South Bay Salt Pond Restoration-Fish Monitoring

Summary Progress Report for January-June, 2012

Objectives 1 and 2: Fish Community Study

Five otter trawl surveys were conducted in fulfillment of Task 1 (Alviso Complex Sampling) and Task 4 (Bair Island Sampling), however no otter trawl samples were conducted in February due to equipment failure. Trawl surveys were conducted using a four-seam otter trawl with a 1.5 m X 4.3 m opening, a length of 5.3 m, and mesh sizes of 35 mm stretch in the body and 6 mm stretch in the cod end. Trawls were towed at two knots for 5 minutes in small sloughs and 10 minutes in large slough. Because otter trawls tend to omit larger fish, which are capable of evading the net, trammel nets (2 in. mono netting w/16 in windows) and experimental gill nets (90'X8' with 15' panels and mesh sizes increasing by ½ in from 0.5 in to 2.5 in) were used to supplement our fish community sampling. Two trammel nets were placed in middle and lower Coyote Creek, Alviso slough, Steinberger Slough, Corkscrew Slough, SF2, Mt. Eden Creek and E9 to document the presence of large fish species. Beach seining was conducted to document the near-shore community using a 90'X 4' seine with ¼" delta netting and a 4'X4' bag.

Task 1 (Alviso Complex):
We conducted 8 10-minute trawls, 15 5-minute otter trawls per month and 6 macro-zooplankton tows within the Alviso Complex during each sampling event, totaling 155 individual trawls over the reporting period. We sampled restoration areas (i.e. newly breached salt ponds) and adjacent habitats at high and low tide. 2 Trammel and 1 gill net (referred to hereafter as "Set nets") were fished for two hours per net per month. In addition two seine hauls were preformed within Knapp's tract (A6), Pond A8 and in the adjacent slough during each sampling event.

Task 2 (Eden Landing)
We conducted two seine surveys at Eden landing from January to June, 2012 as well as a single trawl/set net survey. In total we conducted 5 seine hauls, deployed 4 set nets and preformed 8 otter trawls. Because of the navigational hazards from construction debris and the unconsolidated sediment within the breached ponds, sampling was extremely limited within the complex, and will remain so (for safety reasons) until a boat ramp is installed.

Task 3 (Pond SF2):
We conducted three seine hauls bimonthly within unit 2 of SF2, totaling 12 hauls over the reporting period. We also placed one gill net and one trammel net inside of unit 2. Reduced set net effort at SF2 was deemed appropriate because 100% of the sub tidal channel in the front ditch was blocked by each net.

Task 4 (Bair Island Sampling):
At Outer Bair Island, we conducted two ten minute trawls, 6 five-minute otter trawls and 3 macro-zooplankton surveys per month, totaling 40 trawls over the reporting period. Set nets were also placed for two hours per net per slough; however, beginning in April, 2012, effort was reduced to one hour because of extraordinarily high catch rates.

Species of Concern:
We captured 33 longfin smelt (*Spirinchus thaleichthys*), a California threatened species, in January and March of 2012. We also captured a single Chinook salmon smolt (*Oncorynchus tshawytscha*) in Coyote Creek adjacent to Pond A19 on May 18, 2012. This is the only salmonid captured in our surveys. In addition we began to capture juvenile California halibut (*Paralichthys californicus*) and adult white sturgeon (*Acipenser transmontanus*), both popular game fish, at the Alviso Complex. California halibut were also captured at Bair Island.

Tables 1 and 2 show the total fish species captured via otter trawl during the reporting period. There was a large influx of juvenile fish in March into the Alviso Complex, but not Eden Landing SF2 or Bair Island. High trawl catches of English sole (*Parophrys vetulus*) and Pacific herring (*Clupea pallasii)*. Juvenile Pacific staghorn sculpin (*Leptocottus armatus*) began to recruit to the otter trawl in January and increased in abundance in March. Bay goby young-of-year began to recruit to the otter trawl in May, especially at Bair Island. Juvenile fishes declined substantially by June, with the exception of Pacific staghorn sculpin. Our trawl catches appear consistent with seasonally trends documented by other surveys; however, the Alviso Marsh supports a more diverse fish community than any other location.

