

Fisheries Sampling in the Lower Salt River during the Fall and Winter of 2015 – 2016

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for
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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 420 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). Photographs of these sites are presented in Appendix A.

All of the 2014 spring-early summer sampling was conducted at low tide when water was concentrated in the channels. These initial sampling efforts documented numerous fish species

utilizing the newly accessible habitat, including ESA-listed species such as Coho Salmon (*Oncorhynchus kisutch*), Tidewater Goby (*Eucyclogobius newberryi*), and Chinook Salmon (*O. tshawytscha*). Phase 2 (2A Lower) of the channel restoration also occurred during the summer of 2014, with approximately 7,000 feet channel excavated up to the Dillon Road Bridge.

The next phase of fish sampling occurred during the fall and winter of 2014-2015 and NOAA Fisheries requested that both low and high tide sampling were conducted. Ross Taylor and Associates (RTA) started this sampling effort in November of 2014 and sampled monthly through March of 2015. RTA conducted low tide sampling at the 11 sites established by CDFW, using methods consistent with those utilized by CDFW. RTA was also tasked with developing a high tide sampling protocol for the project. This protocol was drafted after two rounds of high tide sampling were conducted by RTA in November and December of 2014, in which various techniques were tested and the 11 established sites were assessed for feasibility.

Fish sampling continued into the spring and summer of 2015, with CDFW and Humboldt State University conducting the field work. Phase 2 (2A Middle) of the Salt River channel restoration also continued in 2015, with approximately 2,200 feet of channel excavated upstream of the Dillon Road Bridge. Monthly winter fish sampling started in December 2015 by RTA and continued through April 2016. RTA expanded the winter sampling to include locations within the recently excavated channel, upstream of the Riverside Ranch and the Dillon Road Bridge.

This remainder of this report includes the following sections:

1. Methods used at low and high tides.
2. Descriptions of the sites sampled at low and high tides by RTA during the winter of 2015-2016.
3. Results from the monthly sampling conducted between December 2015 and April 2016.
4. Updated photographic catalogs which include the new sample sites and fish species captured between December 2015 and April 2016 (Appendices A and B).

Low Tide Seine Net Sampling Methods

At low tide, 10 of the 11 previously established sites were sampled between December 2015 and April 2016 (Figure 1). Site #14 was dropped because the associated goby lift failed the previous winter and the channel above the lift no longer held water with sufficient depth for fish at low tide. 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 1/8-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 net to more effectively capture and hold fish.

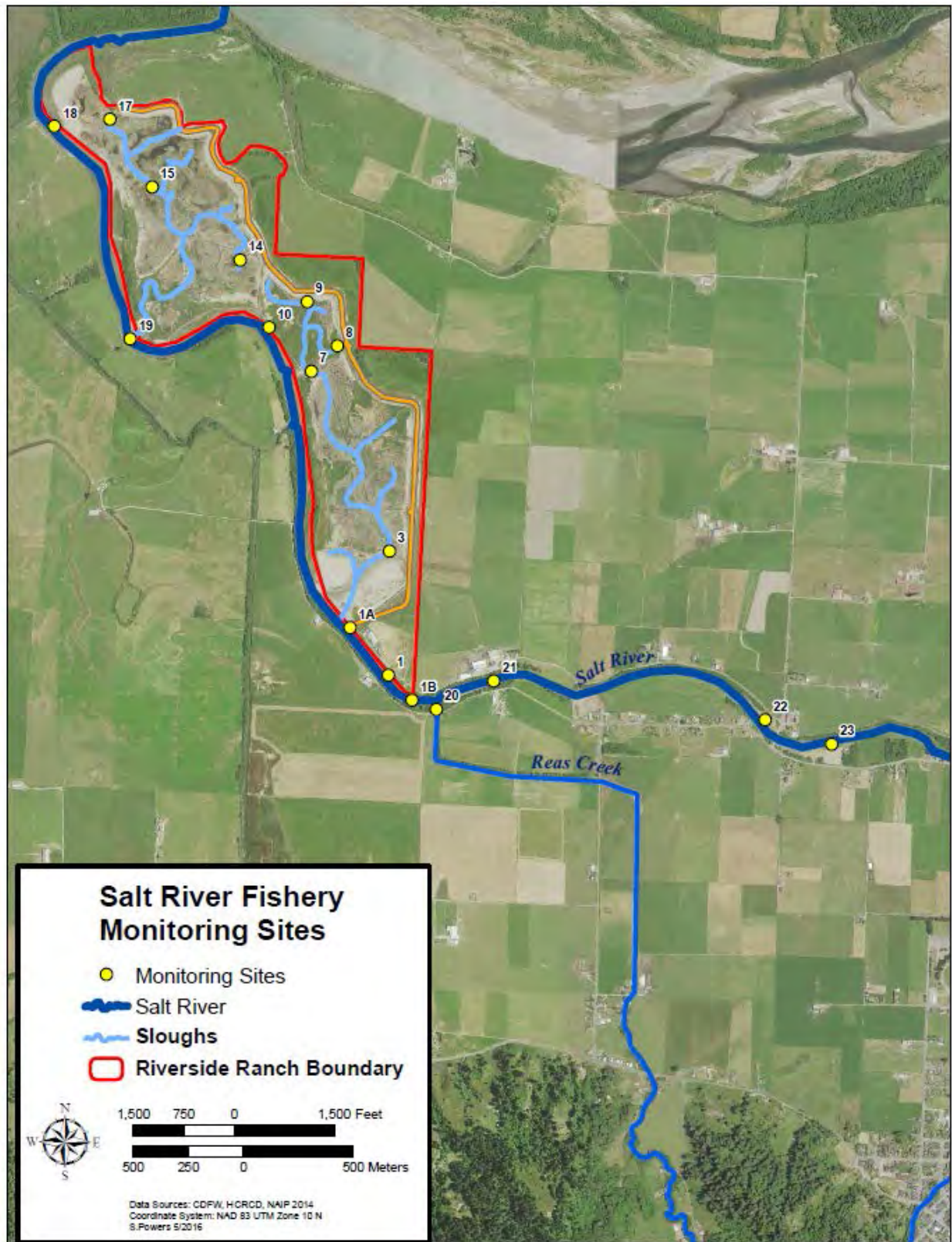


Figure 1. Salt River fisheries monitoring sites for winter of 2015-2016. Map produced by CDFW.

Prior to seining each site we recorded the start time, salinity, dissolved oxygen, and water temperature. All captured fish were temporarily held in aerated 5-gallon buckets, identified to species, enumerated, and released back into the waterway. Photographs were taken of select fish for the development of a Salt River species catalog (Appendix B). Once the sampling was completed, an end time was recorded. All sampling data were recorded in a bound, waterproof field notebook. Back in the office, data were entered into an Excel spreadsheet. Photographs were downloaded, edited, and captioned (species, location and date).

