

ENHANCED ACOUSTIC TAGGING, ANALYSIS, AND REAL-TIME MONITORING OF WILD AND HATCHERY SALMONIDS IN THE SACRAMENTO RIVER VALLEY

Semi-annual report October 1, 2023 to March 31, 2024

Prepared for:

United States Bureau of Reclamation
Cooperative Agreement R21AC10455

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Introduction

This report summarizes the fieldwork, data collection, and analysis performed by UC Santa Cruz (UCSC) between October 1 and March 31, 2024, as part of the Cooperative Agreement R21AC10455 between the US Bureau of Reclamation (USBR) and UCSC. This is the fourth semi-annual report for the Cooperative Agreement R21AC10455, extending from April 1, 2021 to September 30, 2026. This semi-annual report outlines deliverables for the six tasks described by the agreement.

Task 1. Deploy real-time array of JSATS receivers

There were 38 real-time receivers deployed and/or retrieved during this quarter (Table 1). All acoustic receivers stationed in the Lower Sacramento River (5), Stanislaus River (1), and Carquinez Strait (32) were retrieved and deployed by UCSC.

All real-time receivers shown in Table 1 were operational during this quarter, except for temporary receiver outages due to SD card failure, modem disconnect. Site visits were conducted at all locations for quarterly data downloads, maintenance, and SD card swaps. Maintenance for the instruments included updating firmware, replacing two receivers at Meridian Bridge and Benicia, installing new beacon tags and a new hydrophone.

A detailed spreadsheet of all real-time receiver deployments can be found here: <https://docs.google.com/spreadsheets/d/1oBfEO3cIdP9PJxLxyN9kJ2yYpufTfGIIDvBtVnU8muo/edit#gid=79918077>

Table 1: Table 1. Location of real-time JSATS receivers deployed during this report period with the date first operational in real-time

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
Lower Sac R	MeridianBr	39.14556	-121.9182	290.848	ATS SR3017	17134	2023-06-27 09:59:30	2023-12-08 10:08:00
Lower Sac R	MeridianBr	39.14557	-121.9183	290.858	ATS SR3017	21151	2023-06-27 10:01:00	2023-12-08 10:06:00
Carquinez Strait	Benicia01	38.04494	-122.1269	52.041	ATS SR3017	17130	2023-09-28 13:15:00	2024-02-05 11:49:00
Carquinez Strait	Benicia02	38.04377	-122.1260	52.042	ATS SR3017	18008	2023-09-28 12:35:00	2024-02-05 11:58:00
Carquinez Strait	Benicia03	38.04243	-122.1250	52.043	ATS SR3017	17145	2023-09-28 12:22:00	2024-02-05 12:06:00
Carquinez Strait	Benicia04	38.04123	-122.1238	52.044	ATS SR3017	17147	2023-09-28 12:13:00	2024-02-05 12:14:00
Carquinez Strait	Benicia05	38.03994	-122.1230	52.045	ATS SR3017	20046	2023-09-28 12:05:00	2024-02-05 12:21:00
Carquinez Strait	Benicia06	38.03896	-122.1219	52.046	ATS SR3017	17148	2023-09-28 11:55:00	2024-02-05 12:28:00
Carquinez Strait	Benicia07	38.03762	-122.1211	52.047	ATS SR3017	17143	2023-09-28 11:44:00	2024-02-05 12:38:00
Carquinez Strait	Benicia08	38.03645	-122.1201	52.048	ATS SR3017	17146	2023-09-28 11:36:00	2024-02-05 12:48:00

Table 1: Table 1. Location of real-time JSATS receivers deployed during this report period with the date first operational in real-time

