Chapter 3. Nearshore Assessment: Fish use of Salt Creek nearshore

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Introduction

Salt Creek nearshore is comprised of Crescent Bay and lower Salt Creek, and includes a number of highly functioning habitats including estuarine marsh, a sandy embayment, and a rocky shoreline, the later of which respectively support significant stands of eelgrass and kelp habitats (Figure 1).

The estuary is comprised of approximately 71 acres of estuarine salt march bisected by a 100 year old dike that effectively splits Salt Creek estuary in half and the acts as a significant fish passage barrier between the east and west estuary (Figure 1 and 2). Despite this barrier fish are present throughout the Salt Creek east and west estuary as well as in the main channel. The majority of the estuary east of the dike is intact and highly functioning (Tuffley et al 2004; McHenry et al 2004; Shaffer pers.obs). The estuary also includes the main channel and side channels of lower Salt Creek. The main channel is shallow, broad, low energy, and heavily tidally influenced for at least 4600 linear feet upstream from the mouth. The main channel is crossed by a county road approximately 1300' south of the creek mouth. The estuary south and west of the county bridge is in private ownership. North of the bridge is a mosaic of public and private property with the general public/private dividing line located in the center of the creek bed.

The mouth of Salt Creek opens directly into the eastern edge of Crescent Bay and experiences regular unimpeded tidal influence. The mouth does not close off seasonally, but the lower 500 feet or so of river channel migrates regularly. Fish, including smelt, gunnels, sculpins, flounder, sand lance and juvenile salmonids use the main channel and river mouth regularly (Shaffer et al

2002 and unpublished data). Eelgrass occurs in the main channel of the creek up to 2400 feet south from the mouth (Tuffley 2004). Juvenile salmon species composition and abundance varies significantly with sedge (estuarine type) and rose/Douglas fir (freshwater type) riparian areas of the lower creek (Tuffley 2004). Fish use of the impounded west estuary has not been quantified. Stickleback, and salmon have been observed in the wetted areas of the west estuary. Diking of the west estuary also causes significant ponding of the west estuary and as a result is the source of significant mosquito problems for the Salt Creek community (Shaffer et al 2006). Other anthropogenic impacts to the Salt Creek estuary include minor fill for a home site, and creosote piles supporting the county road that crosses the river near the mouth.

Crescent Bay is a highly productive and stable system. Approximately 4200 feet wide at its entrance and relatively shallow, Crescent Bay reaches an approximate maximum depth of 30 meters MLLW at its entrance. In addition to the creek mouth, the Crescent Bay shoreline includes a 1.3 mile long sandy beach that is separated from the marsh and creek by a natural, relatively intact sand spit (Figure 1 &2). This beach supports a healthy clam assemblage that includes native littleneck and cockles. Crescent Bay, and adjoining Agate Bay to the west, are noted as important for Tribal use, including harvest (Wray et al.2004). Net long shore transport in Crescent Bay is from west to the east (Schwartz et al 1991). The western end of the bay is dominated by dense eelgrass beds (DNR shorezone data 2001). The eastern end of Crescent Bay is bordered by a basalt reef that extends northwest approximately 1500 feet from shore to an approximate depth of 14 meters MLLW. This reef, which is located within a county park and an intertidal preserve, supports abundant and diverse rocky reef intertidal and shallow subtidal communities, including mixed *Nereocystis/Macrocystis* beds (Zeh et al 1981;. Clallam County Marine Resources Committee 2001). Subtidally, the nearshore of Salt Creek is documented to support some of the highest densities of sand lance, surf smelt, and juvenile salmon when compared to other central and western Strait nearshore and streams of similar size (Shaffer 2004). These high abundances are attributed in part to the intact lower creek and nearshore system.

Methods and Materials

The Salt Creek nearshore, including Crescent Bay shoreline and two small side channels, and the main channel of Salt Creek estuary were seined weekly using standard beach seining techniques from March-September 2007, and then monthly from October 2007-March 2008. A standard small Puget Sound Ambient Monitoring Protocol (PSAMP) net was used on the side channels throughout the study, and on the main channel from April-September. A standard large PSAMP net was used on the main channel and shoreline throughout the sample period. All fish collected were identified to species, counted, and measured. Water quality was assessed monthly as part of a basic water quality study for WRIA 19 nearshore. Crescent Bay shoreline sites also continue to be monitored monthly for long term trends in fish use. Ecological indices as well as individual species density and length averages were calculated and analyzed for trends along the central Strait. Restoration recommendations where generated for the Salt Creek nearshore (Note: a list of all recommendations for the central Strait nearshore can be found in the executive summary.)

Results

Number of seines by sample site are provided in Table 1.

Date	**Site**	**Number of seines**
March-Sept 2007	Crescent Beach	42
	Salt Creek Main Channel	43
	Salt Creek Side Channel	45
September 2007-March 2008	Crescent Bay	15
	Salt Creek Main Channel	15
	Salt Creek Side Channel	15

Table 1. Seine summary, Salt Creek nearshore.

Figure 1. 2007-2008 Sample locations, Salt Creek nearshore assessment

Species richness and diversity for Salt Creek nearshore are some of the highest observed in this study (Figure 1). Within the Salt Creek nearshore, all sites showed seasonal trends, with peaks both species diversity and richness during summer months, and lows during winter months.

