State of California
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DEPARTMENT OF FISH AND GAME

FISH AND BIVALVES AT BOLSA CHICA MARSH RE-ESTABLISHMENT PROJECT

PROGRESS REPORT III

by

Eric H. Knaggs
and
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MARINE RESOURCES

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ABSTRACT

The objectives of our fish and bivalve study are:

1. Determine changes in the number of species of fish and bivalves before Phase I and during Phase I at Bolsa Chica Marsh.
2. Determine if California Department of Fish and Game's predicted benefits in Phase I were achieved by increases in fish species.
3. Determine influences of water management practices upon fish and bivalve composition.

Thirteen species of fish and five species of bivalves were collected from Inner Bolsa Bay and South Bolsa Slough. Deepbody anchovy, *Anchoa compressa;* jacksmelt, *Atherinopsis californiensis;* longjaw mudsucker, *Gillichthys mirabilis;* specklefin midshipman, *Porichthys myriaster;* round stingray, *Urolophus halleri;* banded chione, *Chione californiensis;* bentnose clam, *Macoma nasuta;* and common littleneck clam, *Protothaca staminea* have not been reported previously from Inner Bolsa Bay. Nine species of fish and four species of bivalves were collected from outer Bolsa Bay. Yellowfin goby, *Acanthogobius flavimanus;* longjaw mudsucker; tilapia, *Tilapia mossambica;* and bay pipefish, *Syngnathus leptorhynchus* have not been reported previously from Outer Bolsa Bay.

1/ Marine Resources Region, Administrative Report No. 80-9, June 1980

2/ Planning Branch, California State Fisheries Laboratory, 350 Golden Shore, Long Beach, California 90802

3/ Marine Resources Region, California State Fisheries Laboratory, 350 Golden Shore, Long Beach, California 90802

INTRODUCTION

This study is designed to examine the fish and bivalves which inhabit Bolsa Chica Marsh during Phase I of the marsh re-establishment project. Phase I is the time period from the original opening of the tide gates in mid-October 1978 until there are activities altering this Phase I salt marsh. The objectives of this study are:

1. Determine changes in the number of species of fish and bivalves before Phase I and during Phase I at Bolsa Chica Marsh.
2. Determine if California Department of Fish and Game's predicted benefits in Phase I were achieved by increases in fish species.
3. Determine influences of water management practices upon fish and bivalve composition.

This report covers the first objective. The second objective has been achieved and was reported by Knaggs and Mall (1980a). The third objective will be discussed after four quarters of sampling have been completed.

MATERIALS AND METHODS

Materials and methods were described by Knaggs and Mall (1980a, b). In addition, two minnow traps were used also to capture fish during the May 15, 1980 sampling. Sample site #7 was added to our sampling stations (Figure 1).

Description of Sample Areas

In our previous reports, we have described our sampling areas in relationship to the tide gates (Knaggs and Mall, 1980a and b). To be consistent with descriptions of Bolsa Chica Marsh by other Department

