Pre-restoration Monitoring at
Bandon Marsh National Wildlife Refuge

2007-2010

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Vancouver, WA

September 2010

Introduction

The loss of tidal wetlands, primarily through dike construction and draining, has been identified as a major factor contributing to the decline of fish populations and overall productivity of estuaries. Bandon Marsh National Wildlife Refuge (BMNWR) is in the process of conducting a large-scale tidal marsh restoration project on the Ni-les'tun Unit (Unit), within the Coquille River estuary (Figure 1). This project is designed to restore approximately 418 acres of important tidal wetlands. When completed, it will constitute the largest tidal marsh restoration project in Oregon's history (USFWS and FHA 2009).

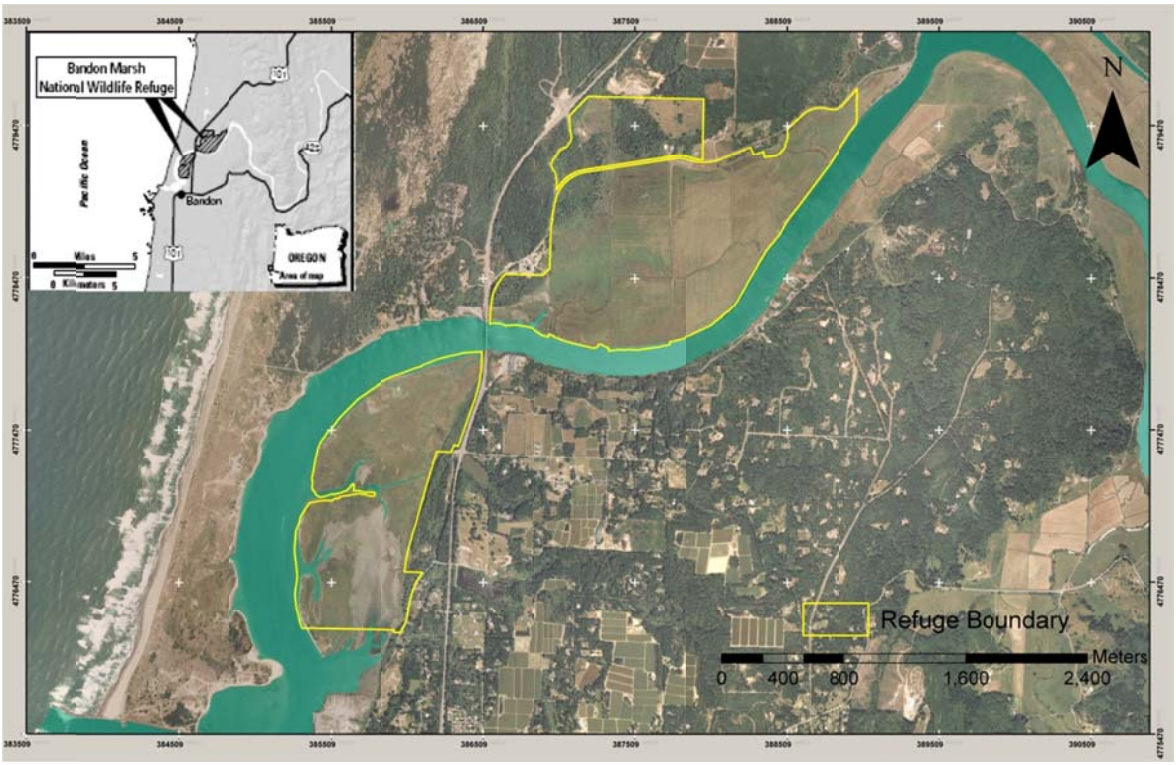

Figure 1. Bandon Marsh National Wildlife Refuge area of study

Restoration will include dike and tide gate removals, culvert replacements, and channel and wetland construction. Utility and infrastructure portions of the restoration include the undergrounding of a powerline that crosses the Unit and raising of a county road that will be effected by the restoration. More than 35 partners have been involved in this effort over ten years. Phase one of the construction began in 2009, with phase two implemented in 2010, and the final phase will be completed in 2011. The complete restoration and associated tasks has an estimated budget of over $9.5 million. Similar restoration efforts occurred in 2007 within the Nestucca Bay NWR where 0.7-miles of dike along the Little Nestucca River were removed restoring 3,965 linear feet of historic tidal channels (USFWS *unpublished data*, Little Nestucca River Restoration, NFWF Project #2006-0175-003).

The short-term goals of the restoration project are to restore tidal wetlands by creating physical conditions allowing unrestricted tidal inundation and fish access to the Unit (USFWS and FHA 2009). The long-term goals are to improve overall quantity and quality of tidal wetlands and estuarine conditions in the lower Coquille River watershed, which provide foraging and rearing habitats for native trout and other salmonids (USFWS and FHA 2009). Since greater than 97% of the tidal marshes and swamps in the Coquille River estuary were estimated to have been lost between 1870-1970 (i.e., 14,350 v. 380 acres), the restoration project could provide a substantial contribution to habitat restoration in the basin (Coquille Watershed Association 2003).

The Unit consists of floodplain lowlands encompassing portions of three drainages, Fahys, Overlook, and Redd creeks. In addition, about 15 miles of ditches have been constructed by past landowners for drainage and over 1.5 miles of dikes and three tide gates impede connectivity of the Unit with the estuary. A new tide gate designed to provide better fish passage was installed on the Fahys Creek outlet in 2003. Restoration will eliminate the drainage ditches and dikes, and provide a dendritic network of tidal channels for fish and wildlife. Salmonids observed using the Unit include multiple age classes of coastal cutthroat trout (*Oncorhynchus clarki clarki*) (CCT), juvenile coho salmon (*O. kisutch,* Oregon Coast ESU threatened) (COHO), steelhead (*O. mykiss*) (STH), and Chinook salmon (*O. tshawytsha*) (CHN). Coastal cutthroat trout likely spawn and rear in some of these drainages. It is not clear to what extent other salmonids have used or will use these drainages.

Objectives of this project are as follows: 1. Describe fish species community within and among restoration sites and reference sites before and after construction; 2. Describe fish species distribution within and among restoration sites and reference sites before and after restoration; 3. Describe fish species relative abundance within and among restoration sites and reference sites before and after construction; 4. Collect invertebrates to archive from restoration sites and reference sites before and after construction.

Methods

Fish Sampling

Fahys Creek

Stream sections within Fahys Creek were differentiated by habitat characteristics. All sections within Fahys Creek are located within the diked areas of the refuge and have been impacted by past agricultural and forestry practices (Figure 2). Section 1 begins on the north

side of the Fahys Creek Tide gates and is 700 m of meandering channel with grasslands on both banks.