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
Carquinez Strait	Benicia09	38.04748	-122.1254	52.236	ATS SR3017	18001	2023-09-28 09:50:00	2024-02-05 13:47:00
Carquinez Strait	Benicia10	38.04682	-122.1248	52.237	ATS SR3017	21154	2023-09-28 10:09:00	2024-02-05 13:39:00
Carquinez Strait	Benicia11	38.04529	-122.1242	52.238	ATS SR3017	17135	2023-09-28 10:18:00	2024-02-05 13:32:00
Carquinez Strait	Benicia12	38.04337	-122.1234	52.239	ATS SR3017	22143	2023-09-28 10:49:00	2024-02-05 13:23:00
Carquinez Strait	Benicia13	38.04241	-122.1220	52.240	ATS SR3017	17127	2023-09-28 10:58:00	2024-02-05 13:17:00
Carquinez Strait	Benicia14	38.04165	-122.1211	52.241	ATS SR3017	17125	2023-09-28 11:11:00	2024-02-05 13:10:00
Carquinez Strait	Benicia15	38.04016	-122.1200	52.242	ATS SR3017	17141	2023-09-28 11:18:00	2024-02-05 13:02:00
Carquinez Strait	Benicia16	38.03872	-122.1193	52.243	ATS SR3017	21150	2023-09-28 11:26:00	2024-02-05 12:55:00
Stanislaus R	ValleyOak_	37.78558	-120.8012	262.320	ATS SR3017	17133	2023-10-25 11:56:00	
Lower Sac R	MeridianBr_	39.14556	-121.9182	290.848	ATS SR3017	17134	2023-12-08 10:08:00	
Lower Sac R	MeridianBr	39.14557	-121.9183	290.858	ATS SR3017	22123	2023-12-08 10:15:00	2024-03-07 13:20:00
Carquinez Strait	Benicia01	38.04494	-122.1269	52.041	ATS SR3017	17130	2024-02-05 11:50:00	
Carquinez Strait	Benicia02	38.04377	-122.1260	52.042	ATS SR3017	18008	2024-02-05 11:58:00	
Carquinez Strait	Benicia03	38.04243	-122.1250	52.043	ATS SR3017	17145	2024-02-05 12:06:00	
Carquinez Strait	Benicia04	38.04123	-122.1238	52.044	ATS SR3017	17147	2024-02-05 12:14:00	
Carquinez Strait	Benicia05	38.03994	-122.1230	52.045	ATS SR3017	20046	2024-02-05 12:21:00	
Carquinez Strait	Benicia06	38.03896	-122.1219	52.046	ATS SR3017	17148	2024-02-05 12:28:00	
Carquinez Strait	Benicia07	38.03762	-122.1211	52.047	ATS SR3017	17143	2024-02-05 12:38:00	
Carquinez Strait	Benicia08	38.03645	-122.1201	52.048	ATS SR3017	17146	2024-02-05 12:48:00	

Table 1: Table 1. Location of real-time JSATS receivers deployed during this report period with the date first operational in real-time

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
Carquinez Strait	Benicia09	38.04748	-122.1254	52.236	ATS SR3017	18001	2024-02-05 13:47:00	
Carquinez Strait	Benicia10	38.04682	-122.1248	52.237	ATS SR3017	21154	2024-02-05 13:39:00	
Carquinez Strait	Benicia11	38.04529	-122.1242	52.238	ATS SR3017	17135	2024-02-05 13:32:00	
Carquinez Strait	Benicia12	38.04337	-122.1234	52.239	ATS SR3017	22143	2024-02-05 13:23:00	
Carquinez Strait	Benicia13	38.04241	-122.1220	52.240	ATS SR3017	17127	2024-02-05 13:17:00	
Carquinez Strait	Benicia14	38.04165	-122.1211	52.241	ATS SR3017	17125	2024-02-05 13:09:00	
Carquinez Strait	Benicia15	38.04016	-122.1200	52.242	ATS SR3017	17141	2024-02-05 13:02:00	
Carquinez Strait	Benicia16	38.03872	-122.1193	52.243	ATS SR3017	21150	2024-02-05 12:55:00	
Lower Sac R	MeridianBr	38.04557	-121.9183	290.858	ATS SR3017	22129	2024-03-07 13:20:00	

Deliverables 1-4 were met by posting data relating to survival and movement to the website: <https://oceanview.pfeg.noaa.gov/CalFishTrack>

Deliverables:

1. Web-accessible reporting status of real-time receivers
2. Real-time data available through ERDDAP data server, updated daily
3. Web-accessible real-time receiver data available in open data format
4. Web-accessible summary database of deployment of receivers
5. Data quality assurance of no more than 3 days of downtime before a site visit to reestablish real-time operations
6. Provide a semi-annual compiled raw data file for each real-time receiver along with deployment meta-data to Arnold Ammann (NMFS)

Task 2. Deploy autonomous array of JSATS and Vemco receivers

Autonomous Receiver Deployment

There were 89 autonomous receivers retrieved and/or deployed during this report period (Table 2). All acoustic receivers stationed in the Sacramento River, Delta, and Golden Gate were retrieved and deployed by UCSC. These locations include the McCloud River (16), Butte Creek (1), the Sutter Bypass (5), the lower Sacramento River (28), the Stanislaus River (1), and Golden Gate (20).