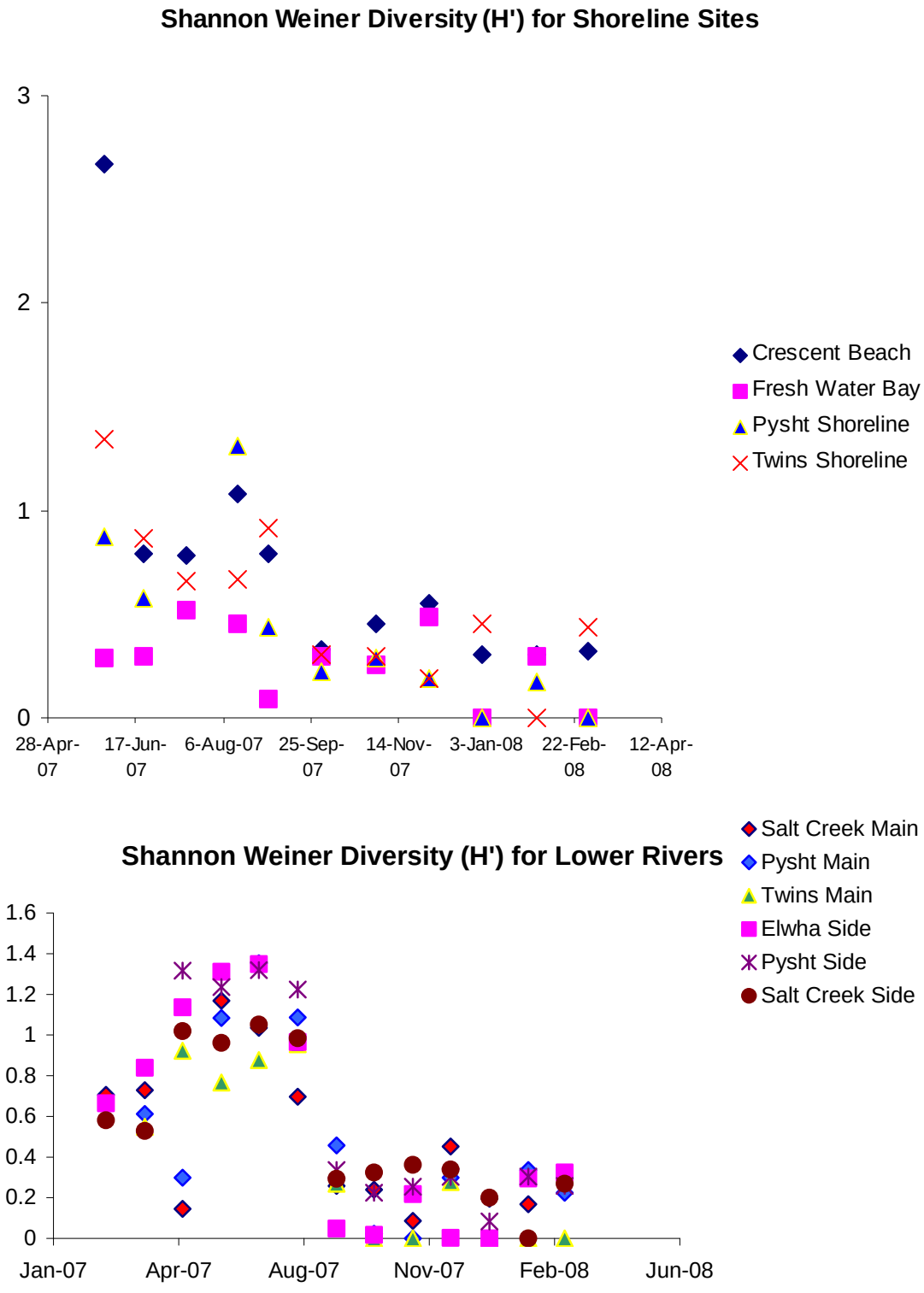
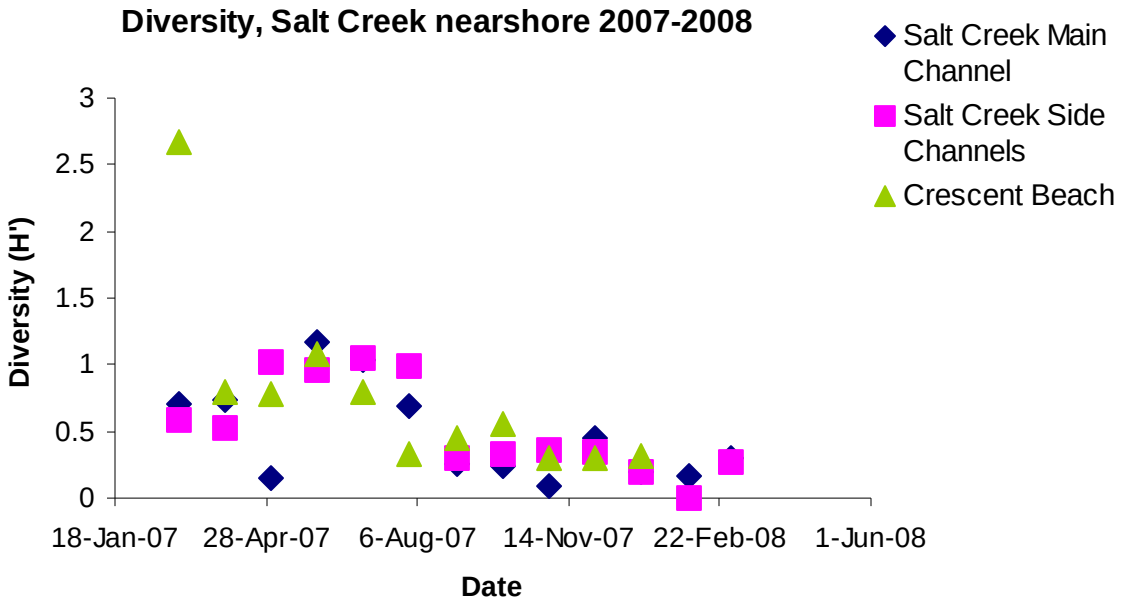


