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MARINE RESOURCES REGION

A SURVEY OF THE MARINE ENVIRONMENT NEAR THE CITY OF GOLETA OCEAN OUTFALL

by Dan B. Odenweller

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INTRODUCTION

The California Department of Fish and Game and the State Water Resources Control Board (through Regional Board #3, Central Coast) entered into an agreement whereby Department biologist-divers conducted a subtidal ecological investigation of the marine environment in the vicinity of the city of Goleta ocean outfall. The objective of the study was to provide the Regional Water Quality Control Board (RWQCB) with data to assist them in evaluating the effects of the discharge on the marine environment at four stations selected by the RWQCB around the outfall terminus (Figure 1). One additional physical data station, (G-4), was occupied for temperature and dissolved oxygen determinations.

The determinations made by biologist-divers included: (i) the number and diversity of animal life; (ii) substrate characteristics; and (iii) physical parameters, including water temperature, clarity, and dissolved oxygen. Additionally, benthic samples were obtained both by the divers and by a Ponar grab at each station.

The State Water Resources Control Board partially reimbursed the Department for expenses incurred during this study. The work was performed by California Department of Fish and Game biologists from the Department's research vessel KELP BASS.

AREA DESCRIPTION

The City of Goleta ocean outfall is located in the Santa Barbara Channel, approximately one mile south of the Goleta Pier, and approximately three

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1/ Prepared at California State Fisheries Laboratory, Marine Resources Region, 350 Golden Shore, Long Beach, California 90802.

