Fisheries Monitoring for the Salt River Ecosystem Restoration Project during the Fall and Winter of 2019 – 2020

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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. In-channel excavation and habitat enhancement commenced in 2014 and has occurred annually, working in an upstream direction (Figure 1).

Near the Salt River mouth, the 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 2).

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 management area (SMA) near the Francis Creek confluence, a boulder-chute transition reach between the SMA and the upstream channel, and construction of nine pools with log or boulder weirs. In 2018, channel work was limited to approximately 1,000 feet due to landowner access issues. In 2019, approximately 4,500 feet of channel was excavated, almost up to the Route 211 Bridge. In this reach, two alcoves with multiple piece LWD structures and three backwater channels with single log structures were also constructed. As in past years, the 2019 channel work terminated with a large pool and a rock grade-control structure. The Humboldt County RCD estimates that one more summer construction season will be required to complete the project, excavating the Salt River channel 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 through March of 2015 and also conducted similar sampling during the fall and winter of 2015-2016, 2016-2017 and 2017-2018. Because of budget limitations, the 2018-2019 season was missed, except for two days of sampling in December of 2018. In 2019, the Humboldt County RCD obtained additional funding for three more years of fisheries monitoring which will cover the fall and winter seasons of 2019-2020, 2020-2021 and 2021-2022. This report provides the results of RTA's fifth season of fall and winter fisheries sampling which occurred between December 2019 and April 2020.

The remainder of this report includes the following sections:

1. Descriptions of the sites sampled by RTA during the fall and winter of 2019-2020.
2. Methods used to conduct the seine netting and minnow trapping.
3. Results from the monthly sampling.
4. Discussion of results and recommendations for future monitoring.
5. Updated photographic catalog of the sites sampled during the 2019-2020 fall-winter sampling season (Appendix A).

Salt River Fisheries Monitoring Site Descriptions

The following descriptions are for the sites RTA sampled for the Salt River 2019-2020 fisheries monitoring (Figures 2 and 3):

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 and is one of the initial sites established by CDFW.

Approximately 150 to 250 feet of channel was sampled with either a 20-foot or 30-foot seine net at low and high tides.

2. Site #1-B is located Salt River main channel, upstream of Site #1, just downstream of the Reas Creek confluence. This site was sampled with a 30-foot seine net.
3. Site #3 is located at the confluence of the Southern Slough and a left-bank tide-gated drainage ditch and is one of the initial sites established by CDFW. Both the slough channel and the drainage ditch were sampled at low to moderate tides with either a 20-foot or 30-foot seine net.
4. Site #20 is located at the confluence of the Salt River and Reas Creek. This was a new site for the fall/winter 2015-2016 and was sampled with minnow traps and a 10-foot seine net in the scour pools formed by the series of fully-spanning log weirs in lower Reas Creek.
5. Site #22 is located downstream of the Dillon Road Bridge, this reach is approximately 250 feet in length with two wood structure pools and a deep scour pool just below the bridge. This was a new site for the fall/winter 2015-2016 and was sampled with minnow traps during the 2019-2020 season.
6. Sites #24 and #25 encompasses the lower Francis Creek and were new sites for the fall/winter 2016-2017. Site #24 is the reach downstream of Port Kenyon Road and Site #25 encompasses the restored channel upstream of Port Kenyon Road. During 2019-2020 we sampled Francis Creek, from the SMA upstream to the upper end of the project reach. Minnow traps were placed in several log-formed pools and a 10-foot seine net was used to sample most of this reach.
7. Site #26 – is a new site constructed in 2019 and is a left-bank, riprap lined, side pool with depths greater than the main channel. We sampled this pool with minnow traps and a 10-foot seine net.
8. Sites #27 and #28 – are new sites constructed in 2019. They are located downstream (#27) and upstream (#28) of Fulmor Road Bridge and are off-channel alcoves with multiple-log LWD jams. We sampled these alcoves with minnow traps and a 10-foot seine net.
9. Site #29 – is a new site constructed in 2019 and is a backwater channel with several single-log structures. This backwater channel was sampled with a 10-foot seine net. The Salt River between Sites #28 and #29 was periodically sampled with a 10-foot seine net.
10. Site #30 - is a new site constructed in 2019 and is a backwater channel with several single-log structures. This backwater channel was sampled with a 10-foot seine net. The Salt River reach between Sites #29 and #30 was periodically sampled with a 10-foot seine net.
11. Site #31 - is a new site constructed in 2019 and is a split channel with several single-log structures in the secondary channel. This secondary channel was sampled with a 10-foot seine net. The Salt River reach between Sites #30 and #31 was periodically sampled with a 10-foot seine net too. Approximately 50 feet downstream of the split channel, high flow

in January of 2020 scoured a deeper hole around two, single-log structures that were sampled with the 10-foot seine net.

12. Site #32 – is the large pool and rock grade control constructed at the terminal end of the 2019 construction season. This is a temporary feature. The large pool was sampled with an 80-foot seine net. We also sampled a section of the Salt River between the grade control and the Route 211 Bridge. In April, we sampled underneath the Route 211 Bridge.

Photographs of the 2019-2020 Salt River fisheries sampling sites are located in Appendix A.

Seine Net Sampling Methods

RTA used a variety of seine nets to conduct the Salt River fisheries monitoring: a 10-foot x 4 foot tall net with a ¼-inch mesh, a 20-foot long x 4-foot tall net with a ¼-inch mesh, a 30-foot long x 4-foot tall net with a ¼-inch mesh and a 80-foot long x 6-foot tall net with a ¼-inch mesh. The three shorter nets were attached to six-foot long poles. The 80-foot net was used in the large pool downstream of the grade-control at Site #32. At each site, we made one or more passes and removed fish from the net after each pass. Unless the tide was completely slack, we typically seined against the current to maintain a bag in the seine to more effectively capture and hold fish. If more than one pass was made at a site, captured fish were temporarily held in dark colored 5-gallon pails with battery powered aerators. When the seine netting was completed, fish were identified, enumerated and then released back into their location of capture. Coho Salmon and other salmonids were typically measured to the nearest mm in fork length.

Sampling with Minnow Traps

During the fall and winter of 2019-2020, RTA continued sampling the Salt River with minnow traps baited with frozen steelhead eggs. Sites #1-B, #22, #24, #26, #27, #28 and #32 were the areas most focused for detection of juvenile Coho Salmon (Figures 1 and 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. Coho Salmon and other salmonids captured in minnow traps were typically measured to the nearest mm in fork length.

Water Quality Measurements

During the fall and winter of 2019-2020, RTA measured water temperature, dissolved oxygen and salinity at each fish sampling site from near-surface (depth = 0.5 feet) to the maximum depth in one-foot intervals. Water temperature and dissolved oxygen were measured with an YSI® ProODO meter and salinity was measured with an YSI® EC300A meter. In wholly freshwater areas, salinities were not measured and were recorded as Not Applicable (N/A).