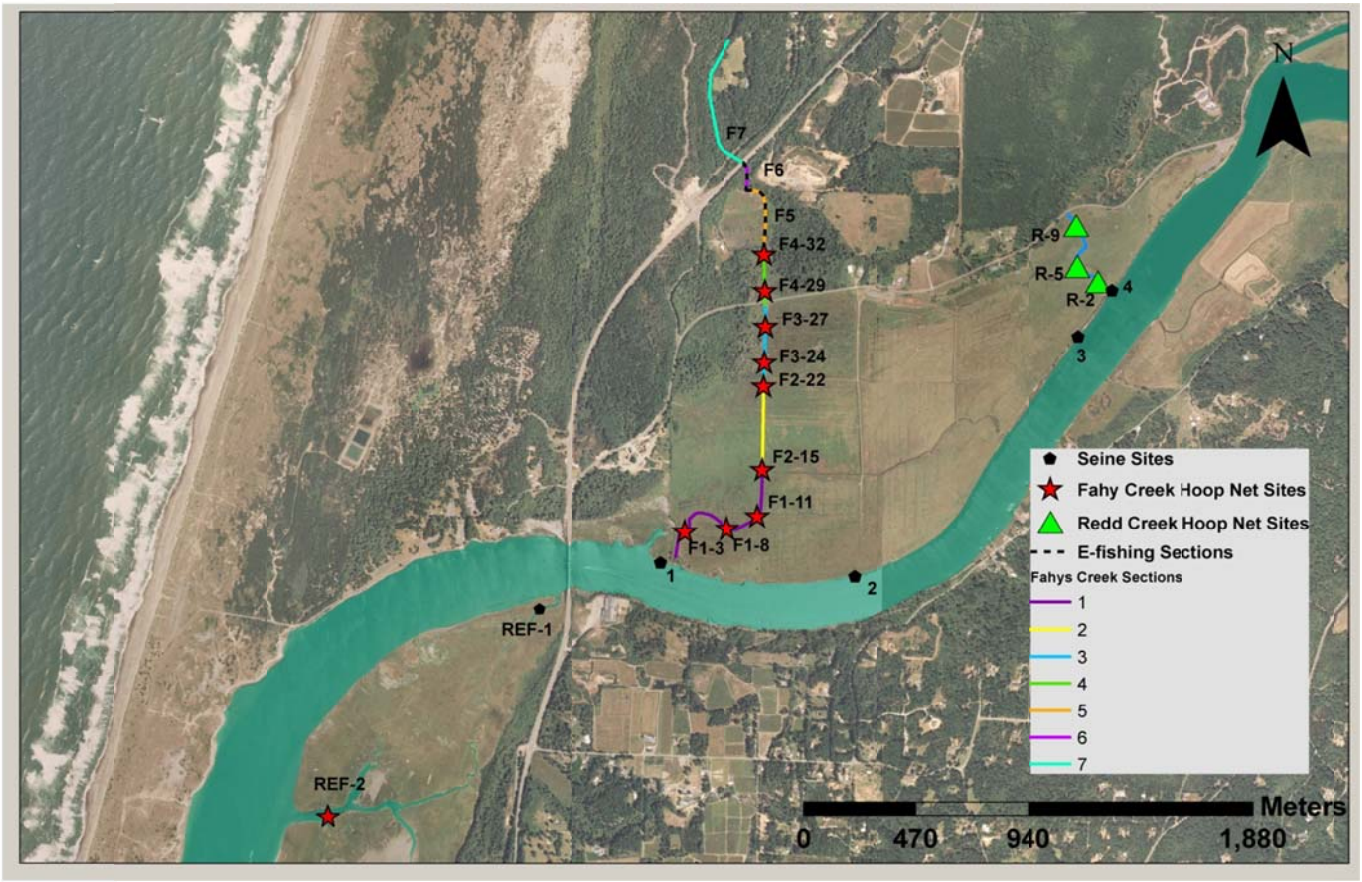

Figure 2. Bandon Refuge hoop net, electrofishing, and seine sample sites.

Section 2 (400 m) is a channelized section of Fahys Creek with grasslands on both banks. Section 3 (300 m) is channelized with beaver dams, forested wetlands on the west bank of the stream, grasslands on the east bank of the stream and ends on the south side of North Bank Lane. Section 4 (250 m) was once a channelized section that is currently a braided channel completely within forested wetlands located on the north side of North Bank Lane. Section 5 (250 m) was historically a forested wetland but is currently channeled around an abandoned cranberry bog and contains a number of beaver ponds. The west bank is the dike containing the cranberry bog. The east bank is forested wetlands that transition to lowland forest. Section 6 (150 m) is upstream from the cranberry bog and below Hwy 101.

Figure 3. Example of double hoop net approach.

Both banks in section 6 are lowland forest. Section 7 (600 m) is above Hwy 101 and below Fahys Lake. Both banks in section 7 are lowland forest transitioning to upland forest. For Sections 1-4, we used a system of two hoop nets, placed cod end to cod end with wings, providing the ability to block all, or at least the majority of, a channel during a sampling period (Figure 3). This technique was determined to be the most successful approach for collecting a representative fish sample after testing a variety of approaches and designs while working at the Nestucca Bay NWR (USFWS *unpublished data*, Little Nestucca River Restoration, NFWF Project #2006-0175-003). Random sample sites (n=9), each representing 50 m reaches, were identified across the four lower sections (Figure 2). Fishing occurred overnight for over 21 hours, on average, resulting in sampling nearly two tidal cycles. By blocking channels in both directions fish could be captured on both incoming and outgoing tides or by upstream and downstream movements. Each hoop net was accompanied by two wings that extended from both sides of the open end. Net sizes used were as follows: 0.76 m diameter, with 4 hoops, and wing size 0.61 m x 1.83 m; 0.91 m diameter, with 5 hoops, and wing size 0.91 m x 3.05 m; and 1.22 m diameter, with 7 hoops, and wing size 1.22 m x 4.57 m. All nets were 6.35 mm mesh. Each wing had floats on the top half and used lead weighted rope along the bottom. The cod ends of two nets were attached and the four wings were staked out to the width of the channels. Two nets were deployed in this manner at each of the sampling sites and were left to fish overnight. Net sizes deployed at each site were selected to be appropriate for the channel size and water depth at the site. The following day, the nets were pulled in the order by which they were set to allow for similar fishing effort with respect to time. The time of deployment and removal of the nets were recorded as well as the size of the net used. Water temperature, conductivity, and salinity measurements were taken at each site. Each individual net at a site was named by the site number and the net location relative to its partner net, such as the North, South, East, or West net.

Table 1. Pre-restoration sample dates.

Year	Season	Sample Dates	
2007	Fall	November	13-17
2008	Winter	January	28-31
	Spring	April	14-17
	Summer	May	27-29
	Fall	November	17-20
2009	Winter	January	26-29
	Spring	March	16-18
	Spring	April	27-30
	Summer	June	1-3
	Summer	July	28-30
	Fall	September	1-3
	Fall	October	26-29
	Winter	December	14-17
2010	Winter	January	19-22
	Spring	March	8-10

Sampling occurred once a season from fall 2007 through winter 2008-2009 and twice a season from spring 2009 through winter 2009-2010 and a final trip in spring 2010 (Table 1). Fish captured in each net were visually identified and measured for fork length (mm). Weight (g) was collected on all salmonid species. Measurements were only taken from the first 20 individuals of a species pulled from the bucket containing the net sample. If more than 20 individuals of the same species were captured, a total count was taken for the remaining fish. Length-frequency analysis was conducted on salmonids to document size structure of populations. Start and stop times of net deployment were recorded each day. All fish were released at the site of capture immediately following workup.

Electrofishing was conducted in sections 5 – 7 of Fahys Creek. Electrofishing was completed with a Smith Root LR-24 electrofisher. Sampling was conducted moving upstream involving two netters working with one electrofisher. Electrofisher settings varied due to changing environmental conditions (i.e., depth, conductivity, temperature) and ranged from 24-30 Hz, 14-18 % Duty Cycle, and 325-350 Volts. Electrofishing was completed twice a year, once in the fall and once in the spring. In spring 2009, section 5 was sampled for lamprey using an AbP-2 electrofisher. Electrofisher settings were 3 Hz, 25% Duty Cycle, and 125 Volts. Sampling within section 7 was terminated after fall 2007 for logistical reasons and because the section is not immediately and directly affected by the current restoration project.

Redd Creek

Redd Creek sampling occurred between the tide gate and the lower culvert just south of North Bank Lane (Figure 2). A single section 400 m in length comprised the study area. The section meandered for the bottom 300 m and was channelized for the upper 100 m. Grasslands dominated both banks for the entire section, with trees and shrubs lining the channelized portion. Random sample sites (n=3), each representing 50 m reaches, were identified (Figure 2). Hoop nets were the only sampling approach and were applied to Redd Creek, as described for Fahys Creek. Sampling occurred on the same schedule as Fahys Creek beginning in fall 2008.

Reference Sites

Two reference sites were sampled in the Bandon Marsh Unit that is a separate non-diked tidal marsh with functioning natural channels on the west side of the refuge. One random sample site, each representing a 50 m reach, was identified per channel (section). Reference-1 (REF-1) is located west of Hwy 101 and south of the river and Reference-2 (REF-2) is located southwest of REF-1 (Figure 2). Both hoop nets and seines were used. The same hoop net methodology described for Fahys Creek was used for the reference sites. An unbagged, 15.20 m long, 1.8 m deep, 0.6 cm mesh seine with float and lead lines was used to collect fish. One end of the net was held at shore while the other was pulled out in a wide arc and towed back to the bank, the drag lines were then pulled to shore simultaneously. Hoop net sampling took place at REF-1 and REF-2 on the same schedule as Fahys Creek with REF-1 beginning in fall 2008 and REF-2 beginning in summer 2009. To reduce potential mortality during low tides, REF-1 was changed from a hoop site to a seine site in September of 2009.

Mainstem Coquille

To gather information on fish community in the river, four beach seine sites were sampled on the mainstem Coquille River adjacent to BMNWR (Figure 2). Four sample sites, each representing a 50 m reach, were chosen in the section of the Coquille River spanning 50 m

upstream of Redd Creek to 50 m downstream of Fahys Creek. These sites were chosen based on spatial dispersion through the section and accessibility. All sites are on the north bank of the Coquille River. Seine 1 (SEINE-1) is located just downstream of the mouth of Fahys Creek. Seine 2 (SEINE-2) is located directly south of the bunkhouse. Seine 3 (SEINE-3) is located approximately 100 m downstream from the mouth of Redd Creek. Seine 4 (SEINE-4) is located just upstream of the mouth of Redd Creek. Seining was conducted as described for the reference sites. Sampling occurred on the same schedule as Fahys Creek beginning in fall 2008.