Table 3 depicts set net catch. Our set net surveys yielded similar species at Eden Landing and Bair Island, and a distinctly different species at the Alviso Complex and pond SF2. Alviso catches consisted of large starry flounders (*Platichthys stellatus*), white sturgeon (*Acipenser transmontanus*) and striped bass (*Morone saxitalis*) while Bair Island and Eden Landing produced numerous barred surfperch (*Amphistichus argentous*), shiner surfperch (*Cymatogaster aggregata),* and leopard shark (*Triakis semifasciata*)*,* and (only at Bair Island) adult jacksmelt (*Atherinopsis californiensis*). No fish were captured via set net at SF2.

Table 4 shows the total beach seine catches at all locations. Beach seine hauls were dominated by neo-tropical silversides (Atherinopsidae). Seine catches were universally low at all locations during this reporting period, as many of the silversides had not recruited to the seine catch by June, 2012.

Sentinel Species Study

Monthly Sampling

During the January to March (1/12-1/14, 2/9-2/11 and 3/3-3/5) & April to July (4/6-4/9, 5/4-5/6, 5/20, 6/1-6/4, 6/28-7/1 & 7/6) reporting periods, we sampled monthly using baited minnow traps at Ponds A6, A8, A21, and SF2 for the sentinel species (longjaw mudsucker) in fulfillment of objective 3, tasks 1 & 3. In addition, to monthly samplings, we conducted three consecutive samplings at each location to supplement efforts to recapture tagged individuals for population abundance estimation and to make up for lost data from the February-April samplings. In total we set 415 traps and counted, measured, weighed and tagged 1382 longjaw mudsuckers. The mean catch per trap varied seasonally, with Jan-March catches being low (0.9 to 1.4 per trap) and May-July catches high (3 to 5 per trap). Catches were consistently higher at stations outside ponds A6 and A21 relative to inside the ponds and pond A8 was consistently the lowest overall in catch.

Quarterly Sampling

We also sampled the Bair Island restoration pond and Eden Landing ponds in May, and July 2012 with up to 30 traps per pond per month in fulfillment of tasks 2 &4. The May sampling resulted in no longjaw mudsuckers being captured, however in July we did capture 19 individuals at Bair Island outside the restoration pond and 15 individuals outside of pond E9.

Sentinel species health

The health of the sentinel species is being assessed for individuals collected inside and outside restoration sites by measuring the condition factor, otolith growth rate, hepatosomatic index, and the proximate composition of the body including the % moisture, lipid and protein for up to 8 individuals per site. We processed longjaw mudsucker samples for otolith growth rates and proximate analysis from the 2010 and 2011 fall surveys. We prepared 77 otoliths for otolith microstructure analysis and conducted proximate analysis for 40 individuals (2011 only) for dry weight and percent protein and lipid content. Condition factor (wet weight/length) was higher inside restoration ponds, however the % moisture was also higher inside ponds suggesting fish were retaining body water to compensate for environmental conditions. This was most apparent for fish collected inside A8, where hepatosomatic index was also low suggesting fish are experiencing prolonged stress inside A8. Otolith growth rates are still being processed.

Problems, observation etc

- January minnow trapping efforts were reduced due to motor problems with our Jon boat; however, all long term trap sites were sampled. In February we discovered that we cracked the block on our larger boat, which is used to conduct the otter trawl surveys for fish community. We were able to sample using an alternate boat, usually reserved for Suisun Marsh sampling. Since then, we have been able to replace the motor on our boat with financial support from the Center for Watershed Sciences at UC Davis (~$17,000).
- In March, we attended the California-Nevada Chapter of the American Fisheries Society annual conference in San Diego California and gave an oral presentation of results from the Fish Community Study, and presented a poster on the Sentinel Species Study.
- On May 21st, we had a laptop computer and datasheets for the minnow trapping efforts stolen from our locked laboratory. Data entry was unfortunately not complete and datasheets had not been photocopied. To supplement for the data loss we conducted three additional sampling days at the end of June.

