trap	CT	299	182.3	25873512
11-Feb-08	Outmigrant Trap	CT	301	265.4	25874219
11-Feb-08	Outmigrant Trap	CT	331	300+	25873568
11-Feb-08	Outmigrant Trap	CT	416	300+	25873618
11-Feb-08	Outmigrant Trap	SH	205	91	25874370
11-Feb-08	Outmigrant Trap	SH	228	90.7	25873871
11-Feb-08	Outmigrant Trap	SH	228	123	25874296
11-Feb-08	Outmigrant Trap	SH	265	190	25874172
13-Feb-08	Outmigrant Trap	CT	157	41.9	25873791
13-Feb-08	Outmigrant Trap	CT	290	300+	25874734
13-Feb-08	Outmigrant Trap	CT	340	300+	25874458
14-Feb-08	Outmigrant Trap	CT	268	173.6	25874530
15-Feb-08	Upstream Trap	CT	223	115.4	25874710
15-Feb-08	Upstream Trap	CT	258	148.2	25874335
15-Feb-08	Upstream Trap	CT	302	268.3	25874037
15-Feb-08	Upstream Trap	CT	312	270.9	25873929
15-Feb-08	Outmigrant Trap	CT	330	300+	25874231
18-Feb-08	Upstream Trap	CT	290	230	25874245
19-Feb-08	Upstream Trap	CT	169	47.5	25874987
19-Feb-08	Outmigrant Trap	SH	250	149.2	25874143
22-Feb-08	Outmigrant Trap	CT	302	250.3	25873637
22-Feb-08	Outmigrant Trap	CT	338	273.4	25873781
22-Feb-08	Upstream Trap	CT	402	300+	25875137
23-Feb-08	Outmigrant Trap	CT	228	134	25874949
23-Feb-08	Outmigrant Trap	CT	365	300+	25874950
26-Feb-08	Outmigrant Trap	CT	415	300+	25874028
27-Feb-08	Upstream Trap	CT	279	216	25874901
27-Feb-08	Upstream Trap	CT	434	300+	25874497

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
28-Feb-08	Upstream Trap	CT	152	32.7	25875169
28-Feb-08	Upstream Trap	CT	163	42.9	25873870
28-Feb-08	Outmigrant Trap	CT	365	300+	25874642
28-Feb-08	Outmigrant Trap	CT	397	300+	25874091
29-Feb-08	Outmigrant Trap	CT	155	36	25874830
29-Feb-08	Outmigrant Trap	CT	280	166.2	25873658
29-Feb-08	Upstream Trap	CT	297	240	25874248
1-Mar-08	Outmigrant Trap	CT	325	300+	25873941
1-Mar-08	Outmigrant Trap	CT	345	300+	25874591
1-Mar-08	Outmigrant Trap	CT	403	300+	25874426
5-Mar-08	Outmigrant Trap	CT	338	300+	25873198
6-Mar-08	Outmigrant Trap	CT	272	180	25873225
7-Mar-08	Outmigrant Trap	CT	304	219.3	25874309
10-Mar-08	Upstream Trap	CT	177	48.1	25874985
11-Mar-08	Upstream Trap	CT	292	240	25873631
11-Mar-08	Upstream Trap	CT	371	300+	25873642
12-Mar-08	Outmigrant Trap	CT	127	19.5	25873376
12-Mar-08	Outmigrant Trap	CT	136	24.1	25874713
12-Mar-08	Outmigrant Trap	CT	140	27.9	25874358
12-Mar-08	Outmigrant Trap	CT	141	26.1	25873740
12-Mar-08	Outmigrant Trap	CT	145	30.8	25874963
12-Mar-08	Outmigrant Trap	CT	147	33	25873422
12-Mar-08	Outmigrant Trap	CT	157	35	25873153
12-Mar-08	Outmigrant Trap	CT	274	159.3	25875189
13-Mar-08	Outmigrant Trap	CT	180	60.2	25874851
13-Mar-08	Outmigrant Trap	CT	274	183	25875189
13-Mar-08	Outmigrant Trap	CT	282	191	25874249
13-Mar-08	Upstream Trap	CT	300	292	25874697
13-Mar-08	Upstream Trap	CT	320	300+	25874078
14-Mar-08	Outmigrant Trap	CT	135		25874713
14-Mar-08	Outmigrant Trap	CT	283	178	25873460
14-Mar-08	Outmigrant Trap	CT	295	208.9	25873780
18-Mar-08	Outmigrant Trap	CT	153	40.6	25874524
18-Mar-08	Outmigrant Trap	CT	155	34.5	25874482
18-Mar-08	Outmigrant Trap	CT	156	35.2	25875324
18-Mar-08	Outmigrant Trap	CT	282	209	25873697
19-Mar-08	Outmigrant Trap	CT	141	29.9	25874835
19-Mar-08	Outmigrant Trap	CT	166	47.2	25873500

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
19-Mar-08	Outmigrant Trap	CT	171	50.9	25874673
19-Mar-08	Outmigrant Trap	CT	293	212	25873957
20-Mar-08	Outmigrant Trap	CT	152	34.5	25874691
21-Mar-08	Outmigrant Trap	CT	157	38.1	25873876
21-Mar-08	Outmigrant Trap	CT	159	42.6	25874661
21-Mar-08	Outmigrant Trap	CT	171	49.9	25873249
24-Mar-08	Outmigrant Trap	CT	144	28.1	25874304
24-Mar-08	Outmigrant Trap	CT	152	33.7	25874574
25-Mar-08	Outmigrant Trap	CT	138	27.6	25874217
25-Mar-08	Outmigrant Trap	CT	139	27.4	25874297
25-Mar-08	Outmigrant Trap	CT	147	34.2	25874819
25-Mar-08	Outmigrant Trap	CT	161	40.3	25874576
25-Mar-08	Outmigrant Trap	CT	164	44.8	25873888
26-Mar-08	Outmigrant Trap	CT	170	46.2	25873720
27-Mar-08	Outmigrant Trap	CT	143	32.5	25875227
27-Mar-08	Outmigrant Trap	CT	146	32.1	25873815
27-Mar-08	Outmigrant Trap	CT	150	31.3	25873507
28-Mar-08	Outmigrant Trap	CT	155	38.3	25875181
31-Mar-08	Outmigrant Trap	CT	143	29.8	26966953
31-Mar-08	Outmigrant Trap	CT	150	36.2	25874670
31-Mar-08	Outmigrant Trap	CT	154	35.1	26968193
31-Mar-08	Outmigrant Trap	CT	301	221.1	26966496
1-Apr-08	Outmigrant Trap	CT	142	28	26967001
1-Apr-08	Outmigrant Trap	CT	151	35.2	26969070
1-Apr-08	Outmigrant Trap	CT	162	37.3	26969023
1-Apr-08	Outmigrant Trap	CT	165	41	26969497
1-Apr-08	Outmigrant Trap	CT	287	22.8	26969124
2-Apr-08	Outmigrant Trap	CT	159	37.4	26968451
2-Apr-08	Outmigrant Trap	CT	162	43.2	26967253
2-Apr-08	Outmigrant Trap	CT	171	49.5	26969001
2-Apr-08	Outmigrant Trap	CT	172	51	26969732
2-Apr-08	Outmigrant Trap	CT	294	215.8	26969101
3-Apr-08	Outmigrant Trap	CT	165	41.5	26969946
3-Apr-08	Outmigrant Trap	CT	166	45.3	26966466
3-Apr-08	Outmigrant Trap	CT	300	206.5	26969257
7-Apr-08	Outmigrant Trap	CT	155	36.2	26969615
7-Apr-08	Outmigrant Trap	CT	157	38	26968703
7-Apr-08	Outmigrant Trap	CT	164	39.6	26967587

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
7-Apr-08	Outmigrant Trap	CT	164	43.3	26968696
7-Apr-08	Outmigrant Trap	CT	165	45.6	26968832
7-Apr-08	Outmigrant Trap	CT	168	47.6	26967604
7-Apr-08	Outmigrant Trap	CT	171	49.2	26969175
7-Apr-08	Outmigrant Trap	CT	171	49.4	26969310
7-Apr-08	Outmigrant Trap	CT	178	54.5	26969886
8-Apr-08	Outmigrant Trap	CT	155	48.2	26969576
8-Apr-08	Outmigrant Trap	CT	255	137.1	26969542
9-Apr-08	Outmigrant Trap	CT	140	25.4	26967922
9-Apr-08	Outmigrant Trap	CT	141	26.2	26966904
9-Apr-08	Outmigrant Trap	CT	144	28.4	26968685
9-Apr-08	Outmigrant Trap	CT	145	27.6	26968708
9-Apr-08	Outmigrant Trap	CT	150	33.1	26969660
9-Apr-08	Outmigrant Trap	CT	151	35.5	26967805
9-Apr-08	Outmigrant Trap	CT	156	35.8	26969799
9-Apr-08	Outmigrant Trap	CT	156	35.4	26968704
9-Apr-08	Outmigrant Trap	CT	158	34.5	26966471
9-Apr-08	Outmigrant Trap	CT	159	36.4	26968394
9-Apr-08	Outmigrant Trap	CT	174	59.7	26966861
9-Apr-08	Outmigrant Trap	CT	188	61.4	26969505
9-Apr-08	Outmigrant Trap	CT	242	115.1	26969427
10-Apr-08	Outmigrant Trap	CT	143	27.3	26967380
10-Apr-08	Outmigrant Trap	CT	156	36.3	26967682
10-Apr-08	Outmigrant Trap	CT	159	40.1	26966778
10-Apr-08	Outmigrant Trap	CT	165	45.8	26968737
10-Apr-08	Outmigrant Trap	CT	169	44.8	26969636
10-Apr-08	Outmigrant Trap	CT	173	53.4	26969837
14-Apr-08	Outmigrant Trap	CT	153	33.4	26966396
14-Apr-08	Outmigrant Trap	CT	154	35	26967513
14-Apr-08	Outmigrant Trap	CT	160	37.5	26968399
14-Apr-08	Outmigrant Trap	CT	162	40.4	26969109
14-Apr-08	Outmigrant Trap	CT	174	44.4	26969544
15-Apr-08	Upstream Trap	CT	154	33.4	26966671
15-Apr-08	Outmigrant Trap	CT	165	41	26967646
15-Apr-08	Outmigrant Trap	CT	166	42.5	26969263
15-Apr-08	Outmigrant Trap	CT	170	47.2	26966844
15-Apr-08	Outmigrant Trap	CT	183	56.9	26969341
15-Apr-08	Outmigrant Trap	CT	186	64	26967558
17-Apr-08	Outmigrant Trap	CO	125	19.9	26969291