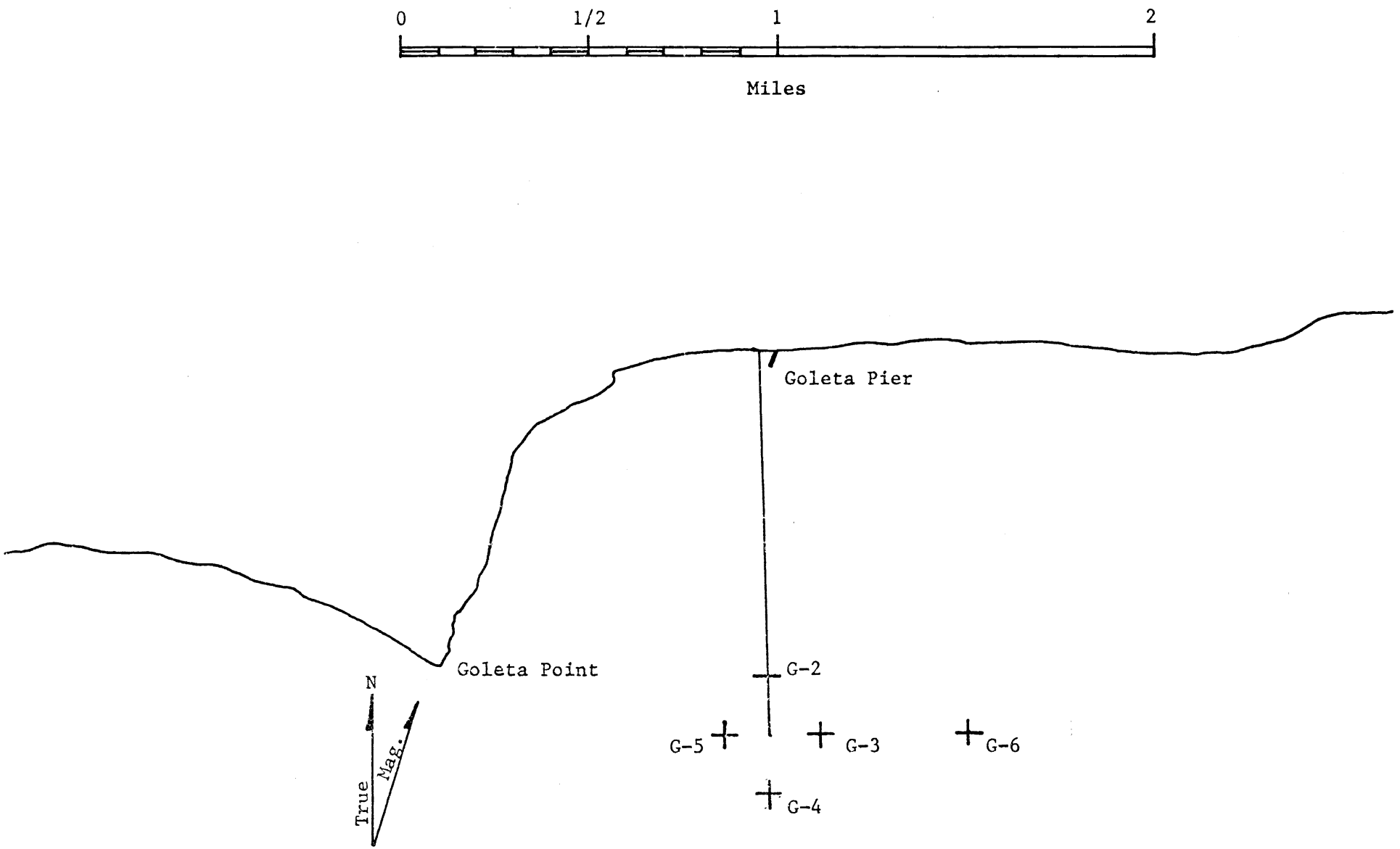

FIGURE 1. Goleta Ocean Outfall Station Location Chart

quarters of a mile due east of Goleta Point. The outfall terminus is located at a depth of approximately 100 feet, on a mud-sand bottom. The general area of coastline in which the City of Goleta outfall is located can be characterized as sandy beach interrupted by rocky headlands with cobble bottom present immediately offshore. Extensive kelp beds (Macrocystis sp.) occur between the outfall terminus and the beach, generally out to depths of approximately 60 feet.

The stations occupied by the biologist-divers fell on two general substrate types. Station G-2 was located adjacent to the outfall pipe 500 feet inshore from the terminus on a cobble bottom. Station G-3 was 500 feet east and G-5 500 feet west of the discharge terminus, while Station G-6 was located 2,000 feet east of the discharge point to serve as a control. These last three stations were all on a silt-sand substrate.

METHODS

The general methods used in this survey are described in reports of previous investigations (Turner, Ebert and Given, 1968). Field operations were conducted by Department biologists on December 7 and 8, 1971, from the Department's 92-foot research vessel, KELP BASS.

Temperature and dissolved oxygen determinations were made with a Martek Model DOA In Situ Dissolved Oxygen Monitor.

The stations selected by the RWQCB were located utilizing information from both radar and fathometer. The presence of a surface "boil" marking the end of the outfall was noted, and this facilitated station location. The sampling site was marked with an anchor and buoy, and the vessel was anchored at the site. Each station was then sampled, from the surface, utilizing a 1/20 m^2 Ponar grab, and by biologist-divers.

Each benthic sampling site was defined by attaching a 3.1 m line to the

station marker and inscribing an arc encompassing approximately 30 m^2. Biologist-divers identified and enumerated all macroscopic animals within the arcs and collected all visible forms within a 1/4 m^2 quadrat randomly placed within the arc. Water temperatures, dissolved oxygen levels and visibility estimates were taken at 10-foot intervals from the surface to the bottom at each station. General bottom conditions noted included substrate description; height, period and direction of ripple marks; and the presence of suspended organic material (leptopel) in the water column and on the bottom.

The benthic grab samples collected by the divers and the Ponar grab samples were sifted through a 0.5 mm screen, and preserved in 50% isopropyl alcohol prior to sorting. All sorting was performed in the laboratory under dissecting microscopes.

RESULTS - PHYSICAL

Two general substrate types were encountered during this survey. The first, found at Station G-2, was a cobble bottom with sand intrusion located north of the outfall pipe terminus in water 65 feet deep. The rock cobble may have been part of the riprap placed around the discharge pipe to hold it in place. The second substrate type, a silty sand bottom, was found at the remaining three stations. These stations ranged in depth from 80 to 100 feet (Table 1). The substrate at these stations near the outfall were generally covered with organic detritus which was easily disturbed by the divers, however, no sludge deposits were identified.