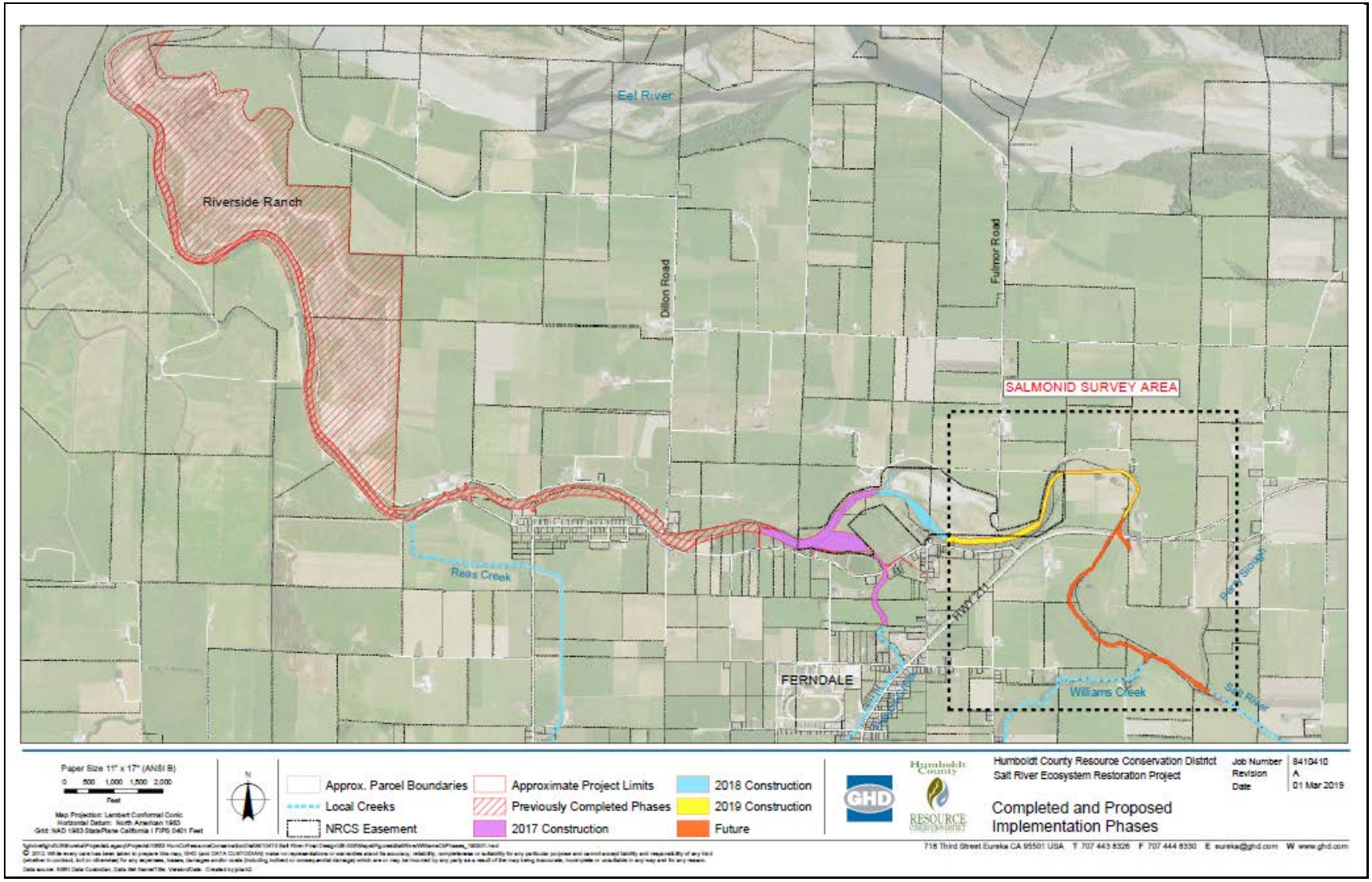

Figure 1. Salt River Ecosystem Restoration Project's construction phases.

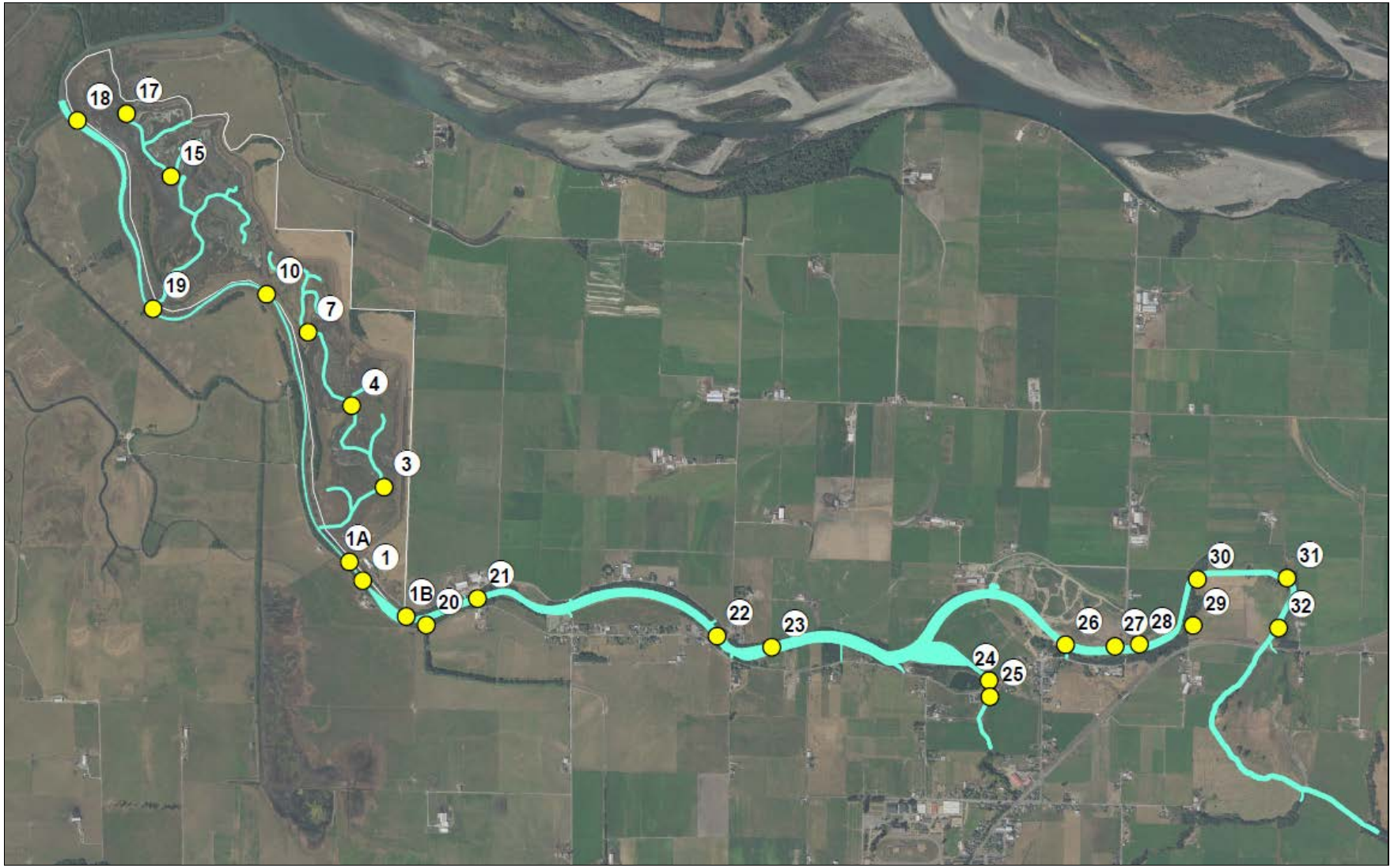

Figure 2. Salt River Ecosystem Restoration Project's fisheries monitoring sites – 2014 to 2020.

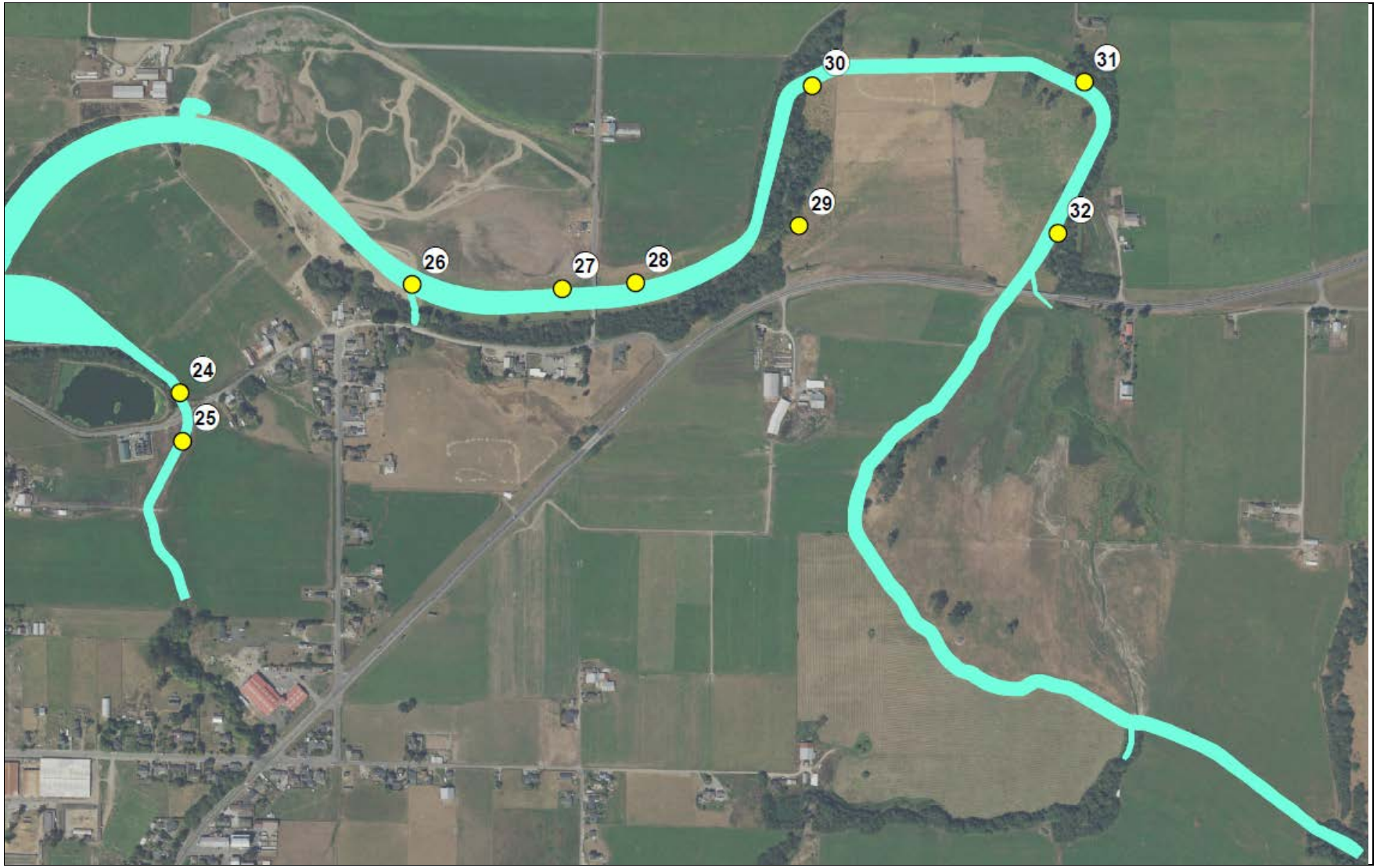

Figure 3. Salt River Ecosystem Restoration Project's fisheries monitoring sites for 2019-2020.

