Fisheries Sampling in the Lower Salt River during the Fall and Winter of 2017 – 2018

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for
NOAA Fisheries and the Humboldt County Resource Conservation District

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Introduction

The Salt River is a tidally influenced slough tributary to the Eel River estuary located in Humboldt County near Ferndale, California. Salinity in the Salt River varies with the interactions of tides, Eel River flows, and freshwater inflows from its tributaries (Williams, Francis, and Reas creeks). In the mid-1800s the Salt River channel was sufficiently deep to support ship traffic up to Port Kenyon, however increased sediment delivered from the upper watershed and reduced tidal prism to flush sediment resulted in an aggraded channel with significantly reduced widths and depths. The frequency of flooding in Ferndale and the surrounding farmland progressively increased as the Salt River filled with sediment over the past century, and efforts to alleviate flooding have become a persistent issue. An intensive multi-stakeholder planning process was started in 1990 with a Coastal Conservancy grant that initiated studies on sedimentation, hydrology, and aquatic and avian biology. Stakeholders have included Ferndale residents and dairy farmers, as well as tribal, city, county, state, and federal entities. The culmination of this process was a multi-phase plan to restore the hydraulic and ecological function of the Salt River.

Near the Salt River mouth, the 400 acre Riverside Ranch was purchased from an interested seller and the title is now held by the California Department of Fish and Wildlife (CDFW). Phase 1 of the Salt River Restoration Program was focused on the Riverside Ranch parcel. In 2013, the Salt River channel was expanded and deepened, selected levees around Riverside Ranch were lowered, a tide gate was removed, and interior slough channels were excavated to meet the following objectives: 1) increase hydrologic function to the lower 2.5 miles of the Salt River, 2) provide access for re-colonization of the lower Salt River by native fish species, and 3) improve habitat for waterfowl and other avian species. The interchange of flow between the Eel River estuary and the lower Salt River was restored in October of 2013 following completion of Phase 1 excavation and other construction activities.

During the spring and early summer of 2014, fish sampling was conducted in the lower Salt River by CDFW, the Humboldt County RCD and other partners to monitor the presence and distribution of fish within the recently restored main channel and sloughs located on the Riverside Ranch. This sampling captured fish with seine nets and minnow traps at 11 sites that were selected to encompass the diversity of channel sizes, depths and locations throughout the main Salt River channel, the northern slough (N1), the southern slough (S1), and smaller side channels to the two sloughs (Figure 1).

Phase 2 implementation of the channel restoration also occurred during the summer of 2014, with approximately 7,000 feet channel excavated up to the Dillon Road Bridge. During the summer of 2015, an additional 1,500 feet of channel was excavated upstream of Dillon Road Bridge. No channel work was conducted in 2016 due to landowner access issues. Approximately

2,200 feet of the Salt River channel was excavated during the summer of 2017, which included reconnecting Francis Creek to the Salt River. Approximately 2,600 feet of Francis Creek was also excavated in 2017; this portion of the project included construction of a sediment retention area near the Francis Creek confluence, a boulder-chute transition reach between the sediment retention area and the upstream channel, and construction of nine pools with log or boulder weirs. The Humboldt County RCD estimates that two more summer construction seasons will be required to complete the project (2.5 miles of channel) – one season to excavate up to the crossing on Route 211 and a final season to excavate up to the confluence with Williams Creek.

Ross Taylor and Associates (RTA) started the fall and winter low tide and high tide sampling in November of 2014 and also conducted similar sampling during the fall and winter of 2015-2016 and 2016-2017. This report provides the results of RTA's fourth season of fall and winter fisheries sampling which occurred between November 2017 and March 2018.

The remainder of this report includes the following sections:

1. Descriptions of the sites sampled at low and high tides by RTA during the fall and winter of 2017-2018.
2. Methods used at low and high tides.
3. Results from the monthly sampling.
4. Discussion of results and recommendations for future monitoring.
5. Updated photographic catalog of all the sites sampled during the four fall/winter sampling seasons (Appendix A).

Salt River Fisheries Monitoring Site Descriptions

Since the start of the fall and winter sampling in November of 2014, the list of sampling sites has changed, with some sites being dropped and new sites being added. Prior to the 2016-2017 sampling, Sites #8, #9 and #14 were dropped because these three locations had failed Tidewater Goby lifts that no longer held water at low tides and were also filled with mud and fine sediments. Site #19 was also dropped from the 2016-2017 sampling due to difficult access and the nearly vertical banks at this location prohibited effective use of the seine nets. Site #10 was dropped prior to the 2017-2018 sampling so that more high-tide sampling effort was possible at Sites #1, #1-A and #1-B. Also, access to Site #10 during wet conditions was problematic, even with a 4WD truck. In 2016-2017, a new sampling site was established in the Southern Slough channel and was designated as Site #4. In 2017-2018, a new sampling site was established near the Salt River and Francis Creek confluence and was designated Site #24.

The following descriptions are for all the sites established for the Salt River fisheries monitoring:

1. Site #1 is located on the Salt River main channel near the Riverside Ranch barn and a utility pole adjacent to the main road. Approximately 150 feet of channel upstream of the utility pole was sampled at low and high tides.
2. Site #1-A is located Salt River main channel, downstream of Site #1 near the downstream end of the Riverside Ranch barn. This site was sampled only at high tide. Up to three net sets were made with the kayak and 100-foot seine net.
3. Site #1-B is located Salt River main channel, upstream of Site #1, just downstream of the Reas Creek confluence. This site was sampled mostly at high tide. Up to three net sets were made with the kayak and 100-foot seine net.
4. Site #3 is located at the confluence of the Southern Slough and a left-bank tide-gated drainage ditch. Both the slough channel and the drainage ditch were sampled at low tide.
5. Site #4 is a new site (added in 2016-2017) located in the Southern Slough that has a LWD root wad. This site was sampled with the 30-foot seine net at low tide and was also sampled during incoming tides with baited minnow traps.
6. Site #7 is associated with a piece of LWD in the Southern Slough, in the upper end of the slough. Approximately 100 feet of channel on both sides of the LWD was sampled at low tide and was also sampled during incoming tides with minnow traps.
7. Site #8 ~~is located on a branch of the upper Southern Slough and is associated with a goby lift. The channel was sampled from the goby lift up to its terminal end at both low and high tides.~~ NOTE: the goby lift failed at this site in 2015 – at low tide the channel is nearly drained. Also appeared filled-in with mud and fine sediment. Not sampled in 2016-17.
8. Site #9 ~~is associated with a goby lift on a branch of the Southern Slough, at the upper end of the slough. The channel was sampled from the goby lift up to its terminal end at both low and high tides.~~ NOTE: the goby lift failed at this site in 2015 – at low tide the channel is nearly drained. Also appeared filled-in with mud and fine sediment. Not sampled in 2016-17.
9. Site #10 i~~s located on the Salt River between the confluences of the Southern and Northern sloughs. Approximately 150 feet of channel was sampled at both low and high tides.~~ NOTE: extremely wet conditions limited our vehicle access to Site #10 during the 2016-17 winter months. Site #10 was not sampled in fall/winter of 2017-18.
10. Site #14 ~~is on a branch of the Northern Slough that has a terminal end. Approximately 150 feet of the channel was sampled up to the terminal end at low and high tides.~~ NOTE: the goby lift failed at Site #14 during the winter of 2014-15 and was not sampled during the winters of 2015-16, 2016-17 and 2017-18.
11. Site #15 is located on the Northern Slough's main channel, just upstream of the second branch off of the slough. Approximately 150 feet of channel was sampled at low tide, upstream of the second slough channel branch.
12. Site #17 is associated with a piece of LWD in the upper reach of the Northern Slough's main channel. Approximately 100 feet of channel on both sides of the LWD was sampled

at low tide. NOTE: the channel upstream of the LWD has completely filled-in with mud and fine sediment, and only the lower section was sampled during 2016-2017.