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 minimize 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).
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, the shore-based crew member grabbed the bow handle of the kayak and then both crew members dragged the boat ashore until the net was at the river bank. The terminal ends of the cork and lead lines were then unclipped from the kayak.
7. Both crew members then started pulling in the net at the end just unclipped from the kayak, one person on the cork line and one person on the lead line, working in such a manner to keep the cork line from drifting over the top of the lead line. The person handling the lead line kept this line as low as possible to minimize lifting the lead line off the channel bottom.
8. Once approximately 60 feet of the net had been retrieved, one crew member switched ends and started to pull in the net from the opposite side. Again, making sure the lead line was kept low was crucial.
9. 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.
10. 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.

For the 2015-16 winter, high tide sampling with the kayak and 100-foot seine net was conducted at Sites #1, #1-A, #1-B, and #10. When feasible, we made three net sets each time we sampled these locations. On January 27, 2016 we also sampled the settling basin (aka Sousa

Lake) located at the upper end of the 2015 channel construction with the kayak and 100-foot seine net.

Sampling with Minnow Traps

During the winter of 2015-16, RTA started sampling the Salt River upstream of the Riverside Ranch, within the channel reaches excavated during the summers of 2014 and 2015. Because of the narrower channel geometry and more constant downstream current in these reaches, RTA primarily deployed seven minnow traps baited with frozen Steelhead eggs. The minnow traps were fished in the vicinity of Sites #20-23 (Figure 1). Some limited seine netting was conducted; however the minnow traps proved more effective, especially with capturing juvenile Coho Salmon. Traps were placed adjacent to wood structures and also in open areas which lacked cover. Roe “balls” were made by wrapping the loose Steelhead eggs in fine-meshed cloth; loose eggs were placed inside the trap too (Figure 3). Traps were typically fished for one to two 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 3. Minnow trap baited with roe ball and loose Steelhead roe, February 24, 2016.

Salt River Fisheries Monitoring Site Descriptions (Figure 1):

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 near 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. Only the drainage ditch was sampled at high tide.
5. 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.
6. 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.
7. 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 – at low tide the channel is nearly drained. Also appeared filled-in with mud and fine sediment.
8. Site #10 is located on the Salt River between the Southern and Northern slough confluences with the main channel. Approximately 150 feet of channel was sampled at both low and high tides.
9. 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 this site during the winter or 2014-15 and was not sampled during the winter of 2015-16.
10. 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.
11. 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.

12. 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.
13. 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.
14. 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.
15. Site #21 encompassed an approximately 600-foot channel reach that started just upstream of Reas Creek. There were 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.
16. Site #22 located downstream of the Dillon Road Bridge, this reach was 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.
17. Site #23 encompassed an approximately 2,000-foot long reach above Dillon Road Bridge that terminated 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. This was a new site for the fall/winter 2015-16 and was sampled primarily with minnow traps; however Sousa Lake was sampled in January with the 100-foot seine net and kayak.

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

Fish Sampling Results – December 2015

In December, the sampling occurred on the 6th and 7th (Tables 1 and 2). On the 6th, the low tide (at Humboldt Bay North Spit) was 1.32 ft at 14:47 hours. On December 7th, the high tide was 6.94 ft at 08:35 hours.

Between December 6th and 7th, the Eel River discharge at Scotia increased from 2,650 cfs to 4,740 cfs. A week earlier, flows in the Eel River at Scotia were very low, around 220 cfs. Four days after the December sampling, flows in the Eel River at Scotia peaked at 43,000 cfs. For the December 2015 fish sampling, salinity readings ranged between 10.5 and 18.1 ppt (Table 1).

Table 1. Dates, site numbers, start and end times, and water quality measurements for December 2015 Salt River fisheries sampling.

| DATE | SITE # | SAMPLE METHOD | TIDE LEVEL | START TIME | END TIME | WATER TEMP (°C) | D.O. (mg/L) | SALINITY (ppt) |
|-----------|--------|--------------------|------------|------------|----------|-----------------|-------------|----------------|
| 12/6/2015 | #8 | Seine Net – 20 ft | Low | 14:55 | 15:20 | 13.6 | 9.3 | 17.6 |
| 12/6/2015 | #7 | Seine Net – 30 ft | Low | 15:45 | 16:00 | 13.0 | 11.4 | 17.6 |
| 12/6/2015 | #18 | Seine Net – 30 ft | Low | 16:10 | 16:20 | 12.8 | 11.5 | 17.3 |
| 12/6/2015 | #15 | Seine Net – 30 ft | Low | 16:25 | 16:40 | 13.2 | 10.8 | 18.1 |
| 12/7/2015 | #10 | Seine Net – 100 ft | High | 10:20 | 10:45 | 12.0 | 9.7 | 13.9 |
| 12/7/2015 | #1 | Seine Net – 100 ft | High | 11:10 | 11:40 | 13.1 | 9.3 | 10.5 |

Six fish species were captured during the December 2015 sampling: Tidewater Goby, Threespine Stickleback (*Gasterosteus aculeatus*), sculpin species, Pacific Staghorn Sculpin (*Leptocottus armatus*), Surf Smelt (*Hypomesus pretiosus*), and juvenile Pacific lamprey (*Entosphenus tridentatus*) (Table 2). We also captured juvenile Dungeness Crab (*Metacarcinus magister*) and Bay Shrimp (*Carragon sp.*). Threespine Sticklebacks were the most common species captured and comprised 63% of all fish sampled in December 2015. The out-migrating juvenile Pacific Lamprey was captured at Site #10 at high tide. The two Tidewater Gobies were captured at Sites #7 and #8, one fish at each location (Table 2).

Table 2. Species and numbers of fish captured during the December 2015 Salt River fisheries sampling.

| DATE | SITE # | Tidewater Goby | Three-spine Stickleback | Sculpin <i>sp.</i> | Pacific Staghorn Sculpin | Surf Smelt | Pacific Lamprey | Juvenile Dungeness Crab | Shrimp <i>Crangon spp.</i> |
|---------------------|--------|----------------|-------------------------|--------------------|--------------------------|------------|-----------------|-------------------------|----------------------------|
| 12/6/2015 | #8 | 1 | 58 | 0 | 0 | 0 | 0 | 0 | 1 |
| 12/6/2015 | #7 | 1 | 6 | 0 | 12 | 13 | 0 | 0 | 38 |
| 12/6/2015 | #18 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12/6/2015 | #15 | 0 | 1 | 2 | 1 | 0 | 0 | 2 | 3 |
| 12/7/2015 | #10 | 0 | 9 | 0 | 0 | 17 | 1 | 0 | 0 |
| 12/7/2015 | #1 | 0 | 12 | 0 | 0 | 5 | 0 | 0 | 0 |
| Catch Totals | | 2 | 90 | 2 | 13 | 35 | 1 | 2 | 42 |

Fish Sampling Results – January 2016

In January, the sampling occurred on the 26th and 27th (Tables 3 and 4). On the 26th, the high tide (at Humboldt Bay North Spit) was 7.03 ft at 12:49 hours. On the 27th, the high tide was 6.55 ft at 13:29 hours. RTA only conducted high tide sampling in January of 2016 because the timing of low tides near 0.0 ft were too early (still dark) and due to the Eel River's elevated discharge levels there was significant backwatering of the lower Salt River during moderate low tides. Also, these late afternoon low tides occurred as it was getting dark.