Figure 2. Species diversity for nearshore central and western Strait



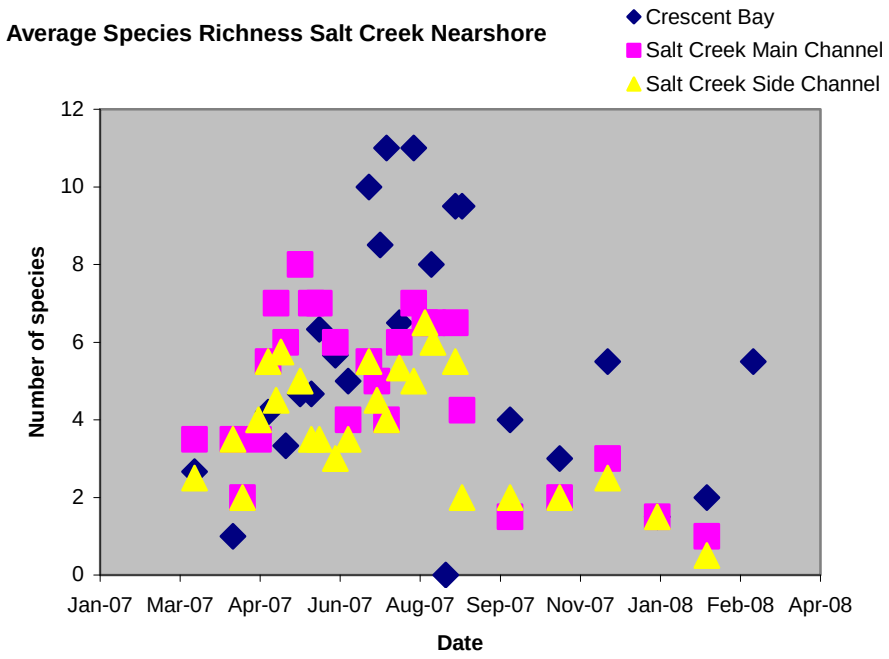


Figure 3. Species richness and diversity, Salt Creek nearshore.

There was a strong seasonal change in fish abundance at the Salt Creek site. In fall and winter far fewer fish were collected. From March-September 2007 over 43,000 fish were collected from the three nearshore habitat types of Salt Creek. From October 2007-March 2008, a total of just under two thousand fish were collected at Salt Creek. When corrected for net size, for spring and summer 2007, 44% of fish were collected from the main channel, 32 % from side channels, and 23 % from the shoreline sites. Just over 50% of all fish collected at Salt Creek during fall and winter months were found in the main channel, 35% were collected along the shoreline, and the remaining 15 % were collected from the side channels of the Salt Creek estuary. There is also a strong interannual variability in fish composition and density along the Crescent Bay estuary (Figure 7).

Percent of fish abundance of the dominant species is shown in Figure 4. Species varies somewhat by nearshore habitat type. Shiner perch, staghorn sculpin, and smelt were the dominant species overall. The majority of salmonids were collected during spring-summer 2007. Combined, Chinook, coho, and chum made up approximately 4% of all fish collected in the Salt Creek nearshore. Ninty one percent of Chinook were collected in the nearshore, 9% in the main channel of Salt Creek. Thirty percent of coho were collected along the shoreline; 50 % were collected along the main river channel, and 20% in the side channels of the estuary (see Appendix A). A subset of Chinook collected from the Salt Creek nearshore were analyzed for genetic composition. Of these, over 50% of Chinook analyzed from the Salt Creek nearshore were found to be from either Puget Sound (Elwha) or Columbia River stocks (Shaffer et al in review, see Chapter 6 for details). Also of interest is the observation of juvenile northern shad at Salt Creek over the study period. These made up less than 1% of the total catch but of which, over 99% collected were collected from the Salt Creek nearshore. Most were collected in fall months from the shoreline area.

Long term monitoring of the Crescent Beach shoreline reveals strong interannual variation in smelt abundance, as well as a strong interannual variation in recruitment of lingcod (Figure 8). Comparison of sand lance densities along shorelines of the central Strait reveals that Salt Creek

supported some of the highest densities of sand lance (even higher than areas documented to support sand lance spawning).

Discussion

The Salt Creek nearshore is a very diverse area for fish use. Seasonally it had the highest diversity observed in this study. It also supports significant numbers of both adult and juvenile forage fish and, along with the Elwha nearshore, had the highest density of juvenile coho of all sites sampled. It also has very high lingcod recruitment, and, based on this and similar observations over a decade ago (Dan Doty, WDFW, pers comm.), is concluded to be an important lingcod nursery area. Our long term sampling indicates strong interanual variation in fish use of the Crescent Bay, and high sand lance densities may indicate that Crescent Bay is a sand lance spawning beach. The beach should be sampled for sand lance spawning.

While Chinook were present in lower numbers, the genetic results of this study are particularly important evidence that the Salt Creek nearshore is highly functioning for a number of critical species, including ESA listed salmon from Puget Sound and as far away as the Columbia River. Salt Creek nearshore is therefore recommended as a high priority for habitat preservation and restoration.