Fahys Lake

Sample sites within Fahys Lake were haphazardly chosen to document fish occupancy using hoop nets, gill nets, minnow traps and electrofishing (Figure 4). One site in Fahys Lake was sampled using hoop nets as described previously. Gill netting in Fahys Lake was conducted at eight locations. Fish were collected using a monofilament gill net, 20 m long by 1.6 m deep, composed of three panels 7, 7, and 6 m with bar mesh measurements of 10, 25, and 40 mm. The net was set perpendicular to shore with start and end times recorded. Three unbaited minnow

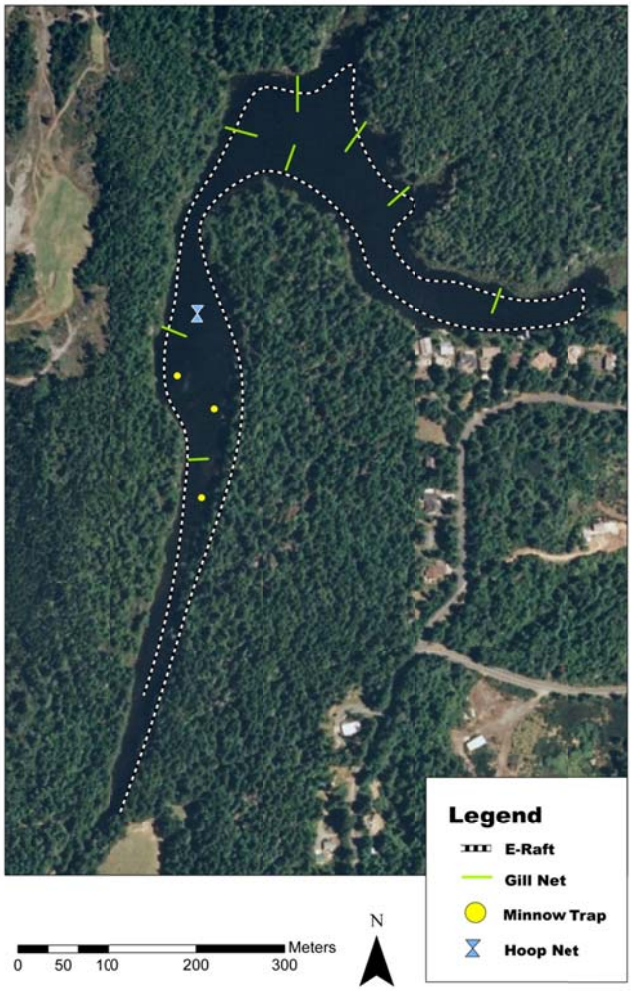

Figure 4. Fahys Lake hoop net, electrofish, gill net, and minnow trap sample sites.

traps with 2.5 cm openings were left overnight in Fahys Lake. Traps were lowered to the substrate with a 3 m rope and attached float. Fahys Lake was also sampled with a 3.7 m electrofisher raft (ERAFT) outfitted with a generator-powered Smith-Root model VVP 15B, a multi-dropper boom anode, and two cathode outriggers on each side of the bow (Figure 5). The field crew consisted of a netter and boat operator who also controlled the electrofishing settings. The boat fished the shoreline. ERAFT settings were 30 Hz, 30 % Duty Cycle, and 600 Volts. All fish were netted and held onboard until the end of sampling. Sampling occurred in the spring and summer of 2009.

Figure 5. Electrofishing raft in Fahys Lake 4/28/2009.

Biodiversity

All species encountered within the Unit restoration area through the period of monitoring were ecologically classified according to average relative species abundance and percent frequency of occurrence (González-Acosta 1998, González-Acosta et al. 2005). This method of classification is based on Olmstead-Tukey's test (Sokal and Rohlf 1969) and allows an ecological and quantitative classification of the species in each area (González-Acosta et al. 2005). The analysis results in the division of species present into four ecological categories (dominant, common, occasional, and rare) represented by quadrants of a scatter plot that are divided by two axes identifying the mean frequency of occurrence and mean relative abundance

for a specific area. Ecological classification occurred within five distinct areas of the study area: Upper Fahys, Lower Fahys, Redd, Reference Sites, and Mainstem Coquille.

Biodiversity was quantified and reported in terms of alpha diversity. Alpha diversity (Simpson Diversity Index) is an index of species richness, or number of species within an area or season. Alpha diversity was compared using ANOVA within section (Fahys Sections 1-6, Redd, Reference, and Mainstem) among seasons (all years pooled). Post hoc multiple comparisons were conducted for a statistically significant ($\alpha = 0.05$) ANOVA.

Biodiversity analyses were conducted on data collected by electrofishing (Upper Fahys), hoop net (Lower Fahys, Redd, Reference Sites) and seine (Mainstem Coquille). While capture efficiency can vary depending on method of capture and habitat, methods were selected for respective habitats to increase capture efficiency, resulting in a description of the fish community that was compared among areas. Lapointe et al. (2006) found that seines produced significantly higher richness and diversity than hoop nets and electrofishing in shallow offshore waters of large rivers (i.e., Mainstem Coquille). Clark et al. (2007) found that fyke nets produced significantly higher richness and diversity than seines when sampling littoral fish communities in floodplain lakes (i.e., Lower Fahys, Redd, Reference Sites). In addition, Lapointe et al. (2006) also found that samples obtained by hoop nets and electrofishing were not significantly different in richness and diversity. Therefore, these methodologies provide measures for comparison of frequency of occurrence (ecological classification) and species richness (alpha diversity). We recognize that potential differences in capture efficiency among methods also affect abundance data (i.e., ecological classification). However, capture methods were selected with respect to each habitat and abundance data is relative to other species captured using the same methodology within a habitat.

Macro-invertebrate Sampling

Fahys Creek

Invertebrate sampling reaches were located on either end and between each of the hoop net sites for Sections 1-4. Sections 5 and 6 were combined to represent one reach. There were a total of 10 reaches sampled. Water column and water surface samples were collected. Efforts were taken so that sampling methods provided both quantitative and qualitative results that could be compared throughout the range of sites as well as with future surveys.

Collection of water column and surface invertebrates was conducted using a unique drift net design (Figure 6). The nets were 250 micron-mesh with a 30.5 cm^2 opening and a one meter long capture bag that tapered down into an 500 ml collection bottle. Three of these nets were used alongside each other. In the center of each net was a 2030R standard mechanical flow meter. Methods for sampling a reach depended on the conditions of the individual sites. If sites were deep enough, a boat was used for collection efforts. For sites that did not allow for boat access, stationary set-nets were staked into position at the bottom of the reach with the mouths facing upstream allowing them to capture any drifting surface/subsurface invertebrates. Set net sites were deployed for 20 minute periods. In areas where flow was too low to gather readings on the mechanical flow meter, an orange and stopwatch were used to calculate approximate flow (Orth 1983). Sampling depth of the net depended on the water depth at the site. Attempts were made to capture as much of the water column near the surface as possible while trying to avoid scraping or disturbing any of the substrate along the bottom.

Figure 6. Invertebrate sampling nets being used in deeper water conditions (active boat- drift sampling) and shallow water conditions (set-netting).

Collected invertebrate specimens were transferred and stored in 500 ml bottles filled with isopropyl alcohol. All samples were preserved. Invertebrate sampling occurred during the spring of 2008 and 2009.

Reference Sites

Macro-invertebrate sampling was also conducted at REF-1. The same methods were applied in REF-1 as described above for Fahys Creek macro-invertebrate sampling. Sampling occurred in spring 2009.

Results

Fish Sampling

Fahys Creek

Hoop nets were deployed during all fifteen sampling trips between November 2007 and March 2010. Native fish species captured within Fahys Creek included: CCT, STH, cutthroat/steelhead hybrids (HYB), CHN, COHO, eulachon (*Thaleichthys pacificus*) (EUCH), three-spined stickleback (*Gasterostreus aculeatus*) (SKB), sculpin species (*Cottidae*) (SCP), shiner perch (*Cymatogaster aggregata*) (SP), and gunnel fish (*Pholidae*) (GUN). Non-native fish species found included brown bullhead (*Ameiurus nebulosus*) (BBH), largemouth bass (*Micropterus salmoides*) (LMB), mosquito fish (*Gambusia affinis*) (MQF), bluegill (*Lepomis macrochirus*) (BG), and common carp (*Cyprinus carpio*) (CARP). Amphibian species found included rough skinned newts (*Taricha granulose*) (RSN), red-legged frogs (*Rana aurora*) (RLF), bull frogs (*Rana catesbeiana*) (BF), and northwestern salamanders (*Ambystoma gracile*) (NWS). Shrimp were also captured in Fahys Creek. Composition and frequency of species captured varied for each sampling trip (Appendix I).

Electrofishing effort totaled 3,490 seconds (sec) during fall 2007, 2,634 sec during spring 2008, 1,981 sec during fall 2008, 2,570 sec during spring 2009, and 2,376 sec during fall 2009. It should be noted that in fall 2007, electrofishing included the beginning section of reach 7 (above Hwy 101). Due to beaver activity creating deep water levels during fall 2008, sampling was unable to be conducted through more than half of sections 5 and 6. Electrofishing effort totaled 905 seconds during spring 2009 lamprey sampling.

Native fish species found in reaches 5, 6, and 7 included CCT, STH, HYB, COHO, SKB, and SCP (Table 2). SCP, SKB, and amphibian species were not targeted. The only non-native fish observed were one smallmouth bass (*Micropterus dolomieu*) (SMB) in fall 2007 and one LMB in fall 2008. Amphibian species observed included RSN, NWS, and RLF. No lamprey were captured.

Length-frequency analysis indicates multiple size classes of CCT in Fahys Creek, but not for COHO, CHN or STH (Figures 7 and 8). Larger CCT are found in reaches 1-4 while reaches 5-7 support the smaller fish.

Table 2. Electrofishing capture results: CCT (coastal cutthroat trout), STH (steelhead), HYB (cutthroat/steelhead hybrid), coho salmon, and trout fry.