Fish Sampling Results – December 2019

In December 2019, the sampling occurred on the 17th and 18th (Tables 1 and 2). On the 18th, the low tide (at Humboldt Bay North Spit) was 3.0 ft at 10:34 hours.

At 0700 hours on December 18th, the Eel River discharge at Scotia was approximately 2,500 cfs and the Van Duzen River was at 450 cfs. The upper Salt River through the 2019 construction reach was extremely shallow, with limited habitat for salmonids.

Table 1. Dates, site numbers and locations, sampling methods, and start and end times for December 2019 Salt River (SR) fisheries sampling. The (#) indicates how many traps were deployed.

DATE	SITE NUMBER AND/OR DESCRIPTION	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME
12/17/2019	SR - Fulmor Rd to 1st cutoff channel	Seine Net – 10 ft	N/A	11:00	11:20
12/17/2019	#28 - alcove upstream of Fulmor Rd	Minnow Traps (2)	N/A	10:45	13:30
12/17/2019	#27 - alcove downstream Fulmor Rd	Minnow Traps (2)	N/A	10:50	13:35
12/17/2019	SR - 1st cutoff channel to 2nd cutoff	Seine Net – 10 ft	N/A	11:20	11:40
12/17/2019	SR - 2nd cutoff channel to GC pool	Seine Net – 10 ft	N/A	12:30	14:30
12/17/2019	#32 - grade control (GC) pool	Minnow Traps (2)	N/A	10:30	14:15
12/17/2019	#32 - grade control (GC) pool	Seine Net – 80 ft	N/A	14:20	14:50
12/12/2019	#26 - LB side pool below Fulmor Rd	Seine Net – 30 ft	N/A	11:50	12:15
12/18/2019	#1-B –near Reas Creek confluence	Seine Net – 30 ft	Low	10:10	10:20
12/18/2019	#20 – Reas Creek log weir pools	Seine Net – 10 ft	Low	10:20	10:35
12/18/2019	#1 – near Riverside Ranch barn	Seine Net – 30 ft	Rising	10:50	11:05
12/18/2019	#22 – downstream of Dillon Road	Minnow Traps (3)	Rising	09:45	12:15
12/18/2019	#24 - rock weir pools near SMA	Seine Net – 10 ft	N/A	12:20	12:30
12/18/2019	#24 - SMA to Port Kenyon Road	Seine Net – 10 ft	N/A	12:30	12:50
12/18/2019	#25 – Port Kenyon Rd to cattle xing	Seine Net – 10 ft	N/A	12:50	13:10
12/18/2019	#25 – cattle xing to upper rock weirs	Seine Net – 10 ft	N/A	13:10	13:30

Five fish species were captured during the December 2019 sampling: Coho Salmon, Threespine Stickleback, Pacific Staghorn Sculpin, Sacramento Pike Minnow, and Surf Smelt (Table 2). Threespine Stickleback was the most common species captured and comprised 82% of all fish sampled in December 2019. All six juvenile Coho Salmon were caught in the 80 foot seine net at Site #32 within the grade control pool at the upper end of the 2019 construction reach (Table 2).

Water quality measurements were made at six locations during the December 2019 fisheries monitoring (Table 3). Cool temperatures with high levels of dissolved oxygen were present at all locations. Salinity measurements were made at two Salt River locations on 12/18/20.

Table 2. Species and numbers of fish captured during the December 2019 Salt River fisheries sampling.

DATE	SITE #	Coho Salmon	Three-spine Stickleback	Pacific Staghorn Sculpin	Sac. Pike Minnow	Surf Smelt
12/17/2019	SR - Fulmor Rd to 1st cutoff channel	0	0	0	0	0
12/17/2019	#28 - alcove upstream of Fulmor Rd	0	0	0	0	0
12/17/2019	#27 - alcove downstream Fulmor Rd	0	6	0	0	0
12/17/2019	SR - 1st cutoff channel to 2nd cutoff	0	0	0	0	0
12/17/2019	SR - 2nd cutoff channel to GC pool	0	0	0	0	0
12/17/2019	#32 - grade control (GC) pool - traps	0	200	0	0	0
12/17/2019	#32 - grade control (GC) pool - net	6	300	0	100	0
12/12/2019	#26 - LB side pool below Fulmor Rd	0	0	0	0	0
12/18/2019	#1-B – near Reas Creek confluence	0	0	0	0	0
12/18/2019	#20 – Reas Creek log weir pools	0	0	0	0	0
12/18/2019	#1 – near Riverside Ranch barn	0	52	11	0	4
12/18/2019	#22 – downstream of Dillon Road	0	0	4	0	0
12/18/2019	#24 - rock weir pools near SMA	0	0	0	0	0
12/18/2019	#24 - SMA to Port Kenyon Road	0	1	0	0	0
12/18/2019	#25 – Port Kenyon Rd to cattle xing	0	22	0	0	0
12/18/2019	#25 – cattle xing to upper rock weirs	0	10	0	2	0
Catch Totals by Species		**6**	**591**	**15**	**102**	**4**

Table 3. Water quality measurements taken during the December 2019 Salt River fisheries sampling.

DATE	TIME (24 HRS)	LOCATION	DEPTH OF READINGS (ft)	DISSOLVED OXYGEN (mg/L)	TEMP (F)	SALINITY (ppt)	COMMENTS AND NOTES
12/17/2019	11:20	#28 - Fulmor Road	0.5	10.4	46.7	N/A	Taken next to LWD structure
12/17/2019	11:20	#28 -Fulmor Road	1.0	10.5	46.4	N/A	Taken next to LWD structure
12/17/2019	13:30	#32 - GC Pool	0.5	9.6	48.6	N/A	Taken in mid-pool by wading out
12/17/2019	13:30	#32 - GC Pool	1.0	9.3	48.2	N/A	Taken in mid-pool by wading out
12/17/2019	13:30	#32 - GC Pool	2.0	9.3	47.9	N/A	Taken in mid-pool by wading out
12/17/2019	13:30	#32 - GC Pool	3.0	9.3	47.7	N/A	Taken in mid-pool by wading out
12/17/2019	13:30	#32 - GC Pool	3.5	9.1	47.7	N/A	Taken in mid-pool by wading out
12/18/2019	10:35	#1-B Salt-Reas	0.5	9.1	47.4	2.7	Taken in SR below Reas Ck confluence
12/18/2019	10:35	#1-B Salt-Reas	1.0	8.9	47.2	2.9	Taken in SR below Reas Ck confluence
12/18/2019	10:35	#1-B Salt-Reas	2.0	7.8	46.5	6.3	Taken in SR below Reas Ck confluence
12/18/2019	10:35	#1-B Salt-Reas	2.5	7.7	47.1	9.4	Taken in SR below Reas Ck confluence
12/18/2019	11:05	#1 - Salt River	0.5	10.4	50.4	17.6	Taken in SR next to Riverside Ranch barn
12/18/2019	11:05	#1 - Salt River	1.0	10.4	50.1	17.8	Taken in SR next to Riverside Ranch barn
12/18/2019	12:15	#22 - Salt River	0.5	10.0	48.5	0.2	Taken in 1st pool below Dillon Road
12/18/2019	12:15	#22 - Salt River	1.0	10.0	48.2	0.2	Taken in 1st pool below Dillon Road
12/18/2019	12:15	#22 - Salt River	2.0	10.0	48.0	0.2	Taken in 1st pool below Dillon Road
12/18/2019	16:00	#24 - Francis Creek	0.5	11.2	49.5	N/A	Taken in 1st pool below Port Kenyon Rd
12/18/2019	16:00	#24 - Francis Creek	1.0	11.3	49.4	N/A	Taken in 1st pool below Port Kenyon Rd

Fish Sampling Results – January 2020

In January 2020, the sampling occurred on the 29th and 30th (Tables 4 and 5). On the 29th, the low tide (at Humboldt Bay North Spit) was 2.9 ft at 08:43 hours. The high tide was 6.0 ft at 13:11 hours.

The winter's first significant rise in Eel River flows occurred in late January with a peak of 35,500 cfs at the Scotia gauge on the 28th. Between January 28th and 29th, the Eel River discharge at Scotia decreased from 35,500 cfs to 17,300 cfs. Flows in the Van Duzen River also peaked on January 28th (3,800 cfs) and were at 2,300 cfs on the 29th.