Between January 26th and 27th, the Eel River discharge at Scotia dropped from approximately 32,800 cfs to 20,600 cfs. Because of the nearly constant storms during January 2016, salinity measurements were very low, with meter readings in parts-per-million (ppm) that ranged from 133.5 ppm to 527.5 ppm (Table 3).

Table 3. Dates, site numbers, start and end times, and water quality measurements for January 2016 Salt River fisheries sampling.

| DATE | SITE # | SAMPLE METHOD | TIDE LEVEL | START TIME | END TIME | WATER TEMP (°C) | D.O. (mg/L) | SALINITY (ppm) |
|-----------|--------|--------------------|------------|------------|----------|-----------------|-------------|----------------|
| 1/26/2016 | #1 | Seine Net – 30 ft | High | 13:15 | 13:50 | 11.8 | 8.9 | 158.4 |
| 1/26/2016 | 1-A | Seine Net – 30 ft | High | 14:00 | 14:45 | 11.8 | 8.9 | 158.4 |
| 1/26/2016 | #8 | Seine Net – 30 ft | High | 15:10 | 15:40 | 14.3 | 7.6 | 527.5 |
| 1/27/2016 | #1-B | Seine Net – 20 ft | High | 13:25 | 14:20 | 14.9 | 8.0 | 186.7 |
| 1/27/2016 | #23 | Seine Net – 100 ft | High | 14:50 | 15:35 | 14.1 | 9.0 | 133.5 |

Seven fish species were captured during the January 2016 sampling: juvenile Coho Salmon, Threespine Stickleback, California Roach (*Hesperoleucus symmetricus*), sculpin species, Pacific Staghorn Sculpin, Sacramento pike minnow (*Ptychocheilus grandis*), and Green Sunfish (*Lepomis cyanellus*) (Table 4). Sacramento Pike Minnow were captured at all four main channel sites sampled and comprised 33% of all fish captured in January 2016. California Roach were the most common species captured and comprised 39% of all fish sampled in January 2016. All 10 juvenile Coho Salmon sampled in January were caught at main channel sites. A Green Shore Crab (*Hemigrapsus oregonensis*) was caught at Site #1 and nine Bay Shrimp were caught at Site #8 during the January 2016 sampling.

At Site #23, we sampled “Sousa Lake”, a large settling basin located at the upper end of the 2015 channel excavation. We made two sets of the 100-foot seine net with the kayak. These two net sets resulted in numerous Threespine Stickleback, California Roach and Sacramento Pike Minnow; as well as two juvenile Coho Salmon and a single Green Sunfish (Table 4). The two Coho Salmon represent the farthest upstream that this species have been captured in the restored Salt River channel. The Green Sunfish, a non-native species, was a juvenile fish, approximately 25 mm in length, and was the first of this species captured during Salt River fisheries sampling.

Table 4. Species and numbers of fish captured during the January 2016 Salt River fisheries sampling.

| DATE | SITE # | Juvenile Coho Salmon | Three-spine Stickleback | California Roach | Sculpin sp. | Pacific Staghorn Sculpin | Sac. Pike Minnow | Green Sunfish |
|---------------------|--------|----------------------|-------------------------|------------------|-------------|--------------------------|------------------|---------------|
| 1/26/2016 | #1 | 2 | 0 | 7 | 1 | 9 | 13 | 0 |
| 1/26/2016 | 1-A | 4 | 1 | 19 | 2 | 5 | 30 | 0 |
| 1/26/2016 | #8 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| 1/27/2016 | #1-B | 2 | 2 | 20 | 0 | 5 | 31 | 0 |
| 1/27/2016 | #23 | 2 | 49 | 81 | 2 | 0 | 33 | 1 |
| Catch Totals | | 10 | 60 | 127 | 5 | 19 | 107 | 1 |

Fish Sampling Results – February 2016

In February, the sampling occurred on the 24th, 25th and 26th (Tables 5 and 6). On the 24th, the high tide (at Humboldt Bay North Spit) was 6.39 ft at 12:51 hours. On the 25th, the low tide was 1.64 ft at 07:14 hours and the high tide was 6.26 ft at 13:13 hours. On the 26th, the low tide was 1.61 ft at 07:54 hours. February was the first month we were able to sample at both low and high tides. We also set minnow traps for the first time in 2016, within the Salt River's main channel, including locations upstream of the Riverside Ranch.

Between the 24th and 27th, the Eel River discharge at Scotia dropped from approximately 8,300 cfs to 6,700 cfs. Salinity measurements ranged from a low of 145 ppm to 6.8 ppt (Table 5).

Table 5. Dates, site numbers, start and end times, and water quality measurements for February 2016 Salt River fisheries sampling.

| DATE | SITE # | SAMPLE METHOD | TIDE LEVEL | START TIME | END TIME | WATER TEMP (°C) | D.O. (mg/L) | SALINITY (ppt) |
|-----------|--------|---------------|------------|------------|----------|-----------------|-------------|----------------|
| 2/24/2016 | #1 | Seine - 100ft | High | 13:00 | 13:40 | 13.7 | 10.0 | 226 ppm |
| 2/24/2016 | #1-A | Seine - 100ft | High | 13:50 | 14:40 | 13.7 | 10.0 | 226 ppm |
| 2/24/2016 | #1-B | Seine - 100ft | High | 14:55 | 15:20 | 16.8 | 10.8 | 211 ppm |
| 2/24/2016 | #1 | Minnow trap | High | 13:30 | 15:30 | 13.7 | 10.0 | 226 ppm |
| 2/24/2016 | #1-A | Minnow trap | High | 14:45 | 15:45 | 13.7 | 10.0 | 226 ppm |
| 2/25/2016 | #3 | Seine - 30ft | Low | 08:25 | 08:40 | 10.4 | 7.6 | 2.6 |
| 2/25/2016 | #3 | Seine - 30ft | Low | 08:40 | 08:50 | 10.4 | 7.6 | 2.6 |
| 2/25/2016 | #18 | Seine - 30ft | Low | 08:55 | 09:10 | 11.3 | 9.2 | 2.1 |
| 2/25/2016 | #15 | Seine - 30ft | Low | 09:15 | 09:35 | 11.3 | 8.7 | 4.1 |
| 2/25/2016 | #17 | Seine - 20ft | Low | 09:40 | 09:55 | 11.5 | 11.4 | 4.8 |
| 2/25/2016 | #9 | Seine - 20ft | Low | 10:05 | 10:15 | 13.4 | 12.7 | 2.5 |
| 2/25/2016 | #8 | Seine - 20ft | Low | 10:20 | 10:30 | 13.8 | 11.8 | 6.8 |
| 2/25/2016 | #10 | Seine -100ft | High | 14:10 | 14:30 | 12.1 | 10.2 | 1.9 |
| 2/25/2016 | #22 | Minnow trap | Incoming | 11:10 | 12:35 | 15.1 | 11.6 | 145 ppm |
| 2/25/2016 | #22 | Minnow trap | Incoming | 11:10 | 12:40 | 15.1 | 11.6 | 145 ppm |
| 2/25/2016 | #22 | Minnow trap | Incoming | 11:15 | 12:50 | 15.1 | 11.6 | 145 ppm |
| 2/26/2016 | #7 | Seine - 20ft | Low | 08:35 | 09:10 | 11.4 | 6.9 | 3.4 |
| 2/26/2016 | #19 | Seine - 30ft | Low | 09:30 | 09:40 | 11.9 | 9.1 | 3.5 |
| 2/26/2016 | #10 | Seine - 30ft | Low | 09:50 | 10:00 | 12.1 | 9.0 | 3.2 |
| 2/26/2016 | #1 | Seine - 30ft | Low | 10:10 | 10:20 | 12.6 | 9.3 | 224 ppm |
| 2/26/2016 | #22 | Seine - 20ft | Low | 10:50 | 11:05 | 13.1 | 10.6 | 155 ppm |
| 2/26/2016 | #22 | Seine - 20ft | Low | 11:05 | 11:15 | 13.1 | 10.6 | 155 ppm |