Table 2: Table 2. Autonomous JSATS receivers deployed and retrieved during this report period

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
Stanislaus R	CAS_DS1	37.69255	-121.2014	198.370	Lotek 4350L	2000377	2023-03-09 09:48:00	2023-10-10 10:30:00
McCloud R	JSCS_DS_1	40.93346	-122.2489	576.310	Lotek 4350L	2000376	2023-09-26 10:59:00	2023-10-19 11:51:00
McCloud R	JSCS_DS_2	40.93329	-122.2487	576.320	Lotek 4350L	2000086	2023-09-26 11:14:00	2023-10-19 11:32:00
McCloud R	JSCS_DS_3	40.93293	-122.2493	576.330	Lotek 4350L	2000375	2023-09-26 11:34:00	2023-10-19 11:35:00
McCloud R	JSCS_DS_4	40.93270	-122.2497	576.340	Lotek 4350L	2000368	2023-09-26 11:45:00	2023-10-19 11:40:00
McCloud R	JSCS_DS_5	40.93259	-122.2494	576.350	Lotek 4350L	2000083	2023-09-26 11:53:00	2023-10-19 11:38:00
McCloud R	JSCS_US_1	40.93365	-122.2487	576.400	Lotek 4350L	2000360	2023-09-26 12:17:00	2023-11-09 09:00:00
McCloud R	JSCS_US_2	40.93347	-122.2484	576.500	Lotek 4350L	2000373	2023-09-26 12:25:00	2023-11-09 09:00:00
McCloud R	JSCS_US_3	40.93392	-122.2481	576.600	Lotek 4350L	2000081	2023-09-26 12:36:00	2023-11-09 09:00:00
McCloud R	JSCS_US_4	40.93410	-122.2478	576.700	Lotek 4350L	2000359	2023-09-26 13:10:00	2023-11-09 09:00:00
McCloud R	JSCS_US_5	40.93423	-122.2480	576.800	Lotek 4350L	2000369	2023-09-26 13:18:00	2023-11-09 09:00:00
McCloud R	Temp_Curt_1	40.91436	-122.2396	573.610	Lotek 4350L	2000363	2023-09-26 16:53:00	2023-12-07 09:00:00
McCloud R	Temp_Curt_2	40.91473	-122.2394	573.620	Lotek 4350L	2000365	2023-09-26 16:54:00	2023-12-07 09:00:00
McCloud R	Temp_Curt_3	40.92203	-122.2455	574.610	Lotek 4350L	2000374	2023-09-26 16:45:00	2023-12-07 09:00:00
McCloud R	Temp_Curt_4	40.92206	-122.2460	574.620	Lotek 4350L	2000371	2023-09-26 16:48:00	2023-12-07 09:00:00
McCloud R	Lwr_McCloud_1	40.93901	-122.2459	577.100	Lotek 4350L	2000366	2023-09-27 08:44:00	2023-11-09 09:00:00
McCloud R	Lwr_McCloud_2	40.93895	-122.2459	577.200	Lotek 4350L	2000361	2023-09-27 08:58:00	2023-11-09 09:00:00
Lower Sac R	Abv_Fremont	38.76009	-121.6714	215.180	Lotek WHS 4350L	2000086	2023-12-07 12:08:00	2024-03-08 11:50:00

Table 2: Table 2. Autonomous JSATS receivers deployed and retrieved during this report period