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
17-Apr-08	Outmigrant Trap	CT	144	26.9	26968110
17-Apr-08	Outmigrant Trap	CT	148	32	26968947
17-Apr-08	Outmigrant Trap	CT	160	96.4	26968280
17-Apr-08	Outmigrant Trap	CT	163	46.5	26966574
17-Apr-08	Outmigrant Trap	CT	168	49	26969388
18-Apr-08	Outmigrant Trap	CT	144	30.5	26969254
18-Apr-08	Outmigrant Trap	CT	188	63.3	26968264
21-Apr-08	Outmigrant Trap	CT	135	25.4	26966891
21-Apr-08	Outmigrant Trap	CT	137	24.3	26969966
21-Apr-08	Outmigrant Trap	CT	139	26.5	26966503
21-Apr-08	Outmigrant Trap	CT	172	25.4	26966532
21-Apr-08	Outmigrant Trap	CT	185	66.3	26968109
22-Apr-08	Outmigrant Trap	CT	155	37.2	25875247
22-Apr-08	Outmigrant Trap	CT	157	36	25874433
22-Apr-08	Outmigrant Trap	CT	159	35.8	26969589
22-Apr-08	Outmigrant Trap	CT	178	38.6	25873648
22-Apr-08	Outmigrant Trap	CT	235	122.4	26969926
23-Apr-08	Outmigrant Trap	CO	155	33.6	26969381
23-Apr-08	Outmigrant Trap	CT	152	34.9	26970099
23-Apr-08	Outmigrant Trap	CT	160	42.2	26969964
23-Apr-08	Outmigrant Trap	CT	160	41.8	25873224
23-Apr-08	Outmigrant Trap	CT	164	39.5	26966676
23-Apr-08	Outmigrant Trap	CT	166	45.3	25875014
23-Apr-08	Outmigrant Trap	CT	171	51.1	26970085
23-Apr-08	Outmigrant Trap	CT	184	62.1	26968809
23-Apr-08	Outmigrant Trap	CT	255	142.2	25874904
23-Apr-08	Outmigrant Trap	CT	280	180.9	26969459
28-Apr-08	Outmigrant Trap	CO	125	20.9	25873380
29-Apr-08	Outmigrant Trap	CT	152	30.8	25874745
29-Apr-08	Outmigrant Trap	CT	155	40.8	25874165
29-Apr-08	Outmigrant Trap	CT	157	39.3	25874423
1-May-08	Outmigrant Trap	CO	124	20.4	25873786
1-May-08	Outmigrant Trap	CT	134	23.3	25874728
4-May-08	Outmigrant Trap	CO	130	22.6	25874826
5-May-08	Outmigrant Trap	CO	130	20.4	25874476
5-May-08	Outmigrant Trap	CO	132	21.4	25873706
5-May-08	Outmigrant Trap	CT	163	43.1	25873517
7-May-08	Outmigrant Trap	CT	189	74.9	25874050

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
9-May-08	Outmigrant Trap	CO	126	19.9	25874060
9-May-08	Outmigrant Trap	CO	128	21.2	25873375
9-May-08	Outmigrant Trap	CO	130	22.4	25874485
12-May-08	Outmigrant Trap	CO	123	18.3	25873892
12-May-08	Outmigrant Trap	CO	129	21.1	25875021
13-May-08	Outmigrant Trap	CT	143	31.9	25874931
13-May-08	Outmigrant Trap	CT	144	31.8	25874439
14-May-08	Outmigrant Trap	CO	120	19.3	25874506
14-May-08	Outmigrant Trap	CO	124	18.9	25875061
16-May-08	Outmigrant Trap	CO	137	24.1	25875317
16-May-08	Outmigrant Trap	CT	164	48.2	25875204
16-May-08	Outmigrant Trap	CT	171	48.8	25874800
16-May-08	Outmigrant Trap	CT	268	228.3	25874386
18-May-08	Outmigrant Trap	CO	120	16.9	25874678
18-May-08	Outmigrant Trap	CO	124	17.7	25874494
20-May-08	Outmigrant Trap	CT	148	29.8	25874114
22-May-08	Outmigrant Trap	CO	120	17.8	25873243
24-May-08	Outmigrant Trap	CO	126	20	25873774
27-May-08	Outmigrant Trap	CO	126	20.6	25873496
20-Nov-08	Upstream Trap	CT	178	66.8	25873258
30-Nov-08	Outmigrant Trap	CT	152	31.8	25873174
30-Nov-08	Outmigrant Trap	CT	182	57	25873368
3-Dec-08	Upstream Trap	SH	208	96.7	25874343
3-Dec-08	Upstream Trap	SH	217	117.5	25874158
3-Dec-08	Upstream Trap	SH	219	113.1	25874212
3-Dec-08	Upstream Trap	SH	232	132.6	25874938
3-Dec-08	Upstream Trap	SH	234	127.4	25874853
4-Dec-08	Upstream Trap	SH	172	45.9	25873524
4-Dec-08	Upstream Trap	SH	186	68.8	25873484
4-Dec-08	Upstream Trap	SH	198	79.2	25874777
4-Dec-08	Upstream Trap	SH	201	88.4	25874449
4-Dec-08	Upstream Trap	SH	206	96.3	25873297
11-Dec-08	Upstream Trap	SH	171	54.7	25875188
11-Dec-08	Upstream Trap	SH	180	57.6	25874687
14-Dec-08	Outmigrant Trap	CT	161	41.1	25874675
14-Dec-08	Outmigrant Trap	CT	316	300+	25873458
14-Dec-08	Upstream Trap	SH	164	46	25874750
14-Dec-08	Upstream Trap	SH	167	48.1	25873607

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
14-Dec-08	Upstream Trap	SH	170	50	25873548
14-Dec-08	Upstream Trap	SH	190	66.4	25874784
14-Dec-08	Upstream Trap	SH	202	86.2	25874462
14-Dec-08	Upstream Trap	SH	203	87.3	25873344
14-Dec-08	Upstream Trap	SH	212	99	25873508
14-Dec-08	Upstream Trap	SH	214	99.6	25874162
15-Dec-08	Upstream Trap	SH	187	74.3	25873702
15-Dec-08	Upstream Trap	SH	197	72.1	25875208
15-Dec-08	Upstream Trap	SH	214	107	25873488
15-Dec-08	Upstream Trap	SH	217	98.7	25874771
15-Dec-08	Upstream Trap	SH	232	121.7	25873887
16-Dec-08	Outmigrant Trap	CT	344	300+	25873284
16-Dec-08	Outmigrant Trap	SH	202	84.8	25875344
16-Dec-08	Outmigrant Trap	SH	242	154.1	25873978
16-Dec-08	Outmigrant Trap	SH	242	153.1	25873676
16-Dec-08	Outmigrant Trap	SH	252	182.4	25874621
17-Dec-08	Outmigrant Trap	CT	311	289.2	25874570
17-Dec-08	Upstream Trap	SH	183	66	25874958
17-Dec-08	Upstream Trap	SH	190	76.3	25874516
17-Dec-08	Upstream Trap	SH	190	79.2	25874279
17-Dec-08	Upstream Trap	SH	199	87.4	25873205
17-Dec-08	Upstream Trap	SH	200	80.2	25873414
17-Dec-08	Upstream Trap	SH	202	77.9	25875009
17-Dec-08	Upstream Trap	SH	202	92.2	25874163
17-Dec-08	Upstream Trap	SH	204	91.2	25874907
17-Dec-08	Upstream Trap	SH	207	93.2	25873678
17-Dec-08	Upstream Trap	SH	211	98.5	25873182
17-Dec-08	Upstream Trap	SH	212	104.5	25874512
17-Dec-08	Upstream Trap	SH	215	105.9	25874096
17-Dec-08	Upstream Trap	SH	215	106.6	25874337
17-Dec-08	Upstream Trap	SH	216	102.9	25873972
17-Dec-08	Upstream Trap	SH	220	124	25873775
17-Dec-08	Upstream Trap	SH	223	117.1	25874900
17-Dec-08	Upstream Trap	SH	231	130.4	25873450
17-Dec-08	Upstream Trap	SH	236	130	25874361
17-Dec-08	Upstream Trap	SH	268	183.5	25874027
17-Dec-08	Upstream Trap	SH	269	217.6	25875244
18-Dec-08	Upstream Trap	SH	191	80	25873300

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
18-Dec-08	Upstream Trap	SH	196	80.4	25873523
18-Dec-08	Upstream Trap	SH	206	97.9	25873331
18-Dec-08	Upstream Trap	SH	212	98.4	25875022
18-Dec-08	Upstream Trap	SH	219	105.5	25875263
19-Dec-08	Upstream Trap	SH	192	77.1	25874215
19-Dec-08	Upstream Trap	SH	201	93.3	25874632
19-Dec-08	Upstream Trap	SH	210	100.5	25873374
19-Dec-08	Upstream Trap	SH	276	239.9	25873185
19-Dec-08	Upstream Trap	SH	280	238.6	25873663
20-Dec-08	Upstream Trap	CT	268	202.3	25874356
20-Dec-08	Upstream Trap	CT	288	245.2	25874354
20-Dec-08	Upstream Trap	CT	296	256.1	25874431
20-Dec-08	Upstream Trap	CT	318	299.7	25873152
20-Dec-08	Upstream Trap	CT	322	300+	25873653
21-Dec-08	Upstream Trap	SH	199	79.7	25873711
21-Dec-08	Upstream Trap	SH	200	84	25873987
21-Dec-08	Upstream Trap	SH	204	98.9	25875303
21-Dec-08	Upstream Trap	SH	219	109	25873677
21-Dec-08	Upstream Trap	SH	238	142.3	25873157
23-Dec-08	Upstream Trap	SH	214	114.6	25874441
23-Dec-08	Upstream Trap	SH	230	130.4	25875011
23-Dec-08	Upstream Trap	SH	232	133.9	25874653
23-Dec-08	Upstream Trap	SH	234	142	25874831
23-Dec-08	Upstream Trap	SH	243	151.5	25874487
24-Dec-08	Upstream Trap	CT	237	300+	25874831
24-Dec-08	Upstream Trap	CT	332	300+	25874577
24-Dec-08	Upstream Trap	CT	353	300+	25875291
24-Dec-08	Upstream Trap	CT	385	300+	25874623
23-Jan-09	Outmigrant Trap	SH	164	46.8	25873234
25-Jan-09	Outmigrant Trap	SH	135	23.4	25873273
25-Jan-09	Outmigrant Trap	SH	155	40.3	25873296
25-Jan-09	Outmigrant Trap	SH	159	41.9	25874214
25-Jan-09	Outmigrant Trap	SH	169	40.6	25874432
25-Jan-09	Outmigrant Trap	SH	182	60.3	25874531
26-Jan-09	Outmigrant Trap	SH	181	61.5	25874651
27-Jan-09	Outmigrant Trap	CT	367	300+	25874749
27-Jan-09	Upstream Trap	SH	250	163.3	25874486
28-Jan-09	Upstream Trap	SH	182	58.4	25873170
28-Jan-09	Upstream Trap	SH	184	61.8	25874927

