

Report

# 2013-2014 Fish Assemblage Inventory and Monitoring

2014 Mid-Year Technical Report

**SAN JOAQUIN RIVER**  
RESTORATION PROGRAM



July 2014



# 2013-2014 Fish Assemblage Inventory and Monitoring



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## Abbreviations and Acronyms

CPUE	catch per unit effort
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
SJRRP	San Joaquin River Restoration Program
USFWS	U.S. Fish and Wildlife Service

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# 1.0 Fish Assemblage Inventory and Monitoring

## 1.1 Background

The San Joaquin River once supported healthy populations of native fishes, most notably Chinook salmon (*Oncorhynchus tshawytscha*). Changes in land use and the construction of Friant Dam, irrigation canals, and flood bypasses has dramatically altered the flow regime and habitat. The Restoration Goal for the San Joaquin River Restoration Program (SJRRP) is “to restore and maintain fish populations in ‘good condition’ in the main stem San Joaquin River below Friant Dam to the confluence with the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish” (*Natural Resources Defense Council (NRDC) vs. Rodgers et al.*, 2006). To assess achievement of this goal, an inventory and monitoring program is being implemented to describe fish abundance and diversity within the Restoration Area during the beginning stages of restoration. Periodic sampling analysis of the temporal and spatial distribution, relative abundance, and diversity of fish will support assessment of the Restoration Goal’s success. This information can be used to adaptively manage future efforts for a more effective implementation of the Restoration Goal. In 2012 U.S. Fish and Wildlife Service (USFWS) implemented standardized sampling protocols and sampled sites to assess changes in fish populations before, during, and after restoration activities. This study is a joint effort between USFWS and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation). The preliminary report here represents only the information directly obtained by the USFWS. The final report will be prepared in conjunction with our Reclamation partners.

### Objectives:

1. Inventory and monitor the fish communities within the five reaches of the Restoration Area to provide baseline data of fish assemblages present during quarterly field samplings.
2. Specific elements of physical and biological assessments of fish assemblages within the restoration area will be used to evaluate the long-term efforts of the Restoration Program.

## 1.2 Methods

The study area consists of the San Joaquin River from Friant Dam to the Merced River confluence (Figure 1). This section of the river has been delineated into 5 reaches.



**Figure 1. Detailed Map Showing the RESTORATION Area (i.e.: the study reach), Friant Dam to the Merced River Confluence**

*Sample Sites*—When possible all habitat types (run, riffle, pool, glide, off-channel habitat) within each reach were sampled with the appropriate gear (e.g., seine, backpack electrofishing). The lack of river access and low water levels limited our sampling efforts in the lower reaches. Each site was sampled once per quarter with the method that was best suited to the habitat type. Sample gear remained consistent for sites that were sampled in multiple seasons.