Table 4. Dates, site numbers and locations, sampling methods, and start and end times for January 2020 Salt River (SR) fisheries sampling. The (#) indicates how many traps were deployed.

DATE	SITE NUMBER AND/OR DESCRIPTION	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME
1/29/2020	#28 - alcove upstream of Fulmor Rd	Minnow Traps (2)	N/A	13:40	13:50
1/29/2020	#27 - alcove downstream Fulmor Rd	Minnow Traps (2)	N/A	14:00	14:15
1/29/2020	#29 - 1st cutoff channel	Seine Net – 10 ft	N/A	14:20	14:45
1/29/2020	#30 - 2nd cutoff channel	Seine Net – 10 ft	N/A	14:50	15:10
1/29/2020	#31 - split channel to GC pool	Seine Net – 10 ft	N/A	15:15	15:15
1/29/2020	#32 - grade control (GC) pool	Seine Net – 80 ft	N/A	15:20	15:20
1/29/2020	#32 – upstream of GC pool	Seine Net – 20 ft	N/A	15:30	15:45
1/29/2020	#26 - LB side pool below Fulmor Rd	Seine Net – 30 ft	N/A	16:00	16:20
1/30/2020	#1-B –near Reas Creek confluence	Seine Net – 20 ft	Ebbing	11:00	11:20
1/30/2020	#20 – Reas Creek log weir pools	Seine Net – 10 ft	Ebbing	11:25	11:40
1/30/2020	#22 – downstream of Dillon Road	Minnow Traps (3)	Ebbing	10:15	14:15
1/30/2020	#24 - rock weir pools near SMA	Seine Net – 10 ft	N/A	12:35	12:45
1/30/2020	#24 - SMA to Port Kenyon Road	Seine Net – 10 ft	N/A	12:45	13:05
1/30/2020	#25 – Port Kenyon Rd to cattle xing	Seine Net – 10 ft	N/A	13:05	13:25
1/30/2020	#25 – cattle xing to upper rock weirs	Seine Net – 10 ft	N/A	13:25	13:50
1/30/2020	#24 - SMA to Port Kenyon Road	Minnow Traps (2)	N/A	10:40	14:00
1/30/2020	#25 – Port Kenyon Rd to cattle xing	Minnow Trap	N/A	10:40	14:00
1/30/2020	#25 – cattle xing to upper rock weirs	Minnow Trap	N/A	10:40	14:00

Six fish species were captured during the January 2020 sampling: Coho Salmon, Coastal Cutthroat Trout, Threespine Stickleback, Pacific Staghorn Sculpin, Sculpin (Species unknown), and Sacramento Pike Minnow (Table 5). Threespine Stickleback was the most common species captured and comprised 58% of all fish sampled in January 2020. A total of 41 juvenile Coho Salmon were caught, including at least one Coho Salmon at every site sampled within the 2019 construction reach on 1/29/20 (Table 5).

Table 5. Species and numbers of fish captured during the January 2020 Salt River fisheries sampling.

DATE	SITE #	Coho Salmon	Coastal Cutthroat Trout	Three-spine Stickleback	Pacific Staghorn Sculpin	Sac. Pike Minnow	Sculpin spp.
1/29/2020	#28 - alcove upstream of Fulmor Rd	1	0	7	0	1	0
1/29/2020	#27 - alcove downstream Fulmor Rd	4	0	8	0	2	0
1/29/2020	#29 - 1st cutoff channel	2	0	60	0	61	0
1/29/2020	#30 - 2nd cutoff channel	1	0	50	0	58	0
1/29/2020	#31 - split channel to GC pool	1	0	25	0	0	0
1/29/2020	#32 - grade control (GC) pool	23	0	250	0	177	0
1/29/2020	#32 – upstream of GC pool	3	0	10	0	1	0
1/29/2020	#26 - LB side pool below Fulmor Rd	2	0	136	32	0	0
1/30/2020	#1-B –near Reas Creek confluence	1	0	5	1	2	1
1/30/2020	#20 – Reas Creek log weir pools	0	0	15	0	25	3
1/30/2020	#22 – downstream of Dillon Road	3	0	14	11	0	6
1/30/2020	#24 - rock weir pools near SMA	0	0	4	4	5	0
1/30/2020	#24 - SMA to Port Kenyon Road	0	1	5	0	2	0
1/30/2020	#25 – Port Kenyon Rd to cattle xing	0	0	3	0	4	0
1/30/2020	#25 – cattle xing to upper rock weirs	0	1	9	0	2	4
Catch Totals by Species		**41**	**2**	**599**	**33**	**340**	**14**

Table 6. Water quality measurements taken during the January 2020 Salt River fisheries sampling.

DATE	TIME (24 HRS)	LOCATION	DEPTH OF READINGS (ft)	DISSOLVED OXYGEN (mg/L)	TEMP (F)	SALINITY (ppt)	COMMENTS AND NOTES
1/29/2020	10:20	#29 - cutoff channel	0.5	9.0	49.9	N/A	Taken in 1st cutoff channel upper most LWD
1/29/2020	10:20	#29 - cutoff channel	0.5	9.6	49.4	N/A	Taken in 1st cutoff channel at 2nd LWD
1/29/2020	10:20	#29 - cutoff channel	1.0	9.5	49.2	N/A	Taken in 1st cutoff channel at 2nd LWD
1/29/2020	10:45	#30 – cutoff channel	0.5	9.8	49.5	N/A	Taken in 2nd cutoff channel at 2nd LWD
1/29/2020	10:45	#30 – cutoff channel	1.0	9.7	49.4	N/A	Taken in 2nd cutoff channel at 2nd LWD
1/29/2020	11:20	#31 – cutoff channel	0.5	10.8	49.8	N/A	Taken in 3rd cutoff channel at 1st LWD
1/29/2020	12:50	#32 - GC Pool	0.5	10.9	52.4	N/A	Taken in mid-pool by wading out
1/29/2020	12:50	#32 - GC Pool	1.0	10.9	52.3	N/A	Taken in mid-pool by wading out
1/29/2020	12:50	#32 - GC Pool	2.0	10.4	52.2	N/A	Taken in mid-pool by wading out
1/29/2020	12:50	#32 - GC Pool	3.0	10.1	52.1	N/A	Taken in mid-pool by wading out
1/29/2020	12:50	#32 - GC Pool	4.0	9.7	51.9	N/A	Taken in mid-pool by wading out
1/30/2020	11:15	#1-B Salt-Reas	0.5	9.4	52.2	0.2	Taken in SR below Reas Ck confluence
1/30/2020	11:15	#1-B Salt-Reas	1.0	9.3	52.1	0.2	Taken in SR below Reas Ck confluence
1/30/2020	11:15	#1-B Salt-Reas	2.0	9.1	52.0	0.2	Taken in SR below Reas Ck confluence
1/30/2020	11:15	#1-B Salt-Reas	3.0	8.9	52.0	0.2	Taken in SR below Reas Ck confluence
1/30/2020	11:40	#20 - Reas Creek	0.5	10.6	52.5	0.2	Taken below series of log weir pools
1/30/2020	11:40	#20 - Reas Creek	1.0	10.6	52.2	0.2	Taken below series of log weir pools
1/30/2020	13:50	#24 - Francis Creek	0.5	10.6	53.7	N/A	Taken downstream of Port Kenyon Rd
1/30/2020	13:50	#24 - Francis Creek	1.0	10.6	53.7	N/A	Taken downstream of Port Kenyon Rd
1/30/2020	14:15	#22 - Salt River	0.5	10.1	54.6	N/A	Taken in 1st pool below Dillon Road
1/30/2020	14:15	#22 - Salt River	1.0	10.1	54.6	N/A	Taken in 1st pool below Dillon Road
1/30/2020	14:15	#22 - Salt River	2.0	9.9	54.2	N/A	Taken in 1st pool below Dillon Road

Fish Sampling Results – February 2020

In February 2020, the sampling occurred on 28th (Tables 7 and 8). On the 28th, the low tide was 1.7 ft at 08:42 hours. On February 28th, the Eel River discharge at Scotia was approximately 1,250 cfs and the flow in the Van Duzen River was 120 cfs. February of 2020 was the third driest February on record for Humboldt County and the Salt River was extremely low and clear, with little suitable habitat for salmonids. The main exception within the 2019 construction reach was Site #32, the grade control pool at the top of the reach.