13. Site #18 is on the Salt River's main channel, approximately 300 feet upstream of the confluence with Cutoff Slough. Approximately 150 feet of channel was sampled at low tide. NOTE: due to extremely wet conditions during the winter of 2016-2017, Site #18 was often too deep to safely wade, even at low tides.
14. Site #19 ~~is located on the Salt River, just upstream of the Northern Slough confluence. Approximately 150 feet of channel was sampled at low tide, upstream of the confluence.~~ NOTE: due to the poor access road and similar open main-channel habitat as Site #10, this site (#19) was dropped from the 2016-2017 sampling.
15. Site #20 is located at the confluence of the Salt River and Reas Creek. This was a new site for the fall/winter 2015-16 and was sampled primarily with minnow traps in scour pools formed by the fully-spanning log weirs in lower Reas Creek.
16. Site #21 encompasses an approximately 600-foot channel reach that starts just upstream of Reas Creek. There are installed wood structures near the upper end of this reach. This was a new site for the fall/winter 2015-16 and was sampled with minnow traps.
17. Site #22 located downstream of the Dillon Road Bridge, this reach is approximately 250 feet in length with two wood structures and a deep scour pool just below the bridge. This was a new site for the fall/winter 2015-16 and was sampled primarily with minnow traps; however several passes were made with the 20-foot seine net.
18. Site #23 encompasses an approximately 2,000-foot long reach above Dillon Road Bridge that terminates at the uppermost end of the 2015 channel excavation. The upper end included Sousa Lake, a large pool with a rock grade-control ramp at the terminus of the 2015 channel excavation. During the 2016-2017 fall/winter season, this site was sampled with baited minnow traps.
19. Site #24 is a new site, located at the confluence of Francis Creek and the Salt River. At this location we made three seine passes that included the Salt River downstream of Francis Creek at the inflow from the Ferndale water treatment plant, the Salt River channel upstream of the water treatment inflow, and the Salt River at the confluence of Francis Creek.

Photographs of all the Salt River fisheries sampling sites are located in Appendix A.

Low Tide Seine Net Sampling Methods

RTA used two seine nets to conduct the low tide sampling: a 20-foot long x 4-foot tall net with a 1/8-inch mesh and a 30-foot long x 4-foot tall net with a 1/4-inch mesh. Both nets were attached to six-foot long poles. At each site, we made a single pass in the manner described in previous CDFW reports; typically a 150-foot reach was seined at each location. Unless the tide was

completely slack, we always seined against the current to maintain a bag in the seine to more effectively capture and hold fish.

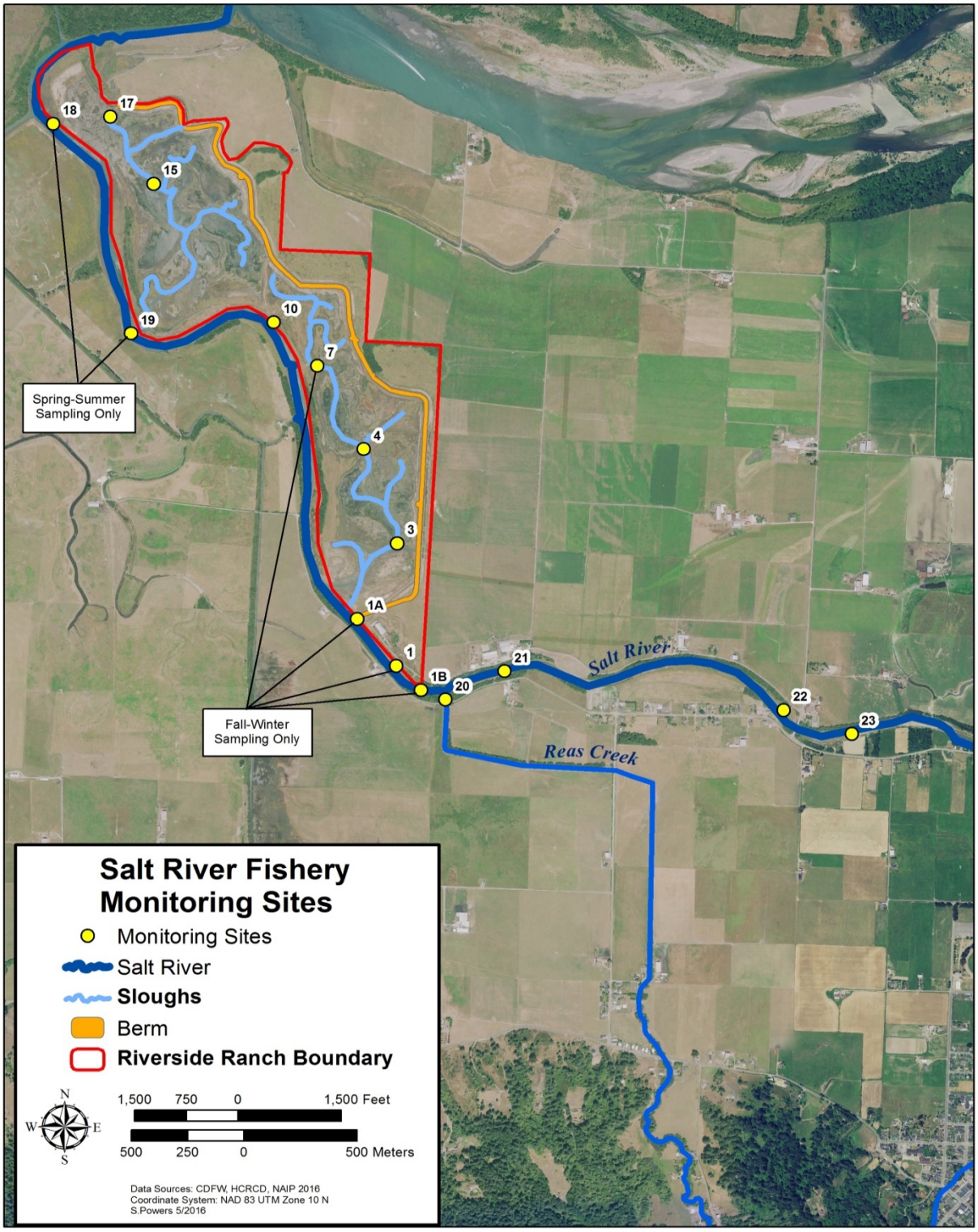


Figure 1. Salt River fisheries monitoring sites for winter of 2017-2018. Map produced by CDFW.

High Tide Seine Net Sampling at Main Channel Sites

At high tide, increased water depths and channel widths in the Salt River's main channel dictated using different sampling gear than wading with the 30 foot seine net. A kayak was used to set a 100-foot long seine net that was six feet tall and had ¼-inch mesh. On each end, the 100-foot net had approximately 10 feet of additional line, allowing for a 120-foot set. The stern end of the kayak was modified to hold a 100-quart cooler that had one end removed, in which the 100-foot seine net was carefully stacked (Figure 2).