Mark Date	Mark Location	Species	Length (mm)	Weight (g)	Pit Tag ID
3-Feb-09	Upstream Trap	SH	280	221.3	25874779
6-Feb-09	Outmigrant Trap	CT	348	300+	25874608
6-Feb-09	Upstream Trap	CT	391	300+	25874210
6-Feb-09	Upstream Trap	CT	470	300+	25875155
6-Feb-09	Outmigrant Trap	SH	180	54.3	25874545
6-Feb-09	Outmigrant Trap	SH	185	63.6	25874241
6-Feb-09	Upstream Trap	SH	156	39.8	25875238
9-Feb-09	Outmigrant Trap	SH	182	58.7	25874531
12-Feb-09	Outmigrant Trap	CT	281	196.8	25874528
12-Feb-09	Outmigrant Trap	CT	291	229.1	25875158
12-Feb-09	Outmigrant Trap	CT	360	300+	25875033
12-Feb-09	Outmigrant Trap	SH	208	90	25873688
12-Feb-09	Outmigrant Trap	SH	232	111.2	25874008
12-Feb-09	Outmigrant Trap	SH	232	123.2	25874806
13-Feb-09	Outmigrant Trap	CT	281	225.2	25875218
15-Feb-09	Outmigrant Trap	CT	165	41.8	25874586
17-Feb-09	Outmigrant Trap	CT	145	29.7	25874278
17-Feb-09	Outmigrant Trap	CT	149	40.2	25874522
17-Feb-09	Outmigrant Trap	CT	153	36.2	25875245
17-Feb-09	Outmigrant Trap	CT	160	38.7	25874282
17-Feb-09	Outmigrant Trap	CT	164	40.9	25873210
18-Feb-09	Upstream Trap	CT	279	200.5	25873558
18-Feb-09	Upstream Trap	CT	305	291.8	25873767
18-Feb-09	Upstream Trap	CT	308	270.8	25873923
22-Feb-09	Outmigrant Trap	CT	138	26.8	25875235
22-Feb-09	Outmigrant Trap	CT	151	34.1	25874411
26-Feb-09	Outmigrant Trap	CT	169	46.3	25874738
27-Feb-09	Outmigrant Trap	CT	134	21.3	25873521
27-Feb-09	Outmigrant Trap	CT	138	27.9	25873945
27-Feb-09	Outmigrant Trap	CT	144	26.2	25874657
27-Feb-09	Outmigrant Trap	CT	146	39	25874951
28-Feb-09	Outmigrant Trap	CT	133	23	25873657
28-Feb-09	Outmigrant Trap	CT	137	25.6	25875130
28-Feb-09	Outmigrant Trap	CT	139	26.4	25875343
1-Mar-09	Outmigrant Trap	CT	133	24.8	25875210
1-Mar-09	Outmigrant Trap	CT	143	26.3	25873761
1-Mar-09	Outmigrant Trap	CT	150	32.6	25874450
1-Mar-09	Outmigrant Trap	CT	153	33.3	25874164

APPENDIX 2

LIST OF JUVENILE COHO IMPLANTED WITH FULL DUPLEX (FDX) PIT TAGS

2007 – 2009

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
8/13/2007	West Fork McGarvey	83	no weight	134872524A
8/13/2007	West Fork McGarvey	79	7.3	133739593A
8/13/2007	West Fork McGarvey	79	7.4	134418717A
8/13/2007	West Fork McGarvey	74	5.9	133576590A
8/13/2007	West Fork McGarvey	75	5.6	134979123A
8/13/2007	West Fork McGarvey	75	6.5	134514563A
8/13/2007	West Fork McGarvey	72	5.7	137323531A
8/13/2007	West Fork McGarvey	75	5.4	133743185A
8/13/2007	West Fork McGarvey	80	7.5	133638334A
8/13/2007	West Fork McGarvey	79	7.2	134979630A
8/13/2007	West Fork McGarvey	87	8.2	133934645A
8/13/2007	West Fork McGarvey	75	5.1	134465510A
8/13/2007	West Fork McGarvey	73	4.9	133535595A
8/13/2007	West Fork McGarvey	74	5	137328396A
8/14/2007	West Fork McGarvey	82	8	137559157A
8/14/2007	West Fork McGarvey	78	6.4	133549177A
10/25/2007	McGarvey Creek (upstream)	75	4.7	135117577A
10/25/2007	McGarvey Creek (upstream)	101	11.3	134449546A
10/25/2007	McGarvey Creek (upstream)	95	8.8	135138227A
10/25/2007	McGarvey Creek (upstream)	95	8.5	134464550A
10/25/2007	McGarvey Creek (upstream)	100	10.6	133548366A
10/25/2007	McGarvey Creek (upstream)	91	8.4	134469247A
10/25/2007	McGarvey Creek (upstream)	88	7.2	135119283A
10/25/2007	McGarvey Creek (upstream)	84	6.2	134433232A
10/25/2007	McGarvey Creek (upstream)	79	5.1	135133385A
10/25/2007	McGarvey Creek (upstream)	76	4.8	135144110A
10/25/2007	McGarvey Creek (upstream)	73	4.2	133871656A
10/25/2007	McGarvey Creek (upstream)	94	9.2	133626346A
10/25/2007	McGarvey Creek (upstream)	92	8.2	133745193A
10/30/2007	McGarvey Creek (upstream)	89	no weight	4708024B3F
11/1/2007	McGarvey Creek (upstream)	76	5.3	47080C7A5D
11/1/2007	McGarvey Creek (upstream)	91	7.8	47080B0B05
11/1/2007	McGarvey Creek (upstream)	76	5.1	47035F4035
11/1/2007	McGarvey Creek (upstream)	94	9.1	470D5B4F53
11/1/2007	McGarvey Creek (upstream)	89	8	47092C2441
11/1/2007	McGarvey Creek (upstream)	76	4.9	47077A4903
11/1/2007	McGarvey Creek (upstream)	75	4.7	47027E710C
11/1/2007	McGarvey Creek (upstream)	84	6.8	470265276D
11/1/2007	McGarvey Creek (upstream)	83	6.6	470B3C5D3B
11/1/2007	McGarvey Creek (upstream)	85	6.7	465B01014B
11/2/2007	McGarvey Creek (upstream)	94	9.3	47063F183A
11/2/2007	McGarvey Creek (upstream)	82	6.4	4706641A27
11/2/2007	McGarvey Creek (upstream)	94	9.1	4706624039
11/2/2007	McGarvey Creek (upstream)	95	8.5	470D645950
11/5/2007	McGarvey Creek (upstream)	87	no weight	470E177575
11/5/2007	McGarvey Creek (upstream)	107	no weight	4705677CB

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/5/2007	McGarvey Creek (upstream)	78	no weight	4708662753
11/5/2007	McGarvey Creek (upstream)	79	no weight	47060F6003
11/5/2007	McGarvey Creek (upstream)	87	no weight	4708234F26
11/5/2007	McGarvey Creek (upstream)	93	no weight	4709572D1A
11/5/2007	McGarvey Creek (upstream)	86	no weight	487767384B
11/5/2007	McGarvey Creek (upstream)	88	no weight	470B293D35
11/5/2007	McGarvey Creek (upstream)	81	no weight	4703376F5C
11/8/2007	McGarvey Creek (upstream)	88	6.9	4705043A41
11/16/2007	McGarvey Creek (upstream)	86	6.8	4706623E55
11/16/2007	McGarvey Creek (upstream)	85	6.2	47047E5F4C
11/16/2007	McGarvey Creek (upstream)	109	14.2	47094D0614
11/17/2007	McGarvey Creek (upstream)	76	4.7	47053D2362
11/17/2007	McGarvey Creek (upstream)	110	14.7	4709332526
12/2/2007	McGarvey Creek (upstream)	108	12.1	47042B414F
12/2/2007	McGarvey Creek (upstream)	93	7.5	470414386A
8/12/2008	Lower McGarvey Creek (single stream)	82	6.2	985121013393347
8/12/2008	Lower McGarvey Creek (single stream)	88	6.7	985121014042894
8/12/2008	Lower McGarvey Creek (single stream)	81	7.4	985121003621482
8/12/2008	Lower McGarvey Creek (single stream)	86	7.3	985121003618207
8/12/2008	Lower McGarvey Creek (single stream)	87	5.7	985121013393187
8/12/2008	Lower McGarvey Creek (single stream)	75	5.2	985121013384356
8/12/2008	Lower McGarvey Creek (single stream)	73	6.2	985121014065486
8/12/2008	Lower McGarvey Creek (single stream)	74	5.3	985121014062766
8/12/2008	Lower McGarvey Creek (single stream)	97	8.5	985121014044323
8/12/2008	Lower McGarvey Creek (single stream)	83	6.5	985121013755513
8/12/2008	Lower McGarvey Creek (single stream)	92	9.3	985121013384748
8/12/2008	Lower McGarvey Creek (single stream)	80	5.9	985121014045009
8/12/2008	Lower McGarvey Creek (single stream)	85	7.2	985121013383471
8/12/2008	Lower McGarvey Creek (single stream)	83	6.3	985121014017927
8/12/2008	Lower McGarvey Creek (single stream)	74	4.5	985121014018353
8/12/2008	Lower McGarvey Creek (single stream)	81	6.3	985121013382195
8/12/2008	Lower McGarvey Creek (single stream)	92	8.6	985121013857343
8/12/2008	Lower McGarvey Creek (single stream)	91	9.4	985121013394458
8/12/2008	Lower McGarvey Creek (single stream)	84	6.8	985121013384076
8/12/2008	Lower McGarvey Creek (single stream)	82	6.2	985121013393386
8/13/2008	Lower McGarvey Creek (single stream)	76	5.7	985121014019069
8/13/2008	Lower McGarvey Creek (single stream)	87	9.1	985121013382856
8/13/2008	Lower McGarvey Creek (single stream)	83	6.4	985121013770215
8/13/2008	Lower McGarvey Creek (single stream)	80	7.4	985121013382851
8/13/2008	Lower McGarvey Creek (single stream)	83	8.2	985121013749436
8/13/2008	Lower McGarvey Creek (single stream)	92	10.2	985121013354251
8/13/2008	Lower McGarvey Creek (single stream)	71	4.3	985121013384091
8/13/2008	Lower McGarvey Creek (single stream)	72	4.3	985121013741858
8/13/2008	Lower McGarvey Creek (single stream)	79	6.3	985121013755909
8/13/2008	Lower McGarvey Creek (single stream)	80	6.4	985121013393595

