



Skagit River System Cooperative

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Memorandum

To: Dawn Pucci, Lead Entity Coordinator for Salmon Recovery, Island County DNR
From: Rich Henderson and Eric Beamer (SRSC)
Date: September 13, 2017
Re: Dugualla DOT Lagoon fish monitoring in 2017

Introduction

Dugualla DOT Lagoon, located in the southeast corner of Dugualla Bay in Skagit Bay, was created in the autumn of 2016 (Figure 1). This tidal lagoon was created by the Washington Department of Transportation (DOT) as mitigation for wetland impacts associated with replacement of the Davis Slough Bridge on state highway 532 near the town of Stanwood (Island County Hearing Examiner 2013). The project restored tidal exchange on portions of a 33-acre diked historic pocket estuary owned by the Whidbey Camano Land Trust.

Fish monitoring was initiated in late winter 2017 by a team of volunteers from Island County's Marine Resources Committee. The monitoring effort was discontinued after the site was found to be too difficult to sample with the equipment and resources available. SRSC agreed to periodic fish sampling in 2017 in order to not miss the opportunity to document which fish used the site in the first year following restoration of tidal exchange. This technical memo presents a summary of beach seine effort and fish catch from SRSC's effort.

Beach Seining

Site Selection, Timing, and Frequency: Four beach seine sites were established on the inside of the lagoon around the perimeter of the excavated shoreline with one beach seine set made at each of the sites for each sampling date. Two beach seine sites were established outside of the lagoon with two beach seine sets being made at each site per sampling date (Figure 1). On the first sampling day (April 4, 2017) the site Dugualla DOT Lagoon Outlet E was sampled but due to fine woody debris particles along the shoreline plugging up the net, an alternative site (Dugualla Bay S) was chosen on the outside of the lagoon for subsequent sampling dates.

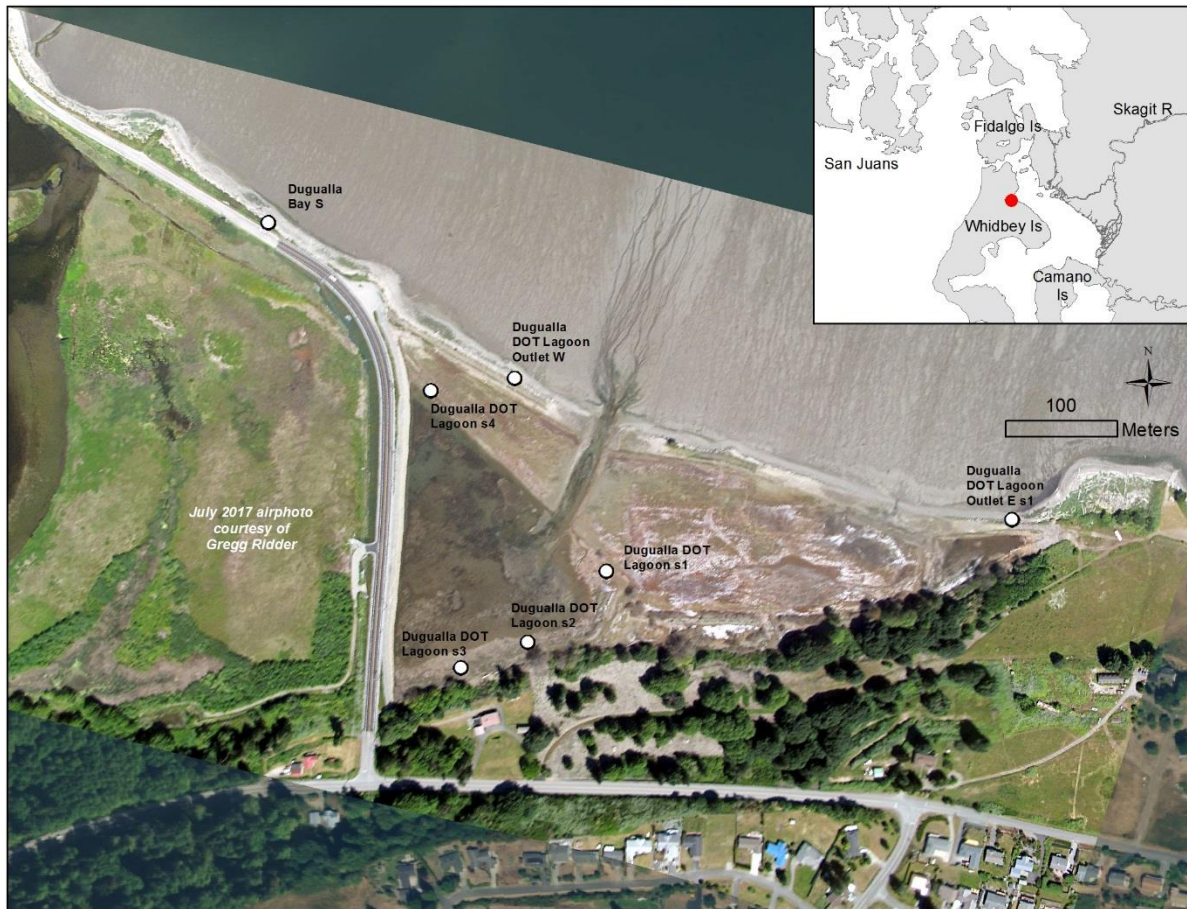


Figure 1. Sample site locations at Dugualla DOT Lagoon. Airphoto by Gregg Ridder taken on July 24, 2017.