Figure 2. Kayak with cooler holding the 100-foot seine net for high tide sampling on 12/02/14.

To set the 100-foot net with the kayak, the following steps were followed by the two-person sampling crew:

1. The terminal ends of the cork and lead lines were clipped to the stern of the kayak with a carabineer and the leading ends of the seine net lines were held to the river bank by a four-foot length of rebar that was securely staked to the bank. The rebar was located approximately 10 feet from the water's edge so that the leading edge of the net was just out of the water.
2. The 100-foot seine net was carefully stacked in the cooler, accordion-style, with cork and lead lines separated to prevent tangling and wrapping.
3. The kayaker wore a life jacket and chest waders with a snugly clipped waist belt.
4. The kayaker paddled the kayak in a large semi-circle from the rebar stake to a predetermined location; either upstream or downstream from the starting location (prevailing wind and tide movement dictated direction) (Figure 3).

5. The shore-based crew member monitored the net-set and informed the kayaker if the net was setting correctly or needed adjustment – the kayaker occasionally had to grab the cork line and give it a firm yank to avoid tangles or wrapping of the lead line.
6. Once the kayaker completed the net-set and pulled the kayak ashore, both crew members started pulling in the net from both ends, working in such a manner to keep the cork line from drifting over the top of the lead line. The lead line was kept as low as possible to minimize lifting the lead line off the channel bottom.
7. Once the entire net was pulled, the two crew members carefully maneuvered the net so that all captured fish were centralized in a small pocket. Then one crew member used an aquarium net to collect fish and place them in aerated five-gallon buckets.
8. After the sampled fish were processed, the 100-foot seine net was restacked into the cooler, making sure all sticks and other debris were removed.

The 2017-18 fall/winter high tide sampling with the kayak and 100-foot seine net was conducted at Sites #1, #1-A, and #1-B. When feasible, three net sets were made at each location, however tidal currents occasionally limited the number of sets made.

Figure 3. Setting the 100-foot seine net at Site #1-A on a high tide on December 12, 2016.

Sampling with Minnow Traps

During the fall and winter of 2017-2018, RTA continued sampling the Salt River with minnow traps baited with frozen steelhead eggs. Sites #3, #4, #7, #17, #22 and #23 were the areas most focused for detection of juvenile Coho Salmon (Figures 1 and 4). One minnow trapping effort (in February 2018) was focused on the Salt River channel downstream of the southern slough with traps placed amongst dense, overhanging willows (Figure 4). Roe "balls" were made by wrapping the loose steelhead eggs in fine-meshed cloth and loose eggs were also placed inside the trap. Traps were typically fished for one to three hours. Deployment and retrieval times were recorded and water quality measurements were taken when the traps were retrieved. Fork lengths were measured to the nearest mm of all juvenile Coho Salmon captured in minnow traps.

Figure 4. Setting minnow traps in Salt River downstream of the Southern Slough confluence on February 2, 2018.

Fish Sampling Results – November 2017

In November, the sampling occurred on the 16th, 29th and 30th (Tables 1 and 2). On the 16th, the high tide (at Humboldt Bay North Spit) was 7.9 ft at 10:24 hours. On the 29th, the low tide was 1.2 ft at 14:41 hours and on the 30th, the low tide was 0.5 ft at 15:29 hours.

Between November 15th and 16th, the Eel River discharge at Scotia increased from 2,100 cfs to 2,400 cfs. On November 29th, the Eel River discharge at Scotia was 7,600 cfs at 08:00 hours, a large drop from a peak of 16,330 cfs at 20:00 hours on the 28th. On November 30th, the flow continued to drop and equaled 4,900 cfs at 12:00 hours. For the November 2017 fish sampling, salinity readings were only collected on the 29th because of equipment failures (Table 1).

Table 1. Dates, site numbers, start and end times, and water quality measurements for November 2017 Salt River fisheries sampling. The (#) indicates how many traps were deployed.

DATE	SITE #	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME	WATER TEMP (°C)	D.O. (mg/L)	SALNITY (ppt)
11/16/2017	#1-B	Seine Net – 100 ft	High	10:15	10:50	12.2	8.7	N/A
11/16/2017	#1	Seine Net – 100 ft	High	11:00	11:30	12.3	7.9	N/A
11/16/2017	#1-A	Seine Net – 100 ft	High	11:45	12:15	12.3	7.9	N/A
11/16/2017	#15	Minnow Traps (2)	Ebbing	12:30	14:30	12.6	9.3	N/A
11/16/2017	#7	Minnow Traps (2)	Ebbing	13:00	14:45	12.4	9.6	N/A
11/16/2017	#4	Minnow Traps (3)	Ebbing	13:20	15:05	12.3	9.7	N/A
11/29/2017	#1	Seine Net – 30 ft	Low	14:20	14:40	9.7	9.1	9.80
11/29/2017	#4	Seine Net – 30 ft	Low	14:55	15:05	11.0	9.4	8.25
11/29/2017	#7	Seine Net – 20 ft	Low	15:30	15:45	10.4	9.4	8.48
11/29/2017	#17	Seine Net – 30 ft	Low	15:55	16:15	9.8	11.4	6.75
11/29/2017	#15	Seine Net – 30 ft	Low	16:30	16:40	9.8	11.3	7.22
11/30/2017	#1-B	Seine Net – 30 ft	Low	15:30	15:40	10.3	9.8	N/A
11/30/2017	#1-B	Seine Net – 20 ft	Low	15:40	15:50	10.1	10.1	N/A
11/30/2017	#3	Seine Net – 30 ft	Low	16:05	16:30	10.3	9.8	N/A
11/30/2017	#18	Seine Net – 30 ft	Low	16:45	17:00	10.8	10.7	N/A

Seven fish species were captured during the November 2017 sampling: Tidewater Goby (*Eucyclogobius newberryi*), juvenile Coho Salmon (*Oncorhynchus Kisutch*), Threespine Stickleback (*Gasterosteus aculeatus*), sculpin species, Pacific Staghorn Sculpin (*Leptocottus armatus*), California Roach (*Hesperoleucus symmetricus*) and Sacramento pike minnow (*Ptychocheilus grandis*) (Table 2). We also captured Green Shore Crab (*Hemigrapsus oregonensis*) and Bay Shrimp (*Carragon sp.*). Threespine Sticklebacks were the most common species captured and comprised 93% of all fish sampled in November 2017. Two juvenile Coho Salmon were captured, one at site #7 and one at site #1-B. The five Tidewater Goby were all captured at Site #17 (Table 2). The minnow traps set at Sites #15, #7 and #4 caught seven Threespine Stickleback, one Pacific Staghorn Sculpin and one Green Shore Crab; no juvenile Coho Salmon were caught (Table 2).

Table 2. Species and numbers of fish captured during the November 2017 Salt River fisheries sampling.