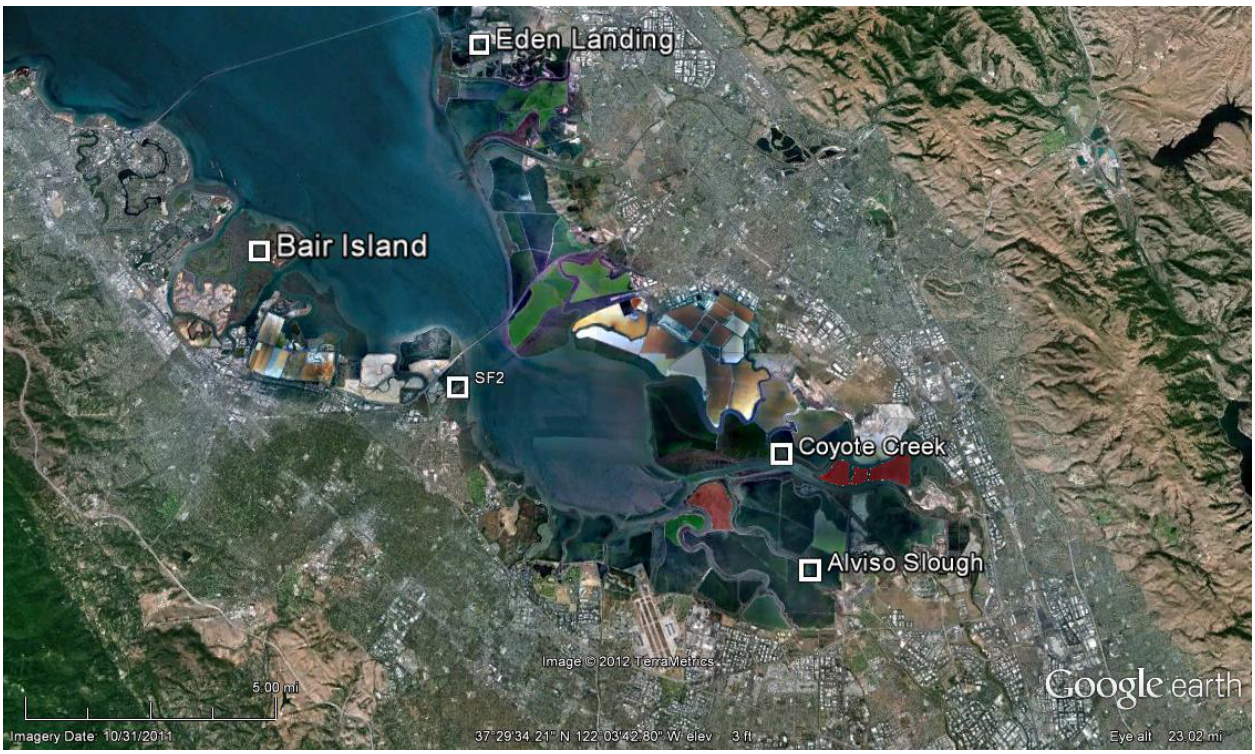

Figure 1: Location of study marshes within South San Francisco Bay.