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
Lower Sac R	Abv_Fremont	38.75940	-121.6716	215.179	ATS V3.1	15010	2023-12-07 12:03:00	2024-03-08 11:20:00
Lower Sac R	Blw_Fremont	38.77015	-121.6322	210.360	Lotek WHS 4350L	2000375	2023-12-07 11:46:00	
Lower Sac R	Blw_Fremont	38.77268	-121.6320	210.359	ATS V3.1	13036	2023-12-07 11:37:00	
Lower Sac R	BlwChinaBent	38.88246	-121.8177	240.619	Lotek WHS 4350L	2000372	2023-12-07 14:07:00	
Lower Sac R	BlwChinaB	38.88089	-121.8178	240.617	ATS 3.1	16001	2023-12-07 13:59:00	2024-03-07 16:27:00
Lower Sac R	FRConf1	38.77409	-121.6004	203.468	ATS V3.1	13034	2023-12-07 11:11:00	
Lower Sac R	FRConf3	38.77573	-121.6018	203.470	Lotek WHS 4350L	2000378	2023-12-07 11:18:00	
Lower Sac R	Knights_RST	38.79248	-121.6909	222.050	ATS V3.1	13054	2023-12-07 13:05:00	
Lower Sac R	Knights_RS	38.79368	-121.6907	222.051	Lotek WHS 4350L	2000370	2023-12-07 13:10:00	2023-03-08 12:50:00
Lower Sac R	KnightsBlwRST	38.78877	-121.6940	221.580	Lotek WHS 4350L	2000368	2023-12-07 12:48:00	
Lower Sac R	KnightsBlw	38.78787	-121.6937	221.570	ATS V3.1	13030	2023-12-07 12:43:00	2024-03-08 12:15:00
Lower Sac R	AbvTisdale3	39.03640	-121.8292	269.236	ATS V3.1	13008	2023-12-08 08:50:00	2024-03-07 14:28:00
Lower Sac R	AbvTisdale	39.03610	-121.8290	269.238	Lotek WHS 4350L	2000359	2023-12-08 08:55:00	2024-03-07 14:49:00
Lower Sac R	BlwTisdale2	39.01862	-121.8212	261.406	ATS V3.1	13072	2023-12-08 08:17:00	
Lower Sac R	BlwTisdale3	39.01736	-121.8234	261.407	Lotek WHS 4350L	2000377	2023-12-08 08:38:00	
SF Bay	GG2.1	37.82606	-122.4694	0.804	ATS V3.0	15045	2023-12-13 14:23:00	2024-04-02 11:57:00

Table 2: Table 2. Autonomous JSATS receivers deployed and retrieved during this report period

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
SF Bay	GG3.1	37.82215	-122.4662	0.806	ATS V3.0	15012	2023-12-13 14:27:00	2024-04-02 11:19:00
SF Bay	GG4	37.81615	-122.4680	0.808	ATS V3.0	15001	2023-12-13 14:42:00	2024-04-02 10:04:00
SF Bay	GG7.5	37.82542	-122.4599	1.715	ATS V3.0	15025	2023-12-13 14:33:00	2024-04-02 11:03:00
SF Bay	GG8	37.81856	-122.4576	1.717	ATS V3.0	15016	2023-12-13 14:38:00	2024-04-02 10:43:00
SF Bay	GG1	37.82898	-122.4741	0.801	ATS V3.0	15043	2023-12-14 09:23:00	2024-04-02 12:06:00
SF Bay	GG5.1	37.81129	-122.4667	0.810	ATS V3.0	15015	2023-12-14 09:17:00	2024-04-02 09:48:00
SF Bay	GG6	37.83390	-122.4680	1.711	ATS V3.1	16014	2023-12-14 09:01:00	2024-04-02 08:16:00
SF Bay	GG7	37.83025	-122.4638	1.713	ATS V3.1	13017	2023-12-14 09:05:00	2024-04-02 11:29:00
SF Bay	GG9	37.81305	-122.4560	1.719	ATS V3.0	15007	2023-12-14 09:12:00	2024-04-02 09:26:00
Sutter Bypass	SB_East_US	39.12862	-121.7956	253.910	Lotek WHS 4350L	2000224	2024-01-29 13:27:00	
Sutter Bypass	Sutter_Byf	38.96592	-121.6721	231.230	Lotek WHS 4350L	2000257	2024-01-29 13:20:00	
Sutter Bypass	Sutter_Bypass	38.95127	-121.6721	229.640	Lotek WHS 4350L	2000008	2024-01-29 13:08:00	
Sutter Bypass	Sutter_Byf	38.78462	-121.6531	208.990	Lotek WHS 4350L	2000005	2024-01-29 12:55:00	
Butte Creek	UpperButte	39.18760	-121.9090	267.216	Lotek WHS 4350L	2000078	2024-01-29 13:42:00	
Sutter Bypass	UpperButte	39.12765	-121.8165	253.917	Lotek WHS 4350L	2000221	2024-01-29 13:38:00	
Lower Sac R	AbvTisdale	39.03640	-121.8292	269.236	ATS V3.1	13049	2024-03-07 14:40:00	

Table 2: Table 2. Autonomous JSATS receivers deployed and retrieved during this report period