Salt Creek also has some functional warning signs, including elevated water temperatures, and the continued presence of juvenile shad. Shad are a non-native species capable of quickly overwhelming watersheds where they are present (WDFW 2002). Shad also are documented to be temperature dependant, and require warmer water for spawning and migration (Acolas et al 2006). Basic water quality monitoring indicates that Salt Creek seasonally experiences some of the warmest water temperatures observed along of central and western Strait of Juan de Fuca nearshore. Additional water quality monitoring of the Salt Creek nearshore is very important to accurately map the temperature of this nearshore. The potential for impact to existing healthy fish stocks in the creek via direct and indirect impacts from elevated water temperature make

water quality as well as quantity a very important preservation and restoration parameter for Salt Creek.

The intact status of the nearshore, with the exception of the dike road that bisects the estuary, make both preservation in the form of acquisition and conservation easement, as well as restoration, of the Salt Creek estuary a top priority for the nearshore central Strait of Juan de Fuca.

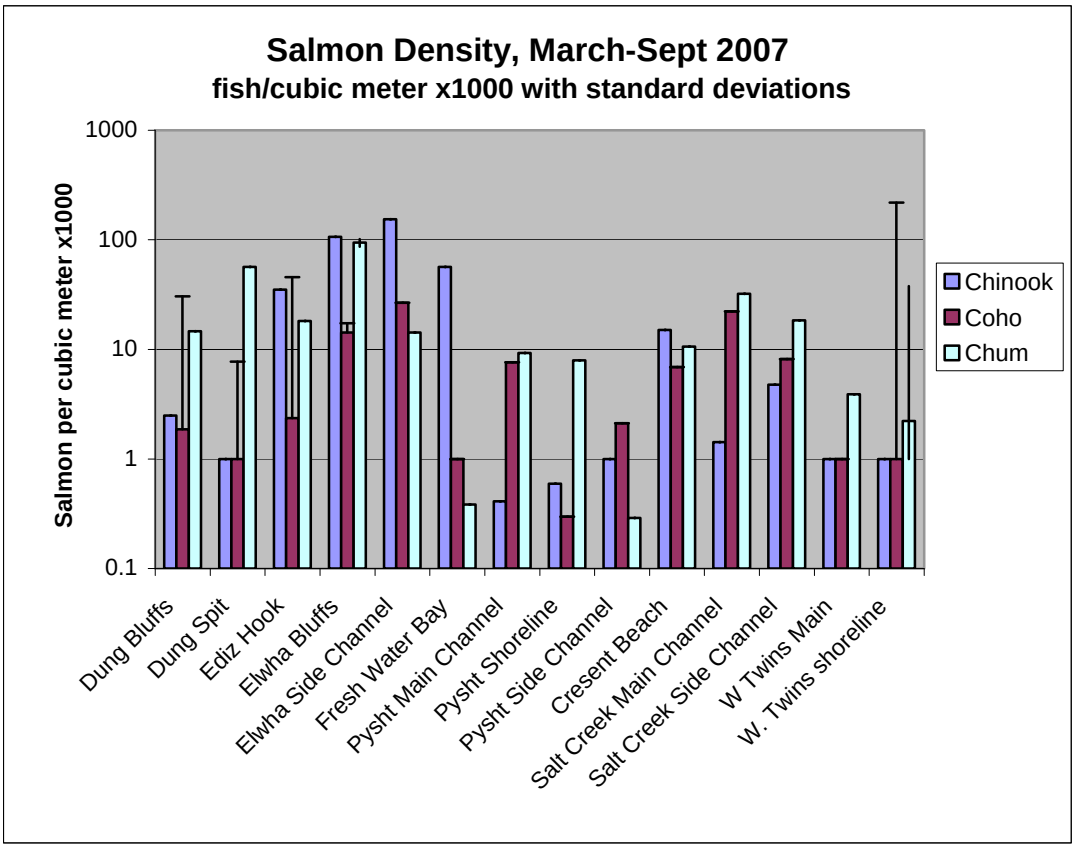
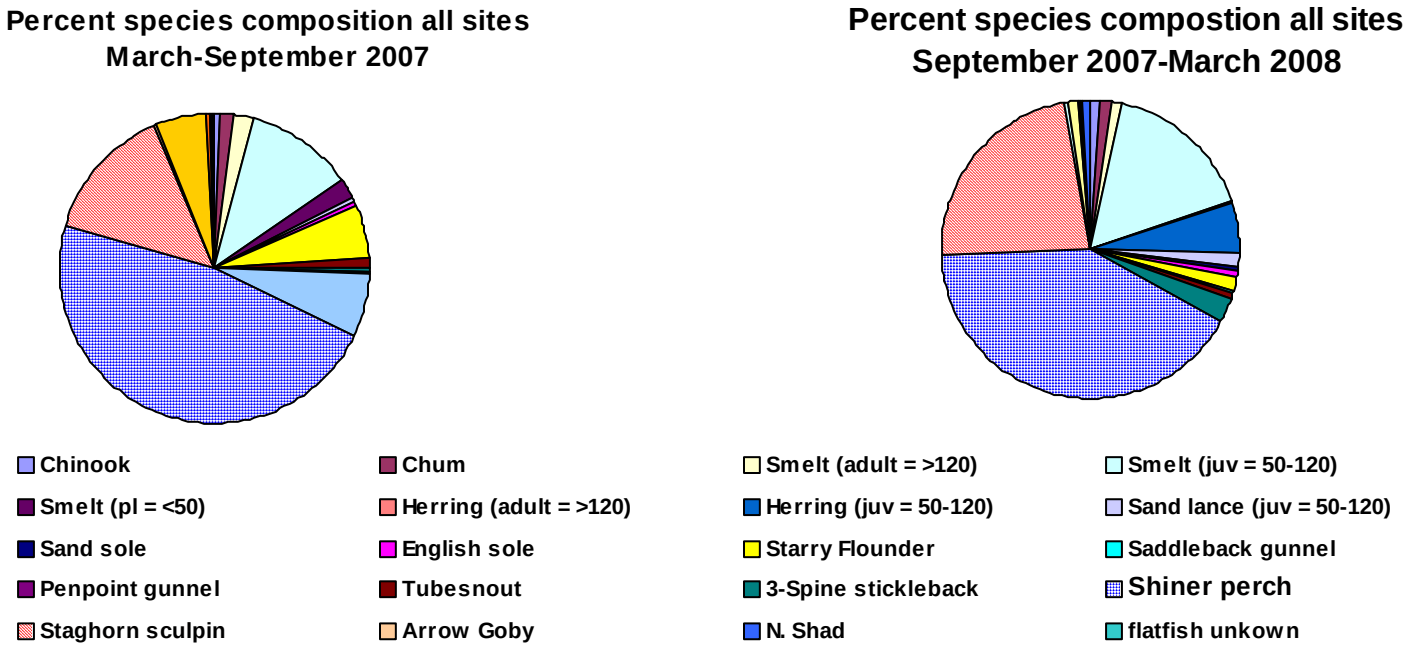
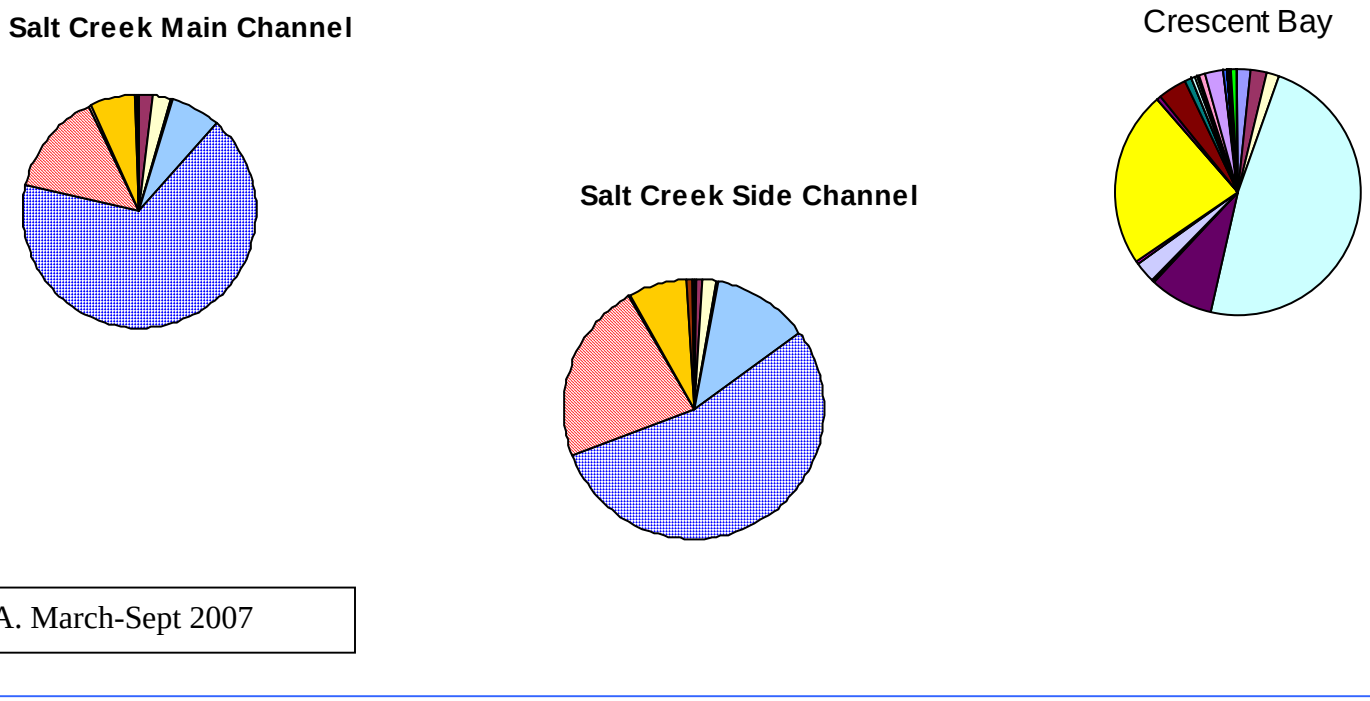