Date	Section	CCT	STH	HYB	COHO	TF
11/2007	F5	106	0	0	29	0
	F6	54	0	1	1	5
	F7	13	0	10	0	16
4/2008	F5	68	0	0	39	2
	F6	40	4	0	4	2
11/2008	F5	50	8	5	22	2
	F6	6	0	1	0	0
4/2009	F5	44	3	6	6	1
	F6	17	1	8	0	1
10/2009	F5	44	1	0	6	3
	F6	28	0	0	2	1

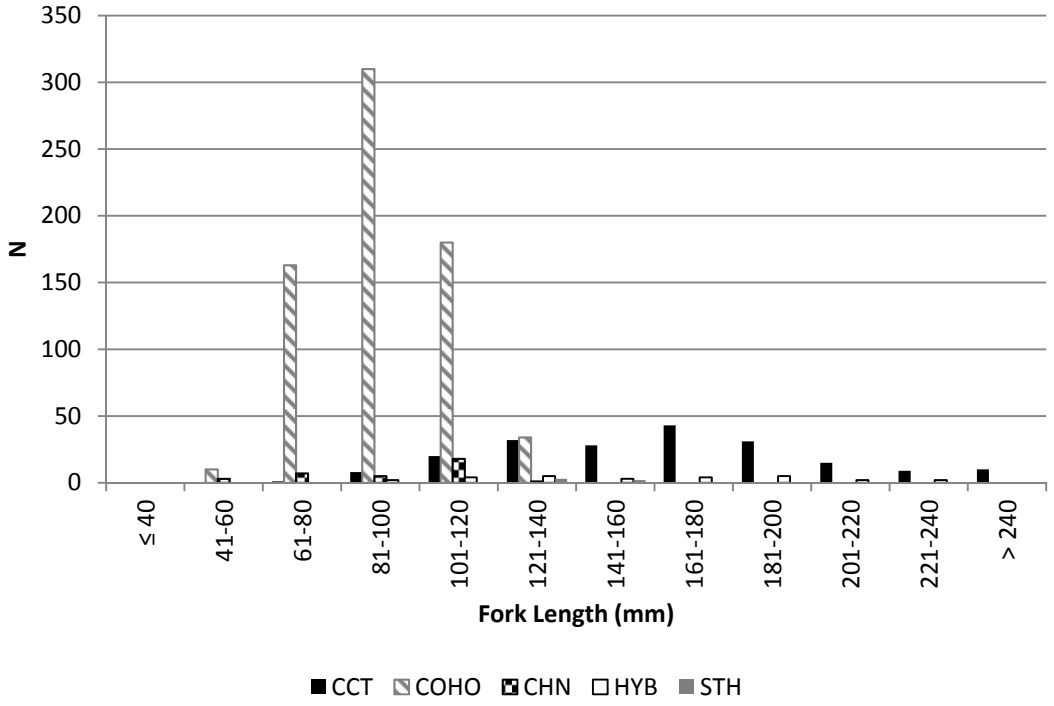

Figure 7. Length/frequency analysis of salmonid species captured across all hoop netting efforts in sections 1-4 in Fahys Creek.

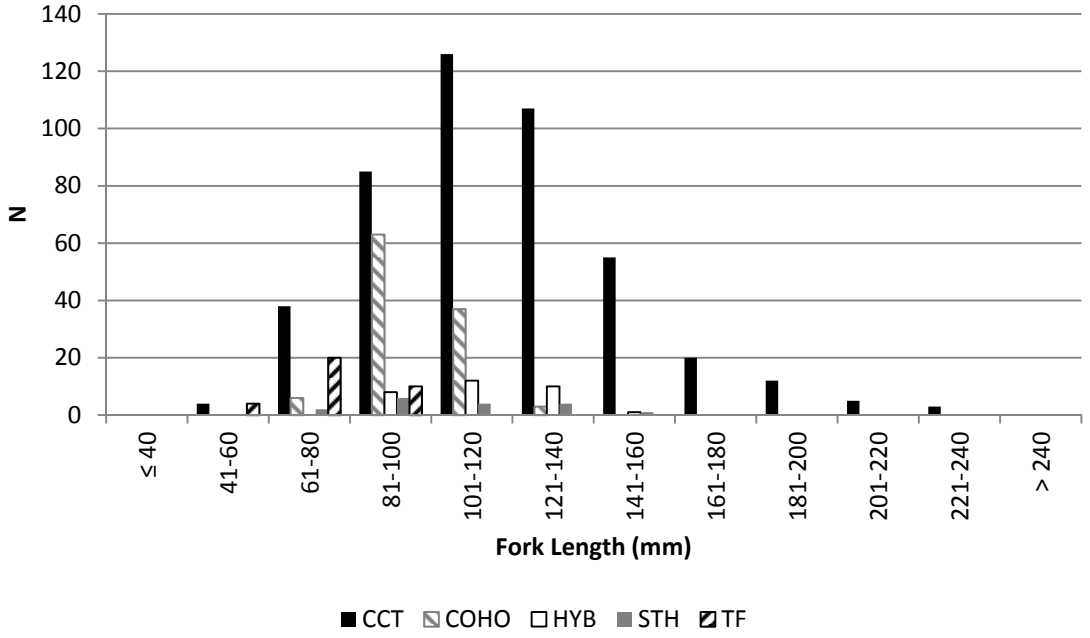

Figure 8. Length/frequencies of salmonid species captured across all electrofishing efforts in sections 5-7 of Fahys Creek.

Redd Creek

Native fish species captured on Redd Creek using hoop nets included: CCT, HYB, CHN, COHO, SKB, SCP, SP, and GUN. Non-native fish species found included BBH, BG, and MQF. Amphibian species found included RLF and RSN. Shrimp, jellyfish, and crab were also captured in Redd Creek. Composition and frequency of species captured varied for each sampling trip (Appendix I). Catch rates were high enough to only conduct length-frequency analysis on COHO, which exhibited a similarly shaped size structure as Fahys Creek (Figure 7) that was shifted slightly toward fish in the 61-80 mm size range.

Reference Sites

Native species captured in REF-1 using hoop nets included: CHN, COHO, EUCH, GUN, SCP, SF (salmon fry), SKB, SP, and starry flounder (*Platichthys stellatus*) (STF). One American shad (*Alosa sapidissima*) (AMS) is the only non-native species captured thus far. Composition and frequency of species captured varied for each sampling trip (Appendix I). Catch rates were high enough to only conduct length-frequency analysis on COHO, which was similar to Redd Creek COHO size structure.

Only three native species have been captured while seining at REF-1: SCP, SKB, and SP. Species catch rates varied for each sampling trip (Appendix II). Native species captured in REF-2 using hoop nets included: COHO, EUCH, GUN, SCP, SKB, and SP. No non-native species have been captured thus far. Shrimp, crabs (of at least two different species), and jellyfish were captured at both REF-1 and REF-2.

Mainstem Coquille

Native species captured include: CHN, COHO, GUN, SCP, SKB, SP, and STF. No non-native species have been captured (Table 3). Shrimp, jellyfish, and crabs were also captured in the mainstem Coquille. Due to extreme tides in December 2009, no seining occurred at sampling sites SEINE -1, SEINE -2, and SEINE-3. Insufficient numbers of salmonids were captured to conduct length-frequency analysis.

Table 3. Capture results from seining in mainstem Coquille River during all sampling trips.

					Species			
Season	Site	CHN	COHO	GUN	PSS	SCP	SP	STF
Winter 2008	SEINE-1	--	--	--	--	--	--	--
	SEINE-2	--	--	--	--	--	--	--
	SEINE-3	--	--	--	--	--	--	--
	SEINE-4	--	--	--	1	1	--	--
	Total	--	--	--	1	1	--	--
Spring 2009	SEINE-1	--	--	--	6	28	--	1
	SEINE-2	1	--	--	1	15	--	--
	SEINE-3	2	1	--	29	75	--	1
	SEINE-4	--	1	--	11	11	--	1
	Total	3	2	--	47	129	--	3
Summer 2009	SEINE-1	--	--	--	64	72	--	11
	SEINE-2	--	--	6	6	8	80	--
	SEINE-3	--	--	--	3	29	683	1
	SEINE-4	5	1	2	1	40	38	--
	Total	5	1	8	74	149	801	12
Fall 2009	SEINE-1	2	--	--	8	9	15	5
	SEINE-2	--	--	4	--	4	55	--
	SEINE-3	--	--	1	4	4	--	4
	SEINE-4	--	--	--	4	4	--	--
	Total	2	--	5	22	28	132	9
Winter 2009	SEINE-1	--	--	--	--	--	--	--
	SEINE-2	--	--	--	--	--	--	--
	SEINE-3	--	2	--	--	--	--	1
	SEINE-4	--	--	--	--	2	--	--
	Total	--	2	--	2	5	--	1
Spring 2010	SEINE-1	--	--	--	9	9	--	1
	SEINE-2	--	--	--	1	1	--	--
	SEINE-3	--	--	--	11	27	--	--
	SEINE-4	--	7	--	24	32	--	--
	Total	--	7	--	47	72	--	1

Fahys Lake

Native species captured include CCT, SKB, and SCP. CCT were only captured with gill nets (Figure 9). RSN were the only amphibian species captured. No non-native species were captured.