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
Lower Sac R	AbvTisdale	39.03610	-121.8290	269.238	ATS V3.1	13026	2024-03-07 14:54:00	
Lower Sac R	BlwChinaBent	38.88089	-121.8178	240.617	ATS V3.0	15003	2024-03-07 16:00:00	
Lower Sac R	BlwTisdale	39.01862	-121.8212	261.406	ATS V3.0	15019	2024-03-07 15:40:00	
Lower Sac R	Abv_Fremont	38.76009	-121.6714	215.180	ATS V3.1	13064	2024-03-08 12:01:00	
Lower Sac R	Abv_Fremont	38.75940	-121.6716	215.179	ATS V3.1	13055	2024-03-08 11:35:00	
Lower Sac R	Blw_Fremont	38.77268	-121.6320	210.359	ATS V3.1	15017	2024-03-08 11:05:00	
Lower Sac R	FRConf1	38.77409	-121.6004	203.468	ATS V3.1	13022	2024-03-08 10:06:00	
Lower Sac R	Knights_RSTB	38.79248	-121.6909	222.050	ATS V3.1	13043	2024-03-08 13:28:00	
Lower Sac R	Knights_RSTB	38.79368	-121.6907	222.051	ATS V3.1	20057	2024-03-08 12:58:00	
Lower Sac R	KnightsBlw_RSTB	38.78877	-121.6940	221.580	ATS V3.1	20074	2024-03-08 12:41:00	
Lower Sac R	KnightsBlw_RSTB	38.78787	-121.6937	221.570	ATS V3.1	16013	2024-03-08 12:18:00	
South Delta	OR_HOR_137	37.81378	-121.3357	158.121	Lotek WHS 4350L	2000370	2024-03-14 10:13:00	
South Delta	OR_HOR_137	37.81339	-121.3351	158.122	Lotek WHS 4350L	2000077	2024-03-14 10:23:00	
South Delta	OR_HOR_237	37.81544	-121.3345	159.040	Lotek WHS 4350L	2000083	2024-03-14 10:36:00	
South Delta	OR_HOR_137	37.81546	-121.3338	160.120	Lotek WHS 4350L	2000374	2024-03-14 10:50:00	
South Delta	ORMH_137	37.82076	-121.3778	152.840	Lotek WHS 4350L	2000189	2024-03-14 11:11:00	

Table 2: Table 2. Autonomous JSATS receivers deployed and retrieved during this report period

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
South Delta	ORMH_1_	37.82046	-121.3775	152.322	Lotek WHS 4350L	2000369	2024-03-14 11:22:00	
South Delta	SJ_HOR_1_	37.81160	-121.3190	158.451	Lotek WHS 4350L	2000081	2024-03-14 11:46:00	
South Delta	SJ_HOR_1_	37.81150	-121.3184	158.452	Lotek WHS 4350L	2000086	2024-03-14 11:55:00	
South Delta	SJ_HOR_2_	37.81374	-121.3183	158.142	Lotek WHS 4350L	2000366	2024-03-14 12:08:00	
South Delta	SJ_HOR_2_	37.81379	-121.3184	158.141	Lotek WHS 4350L	2000187	2024-03-14 12:20:00	
South Delta	SJ_HOW_1_	37.87359	-121.3319	148.211	Lotek WHS 4350L	2000376	2024-03-14 12:47:00	
South Delta	SJ_HOW_1_	37.87363	-121.3317	148.212	Lotek WHS 4350L	2000360	2024-03-14 12:58:00	
San Joaquin River	SJ_Moss_1_	37.79184	-121.3075	163.142	Lotek WHS 4350L	2000359	2024-03-14 09:04:00	
San Joaquin River	SJ_Moss_1_	37.79183	-121.3068	163.141	Lotek WHS 4350L	2000047	2024-03-14 09:13:00	
South Delta	SJG_1_1_	37.93633	-121.3345	145.392	Lotek WHS 4350L	2000373	2024-03-14 13:23:00	
South Delta	SJG_1_2_	37.93621	-121.3333	145.391	Lotek WHS 4350L	2000361	2024-03-14 13:35:00	
South Delta	SJG_2_1_	37.93812	-121.3358	145.163	Lotek WHS 4350L	2000079	2024-03-14 13:52:00	
South Delta	SJG_2_2_	37.93829	-121.3355	145.164	Lotek WHS 4350L	2000362	2024-03-14 13:44:00	
SF Bay	GG1	37.82898	-122.4741	0.801	ATS V3.1	13008	2024-04-02 13:39:00	

Table 2: Table 2. Autonomous JSATS receivers deployed and retrieved during this report period