Visibility on the bottom ranged from 6 to 15 feet, while bottom temperatures ranged from 10.5 C to 10.8 C (Table 1). Little leptopel was noted in the water column at the four diving stations.

Temperature and dissolved oxygen profiles were taken with the Martek DOA.

TABLE 1. City of Goleta Ocean Outfall Station Data

Station	Date	Depth	Bottom Temp.(C)	Bottom Vis.(Ft.)	Characteristics
G-2	12-7-71	65'	10.8	6'	Cobble bottom, 4-6" diameter. Station located adjacent to pipe. Core: 1/4" silt, 8" brown-grey sand, strong H_2S odor. Quadrat in SW quarter.
G-3	12-7-71	80'	10.8	8'	Silty sand bottom. Core: 2 1/2" light brown sand, 6 1/2" dark brown silty sand. Strong H_2S odor. Ripple marks E-W, 4" period 1/4-1/2" high. No quadrat taken.
G-5	12-7-71	100'	10.5	10'	Silty sand bottom. Core: 1 1/2" brown sand, 4" intermediate, 3" black silty sand and mud. Moderate H_2S odor. No ripple marks. Quadrat in NW quarter.
G-6	12-8-71	90'	10.8	15'	Silty sand bottom. Core: 1/2" silt, 2 1/2" fine grey-brown sand w/mica, 7" darker brown (black) sand w/mica. Strong H_2S odor. Ripple marks E-W, 4" period, 1" high. Quadrat in NW quarter.
G-4	12-8-71	120'	11.5	-	Sampled for vertical profile only.

Dissolved oxygen levels ranged from a high of 7.8 ppm at the surface at Station G-6 to a low of 6.1 ppm near the bottom at Station G-5 (Table 2). One additional station (G-4) was occupied in 120 feet of water, to compare with dissolved oxygen readings taken near the outfall.

Core samples taken by divers at Stations, G-2, G-3, G-5 and G-6 all contained moderate to strong H_2S odor (Table 1).

RESULTS BIOLOGICAL

The biota observed by the biologist-divers was typical for the two general habitat types encountered (Table 3). The invertebrates observed to be most common at the stations with a silt-sand bottom were tube anemones (Cerianthidae), sea pens (Stylatula elongata), tube polychaetes (Diopatra sp.) and sand stars (Astropecten spp.). The only fish observed were sanddabs (Citharichthys sp.) and one unidentified cottid.

The cobble-sand bottom (Station G-2) contained a more diverse faunal assemblage with animals typical of both rocky and soft bottom habitats. The most common invertebrates observed were aggregating anemones (Corynactis californica), sea pens, tube polychaetes (Diopatra sp.), whelks (Kelletia kelletii), abalone jingles (Pododesmus cepio), and sea stars (Pisaster spp.). Fish were more abundant than at the silt-sand stations and again included those associated with soft bottoms as well as those associated with rocky habitats.

Five species of fish were observed in the arc area, the most common being sanddabs, and juvenile blue rockfish (Sebastes mystinus). Several other fish species were observed extralimitally along the pipe and riprap (Table 3).

Invertebrates observed extralimitally along the outfall pipe include a gorgonian (Lophogorgia chilensis), aggregating anemones (Corynactis californica), the solitary coral (Paracyathus stearnsii), and the nudibranchs Triopha carpenteri

TABLE 2. City of Goleta Ocean Outfall Temperature, DO, and Visibility Profiles.

Station G-2

Depth	T(C)	DO(ppm)	Vis.
SS	11.5	7.5	10'
10	11.2	7.5	10'
20	11.1	7.4	8'
30	11.0	7.5	8'
40	11.0	7.5	8'
50	11.0	7.4	8'
60	10.9	6.8	6'
65	10.8		6'

Station G-3

Depth	T(C)	DO(ppm)	Vis.
SS	11.0	7.0	10'
10	11.0	7.0	10'
20	11.1	6.8	10'
30	11.1	6.8	10'
40	11.1	6.8	10'
50	11.0	6.8	10'
60	10.9	6.6	10'
70	10.9	6.5	10'
80	10.8	6.2	8'