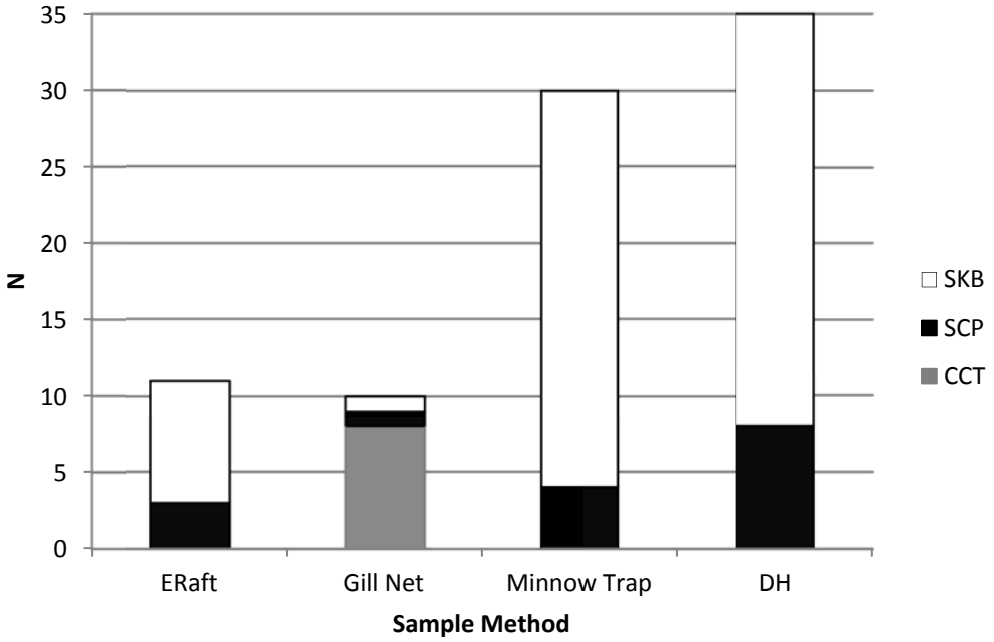

Figure 9. Capture results from ERAFT, gill net, minnow trap, and hoop net (DH) sites in Fahys Lake during all sampling trips.

Biodiversity

Pre-restoration ecological classification indicates differences in occurrence and relative abundance among the five distinct areas of the study area (Figure 10). SKB and SCP were most commonly classified dominant across the areas. The most notable exception would be Upper Fahys Creek where fish were captured via backpack electrofishing. This capture method is not efficient for small bodied fish and the results may not accurately reflect the true ecological classification of these species in this area. Other notable differences were CCT classified dominant in Upper Fahys Creek and COHO classified dominant in Lower Fahys Creek. These two species were classified common in Redd Creek. CCT were not present in the two remaining areas (Reference Sites and Mainstem Coquille River). COHO were borderline common/rare in these two areas. Shiner perch were not present in Upper Fahys Creek and were classified rare in Lower Fahys and Redd creeks, but were classified occasional in Mainstem Coquille River and borderline common/rare in Reference Sites. Nonnative species (with the exception of American shad) were only present behind the dike in Fahys and Redd creeks.

Alpha diversity (Simpson Diversity Index) is documented for all sections and seasons on an index of 0 to1, where 0 represents a truly homogenous community and 1 represents a truly heterogeneous community (Table 4). Alpha diversity ranged from 0.000 to 0.830. There were no significant differences in alpha diversity within section among seasons.

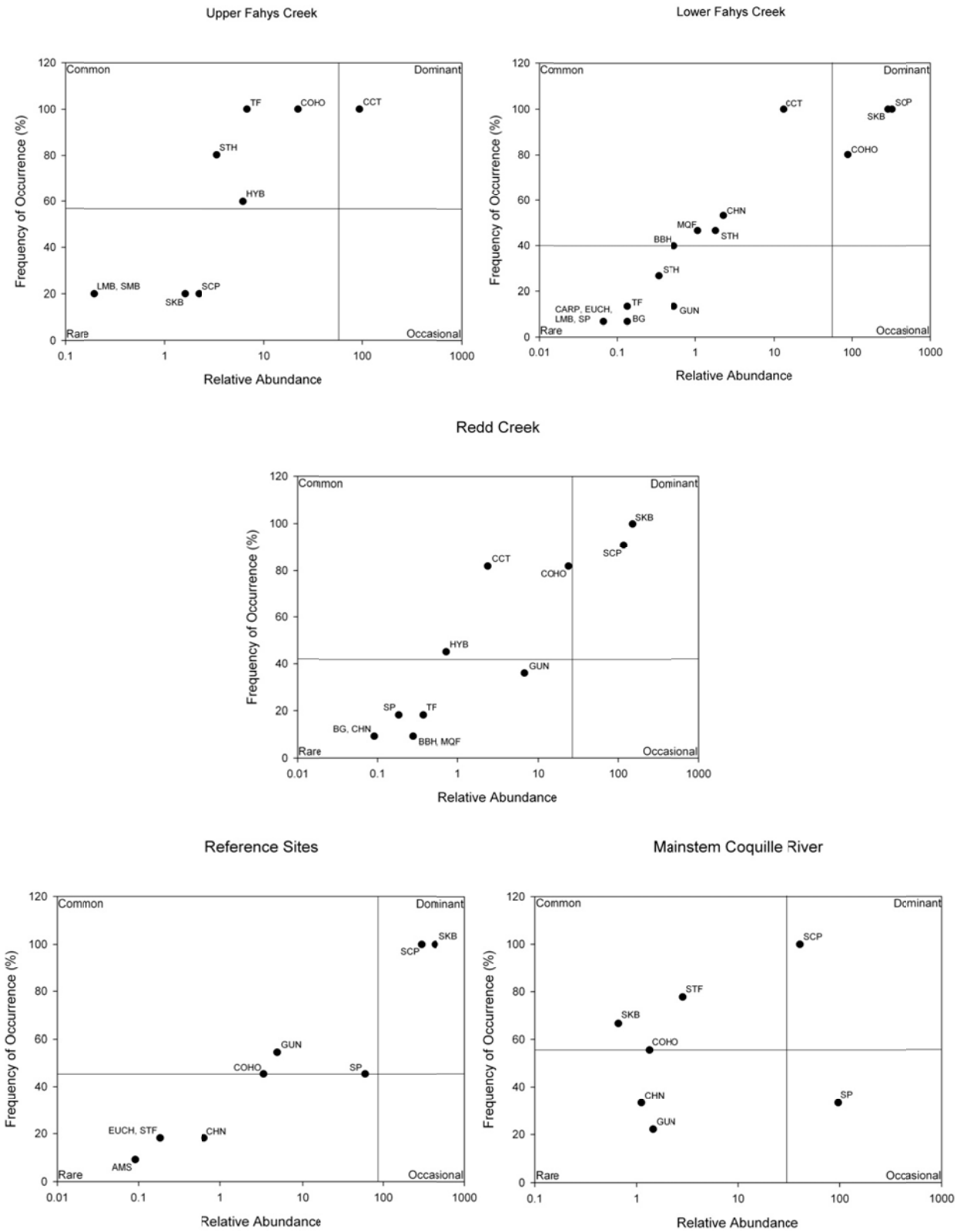

Figure 10. Ecological classification of taxon encountered throughout restoration area during the period of monitoring. Taxon are classified to Dominant, Common, Occasional, or Rare.

Table 4. Seasonal alpha diversity (Simpson Diversity Index) across sampling areas of the tidal marsh.

Season	Sample Date	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Redd Creek	Reference	Reference (Seine)	Mainstem Coquille	Fahys Lake
Spring	April 2008	0.514	0.520	0.627	0.508	0.487	0.376						
	March 2009	0.651	0.413	0.781	0.810				0.704	0.131		0.323	
	April 2009	0.485	0.575	0.656	0.585	0.447	0.533		0.546	0.287		0.071	0.290
	March 2010	0.640	0.699	0.394	0.745				0.778	0.542	0.000	0.212	
Summer	May 2008	0.289	0.531	0.565	0.343								
	June 2009	0.442	0.349	0.590	0.356				0.590	0.460		0.185	0.378
	July 2009	0.496	0.423	0.537	0.285				0.469	0.623		0.081	0.363
Fall	November 2007	0.531	0.487	0.830	0.796	0.359	0.213	0.672					
	November 2008	0.575	0.575	0.743	0.811	0.600	0.286		0.413	0.676			
	September 2009	0.487	0.335	0.607	0.059				0.588	0.642	0.032	0.511	
	October 2009	0.551	0.581	0.562	0.248	0.568	0.353		0.383	0.583	0.417	0.595	
Winter	January 2008	0.602	0.415	0.725	0.767								
	January 2009	0.326	0.548	0.729	0.417				0.643	0.354			
	December 2009	0.702	0.517	0.533	0.742				0.287	0.528	0.000	0.000	
	January 2010	0.307	0.750	0.747	0.800				0.733	0.488	0.000	0.800	

Invertebrate Sampling

Invertebrate samples (n=63) were collected across 11 reaches on Fahys Creek and REF-1 in 2008 and 2009.