Region	GPSname	Lat	Lon	rkm	RecMake	SN	StartTime	EndTime
SF Bay	GG2.1	37.82606	-122.4694	0.804	ATS V3.1	19072	2024-04-02 13:44:00	
SF Bay	GG3.1	37.82215	-122.4662	0.806	ATS V3.1	13025	2024-04-02 13:50:00	
SF Bay	GG4	37.81615	-122.4680	0.808	ATS V3.0	15013	2024-04-02 10:14:00	
SF Bay	GG5.1	37.81129	-122.4667	0.810	ATS V3.0	15014	2024-04-02 09:53:00	
SF Bay	GG6	37.83390	-122.4680	1.711	ATS V3.1	16001	2024-04-02 09:00:00	
SF Bay	GG7	37.83025	-122.4638	1.713	ATS V3.1	13013	2024-04-02 14:02:00	
SF Bay	GG7.5	37.82542	-122.4599	1.715	ATS V3.1	13014	2024-04-02 13:55:00	
SF Bay	GG8	37.81856	-122.4576	1.717	ATS V3.1	13030	2024-04-02 10:52:00	
SF Bay	GG9	37.81305	-122.4560	1.719	ATS V3.1	13032	2024-04-02 09:31:00	

Vemco Receiver Deployment

UCSC deployed or retrieved 24 Vemco receivers between 2023-10-01 and 2024-03-31 (Table 3). All Golden Gate receivers were acoustic release style. These receivers are used to anchor JSATS receivers, but also serve a double purpose as a hydrophone for Vemco tags.

Table 3: Table 3. Vemco receivers active, deployed, or retrieved during this report period

GPSname	Lat	Lon	rkm	VemcoSN	StartTime	EndTime
AbvTisdale	39.03640	-121.8292	269.238	108505	2023-12-08 09:00:00	
AbvTisdale3	39.03640	-121.8292	269.238	106789	2023-12-08 09:13:00	
GG2.1	37.82126	-122.4692	0.800	552213	2023-12-13 14:23:00	2024-04-02 11:57:00
GG3.1	37.82126	-122.4692	0.800	552215	2023-12-13 14:27:00	2024-04-02 11:19:00
GG4	37.82126	-122.4692	0.800	552208	2023-12-13 14:42:00	2024-04-02 10:04:00

Table 3: Table 3. Vemco receivers active, deployed, or retrieved during this report period

GPSname	Lat	Lon	rkm	VemcoSN	StartTime	EndTime
GG7.5	37.82794	-122.4617	1.710	546976	2023-12-13 14:33:00	2024-04-02 11:03:00
GG8	37.82794	-122.4617	1.710	551244	2023-12-13 14:38:00	2024-04-02 10:43:00
GG1	37.82126	-122.4692	0.800	547650	2023-12-14 09:23:00	2024-04-02 12:06:00
GG5.1	37.82126	-122.4692	0.800	552209	2023-12-14 09:17:00	2024-04-02 09:48:00
GG6	37.82794	-122.4617	1.710	551251	2023-12-14 09:01:00	2024-04-02 08:16:00
GG7	37.82794	-122.4617	1.710	551248	2023-12-14 09:05:00	2024-04-02 11:29:00
GG9	37.82794	-122.4617	1.710	551252	2023-12-14 09:12:00	2024-04-02 09:26:00
SJ_Moss_1	37.79228	-121.3063	163.141	545614	2024-02-14 09:45:00	
SJ_Moss_1	37.79184	-121.3075	163.141	545623	2024-03-14 09:32:00	
GG1	37.82126	-122.4692	0.800	545632	2024-04-02 13:39:00	
GG2.1	37.82126	-122.4692	0.800	545613	2024-04-02 13:44:00	
GG3.1	37.82126	-122.4692	0.800	545620	2024-04-02 13:50:00	
GG4	37.82126	-122.4692	0.800	547644	2024-04-02 10:14:00	
GG5.1	37.82126	-122.4692	0.800	547649	2024-04-02 09:53:00	
GG6	37.82794	-122.4617	1.710	546977	2024-04-02 09:00:00	
GG7	37.82794	-122.4617	1.710	546163	2024-04-02 14:02:00	
GG7.5	37.82794	-122.4617	1.710	547647	2024-04-02 13:55:00	
GG8	37.82794	-122.4617	1.710	546162	2024-04-02 10:52:00	
GG9	37.82794	-122.4617	1.710	547651	2024-04-02 09:31:00	

Deliverables:

1. Provide data to ITAG JSATS Database coordinator and web-accessible autonomous receiver data (via ERDDAP) within 30 days of downloading
2. Web-accessible semi-annual log of deployment and download activity including what sites were visited and operational coverage for each receiver

Task 3. Source, obtain, and tag wild winter and spring-run Chinook salmon

Acoustic Tagging of Wild Chinook

No wild fish were tagged during this report period.