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
8/13/2008	Lower McGarvey Creek (single stream)	77	6.1	985121014016129
8/13/2008	Lower McGarvey Creek (single stream)	80	6.2	985121014001540
8/13/2008	Lower McGarvey Creek (single stream)	88	7.4	985121013382157
8/13/2008	Lower McGarvey Creek (single stream)	85	6.8	985121013382347
8/13/2008	Lower McGarvey Creek (single stream)	76	5.4	985121013384933
8/13/2008	Lower McGarvey Creek (single stream)	8	5.3	985121013773158
8/13/2008	Lower McGarvey Creek (single stream)	75	5.1	985121013760220
8/13/2008	Lower McGarvey Creek (single stream)	80	6.5	985121013382957
8/13/2008	Lower McGarvey Creek (single stream)	84	7.1	985121013393319
8/13/2008	Lower McGarvey Creek (single stream)	78	5.9	985121013394354
8/13/2008	Lower McGarvey Creek (single stream)	83	7	985121014001537
8/13/2008	Lower McGarvey Creek (single stream)	9	9.1	985121013744365
8/13/2008	Lower McGarvey Creek (single stream)	75	6.9	985121013731363
8/13/2008	Lower McGarvey Creek (single stream)	75	4.8	985121013384283
8/13/2008	Lower McGarvey Creek (single stream)	75	6.5	985121014045786
8/13/2008	Lower McGarvey Creek (single stream)	76	5.9	985121013393651
8/13/2008	Lower McGarvey Creek (single stream)	85	7.1	985121013747504
8/13/2008	Lower McGarvey Creek (single stream)	83	7.8	985121013393065
8/13/2008	Lower McGarvey Creek (single stream)	79	6.1	985121013744244
8/14/2008	Lower McGarvey Creek (single stream)	82	5.5	985121013382700
8/14/2008	Lower McGarvey Creek (single stream)	77	5.3	985121013774283
8/14/2008	Lower McGarvey Creek (single stream)	70	3	985121013776061
8/14/2008	Lower McGarvey Creek (single stream)	73	4.3	985121013999657
8/14/2008	Lower McGarvey Creek (single stream)	81	2.6	985121014041798
8/14/2008	Lower McGarvey Creek (single stream)	84	6.3	985121013810622
8/14/2008	Lower McGarvey Creek (single stream)	74	4.8	985121013780161
8/14/2008	Lower McGarvey Creek (single stream)	82	5	985121013743111
8/14/2008	Lower McGarvey Creek (single stream)	76	5	985121014007239
8/14/2008	Lower McGarvey Creek (single stream)	80	6.1	985121013382260
8/14/2008	Lower McGarvey Creek (single stream)	72	4.2	985121014005239
8/14/2008	Lower McGarvey Creek (single stream)	77	5.2	985121013393331
8/14/2008	Lower McGarvey Creek (single stream)	74	3.9	985121013384266
8/14/2008	Lower McGarvey Creek (single stream)	76	5.2	985121013395312
8/14/2008	Lower McGarvey Creek (single stream)	86	7.4	985121013855202
8/14/2008	Lower McGarvey Creek (single stream)	84	8.8	985121013394265
8/14/2008	Lower McGarvey Creek (single stream)	75	5.3	985121013395287
8/14/2008	Lower McGarvey Creek (single stream)	86	7.9	985121013755497
8/14/2008	Lower McGarvey Creek (single stream)	87	7.9	985121013759774
8/14/2008	Lower McGarvey Creek (single stream)	76	5.1	985121014017453
8/14/2008	Lower McGarvey Creek (single stream)	79	6	985121013741094
8/18/2008	McGarvey Creek			985121014001545
8/19/2008	Lower McGarvey Creek (single stream)	72	4.9	985121013750557
8/19/2008	Lower McGarvey Creek (single stream)	79	5.8	985121013754995

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
8/19/2008	Lower McGarvey Creek (single stream)	70	5.2	985121013385025
8/19/2008	Lower McGarvey Creek (single stream)	76	5.1	985121013394382
8/19/2008	Lower McGarvey Creek (single stream)	75	5	985121013744952
8/19/2008	Lower McGarvey Creek (single stream)	76	5.9	985121013382674
8/19/2008	Lower McGarvey Creek (single stream)	75	4.8	985121013382702
8/25/2008	Upper McGarvey Creek (single stream)	78	5.8	985121013384297
8/25/2008	Upper McGarvey Creek (single stream)	71	4.5	985121013814081
8/25/2008	Upper McGarvey Creek (single stream)	71	4.4	985121013385004
8/25/2008	Upper McGarvey Creek (single stream)	75	5.1	985121013383077
8/25/2008	Upper McGarvey Creek (single stream)	70	4.3	985121013394026
8/25/2008	Upper McGarvey Creek (single stream)	76	5.1	985121013394372
8/25/2008	Upper McGarvey Creek (single stream)	86	7.5	985121014005518
8/26/2008	Upper McGarvey Creek (single stream)	80	6.4	985121013774384
8/26/2008	Upper McGarvey Creek (single stream)	80	6.3	985121013999662
9/4/2008	Lower McGarvey Creek (below bridge)	89	9.7	985121013394710
9/4/2008	Lower McGarvey Creek (below bridge)	81	6.3	985121013393616
9/4/2008	Lower McGarvey Creek (below bridge)	98	10.2	985121013384188
9/4/2008	Lower McGarvey Creek (below bridge)	90	8.8	985121013752903
9/4/2008	Lower McGarvey Creek (below bridge)	95	10.5	985121013741648
9/4/2008	Lower McGarvey Creek (below bridge)	80	6.4	985121013393703
9/4/2008	Lower McGarvey Creek (below bridge)	85	7.1	985121013751619
9/4/2008	Lower McGarvey Creek (below bridge)	80	5.8	985121014041584
9/4/2008	Lower McGarvey Creek (below bridge)	76	5.3	985121013383461
9/4/2008	Lower McGarvey Creek (below bridge)	87	6.9	985121013857717
9/4/2008	Lower McGarvey Creek (below bridge)	76	4.9	985121013384489
9/4/2008	Lower McGarvey Creek (below bridge)	83	6.4	985121013768855
9/4/2008	Lower McGarvey Creek (below bridge)	91	8.3	985121013384831
9/4/2008	Lower McGarvey Creek (below bridge)	82	6.4	985121013384088
9/4/2008	Lower McGarvey Creek (below bridge)	81	5.6	985121013773158
9/4/2008	Lower McGarvey Creek (below bridge)	90	8.9	985121014009687
9/4/2008	Lower McGarvey Creek (below bridge)	85	7.2	985121013384145
9/4/2008	Lower McGarvey Creek (below bridge)	84	6.8	985121013751735
9/4/2008	Lower McGarvey Creek (below bridge)	78	6.5	985121013383756
9/4/2008	Lower McGarvey Creek (below bridge)	85	6.9	985121013393165
9/4/2008	Lower McGarvey Creek (below bridge)	83	6.6	985121014051462
9/4/2008	Lower McGarvey Creek (below bridge)	82	6.5	985121013393361
9/4/2008	Lower McGarvey Creek (below bridge)	93	9.9	985121013382908
9/4/2008	Lower McGarvey Creek (below bridge)	92	8.8	985121013745091
9/4/2008	Lower McGarvey Creek (below bridge)	94	9.6	985121013384722
9/4/2008	Lower McGarvey Creek (below bridge)	85	6.9	985121013393740
9/4/2008	Lower McGarvey Creek (below bridge)	92	9.2	985121013395143
9/4/2008	Lower McGarvey Creek (below bridge)	91	8.9	985121013816555
9/4/2008	Lower McGarvey Creek (below bridge)	98	11.2	985121013383148
9/4/2008	Lower McGarvey Creek (below bridge)	94	9.5	985121014066286
9/4/2008	Lower McGarvey Creek (below bridge)	78	5.3	985121013393437

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
9/4/2008	Lower McGarvey Creek (below bridge)	94	9.6	985121013756242
9/4/2008	Lower McGarvey Creek (below bridge)	94	10.5	985121013394445
9/4/2008	Lower McGarvey Creek (below bridge)	83	6	985121013752850
9/4/2008	Lower McGarvey Creek (below bridge)	85	7	985121013394774
9/4/2008	Lower McGarvey Creek (below bridge)	80	5.9	985121013383361
9/8/2008	Lower McGarvey Creek (below bridge)	83	6.2	985121014001622
9/8/2008	Lower McGarvey Creek (below bridge)	83	6.5	985121013384660
9/8/2008	Lower McGarvey Creek (below bridge)	89	7.3	985121013726861
9/8/2008	Lower McGarvey Creek (below bridge)	77	4.9	985121013384283
9/8/2008	Lower McGarvey Creek (below bridge)	91	8.4	985121013758250
9/8/2008	Lower McGarvey Creek (below bridge)	72	4.1	985121013393618
9/8/2008	Lower McGarvey Creek (below bridge)	84	6.6	985121013816372
9/8/2008	Lower McGarvey Creek (below bridge)	84	6.4	985121013752782
9/8/2008	Lower McGarvey Creek (below bridge)	72	4	985121013383254
9/8/2008	Lower McGarvey Creek (below bridge)	83	6.5	985121013384012
9/8/2008	Lower McGarvey Creek (below bridge)	77	5.5	985121013393177
9/9/2008	West Fork McGarvey Creek (single stream)	84	4.6	985121014016980
9/9/2008	West Fork McGarvey Creek (single stream)	81	6.3	985121013382624
9/9/2008	West Fork McGarvey Creek (single stream)	75	4.6	985121013394270
9/9/2008	West Fork McGarvey Creek (single stream)	69	3.6	985121014017956
9/9/2008	West Fork McGarvey Creek (single stream)	81	6.1	985121014015934
9/9/2008	West Fork McGarvey Creek (single stream)	79	5.5	985121013394286
9/9/2008	West Fork McGarvey Creek (single stream)	84	6.6	985121014000823
9/9/2008	West Fork McGarvey Creek (single stream)	74	5.9	985121013395352
9/9/2008	West Fork McGarvey Creek (single stream)	74	4.8	985121013393057
9/9/2008	West Fork McGarvey Creek (single stream)	79	6.7	985121013393327
9/9/2008	West Fork McGarvey Creek (single stream)	70	4.2	985121013382777
9/9/2008	West Fork McGarvey Creek (single stream)	74	4.8	985121013773575
9/9/2008	West Fork McGarvey Creek (single stream)	73	4.4	985121013362600
9/9/2008	West Fork McGarvey Creek (single stream)	67	4.3	985121013384406
9/9/2008	West Fork McGarvey Creek (single stream)	72	4.5	985121013770213
9/9/2008	West Fork McGarvey Creek (single stream)	68	4.5	985121013394009
9/9/2008	West Fork McGarvey Creek (single stream)	73	4.8	985121013384495
9/9/2008	West Fork McGarvey Creek (single stream)	83	6.8	985121013744451
9/9/2008	West Fork McGarvey Creek (single stream)	82	6.8	985121013769351
9/9/2008	West Fork McGarvey Creek (single stream)	72	4.6	985121013383754
9/9/2008	West Fork McGarvey Creek (single stream)	78	6.8	985121013395111
9/10/2008	West Fork McGarvey Creek (single stream)	86	8.9	985121013760092
9/10/2008	West Fork McGarvey Creek (single stream)	76	5.1	985121013382152
9/10/2008	West Fork McGarvey Creek (single stream)	80	6	985121014043419
9/10/2008	West Fork McGarvey Creek (single stream)	88	8.5	985121013382998
9/10/2008	West Fork McGarvey Creek (single stream)	89	8.7	985121013393712
9/10/2008	West Fork McGarvey Creek (single stream)	82	7	985121013394602
9/10/2008	West Fork McGarvey Creek (single stream)	82	7.2	985121014014024
9/10/2008	West Fork McGarvey Creek (single stream)	76	6.8	985121013394759