Station G-4

Depth	T(C)	DO(ppm)
SS	11.3	7.8
10	11.5	7.6
20	11.5	7.7
30	11.5	7.8
40	11.5	7.8
50	11.5	7.6
60	11.5	7.8
70	11.5	7.8
80	11.5	7.8
90	11.5	7.8
100	11.5	7.8
110	11.5	7.4
120	11.5	6.6

Station G-5

Depth	T(C)	DO(ppm)	Vis.
SS	11.1	7.0	10-15'
10	11.1	7.1	
20	11.1	7.0	
30	11.0	6.4	15-20'
40	11.0	6.3	15-20'
50	10.8	6.2	15-20'
60	10.8	6.1	
70	10.8	6.2	15-20'
80	10.8	6.2	15-20'
90	10.5	6.1	
100			10'

Station G-6

Depth	T(C)	DO(ppm)	Vis.	Remarks
SS	11.1	7.8	10'	
10	11.1	7.5	15'	
20	11.1	7.8	15'	Leptopel present
30	11.1	7.6	15'	20-30 foot depths
40	11.1	7.8	15'	
50	11.0	7.8	15'	
60	11.0	7.7	15'	
70	11.0	7.8	15'	
80	10.9	7.4	15'	
90	10.8	6.2	15'	

TABLE 3. List of Animals Recorded During the City of Goleta Ocean Outfall Survey, December 7 and 8, 1971.

Scientific name	Transect and abundance *									
	G-2			G-3			G-5			G-6
COELENTERATA										
Aglaophenia sp.	P	((P))							S	
Cerianthidae (unident.)				8					10	
Corynactis californica	C	((A))								
Hydrozoa (unident.)	C	[C]	((S))		(1)					
Lophogorgia chilensis	1		((1))							
Paracyathus stearnsii	3									
Stylatula elongata	5						6		4	
NEMATODA (unident.)										(4)
NEMERTEA (unident.)					(1)			(5)		
POLYCHAETA										
Ampharetidae (unident.)					(1)			(1)		
Arabella sp.										(1)
Arabellidae (unident.)										(2)
Asychis disparidentata										(1)
Capitellidae (unident.)					(1)					
Cirratulidae (unident.)			(3)					(3)		(2)
Diopatra sp.	C	(8)		24			C	(3)	70	
Drilonereis longa										(1)
Glycera branchiopoda								(3)		(1)
Glycera sp.					(1)					
Glycinde armigera			(5)		(4)			(6)		
Goniada brunnea					(1)					(1)
Goniadidae (unident.)										(3)

TABLE 3 - Continued

Scientific name	Transect and abundance *			
	G-2	G-3	G-5	G-6
Haploscopolos elongatus				(1)
Laonice cirrata	(2)			
Lumbrineridae (unident.)				(2)
Lumbrineris cruzensis	(1)			
Lumbrineris sp.	(1)	(1)	(2)	
Magelona sacculata	(1)			
Magelona sp.	(1)			
Maldanidae (unident.)	(1)	(4)	(2)	(2)
Melinna oculata				(1)
Nephtys sp.	(4)	(1)	(3)	(2)
Nereidae (unident.)		(1)		
Nothria sp.		(1)	(1)	(1)
Owenia collaris		(1)		
Pectinaria californiensis			(2)	(6)
Pherusa sp.		(2)	(1)	
Phyllodocidae (unident.)	(2)	(1)		
Polychaeta (unident.)	(3)		C [6]	C [C]
Polydora sp.			(1)	(5)
Polynoidea (unident.)	[1]			
Prionospio malmgreni	(3)	(7)	(1)	(2)
Prionospio pinnata	(1)	(1)	(2)	(1)
Sabellidae (unident.)	(1)			
Salmacina tribranchiata	2 colonies			
Scoloplos sp.	(1)	(1)		
Spiophanes missionensis	(1)	(1)		