Deliverables:

1. Final Pre-season tagging plan available via the website
2. Web-accessible Telemetry Study Summary no more than 96 hours after the release of fish
3. Annual technical report summarizing results from the previous study year
4. Final report summarizing the results of the three study years
5. One peer reviewed publication

Task 4. Implant AT into a portion of hatchery produced juvenile Chinook salmon juveniles and Steelhead

Acoustic Tagging of Chinook Salmon juveniles

Seasonal Survival Study UCSC staff implanted 566 acoustic tags into hatchery produced jumpstart winter-run and late-fall run Chinook smolts as part of the Seasonal Survival Study. Releases of these fish were spaced out across four weeks between 2023-12-04 - #r wk4# with the intention of gathering movement and survival data across a range of environmental conditions during winter. These fish were tagged at Coleman, and Livingston Stone Fish Hatcheries and transported to the Red Bluff Diversion Dam (RBDD_Rel) to increase the sample size of fish in downstream reaches. Fish were available for tagging with the help and assistance of the U.S. Fish and Wildlife Service. The weekly release groups of tagged fish are shown in Table 4.

Preliminary movement and survival data can be found here: https://oceanview.pfeg.noaa.gov/CalFishTrack/pageSeasSurv_2024.html

Table 4: Table 4. Hatchery Chinook acoustic tagged during this report period.

StudyID	Fish Type	Release Loc	Raceway	Count	Release Date	Avg Weight	Avg Length
Seasonal_S	Coleman Late Fall Chinook	RBDD_Rel	5	99	2023-12-06 10:00:00	29.77	135.63

Table 4: Table 4. Hatchery Chinook acoustic tagged during this report period.

StudyID	Fish Type	Release Loc	Raceway	Count	Release Date	Avg Weight	Avg Length
Seasonal_Survival_Fall_2023	Coleman Chinook	RBDD_Rel	5	102	2023-12-07 10:35:00	36.29	144.84
Seasonal_Survival_Winter_2024	LSNFH Chinook	RBDD_Rel	C43	100	2024-01-31 10:20:00	6.46	82.42
Seasonal_Survival_Winter_2024	LSNFH Chinook	RBDD_Rel	C43	100	2024-02-01 09:35:00	6.42	82.76
Seasonal_Survival_Winter_2024	LSNFH Chinook	RBDD_Rel	C44	100	2024-02-21 10:00:00	8.31	89.39
Seasonal_Survival_Winter_2024	LSNFH Chinook	RBDD_Rel	C44	65	2024-02-22 10:00:00	7.93	88.46

Acoustic Tagging of Juvenile Steelhead

UCSC staff implanted #r sttotal# acoustic tags into hatchery produced Steelhead at Mokelumne Fish Hatcheries and transported to three release sites at Head of Old River, Durham Ferry, and Dos Reis on the San Joaquin River. Fish were available for tagging with the help and assistance of the U.S. Fish and Wildlife Service. The first release group of tagged fish is shown in Table 5.

Preliminary movement and survival data can be found here: https://oceanview.pfeg.noaa.gov/CalFishTrack/pageSJSTH_2024.html

Tag Retention Studies

Seasonal Survival Tag Retention Study As part of the Seasonal Survival Study, a total of #r sttotal# juvenile winter run and fall-run Chinook salmon were tagged at CNFH and LSNFH across eight weeks (#r wk1#, #r wk2#, #r wk3#, and #r wk4#). Fall-run Chinook were transported to the NMFS-SWFSC lab where they were held on-site. Winter-run fish remained at LSNFH. The fish were fed and the tanks checked daily for expelled tags. Fish were measured and weighed at the start and end of the six week tag retention study. At the end of the study, all fish were processed and inspected for shed tags.

During this report period #r SSshedcount# tags were found shed.

For fall-run Chinook tagged during the first week of the Seasonal Survival Study, the average weight gained was #r SSg# and the average length gained was #r SSL# during the tag warranty duration of 71 days.