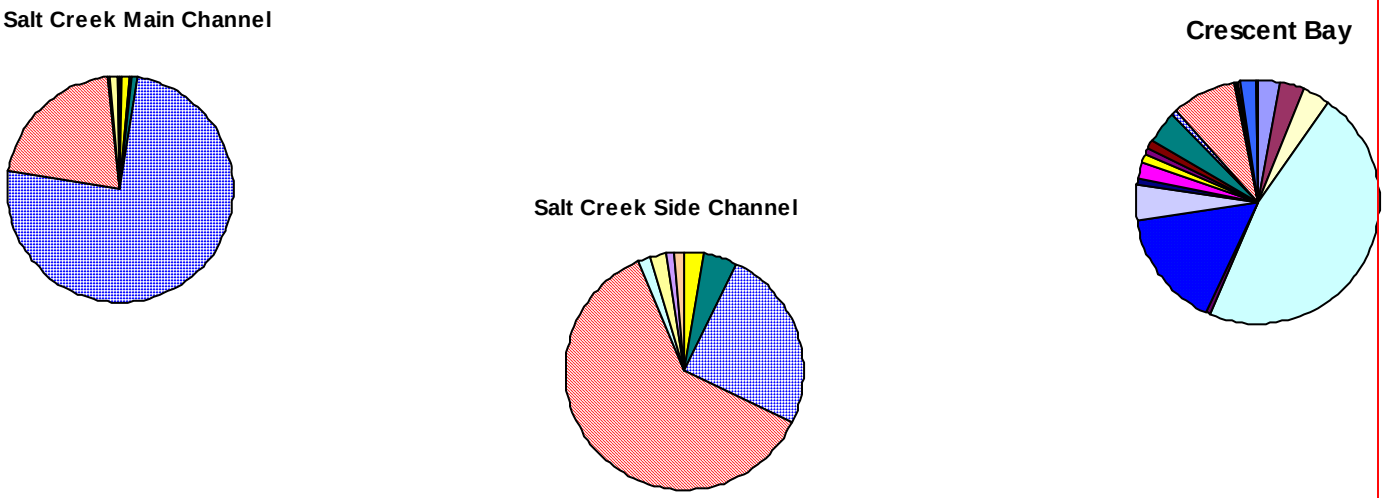
Figure 4. Salmonid abundance, Salt Creek nearshore.

Figure 5. Percent species composition, Salt Creek nearshore. A. March-September 2007; B. September 2007-March 2008.





A. March-Sept 2007



B. September 2007-March 2008

Figure 6. Species composition, percent, by habitat type, Salt Creek nearshore.

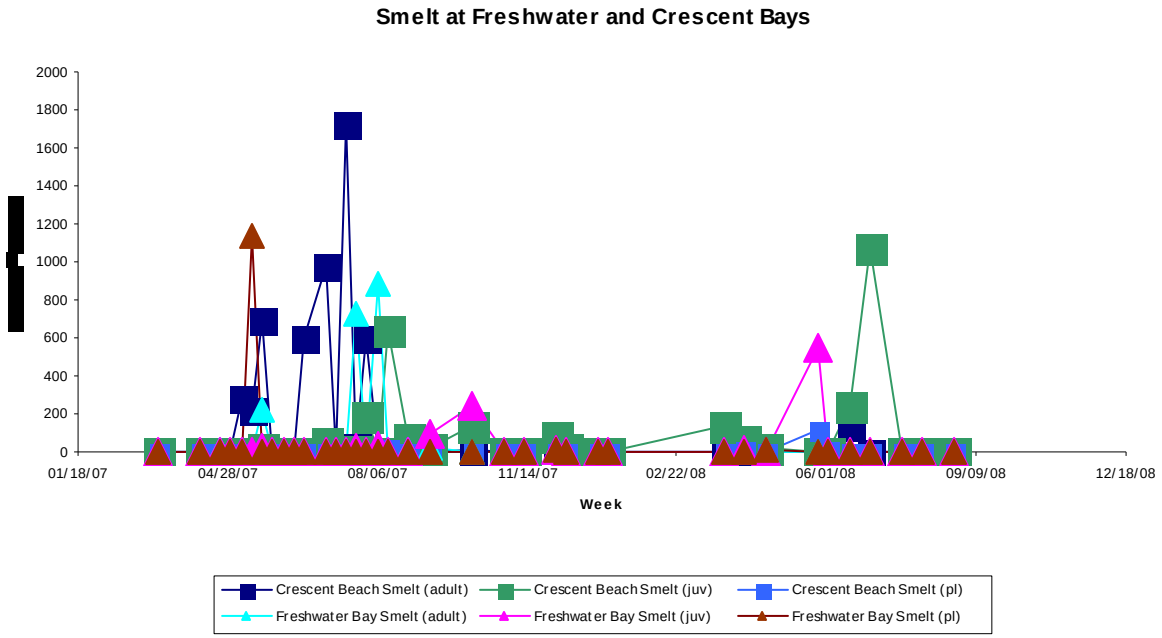


Figure 7. Smelt density Crescent Bay and Freshwater Bay shorelines.