9/10/2008	West Fork McGarvey Creek (single stream)	76	6.8	985121013394759
Mark Date	**Mark Location**	**Fork Length (mm)**	**Weight (g)**	**Pit Tag ID**
9/10/2008	West Fork McGarvey Creek (single stream)	89	7.9	985121013393301
9/10/2008	West Fork McGarvey Creek (single stream)	72	4.8	985121013756159
9/10/2008	West Fork McGarvey Creek (single stream)	75	5.9	985121013382884
9/10/2008	West Fork McGarvey Creek (single stream)	79	5.9	985121013395064
9/10/2008	West Fork McGarvey Creek (single stream)	75	5.9	985121013382884
9/10/2008	West Fork McGarvey Creek (single stream)	79	5.9	985121013395064
9/10/2008	West Fork McGarvey Creek (single stream)	68	3.4	985121013754951
9/10/2008	West Fork McGarvey Creek (single stream)	78	5.5	985121013756779
9/10/2008	West Fork McGarvey Creek (single stream)	68	3.4	985121013754951
9/10/2008	West Fork McGarvey Creek (single stream)	78	5.5	985121013756779
9/10/2008	West Fork McGarvey Creek (single stream)	62	3	985121013382671
9/10/2008	West Fork McGarvey Creek (single stream)	67	3.7	985121013383544
9/10/2008	West Fork McGarvey Creek (single stream)	74	4.9	985121013382792
9/11/2008	West Fork McGarvey Creek (single stream)	81	6.2	985121013395175
9/11/2008	West Fork McGarvey Creek (single stream)	90	8.7	985121013382718
9/11/2008	West Fork McGarvey Creek (single stream)	77	5.2	985121013382713
9/11/2008	West Fork McGarvey Creek (single stream)	71	4.2	985121013384818
9/11/2008	West Fork McGarvey Creek (single stream)	70	3.9	985121013393320
9/11/2008	West Fork McGarvey Creek (single stream)	81	5.9	985121014042165
9/11/2008	West Fork McGarvey Creek (single stream)	73	4.3	985121013393657
9/11/2008	West Fork McGarvey Creek (single stream)	72	4.4	985121013394077
9/11/2008	West Fork McGarvey Creek (single stream)	78	6.5	985121013382476
9/11/2008	West Fork McGarvey Creek (single stream)	69	3.8	985121013383650
9/11/2008	West Fork McGarvey Creek (single stream)	79	5.6	985121013384851
9/11/2008	West Fork McGarvey Creek (single stream)	74	5.5	985121013383073
9/11/2008	West Fork McGarvey Creek (single stream)	70	4.1	985121013779475
9/11/2008	West Fork McGarvey Creek (single stream)	79	5.7	985121014000704
11/4/2008	McGarvey Creek (downstream)	72	no weight	985121013744337
11/4/2008	McGarvey Creek (upstream)	85	6.3	985121003610501
11/5/2008	McGarvey Creek (downstream)	87	6.6	985121003611020
11/5/2008	McGarvey Creek (downstream)	88	7.1	985121003618614
11/5/2008	McGarvey Creek (downstream)	94	9.4	985121003621916
11/5/2008	McGarvey Creek (downstream)	92	8.2	985121003617076
11/5/2008	McGarvey Creek (downstream)	117	17	985121003610496
11/5/2008	McGarvey Creek (downstream)	89	7.7	985121003618635
11/5/2008	McGarvey Creek (downstream)	92	8.6	985121003629359
11/5/2008	McGarvey Creek (downstream)	98	9.4	985121013384722
11/5/2008	McGarvey Creek (upstream)	10	11.6	985121003622407
11/6/2008	McGarvey Creek (downstream)	91	8.1	985121013779493
11/6/2008	McGarvey Creek (downstream)	91	8.8	985121013821388
11/6/2008	McGarvey Creek (downstream)	93	8.5	985121013393126
11/6/2008	McGarvey Creek (downstream)	91	8.6	985121013393564
11/6/2008	McGarvey Creek (downstream)	81	6.1	985121013748031
11/6/2008	McGarvey Creek (downstream)	84	6.5	985121013382417
11/6/2008	McGarvey Creek (downstream)	97	8.7	985121013393185

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/6/2008	McGarvey Creek (downstream)	91	8.2	985121013384456
11/6/2008	McGarvey Creek (downstream)	95	9.7	985121013384552
11/6/2008	McGarvey Creek (downstream)	96	10	985121013384534
11/6/2008	McGarvey Creek (downstream)	82	6	985121013995426
11/6/2008	McGarvey Creek (downstream)	80	5.5	985121014005224
11/6/2008	McGarvey Creek (downstream)	90	8.1	985121013742114
11/6/2008	McGarvey Creek (downstream)	110	14.4	985121013383268
11/6/2008	McGarvey Creek (downstream)	92	8.5	985121013769351
11/6/2008	McGarvey Creek (downstream)	98	10.5	985121013773632
11/6/2008	McGarvey Creek (upstream)	100	11.5	985121013393777
11/7/2008	McGarvey Creek (downstream)	90	8.2	985121014042864
11/7/2008	McGarvey Creek (downstream)	90	8.4	985121013393683
11/7/2008	McGarvey Creek (downstream)	91	8.2	985121013383644
11/7/2008	McGarvey Creek (downstream)	84	6.5	985121013382380
11/7/2008	McGarvey Creek (downstream)	95	10.2	985121013383497
11/7/2008	McGarvey Creek (upstream)	94	8.7	985121013395231
11/7/2008	McGarvey Creek (upstream)	91	9.4	985121013382875
11/7/2008	McGarvey Creek (upstream)	86	7.9	985121013741496
11/7/2008	McGarvey Creek (upstream)	92	9	985121013395055
11/7/2008	McGarvey Creek (upstream)	87	8.4	985121013394289
11/7/2008	McGarvey Creek (upstream)	100	10.9	985121014068029
11/7/2008	McGarvey Creek (upstream)	95	9.5	985121014007689
11/7/2008	McGarvey Creek (upstream)	100	12.9	985121014047197
11/7/2008	McGarvey Creek (upstream)	94	9.2	985121013743239
11/7/2008	McGarvey Creek (upstream)	100	11.7	985121014064610
11/7/2008	McGarvey Creek (upstream)	92	8	985121013383421
11/7/2008	McGarvey Creek (upstream)	100	1.5	985121013754540
11/7/2008	McGarvey Creek (upstream)	101	12	985121013760282
11/7/2008	McGarvey Creek (upstream)	100	9.2	985121014066162
11/7/2008	McGarvey Creek (upstream)	92	9.5	985121013383722
11/8/2008	McGarvey Creek (downstream)	93	9.2	985121013383993
11/8/2008	McGarvey Creek (downstream)	108	14.1	985121013394897
11/8/2008	McGarvey Creek (downstream)	106	12.9	985121013780966
11/8/2008	McGarvey Creek (downstream)	89	7.9	985121013393793
11/8/2008	McGarvey Creek (downstream)	98	11.7	985121013383566
11/8/2008	McGarvey Creek (downstream)	88	7.7	985121014004024
11/8/2008	McGarvey Creek (downstream)	92	8.6	98512101338369
11/8/2008	McGarvey Creek (downstream)	96	10.2	985121013383233
11/8/2008	McGarvey Creek (downstream)	93	9.2	985121014017388
11/8/2008	McGarvey Creek (downstream)	92	9.6	985121014016304
11/8/2008	McGarvey Creek (upstream)	90	7.6	985121014042553
11/8/2008	McGarvey Creek (upstream)	102	13.7	985121014002112
11/8/2008	McGarvey Creek (Upstream)	97	11	985121013383405
11/8/2008	McGarvey Creek (Upstream)	88	7.8	985121013394456

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/8/2008	McGarvey Creek (Upstream)	103	12	985121014048779
11/8/2008	McGarvey Creek (Upstream)	85	7	985121013750853
11/8/2008	McGarvey Creek (Upstream)	85	7.1	985121013816456
11/8/2008	McGarvey Creek (Upstream)	85	6.3	985121013743134
11/8/2008	McGarvey Creek (Upstream)	107	14.9	985121013759452
11/8/2008	McGarvey Creek (Upstream)	92	8.2	985121013741376
11/8/2008	McGarvey Creek (Upstream)	110	15.9	985121013384295
11/8/2008	McGarvey Creek (Upstream)	94	9.7	985121013382297
11/8/2008	McGarvey Creek (Upstream)	79	4.6	985121013393063
11/8/2008	McGarvey Creek (Upstream)	93	8.9	985121014008559
11/8/2008	McGarvey Creek (Upstream)	93	9.3	985121013382436
11/8/2008	McGarvey Creek (Upstream)	89	8.1	985121013752055
11/8/2008	McGarvey Creek (Upstream)	102	12.3	985121013774003
11/8/2008	McGarvey Creek (Upstream)	84	6.4	985121013356694
11/9/2008	McGarvey Creek (Upstream)	90	8.3	985121013384117
11/9/2008	McGarvey Creek (Upstream)	90	8.5	985121013729975
11/9/2008	McGarvey Creek (Upstream)	89	7.8	985121013384375
11/10/2008	McGarvey Creek (downstream)	103	12.6	985121014045800
11/10/2008	McGarvey Creek (downstream)	96	9.2	985121014041777
11/10/2008	McGarvey Creek (downstream)	96	9.8	985121014006668
11/10/2008	McGarvey Creek (downstream)	91	8.8	985121013384388
11/10/2008	McGarvey Creek (downstream)	95	10.3	985121013755199
11/10/2008	McGarvey Creek (downstream)	102	12.4	985121013394600
11/10/2008	McGarvey Creek (downstream)	101	11.8	985121014046161
11/10/2008	McGarvey Creek (downstream)	100	10.5	985121013383888
11/10/2008	McGarvey Creek (downstream)	93	9	985121013382336
11/10/2008	McGarvey Creek (downstream)	94	10.2	985121013384498
11/10/2008	McGarvey Creek (downstream)	99	11.8	985121014049738
11/11/2008	McGarvey Creek (downstream)	89	7.6	985121014016681
11/11/2008	McGarvey Creek (downstream)	83	6.4	985121014002527
11/11/2008	McGarvey Creek (downstream)	85	6.9	985121013384183
11/11/2008	McGarvey Creek (downstream)	79	5.4	985121013747869
11/11/2008	McGarvey Creek (downstream)	76	5.1	985121014053389
11/11/2008	McGarvey Creek (downstream)	100	11.1	985121013769682
11/11/2008	McGarvey Creek (downstream)	77	4.9	985121014014017
11/11/2008	McGarvey Creek (downstream)	90	8.1	985121013853031
11/11/2008	McGarvey Creek (downstream)	78	no weight	985121013384258
11/11/2008	McGarvey Creek (downstream)	88	7.5	985121013394381
11/11/2008	McGarvey Creek (downstream)	72	4.1	985121013444898
11/11/2008	McGarvey Creek (downstream)	82	5.9	985121013394444
11/11/2008	McGarvey Creek (downstream)	88	6.8	985121013751539
11/11/2008	McGarvey Creek (downstream)	90	8.2	985121013773547
11/11/2008	McGarvey Creek (downstream)	85	6.6	985121013393674
11/11/2008	McGarvey Creek (downstream)	139	31.4	125874489
11/11/2008	McGarvey Creek (downstream)	95	9.2	985121013379115