Findings

- Salmonids were found in all areas (Fahys Cr., Redd Cr., Reference, and Mainstem Coquille) sampled.
- Coastal cutthroat trout were only found in areas behind existing dike structure (Fahys and Redd creeks). Both of these areas have freshwater sources independent of the mainstem Coquille River.
- Nonnative species were only found in areas behind existing dike structure. Both of these areas have freshwater sources independent of the mainstem Coquille River.
- Fahys Creek supports multiple size classes of CCT and larger COHO than any other area sampled.
- Ecological classification indicates CCT and COHO as dominant species (in absence of SKB and SCP) in Fahys Creek and COHO as the single dominant species in Redd Creek.
- While there were no significant differences in alpha diversity within sections among seasons, patterns evident included:
  - The highest alpha diversity levels were in Fahys Creek in the spring and fall.
  - Alpha diversity was generally higher in Fahys and Redd creeks than in the reference sites or the mainstem Coquille River.
  - The lowest overall alpha diversity levels were in the summer and winter and levels in the mainstem Coquille River were consistently lower levels than any other reaches sampled.

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Appendix I: Catch table for all hoop net samples.

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Fall 2007	F1-11-N	--	--	--	--	--	--	--	--	--	--	--	--	4	--	5	--	--	--	--
	F1-11-S	--	--	--	--	--	--	3	--	--	--	--	--	3	--	2	--	--	--	--
	F1-3-N	--	--	--	--	--	--	--	--	--	--	--	--	13	--	11	--	--	--	--
	F1-3-S	--	--	--	--	--	--	--	--	--	--	--	--	8	--	5	1	--	--	--
	F1-8-N	--	--	--	--	--	--	--	--	--	--	--	--	7	--	5	--	--	--	--
	F1-8-S	--	--	--	--	--	--	--	--	--	--	--	--	12	--	2	--	--	--	--
	F2-15-N	--	--	--	--	--	--	6	--	--	--	--	2	5	--	20	--	--	--	--
	F2-15-S	--	--	--	--	--	--	2	--	--	--	--	--	10	--	28	--	--	--	--
	F2-22-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	10	--	--	--	--
	F2-22-S	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--
	F3-24-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--
	F3-24-S	--	--	--	--	--	--	--	--	--	--	--	--	2	--	3	--	--	--	--
	F3-27-N	--	--	--	--	5	--	3	--	--	1	--	1	--	--	--	--	--	--	--
	F3-27-S	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
	F4-29-N	--	--	--	--	2	--	--	--	--	1	--	--	4	--	1	--	--	--	--
	F4-29-S	--	--	--	--	3	--	6	--	--	1	--	--	--	--	--	--	--	--	--
	F4-32-N	--	--	--	--	--	--	2	--	--	--	--	--	4	--	7	--	--	--	--
	F4-32-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total	--	1	--	--	10	--	22	--	--	3	--	3	74	--	103	1	--	--	--

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Winter 2008	F1-11-N	--	--	--	--	1	--	32	--	--	--	--	--	5	--	10	--	--	--	--
	F1-11-S	--	--	--	--	--	1	26	--	--	--	--	--	6	--	4	--	--	--	--
	F1-3-N	--	--	--	--	--	--	--	--	--	--	--	--	7	--	--	--	--	--	--
	F1-3-S	--	--	--	--	--	--	6	--	--	--	--	--	16	--	1	--	--	--	--
	F1-8-N	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--
	F1-8-S	--	--	--	--	--	--	4	--	--	--	--	--	9	--	3	--	--	--	--
	F2-15-N	--	--	--	--	1	--	99	--	--	--	--	--	14	--	21	--	--	--	--
	F2-15-S	--	--	--	--	--	--	58	--	--	--	--	--	3	--	2	--	--	--	--
	F2-22-N	--	--	--	--	--	--	1	--	--	--	--	--	6	--	3	--	--	--	--
	F2-22-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	--	--
	F3-24-N	--	--	--	--	3	--	2	--	--	--	--	--	2	--	3	--	--	--	--
	F3-24-S	--	--	--	--	1	--	5	--	--	1	--	--	--	--	1	--	--	--	--
	F3-27-N	--	--	--	--	6	--	1	--	--	--	--	--	1	--	1	--	--	--	--
	F3-27-S	--	--	--	--	4	--	1	--	--	--	--	--	--	--	1	--	--	--	--
	F4-29-N	--	--	--	--	1	--	5	--	--	--	--	--	1	--	1	--	--	--	--
	F4-29-S	--	--	--	--	5	--	2	--	--	--	--	--	2	--	3	--	--	--	--
	F4-32-N	--	--	--	--	1	--	--	--	--	--	--	--	--	--	2	--	--	--	--
	F4-32-S	--	--	--	--	1	--	--	--	--	--	--	--	1	--	--	--	--	--	--
	Total	--	--	--	--	24	1	243	--	--	1	--	--	73	--	60	--	--	--	--

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Spring 2008	F1-3-N	--	--	--	--	--	--	2	--	--	--	--	--	40	--	2	--	--	--	--
	F1-3-S	--	--	--	--	--	--	1	--	--	--	--	--	24	--	32	--	--	--	--
	F1-8-N	--	--	--	--	--	--	10	--	--	--	--	--	36	--	11	--	--	--	--
	F1-8-S	--	--	--	--	--	1	6	--	--	--	--	--	86	--	47	--	--	--	--
	F2-11-N	--	--	--	--	--	1	10	--	--	--	--	--	40	--	49	--	--	--	--
	F2-11-S	--	--	--	--	--	1	47	--	--	--	--	--	50	--	121	--	--	--	--
	F2-15-N	--	--	--	--	--	--	2	--	--	--	--	--	151	--	300	--	--	--	--
	F2-15-S	--	1	--	--	--	--	--	--	--	--	--	--	22	--	50	--	--	--	--
	F3-22-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F3-22-S	--	--	--	--	--	--	--	--	--	--	--	--	3	--	21	--	--	--	--
	F3-24-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F3-24-S	--	--	--	--	6	--	5	--	--	--	--	--	6	--	6	--	--	--	--
	F3-27-N	--	--	--	--	5	--	2	--	--	--	--	--	1	--	2	--	--	--	--
	F3-27-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	--	--	--	--
	F4-29-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	--	--
	F4-29-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	--	--
	F4-32-N	--	--	--	--	--	--	1	--	--	--	--	--	2	--	1	--	--	--	--
	F4-32-S	--	--	--	--	--	--	2	--	--	--	--	--	--	--	4	--	--	--	--
	Total	--	1	--	--	11	3	88	--	--	--	--	--	461	--	659	--	--	--	--

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Summer 2008	F1-11-N	--	--	--	--	1	--	--	--	--	--	--	--	81	--	33	--	--	--	--
	F1-11-S	--	--	--	--	--	--	1	--	--	--	--	--	211	--	47	--	--	--	--
	F1-3-N	--	--	--	--	--	--	--	--	3	--	--	--	103	--	11	--	--	--	--
	F1-3-S	--	--	--	--	--	3	5	--	1	--	--	--	905	--	91	--	--	--	--
	F1-8-N	--	1	--	--	1	--	10	--	--	--	--	--	799	--	125	--	--	--	--
	F1-8-S	--	--	--	--	--	3	5	--	3	--	--	--	612	--	220	--	--	--	--
	F2-15-N	--	--	--	--	--	--	--	--	--	--	--	--	16	--	8	--	--	--	--
	F2-15-S	--	--	--	--	1	--	--	--	--	1	--	--	16	--	30	--	--	--	--
	F2-22-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F2-22-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F3-24-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--
	F3-24-S	--	--	--	--	2	--	--	--	--	1	--	--	2	--	7	--	--	--	--
	F3-27-N	--	2	--	--	2	--	--	--	--	--	--	--	1	--	1	--	--	--	--
	F3-27-S	--	--	--	--	5	--	--	--	--	1	--	--	1	--	19	--	--	--	--
	F4-29-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	2	--	--	--	--
	F4-29-S	--	--	--	--	--	--	--	--	--	--	--	--	2	--	3	--	--	--	--
	F4-32-N	--	--	--	--	--	--	--	--	--	--	--	--	2	--	12	--	--	--	--
	F4-32-S	--	--	--	--	--	--	1	--	--	--	--	--	--	--	7	--	--	--	--
	Total	--	3	--	--	12	6	22	--	7	3	--	--	2752	--	618	--	--	--	--