TABLE 3 - Continued

Scientific name	Transect and abundance *			
	G-2	G-3	G-5	G-6
Stemaspis fossor				(2)
Sthenelais sp.		(1)		
Sthenelanella uniformis		(2)	(1)	
Terebellidae (unident.)	(1)			
Terebellides stroemii				(1)
Tharyx multifilis		(4)	(2)	
Tharyx sp.	(4)		(3)	
MOLLUSCA				
Gastropoda				
Acteocina sp.	(1)			
Acteon punctocaelatus	(1)		(2)	
Bittium sp.			(1)	
Cylichna sp.			(2)	
Cypraea spadicea	((S))			
Dendrodoris sp.	3 [1] ((S))			
Epitonium sp.	(1)	(1)	(1)	
Flabellinopsis iodinea	((S))			2
Gastropoda (unident.)				1
Kelletia kelletii	15 ((C))			
Ophiodermella sp.				(2)
Triopha carpenteri	1 ((S))			
Trophonopsis sp.			(1)	
Volvuella sp.				(1)
Pelecypoda				
Epilucina sp.			(1)	

TABLE 3 - Continued

Scientific name	Transect and abundance *			
	G-2	G-3	G-5	G-6
Hinnites multirugosus	1 1			
Nuculana sp.	(1)	(4)	(3)	(2)
Pododesmus cepio	C ((C))			
Spat (unident.)	(16)	(12)	(20)	(20)
Tellina sp.		(4)	(3)	(8)
CRUSTACEA				
Ostracoda (unident.)	(29)	(28)	(26)	(31)
Malacostraca				
Cumacea (unident.)				(2)
Isopoda (unident.)	(4)	(4)	(2)	(7)
Amphipoda				
Gammaridae (unident.)	(15)	(9)	(9)	(32)
Decapoda (unident.)	2			
SIPUNCULIDA (unident.)				(1)
BRYOZOA				
Diaperoecia californica	S			
Bryozoa (unident.)	S [S]			
BRACHIOPODA				
Glottidia albida				(1)
ECHINODERMATA				
Asteroidea				
Astropecten armatus	1			
Astropecten verrilli				1
Astropecten sp.			1 [1]	

TABLE 3 - Continued

Scientific name	Transect and abundance *									
	G-3			G-3		G-5		G-6		
Patiria miniata	((P))									
Pisaster brevispinus	1	((P))								
Pisaster giganteus	4	((P))								
Ophiuroidea										
Amphiodia sp.							(5)			
Ophiuroidea (unident.)	C	[C]	1		(1)		(8)	1		(17)
Holothuroidea (unident.)							(2)			
CHORDATA										
Ascidiacea (unident.)	S	[S]								(1)
Vertebrata										
Agonopsis sterletus	1	((1))								
Citharichthys	C					4		S		
Coryphopterus nicholsii	3									
Cottidae (unident.)								1		
Cymatogaster aggregata	((P))									
Paralabrax nebulifer	((P))									
Phanerodon furcatus	((P))									
Rathbunella sp.	((P))									
Sebastes auriculatus	((P))									
S. carnatus	1									
S. Mystinus	C juvenile									
S. vexillaris	((P))									

TABLE 3 - Continued

* Abundance symbols

A = Abundant, numerous and evenly distributed throughout the area.

C = Common, unevenly present throughout arc and only occasionally numerous

P = Present, no abundance estimate made

S = Sparse, widely scattered throughout arc but nowhere numerous

[] = Occurrence within a quadrat 0.25 m on a side

() = Ponar grab

(())= Extralimital

and Flabellinopsis iodinea. One giant kelp plant (Macrocystis pyrifera) was observed growing attached to the outfall pipe with whitebelly rockfish (Sebastes vexillaris) and brown rockfish (Sebastes auriculatus) associated with it.

Analysis of the material collected with the Ponar grab failed to reveal any significant difference between the four stations (Table 3). However, since no replicate samples were taken, and no background data are available, no conclusions can be made based on the limited data presented here.

CONCLUSIONS

The qualitative impressions of the biologist-divers suggest the station areas surveyed near the outfall terminus are supporting a normal biota for the area. Analysis of the microfauna fails to show any significant differences between the stations. A survey of this nature is not conclusive, and without a more comprehensive and detailed study, these results should be used with caution.

ACKNOWLEDGMENTS

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