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/11/2008	McGarvey Creek (downstream)	75	4.5	985121013384930
11/11/2008	McGarvey Creek (downstream)	82	6.4	985121013384970
11/11/2008	McGarvey Creek (downstream)	79	5.9	985121013384389
11/11/2008	McGarvey Creek (downstream)	96	9.5	985121014002527
11/11/2008	McGarvey Creek (downstream)	92	8.7	985121013393867
11/11/2008	McGarvey Creek (downstream)	96	7	985121013395198
11/11/2008	McGarvey Creek (downstream)	94	8.9	985161000965973
11/11/2008	McGarvey Creek (downstream)	72	6.2	985161000041565
11/11/2008	McGarvey Creek (downstream)	89	8	985161000973528
11/11/2008	McGarvey Creek (downstream)	78	5.2	985161001296261
11/12/2008	McGarvey Creek (downstream)	100	10.7	985121013384403
11/12/2008	McGarvey Creek (downstream)	95	9.4	985121013383084
11/12/2008	McGarvey Creek (downstream)	83	6.8	985121013395130
11/12/2008	McGarvey Creek (downstream)	85	7	985121013758515
11/12/2008	McGarvey Creek (downstream)	80	6.4	985121013393747
11/12/2008	McGarvey Creek (downstream)	77	5.3	985121013393917
11/12/2008	McGarvey Creek (downstream)	88	7.9	985121013394776
11/12/2008	McGarvey Creek (downstream)	95	9.2	985121013742258
11/12/2008	McGarvey Creek (downstream)	90	8.1	985121013780097
11/12/2008	McGarvey Creek (downstream)	88	7.9	985121013384408
11/12/2008	McGarvey Creek (downstream)	94	8.3	985121013383738
11/12/2008	McGarvey Creek (downstream)	80	5.3	985121013394267
11/12/2008	McGarvey Creek (downstream)	91	8.8	985121014041554
11/12/2008	McGarvey Creek (downstream)	85	7.2	985121013384442
11/12/2008	McGarvey Creek (downstream)	89	7.6	985121013757922
11/12/2008	McGarvey Creek (downstream)	82	6.1	985121013994212
11/12/2008	McGarvey Creek (downstream)	103	12.6	985121013771802
11/12/2008	McGarvey Creek (downstream)	93	9.6	985121014068218
11/12/2008	McGarvey Creek (downstream)	89	8.2	985121013383747
11/12/2008	McGarvey Creek (downstream)	82	6.2	985121014003933
11/12/2008	McGarvey Creek (downstream)	80	6.3	985121013383795
11/12/2008	McGarvey Creek (downstream)	80	5.8	985121014053761
11/12/2008	McGarvey Creek (downstream)	98	10.3	985121013384422
11/12/2008	McGarvey Creek (downstream)	96	10	985121013383518
11/12/2008	McGarvey Creek (downstream)	82	6.4	985121013745536
11/12/2008	McGarvey Creek (downstream)	82	6.5	985121013395219
11/12/2008	McGarvey Creek (downstream)	90	8.5	985121013394263
11/12/2008	McGarvey Creek (downstream)	86	9.9	985121013773339
11/12/2008	McGarvey Creek (downstream)	90	8.8	985121013384698
11/12/2008	McGarvey Creek (downstream)	89	7.8	985121014044310
11/12/2008	McGarvey Creek (downstream)	94	9.4	985121014065836
11/12/2008	McGarvey Creek (downstream)	84	6.6	985121013769542
11/12/2008	McGarvey Creek (downstream)	81	6.3	985121013756629
11/12/2008	McGarvey Creek (downstream)	84	6.2	985121013384655
11/12/2008	McGarvey Creek (downstream)	92	10.3	985121013775822

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/12/2008	McGarvey Creek (downstream)	107	11.1	985121014013568
11/12/2008	McGarvey Creek (downstream)	99	11.1	985121013814694
11/13/2008	McGarvey Creek (downstream)	78	5.9	985121013745621
11/13/2008	McGarvey Creek (downstream)	89	8.4	985121013384002
11/13/2008	McGarvey Creek (downstream)	82	7.3	985121013384038
11/13/2008	McGarvey Creek (downstream)	96	9.4	985121014063842
11/13/2008	McGarvey Creek (downstream)	99	12.2	985121013394394
11/13/2008	McGarvey Creek (downstream)	90	8.4	985121014044224
11/13/2008	McGarvey Creek (downstream)	95	9	985121013383439
11/13/2008	McGarvey Creek (downstream)	88	7.7	985121013998211
11/13/2008	McGarvey Creek (downstream)	76	5.7	985121014015459
11/13/2008	McGarvey Creek (downstream)	100	10.8	985121013729518
11/13/2008	McGarvey Creek (downstream)	80	5.8	985121013395388
11/13/2008	McGarvey Creek (downstream)	90	8.7	985121013383188
11/13/2008	McGarvey Creek (downstream)	82	6.7	985121014017027
11/13/2008	McGarvey Creek (downstream)	88	8.4	985121013394803
11/13/2008	McGarvey Creek (downstream)	76	5	985121013384273
11/13/2008	McGarvey Creek (downstream)	88	8.3	985121013772005
11/13/2008	McGarvey Creek (downstream)	83	8.5	985121013385009
11/13/2008	McGarvey Creek (downstream)	76	5.8	985121013394323
11/13/2008	McGarvey Creek (downstream)	93	8.3	985121013394107
11/13/2008	McGarvey Creek (downstream)	86	8.3	985121013384002
11/13/2008	McGarvey Creek (downstream)	85	5.8	985121013393121
11/13/2008	McGarvey Creek (downstream)	106	13.8	985121013384943
11/13/2008	McGarvey Creek (downstream)	82	6	985121013379103
11/13/2008	McGarvey Creek (downstream)	78	5.4	985121014015007
11/13/2008	McGarvey Creek (downstream)	95	8.2	985121014046580
11/13/2008	McGarvey Creek (downstream)	84	7.3	985121014013821
11/13/2008	McGarvey Creek (downstream)	79	6.1	985121013394219
11/13/2008	McGarvey Creek (downstream)	89	7.7	985121013383586
11/13/2008	McGarvey Creek (downstream)	80	6.3	985121013394317
11/13/2008	McGarvey Creek (downstream)	80	5.6	985121014018226
11/13/2008	McGarvey Creek (downstream)	87	7.3	985121013384916
11/13/2008	McGarvey Creek (downstream)	76	4.9	985121013394706
11/13/2008	McGarvey Creek (downstream)	78	4.9	985121013384556
11/13/2008	McGarvey Creek (downstream)	85	6.5	985121013745323
11/13/2008	McGarvey Creek (downstream)	76	6	985121013383205
11/13/2008	McGarvey Creek (downstream)	97	11.4	985121013745897
11/13/2008	McGarvey Creek (downstream)	94	11.1	985121013773133
11/14/2008	McGarvey Creek (downstream)	96	14.5	985121013761926
11/14/2008	McGarvey Creek (downstream)	86	8	985121014810582
11/14/2008	McGarvey Creek (downstream)	85	7	985121014014155
11/14/2008	McGarvey Creek (downstream)	104	12.2	985121014795822
11/14/2008	McGarvey Creek (downstream)	80	6.3	985121013393548
11/14/2008	McGarvey Creek (downstream)	106	13.2	985121013755053
11/14/2008	McGarvey Creek (downstream)	86	7.1	985121014809239

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/14/2008	McGarvey Creek (downstream)	121	18.7	985121015348059
11/14/2008	McGarvey Creek (downstream)	90	8.6	985121014803225
11/14/2008	McGarvey Creek (downstream)	95	9.5	985121013875486
11/14/2008	McGarvey Creek (downstream)	83	7.1	985121014798476
11/14/2008	McGarvey Creek (downstream)	81	6.3	985121014802198
11/14/2008	McGarvey Creek (downstream)	82	5.8	985121014786871
11/14/2008	McGarvey Creek (downstream)	101	9	985121014802098
11/14/2008	McGarvey Creek (downstream)	93	15.1	985121013874262
11/14/2008	McGarvey Creek (downstream)	94	9.1	985121014801759
11/14/2008	McGarvey Creek (downstream)	103	12.1	985121013734989
11/14/2008	McGarvey Creek (downstream)	81	6	985121013737501
11/14/2008	McGarvey Creek (downstream)	97	10.1	985121013736549
11/15/2008	McGarvey Creek (downstream)	85	7.3	985121013734625
11/15/2008	McGarvey Creek (downstream)	85	6.4	985121014797631
11/15/2008	McGarvey Creek (downstream)	90	7.5	985121014801511
11/15/2008	McGarvey Creek (downstream)	105	12.8	985121014777588
11/15/2008	McGarvey Creek (downstream)	105	12.4	985121014801566
11/15/2008	McGarvey Creek (downstream)	85	7.4	985121013734067
11/15/2008	McGarvey Creek (downstream)	86	6.6	985121014800299
11/15/2008	McGarvey Creek (downstream)	76	4.3	985121013738770
11/15/2008	McGarvey Creek (downstream)	90	7.5	985121014719215
11/15/2008	McGarvey Creek (downstream)	98	9.6	985121013736598
11/15/2008	McGarvey Creek (downstream)	78	4.9	985121014842861
11/15/2008	McGarvey Creek (downstream)	75	4.8	985121013764428
11/15/2008	McGarvey Creek (downstream)	99	10.4	985121013737195
11/15/2008	McGarvey Creek (downstream)	98	10.7	985121015301930
11/15/2008	McGarvey Creek (downstream)	95	8.6	985121014779654
11/15/2008	McGarvey Creek (downstream)	80	5.8	985121014832724
11/15/2008	McGarvey Creek (downstream)	97	9.3	985121014710357
11/15/2008	McGarvey Creek (downstream)	89	7.2	985121014809088
11/15/2008	McGarvey Creek (downstream)	95	9.4	985121014801454
11/15/2008	McGarvey Creek (downstream)	110	14	985121013739030
11/15/2008	McGarvey Creek (downstream)	75	4.9	985121013878802
11/15/2008	McGarvey Creek (downstream)	80	6	985121015352081
11/15/2008	McGarvey Creek (downstream)	94	8.4	985121013875517
11/15/2008	McGarvey Creek (downstream)	75	4.6	985121015343563
11/15/2008	McGarvey Creek (downstream)	88	7.5	985121013791788
11/15/2008	McGarvey Creek (downstream)	96	9.3	985121015356396
11/15/2008	McGarvey Creek (downstream)	80	4.9	985121014798248
11/15/2008	McGarvey Creek (downstream)	93	8.3	985121014833726
11/15/2008	McGarvey Creek (downstream)	90	7.9	985121015341652
11/15/2008	McGarvey Creek (downstream)	85	6.9	985121014804831
11/15/2008	McGarvey Creek (downstream)	90	7	985121014802273
11/15/2008	McGarvey Creek (downstream)	96	9	985121014782332
11/15/2008	McGarvey Creek (downstream)	97	9.7	985121015330644