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

DATE	SITE NUMBER AND/OR DESCRIPTION	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME
2/28/2020	#22 – downstream of Dillon Road	Minnow Traps (2)	Rising	10:40	11:00
2/28/2020	#3 – South slough main channel	Seine Net – 30 ft	Rising	11:05	11:40
2/28/2020	#3 – South slough ditch up to culvert	Seine Net – 10 ft	Rising	9:40	12:15
2/28/2020	#24 - SMA to Port Kenyon Road	Minnow Trap	N/A	10:25	12:05
2/28/2020	#26 - LB side pool below Fulmor Rd	Seine Net – 30 ft	N/A	12:25	12:40
2/28/2020	SR - Fulmor Rd to 1st cutoff channel	Seine Net – 10 ft	N/A	12:45	14:00
2/28/2020	SR - 1st cutoff channel to 2nd cutoff	Seine Net – 10 ft	N/A	14:00	14:20
2/28/2020	SR - 2nd cutoff channel to GC pool	Seine Net – 10 ft	N/A	14:25	15:00
2/28/2020	#32 - grade control pool	Seine Net – 80 ft	N/A	15:25	16:05

Six fish species were captured during the February 2020 sampling: Coho Salmon, Threespine Stickleback, sculpin (species unknown), Pacific Staghorn Sculpin, Sacramento Pike Minnow, and Starry Flounder (Table 8). Sacramento Pike Minnow was the most common species captured and comprised 38% of all fish sampled in February 2020. These Sacramento Pike Minnows were mostly less than 100 mm in fork length. The catch of 328 juvenile Coho Salmon was the largest catch of Coho Salmon made in the five seasons of Salt River fisheries monitoring. Most of these fish were captured in the large pool below the grade control structure (Table 8). Forty of these 315 juvenile Coho Salmon were measured in fork length to the nearest mm. Twelve juvenile Coho Salmon were also captured in the Salt River approximately 30 feet downstream of Site #31 where high flows in January had scoured a pool around two, single-log structures.

Water quality measurements were made at three locations during the February 2020 fisheries monitoring (Table 9). Cool temperatures with high levels of dissolved oxygen were present at all locations. Salinity measurements were made at two Salt River locations on 2/28/20 and levels reflected the lack of freshwater runoff during the near-record dry February (Table 9).

Table 8. Species and numbers of fish captured during the February 2020 Salt River fisheries sampling.

DATE	SITE #	Coho Salmon	Three-spine Stickleback	Pacific Staghorn Sculpin	Sculpin spp.	Sac. Pike Minnow	Starry Flounder
2/28/2020	#22 – downstream of Dillon Road	1	20	37	3	0	0
2/28/2020	#3 – South slough main channel	0	50	374	8	0	0
2/28/2020	#3 – South slough ditch up to culvert	0	2	0	0	0	1
2/28/2020	#24 - SMA to Port Kenyon Road	0	60	4	3	0	0
2/28/2020	#26 - LB side pool below Fulmor Rd	0	20	0	0	73	0
2/28/2020	SR - Fulmor Rd to 1st cutoff channel	0	20	0	0	2	0
2/28/2020	SR - 1st cutoff channel to 2nd cutoff	0	25	0	0	28	0
2/28/2020	SR - 2nd cutoff channel to GC pool	12	30	0	0	134	0
2/28/2020	#32 - grade control pool	315	200	1	0	500	1
Catch Totals by Species		**328**	**427**	**416**	**14**	**737**	**1**

Table 9. Water quality measurements taken during the February 2020 Salt River fisheries sampling.

DATE	TIME (24 HRS)	LOCATION	DEPTH OF READINGS (ft)	DISSOLVED OXYGEN (mg/L)	TEMP (F)	SALINITY (ppt)	COMMENTS AND NOTES
2/28/2020	11:15	Site #3 - Salt River	0.5	7.8	51.1	5.0	Taken in main South Slough channel
2/28/2020	11:15	Site #3 - Salt River	1.0	7.7	51.0	10.6	Taken in main South Slough channel
2/28/2020	11:15	Site #3 - Salt River	2.0	7.5	50.9	11.1	Taken in main South Slough channel
2/28/2020	11:15	Site #3 - Salt River	3.0	6.9	51.2	11.9	Taken in main South Slough channel
2/28/2020	11:40	Site #3 - Salt River	0.5	8.9	52.3	5.9	Taken in pool at culvert at top of ditch
2/28/2020	11:40	Site #3 - Salt River	1.0	7.1	52.7	6.8	Taken in pool at culvert at top of ditch
2/28/2020	16:10	Site #3 - Salt River	1.5	5.8	52.8	11.8	Taken in pool at culvert at top of ditch
2/28/2020	16:10	Site #32 - GC Pool	0.5	10.8	50.6	N/A	Taken in mid-pool by wading out
2/28/2020	16:10	Site #32 - GC Pool	1.0	10.7	50.4	N/A	Taken in mid-pool by wading out
2/28/2020	16:10	Site #32 - GC Pool	2.0	10.4	50.2	N/A	Taken in mid-pool by wading out
2/28/2020	16:10	Site #32 - GC Pool	3.0	9.6	49.8	N/A	Taken in mid-pool by wading out
2/28/2020	16:10	Site #32 - GC Pool	3.5	9.4	49.7	N/A	Taken in mid-pool by wading out

Fish Sampling Results – March 2020

No fisheries monitoring sampling occurred during March of 2020 due to the Covid-19 pandemic. The monitoring was resumed during April 2020 when RTA was able to ensure safe social distancing measures.

Fish Sampling Results – April 2020

The April 2020 fisheries sampling was conducted on the 14th and 15th. On the 14th, the high tide was 6.3 ft at 05:00 hours and the low tide was -0.1 ft at 12:12 hours. On the 14th, the Eel River discharge at Scotia was approximately 2,900 cfs and the flow in the Van Duzen River was 350 cfs. The weather was sunny and breezy and no rain had fallen for past eight to ten days.

Table 10. Dates, site numbers and locations, sampling methods, and start and end times for April 2020 Salt River fisheries sampling. The (#) indicates how many traps were deployed.

DATE	SITE NUMBER AND/OR DESCRIPTION	SAMPLE METHOD	TIDE LEVEL	START TIME	END TIME
4/14/2020	#28 - alcove upstream of Fulmor Rd	Minnow Traps (2)	N/A	9:50	12:20
4/14/2020	#27 - alcove downstream Fulmor Rd	Minnow Traps (2)	N/A	10:00	12:25
4/14/2020	#26 - LB side pool below Fulmor Rd	Minnow Traps (4)	N/A	10:20	12:40
4/14/2020	#26 - LB side pool below Fulmor Rd	Seine Net – 10 ft	N/A	12:45	13:00
4/14/2020	SR - Fulmor Rd to 1st cutoff channel	Seine Net – 10 ft	N/A	13:10	13:20
4/14/2020	SR - 1st cutoff channel to 2nd cutoff	Seine Net – 10 ft	N/A	13:20	13:30
4/14/2020	SR - 2nd cutoff channel to GC pool	Seine Net – 10 ft	N/A	13:30	13:40
4/14/2020	#32 – upstream of GC pool	Seine Net – 10 ft	N/A	13:40	14:00
4/14/2020	Salt River – underneath Route 211	Seine Net – 10 ft	N/A	14:30	15:00
4/14/2020	#32 - grade control pool	Seine Net – 80 ft	N/A	14:00	14:20
4/14/2020	Salt River – underneath Route 211	Seine Net – 20 ft	N/A	15:15	15:50
4/15/2020	#24 - SMA to Port Kenyon Road	Minnow Traps (2)	Ebbing	11:00	11:20
4/15/2020	#22 – downstream of Dillon Road	Minnow Traps (2)	Ebbing	10:15	14:15
4/15/2020	#1-B –near Reas Creek confluence	Seine Net – 20 ft	Ebbing	11:00	11:20
4/15/2020	#20 – Reas Creek log weir pools	Seine Net – 10 ft	Ebbing	11:25	11:40
4/15/2020	#1 – near Riverside Ranch barn	Seine Net – 10 ft	Ebbing	11:25	11:40
4/15/2020	#3 – South slough main channel	Seine net – 20 ft	Ebbing	11:50	12:05
4/15/2020	#3 – South slough ditch up to culvert	Seine net – 10 ft	Ebbing	12:05	12:20
4/15/2020	#24 - rock weir pools near SMA	Seine Net – 10 ft	N/A	12:35	12:45
4/15/2020	#24 - SMA to Port Kenyon Road	Seine net – 20 ft	N/A	12:45	13:05
4/15/2020	#25 – Port Kenyon Rd to cattle xing	Seine net – 20 ft	N/A	13:05	13:25
4/15/2020	#25 – cattle xing to upper rock weirs	Seine net – 20 ft	N/A	13:25	13:50

Seven fish species were captured during the April 2020 sampling: juvenile Coho Salmon, Coastal Cutthroat Trout, Threespine Stickleback, Pacific Staghorn Sculpin, sculpin (species unknown), Sacramento Pike Minnow and Bay Pipefish (Table 11). Sacramento Pikeminnow was the most common species captured and comprised 52% of all fish sampled in April 2020. These fish were mostly juveniles with fork lengths less than 100 mm; however one individual caught at Site #1 was 175 mm in fork length. We checked the stomach of this Sacramento Pikeminnow and it was empty.