Field Methods: We used a small net beach seine method to sample sites. Small net beach seine methodology uses an 80-ft (24.4 m) by 6-ft (1.8 m) by 1/8-inch (0.3 cm) mesh knotless nylon net. The net is set in “round haul” fashion by fixing one end of the net on the beach, while the other end is deployed by setting the net “upstream” against the water current, if present, and then returning to the shoreline in a half circle. Both ends of the net are then retrieved, yielding a catch. Average beach seine set area is 96 square meters. For each set, we identify and count fish by species. All the fish are returned alive to the water, with the exception of hatchery-origin Chinook salmon with coded-wire tags embedded in their snouts. These fish are sacrificed in order to read the tag.

We also record the time and date of each set, the percent of set area (the area that the net covers compared to setting in a perfect half circle), and measure certain environmental conditions (salinity, temperature, dissolved oxygen (DO), velocity, depth, substrate class, and vegetation

class) in the seined area at the time of seining. Water temperature, salinity, and DO are measured with a YSI Professional Plus Model meter. For salinity, the meter measures the conductivity of the water and then calculates and displays this value as salinity. We take two readings when there is sufficient water depth, just under the surface and at the bottom of the water column, within the set area. If the water is not sufficiently deep, only the surface reading is taken. Water depth is measured with a stadia rod. Surface water velocity is measured using a Swoffer Model 2100 flow meter. Four velocity measurements are taken across the area seined after the set is made; these values are converted to meters per second and the average value of these readings is reported for each site/date combination. Substrate and vegetation at each site are recorded according to criteria described in SSC (2003).

Sampling Effort

Sampling occurred twice per month April through June and once in July, giving a total of 7 sampling days conducted April 4 through July 18, 2017. Table 1 lists the sampling dates. Figure 1 shows the location of sample sites referred to in this report.

Table 1. Number of beach seine sets by date and strata at Dugualla DOT Lagoon, 2017.

Date	Inside Lagoon	Outside Lagoon
04/04/17	4	4
04/18/17	4	4
05/02/17	4	4
05/17/17	4	4
06/06/17	4	4
06/21/17	4	4
07/18/17	4	4

Fish Catch

There were 13,315 fish representing 11 fish species caught at Dugualla DOT Lagoon in 2017. The total catch for all species by site and strata is shown in Table 2. Fish catch results from the site ‘Dugualla DOT Lagoon Outlet E’ are given in Table 2 but, as noted earlier, this site was not sampled after the first sampling date.

In Dugualla DOT lagoon proper, 8 of the 11 species were present including both juvenile chum and Chinook salmon. The most abundant fish species within the lagoon was three-spine stickleback, followed by shiner perch and staghorn sculpins.

The April start to beach seining likely under-detected the duration of Chinook salmon rearing within Dugualla DOT lagoon (Figure 2). Chinook salmon fry are known to rear in pocket estuaries from January into June (Beamer et al. 2003; Beamer et al. 2006), and on average peak in March (Beamer et al. 2013).

Table 2. Total catch by species at Dugualla DOT Lagoon sites April 4 through July 18, 2017. Mean catch per unit effort (beach seine set) is in parentheses. Note: Dugualla DOT Lagoon Outlet E was sampled only on April 4 ; Dugualla Bay S was sampled on the other dates..