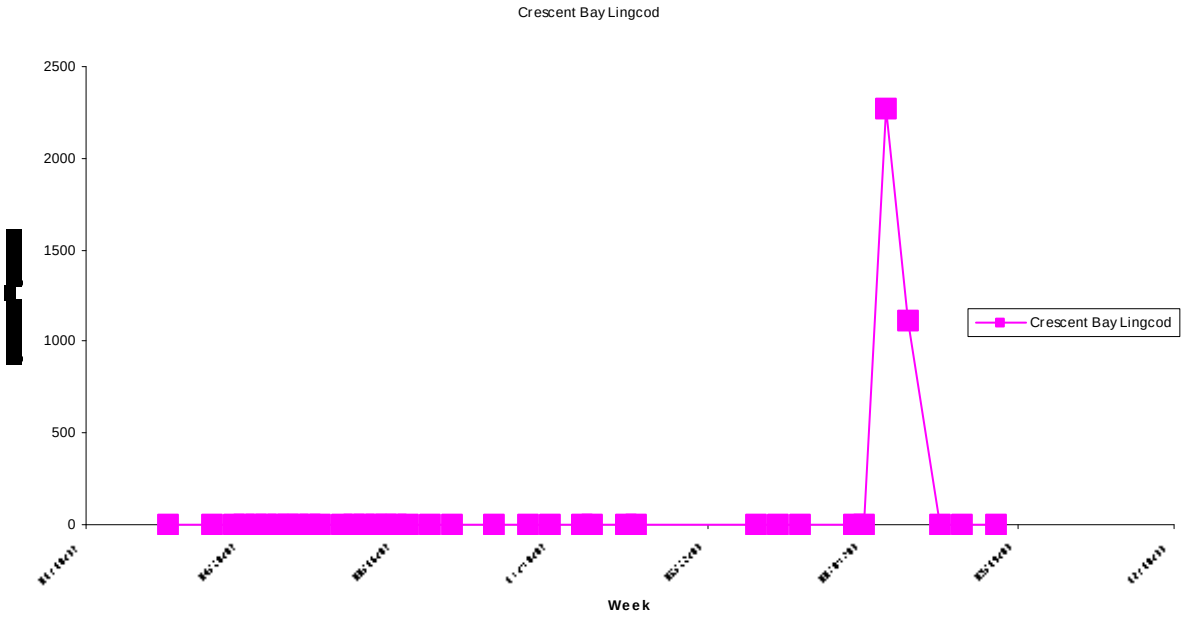
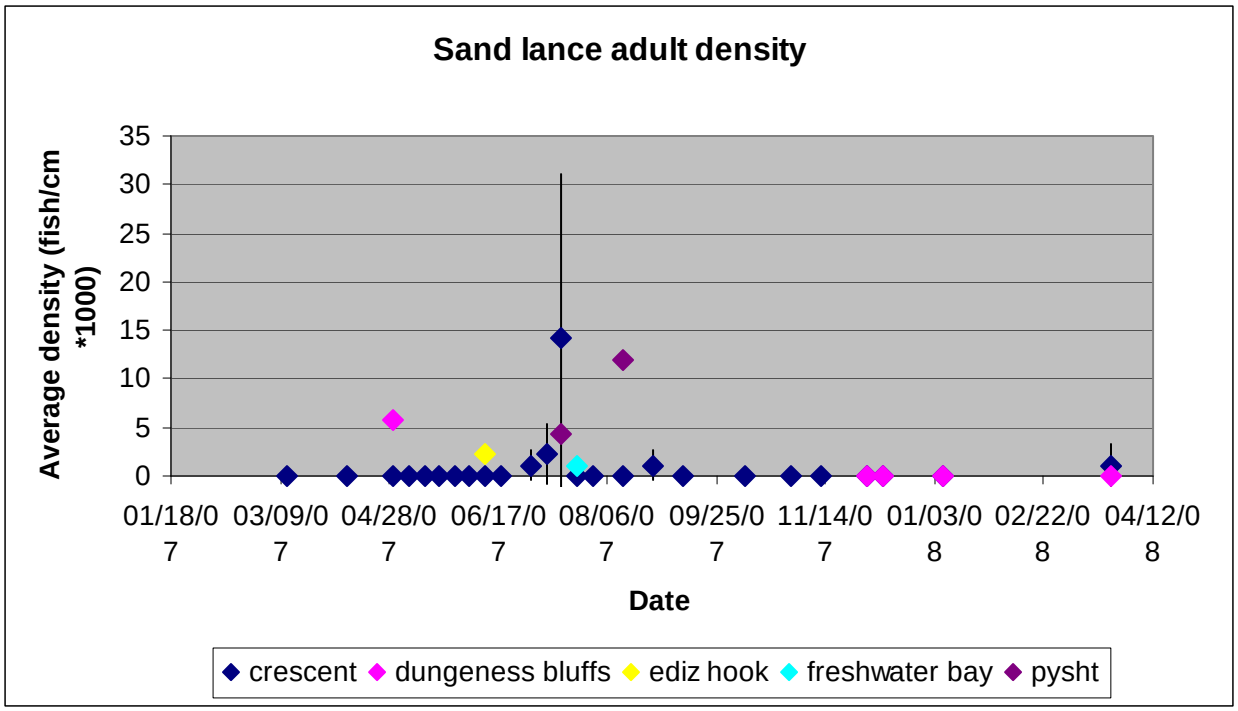
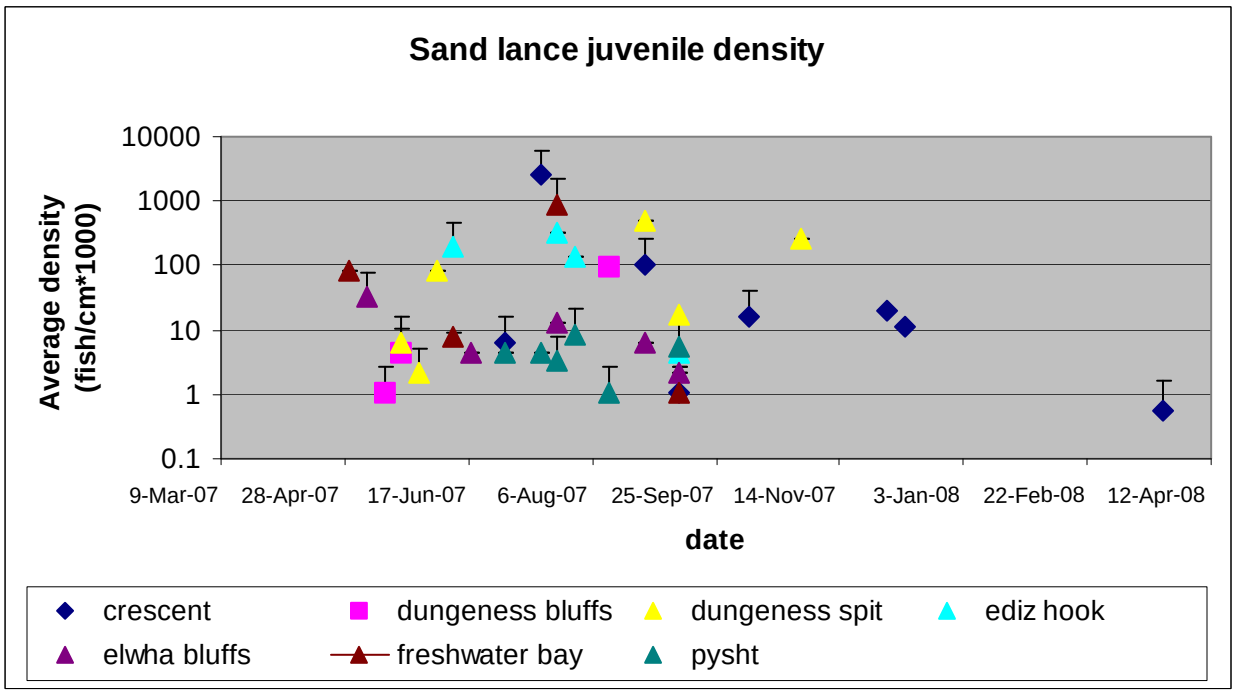