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/15/2008	McGarvey Creek (downstream)	85	7	985121014779463
11/15/2008	McGarvey Creek (downstream)	80	6.2	985121015342229
11/15/2008	McGarvey Creek (downstream)	79	5.3	985121015337948
11/15/2008	McGarvey Creek (downstream)	95	8.1	985121014708707
11/15/2008	McGarvey Creek (downstream)	120	18.2	985121015349397
11/15/2008	McGarvey Creek (downstream)	85	6.1	985121014793168
11/15/2008	McGarvey Creek (downstream)	90	7.1	985121013733960
11/15/2008	McGarvey Creek (downstream)	90	7.8	985121015372383
11/15/2008	McGarvey Creek (downstream)	80	5	985121014798036
11/15/2008	McGarvey Creek (downstream)	95	10.2	985121015337587
11/15/2008	McGarvey Creek (downstream)	75	4.7	985121013839694
11/15/2008	McGarvey Creek (downstream)	105	12.1	985121013875463
11/17/2008	McGarvey Creek (downstream)	94	8.6	985121014800255
11/17/2008	McGarvey Creek (downstream)	85	7	985121013739171
11/17/2008	McGarvey Creek (downstream)	96	10.2	985121013766745
11/17/2008	McGarvey Creek (downstream)	74	4.5	985121015333242
11/17/2008	McGarvey Creek (downstream)	92	8.6	985121014819588
11/17/2008	McGarvey Creek (downstream)	80	5.8	985121015352935
11/17/2008	McGarvey Creek (downstream)	79	5.3	985121015307021
11/17/2008	McGarvey Creek (downstream)	80	5.5	985121015343854
11/17/2008	McGarvey Creek (downstream)	88	8	985121015355667
11/17/2008	McGarvey Creek (downstream)	90	8	985121014781347
11/17/2008	McGarvey Creek (downstream)	99	10	985121014780278
11/17/2008	McGarvey Creek (upstream)	119	19.1	985121015354338
11/17/2008	McGarvey Creek (upstream)	92	8.4	985121015335702
11/17/2008	McGarvey Creek (upstream)	95	10.4	985121014797745
11/17/2008	McGarvey Creek (upstream)	85	6.7	985121014809538
11/17/2008	McGarvey Creek (upstream)	91	8.3	985121014779779
11/17/2008	McGarvey Creek (upstream)	78	4.2	985121014798088
11/17/2008	McGarvey Creek (upstream)	91	8.8	985121014803241
11/17/2008	McGarvey Creek (upstream)	115	15.4	985121013840886
11/17/2008	McGarvey Creek (upstream)	91	8.3	985121014796246
11/17/2008	McGarvey Creek (upstream)	85	6.7	985121013875358
11/17/2008	McGarvey Creek (upstream)	120	18.9	985121015346117
11/17/2008	McGarvey Creek (upstream)	97	7.8	985121015376723
11/18/2008	McGarvey Creek (downstream)	91	8.6	985121015373758
11/18/2008	McGarvey Creek (downstream)	88	8.7	985121014819588
11/18/2008	McGarvey Creek (upstream)	82	6.3	985121014801870
11/18/2008	McGarvey Creek (upstream)	91	8.3	985121014807777
11/18/2008	McGarvey Creek (upstream)	94	9.5	985121014715791
11/18/2008	McGarvey Creek (upstream)	83	6.9	985121013763384
11/18/2008	McGarvey Creek (upstream)	91	9.1	985121015338662
11/18/2008	McGarvey Creek (upstream)	87	7.7	985121013876393
11/18/2008	McGarvey Creek (upstream)	84	6.6	985121013766325
11/19/2008	McGarvey Creek (downstream)	71	4.1	985121014783560
11/19/2008	McGarvey Creek (downstream)	91	8.2	985121014777355

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/19/2008	McGarvey Creek (downstream)	92	8.5	985121015338778
11/19/2008	McGarvey Creek (downstream)	84	7	985121014793137
11/19/2008	McGarvey Creek (downstream)	97	10.4	985121013840687
11/19/2008	McGarvey Creek (downstream)	98	9.7	985121014795832
11/19/2008	McGarvey Creek (downstream)	86	7.3	985121013762316
11/20/2008	McGarvey Creek (upstream)	89	8.3	985121013764129
11/20/2008	McGarvey Creek (upstream)	98	10.5	985121014711615
11/20/2008	McGarvey Creek (upstream)	91	10.6	985121014793505
11/20/2008	McGarvey Creek (upstream)	95	10.7	985121014844733
11/20/2008	McGarvey Creek (upstream)	96	9.1	985121015340611
11/21/2008	McGarvey Creek (upstream)	100	9.7	985121014794433
11/23/2008	McGarvey Creek (upstream)	113	17.7	985121015356623
11/23/2008	McGarvey Creek (upstream)	112	17.2	985121013761507
11/23/2008	McGarvey Creek (upstream)	97	11.6	985121013734707
11/23/2008	McGarvey Creek (upstream)	106	13.6	985121014792073
11/23/2008	McGarvey Creek (upstream)	89	8.3	985121014793899
11/23/2008	McGarvey Creek (upstream)	89	8	985121014781018
11/24/2008	McGarvey Creek (upstream)	92	8.9	985121013736012
11/24/2008	McGarvey Creek (upstream)	104	12.7	985121013766476
11/24/2008	McGarvey Creek (upstream)	87	8	985121015344201
11/24/2008	McGarvey Creek (upstream)	103	12.6	985121015349313
11/24/2008	McGarvey Creek (upstream)	92	8.4	985121015349633
11/24/2008	McGarvey Creek (upstream)	109	13.5	985121014715844
11/24/2008	McGarvey Creek (upstream)	95	9.8	985121013766021
11/24/2008	McGarvey Creek (upstream)	94	9.4	985121014819740
11/24/2008	McGarvey Creek (upstream)	94	9.4	985121013876953
11/24/2008	McGarvey Creek (upstream)	105	13	985121015339126
11/24/2008	McGarvey Creek (upstream)	98	10	985121013792294
11/24/2008	McGarvey Creek (upstream)	93	8.8	985121015345603
11/24/2008	McGarvey Creek (upstream)	94	8.8	985121014794867
11/25/2008	McGarvey Creek (downstream)	no FL	no weight	985121015347835
11/25/2008	McGarvey Creek (downstream)	101	11.8	985121015342495
11/25/2008	McGarvey Creek (downstream)	85	9.4	985121013877313
11/25/2008	McGarvey Creek (downstream)	109	13.6	985121014795485
11/25/2008	McGarvey Creek (upstream)	85	7	985121014710679
11/25/2008	McGarvey Creek (upstream)	78	5.2	985121013737131
11/25/2008	McGarvey Creek (upstream)	90	8.3	985121015347680
11/25/2008	McGarvey Creek (upstream)	97	13.5	985121013763343
11/25/2008	McGarvey Creek (upstream)	100	12	985121014793897
11/25/2008	McGarvey Creek (upstream)	90	7.8	985121015348763
11/25/2008	McGarvey Creek (upstream)	103	12.8	985121014718991
11/25/2008	McGarvey Creek (upstream)	93	14.8	985121014834044
11/25/2008	McGarvey Creek (upstream)	91	8.7	985121015306828
11/26/2008	McGarvey Creek (downstream)	103	11.9	985121014709643
11/26/2008	McGarvey Creek (downstream)	92	9	985121014797832
11/26/2008	McGarvey Creek (downstream)	86	7.8	985121015352508

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
11/26/2008	McGarvey Creek (downstream)	105	14	985121013762628
11/26/2008	McGarvey Creek (downstream)	98	10.3	985121015338994
11/26/2008	McGarvey Creek (downstream)	94	9	985121013877966
11/26/2008	McGarvey Creek (downstream)	121	18.9	985121015304339
11/26/2008	McGarvey Creek (downstream)	87	7.3	985121013735654
11/27/2008	McGarvey Creek (upstream)	81	6.4	985121014809243
11/28/2008	McGarvey Creek (downstream)	87	8.4	985121014709905
11/28/2008	McGarvey Creek (downstream)	94	11.1	985121015356346
11/28/2008	McGarvey Creek (upstream)	100	12.4	985121014780009
11/29/2008	McGarvey Creek (downstream)	76	5.1	985121003613031
11/29/2008	McGarvey Creek (downstream)	98	11.4	985121014779367
11/29/2008	McGarvey Creek (upstream)	95	9.5	985121015356455
11/29/2008	McGarvey Creek (upstream)	98	10.9	985121015348262
11/29/2008	McGarvey Creek (upstream)	106	14.2	985121015345809
11/30/2008	McGarvey Creek (downstream)	91	7	985121014709656
11/30/2008	McGarvey Creek (upstream)	104	12.3	985121015349580
11/30/2008	McGarvey Creek (upstream)	106	14	985121013842120
11/30/2008	McGarvey Creek (upstream)	105	13.5	985121015354237
12/1/2008	McGarvey Creek (upstream)	106	12.5	985121015374621
12/1/2008	McGarvey Creek (upstream)	104	10.8	985121014715731
12/1/2008	McGarvey Creek (upstream)	105	11.6	985121015305909
12/2/2008	McGarvey Creek (upstream)	104	14.6	985121015352572
12/2/2008	McGarvey Creek (upstream)	94	9.2	985121014799934
12/2/2008	McGarvey Creek (upstream)	111	15.1	985121014800598
12/2/2008	McGarvey Creek (upstream)	93	10.9	985121015305681
12/2/2008	McGarvey Creek (upstream)	86	8.5	985121014801197
12/2/2008	McGarvey Creek (upstream)	90	8.1	985121014708003
12/2/2008	McGarvey Creek (upstream)	97	11.5	985121015337734
12/2/2008	McGarvey Creek (upstream)	106	14.5	985121013733910
12/2/2008	McGarvey Creek (upstream)	94	9.9	985121014791644
12/3/2008	McGarvey Creek (downstream)	89	9.9	985121014802164
12/3/2008	McGarvey Creek (upstream)	103	12.5	985121014718251
12/3/2008	McGarvey Creek (Upstream)	94	9.1	985121015337328
12/5/2008	McGarvey Creek (Upstream)	95	10.3	985121014718300
12/14/2008	McGarvey Creek (downstream)	104	11.3	985121014802229
12/14/2008	McGarvey Creek (downstream)	105	11.3	985121013734434
12/14/2008	McGarvey Creek (downstream)	100	10.5	985121014799729
12/14/2008	McGarvey Creek (downstream)	94	8.6	985121014794835
12/14/2008	McGarvey Creek (downstream)	99	10	985121014717887
12/14/2008	McGarvey Creek (downstream)	91	7.6	985121013734624
12/14/2008	McGarvey Creek (downstream)	94	8.4	985121015342221
12/14/2008	McGarvey Creek (downstream)	100	10.5	985121014799729
12/14/2008	McGarvey Creek (downstream)	103	no weight	985121013789778
12/14/2008	McGarvey Creek (downstream)	99	9.8	985121013763675
12/15/2008	McGarvey Creek (downstream)	102	10.5	985121015344157
12/15/2008	McGarvey Creek (downstream)	114	14.2	985121015306384