DATE	SITE #	Tidewater Goby	Coho Salmon	Three-spine Stickleback	Sculpin *sp.*	Pacific Staghorn Sculpin	Sac. Pike Minnow	California Roach	Green Shore Crab	Shrimp *Crangon spp.*
11/16/2017	#1-B	0	0	0	0	1	0	0	0	0
11/16/2017	#1	0	0	3	0	0	0	0	0	1
11/16/2017	#1-A	0	0	6	0	0	0	0	0	0
11/16/2017	#15	0	0	3	0	0	0	0	0	0
11/16/2017	#15	0	0	2	0	0	0	0	0	0
11/16/2017	#7	0	0	2	0	0	0	0	0	0
11/16/2017	#7	0	0	0	0	0	0	0	0	0
11/16/2017	#4	0	0	0	0	1	0	0	0	0
11/16/2017	#4	0	0	0	0	0	0	0	1	0
11/16/2017	#4	0	0	0	0	0	0	0	0	0
11/29/2017	#1	0	0	11	0	0	1	0	0	0
11/29/2017	#4	0	0	4	0	0	0	0	0	0
11/29/2017	#7	0	1	349	0	6	0	1	0	0
11/29/2017	#17	5	0	352	0	34	4	0	0	5
11/29/2017	#15	0	0	1	0	0	0	0	0	0
11/30/2017	#1-B	0	1	13	0	0	0	0	0	0
11/30/2017	#1-B	0	0	10	0	1	4	0	0	0
11/30/2017	#3	0	0	205	3	9	0	4	0	7
11/30/2017	#18	0	0	0	0	0	0	0	0	0
Catch Totals by Species		**5**	**2**	**961**	**3**	**52**	**9**	**5**	**1**	**13**

Fish Sampling Results – December 2017

In December, the sampling occurred on the 12th and 14th (Tables 3 and 4). On the 12th, the low tide (at Humboldt Bay North Spit) was 1.5 ft at 13:59 hours. On the 14th, the high tide was 7.2 ft at 08:07 hours and the low tide was 0.9 ft at 14:53 hours.

At 07:00 hours on December 12th, the Eel River discharge at Scotia was approximately 1,150 cfs and the Van Duzen River was at 160 cfs. Flows were slightly lower on the 14th; the Eel River discharge at Scotia was approximately 1,080 cfs and the Van Duzen River was at 150 cfs. Unfortunately, the salinity meter was still inoperable, thus no measurements were taken during the December 2017 sampling (Table 3).

Table 3. Dates, site numbers, start and end times, and water quality measurements for December 2017 Salt River fisheries sampling. The (#) indicates how many traps were deployed.

DATE	SITE #	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME	WATER TEMP (°C)	D.O. (mg/L)	SALNITY (ppt)
12/12/2017	#1-B	Seine Net – 30 ft	Low	13:40	13:50	8.1	9.7	N/A
12/12/2017	#1	Seine Net – 30 ft	Low	14:00	14:15	7.8	10.1	N/A
12/12/2017	#3	Seine Net – 30 ft	Low	14:20	15:10	9.1	10.8	N/A
12/12/2017	#7	Seine Net – 20 ft	Low*	15:15	15:20	10.2	11.5	N/A
12/12/2017	#17	Seine Net – 20 ft	Low*	15:20	15:25	10.2	10.4	N/A
12/12/2017	#18	Seine Net – 20 ft	Low	15:30	15:45	10.9	10.3	N/A
12/12/2017	#4	Seine Net – 30 ft	Low	16:00	16:20	10.9	10.3	N/A
12/14/2017	#1-B	Seine Net – 100 ft	High	09:00	09:30	8.0	10.4	N/A
12/14/2017	#1	Seine Net – 100 ft	High	09:35	10:00	8.0	10.4	N/A
12/14/2017	#1-A	Seine Net – 100 ft	High	10:05	10:25	9.3	11.0	N/A
12/14/2017	#22	Minnow Traps (5)	Ebbing	11:00	14:00	10.7	10.2	N/A

Five fish species were captured during the December 2017 sampling: Threespine Stickleback, sculpin species, Pacific Staghorn Sculpin, Sacramento Pike Minnow, and Surf Smelt (*Spirinchus starksi*) (Table 4). Threespine Sticklebacks were the most common species captured and comprised 84% of all fish sampled in December 2017. The five minnow traps set at Site #22 on 12/14/17 caught 16 Threespine Stickleback, five Sacramento Pike Minnow and one Pacific Staghorn Sculpin; no juvenile Coho Salmon were caught (Table 4).

Table 4. Species and numbers of fish captured during the December 2017 Salt River fisheries sampling.

DATE	SITE #	Three-spine Stickleback	Sculpin *sp.*	Pacific Staghorn Sculpin	Sac. Pike Minnow	Surf Smelt	Shrimp *Crangon spp.*
12/12/2017	#1-B	1	0	1	0	0	1
12/12/2017	#1	14	0	18	0	0	1
12/12/2017	#3	193	3	5	0	0	6
12/12/2017	#7	0	0	0	0	0	0
12/12/2017	#17	0	0	0	0	0	0
12/12/2017	#18	0	0	0	0	0	0
12/12/2017	#4	136	0	32	0	0	0
12/14/2017	#1-B	0	0	0	0	0	0
12/14/2017	#1	0	0	1	0	2	1
12/14/2017	#1-A	1	0	0	0	0	0
12/14/2017	#22	5	0	0	2	0	0
12/14/2017	#22	2	0	0	1	0	0
12/14/2017	#22	6	0	0	0	0	0
12/14/2017	#22	3	0	1	2	0	0
12/14/2017	#22	0	0	0	0	0	0
Catch Totals by Species		**361**	**3**	**58**	**5**	**2**	**9**

Fish Sampling Results – January 2018

In January, the sampling occurred on the 29th (Tables 5 and 6). The high tide (at Humboldt Bay North Spit) was 8.3 ft at 09:15 hours. The low tide was -1.2 ft at 13:41 hours.

The winter's first significant rise in Eel River flows occurred in late January with a peak of 33,500 cfs at the Scotia gauge on the 25th. Between January 28th and 29th, the Eel River discharge at Scotia decreased from 21,300 cfs to 14,300 cfs. Flows in the Van Duzen River also peaked on January 25th (5,100 cfs) and were at 1,800 cfs on the 29th. RTA purchased a salinity meter so readings were made at all fish sampling sites; because of the recent rainfall the salinity measurements were relatively low (Table 1).

Table 5. Dates, site numbers, start and end times, and water quality measurements for January 2018 Salt River fisheries sampling. The (#) indicates how many traps were deployed.

DATE	SITE #	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME	WATER TEMP (°C)	D.O. (mg/L)	SALNITY (ppt)
1/29/2018	#1-B	Seine Net – 100 ft	High	09:40	10:10	10.1	9.7	0.3
1/29/2018	#1	Seine Net – 100 ft	High	10:20	10:35	10.1	9.7	0.3
1/29/2018	#1-A	Seine Net – 100 ft	High	10:40	11:00	10.9	10.1	1.1
1/29/2018	#8	Seine Net – 20 ft	High	11:25	11:35	10.8	9.5	3.2
1/29/2018	#22	Minnow Traps (4)	Ebbing	11:45	14:00	11.7	10.3	0.2
1/29/2018	#23	Minnow Traps (3)	Ebbing	12:10	14:30	11.6	10.3	0.1
1/29/2018	#17	Seine Net – 20 ft	Ebbing	15:00	15:15	11.7	10.3	0.7
1/29/2018	#15	Seine Net – 30 ft	Ebbing	15:25	15:35	11.7	10.4	1.5
1/29/2018	#7	Seine Net – 20 ft	Low	16:00	16:20	12.2	10.8	3.1
1/29/2018	#1	Seine Net – 30 ft	Low	16:30	16:50	11.9	9.7	0.3
1/29/2018	#1-B	Seine Net – 30 ft	Low	16:55	17:05	12.0	9.7	0.3
1/29/2018	#3	Seine Net – 30 ft	Low	17:10	17:40	11.8	10.1	1.2

Five fish species were captured during the January 2018 sampling: Threespine Stickleback, Pacific Staghorn Sculpin, Sacramento Pike Minnow, California Roach, and Surf Smelt (Table 6). Threespine Sticklebacks were the most common species captured and comprised 67% of all fish sampled in January 2018. The four minnow traps set at Site #22 caught two Sacramento Pike Minnow. The three minnow traps set at Site #23 caught two Sacramento Pike Minnow and one Pacific Staghorn Sculpin; no juvenile Coho Salmon were caught (Table 6).