All of the 105 juvenile Coho Salmon sampled in April 2020 were captured in the new project reach; none were sampled in Francis Creek or in the lower Salt River. Most of these fish (70) were captured at Site #32, the grade control pool at the top of the 2019 project reach. Twenty of these juvenile Coho Salmon were measured in fork length to the nearest mm. We also sampled the channel above the grade control and caught two Coho Salmon. This led us to sampling under the Route 211 Bridge where a relatively deep and long pool exists. A total of 29 juvenile Coho Salmon were caught under the bridge and these fish were relocated downstream to the grade control pool because the Salt River flow was going sub-surface through the grade control (migration barrier) and the water temperature under the Route 211 Bridge was >70^{o}F. Fork lengths (mm) were measured on 18 of these juvenile Coho Salmon. Because the numbers of juvenile Coho Salmon caught in one seine net pass in the grade control pool dropped from 315 fish in late February to 70 fish in April suggests that fish were starting to smolt and out-migrate. Many of the juvenile Coho Salmon caught on 4/14/20 exhibited signs of smolting, such as silvery/flakey scales and dark borders on caudal and dorsal fins (Figure 4).

Water quality measurements were made at 12 locations during the April 2020 fisheries monitoring (Table 12). In the afternoons, water temperatures at most locations were in the low to mid 60's. As previously mentioned, water temperatures exceeded 70^{o}F in the Salt River underneath the Route 211 Bridge. This water was flowing off of a shallow ponded area on the dairy fields located upstream of Route 211. On 4/15/2020, water temperatures were taken within the Francis Creek SMA and documented that as flow passed through the shallow and exposed SMA, temperatures increased by 3.5^{o}F (Table 11). Dissolved oxygen levels also decreased by 4.5 mg/L as flow moved through the Francis Creek SMA (Table 11). Francis Creek at the upstream end of the restored channel reach was 3.0^{o}F cooler than lower creek where it entered the SMA (Table 11).

Fish Sampling Results – May 2020

Although RTA was not budgeted to sample the Salt River enhancement project for the month of May, CDFW was still unable to send field crews out because of Covid-19. In early May we were concerned that low flows may impede smolts from out-migrating due to the extensive reach of extremely shallow channel through the 2019 construction reach. Through conversations with the Humboldt County RCD and CDFW, RTA was directed to seine the grade control pool and relocate any captured Coho Salmon downstream to the area around Reas Creek/Salt River confluence. Fortunately, an extremely wet front passed through northern California the week of May 18th-24th and dropped nearly four inches of rain. On May 26th, RTA made two passes through the grade control pool with the 80-foot long seine net and no juvenile Coho Salmon

were captured, indicating that the elevated flows from the recent storm provided any remaining smolts ideal conditions for out-migration. On the 5/26/20 seining of the grade control pool, an estimated 2,000-2,500 Threespine Sticklebacks were caught and 111 Sacramento Pike Minnow were caught and humanely dispatched.

Water quality measurements in the grade control pool on 5/26/20 at 10:30 hours were:

- Depth 0.5 feet = 6.0 mg/L and 62.5^{o}F.
- Depth 1.0 feet = 5.8 mg/L and 62.3^{o}F.
- Depth 2.0 feet = 5.7 mg/L and 62.3^{o}F.
- Depth 3.0 feet = 5.6 mg/L and 62.2^{o}F.
- Depth 4.0 feet = 5.5 mg/L and 62.1^{o}F.

Figure 4. Coho Salmon smolt (140 mm in FL) caught in grade control pool on 4/14/20.

Table 11. Species and numbers of fish captured during the April 2020 Salt River fisheries sampling.

DATE	SITE #	Coho Salmon	Coastal Cutthroat Trout	Three-spine Stickleback	Pacific Staghorn Sculpin	Sac. Pike Minnow	Sculpin spp.	Bay Pipefish
4/14/2020	#28 - alcove upstream of Fulmor Rd	0	0	0	0	0	0	0
4/14/2020	#27 - alcove downstream Fulmor Rd	0	0	0	0	0	0	0
4/14/2020	#26 - LB side pool below Fulmor Rd	4	0	0	0	0	0	0
4/14/2020	#26 - LB side pool below Fulmor Rd	0	0	50	0	150	0	0
4/14/2020	SR - Fulmor Rd to 1st cutoff channel	0	0	0	0	0	0	0
4/14/2020	SR - 1st cutoff channel to 2nd cutoff	0	0	0	0	0	0	0
4/14/2020	SR - 2nd cutoff channel to GC pool	0	0	3	0	0	0	0
4/14/2020	#32 – upstream of GC pool	2	0	0	0	0	0	0
4/14/2020	Salt River – underneath Route 211	18	0	50	0	100	0	0
4/14/2020	#32 - grade control pool	70	0	200	0	300	0	0
4/14/2020	Salt River – underneath Route 211	11	0	20	0	50	0	0
4/15/2020	#24 - SMA to Port Kenyon Road	0	0	3	0	0	0	0
4/15/2020	#22 – downstream of Dillon Road	0	0	20	0	0	1	0
4/15/2020	#1-B –near Reas Creek confluence	0	0	4	12	0	0	0
4/15/2020	#20 – Reas Creek log weir pools	0	0	3	1	0	0	0
4/15/2020	#1 – near Riverside Ranch barn	0	0	4	34	71	1	0
4/15/2020	#3 – South slough main channel	0	0	1	5	1	0	0
4/15/2020	#3 – South slough ditch up to culvert	0	0	37	55	0	0	1
4/15/2020	#24 - rock weir pools near SMA	0	0	3	0	0	0	0
4/15/2020	#24 - SMA to Port Kenyon Road	0	0	8	0	0	0	0
4/15/2020	#25 – Port Kenyon Rd to cattle xing	0	0	5	0	1	0	0
4/15/2020	#25 – cattle xing to upper rock weirs	0	1	93	0	5	0	0
Catch Totals by Species		**105**	**1**	**414**	**107**	**686**	**2**	

Table 12. Water quality measurements taken during the April 2020 Salt River fisheries sampling.

DATE	TIME (24 HRS)	LOCATION	DEPTH OF READINGS (ft)	DISSOLVED OXYGEN (mg/L)	TEMP (F)	SALINITY (ppt)	COMMENTS AND NOTES
4/14/2020	10:50	SR – main channel	0.5	11.4	54.9	N/A	Taken by LWD below 3rd cutoff channel
4/14/2020	10:50	SR – main channel	1.0	11.1	54.9	N/A	Taken by LWD below 3rd cutoff channel
4/14/2020	10:50	SR – main channel	1.5	10.8	54.7	N/A	Taken by LWD below 3rd cutoff channel
4/14/2020	13:00	SR – main channel	0.5	7.8	61.4	N/A	Taken in main channel next to Site #26
4/14/2020	13:00	SR – main channel	1.0	7.4	61.5	N/A	Taken in main channel next to Site #26
4/14/2020	13:00	SR – main channel	2.0	7.1	60.3	N/A	Taken in main channel next to Site #26
4/14/2020	13:00	SR – main channel	3.0	6.8	60.1	N/A	Taken in main channel next to Site #26
4/14/2020	14:30	#32 - GC Pool	0.5	9.7	65.2	N/A	Taken in mid-pool by wading out
4/14/2020	14:30	#32 - GC Pool	1.0	9.3	64.2	N/A	Taken in mid-pool by wading out
4/14/2020	14:30	#32 - GC Pool	2.0	8.4	59.3	N/A	Taken in mid-pool by wading out
4/14/2020	14:30	#32 - GC Pool	3.0	7.8	54.5	N/A	Taken in mid-pool by wading out
4/14/2020	14:30	#32 - GC Pool	4.0	7.1	53.9	N/A	Taken in mid-pool by wading out
4/14/2020	15:30	SR – 211 bridge	0.5	4.8	71.4	N/A	Taken at upper end of pool under bridge
4/14/2020	15:30	SR – 211 bridge	1.0	4.0	70.1	N/A	Taken at upper end of pool under bridge
4/15/2020	10:55	#1-B Salt-Reas	0.5	8.9	54.9	0.5	Taken in SR below Reas Ck confluence
4/15/2020	10:55	#1-B Salt-Reas	1.0	8.9	54.8	1.2	Taken in SR below Reas Ck confluence
4/15/2020	10:55	#1-B Salt-Reas	2.0	8.7	55.2	2.6	Taken in SR below Reas Ck confluence
4/15/2020	11:15	Salt River at Site #1	0.5	9.3	55.5	0.9	Taken in SR by Riverside Ranch barn
4/15/2020	11:15	Salt River at Site #1	1.0	9.3	55.5	1.5	Taken in SR by Riverside Ranch barn
4/15/2020	12:00	Salt River at Site #3	0.5	5.7	60.7	0.7	Taken in South Slough
4/15/2020	12:00	Salt River at Site #3	1.0	5.5	60.6	1.9	Taken in South Slough
4/15/2020	12:00	Salt River at Site #3	2.0	5.5	60.6	2.3	Taken in South Slough
4/15/2020	12:25	Salt River at Site #3	0.5	8.2	63.7	3.7	Taken in pool at tide gate in ditch channel
4/15/2020	12:25	Salt River at Site #3	1.0	7.9	63.4	7.9	Taken in pool at tide gate in ditch channel
4/15/2020	13:15	Salt River at Site #22	1.0	11.3	56.8	N/A	Taken in 1st pool below Dillon Road
4/15/2020	13:15	Salt River at Site #22	2.0	11.0	56.7	N/A	Taken in 1st pool below Dillon Road
4/15/2020	13:15	Salt River at Site #22	3.0	10.9	56.5	N/A	Taken in 1st pool below Dillon Road

Table 12 (continued).