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
12/15/2008	McGarvey Creek (downstream)	102	10.9	985121013739022
12/15/2008	McGarvey Creek (downstream)	95	8.6	985121014808278
12/15/2008	McGarvey Creek (downstream)	86	6	985121014789115
12/15/2008	McGarvey Creek (downstream)	95	8.8	985121015376278
12/15/2008	McGarvey Creek (downstream)	88	7	985121013763049
12/15/2008	McGarvey Creek (downstream)	95	11.1	985121014777334
12/15/2008	McGarvey Creek (downstream)	99	11	985121013766513
12/15/2008	McGarvey Creek (downstream)	88	8.5	985121014792551
12/15/2008	McGarvey Creek (downstream)	99	9.9	985121013736641
12/16/2008	McGarvey Creek (downstream)	87	7	985121013765472
12/16/2008	McGarvey Creek (downstream)	104	11.8	985121014778760
12/16/2008	McGarvey Creek (downstream)	98	10.5	985121013766947
12/16/2008	McGarvey Creek (downstream)	80	5.4	985121014816187
12/16/2008	McGarvey Creek (downstream)	81	6.2	985121015347107
12/16/2008	McGarvey Creek (downstream)	93	9.2	985121015375346
12/16/2008	McGarvey Creek (downstream)	79	5.2	985121014795422
12/16/2008	McGarvey Creek (downstream)	83	6	985121014802764
12/16/2008	McGarvey Creek (downstream)	104	11.6	985121014787329
12/16/2008	McGarvey Creek (downstream)	101	11.8	985121014778511
12/16/2008	McGarvey Creek (downstream)	94	9.5	985121013734404
12/16/2008	McGarvey Creek (downstream)	101	11.3	985121015302691
12/16/2008	McGarvey Creek (downstream)	98	9.7	985121013762390
12/16/2008	McGarvey Creek (downstream)	114	9	985121014810063
12/16/2008	McGarvey Creek (downstream)	94	16	985121015353505
12/16/2008	McGarvey Creek (downstream)	92	8.2	985121014710636
12/16/2008	McGarvey Creek (downstream)	88	7.1	985121013765916
12/16/2008	McGarvey Creek (downstream)	86	7.4	985121014819520
12/16/2008	McGarvey Creek (downstream)	100	10.7	985121015349480
12/16/2008	McGarvey Creek (downstream)	85	6.7	985121014792171
12/16/2008	McGarvey Creek (downstream)	89	7	985121014714008
12/16/2008	McGarvey Creek (downstream)	93	9.1	985121014799380
12/16/2008	McGarvey Creek (downstream)	114	15	985121013735423
12/16/2008	McGarvey Creek (downstream)	106	12	985121014803564
12/16/2008	McGarvey Creek (downstream)	80	5.3	985121013766363
12/16/2008	McGarvey Creek (downstream)	95	10	985121014708582
12/16/2008	McGarvey Creek (downstream)	95	9.4	985121015306842
12/16/2008	McGarvey Creek (downstream)	107	14.2	985121013738310
12/17/2008	McGarvey Creek (downstream)	93	8.6	985121014719050
12/17/2008	McGarvey Creek (downstream)	89	8.3	985121014838357
12/17/2008	McGarvey Creek (downstream)	90	8	985121013738906
12/17/2008	McGarvey Creek (downstream)	88	7.3	985121014807256
12/17/2008	McGarvey Creek (downstream)	89	7.4	985121015339702
12/17/2008	McGarvey Creek (downstream)	99	10.2	985121014716794
12/17/2008	McGarvey Creek (downstream)	90	8	985121014711592
12/17/2008	McGarvey Creek (downstream)	94	8.8	985121014714951

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
12/17/2008	McGarvey Creek (downstream)	93	8.1	985121014707565
12/17/2008	McGarvey Creek (downstream)	89	8	985121015340576
12/17/2008	McGarvey Creek (downstream)	91	8.3	985121014795917
12/17/2008	McGarvey Creek (downstream)	86	6.8	985121013876288
12/17/2008	McGarvey Creek (downstream)	90	8.1	985121014779258
12/17/2008	McGarvey Creek (downstream)	88	7.7	985121014813412
12/17/2008	McGarvey Creek (downstream)	90	7.3	985121013738058
12/17/2008	McGarvey Creek (downstream)	92	8.6	985121013803580
12/17/2008	McGarvey Creek (downstream)	98	8.5	985121013765593
12/17/2008	McGarvey Creek (downstream)	89	7.4	985121014835128
12/17/2008	McGarvey Creek (downstream)	93	8.8	985121015304952
12/17/2008	McGarvey Creek (downstream)	91	8.4	985121015343874
12/17/2008	McGarvey Creek (downstream)	89	8.3	985121015340457
12/17/2008	McGarvey Creek (downstream)	96	9.2	985121015351290
12/17/2008	McGarvey Creek (downstream)	94	8.7	985121015347183
12/17/2008	McGarvey Creek (downstream)	95	9.5	985121013733631
12/17/2008	McGarvey Creek (downstream)	97	9.9	985121013763297
12/17/2008	McGarvey Creek (downstream)	89	7.7	985121014777557
12/17/2008	McGarvey Creek (downstream)	94	9.1	985121013873826
12/17/2008	McGarvey Creek (downstream)	93	9.2	985121015376278
12/17/2008	McGarvey Creek (downstream)	91	8	985121014798057
12/17/2008	McGarvey Creek (downstream)	103	12.5	985121014799524
12/18/2008	McGarvey Creek (downstream)	96	9.9	985121013734792
12/18/2008	McGarvey Creek (downstream)	88	8.8	985121013734364
12/18/2008	McGarvey Creek (downstream)	99	10.6	985121014783586
12/18/2008	McGarvey Creek (downstream)	99	11.2	985121013734385
12/18/2008	McGarvey Creek (Upstream)	108	14.9	985121014786333
12/18/2008	McGarvey Creek (Upstream)	110	14.5	985121013878162
12/19/2008	McGarvey Creek (Upstream)	76	6.2	985121013761910
12/20/2008	McGarvey Creek (downstream)	95	9.9	985121015348843
12/20/2008	McGarvey Creek (downstream)	82	5.8	985121014822768
12/20/2008	McGarvey Creek (downstream)	81	5.7	985121014779264
12/20/2008	McGarvey Creek (downstream)	97	9.8	985121014845306
12/20/2008	McGarvey Creek (downstream)	81	6.5	985121013840399
12/20/2008	McGarvey Creek (downstream)	89	7.8	985121015368799
12/20/2008	McGarvey Creek (downstream)	102	10.8	985121015377321
12/24/2008	McGarvey Creek (upstream)	83	6.7	985121014807677
12/25/2008	McGarvey Creek (downstream)	90	7.2	985121014796244
12/25/2008	McGarvey Creek (downstream)	96	8.9	985121015341412
12/25/2008	McGarvey Creek (downstream)	90	7.5	985121014798191
12/25/2008	McGarvey Creek (downstream)	100	10.7	985121015340902
12/25/2008	McGarvey Creek (Upstream)	88	7.7	985121014780982
12/25/2008	McGarvey Creek (Upstream)	102	12.2	985121013733993
12/27/2008	McGarvey Creek (downstream)	88	7.3	985121014714754
12/27/2008	McGarvey Creek (downstream)	92	8.4	985121013735466

Mark Date	Mark Location	Fork Length (mm)	Weight (g)	Pit Tag ID
12/27/2008	McGarvey Creek (downstream)	76	5.4	985121014805447
12/27/2008	McGarvey Creek (downstream)	90	8	985121014800271
12/27/2008	McGarvey Creek (Upstream)	87	7.5	985121015345401
12/27/2008	McGarvey Creek (Upstream)	103	12.5	985121014782466
1/23/2009	McGarvey Creek (downstream)	72	3.9	985121013767171
1/23/2009	McGarvey Creek (downstream)	81	5.5	985121014779827
1/23/2009	McGarvey Creek (downstream)	81	5.7	985121014809606
1/25/2009	McGarvey Creek (downstream)	85	6.6	985121014799939
1/26/2009	McGarvey Creek (downstream)	76	4.6	985121015303614
1/26/2009	McGarvey Creek (downstream)	82	5.6	985121014786019
1/27/2009	McGarvey Creek (downstream)	89	8	985121013764035

Actual project cost breakdown

Grantor: California Department of Fish and Game
Period covered: June 1, 2006 to March 31, 2009
Grant #: P0510511
Project title: McGarvey Creek Salmonid Life History Monitoring

Personnel services cost	Number of hours	Hourly rate	CDFG Share	Recipient Share	Project Total
Senior Biologist	432.50	$ 31.480000	$ -	$ 13,615.10	$ 13,615.10
Biologist	2734.74	$ 20.240783	$ 55,353.28	$ -	$ 55,353.28
Fisheries Technician	2355.27	$ 12.564431	24,407.79	5,184.90	29,592.69
Subtotal			$ 79,761.07	$ 18,800.00	$ 98,561.07
Actual staff benefits cost @	28.382067%		22,637.84	5,335.83	27,973.67
Total personnel services costs			$ 102,398.91	$ 24,135.83	$ 126,534.74
Operating expenses					
Office supplies			$15.36	$300.00	$315.36
Electrofishing Gear			$0.00	$1,800.00	$1,800.00
Snorkel Gear			$0.00	$700.00	$700.00
Vehicle, maintenance, and repair			$1,929.00	$4,500.00	$6,429.00
Field supplies			$2,655.35	$600.00	$3,255.35
Adult wier supplies			$1,607.41	$1,500.00	$3,107.41
Out-migrant wier supplies			$537.43	$750.00	$1,287.43
Fish Trapping supplies			$0.00	$2,300.00	$2,300.00
PIT Tags/Implanter			$55.00	$687.50	$742.50
PIT Tag stations			$0.00	$5,000.00	$5,000.00
Waders and boots			$738.85	$400.00	$1,138.85
Total operating costs			$ 7,538.40	$ 18,537.50	$ 26,075.90
Subtotal			109,937.31	42,673.33	152,610.64
Administrative overhead @	29.03990%		31,925.69	12,392.29	44,317.98
Total			$ 141,863.00	$ 55,065.62	$ 196,928.62

Actual cost breakdown

Agency invoiced: **California Department of Fish and Game**
Period covered: **June 15, 2007 to March 31, 2009**
Grant #: **P0610552**
Project title: **McGarvey Creek Monitoring of Salmonids**

Personnel services cost	**Number of hours**	**Hourly rate**	**CDFG Share**	**Applicant cost share**	**Total cost**
Senior Biologist	335.12	$ 29.84	$0.00	$10,000.00	$10,000.00
Biologist	2920.38	$ 18.19	$45,921.73	$7,200.00	$53,121.73
Fisheries Technician III	98.62	$ 16.80	$1,656.97	$0.00	$1,656.97
Fisheries Technician II	2154.19	$ 11.21	$24,148.45	$0.00	$24,148.45
Fisheries Technician I	741.33	$ 11.22	$8,315.38	$0.00	$8,315.38
Total wages			$80,042.53	$17,200.00	$97,242.53
Actual staff benefits cost @	29.16551988%		$23,344.82	$5,016.47	$28,361.29
Total personnel services costs			$103,387.35	$22,216.47	$125,603.82
Operating expenses					
Fish trapping supplies			$4,193.95	$3,800.00	$7,993.95
Electrofishing Gear			$0.00	$1,800.00	$1,800.00
PIT Tags			$1,363.65	$1,375.00	$2,738.65
PIT Tag station			$0.00	$1,500.00	$1,500.00
Field supplies			$752.31	$600.00	$1,352.31
Out-migrant weir supplies			$23.71	$750.00	$773.71
Waders and boots			$254.89	$625.00	$879.89
Office Supplies			$0.00	$300.00	$300.00
Vehicle Fuel, Repairs & Maintenance to veicle/boat			$1,342.90	$1,250.00	$2,592.90
Total operating costs			$7,931.41	$12,000.00	$19,931.41
Administrative overhead @	27.9200%		$31,080.24	$9,553.24	$40,633.48
	Total		$142,399.00	$43,769.71	$186,168.71