Eight fish species were captured during the February 2016 sampling: Tidewater Goby, juvenile Coho Salmon, Threespine Stickleback, California Roach, sculpin species, Pacific Staghorn Sculpin, Sacramento Pike Minnow and Green Sunfish (Table 6). Pacific Staghorn Sculpin were the most common species captured and comprised 52% of all fish sampled in February 2016. Of the 267 Pacific Staghorn Sculpin captured, 157 were age-0 fish less than 30 mm in length. Sacramento Pike Minnow were a common catch in the low salinity water and comprised 27% of the total catch. Fifteen of the 18 coho salmon sampled in February 2016 were captured in main channel locations, distributed between Site #1-A and upstream to Dillon Road Bridge (Site #22). Three Coho Salmon were captured during low tide sampling at slough channel sites #7 and #15 (Table 6). Eight Coho Salmon were captured in minnow traps, including seven fish from three traps fished just downstream of the Dillon Road Bridge.

The growth and condition of juvenile Coho Salmon captured during the February 2016 sampling appeared good. Their fork lengths (mm) were: 76, 77, 78, 78, 83, 84, 89, 92, 95, 97, 100, 102, 102, 108, 108, 110, 111, and 121.

Table 6. Species and numbers of fish captured during the February 2016 Salt River fisheries sampling.

| DATE | SITE # | Tide-water Goby | Juvenile Coho Salmon | Three-spine Stickle-back | CA Roach | Sculpin sp. | Pacific Stag-horn Sculpin | Sac. Pike Minnow | Green Sunfish |
|---------------------|--------|-----------------|----------------------|--------------------------|-----------|-------------|---------------------------|------------------|---------------|
| 2/24/2016 | #1 | 0 | 0 | 16 | 0 | 1 | 0 | 2 | 0 |
| 2/24/2016 | #1-A | 0 | 4 | 23 | 20 | 0 | 5 | 18 | 0 |
| 2/24/2016 | #1-B | 0 | 0 | 2 | 1 | 0 | 15 | 10 | 0 |
| 2/24/2016 | #1 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 |
| 2/24/2016 | #1-A | 0 | 1 | 0 | 0 | 0 | 13 | 0 | 0 |
| 2/25/2016 | #3 | 0 | 0 | 10 | 22 | 0 | 13 | 3 | 0 |
| 2/25/2016 | #3 | 0 | 0 | 0 | 2 | 0 | 6 | 0 | 0 |
| 2/25/2016 | #18 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 |
| 2/25/2016 | #15 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 0 |
| 2/25/2016 | #17 | 0 | 0 | 5 | 0 | 0 | 42 | 0 | 0 |
| 2/25/2016 | #9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2/25/2016 | #8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2/25/2016 | #10 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| 2/25/2016 | #22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2/25/2016 | #22 | 0 | 2 | 20 | 0 | 1 | 0 | 0 | 0 |
| 2/25/2016 | #22 | 0 | 5 | 1 | 0 | 0 | 6 | 0 | 0 |
| 2/26/2016 | #7 | 2 | 1 | 26 | 27 | 0 | 135 | 19 | 1 |
| 2/26/2016 | #19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2/26/2016 | #10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2/26/2016 | #1 | 0 | 0 | 0 | 4 | 0 | 14 | 10 | 0 |
| 2/26/2016 | #22 | 0 | 1 | 6 | 20 | 0 | 0 | 59 | 0 |
| 2/26/2016 | #22 | 0 | 2 | 1 | 1 | 0 | 2 | 17 | 0 |
| Catch Totals | | 2 | 18 | 114 | 97 | 2 | 267 | 138 | 1 |

Fish Sampling Results – March 2016

In March, the sampling occurred on the 23rd and 24th (Tables 7 and 8). On the 23rd, the high tide (at Humboldt Bay North Spit) was 6.23 ft at 12:44 hours. On the 24th, the low tide was 0.80 ft at 07:13 hours and the high tide was 6.03 ft at 13:33 hours.

The Eel River discharge at Scotia was between approximately 27,700 cfs on the 23rd and 23,800 cfs on the 24th. No salinity measurements were made in March 2016 because the meter was broken; however salinity was assumed to be low due to the numerous storms and elevated flows.

Only five fish species were captured during March 2016 sampling; however sampling with seine nets was limited to two sites due to an ill field employee. All of the low tide effort on the 24th was conducted by one person with minnow traps. The five species captured were: juvenile Coho Salmon, juvenile Steelhead (*O. mykiss*), Threespine Stickleback, Pacific Staghorn Sculpin, and Sacramento Pike Minnow (Table 8). Pacific Staghorn Sculpin was the most common species captured and comprised 61% of all fish sampled in March 2016. Forty-seven of the 115 Pacific Staghorn Sculpin were age-0 fish. The juvenile Steelhead captured had a fork length of 112 mm and was the first of this species captured within the restored section of the Salt River. The 14 juvenile coho salmon captured in March were relatively large, silver in coloration and probably close to smolting. Their fork lengths (mm) were: 98, 102, 104, 107, 108, 115, 117, 118, 119, 123, 128, 130, 136, and 145.