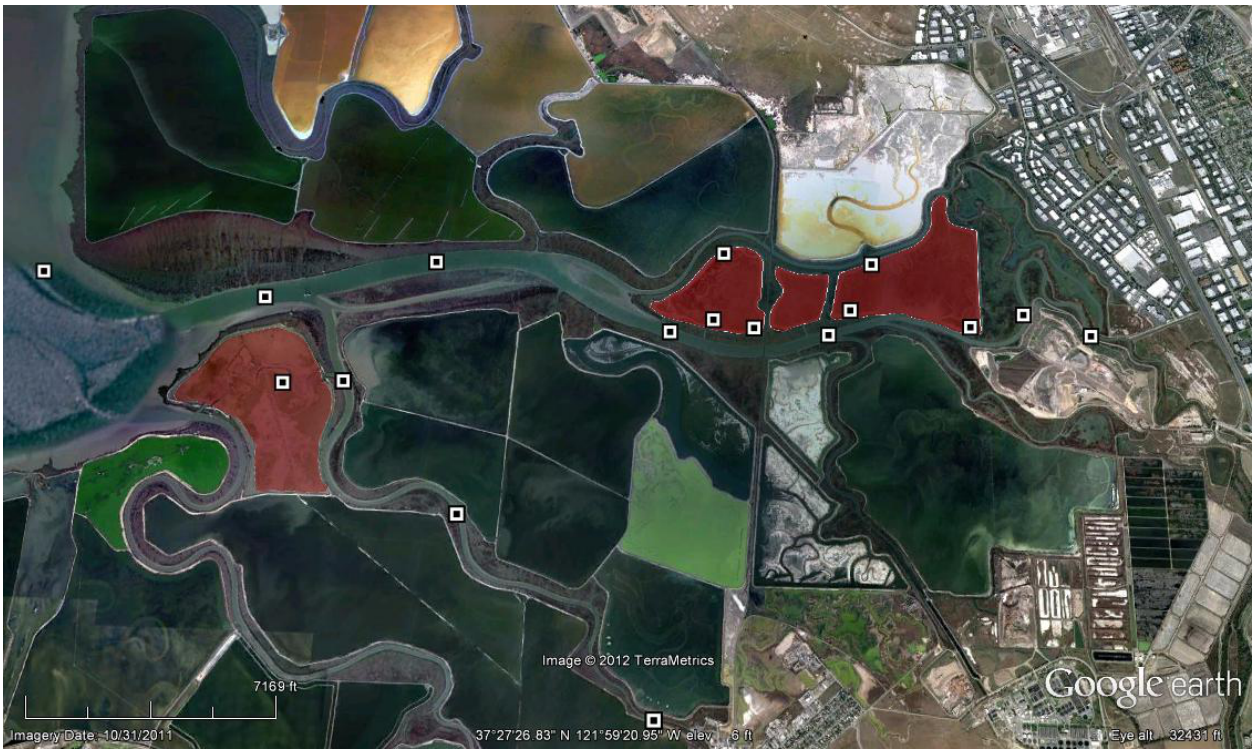

Figure 2: Otter trawl stations within the Alviso Marsh.

Figure 3: Trawl stations with Bair Island

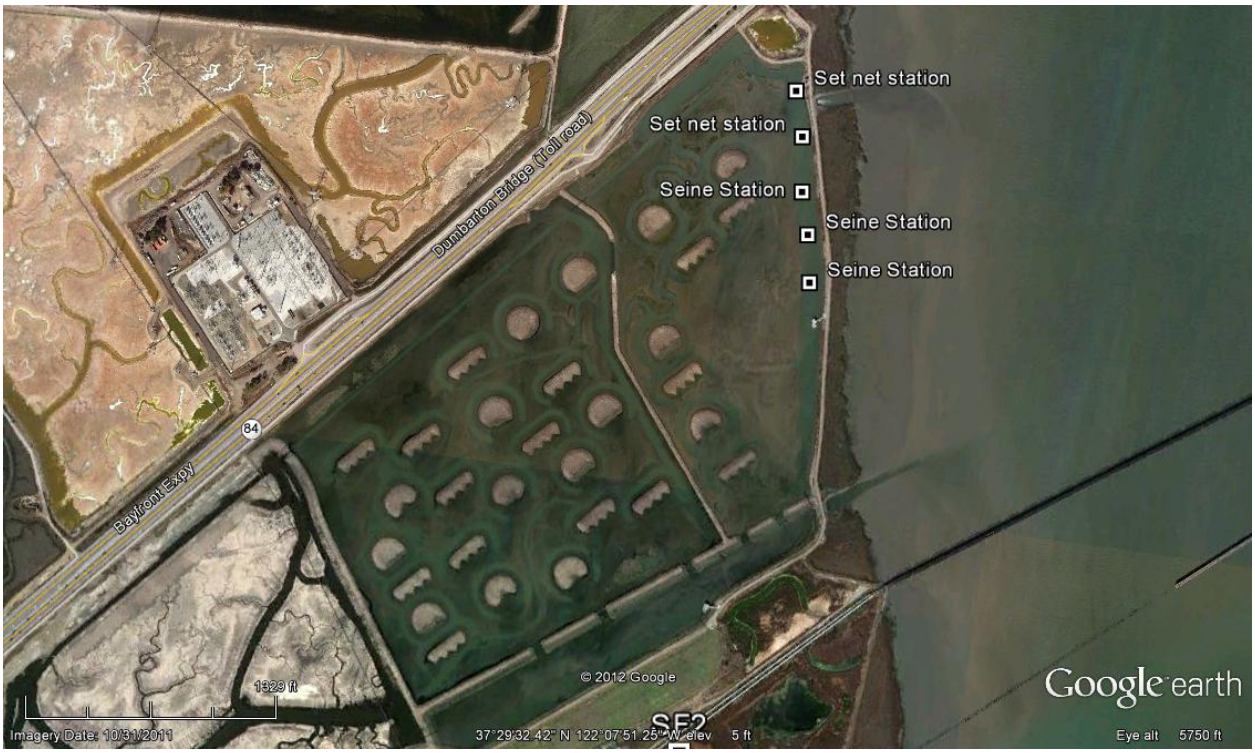

Figure 4: Sampling stations in SF2

Table 1: Otter trawl catches within the Alviso Marsh in 2012. Blank cells indicate a zero.

