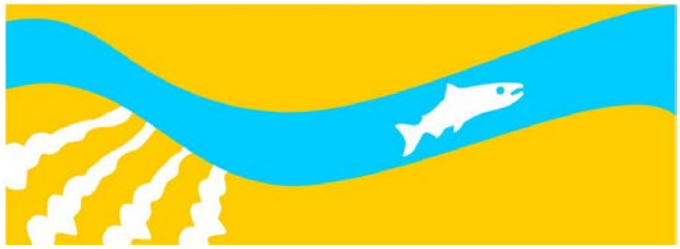
Report

2013 Assessment of Predator Abundance and Distribution in Mine Pit Habitat in the San Joaquin River Restoration Area

2014 Mid-Year Technical Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM



July 2014

2013 Assessment of Predator Abundance and Distribution in Mine Pit Habitat in the San Joaquin River Restoration Area

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Abbreviations and Acronyms

SJRRP	San Joaquin River Restoration Program

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1.0 Assessment of Predator Abundance and Distribution in Mine Pit Habitat in the San Joaquin River Restoration Area

1.1 Background

The San Joaquin River has been impacted by sand and gravel mining operations. These mining activities have resulted in off-channel mine pits and 'captured' mine pits in the river. Off-channel mine pit connectivity varies from connected at low flows to only connected at flows over 1,000 cfs. Approximately 33 river miles have been directly impacted by mining actions (FWUA/NRDC 2002). Studies on the Tuolumne River have shown in-stream and captured gravel pits and the lentic habitat they create favor largemouth bass and that predation losses in these habitats may be significant enough to affect populations of salmonids (TID/MID 1992; Stillwater 2003). Largemouth bass are adapted to high water temperatures and are commonly found in captured mine pits in the San Joaquin basin (CDFW 2007; FMWG 2009a).

Predation has been identified as a limiting factor for juvenile salmonids to be addressed during restoration actions in the San Joaquin River Restoration Program. The Restoration Area is known to harbor a number of likely predators on juvenile salmonids including largemouth bass (*Micropterus salmoides*), spotted bass (*M. punctulatus*), Sacramento pikeminnow (*Ptychocheilus grandis*), green sunfish (*Lepomis cyanellus*), black crappie (*Pomoxis nigromaculatus*) and striped bass (*Morone saxitalis*). Predation risk below small dams, such as Sack Dam in the Restoration Area, has been well documented in other locales in the Central Valley, such as Woodbridge Irrigation District Dam (Workman 2006). Currently, reintroduction actions have included developing spring-run Chinook salmon broodstock at the interim Salmon Conservation and Research Facility, trap and haul of fall-run Chinook salmon adults from Reach 5 to Reach 1, releases of progeny of streamside spawned fall-run Chinook salmon in reaches 1 and 5, and releases of spring-run Chinook salmon from the Feather River Fish Hatchery in Reach 5. Assessment of predator populations are needed to inform management decisions necessary to achieve the population objectives outlined in the Fisheries Management Plan (FMWG 2009b).

Results from this assessment are intended to inform Phase II settlement actions related to prioritizing mine pits for restoration (NRDC vs. Rodgers 2006).

Objectives:

1. Develop predator species distribution, richness and abundance estimates in mine pit habitat in the Restoration Area.

2. Determine if predator populations move among mine pits, or maintain resident populations within each mine pit.

3. Characterize available predator habitat (e.g., temperature, depth, water clarity) in existing mine pits in the Restoration Area to assess predator habitat suitability and prioritize mine pits for restoration.

4. Use the above information to develop a prioritized ranking of existing mine pits for restoration actions.

5. Determine predation rates on tagged juvenile salmon.

1.2 Methods

Study Area.—There are six major complexes of captured mine pits between Friant Dam and Gravelly Ford. Each of these complexes will be considered one sampling site. These sampling locations are identified as:

1. First Set of Captured Mine Pits (Fort Washington) – river mile (rm) 258-256

2. Second Set of Captured Mine Pits (Sycamore Island) – rm 254-252

3. Third Set of Captured Mine Pits (Milburn Unit) – rm 248

4. Fourth Set of Captured Mine Pits (Camp Pashayn) – rm 244

5. Fifth Set of Captured Mine Pits (Donnie Bridge) – rm 241

6. Sixth Set of Captured Mine Pits (Skaggs Park) – rm 233

Boat Electrofishing.—Monthly sampling was conducted from February through June of 2014. Thirty seven mine pits were sampled by United States Fish and Wildlife Service (USFWS) staff using a boat electroshocker. Within each pit portions of the shoreline habitat including the shorelines of any islands within the pits, and any brush piles or other structure was boat electrofished using direct current. Conductivity measurements ranged between 440 µS and 490 µS. The shocker settings were kept constant in all pits. Standard information regarding water temperature, dissolved oxygen, clarity (NTUs) and weather condition were recorded. Predator fish were netted and placed in a re-circulating live well on the boat until brought back to the processing area.

