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

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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 Watsonville ocean outfall in Monterey Bay. 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).

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

The State Water Resources Control Board 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 Watsonville ocean outfall is located in Monterey Bay approximately one-half mile west of the mouth of the Pajaro River at a depth of approximately 50 feet. This area of the coastline can be

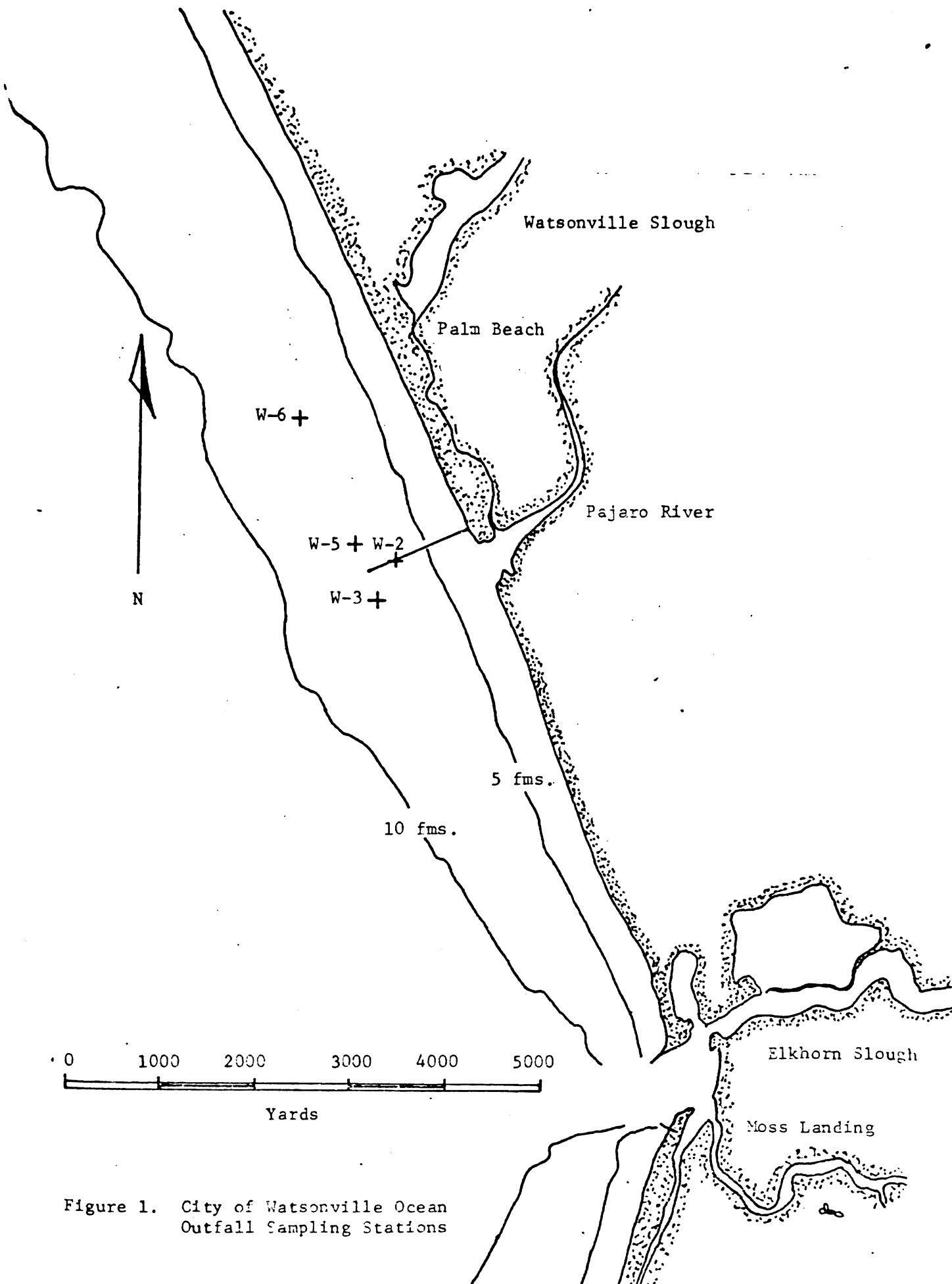


Figure 1. City of Watsonville Ocean Outfall Sampling Stations

characterized as open-coast sandy beach (Ricketts, et al., 1968), and only two general benthic habitats were encountered. The first habitat type, the pipe and its associated structures, was present at one station, W-2. The second, the open-coast sandy beach, was present at all four stations, and would be more characteristic of the general area in which the outfall is located.