San Joaquin Steelhead Tag Retention Study As part of the Steelhead Survival Study, a total of #r sttotal# juvenile fish were tagged at Mokelumne Fish Hatchery and transported to the NMFS-SWFSC lab where they were held on-site. Fish were fed and the tanks checked daily for expelled tags, and were measured and weighed at the trial start. At the end of the »six week..needs update« tag retention study, all fish will be measured and weighed, processed and inspected for shed tags.

Tag Life Tests

Seasonal Survival Tag Life Study To monitor the battery life of the tags used for the Seasonal Survival Study, a 5% random sample was taken from the total proportion of tags used for each release group. In total, 30 SS400 tags were started over a period of three weeks (on 12/6/23, 1/31/24, and 2/16/24) and placed in the tag life tank located at the NMFS-SWFSC lab, for monitoring. Data collected in this study examined the range of battery life for these particular tags, in order to correct any discrepancies in survival estimates as a result of tags shutting off prematurely. #r n# tags in the 2023 Seasonal Survival tag life study made it to the warranty life of 71 days. The average run time was #r avgrun# days with a range of #r mi# to #r ma# days.

Tags started week 1: 2023-12-04 A total of 10 acoustic tags (model SS400) were randomly selected to be used in this tag life study. Tags were started on 2023-12-04 and placed into the tag life tank for the duration of the study. All tags in the RBDD Week 1 tag life study made it to the warranty life of 71 days and were detected consistently.

Tags started week 2: 2024-01-29 A total of 10 acoustic tags (model SS400) were randomly selected to be used in this tag life study. Tags were started on 2024-01-29 and placed into the tag life tank for the duration of the study.

Tags started week 3: 2024-02-19 A total of 10 acoustic tags (model SS400) were randomly selected to be used in this tag life study. Tags were started on 2024-02-19 and placed into the tag life tank for the duration of the study.

Tags started week 4: #r wk4# A total of 10 acoustic tags (model SS400) were randomly selected to be used in this tag life study. Tags were started on #r wk4# and placed into the tag life tank for the duration of the study.

San Joaquin Steelhead Tag Life Study To monitor the battery life of tags implanted in San Joaquin Steelhead, a 5% random sample was taken from the total number of tags used for the first six release groups, tagged on study week one, during this report period. 18 SS300 tags were started on 3/18/2024 and placed in the tag life tank located at the NMFS-SWFSC lab to monitor the range of battery life for these particular tags, and to correct any discrepancies in survival estimates as a result of tags shutting off prematurely.

Deliverables:

1. Final Pre-season tagging plan available via the website
2. Web-accessible Telemetry Study Summary no more than 96 hours after the release of fish
3. Final memo/report on tag life results at end of year available via website
4. Final memo/report on tag effects results at end of year available via website
5. Annual technical report summarizing results from the previous study year
6. Final report summarizing the results of the three study years
7. Two peer reviewed publications

Task 5. Produce and deliver real-time metrics

The project website was updated with new web pages describing unique tagging studies, including release metadata, travel time, number of fish detected at each real-time receiver, and detection efficiency for dual-line receiver locations (Sacramento, Benicia). <https://oceanview.pfeg.noaa.gov/CalFishTrack/>. Tagging

data were updated two days after fish were tagged. Data from real-time receivers was automatically updated every hour.

Deliverables:

1. Website and email daily updates of arrival times, movement rates, and percent detected for each release group beginning immediately after the release of the first group.
2. Website updated weekly with real-time data, summary statistics of real-time survival and routing, and predictions based on models fitted to historical late-fall Chinook data.

Task 6. Project Management

Bi-weekly CVEAT conference calls and monthly ITAG virtual meetings were scheduled and moderated by ITAG facilitator Flora Cordoleani of UC Santa Cruz during the reporting period. These CVEAT calls facilitate close coordination on tagging events and receiver deployments between the many field operation leaders for the many different telemetry projects. Monthly ITAG meetings are for higher-level coordination and long-term planning for the Central Valley telemetry programs, and is attended by both field operation leaders as well as higher level agency representatives.

Deliverables:

1. Semi-annual progress reports
2. The database coordinator will lead a data management workshop
3. The database coordinator will participate in the ITAG meetings and appropriate subgroup meetings
4. The database coordinator will work with agencies and stakeholders to address key data management questions
5. The ITAG facilitator will schedule meetings and take meeting notes, and make meeting notes accessible to public via an online platform
6. The ITAG facilitator will collect pre- and post-study summary forms from researchers and host them on the CalFishTrack website
7. The ITAG facilitator will provide a summary report of ITAG activities within 6 months of the completion of the last ITAG tagging effort for the water year