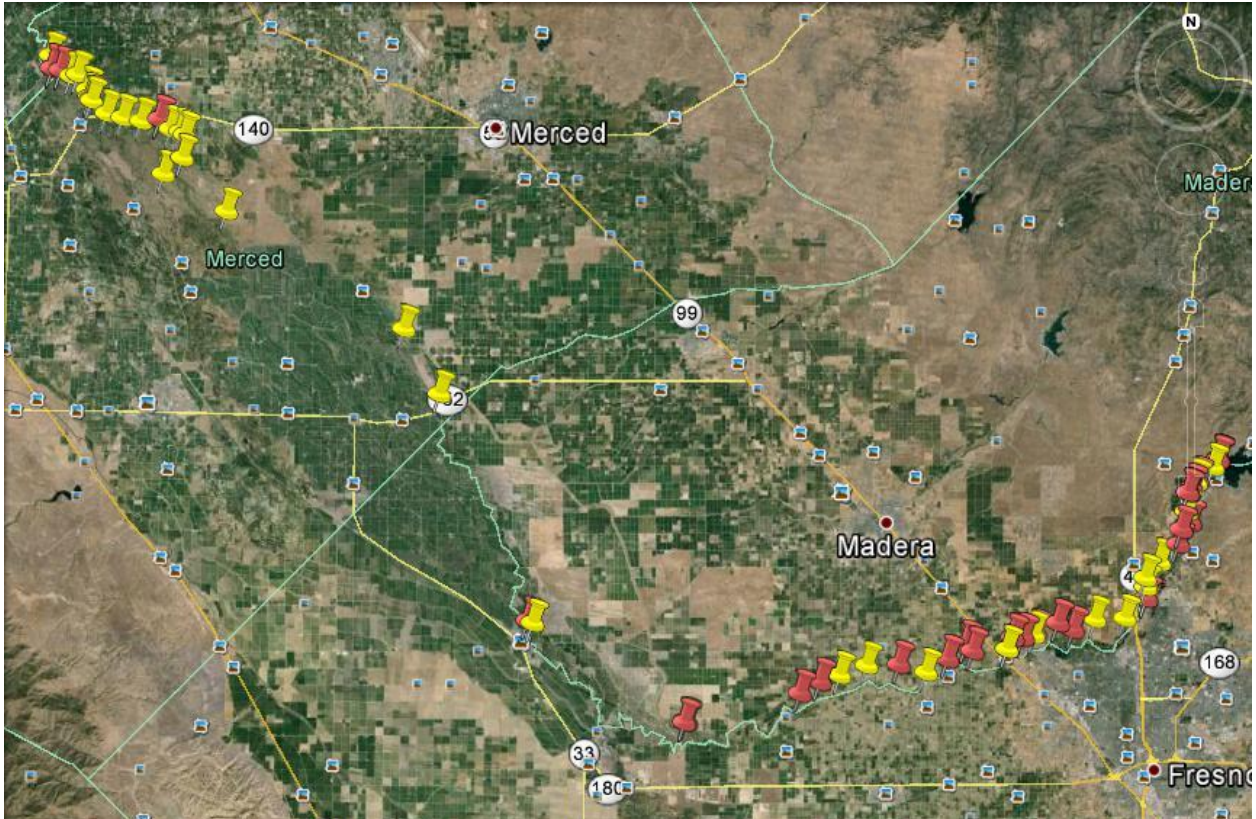
Sample sites within each reach were spread out to provide representation of habitat availability throughout the reach. Although an effort was made to sample throughout reaches 2 and 3, limited access resulted in those sites to be clumped (Figure 2).

*Backpack Electrofishing*—Backpack electrofishing was conducted by USFWS in wadeable areas with complex habitat that prevented effective seining, areas with irregular substrate contours and woody debris. At some sites the fish were netted with hand nets,



but if the current was swift a block net was created using the seine and fish were shocked into it.

*Beach Seining*—Seining was conducted by USFWS in shallow areas with little to no current, and free from snags.



**Figure 2. USFWS Fish Assemblage Sampling Sites in the San Joaquin River Restoration Area (sample Sites red= backpack electrofishing yellow=seine)**

*Data Collection*—All fish captured were identified to the species level, measured to the nearest mm (FL or TL, depending on species), weighed, and released alive unless otherwise noted. Environmental data was recorded at all sites (e.g., precipitation, cloud cover). Dissolved oxygen, water temperature, and turbidity were recorded at all seine and backpack electrofishing sites. Water velocity was measured at the top and bottom of each backpack shocked site and the start and halfway depth of each seine site. The area sampled (length, width, depths) was also recorded allowing calculation of catch per unit effort (CPUE) in fish per meter cubed. When electroshocking the time shocked was recorded for CPUE calculations.

*Data Summary.*—The number of samples varied during the course of the study, gaining sites as we acquired more river access and dropping sites that could be represented by other sample site data effectively. The low number of backpack electrofishing samples in reach 1 of June 2014 is due to high flows in the main river channel (Table 2). The low number of beach seines in June 2014 is due to low flows in the main river channel of

reach 5 (Table 2). From October 2013 and June 2014, 28 fish species were captured (Table 3).