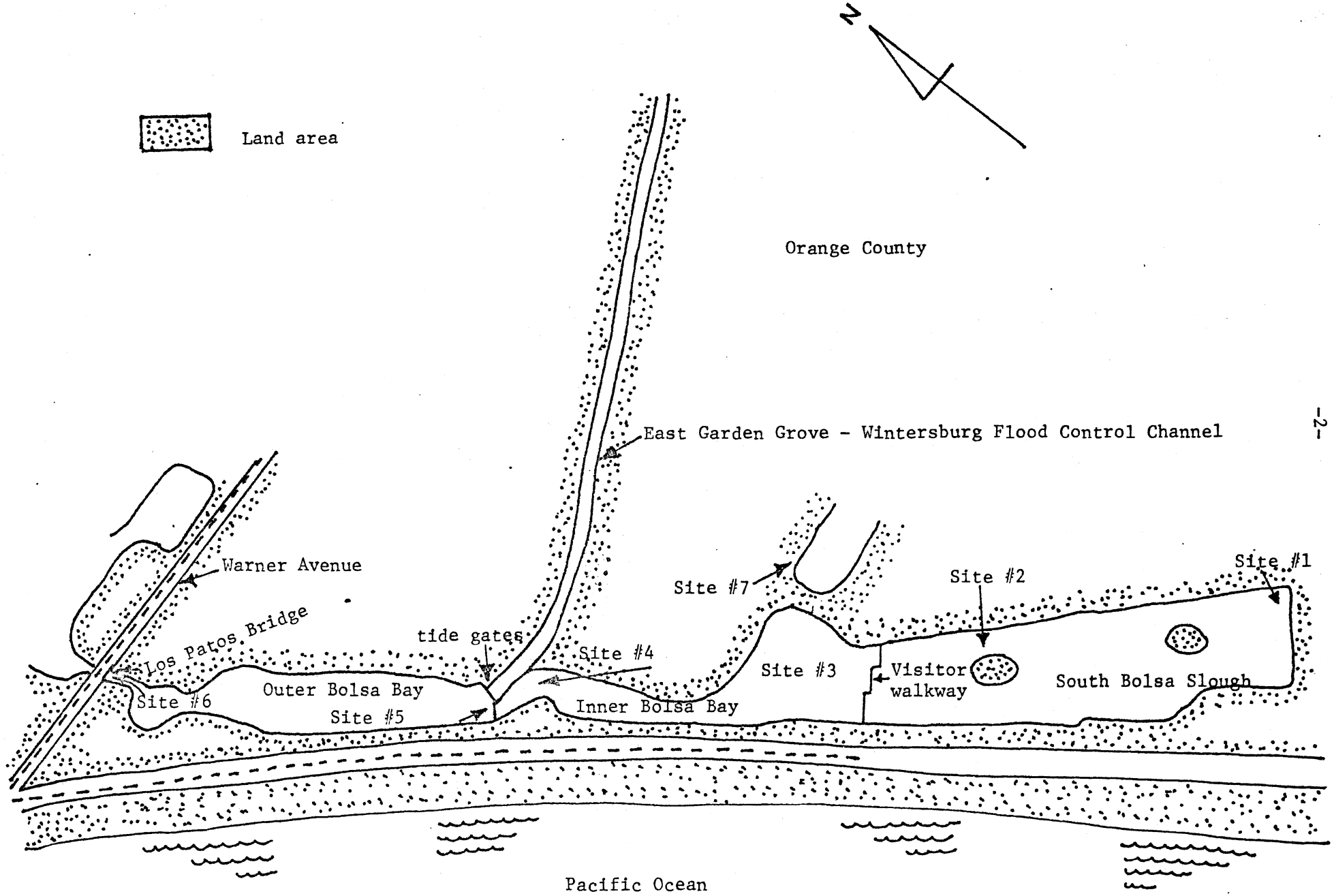

FIGURE 1. Phase 1 sites at Bolsa Chica Marsh.

personnel, we have redefined our general sample areas as follows:

1. Outer Bolsa Bay is the intertidal portion of Bolsa Chica Marsh within State Lands bounded by the Warner Avenue bridge (Los Patos bridge) on the northwest and the tide gates on the southeast (Figure 1).
2. Inner Bolsa Bay is the intertidal portion of Bolsa Chica Marsh bounded by the levee system on the northeast, tide gates on the northwest, visitor walkway on the southeast, and Pacific Coast Highway on the southwest (Figure 1).
3. South Bolsa Slough is the intertidal portion of Bolsa Chica Marsh bounded by the visitor walkway on the northwest, levee system on the northeast and southeast, and Pacific Coast Highway on the southwest (Figure 1).

Tide Gates

The passage of water between Inner and Outer Bolsa Bay is through three 48 in. culverts with flat tide gates on the Outer Bolsa Bay side of each culvert. Between our February and May 1980 sampling, one tide gate came off a culvert. The other two tide gates were opened and closed in various combinations with the one open culvert. During our May 15, 1980 sampling, the passage of water was through two open culverts while the third culvert remained closed.

RESULTS

Fish

Six bag-seine, one gill-net, and one minnow trap sample sites were chosen for collection of fish on May 15, 1980. Thirteen species of fish were collected from Inner Bolsa Bay and South Bolsa Slough at sites 1,

2, 3, and 4 (Table 1). Five of these species, the deepbody anchovy, *Anchoa compressa;* jacksmelt, *Atherinopsis californiensis;* longjaw mudsucker, *Gillichthys mirabilis;* specklefin midshipman, *Porichthys myriaster;* and round stingray, *Urolophus halleri,* have not been reported previously from Inner Bolsa Bay and South Bolsa Slough.