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Fall 2008	F1-11-N	--	--	--	--	--	--	6	--	--	--	--	--	2	--	19	--	--	--	--
	F1-11-S	--	--	--	--	--	--	14	--	--	--	--	--	1	--	11	--	--	--	--
	F1-3-N	--	--	--	--	--	--	1	--	--	--	--	--	5	--	19	--	--	--	--
	F1-3-S	--	--	--	--	--	--	48	--	--	--	--	--	3	--	32	--	--	--	--
	F1-8-S	--	--	--	--	1	--	22	--	1	--	--	1	4	--	26	--	--	--	--
	F2-15-N	--	--	--	--	--	--	12	--	--	--	1	--	7	--	40	--	--	--	--
	F2-15-S	--	--	--	--	--	--	42	--	--	--	--	1	3	--	55	--	--	--	--
	F2-22-N	--	--	--	--	--	--	25	--	--	--	--	--	2	--	10	--	--	--	--
	F2-22-S	--	--	1	--	--	--	12	--	--	--	--	3	2	--	13	--	--	--	--
	F3-24-N	--	1	--	--	--	--	--	--	--	1	--	--	4	--	1	--	--	--	--
	F3-24-S	--	--	1	--	2	--	1	--	--	--	--	--	13	--	--	--	--	--	--
	F3-27-N	--	--	--	--	5	5	3	--	--	--	--	--	2	--	1	--	--	--	--
	F3-27-S	--	--	--	--	--	--	14	--	--	--	--	--	4	--	1	--	--	--	--
	F4-29-N	--	--	--	--	1	--	2	--	--	--	--	--	1	--	1	--	--	--	--
	F4-29-S	--	--	--	--	9	9	10	--	--	3	--	--	3	--	1	--	--	--	--
	F4-32-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	3	--	--	--	--
	F4-32-S	--	--	--	--	--	--	--	--	--	--	--	--	1	--	12	--	--	--	--
	R-2-N	--	--	--	--	--	--	9	--	--	--	--	--	6	--	--	--	--	--	--
	R-2-S	--	--	--	--	--	--	11	--	--	--	--	--	5	--	8	--	--	--	--
	R-5-N	--	--	--	--	--	--	11	--	--	--	--	--	13	--	53	--	--	--	--
	R-5-S	--	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	--	--
	R-9-N	--	--	--	--	1	--	4	--	--	--	--	--	3	--	39	--	--	--	--
	R-9-S	--	--	--	--	1	--	29	--	--	--	--	--	157	--	625	--	--	--	--
	REF-1-N	--	--	--	--	--	--	--	--	--	--	--	--	24	--	9	10	--	--	--
	REF-1-S	--	--	--	--	--	--	1	--	14	--	--	--	21	--	11	1	--	--	--
	Total	--	1	2	--	20	14	282	--	15	4	1	5	287	--	990	11	--	--	--

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Winter 2009	F1-11-N	--	--	--	--	--	--	39	--	--	--	--	--	4	--	43	--	--	--	--
	F1-11-S	--	--	--	--	--	--	6	--	--	--	--	--	2	--	61	--	--	--	--
	F1-3-N	--	--	--	--	--	--	2	--	--	--	--	--	2	--	55	--	--	--	--
	F1-3-S	--	--	--	--	--	--	--	--	--	--	--	--	3	--	13	--	--	--	--
	F1-8-N	--	--	--	--	--	--	--	--	--	--	--	--	2	--	8	--	--	--	--
	F1-8-S	--	--	--	--	--	--	4	--	--	--	--	--	2	--	45	--	--	--	--
	F2-15-N	--	--	--	--	--	--	12	--	--	--	--	--	9	--	132	--	--	--	--
	F2-15-S	--	--	--	--	--	1	99	--	--	--	--	--	2	--	36	--	--	--	1
	F2-22-N	--	--	--	1	--	--	7	--	--	--	--	--	3	--	23	--	--	--	--
	F2-22-S	--	--	--	--	--	--	8	--	--	--	--	--	6	--	21	--	--	--	--
	F2-29-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	4	--	--	--	--
	F2-29-S	--	--	--	--	1	--	14	--	--	1	--	--	2	--	1	--	--	--	--
	F3-24-N	--	--	--	--	1	--	--	--	--	--	--	1	9	--	2	--	--	--	--
	F3-24-S	--	--	--	--	1	--	1	--	--	--	--	--	4	--	8	--	--	--	--
	F3-27-N	--	--	--	--	4	--	3	--	--	--	--	--	6	--	2	--	--	--	--
	F3-27-S	--	--	--	--	8	--	3	--	--	4	--	--	3	--	--	--	--	--	--
	F4-29-N	--	--	--	--	--	--	1	--	--	--	--	--	1	--	1	--	--	--	--
	F4-29-S	--	--	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F4-32-N	--	--	--	--	1	--	1	--	--	--	--	--	--	--	10	--	--	--	--
	F4-32-S	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--
	R-2-N	--	--	--	--	--	--	3	--	--	--	--	--	8	--	--	--	--	--	--
	R-2-S	--	--	--	--	--	--	3	--	--	--	--	--	1	--	1	--	--	--	--
	R-5-N	--	--	--	--	--	--	1	--	--	--	--	--	7	--	3	--	--	--	--
	R-5-S	--	--	--	--	--	--	1	--	--	--	--	--	3	--	5	--	--	--	--
	R-9-N	--	--	--	--	--	--	15	--	--	--	--	--	--	--	4	--	--	--	1
	R-9-S	--	--	--	--	1	--	101	--	--	--	--	--	2	--	39	--	--	--	--
	REF-1-N	--	--	--	--	--	--	--	--	--	--	--	--	4	--	30	--	--	--	--
	REF-1-S	--	--	--	--	--	--	--	--	--	--	--	--	9	--	15	--	--	--	--
	REF-2-N	--	--	--	--	--	--	13	--	--	--	--	--	163	--	30	--	--	--	--
	REF-2-S	--	--	--	--	--	--	3	1	--	--	--	--	123	--	266	--	--	--	--
	Total	--	--	--	1	21	1	340	1	--	5	--	1	382	--	859	--	--	--	2

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Spring 2009	F1-11-N	--	--	--	--	1	--	200	--	--	--	--	--	156	--	183	--	--	--	--
	F1-11-S	--	--	--	--	3	--	41	1	--	--	--	--	32	--	36	--	--	--	--
	F1-3-N	--	--	--	--	--	1	2	--	--	--	--	--	37	--	18	--	--	--	--
	F1-3-S	--	--	--	--	--	--	7	--	--	--	--	--	7	--	6	--	--	--	--
	F1-8-N	--	--	--	--	2	3	122	--	--	--	--	--	96	--	51	--	--	--	--
	F1-8-S	--	--	--	--	1	1	26	--	--	--	--	--	17	--	24	--	--	--	--
	F2-15-N	--	--	--	--	1	--	--	--	--	--	--	--	45	--	55	--	--	--	--
	F2-15-S	--	--	--	--	1	--	31	--	--	--	--	--	35	--	38	--	--	--	--
	F2-22-N	--	--	--	--	--	--	5	--	--	--	--	--	12	--	91	--	--	--	--
	F2-22-S	--	--	--	--	1	--	6	--	--	--	--	--	10	--	70	--	--	--	--
	F3-24-N	--	--	--	--	--	--	3	--	--	--	--	--	4	--	16	--	--	--	--
	F3-24-S	--	--	--	--	5	--	3	--	--	--	--	--	8	--	9	--	--	--	--
	F3-27-N	--	--	--	--	--	--	2	--	--	--	--	--	6	--	18	--	--	--	--
	F3-27-S	--	--	--	--	14	--	16	--	--	5	--	--	6	--	17	--	--	--	--
	F4-29-N	--	--	--	--	--	--	--	--	--	--	--	--	3	--	2	--	--	1	--
	F4-29-S	--	--	--	--	6	--	9	--	--	2	--	--	1	--	3	--	--	1	--
	F4-32-N	--	--	--	--	2	--	1	--	--	1	--	--	2	--	13	--	--	--	--
	F4-32-S	--	--	--	--	3	--	1	--	--	3	--	--	2	--	26	--	--	--	--
	R-2-N	--	--	--	--	--	--	12	--	--	--	--	--	99	--	5	--	--	--	1
	R-2-S	--	3	--	--	--	--	2	--	--	--	--	--	140	--	9	--	--	--	--
	R-5-N	--	--	--	--	1	--	5	--	--	--	--	--	72	--	44	--	--	--	1
	R-5-S	--	--	--	--	3	--	22	--	--	--	--	--	35	--	32	--	--	--	--
	R-9-N	--	--	--	--	--	--	3	--	--	--	--	--	--	--	46	--	--	--	1
	R-9-S	--	--	--	--	2	--	15	--	--	4	--	--	7	--	247	--	--	--	--
	REF-1-N	--	--	--	--	--	--	7	--	--	--	--	--	209	--	28	--	--	--	--
	REF-1-S	1	--	--	--	--	--	1	1	1	--	--	--	287	1	14	--	1	--	--
	Total	1	3	--	--	46	5	542	2	1	15	--	--	1328	1	1101	--	1	2	3