DATE	TIME (24 HRS)	LOCATION	DEPTH OF READINGS (ft)	DISSOLVED OXYGEN (mg/L)	TEMP (F)	SALINITY (ppt)	COMMENTS AND NOTES
4/15/2020	13:45	Francis Ck - Site #24	0.5	6.2	60.8	N/A	Taken at downstream end of SMA
4/15/2020	13:45	Francis Ck - Site #24	0.5	10.7	57.3	N/A	Taken at upstream end of SMA
4/15/2020	15:15	Francis Ck - Site #24	0.5	11.3	54.3	N/A	Taken in pool at top of restored reach
4/15/2020	15:15	Francis Ck - Site #24	1.0	11.5	54.1	N/A	Taken in pool at top of restored reach
4/15/2020	15:15	Francis Ck - Site #24	2.0	11.7	54.0	N/A	Taken in pool at top of restored reach

Fisheries Monitoring Results – Comparison of Data Sets from Five Fall/Winter Seasons

Prior to the 2019-2020 season, fish sampling within the restored Riverside Ranch reach of the Salt River had 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 captured 22 fish species; 19 native and three non-native (Sacramento Pike Minnow, California Roach and Green Sunfish) (Table 13). When comparing the data, the most apparent difference is the species diversity between the first season and the subsequent seasons (Table 13). 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 13). 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.

During the 2019-2020 monitoring, most of the fisheries sampling effort was focused within the 2019 construction reach, with limited sampling within the tidally-influenced, brackish water, reach on the Riverside Ranch. Thus, comparisons of fish species captured in 2019-2020 with earlier data sets are not necessarily accurate portrayals of species diversity or presence within the Salt River watershed since earlier seasons consisted of more sampling effort at brackish water sites. However, during the 2019-2020 monitoring a total of nine fish species were captured, including a Starry Flounder and a Bay Pipefish, two species that had only been caught during the 2014-2015 season (Table 13).

As the Salt River enhancement project extends upstream and more freshwater habitat is made available, Sacramento Pike Minnow have become a more common fish species (Table 14). During two of the four sampling events in 2019-2020, Sacramento Pike Minnow were the most abundant fish species captured. Consistent with previous seasons, nearly all of the Sacramento Pike Minnow sampled in 2019-2020 were less than 100 mm in fork length.

Despite the reduced sampling effort in brackish water habitats, the 571 Pacific Staghorn Sculpin captured during the 2019-2020 season was the highest catch of this species for the five seasons of fisheries monitoring (Table 14). Approximately 65% of the season's catch was from one seine net pass in the terminal ditch at Site #3 on 2/28/20. Most of these 374 Pacific Staghorn Sculpin appeared to be age-0 or age-1 juveniles (30 to 50 mm in FL).

No Tidewater Goby were caught during the 2019-2020 fisheries monitoring, yet we did not sample any sites that were consistent goby locations in previous years. As suggested in earlier reports, a concerted effort to locate goby habitat in the lower Salt River should focus on sampling side channels off the major slough channels in areas that retain water at low tide.

Table 13. 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	Captured in 2019-2020
COHO SALMON	X	X	X	X	X
TIDEWATER GOBY	X	X	X	X	
STICKLEBACK	X	X	X	X	X
SCULPIN SP.	X	X	X	X	X
STAGHORN SCULPIN	X	X	X	X	X
PIKE MINNOW	X	X	X	X	X
CALIFORNIA ROACH	X	X	X	X	
SURF SMELT	X	X	X	X	X
PACIFIC LAMPREY	X	X			
PACIFIC HERRING	X	X	X		
LONGFIN SMELT	X		X		
GREEN SUNFISH		X	X		
BAY PIPEFISH	X				X
SHINER SURFPERCH	X				
TOP SMELT	X				
STARRY FLOUNDER	X				X
SADDLEBACK GUNNEL	X				
JUVENILE ROCKFISH	X				
CUTTHROAT TROUT				X*	X**
CHINOOK SALMON	X			X*	
STEELHEAD		X			
PACIFIC RAINBOW SMELT			X		
No. of Species Caught	**18**	**12**	**11**	**10**	**9**

*caught in Francis Creek during post-project monitoring on 6/21/18. **caught in Francis Creek.

Table 14. Comparison summaries of Salt River fish (eight species) abundance by sampling season, for select species captured during five seasons of fall/winter sampling.

SPECIES LIST	# Captured in 2014-2015	# Captured in 2015-2016	# Captured in 2016-2017	# Captured in 2017-2018	# Captured in 2019-2020
COHO SALMON	**37**	**42**	**24**	**10**	**482**
TIDEWATER GOBY	**318**	**7**	**4**	**7**	**0**
STICKLEBACK	**9,875**	**3,675**	**5,488**	**1,783**	**2,116**
SCULPIN SP.	**1,092**	**10**	**7**	**7**	**30**
STAGHORN SCULPIN	**157**	**481**	**188**	**232**	**571**
PIKE MINNOW	**131**	**408**	**1,080**	**423**	**1,865**
CALIFORNIA ROACH	**18**	**255**	**66**	**15**	**0**
SURF SMELT	**233**	**43**	**1**	**3**	**4**
ANNUAL TOTAL CATCH	**11,861**	**4,921**	**6,858**	**2,480**	**5,068**

Fish Sampling Results – Salmonids

In regards to juvenile Coho Salmon, the 482 fish captured during the 2019-2020 season was more than 10-fold the previous season-high catch of 42 fish during the 2015-2016 season (Table 14). Most of these juvenile Coho Salmon (414 fish) were caught in the large pool at the grade control structure at the upper end of the 2019 construction reach. An additional 32 juvenile Coho Salmon were captured upstream of the grade control, thus nearly 93% of the season's catch occurred at the top of the enhancement reach. Juvenile Coho Salmon were found in low numbers in other areas of the 2019 construction reach only when stream flows were elevated. During low flow periods, the Salt River main channel, the two alcoves sites, and three off-channel sites were too shallow to provide sufficient habitat for sheltering and rearing.

For the past three sampling seasons, we measured the fork lengths to the nearest millimeter of juvenile Coho Salmon (Table 15). In 2019-2020, we measured only a subset of fish from the grade control pool when large numbers were captured in February and April because we were more concerned about minimizing handling time and associated stress. Fork lengths of 134 juvenile Coho Salmon were measured during the 2019-2020 season (Appendix B). Average lengths of juvenile Coho Salmon during the 2019-2020 season were somewhat comparable to previous seasons; however average lengths from previous seasons were generated from small sample sizes of fish (Table 15).

Table 15. Average fork length (mm) summaries of juvenile Coho Salmon captured during the 2016-2017 and 2017-2018 Salt River sampling. N/A = not available because no Coho were captured during these months and/or no sampling occurred during these months.

SAMPLING MONTH	AVERAGE FORK LENGTH (mm) in 2016-2017	AVERAGE FORK LENGTH (mm) in 2017-2018	AVERAGE FORK LENGTH (mm) in 2019-2020
November	72.0 (9 fish)	82.5 (2 fish)	N/A
December	75.9 (7 fish)	N/A	89.7 (6 fish)
January	N/A	N/A	90.6 (41 fish)
February	90.0 (2 fish)	N/A	97.1 (43 fish)
March	106.2 (6 fish)	90.2 (8 fish)	N/A
April	N/A	N/A	106.2 (44 fish)

Salt River 2019-2020 Fisheries Monitoring – Discussion and Recommendations

The most encouraging aspect of the 2019-2020 fisheries monitoring was the large numbers of juvenile Coho Salmon captured in the 2019 construction reach. The large pool at the grade control provided sufficient habitat for these fish to rear and grow from December through March. The two alcoves and three off-channel features constructed in 2019 appeared to only be occupied by Coho Salmon when flows were elevated. At base winter flows and lower, such as during most of February of 2020, these structures lacked depth for rearing and cover. Also, the channel reaches between alcoves and off-channel habitats were shallow and relatively barren of functional fish habitat (Figure 5). Because the Salt River monitoring program is based

on adaptive management, we recommend that more emphasis is placed on creating salmonid rearing habitat that is functional on a wider range of flows, especially lower flows. Pools with depths greater than the current channel's depths would be beneficial, along with the placement of more wood structures with rootwads. The single log structures along the 2019 construction reach provide minimal cover for fish and should be allowed to accumulate storm debris and scour the channel to form more suitable salmonid rearing habitat. RTA also recommends that project managers consider leaving the large pool at the grade control structure intact as construction moves farther upstream and consider adding LWD structures to this large pool.