Table 6. Species and numbers of fish captured during the January 2018 Salt River fisheries sampling.

DATE	SITE #	Three-spine Stickleback	Pacific Staghorn Sculpin	Sac. Pike Minnow	California Roach	Surf Smelt	Shrimp *Crangon spp.*
1/29/2018	#1-B	3	3	5	0	0	0
1/29/2018	#1	0	0	1	0	0	0
1/29/2018	#1-A	2	0	0	0	0	0
1/29/2018	#8	0	0	0	0	0	0
1/29/2018	#22	0	0	2	0	0	0
1/29/2018	#22	0	0	0	0	0	0
1/29/2018	#22	0	0	0	0	0	0
1/29/2018	#22	0	0	0	0	0	0
1/29/2018	#23	0	1	0	0	0	0
1/29/2018	#23	0	0	2	0	0	0
1/29/2018	#23	0	0	0	1	0	0
1/29/2018	#17	102	47	0	0	0	1
1/29/2018	#15	3	1	0	0	0	0
1/29/2018	#7	4	0	0	0	1	0
1/29/2018	#1	1	1	0	0	0	0
1/29/2018	#1-B	4	0	18	0	0	0
1/29/2018	#3	92	10	9	0	0	0
Catch Totals by Species		**211**	**63**	**37**	**1**	**1**	**1**

Fish Sampling Results – February 2018

In February, the sampling occurred on the 2nd and 27th (Tables 7 and 8). On the 2nd, the high tide (at Humboldt Bay North Spit) was 7.9 ft at 12:42 hours. On the 27th, the high tide was 7.7 ft at 09:05 hours. On February 2nd, the sampling consisted of setting baited minnow traps in the Salt River near its confluence with the Southern Slough. These traps were fished for approximately four hours through the peak of the high tide and the start of the ebb tide. The traps were placed amongst overhanging willows and submerged wood in hopes of detecting juvenile Coho Salmon which hadn't been caught since early November. On February 27th, minnow traps were fished for about two hours near the high tide peak. We also conducted seine netting at a new site (#24) near the confluence of the Salt River and Francis Creek, within the channel reach restored during the summer of 2017.

On February 2nd, the Eel River discharge at Scotia was approximately 7,450 cfs and the flow in the Van Duzen River was 1,100 cfs.

Table 7. Dates, site numbers, start and end times, and water quality measurements for February 2018 Salt River fisheries sampling.

DATE	SITE #	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME	WATER TEMP (°C)	D.O. (mg/L)	SALNITY (ppt)
2/2/2018	#1-A[1]	Minnow Traps (2)	Flood	10:00	13:00	10.9	10.8	1.7
2/2/2018	#1-A[2]	Minnow Traps (2)	Flood	10:10	13:10	10.9	10.8	1.7
2/2/2018	#1-A[3]	Minnow Traps (2)	Flood	10:20	13:20	10.9	10.8	1.7
2/27/2018	#17	Minnow Traps (2)	High	09:15	11:15	8.8	12.5	11.7
2/27/2018	#7	Minnow Traps (2)	High	09:30	11:30	9.1	11.8	7.4
2/27/2018	#1-A	Minnow Traps (2)	High	09:45	11:45	9.5	11.2	0.4
2/27/2018	#24[4]	Seine Net – 20 ft	Ebbing	13:00	13:15	9.7	11.4	0.1
2/27/2018	#24[5]	Seine Net – 20 ft	Ebbing	13:20	13:40	9.7	11.4	0.1
2/27/2018	#24[6]	Seine Net – 20 ft	Ebbing	13:45	14:00	9.7	11.4	0.1

1 = set 450-500 feet downstream of Southern Slough. **2** = set 250-300 feet downstream of Southern Slough. **3** = set 50 feet downstream and 200 feet upstream of Southern Slough. **4** = pool at water treatment inflow. **5** = channel above water treatment inflow. **6** = channel just downstream of Francis Creek confluence.

Five fish species were captured during the February 2018 sampling: Threespine Stickleback, sculpin (species unknown), Pacific Staghorn Sculpin, Sacramento Pike Minnow, and California Roach (Table 8). Sacramento Pike Minnow were the most common species captured and comprised 85% of all fish sampled in February 2018. The six minnow traps set near the Southern Slough confluence only caught three Pacific Staghorn Sculpins, no Coho Salmon were caught (Table 8). The six minnow traps set on February 27th failed to catch any fish (Table 8). The Salt River channel near the Francis Creek channel was dominated by Sacramento Pike Minnow (Table 8). No juvenile salmonids were captured during the month of February. In the three previous years, February was consistently the month where most of the season's Coho Salmon were captured.

Table 8. Species and numbers of fish captured during the February 2018 Salt River fisheries sampling.

DATE	SITE #	Three-spine Stickleback	Sculpin *sp.*	Pacific Staghorn Sculpin	Sac. Pike Minnow	California Roach
2/2/2018	#1-A[1]	0	0	0	0	0
2/2/2018	#1-A[1]	0	0	0	0	0
2/2/2018	#1-A[2]	0	0	0	0	0
2/2/2018	#1-A[2]	0	0	0	0	0
2/2/2018	#1-A[3]	0	0	1	0	0
2/2/2018	#1-A[3]	0	0	2	0	0
2/27/2018	#17	0	0	0	0	0
2/27/2018	#17	0	0	0	0	0
2/27/2018	#7	0	0	0	0	0
2/27/2018	#7	0	0	0	0	0
2/27/2018	#1-A	0	0	0	0	0
2/27/2018	#1-A	0	0	0	0	0
2/27/2018	#24[4]	8	0	0	125	2
2/27/2018	#24[5]	26	1	0	94	0
2/27/2018	#24[6]	6	0	0	79	5
Catch Totals by Species		**40**	**1**	**3**	**298**	**7**

1 = set 450-500 feet downstream of Southern Slough. **2** = set 250-300 feet downstream of Southern Slough. **3** = set 50 feet downstream and 200 feet upstream of Southern Slough. **4** = pool at water treatment inflow. **5** = channel above water treatment inflow. **6** = channel just downstream of Francis Creek confluence.

Fish Sampling Results – March 2018

In March, the sampling occurred on the 23rd and 30th (Tables 9 and 10). On the 23rd the low tide (at Humboldt Bay North Spit) was 0.2 ft at 11:33 hours and the high tide was 5.2 ft at 18:25 hours. On the 30th, the high tide was 6.9 ft at 11:49 hours and the low tide was -0.2 ft at 18:02 hours.

The Eel River discharge at Scotia peaked at approximately 32,000 cfs at 06:00 hrs on the 23rd and the Van Duzen River was at approximately 2,600 cfs at this same time and date. During the Salt River sampling on the 30th the Eel River discharge at Scotia was 11,500 cfs and the Van Duzen River was at 1,650 cfs.

Table 9. Dates, site numbers, start and end times, and water quality measurements for March 2018 Salt River fisheries sampling.