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Summer 2009	F1-11-N	--	--	--	--	--	2	--	--	--	--	--	--	132	--	77	--	--	--	--
	F1-11-S	--	--	--	--	--	--	--	--	--	--	--	--	48	--	54	--	--	--	--
	F1-3-N	--	--	--	--	--	--	--	--	--	--	--	--	26	--	3	--	--	--	--
	F1-3-S	--	--	--	--	1	1	--	--	--	--	--	--	114	--	251	--	--	--	--
	F1-8-N	--	--	--	--	--	--	--	--	--	--	--	--	11	--	19	--	--	--	--
	F1-8-S	--	--	--	--	--	--	--	--	--	--	--	--	145	--	398	--	--	--	--
	F2-15-N	--	--	--	--	--	1	--	--	--	--	--	--	25	--	46	--	--	--	--
	F2-15-S	--	--	--	--	--	--	1	--	--	--	--	--	8	--	16	--	--	--	--
	F2-22-N	--	--	--	--	2	--	--	--	--	--	--	--	5	--	76	--	--	--	--
	F2-22-S	--	--	--	--	2	--	--	--	--	--	--	2	14	--	54	--	--	--	--
	F3-24-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	3	--	--	--	--
	F3-24-S	--	1	--	--	3	--	--	--	--	--	--	1	18	--	36	--	--	--	--
	F3-27-N	--	1	--	--	3	--	--	--	--	--	--	--	23	--	17	--	--	--	--
	F3-27-S	--	--	--	--	6	--	--	--	--	--	--	--	8	--	4	--	--	--	--
	F4-29-N	--	--	--	--	6	--	--	--	--	--	--	--	6	--	7	--	--	--	--
	F4-29-S	--	--	--	--	7	--	--	--	--	--	--	--	3	--	7	--	--	--	--
	F4-32-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	51	--	--	--	1
	F4-32-S	--	--	--	--	--	--	--	--	--	--	--	--	4	--	48	--	--	--	--
	R-2-N	--	--	--	--	--	--	--	--	23	--	--	--	92	--	7	--	--	--	--
	R-2-S	--	--	--	--	3	--	4	--	35	--	--	--	286	--	9	--	--	--	--
	R-5-N	--	--	--	--	2	--	1	--	--	1	--	--	88	--	74	1	--	--	--
	R-5-S	--	--	--	--	--	--	2	--	--	--	--	--	62	--	16	--	--	--	--
	R-9-N	--	--	1	--	2	--	2	--	--	1	--	--	14	--	26	--	--	--	--
	R-9-S	--	--	--	--	5	--	4	--	--	1	--	--	33	--	148	--	--	--	--
	REF-1-N	--	--	--	--	--	2	--	--	2	--	--	--	364	--	34	239	--	--	--
	REF-1-S	--	--	--	--	--	5	--	--	1	--	--	--	340	--	60	4	1	--	--
	REF-2-N	--	--	--	--	--	--	--	--	15	--	--	--	282	--	716	4	--	--	--
	REF-2-S	--	--	--	--	--	--	--	--	3	--	--	--	801	--	2527	--	--	--	--
	Total	--	2	1	--	42	11	14	--	79	3	--	3	2961	--	4811	248	1	--	1

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Fall 2009	F1-11-N	--	--	--	--	--	--	--	--	--	--	--	--	6	--	4	--	--	--	--
	F1-11-S	--	--	--	--	1	--	--	--	--	--	--	1	8	--	9	--	--	--	--
	F1-3-N	--	--	--	--	--	--	--	--	--	--	--	1	15	--	24	--	--	--	--
	F1-3-S	--	--	--	--	--	--	--	--	--	--	--	--	39	--	20	--	--	--	--
	F1-8-N	--	--	--	--	--	--	--	--	--	--	--	--	46	--	11	--	--	--	--
	F1-8-S	--	--	--	--	1	--	--	--	--	--	--	1	21	--	21	--	--	--	--
	F2-15-N	--	--	--	--	1	--	--	--	--	--	--	--	9	--	5	--	--	--	--
	F2-15-S	--	--	--	--	--	--	--	--	--	--	--	--	28	--	17	--	--	--	--
	F2-22-N	--	--	--	--	--	--	--	--	--	--	--	--	2	--	3	--	--	--	--
	F2-22-S	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F3-24-N	--	--	--	--	1	--	--	--	--	--	--	1	2	--	6	--	--	--	--
	F3-24-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	--	--
	F3-27-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--
	F3-27-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
	F3-28-N	--	--	--	--	1	--	--	--	--	--	--	--	3	--	2	--	--	--	--
	F3-28-S	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--
	F4-29-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	--	--
	F4-29-S	--	--	--	--	2	--	--	--	--	--	--	--	--	--	3	--	--	--	--
	F4-32-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	24	--	--	--	--
	F4-32-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	--	--	--	--
	R-2-N	--	--	--	--	1	--	--	--	16	--	--	1	39	--	8	--	--	--	--
	R-2-S	--	--	--	--	1	--	--	--	--	--	--	--	17	--	4	1	--	--	--
	R-5-N	--	--	--	--	--	--	--	--	--	1	--	2	11	--	38	--	--	--	--
	R-5-S	--	--	--	--	--	--	--	--	--	--	--	--	2	--	22	--	--	--	--
	R-9-N	--	--	--	--	2	--	--	--	--	--	--	--	17	--	32	--	--	--	--
	R-9-S	--	--	--	--	--	1	--	--	--	--	--	--	58	--	97	--	--	--	--
	REF-2-N	--	--	--	--	--	--	--	--	2	--	--	--	181	--	463	249	--	--	--
	REF-2-S	--	--	--	--	--	--	--	--	2	--	--	--	87	--	238	157	--	--	--
	Total	--	--	--	--	14	1	--	--	20	1	--	7	594	--	1074	407	--	1	--

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Winter 2010	F1-11-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--
	F1-11-S	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--
	F1-3-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F1-3-S	--	--	--	--	--	--	7	--	--	--	--	--	--	--	--	--	--	--	--
	F1-8-N	--	--	--	--	--	--	7	--	--	--	--	--	1	--	--	--	--	--	--
	F1-8-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F2-15-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F2-15-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F2-22-N	--	--	--	--	1	--	2	--	--	--	--	--	1	--	--	--	--	--	--
	F2-22-S	--	--	--	--	1	--	2	--	--	--	--	--	--	--	--	--	--	1	--
	F3-24-N	--	--	--	--	--	--	3	--	--	--	--	--	3	--	--	--	--	--	--
	F3-24-S	--	--	--	--	5	--	5	--	--	--	--	--	1	--	9	--	--	--	--
	F3-27-N	--	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--	--	--
	F3-27-S	--	--	--	--	--	--	1	--	--	--	--	--	2	--	3	--	--	--	--
	F4-29-N	--	--	--	--	--	--	1	--	--	--	--	--	--	--	1	--	--	--	--
	F4-29-S	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--
	F4-32-N	--	--	--	--	3	--	--	--	--	--	--	--	2	--	1	--	--	--	--
	F4-32-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
	R-2-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	R-2-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	R-5-N	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--
	R-5-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	R-9-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	2	--	--	--	--
	R-9-S	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--
	REF-2-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	2	--	--	--	--
	REF-2-S	--	--	--	--	--	--	3	--	--	--	--	--	50	--	23	--	--	--	--
	Total	--	--	--	--	10	--	34	--	--	--	--	--	67	--	43	--	--	1	--

"--" represents no fish captured

Appendix I: Catch table for all hoop net samples. *(cont.)*

		Species																		
Season	Site	AMS	BBH	BG	CARP	CCT	CHN	COHO	EUCH	GUN	HYB	LMB	MQF	SCP	SF	SKB	SP	STF	STH	TF
Spring 2010	F1-11-N	--	--	--	--	--	--	5	--	--	--	--	--	--	--	2	--	--	--	--
	F1-11-S	--	--	--	--	1	--	22	--	--	--	--	--	--	--	1	--	--	1	--
	F1-3-N	--	--	--	--	--	--	1	--	--	--	--	--	4	--	3	--	--	--	--
	F1-3-S	--	--	--	--	--	--	1	--	--	--	--	--	3	--	5	--	--	--	--
	F1-8-N	--	--	--	--	--	--	1	--	--	--	--	--	3	--	1	--	--	--	--
	F1-8-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	--	--	--	--
	F2-15-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
	F2-15-S	--	--	--	--	5	--	3	--	--	--	--	--	1	--	1	--	--	--	--
	F2-22-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F2-22-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	--	--	--	--
	F3-24-N	--	--	--	--	--	--	--	--	--	--	--	--	1	--	4	--	--	--	--
	F3-24-S	--	--	--	--	3	--	--	--	--	--	--	--	1	--	9	--	--	--	--
	F3-27-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--
	F3-27-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
	F4-29-N	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	--
	F4-29-S	--	--	--	--	1	--	1	--	--	--	--	--	--	--	1	--	--	--	--
	F4-32-N	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--
	F4-32-S	--	--	--	--	1	--	--	--	--	--	--	--	--	--	3	--	--	--	--
	R-2-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	R-2-S	--	--	--	--	--	--	2	--	--	--	--	--	2	--	--	--	--	--	--
	R-5-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	R-5-S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	R-9-N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--
	R-9-S	--	--	--	--	1	--	2	--	--	--	--	--	--	--	1	--	--	--	--
	REF-2-N	--	--	--	--	--	--	2	--	14	--	--	--	40	--	12	--	--	--	--
	REF-2-S	--	--	--	--	--	--	7	--	--	--	--	--	221	--	236	--	--	--	--
	Total	--	--	--	--	13	--	47	--	14	--	--	--	278	--	297	--	--	1	--

"--" represents no fish capture