Nine species of fish were collected in Outer Bolsa Bay at site 5. Four of these species, yellowfin goby, *Acanthogobius flavimanus;* longjaw mudsucker; tilapia, *Tilapia mossambica;* and bay pipefish, *Syngnathus leptorhynchus,* have not been reported here previously.

Bivalves

Three species of bivalves were collected on March 13, 1980, and five species on May 15, 1980 at site 4 (Table 2). Three of these species, the banded chione, *Chione californiensis;* bentnose clam, *Macoma nasuta;* and common littleneck, *Protothaca staminea,* have not been reported previously from Inner Bolsa Bay.

Two species of bivalves were collected on March 13, 1980, and four species on May 15, 1980 at site 6. All species of bivalves collected at site 6 have been reported from Outer Bolsa Bay prior to or during Phase 1.

DISCUSSION

Fishes

Sample site #7 was added to our sampling stations because of a proposal to allow sea water from the area inside the Phase 1 dikes to flow outside and re-flood a small portion of the former wetlands. Sample site #7 is located in Pre-Phase I pond numbered area 6 (Knaggs and Mall 1980a). A bag seine set yielded only one arrow goby, *Clevelandia ios,* at this new sample site (Table 1).

TABLE 1. Fish Collected at Bolsa Chica Marsh May 15, 1980.

Site No.	Number of sets: Bag seine	Number of sets: Gill net	Scientific name	Common name	Prephase I pond numbered areas corresponding to our site numbers	No. captured*	Total length in mm TL: min.*	Total length in mm TL: max.*
1	1		*Anchoa compressa*	deepbody anchovy	none	1	86	
			Fundulus parvipinnis	Calif. killifish		2	86	90
			Clevelandia ios	arrow goby		31		
			Acanthogobius flavimanus	yellowfin goby		1	54	
			Atherinops affinis	topsmelt		99	21	180
2	1		*Atherinops affinis*	topsmelt	none	>500	38	179
			Fundulus parvipinnis	Calif. killifish		2	81	87
			Clevelandia ios	arrow goby		5	44	51
			Anchoa compressa	deepbody anchovy		5	119	132
3	1		*Atherinops affinis*	topsmelt	4	28	31	136
			Fundulus parvipinnis	Calif. killifish		2	79	85
			Acanthogobius flavimanus	yellowfin goby		4	67	80
			Gillichthys mirabilis	longjaw mudsucker		1	82	
			Clevelandia ios	arrow goby		5	36	42
4	2		*Atherinops affinis*	topsmelt	4	158(164)	28(20)	208(199)
			Hypsopsetta guttulata	diamond turbot		2(1)	19	28(207)
			Clevelandia ios	arrow goby		2(67)	48	53
			Atherinops californiensis	jacksmelt		(12)	(73)	(88)
			Cymatogaster aggregata	shiner surfperch		(3)	(115)	(119)
			Acanthogobius flavimanus	yellowfin goby		(1)	(58)	
			Urolophus halleri	round stingray		2		
4		2	*Porichthys myriaster*	specklefin midshipman	4	1	208	
			Hypsopsetta guttulata	diamond turbot		2(2)	110(158)	264(160)
			Cymatogaster aggregata	shiner surfperch		1(3)	115(109)	(115)
			Atherinops affinis	topsmelt		4(79)	172(122)	217(218)
			Clevelandia ios	arrow goby		1	56	
			Leptocottus armatus	staghorn sculpin		2(2)	145(131)	170(152)
			Urolophus halleri	round stingray		4		
			Mugil cephalus	striped mullet		(1)	(334)	
5	1		*Atherinops affinis*	topsmelt	1	532	30	192
			Cymatogaster aggregata	shiner surfperch		16	41	70
			Leptocottus armatus	staghorn sculpin		19	61	100
			Tilapia mossambica	tilapia		1	16	
			Fundulus parvipinnis	Calif. killifish		1	90	
			Gillichthys mirabilis	longjaw mudsucker		4	90	132
			Clevelandia ios	arrow goby		>100	36	53
			Acanthogobius flavimanus	yellowfin goby		1	49	
			Syngnathus leptorhynchus	bay pipefish		8	105	216
7	1		*Clevelandia ios*	arrow goby	6	1		

* Number in parenthesis is second set

TABLE 2. Bivalves Collected at Bolsa Chica Marsh.