Strata	Inside Lagoon				Outside Lagoon		
Site	Dugualla DOT Lagoon s1	Dugualla DOT Lagoon s2	Dugualla DOT Lagoon s3	Dugualla DOT Lagoon s4	Dugualla Bay S	Dugualla DOT Lagoon Outlet W	Dugualla DOT Lagoon Outlet E
Salmonid species:							
Chinook salmon, unmarked subyearling <i>Oncorhynchus tshawytscha</i>	0 (0.00)	5 (0.71)	2 (0.29)	22 (3.14)	1 (0.08)	10 (0.71)	1 (0.50)
Chinook salmon, hatchery origin, all ages <i>Oncorhynchus tshawytscha</i>	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.07)	0 (0.00)
Chum salmon subyearling <i>Oncorhynchus keta</i>	9 (1.29)	241 (34.43)	341 (48.71)	1,592 (227.43)	215 (17.92)	451 (32.21)	2 (1.00)
Total salmonids:	9	246	343	1,614	216	462	3
Other fish species:							
Surf smelt <i>Hypomesus pretiosus</i>	70 (10.00)	2 (0.29)	0 (0.00)	0 (0.00)	84 (7.00)	50 1 (35.79)	0 (0.00)
Pacific herring <i>Clupea pallasii</i>	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.07)	0 (0.00)
Northern anchovy <i>Engraulis mordax</i>	0 (0.00)	0 (0.00)	1 (0.14)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Pacific staghorn sculpin <i>Leptocottus armatus</i>	109 (15.57)	142 (20.29)	259 (37)	150 (21.43)	843 (70.25)	634 (45.29)	0 (0.00)
Sharpnose sculpin <i>Clinocottus acuticeps</i>	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.08)	0 (0.00)	0 (0.00)
Starry flounder <i>Platichthys stellatus</i>	0 (0.00)	1 (0.14)	1 (0.14)	8 (1.14)	36 (3.00)	34 (2.43)	0 (0.00)
Three-spine stickleback <i>Gasterosteus aculeatus</i>	183 (26.14)	1,726 (246.57)	3,122 (446)	61 (8.71)	90 (7.50)	93 (6.64)	0 (0.00)
Shiner perch <i>Cymatogaster aggregata</i>	229 (32.71)	58 (8.29)	62 (8.86)	356 (50.86)	833 (69.42)	731 (52.21)	0 (0.00)
Striped perch <i>Clinocottus acuticeps</i>	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.08)	0 (0.00)	0 (0.00)
Total other fish species:	591	1,929	3,445	575	1,888	1,994	0
Total Catch	600	2,175	3,788	2,189	2,104	2,456	3

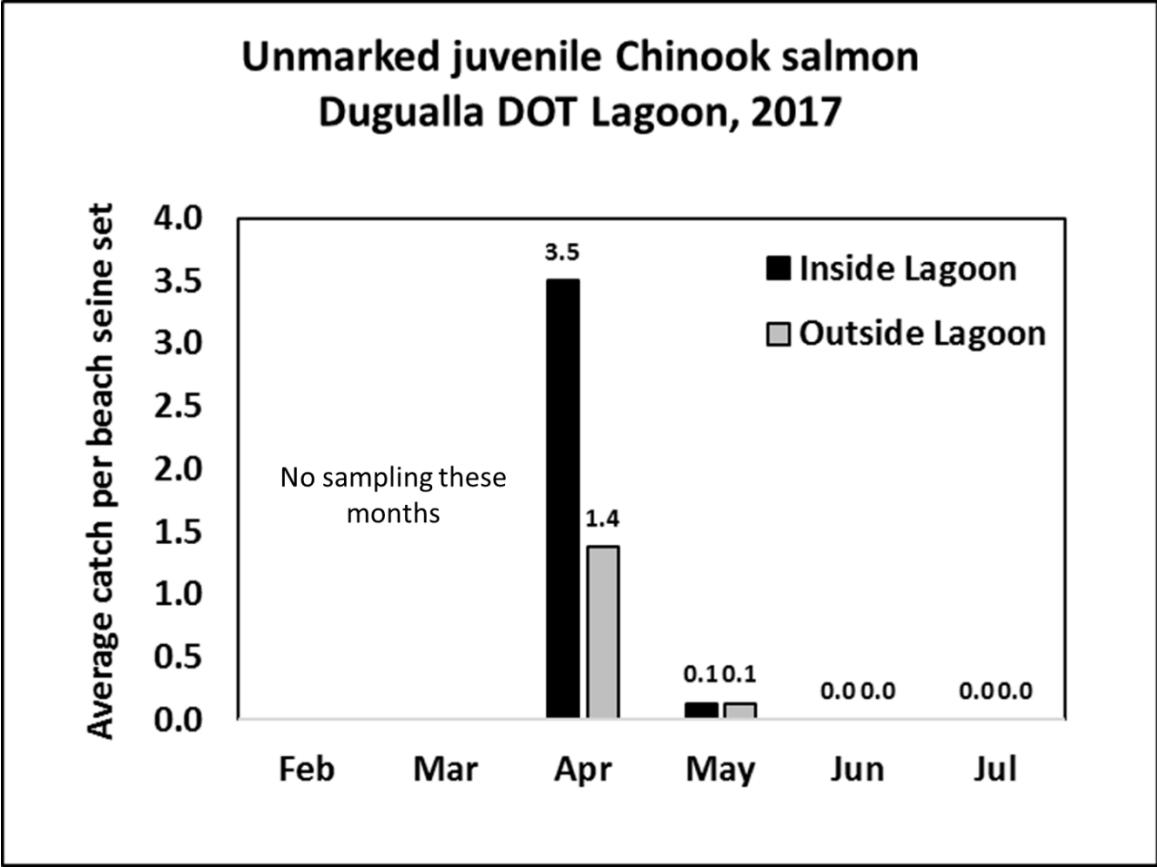


Figure 2. Monthly average unmarked juvenile Chinook salmon catch per beach seine set at Dugualla DOT Lagoon in 2017. No Chinook salmon were caught in June and July. No beach seining occurred in February or March, a time when juvenile Chinook fry are often most abundant in Skagit Bay pocket estuaries.

References

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