Table 7. Dates, site numbers, start and end times, and water quality measurements for March 2016 Salt River fisheries sampling.

| DATE | SITE # | SAMPLE METHOD | TIDE LEVEL | START TIME | END TIME | WATER TEMP (°C) | D.O. (mg/L) | SALINITY (ppt) |
|-----------|--------|----------------|------------|------------|----------|-----------------|-------------|----------------|
| 3/23/2016 | #1-A | Seine – 100 ft | High | 13:30 | 14:30 | 13.5 | 9.2 | N/A |
| 3/23/2016 | #1 | Seine – 100 ft | High | 14:40 | 15:20 | 13.5 | 9.3 | N/A |
| 3/24/2016 | #7 | Minnow Trap | Low | 8:50 | 10:35 | 12.5 | 6.1 | N/A |
| 3/24/2016 | #17 | Minnow Trap | Low | 9:10 | 10:55 | 13.0 | 8.8 | N/A |
| 3/24/2016 | #17 | Minnow Trap | Low | 9:15 | 11:05 | 13.0 | 8.2 | N/A |
| 3/24/2016 | #15 | Minnow Trap | Low | 9:25 | 11:15 | 13.0 | 8.2 | N/A |
| 3/24/2016 | #21 | Minnow Trap | Rising | 11:40 | 13:10 | 13.5 | 9.5 | N/A |
| 3/24/2016 | #21 | Minnow Trap | Rising | 11:40 | 13:15 | 13.5 | 9.5 | N/A |
| 3/24/2016 | #21 | Minnow Trap | Rising | 11:45 | 13:20 | 13.5 | 9.5 | N/A |
| 3/24/2016 | #21 | Minnow Trap | Rising | 11:50 | 13:25 | 13.5 | 9.5 | N/A |
| 3/24/2016 | #22 | Minnow Trap | Rising | 12:10 | 13:40 | 13.5 | 9.5 | N/A |
| 3/24/2016 | #22 | Minnow Trap | Rising | 12:15 | 13:45 | 13.5 | 9.8 | N/A |
| 3/24/2016 | #23 | Minnow Trap | Rising | 12:30 | 14:00 | 13.5 | 9.8 | N/A |

Table 8. Species and numbers of fish captured during the March 2016 Salt River fisheries sampling.

| DATE | SITE # | Juvenile Coho Salmon | Juvenile Steelhead | Threespine Stickle-back | Pacific Stag-horn Sculpin | Sac. Pike Minnow |
|---------------------|--------|----------------------|--------------------|-------------------------|---------------------------|------------------|
| 3/23/2016 | #1-A | 5 | 1 | 6 | 51 | 29 |
| 3/23/2016 | #1 | 0 | 0 | 1 | 29 | 12 |
| 3/24/2016 | #7 | 0 | 0 | 0 | 6 | 0 |
| 3/24/2016 | #17 | 0 | 0 | 3 | 1 | 0 |
| 3/24/2016 | #17 | 0 | 0 | 1 | 1 | 0 |
| 3/24/2016 | #15 | 0 | 0 | 0 | 3 | 0 |
| 3/24/2016 | #21 | 0 | 0 | 1 | 2 | 0 |
| 3/24/2016 | #21 | 0 | 0 | 0 | 3 | 0 |
| 3/24/2016 | #21 | 1 | 0 | 1 | 13 | 0 |
| 3/24/2016 | #21 | 1 | 0 | 0 | 0 | 0 |
| 3/24/2016 | #22 | 1 | 0 | 0 | 1 | 0 |
| 3/24/2016 | #22 | 2 | 0 | 0 | 5 | 0 |
| 3/24/2016 | #23 | 4 | 0 | 0 | 0 | 1 |
| Catch Totals | | 14 | 1 | 13 | 115 | 42 |

Fish Sampling Results – April 2016

In April, the sampling occurred on the 26th and 27th (Tables 9 and 10). On the 26th, the low tide (at Humboldt Bay North Spit) was -0.16 ft at 09:21 hours. On the 27th, the low tide was -0.05 ft at 10:06 hours and the high tide was 4.85 ft at 17:00 hours.

The Eel River discharge at Scotia dropped from approximately 4,400 cfs on the 25th to 3,600 cfs on the 27th. Salinity measurements ranged from 0.5 to 6.7 ppt (Table 9).

Table 9. Dates, site numbers, start and end times, and water quality measurements for April 2016 Salt River fisheries sampling.

| DATE | SITE # | SAMPLE METHOD | TIDE LEVEL | START TIME | END TIME | WATER TEMP (°C) | D.O. (mg/L) | SALINITY (ppt) |
|-----------|--------|---------------|------------|------------|----------|-----------------|-------------|----------------|
| 4/26/2016 | #3 | Seine – 30 ft | Low | 9:45 | 10:00 | 13.8 | 7.6 | 6.0 |
| 4/26/2016 | #3 | Seine – 20 ft | Low | 10:05 | 10:15 | 13.8 | 7.6 | 6.0 |
| 4/26/2016 | #10 | Seine – 30 ft | Low | 10:25 | 10:35 | 14.0 | 8.4 | 6.7 |
| 4/26/2016 | #7 | Seine – 20 ft | Low | 10:50 | 11:05 | 18.0 | 7.4 | 5.8 |
| 4/26/2016 | #8 | Seine – 20 ft | Low | 11:10 | 11:20 | 18.8 | 7.1 | 5.6 |
| 4/26/2016 | #9 | Seine – 20 ft | Low | 11:30 | 11:40 | 19.2 | 15.6 | 5.4 |
| 4/26/2016 | #1 | Seine – 30 ft | Low | 12:10 | 12:25 | 15.4 | 8.1 | 1.8 |
| 4/26/2016 | #1-B | Seine – 30 ft | Low | 12:35 | 12:50 | 16.0 | 7.3 | 1.6 |
| 4/26/2016 | #20 | Seine – 20 ft | Low | 12:55 | 13:10 | 15.2 | 7.8 | 0.5 |
| 4/27/2016 | #22 | Minnow Trap | Rising | 14:20 | 15:25 | 15.0 | 9.2 | N/A |
| 4/27/2016 | #22 | Minnow Trap | Rising | 14:25 | 15:30 | 15.0 | 9.2 | N/A |
| 4/27/2016 | #22 | Minnow Trap | Rising | 14:30 | 15:35 | 15.0 | 9.2 | N/A |
| 4/27/2016 | #23 | Minnow Trap | Rising | 14:35 | 15:40 | 15.0 | 9.3 | N/A |
| 4/27/2016 | #23 | Minnow Trap | Rising | 14:40 | 15:45 | 15.0 | 9.4 | N/A |
| 4/27/2016 | #23 | Minnow Trap | Rising | 14:45 | 15:55 | 15.0 | 9.4 | N/A |
| 4/27/2016 | #23 | Minnow Trap | Rising | 14:50 | 16:00 | 15.0 | 9.4 | N/A |

During the April 2016 sampling, eight fish species were captured: Tidewater Goby, Threespine Stickleback, California Roach, sculpin species, Pacific Staghorn Sculpin, Sacramento Pike Minnow, Surf Smelt, and a juvenile Pacific Herring (*Clupea harengus*) (Table 10). Threespine sticklebacks were overwhelmingly the most common species captured and comprised 94% of all fish sampled in April 2016. Most of the Threespine Sticklebacks were age-0 fish, 3,332 out of 3,398 fish. Most (81%) of the Threespine Sticklebacks were captured at Site #3. The juvenile Pacific Herring was also captured at Site #3. No juvenile salmonids were captured in April 2016.