DATE	SITE #	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME	WATER TEMP (°C)	D.O. (mg/L)	SALNITY (ppt)
3/23/2018	#4	Minnow Traps (2)	Low	11:30	14:00	10.8	9.8	0.4
3/23/2018	#7	Minnow Traps (2)	Low	11:45	14:20	10.9	9.6	0.3
3/23/2018	#17	Minnow Traps (2)	Low	12:00	14:50	10.8	9.9	0.7
3/30/2018	#1	Seine – 100 ft	High	12:20	12:50	13.5	9.1	0.3
3/30/2018	#1-B	Seine – 100 ft	High	13:05	13:20	13.4	9.1	0.4
3/30/2018	#1-A	Seine – 100 ft	High	13:25	13:55	13.4	9.2	0.4
3/30/2018	#7	Seine – 20 ft	Ebbing	14:50	15:15	14.1	9.7	1.4
3/30/2018	#17	Seine – 20 ft	Ebbing	15:25	15:45	13.9	9.3	1.7
3/30/2018	#4	Seine – 20 ft	Ebbing	16:00	16:20	13.8	9.5	1.5

Six fish species were captured during the March 2018 sampling: juvenile Coho Salmon, Tidewater Goby, Threespine Stickleback, California Roach, Pacific Staghorn Sculpin, and Sacramento Pike Minnow (Table 10). Threespine Stickleback was the most common species captured and comprised 60% of all fish sampled in March 2018. Sacramento Pike Minnow comprised 21% of the fish sampled in March 2018 and were mostly juveniles with fork lengths less than 100 mm.

The two Tidewater Gobies were caught at Site #17, which has been a consistent location for gobies over the past four sampling seasons. The eight juvenile Coho Salmon captured in March 2018 were the first Coho Salmon caught since November 30, 2017. These fish ranged in size from 83 to 93 mm in fork length.

Table 10. Species and numbers of fish captured during the March 2018 Salt River fisheries sampling.

DATE	SITE #	Coho Salmon	Tidewater Goby	Threespine Stickleback	California Roach	Pacific Staghorn Sculpin	Sac. Pike Minnow	Green Shore Crab
3/23/2018	#4	0	0	7	0	2	0	0
3/23/2018	#4	0	0	10	0	1	0	0
3/23/2018	#7	0	0	5	0	4	0	0
3/23/2018	#7	0	0	7	0	5	0	0
3/23/2018	#17	0	0	31	0	1	0	0
3/23/2018	#17	0	0	12	0	3	0	0
3/30/2018	#1-B	3	0	0	1	8	20	1
3/30/2018	#1	2	0	5	0	3	24	0
3/30/2018	#1-A	1	0	5	1	3	3	0
3/30/2018	#7	1	0	23	0	9	13	0
3/30/2018	#17	0	2	57	0	9	0	0
3/30/2018	#4	1	0	48	0	8	14	0
Catch Totals by Species		**8**	**2**	**210**	**2**	**56**	**74**	**1**

Fish Sampling Results – Comparison of Data Sets from four Fall/Winter Seasons

Fish sampling within the restored Riverside Ranch reach of the Salt River has occurred for four consecutive fall/winter seasons; November through March of 2014-2015, December through April of 2015-2016, November through March of 2016-2017 and 2017-2018. During these four sampling periods RTA has captured 21 fish species; 18 native and three non-native (Sacramento Pike Minnow, California Roach and Green Sunfish) (Table 11). When comparing the data, the most apparent difference is the species diversity between the first season and the subsequent seasons (Table 11). A total of 18 fish species were captured during the 2014-2015 season, 12 fish species were captured during the 2015-2016 and 2016-2017 seasons, and eight species during the 2017-2018 season (Table 11). The reduced number of species captured in 2015-2016 and 2016-2017 was most likely a function of wetter winters and consistently lower salinity levels when compared to the 2014-2015 season. At least six species not sampled in 2015-2016 and in 2016-2017 could be considered more brackish to marine species, thus were not present in the lower Salt River during the wetter winters. These species were Starry Flounder, Saddleback Gunnel, Shiner Surfperch, Bay Pipefish, juvenile Rockfish, and Top Smelt. During the start of the 2017-2018 sampling in November, salinities were within brackish water ranges, yet none of the brackish water species were detected.

Tidewater Goby numbers dropped dramatically from the first sampling season to the subsequent three seasons; 318 fish in 2014-2015 versus only seven fish in 2015-2016, only four fish in 2016-2017, and only seven fish captured in 2017-2018 (Table 12). During the 2014-2015 season, Tidewater Gobies were sampled at eight locations (Sites #1, #3, #7, #8, #9, #14, #15 and #17) versus two locations during the 2015-2016 season (Sites #7 and #8) and only at Site #17 during the 2016-2017 and 2017-2018 seasons. The goby-lifts constructed at Sites #8, #9 and #14 failed and the channel above these lifts filled-in with fine sediments and also failed to hold back water during low tides. The reason for the absence of Tidewater Gobies at Sites #1, #3, #7, and #15 is unknown. Again, the main difference between the first three sampling periods was the wetter conditions in 2015-2016 and 2016-2017, which resulted in higher flows and lower salinities. Continued sampling will hopefully provide more insight into the dynamics of the Tidewater Goby's distribution and relative abundance within the lower Salt River.

Another shift in species distribution and relative abundance between the first two sampling periods was evident with Pacific Staghorn Sculpin and what have been identified generically as sculpin "species". During the 2014-2015 sampling, sculpin "species" were widely distributed (present at 12 sites) and common (1,092 fish captured). During 2014-2015 sampling, Pacific Staghorn Sculpin were also well distributed (present at 10 sites), but appeared less common (157 fish captured). Then during the 2015-2016 season, the distribution and relative abundance of sculpin "species" decreased to a total of 10 fish captured at six sites; whereas Pacific Staghorn Sculpin were caught at 13 sites in relatively higher numbers (481 fish). This shift in relative abundance between sculpin "species" and Staghorn Sculpin was also evident during the 2016-2017 sampling (seven sculpin "species" captured at four sites and 188 Pacific Staghorn Sculpin captured at 10 sites) and during the 2017-2018 sampling (seven sculpin "species" captured at two sites and 232 Pacific Staghorn Sculpin captured at 10 sites)(Table 12).

Table 11. Comparison summaries of Salt River fish species diversity by sampling season.

SPECIES LIST	Captured in 2014-2015	Captured in 2015-2016	Captured in 2016-2017	Captured in 2017-2018
COHO SALMON	X	X	X	X
TIDEWATER GOBY	X	X	X	X
STICKLEBACK	X	X	X	X
SCULPIN SP.	X	X	X	X
STAGHORN SCULPIN	X	X	X	X
PIKE MINNOW	X	X	X	X
CALIFORNIA ROACH	X	X	X	X
SURF SMELT	X	X	X	X
PACIFIC LAMPREY	X	X		
PACIFIC HERRING	X	X	X	
LONGFIN SMELT	X		X	
GREEN SUNFISH		X	X	
BAY PIPEFISH	X			
SHINER SURFPERCH	X			
TOP SMELT	X			
STARRY FLOUNDER	X			
SADDLEBACK GUNNEL	X			
CHINOOK SALMON	X			
JUVENILE ROCKFISH	X			
STEELHEAD		X		
PACIFIC RAINBOW SMELT			X	
No. of Species Caught	**18**	**12**	**11**	**8**

Sacramento Pike Minnow were sampled during periods (or in areas) of low salinity and their relative abundance increased between the 2014-2015 sampling season and the three subsequent seasons. In 2014-2015, a total of 131 Sacramento Pike Minnow were captured and during the 2015-2016 sampling their numbers increased to 408 fish. These increases were most likely a function of lower salinities due to increased rainfall during the 2015-2016 sampling, as well as the addition of new sampling sites located upstream of Reas Creek that were also above the tidal prism. Nearly all the Sacramento Pike Minnow captured in 2015-2016 were less than 100 mm in length; the largest fish was 188 mm in length and its stomach was empty. In 2016-2017, a total of 1,080 Sacramento Pike Minnow were captured at nearly every site sampled, including: #1, #1-A, #1-B, #3, #4, #7, #10, #15, #17, #18, #22 and #23. Most (70%) of the Sacramento Pike Minnow sampled in 2017-2018 were caught at the new sampling location (Site #24) near the Francis Creek confluence. Nearly all of the Sacramento Pike Minnow sampled in 2017-2018 were less than 100 mm in fork length.