Gill Netting.—Sampling also included gill netting with 125’ gillnets that had five 25’ sections of mesh 1’’, 1.5’’, 2’’, 2.5’’, and 3’’. Only twenty-two of the thirty-seven

sampled pits had deep enough habitat to facilitate netting. Nets were deployed at the start of the day prior to boat electrofishing and retrieved at the conclusion of electrofishing. Environmental data were recorded (e.g., water temperature, dissolved oxygen, clarity (NTUs), weather).

Sample Processing.—Fish captured were identified to species, weighed to the nearest 0.01 kg, and measured to fork length or total length depending on species to the nearest mm. All adult predators were tagged with a uniquely numbered floy tag and released in the mine pit where they were captured. A subsample of each predator species encountered was subjected to gastric lavage to assess diet. If a captured fish died, a stomach sample was taken by normal lavage procedures then the stomach was removed to determine efficiency of gut content extraction. Predators that were recaptured were automatically subjected to stomach sampling if they had been previously subsampled. If a recap was not previously sampled then it would become part of the random subsample.

Stomach Samples.—Stomach samples are being analyzed by California State University, Fresno along with water samples, fin clips, and scales from predators to assess diet, site fidelity, and age and growth.

1.3 Results

Results for this report only include sampling from February to May. Sampling data collected at the end of June has not been processed.

A total of 16 different predator species were captured this year (Table 1). A total of 1,339 fish were tagged, 568 stomach samples were collected, and there were 86 recaptures (Table 2). Sycamore Island and Milburn mine pits had the highest number of tagged fish, stomach samples, and recaptures. Pashayan had the lowest amount of tagged predators, stomach samples and recaptures. Total time spent boat electrofishing among all pits was 85,570 seconds. A total of 2,129 hours and 19 minutes was spent gill netting among sites (Table 4).

Table 1.
List of Predator and Non-predator Species Captured During 2014 Sampling

Predator Species (Adult Size)		Non-Predator Species
Black Bullhead	(200)	Bigscale logperch
Black Crappie	(240)	Carp
Bluegill	(90)	Fathead Minnow
Brown Bullhead	(250)	Golden Shiner
Channel Catfish	(250)	Goldfish
Chinook	(600)	Kern Brook Lamprey
Green Sunfish	(140)	Pacific Lamprey
Largmouth Bass	(290)	Prickly Sculpin
Pumpkinseed	(90)	Sacramento Sucker
Rainbow Trout	(380)	Threadfin Shad
Redear Sunfish	(190)	Threespine Stickleback
Sacramento Pikeminnow	(190)	Western Mosquitofish
Spotted Bass	(190)	
Striped Bass	(500)	
Warmouth	(90)	
White Catfish	(170)	

Table 2.
Total Number of Predators Tagged, Stomach Sampled and Recaptured by Month from Boat Electrofishing and Gill Net Data

# of Predators Tagged by Month						
SITE	**February**	**March**	**April**	**May**	**June**	**Total Tagged**
Ft. Washington	11	13	16	32	.	72
Sycamore Island	126	152	131	186	.	595
Milburn	98	67	105	96	.	366
Pashayan	16	14	20	8	.	58
Donnie Bridge	38	35	35	20	.	128
Skaggs	32	26	33	29	.	120
Total	321	307	340	371	.	1339
# of Stomach Samples by Month						
SITE	**February**	**March**	**April**	**May**	**June**	**Total Stomach samples**
Ft. Washington	7	6	13	17	.	43
Sycamore Island	61	63	68	68	.	260
Milburn	28	19	30	28	.	105
Pashayan	8	7	10	7	.	32
Donnie Bridge	19	17	16	11	.	63
Skaggs	16	14	19	16	.	65
Total	139	126	156	147	.	568

Table 2.
Total Number of Predators Tagged, Stomach Sampled and Recaptured by Month from Boat Electrofishing and Gill Net Data (contd.)

# of Recaptures by Month						
SITE	**February**	**March**	**April**	**May**	**June**	**Total Recaps**
Ft. Washington	2	0	2	4	.	8
Sycamore Island	4	9	16	15	.	44
Milburn	1	8	4	7	.	20
Pashayan	1	1	1	0	.	3
Donnie Bridge	1	1	2	0	.	4
Skaggs	2	1	4	0	.	7
Total	11	20	29	26	.	86

Table 3.
Total Boat Electrofishing Time in s by Month for all Six Mine Pit Complexes Sampled During 2014

E-Fish: Total Time Shocked Per Month	
Month	**Total Time Shocked (s)**
February	18,372
March	20,111
April	20,329
May	26,758
June	---
Grand Total	**85,570**

Table 4.
Total Gill Netting Time in h:Min by Month for all Six Mine Pit Complexes Sampled During 2014

E-Fish: Total Time Gill Netting	
Month	Total Time Gill Netting (h:min)
February	708:19
March	500:31
April	589:47
May	330:42
June	---
Grand Total	**2,129:19**

1.4 Discussion

To be completed for December ATR.

1.5 References

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