Table 10. Species and numbers of fish captured during the April 2016 Salt River fisheries sampling.

| DATE | SITE # | Tide-water Goby | Three-spine Stickle-back | CA Roach | Sculpin sp. | Pacific Stag-horn Sculpin | Sac. Pike Minnow | Surf Smelt | Pacific Herring |
|---------------------|--------|-----------------|--------------------------|-----------|-------------|---------------------------|------------------|------------|-----------------|
| 4/26/2016 | #3 | 0 | 2,714 | 0 | 0 | 0 | 0 | 7 | 1 |
| 4/26/2016 | #3 | 0 | 45 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4/26/2016 | #10 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 0 |
| 4/26/2016 | #7 | 1 | 14 | 0 | 0 | 18 | 0 | 0 | 0 |
| 4/26/2016 | #8 | 2 | 97 | 0 | 0 | 9 | 0 | 0 | 0 |
| 4/26/2016 | #9 | 0 | 41 | 0 | 0 | 9 | 0 | 0 | 0 |
| 4/26/2016 | #1 | 0 | 122 | 3 | 0 | 21 | 12 | 0 | 0 |
| 4/26/2016 | #1-B | 0 | 92 | 2 | 0 | 1 | 90 | 0 | 0 |
| 4/26/2016 | #20 | 0 | 26 | 0 | 1 | 1 | 6 | 0 | 0 |
| 4/27/2016 | #22 | 0 | 163 | 25 | 0 | 0 | 9 | 0 | 0 |
| 4/27/2016 | #22 | 0 | 3 | 1 | 0 | 0 | 1 | 0 | 0 |
| 4/27/2016 | #22 | 0 | 10 | 0 | 0 | 0 | 2 | 0 | 0 |
| 4/27/2016 | #23 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4/27/2016 | #23 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4/27/2016 | #23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4/27/2016 | #23 | 0 | 50 | 0 | 0 | 0 | 1 | 0 | 0 |
| Catch Totals | | 3 | 3,398 | 31 | 1 | 67 | 121 | 8 | 1 |

Fish Sampling Results – Comparison of Data Sets from two Winter/Spring Seasons

Fish sampling within the restored Riverside Ranch reach of the Salt River has occurred for two consecutive winter/spring seasons; November through March of 2014-2015 and December through April of 2015-2016. During these two sampling periods RTA has captured 20 fish species. A comparison summary of the two winter/spring data sets provided a closer examination of species diversity by year; by month and tide; and how frequently each fish species was captured (Table 11). This comparison of the two data sets was limited to the months and tides that were sampled during both seasons; for example sampling occurred in November 2014, but not in November 2015, thus the 2014 data were not included (Table 11). For the two data sets, a total of eight sampling events were compared (Table 11).

When comparing the two data sets, the most apparent difference is the species diversity between the two winter/spring seasons (Table 11). A total of 18 fish species were captured during the 2014-2015 season versus 12 fish species during the 2015-2016 season (Table 11). The reduced number of species captured in 2015-2016 was most likely a function of the wetter winter season and consistently lower salinity levels. At least six species not sampled in 2015-2016 could be considered more brackish to marine species, thus were not present in the lower

Salt River during the winter/spring of 2015-2016. These species were Starry Flounder, Saddleback Gunnel, Shiner Surfperch, Bay Pipefish, juvenile Rockfish, and Top Smelt.

Tidewater Goby were captured during all eight sampling events in 2014-2015, but were only present in four sampling events in 2015-2016 (Table 11). The total numbers of Tidewater Gobies captured dropped dramatically between the two sampling seasons; 318 fish in 2014-2015 versus only seven fish in 2015-2016. During the winter/spring season of 2014-2015 Tidewater Gobies were sampled at eight locations (Sites #1, #3, #7, #8, #9, #14, #15 and #17) versus only two locations during the winter/spring 2015-2016 (Sites #7 and #8). The goby-lifts constructed at Sites #9 and #14 have failed and the channel above these lifts filled-in with fine sediments and also failed to hold back water during low tides. Overall fish numbers (of all species) were low at both of these sites during the winter/spring 2015-2016 sampling. The reason for the absence of Tidewater Gobies at Sites #1, #3, #15 and #17 and their low numbers at Sites #7 and #8 during the winter/spring of 2015-2016 is unknown. Again, the main difference between the two winter/spring sampling periods was the wetter conditions in 2015-2016, 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 two winter/spring sampling periods was evident with Pacific Staghorn Sculpin and what have been identified generically as sculpin "species" (Tables 2, 4, 6, 8, 10 and 11). 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). Again, continued sampling will hopefully provide more insight into the dynamics of the distribution and relative abundance of these two sculpin species within the lower Salt River.

Sacramento Pike Minnow and California Roach were sampled during periods (or in areas) of low salinity and the relative abundance of both species increased between the two winter/spring sampling periods (Tables 2, 4, 6, 8, 10, and 11). During the winter/spring of 2014-2015, a total of 131 Sacramento Pike Minnow and 18 California Roach were captured and during the 2015-2016 sampling their numbers increased to 408 fish and 255 fish, respectively. 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.

Table 11. Comparison summaries of Salt River fish species diversity by month/tide and fish species occurrence per sampling event. Time periods covered were December 2014 to April 2015 (X) and December 2015 to April 2016 (X). NOTE: an “X” denotes that at least one fish of a particular species was caught during a sampling event; please refer to Tables 2, 4, 6, 8, and 10 for fish numbers and capture locations.

| SPECIES LIST | DEC. HIGH TIDE | DEC. LOW TIDE | JAN. HIGH TIDE | FEB. HIGH TIDE | FEB. LOW TIDE | MARCH HIGH TIDE | MARCH LOW TIDE | APRIL LOW TIDE | Number of Occurrences in 2014-2015 | Number of Occurrences in 2015-2016 |
|---|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|------------------------------------|------------------------------------|
| STICKLEBACK | X X | X X | X X | X X | X X | X X | X X | X X | 8 | 8 |
| SCULPIN SP. | X | X X | X X | X X | X | X | X | X X | 8 | 4 |
| TIDEWATER GOBY | X | X X | X X | X | X X | X | X | X X | 8 | 4 |
| SURF SMELT | X X | X X | X | X | X | X | X | X X | 8 | 3 |
| STAGHORN SCULPIN | | X X | X X | X X | X X | X X | X X | X | 6 | 7 |
| COHO SALMON | X | | X X | X X | X X | X X | X | X | 6 | 5 |
| PIKE MINNOW | | | X X | X X | X X | X X | X X | X | 5 | 6 |
| BAY PIPEFISH | | | | | X | X | | | 2 | 0 |
| SHINER SURFPERCH | | | | | | | X | | 1 | 0 |
| CALIFORNIA ROACH | | | | X X | X X | X | X | X | 4 | 3 |
| LONGFIN SMELT | | X | | X | X | | | | 3 | 0 |
| TOP SMELT | | | | | | | X | X | 2 | 0 |
| STARRY FLOUNDER | | | | | X | | | | 1 | 0 |
| SADDLEBACK GUNNEL | | | | | | X | | | 1 | 0 |
| CHINOOK SALMON | | | | | X | | | X | 2 | 0 |
| STEELHEAD | | | | | | X | | | 0 | 1 |
| GREEN SUNFISH | | | X | | X | | | | 0 | 2 |
| PACIFIC HERRING | | | | | | | X | X | 1 | 1 |
| JUVENILE ROCKFISH | | | | | | | X | | 1 | 0 |
| PACIFIC LAMPREY | X X | | | | | | | | 1 | 1 |
| Number of Species per Sampling Event | 6 3 | 6 5 | 7 7 | 9 6 | 12 7 | 10 5 | 11 4 | 7 8 | | |

Fish species that occurred infrequently may be either rare in occurrence, present in low numbers, or not susceptible to the sampling methods employed by RTA. For example, the two juvenile Pacific lamprey sampled by RTA in December (one in each season) 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 be able to avoid capture as seine nets are hauled-in at a relatively slow pace.