Fish species that occurred infrequently may be either rare in occurrence, present in low numbers, or not susceptible to sampling methods employed by RTA. For example, the two

juvenile Pacific lamprey sampled in December (2014 and 2015) were caught with the 100-foot seine. Both times, the lampreys wriggled through the ¼-inch mesh and were almost missed as fish were being collected. Conversely, other species such as starry flounder are relatively strong swimmers and may avoid capture as seine nets are hauled-in at a relatively slow pace.

In addition to the drop of species diversity documented during the fall/winter sampling of 2017-2018, there was a marked decrease in overall fish abundance (Table 12). The total fish catch (all species combined) was 2,480 fish during the 2017-2018 sampling season, just 38% of the four-season average of 6,530 total fish captured. By species, the largest drops were the numbers of Threespine Sticklebacks, sculpin species and Surf Smelt (Table 12). Compared to the previous three seasons, juvenile Coho Salmon were relatively scarce in 2017-2018, with ten individuals caught, just 34% of the four-season average of 28 fish (Table 12). No juvenile Coho Salmon were captured in December, January and February; the months in past years when most of the Coho Salmon were caught.

Table 12. Comparison summaries of Salt River fish species abundance by sampling season, for the eight species captured during the 2017-2018 season.

SPECIES LIST	# Captured in 2014-2015	# Captured in 2015-2016	# Captured in 2016-2017	# Captured in 2017-2018
COHO SALMON	**37**	**42**	**24**	**10**
TIDEWATER GOBY	**318**	**7**	**4**	**7**
STICKLEBACK	**9,875**	**3,675**	**5,488**	**1,783**
SCULPIN SP.	**1,092**	**10**	**7**	**7**
STAGHORN SCULPIN	**157**	**481**	**188**	**232**
PIKE MINNOW	**131**	**408**	**1,080**	**423**
CALIFORNIA ROACH	**18**	**255**	**66**	**15**
SURF SMELT	**233**	**43**	**1**	**3**
ANNUAL TOTAL CATCH	**11,861**	**4,921**	**6,858**	**2,480**

Fish Sampling Results – Salmonids

In regards to juvenile Coho Salmon, 37 fish were captured during the 2014-2015 season, 42 fish were captured during the 2015-2016 season, 24 fish were captured during the 2016-2017 season and only 10 fish were captured during the 2017-2018 season (Table 12). During all four seasons, within the Salt River main channel below Reas Creek, juvenile Coho Salmon were more frequently captured during high tide than during low tide (Sites #1, #1-A, #1-B). During the second season of sampling, more effort was made with minnow traps in the recently excavated channel upstream of Reas Creek, and 17 juvenile Coho Salmon (40% of the total catch) were captured in baited minnow traps. During the 2016-2017 season, approximately 30% of the juvenile Coho Salmon were caught in minnow traps. In 2017-2018, no juvenile Coho Salmon were caught in minnow traps, even though extra trapping efforts were made. As previously mentioned, no juvenile Coho Salmon were detected during the months of December through February. We suspect that this absence may be due to lower numbers of juvenile Coho Salmon

within the Eel River watershed as a function of the previous winter's near-record rainfall. Much of the watershed experienced peak flows in February of 2017 that mobilized bedload and may have scoured or buried Coho Salmon redds, resulting in poor recruitment.

For the past two sampling seasons, we measured the fork lengths to the nearest millimeter of all juvenile Coho Salmon. Compared to juvenile Coho Salmon captured in March 2017, the eight juveniles caught in March 2018 were significantly smaller (Table 13). This reduced growth may be a function of less time spent in the Eel/Salt River estuary by juvenile Coho Salmon in 2018.

Table 13. Average fork length (mm) summaries of juvenile Coho Salmon captured during the 2016-2017 and 2017-2018 Salt River sampling.

SAMPLING MONTH	NUMBER OF COHO CAPTURED in 2016-2017	AVERAGE FORK LENGTH (mm) in 2016-2017	NUMBER OF COHO CAPTURED in 2017-2018	AVERAGE FORK LENGTH (mm) in 2017-2018
November	9 fish	72.0	2 fish	82.5
December	7 fish	75.9	0 fish	N/A
January	0 fish	N/A	0 fish	N/A
February	2 fish	90.0	0 fish	N/A
March	6 fish	106.2	8 fish	90.2

For a third consecutive season, RTA failed to capture any juvenile Chinook Salmon in the Salt River. However; CDFW captured several juvenile Chinook Salmon in April 2018 and RTA caught three juvenile Chinook Salmon in lower Francis Creek on May 10, 2018 (Figure 5).

Figure 5. Juvenile Chinook Salmon caught in lower Francis Creek on 5/10/18.

Salt River Fall and Winter Sampling – Discussion and Recommendations

Setting the 100-foot seine net with a kayak proved to be an effective method for sampling the Salt River's main channel at high tide. We recommend that high tide sampling be continued since this method was effective at capturing juvenile Coho Salmon in the main channel downstream of the Reas Creek confluence at Sites #1, #1-A, and #1-B. Another high tide sampling location to consider is the main channel downstream of Site #18 at the Salt River's confluence with Cutoff Slough. There's a deep pool at this confluence and there are ongoing efforts to improve fish passage and tidal movement at the entrance to Cutoff Slough and lower Russ Creek. Sampling with the kayak and the 100-foot seine net at this confluence could provide useful information about the potential for fish recolonization of lower Russ Creek.