Date	Site No.	Scientific name	Common name	Prephase I pond numbered areas corresponding to our site numbers	Number taken
3/13/80	4	*Chione fluctifraga*	smooth chione	4	141
		C. californiensis	banded chione		1
		Mytilus edulis	bay mussel		*
3/13/80	6	*Protothaca staminea*	common littleneck	1	200
		Mytilus edulis	bay mussel		*
5/15/80	4	*Chione fluctifraga*	smooth chione	4	119
		Protothaca staminea	common littleneck		4
		C. californiensis	banded chione		1
		Macoma nasuta	bentnose clam		3
		Mytilus edulis	bay mussel		*
5/15/80	6	*Protothaca staminea*	common littleneck	1	142
		Tagelus californianus	Calif. jackknife clam		3
		Tresus nuttalli	gaper clam		15
		Mytilus edulis	bay mussel		*

* Numerous at this station but not collected

Two minnow traps were set at sample site #4 on May 15, 1980. One trap broke open while fishing, and one staghorn sculpin, *Leptocottus armatus*, was captured in the other trap.

Large numbers of gobies were captured in the Bolsa Chica Marsh. A total of 117 gobies in five bag seine sets was captured from Inner Bolsa Bay and South Bolsa Slough, while over 100 gobies were captured in one bag seine set in Outer Bolsa Bay. This compares to five gobies captured in 14 bag seine sets for November and February sampling. We believe the gobies were vulnerable to capture with a bag seine because of a large bloom of green algae, *Enteromorpha* spp. and *Ulva* spp. The gobies were either up in this green algae or became entangled in the algae as the bag seine was pulled into shore.

Spawning and recruitment of the 1980 year class of topsmelt, *Atherinops affinis*, was successful in the Bolsa Chica population. Large numbers of juvenile fish were found throughout Bolsa Chica Marsh. Gravid female topsmelt and arrow gobies were found during sampling. A male bay pipefish, *Syngnathus leptorhynchus*, was found brooding larvae at site #5. Large numbers of eyed fish eggs were found on the green algae *Enteromorpha* spp. throughout the Marsh.

A dead Pacific bonito, *Sarda chiliensis*, was found April 9, 1980 at sample site #1 by Harold Novick. This fish was in a fresh condition when found.

A collection of fish was made on September 29, 1979 by C. Robert Feldmeth of the Claremont Colleges. This collection of fish has not been reported previously (Table 3). White croaker, *Genyonemus lineatus*, has not been reported from Outer Bolsa Bay; while tilapia has not been reported from Inner Bolsa Bay. A collection of fish was made also on

TABLE 3. Fish Collected at Bolsa Chica Marsh September 29, 1979.

Scientific name	Common name	Numbered captured	
		Outer Bolsa Bay	Inner Bolsa Bay
Acanthogobius flavimanus	yellowfin goby	5	1
Atherinops affinis	topsmelt	20	1
Fundulus parvipinnis	Calif. killifish	51	153
Genyonemus lineatus	white croaker	1	0
Gillichthys mirabilis	longjaw mudsucker	15	0
Leptocottus armatus	staghorn sculpin	1	0
Syngnathus leptorhynchus	bay pipefish	0	3
Tilapia mossambica	tilapia	0	5
Hypsopsetta guttulata	diamond turbot	1	5

February 5, 1980 from Inner Bolsa Bay, but only topsmelt were captured.

Bivalves

A large bed of smooth chione clams was located at sample site #4. This bed is a sand bar approximately 30 m above the tide gates on the south side of the main water channel. Common littleneck clams, banded chione, and bentnose clams were found also in this clam bed on May 15, 1980 (Table 2).

Fifteen young of the year gaper clams, *Tresus nuttalli*, were collected on May 15, 1980 at sample site #6. The mean size of these gaper clams was 11 mm.

The Project

The current outlook for successfully achieving the project objectives is good. The second objective has already been achieved. We believe this study should continue through four quarters of sampling since (1) all three of the project objectives will be achieved, (2) data gathered will be of minimal cost to the Department, and (3) useful information on fish and bivalves in Bolsa Chica Marsh will be developed in this study.

REFERENCES

Knaggs, Eric H. and R. E. Mall. 1980a. Fish and bivalves at Bolsa Chica Marsh re-establishment project. Progress report I. Calif. Dept. of Fish and Game, Mar. Res. Admin. Rept. No. 80-3. 13 p.

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