Fish Sampling Results – Salmonids

In regards to juvenile Coho Salmon, 37 fish were captured during the 2014-2015 season and 42 fish were captured during the 2015-2016 season. During both 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, and #10). During the winter/spring of 2014-2015, juvenile Coho Salmon were captured during six of the eight events and in four months, December through March. In contrast, during the winter/spring 2015-2016 sampling, juvenile Coho Salmon were captured in only three of the five months, January through March (Table 11). During this 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. In the channel reaches associated with Sites #20-23, RTA experimented with setting traps in open channel areas and adjacent to wood structures; overwhelmingly juvenile Coho Salmon were caught in traps placed next to wood structures. RTA also measured the fork length to the nearest millimeter of all juvenile Coho Salmon caught winter/spring 2015-2016 sampling. As during the previous year's sampling, juvenile Coho Salmon captured in January-March of 2016 appeared in good condition and were larger each subsequent month (Table 12 and Figures 4-6).

Table 12. Fork length (mm) summaries of juvenile Coho Salmon captured during the winter/spring 2015-2016 Salt River sampling.

| SAMPLING MONTH | NUMBER OF COHO CAPTURED | FORK LENGTH RANGE (mm) | AVERAGE FORK LENGTH (mm) |
|-----------------------|--------------------------------|-------------------------------|---------------------------------|
| January | 10 fish | 68 – 95 | 78.6 |
| February | 18 fish | 78 – 121 | 95.8 |
| March | 14 fish | 98 – 145 | 117.9 |

During the 2015-2016, no juvenile Chinook Salmon were captured, compared to four individuals caught the previous season. RTA captured a juvenile Steelhead during the March 2016 high tide sampling at Site #1-A; this was the first Steelhead documented in the restored Salt River channel.



Figure 4. Coho Salmon (76 mm FL) - near the average length of fish caught in January 2016.



Figure 5. Coho Salmon (95 mm FL) - near the average length of fish caught in February 2016.



Figure 5. Coho Salmon (128 mm FL) - caught in March 2016.

Salt River Fall and Winter Sampling – Discussion

The December 2015 to April 2016 winter/spring Salt River sampling resulted in the capture of 12 fish species, as well as Dungeness Crab, Green Shore Crab and Bay Shrimp. Over this five month sampling period, Threespine Sticklebacks were the most common species captured. Juvenile Coho Salmon were first sampled in January 2016 and their numbers peaked during the February sampling. Between the 2014-2015 and 2015-2016 sampling seasons, the number of Tidewater Gobies captured dropped by 98%. Numbers of generic sculpin “species” also dropped between the two sampling seasons, by 99%. Conversely, the total catch of Pacific Staghorn Sculpin increased by 206% between the 2014-2015 and 2015-2016 seasons. Lower salinities from the relatively wet winter of 2015-2016 appeared to influence the diversity of fish species, with fewer saline/brackish species present and a higher total catch of species more common to freshwater. The capture of two juvenile Green Sunfish during the 2015-2016 sampling was the first documentation of this non-native fish within the restored Salt River channel; however Green Sunfish are common in the lower Eel River mainstem and South Fork.

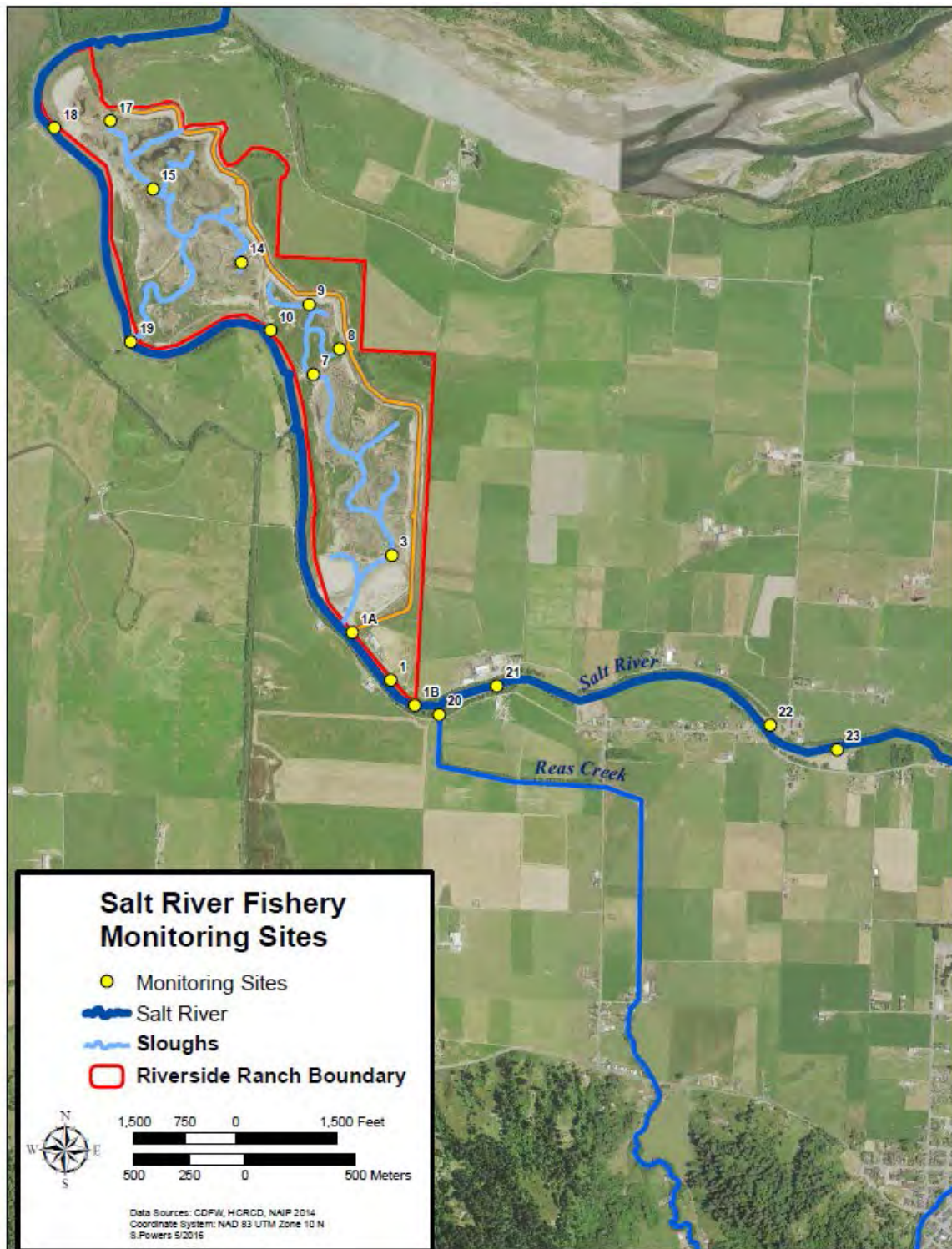
Setting the 100-foot seine net with a kayak proved to be an effective method for sampling the Salt River’s main channel at high tide. We recommend that high tide sampling be continued since this method was effective at capturing juvenile Coho Salmon in the main channel downstream of the Reas Creek confluence.