**Table 1. Total Number of Sites Beach Seined by Sample Month and Restoration Reaches of the San Joaquin River, October 2013-June 2014**

**Beach Seine Sample Sites By Reach and Month**

	<b>13-Oct</b>	<b>14-Jan</b>	<b>14-Apr</b>	<b>14-Jun</b>
Reach 1	16	16	15	14
Reach 2	1	1	1	1
Reach 3	1	1	1	1
Reach 4	5	6	6	5
Reach 5	12	12	12	8
<b>Total</b>	<b>35</b>	<b>36</b>	<b>35</b>	<b>29</b>

**Table 2. Total Number of Sites Backpack Electrofished by Sample Month and Restoration Reaches of the San Joaquin River, October 2013-June 2014**

**Backpack E-Fish Sample Sites By Reach and Month**

	<b>13-Oct</b>	<b>14-Jan</b>	<b>14-Apr</b>	<b>14-Jun</b>
Reach 1	18	18	17	13
Reach 2	4	4	4	4
Reach 3	1	1	1	1
Reach 4	1	1	1	1
Reach 5	4	4	4	2
<b>Total</b>	<b>28</b>	<b>28</b>	<b>27</b>	<b>21</b>

**Table 3. Species Captured by USFWS Crews During Fish Assemblage Sampling in the San Joaquin River Restoration Area, October 2013-June 2014**

<b>Native</b>	<b>Non-Native (contd.)</b>
Chinook Salmon	Channel Catfish
Kern River Lamprey	Fathead Minnow
Pacific Lamprey	Goldfish
Prickly Sculpin	Golden Shiner
Rainbow Trout	Green Sunfish
Sacramento Pikeminnow	Inland Silverside
Sacramento Sucker	Largemouth Bass
Three spine Stickleback	Redear Sunfish
<b>Non-Native</b>	Red Shiner
Black Bullhead	Spotted Bass
Black Crappie	Threadfin Shad
Bluegill	White Catfish
Brown Bullhead	Warmouth
Bigscale Logperch	Western Mosquitofish
Common Carp	

### 1.3 Results

*Backpack Electrofishing*—Among all sampling months October had the highest total effort, 8,024 seconds, and June the lowest, 5,933 seconds (Table 4). Across all reaches, reach one had the highest effort and species diversity in all sampling seasons (Table 4). Reach 3 had the lowest effort in October and January and Reach 4 had the lowest in April and June. Species diversity was lowest in reach 3 for all months except for April (Table 4).

*Beach Seining*—Among all sampling months October had the highest species diversity and June the lowest except in reach 5 (Table 5).

**Table 4. Number of Fish Species and Effort Backpack Shocked by Reach and Month During 2013-2014 Sample Year**

Reach	13-Oct		14-Jan		14-Apr		14-Jun	
	# species	Time E-fish (s)	# species	Time E-fish (s)	# species	Time E-fish (s)	# species	Time E-fish (s)
1	12	4582	13	4271	11	5749	4	2782
2	5	1641	10	1460	4	1017	4	1521
3	2	399	3	485	2	499	0	877
4	10	498	8	559	1	353	3	326
5	7	904	9	714	6	326	8	427
<b>Total</b>		<b>8024</b>		<b>7489</b>		<b>7944</b>		<b>5933</b>

**Table 5. Number of Fish Species by Reach and Month Beach Seining During 2013-2014  
Sample Year**

Reach	13-Oct	14-Jan	14-Apr	14-Jun
	# of Species	# of Species	# of Species	# of Species
1	11	9	10	5
2	2	0	0	0
3	2	0	0	0
4	7	6	6	5
5	12	7	7	8

## 1.4 Discussion

To be completed for December ATR.

## 1.5 References

NRDC vs. Rodgers et al., 2006. Stipulation of the Settlement in *NRDC, et al., v. Kirk Rodgers, et al.* United States District Court, Eastern District of California.  
Available at: [www.restoresjr.net](http://www.restoresjr.net).