Figure 8. Juvenile lingcod densities, Crescent Bay.


Sand lance adult density
Average density (fish/cm *1000)
35
30
25
20
15
10
5
0
01/18/07
03/09/07
04/28/07
06/17/07
08/06/07
09/25/07
11/14/07
01/03/08
02/22/08
04/12/08
Date
crescent
dungeness bluffs
ediz hook
freshwater bay
pysht


Sand lance juvenile density
Average density (fish/cm*1000)
10000
1000
100
10
1
0.1
9-Mar-07
28-Apr-07
17-Jun-07
6-Aug-07
25-Sep-07
14-Nov-07
3-Jan-08
22-Feb-08
12-Apr-08
date
crescent
dungeness bluffs
dungeness spit
ediz hook
elwha bluffs
freshwater bay
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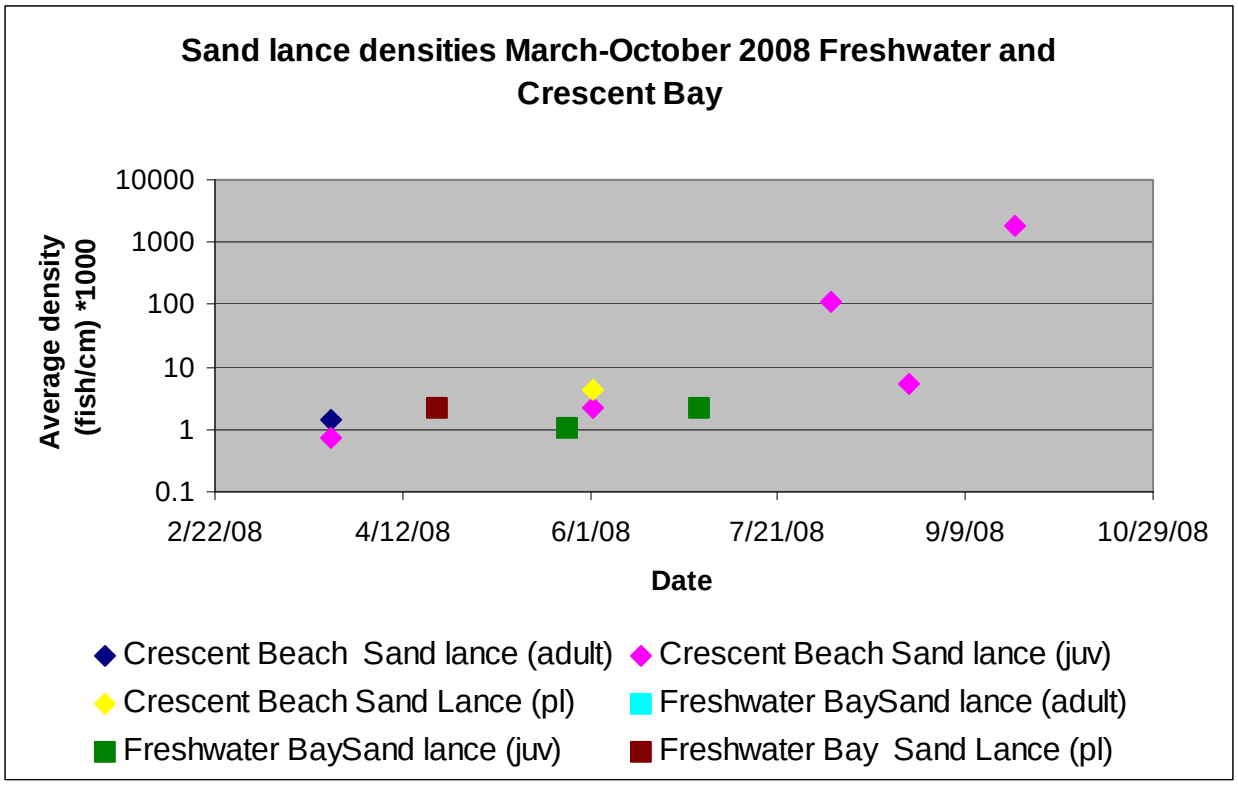

Figure 9. Sand lance densities, Crescent Bay compared to Freshwater Bay shorelines.

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