The lack of Tidewater Gobies during the 2019-2020 season was largely influenced by minimal sampling focused on catching this species. While on the Riverside Ranch property we did inspect several of the original monitoring sites where gobies had been caught, including Site #7, Site #8 and Site #17. These sites have continued to fill with sediment, including the LWD rootwad pools at Sites #7 and #17. If more information about Tidewater Goby presence and distribution within the Riverside Ranch property is desired, additional sampling with a 1/8-inch seine net 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 continue to recommend that additional sites are established as the channel excavation process continues to move farther upstream, including establishing fisheries monitoring sites within Williams Creek.

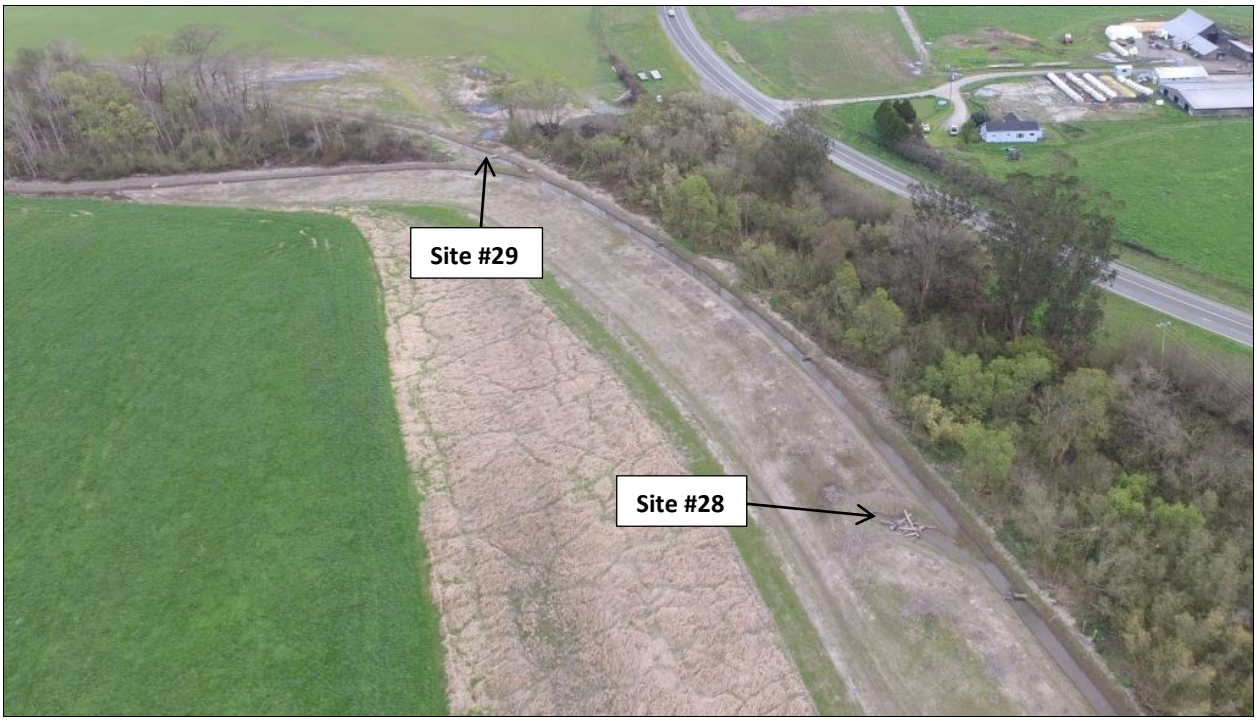

Figure 5. Salt River enhancement reach near fisheries monitoring Sites #28 and #29.

APPENDIX A: CATALOG OF SALT RIVER 2020 SAMPLE SITES

Photo credit: Michael Love and Associates

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-B: Located on the Salt River main channel, just below the 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 high and low tides.

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 #22: Channel reach located downstream of Dillon Road Bridge (2015 and 2020).

Site #24: Francis Creek from the Sediment Management Area upstream to Port Kenyon Road.

Site #25: Francis Creek from Port Kenyon Road to top of restoration reach (2018 and 2020).

Site #26: Salt River – Left-bank, rip-rapped, side pool downstream of Fulmor Road Bridge.

Site #27: Salt River – Alcove downstream of Fulmor Road Bridge, elevated flow on 1/29/20.

Site #28: Salt River – Alcove upstream of Fulmor Road Bridge, low flow on 5/26/20.

Site #29: Salt River – Off-Channel #1, elevated flow on 1/29/20 and low flow on 5/26/20.

Site #30: Salt River – Off-Channel #2.

Site #31: Salt River – Split Channel with single log structures.

Site #32: Salt River – Temporary grade control structure and pool at end of 2019 construction.

APPENDIX B: COHO SALMON INFORMATION

DATE	SITE DESCRIPTION	SAMPLE METHOD	FORK LENGTH (mm)
12/17/2019	Grade Control (GC) pool at top of project	Seine - 80 ft	80
12/17/2019	Grade Control (GC) pool at top of project	Seine - 80 ft	83
12/17/2019	Grade Control (GC) pool at top of project	Seine - 80 ft	85
12/17/2019	Grade Control (GC) pool at top of project	Seine - 80 ft	90
12/17/2019	Grade Control (GC) pool at top of project	Seine - 80 ft	95
12/17/2019	Grade Control (GC) pool at top of project	Seine - 80 ft	105
1/29/2020	First off-channel near parking area	Seine - 10 ft	89
1/29/2020	First off-channel near parking area	Seine - 10 ft	80
1/29/2020	Second off-channel - top of wooded reach	Seine - 10 ft	108
1/29/2020	Third off-channel - near bend towards GC pool	Seine - 10 ft	86
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	104
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	98
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	99
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	100
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	98
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	81
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	97
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	98
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	86
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	83
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	79
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	92
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	81
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	85
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	93
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	99
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	77
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	87
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	102
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	93
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	95
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	105
1/29/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	95
1/29/2020	Upstream of GC pool - below Route 211 bridge	Seine - 10 ft	87

DATE	SITE DESCRIPTION	SAMPLE METHOD	FORK LENGTH (mm)
1/29/2020	Upstream of GC pool - below Route 211 bridge	Seine - 10 ft	88
1/29/2020	Upstream of GC pool - below Route 211 bridge	Seine - 10 ft	104
1/29/2020	Alcove upstream of Fulmor Road	Minnow trap	80
1/29/2020	Alcove downstream of Fulmor Road	Minnow trap	105
1/29/2020	Alcove downstream of Fulmor Road	Seine - 10 ft	93
1/29/2020	Alcove downstream of Fulmor Road	Seine - 10 ft	78
1/29/2020	Alcove downstream of Fulmor Road	Seine - 10 ft	83
1/29/2020	Salt River - LB riprap side pool below Fulmor Rd	Seine - 10 ft	79
1/29/2020	Salt River - LB riprap side pool below Fulmor Rd	Seine - 10 ft	89
1/30/2020	Salt River - by Reas Creek confluence	Seine - 20 ft	83
1/30/2020	Salt River by Dillon Road Bridge	Minnow trap	85
1/30/2020	Salt River by Dillon Road Bridge	Minnow trap	95
1/30/2020	Salt River by Dillon Road Bridge	Minnow trap	90
2/28/2020	#3 - Main slough channel	Seine - 20 ft	97
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	93
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	89
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	94
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	94
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	97
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	87
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	103
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	104
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	92
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	95
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	97
2/28/2020	Salt River - 2nd cutoff channel to GC pool	Seine - 10 ft	98
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	93
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	102
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	107
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	97
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	86
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	91
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	109
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	87
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	102

DATE	SITE DESCRIPTION	SAMPLE METHOD	FORK LENGTH (mm)
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	113
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	98
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	83
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	96
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	103
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	96
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	94
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	105
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	102
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	98
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	84
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	87
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	106
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	112
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	110
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	93
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	92
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	101
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	97
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	93
2/28/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	100
4/14/2020	Salt River - LB riprap side pool below Fulmor Rd	Minnow trap	97
4/14/2020	Salt River - LB riprap side pool below Fulmor Rd	Minnow trap	102
4/14/2020	Salt River - LB riprap side pool below Fulmor Rd	Minnow trap	89
4/14/2020	Salt River - LB riprap side pool below Fulmor Rd	Minnow trap	85
4/14/2020	Salt River above Grade Control	Seine - 10 ft	97
4/14/2020	Salt River above Grade Control	Seine - 10 ft	103
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	140
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	123
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	118
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	104
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	98
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	109
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	115
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	121
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	107

DATE	SITE DESCRIPTION	SAMPLE METHOD	FORK LENGTH (mm)
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	132
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	127
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	99
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	124
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	113
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	118
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	111
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	108
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	107
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	126
4/14/2020	Grade Control (GC) pool at top of project	Seine - 80 ft	102
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	97
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	103
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	109
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	98
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	93
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	110
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	83
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	89
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	98
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	101
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	112
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	107
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	95
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	93
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	102
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	107
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	103
4/14/2020	Salt River underneath Route 211 bridge	Seine - 10 ft	99