During two seasons of high tide sampling in the main channel, we consistently captured more fish at the upper sites (#1, #1-A and #1-B) compared to the lower sites (#10, #18 and #19). We suspect that the upper sites may be more attractive for fish due to the extended periods of slack water compared to lower reaches where the current was constantly moving. The upper sites were also within a channel reach lined with mature riparian trees and several deadfalls extending into the water, thus possibly providing in-channel habitat and overhead cover that was generally lacking at the lower main channel sites.

Minnow traps baited with frozen Steelhead roe proved to be an effective way to sample the newly constructed channel located upstream of the Riverside Ranch due to its narrow width and nearly vertical banks defining the main channel. Juvenile Coho Salmon were most frequently caught in traps placed adjacent to wood structures, whereas traps set in open channel areas mainly caught Pacific Staghorn Sculpin and Threespine Sticklebacks.

We recommend that fisheries sampling is continued in the lower Salt River to better understand the temporal and spatial use of the restored channel by the various fish species. We also recommend that sampling is continued at established sites and that additional sites are established upstream of Riverside Ranch as the channel excavation process moves farther upstream. Finally, we recommend that future winter/spring sampling is modified to assess movement and growth of juvenile Coho Salmon through the use of PIT tags and possibly several antenna/receiver arrays. RTA would like to explore possible methods to conduct this type of study with NOAA Fisheries, CDFW and Humboldt County RCD staff.

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. (Low tide photo is facing upstream and high tide photo is facing downstream).



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 (low and high tide photos).



Site #3: Photographs of tide gate and drainage channel at low and high 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 (low tide photo is facing upstream and high tide photo is facing downstream).



Site #8: is associated with a goby lift on a branch of the S1 slough. Seine from lift to the upstream end of channel.



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.



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. Low and high tide photos.



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.



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 (low and high tide photos).



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.

APPENDIX B:
CATALOG OF FISH CAPTURED IN THE SALT RIVER DURING
WINTER/SPRING SAMPLING IN 2014-2015 AND 2015-2016

Threespine Stickleback (*Gasterosteus aculeatus*)



Gravid female captured in March of 2015



Male in spawning colors captured in March of 2015



Age-0 and adult captured in March of 2015

Tidewater Goby (*Eucyclogobius newberryi*)



Tidewater Goby captured at Site #8 on February 24, 2015

California Roach (*Hesperoleucus symmetricus*)



California Roach captured at Site #1 on March 23, 2015

Pacific Staghorn Sculpin (*Leptocottus armatus*)



Adult Pacific Staghorn Sculpin captured at Site #18 on February 26, 2015



Age-0 Pacific Staghorn Sculpin captured in March of 2015

Sculpin Species (*Cottus sp.*)



Sculpin sp. captured at Site #7 on November 12, 2014



Comparison of Pacific Staghorn Sculpin (left) and sculpin species (right) from Site #3 on February 24, 2015

Starry Flounder (*Platichthys stellatus*)



Starry Flounder caught at Site #18 on November 11, 2014



Starry Flounder caught at Site #18 on February 24, 2015

Coho Salmon (*Oncorhynchus kisutch*)



Coho Salmon: 65 mm juvenile captured on December 2, 2014



Coho Salmon: 90 mm juvenile captured on January 20, 2015

Coho Salmon (*Oncorhynchus kisutch*)



Coho Salmon: 120 mm juvenile captured on February 17, 2015



Coho Salmon: 135 mm juvenile captured on March 24, 2015

Chinook Salmon (*Oncorhynchus tshawytscha*)



Chinook Salmon: 35 mm juvenile captured at Site #3 on March 24, 2015

Steelhead (*Oncorhynchus mykiss*)



Steelhead: 112 mm juvenile captured at Site #1-A on March 23, 2016

Surf Smelt (*Hypomesus pretiosus*)



Two of the 71 Surf Smelt captured during the January 2015 sampling



Juvenile smelt (50 mm in length) captured at Site # on November 11, 2014

Longfin Smelt (*Spirinchus starksi*)



Longfin Smelt (130 mm in length) captured at Site #1 on December 1, 2014



Two Longfin Smelt captured at Site #1-A on February 17, 2015

Pacific Herring (*Clupea harengus*)



Juvenile Pacific Herring (30 mm in length) captured at Site #3 on March 24, 2015

Sacramento Pikeminnow (*Ptychocheilus grandis*)



One of nine Sacramento Pike Minnow caught during the March 2015 sampling

Shiner Surfperch (*Cymatogaster aggregata*)



Shiner Surfperch (160 mm in length) captured at Site #19 on March 24, 2015

Saddleback Gunnel (*Photis ornata*)



One of two Saddleback Gunnels caught at Site #18 on March 23, 2015

Pacific Lamprey (*Entosphenus tridentatus*)



Juvenile (out-migrant) Pacific Lamprey caught at Site #10 on December 2, 2014

Rockfish species (*Sebastes sp.*)



One of four juvenile (newly settled) rockfish caught at Site #3 (in the drainage ditch) on March 24, 2015

Bay Pipefish (*Syngnathus leptorhynchus*)



One of two Bay Pipefish caught at Site #1-A (high tide site) on March 24, 2015



Close-up of Bay Pipefish caught at Site #1-A (high tide site) on March 24, 2015

Green Sunfish (*Lepomis cyanellus*)



Green Sunfish caught at Site #23 (Sousa Lake) on January 27, 2016



Green Sunfish, 34 mm fork length, caught at Site #7 (low tide) on February 26, 2016

Dungeness Crab (*Metacarcinus magister*)



Two of 28 Dungeness crab caught at Site #18 on March 23, 2015; male (left) and female (right)

Bay Shrimp (*Crangon Sp.*)



One of two Bay Shrimp caught at Site #1 on March 24, 2015

Green Shore Crab (*Hemigrapsus oregonensis*)



Green Shore Crab caught at Site #1 on January 26, 2016