Species	January	March	April	May	June
American shad	26	10	5	1	3
arrow goby		70	9	92	122
bay goby			8	2	1
bay pipefish	6	5	3	1	2
CA bat ray		1	1	1	3
California halibut			9	6	7
Chinook salmon				1	
English sole	65	1369	270	2	1
longfin smelt	15	17			
longjaw mudsucker				4	
Mississippi silverside		2			
Northern anchovy	1	24	223	78	206
Pacific herring	1	771	296	1	1
Pacific lamprey	18				
Pacific staghorn sculpin	104	1038	1564	292	343
plainfin midshipman					1
prickly sculpin	11	4	2	2	3
rainwater killifish					2
Sacramento sucker		1	1	3	4
shimofuri goby			1		
shiner surfperch	2	11	12	1	1
shokahaze goby				2	
speckled sanddab	3	2	3		
starry flounder	16	23	12	9	48
striped bass		1	32	20	8
surf smelt		1			
threadfin shad	8	5			
three-spine stickleback	99	119	10	8	76
topsmelt	11	1		1	
white sturgeon			1		
yellowfin goby	53	28	18	23	220

Table 2: Otter trawl catches within the Outer Bair Island Marsh. Blank cells indicate a zero.

Species	January	March	May	June
arrow goby	3	18	20	37
barred surfperch	1	3	2	2
bay goby	1		166	59
bay pipefish	1			
brown smoothound			3	
CA bat ray			1	1
California tonguefish			1	
chameleon goby	7	1	5	2
diamond turbot		1		
dwarf perch	12			2
English sole	6	8	54	
jacksmelt			1	1
leopard shark			1	2
longfin smelt	1			
No Catch	1			
Northern anchovy	28	16	25	52
Pacific herring	1	395	21	
Pacific staghorn sculpin	24	120	638	115
shiner surfperch	30	4	101	98
speckled sanddab			1	1
starry flounder		1		
threadfin shad	2			
topsmelt		1	8	30
white croaker	1		11	2
yellowfin goby	2			

Table 3: Set net catch at all marshes.

Month/Species	A8	COYOTE /ALVISO	Corkscrew	STEINBURGER	Eden
January					
jacksmelt				1	
No Catch	1		1	1	
striped bass	1				
March					
barred surfperch			1		n/a
jacksmelt			5	9	n/a
white sturgeon		2			n/a
April					
American shad	n/a	1	n/a	n/a	n/a
striped bass	n/a	7	n/a	n/a	n/a
topsmelt	n/a	1	n/a	n/a	n/a
May					
American shad		2			
barred surfperch				2	3
English sole			1		
jacksmelt				3	
leopard shark				16	
Northern anchovy		5	7	2	8
shiner surfperch			1		
striped bass		4			
topsmelt			1	16	
June					
barred surfperch			2		n/a
leopard shark			6		n/a
Northern anchovy		4	1		n/a
striped bass		1			n/a

Table 4: Seine net catch at all marshes. Blank cells indicate zeros.

Month/Species	ALVISO	RAVENSWOOD	EDEN
January			
No Catch	1		
rainwater killifish	1		
three-spine stickleback	1		2
topsmelt			25
March			
bay pipefish	1		
Mississippi silverside	12		
Pacific herring	37		
Pacific staghorn sculpin		9	
shiner surfperch		1	
topsmelt	1	7	
May			
bay pipefish	2		
diamond turbot		1	
English sole	7		
Mississippi silverside	27		
Northern anchovy	17		
Pacific staghorn sculpin	35	47	6
rainwater killifish	12		
shiner surfperch	1		
three-spine stickleback	18	10	10
topsmelt	64		20
yellowfin goby	6	3	3
June			
longjaw mudsucker	4		
Mississippi silverside	14		
Northern anchovy	10		
Pacific herring	1		
Pacific staghorn sculpin	19	14	
rainwater killifish	16		
shiner surfperch	1		
three-spine stickleback	28		
topsmelt	39	1	
yellowfin goby	27	48	