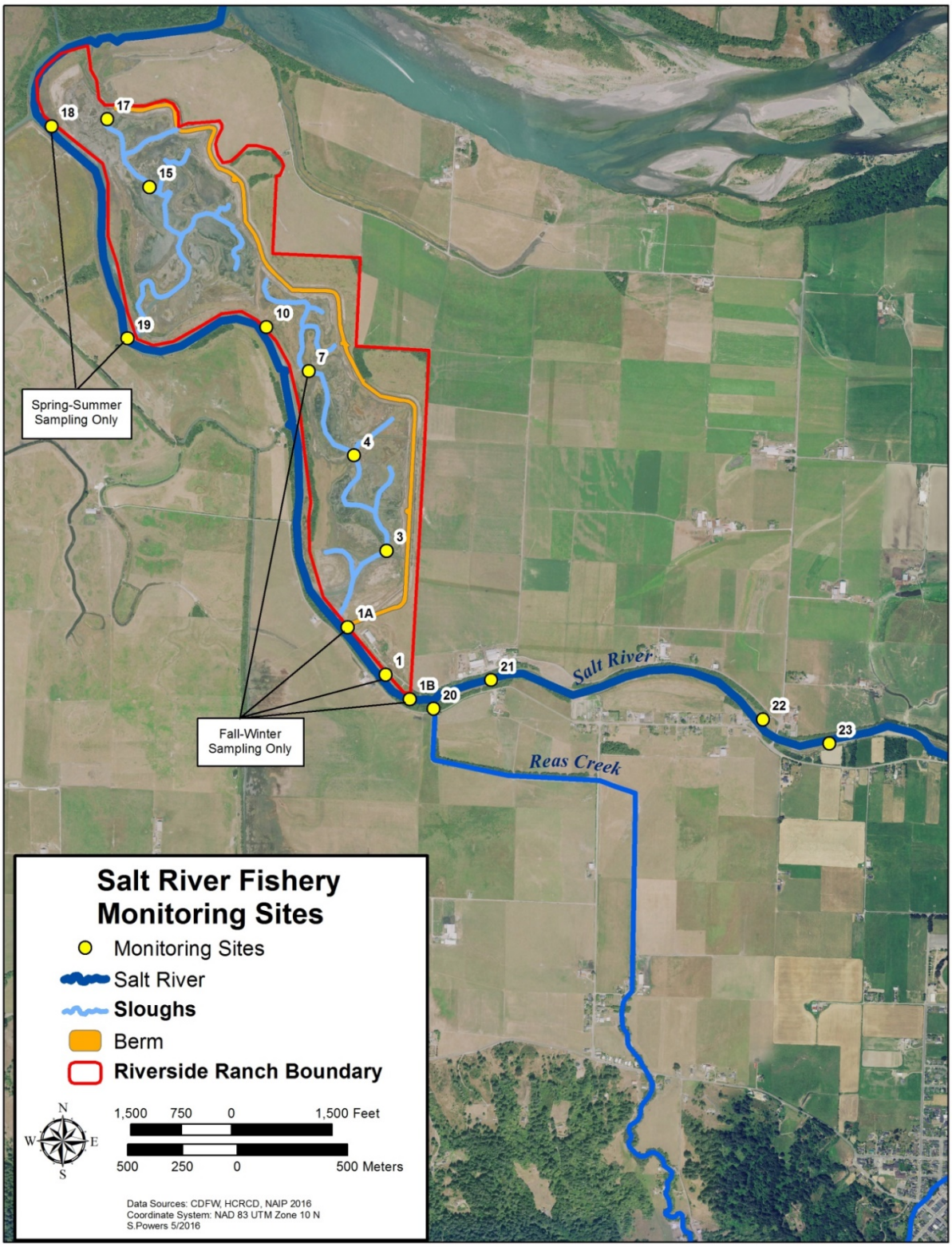
Additional locations should be considered for sampling, specifically areas where the most recent channel excavation occurs. Because the more recent channel excavation have occurred upstream of the tidal influence, timing of sampling is not influenced by tide levels. Rainfall, streamflow and water quality parameters should still be noted and measured at all sampling sites.

Although no juvenile Coho Salmon were caught in minnow traps during the 2017-2018 season, these traps baited with frozen steelhead roe have been proven to be an effective way to sample juvenile salmonids and we recommend that traps are used in the future. This season, we used weights to hold traps in place in channel locations where strong tidal currents existed. The weighted traps seemed to remain stable. Because the Salt River monitoring program is based on adaptive management, we recommend that the placement of more wood structures with rootwads in the existing Northern and Southern sloughs as well as the upper sections of the main channel be considered. Additional wood structures may also assist in keeping fine sediments in suspension, so that these sediments are flushed out of the lower Salt River as opposed to settling and causing channel aggradation. Pools scoured by LWD may also be more effective in creating and maintaining Tidewater Goby habitat than earthen berms (aka goby lifts).

The continued low numbers of Tidewater Gobies at the established sampling sites appears to be influenced by the failure of the goby lifts. Site #17 was the only location where Tidewater Gobies have been detected the past two seasons. The LWD rootwad at this site has scoured a pool that retains water at low tide, even though the downstream goby lift failed. If more information about Tidewater Goby presence and distribution within the Riverside Ranch property is desired, additional sampling should focus on side channels off the Northern and Southern sloughs that retain water at low tide.

We recommend that fisheries sampling is continued in the lower Salt River at established sites to better understand the temporal and spatial use of the restored channel by the various fish species. We also recommend that additional sites are established upstream of Riverside Ranch as the channel excavation process continues to move farther upstream.

APPENDIX A: CATALOG OF SALT RIVER SAMPLE SITES



Site #1: Main channel of the Salt River near the Riverside Ranch barn and telephone pole on the main access road. Seine about 150 feet upstream of telephone pole.

Site #1-A: Located on the main channel, downstream of Site #1 near the downstream end of the Riverside Ranch barn. This site was sampled only at high tide with kayak and 100-foot seine.

Site #1-B: Located on the main channel, upstream of Site #1 between stage plate and confluence of Reas Creek.

Site #3: Located at confluence of S1 slough and tide gate drainage channel. Seine both the S1 slough (approximately 150 feet) and the drainage channel from the confluence up to the tide gate.

Site #3: Photographs of tide gate and drainage channel at low and high tides.

Site #4: Located in the main channel of the S1 slough and is associated with a piece of placed LWD. Approximately 150 feet of channel was sampled on the downstream side of the LWD. Minnow traps were also fished at this location, at both low and incoming tides.

Site #7: Located in the upper end of the S1 slough and is associated with a piece of placed LWD. Approximately 100 feet of channel was sampled on both sides of LWD.

Site #8: is associated with a goby lift on a branch of the S1 slough. Seine from lift to the upstream end of channel. This site is no longer sampled because of the failed goby lift.

Site #9: is associated with a goby lift on a branch of the S1 slough, near the upper end of the slough. Seine from lift to the upstream end of channel. This site is no longer sampled because of the failed goby lift.

Site #10: is located on the Salt River main channel between the mouths of north and south sloughs. The site is accessed from the one side road that leaves the Riverside Ranch main road. This site is no longer sampled because of poor road access.

Site #14: Access Site #14 from the side road taken down to #10 and #19. Site #14 is on branch of N1 slough that has a terminal end. Seine uppermost 150 feet of channel. This site is no longer sampled because of the failed goby lift.

Site #15: Located on the Northern Slough's main channel, just upstream of the 2nd branch off of the slough. We parked vehicle at end of levee road to access Site #15.

Site #17: Located on the Northern Slough's main channel, just upstream of the 2nd branch off of the slough.

Site #18: Lowest main channel sampling site, accessed from turnaround at end of levee road.

Site #19: Located at confluence of the Salt River main channel and Northern Slough. This site is no longer sampled because of poor road access.

Site #20: Located at confluence of the Salt River main channel and Reas Creek – sampled up into Reas Creek and series of pools created by log weirs.

Site #21: Channel reach located upstream of the Salt River – Reas Creek confluence.

Site #22: Channel reach located downstream of Dillon Road Bridge.

Site #23: Salt River main channel reach from Dillon Road Bridge upstream to Sousa Lake.

Sousa Lake at upper end of Site #23 channel reach on January 27, 2016.

Wood structure in Site #23 channel reach - approximately 1,500 feet upstream of Dillon Road.

Site #24: Salt River main channel reach near the Francis Creek confluence, including inflow from the Ferndale water treatment plant.