#### METHODS

The general methods used in this survey are described in reports of previous investigations (Turner et al., 1968). Field operations were conducted by Department biologists on September 20, 1971, from the Department's 92-foot research vessel, KELP BASS.

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  $1/10 \text{ m}^2$  Ponar grab, and by biologist-divers.

Each benthic sampling site was defined by attaching a 3.3 m line to the station marker and inscribing an arc encompassing approximately  $30 \text{ m}^2$ . Biologist-divers identified and enumerated all macroscopic plants and animals within the arcs and collected all forms within a  $1/4 \text{ m}^2$  quadrat randomly placed within the arc. Additional substrate samples were taken at station W-3 and W-5 for infauna. Water temperatures 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 habitats were encountered during this investigation. The first, common to all four stations, consisted of fine grey-brown sand, and is characteristic of an open-coast sandy beach. The second habitat was present at station W-2, and consisted of the outfall pipe and its associated structures. Depths ranged from 35 feet at station W-2 to 48 feet at station W-3 (Table 1).

Visibility on the bottom ranged from 10 to 20 feet while bottom temperatures ranged from 54 to 56°F (Table 1). No thermocline was present at the stations surveyed, and leptopel was noted in the water column at all four stations (Table 2). Flocculent organic material was also present on the bottom at all four stations (Table 1).

#### RESULTS - BIOLOGICAL

Macroscopically, the biota observed by the biologist-divers appeared normal at all four stations. The only noticeable difference appeared at station W-2, where the outfall pipe and its associated structures served as an additional substrate type, thus accounting for the increased variety recorded at that station (Table 3). Station W-6 appears to be lacking in many forms but this can be explained by the fact that a separate substrate sample was not taken, thus eliminating the infauna recorded at the other stations.

Analysis of the material collected with the Ponar grab indicated that the "control" station (W-6) showed an increase in total numbers of animals over the other stations (Table 4). The most noticeable increases

TABLE 1

City of Watsonville Ocean Outfall Station Data

<u>Station</u>	<u>Date</u>	<u>Depth</u>	<u>Bottom temp. °F</u>	<u>Bottom visibility</u>	<u>Bottom Description</u>
W-2	9-20-71	35'	56°	20'	Fine grey-brown sand with flocculent material. Ridges 4-5" period, 2" high. Pipe, anchored by chain, ran through arc, no chain in the arc. Quadrat in NE quarter of arc, all in sand.
W-3	9-20-71	48'	55°	20'	Fine brown-grey sand with slight flocculent material topping each ridge. Ripples NNW-SSE, 6" period, 1" high. Little shell debris or sand dollar tests. Quadrat in SE quarter of arc, all in sand.
W-5	9-20-71	47'	56°	15'	Hard-packed grey-brown sand. Easily stirred up flocculent material on ridge crests, more than at W-6. Ripples NNW-SSE, 4" period, 1" high. Quadrat all in sand.
W-6	9-20-71	47'	54°	10'	Hard-packed light grey-brown sand. Light flocculent material on bottom. Ripple marks E-W, 8" period, 1" high. Small pieces of drift algae on bottom. Quadrat all on sand.

TABLE 2

City of Watsonville Ocean Outfall Vertical Temperature  
and Visibility Profiles  
September 20, 1971

<u>Depth</u>	<u>W-2</u> <u>Temp.</u> <u>(°F)</u>	<u>Vis.</u> <u>(Ft.)</u>	<u>Depth</u>	<u>W-3</u> <u>Temp.</u> <u>(°F)</u>	<u>Vis.</u> <u>(Ft.)</u>
SS	59	50	SS	59	40
10	58	30	10	59	40
20	57	20+ (leptopel)	20	57	40 (leptopel)
30	56	10+	30	55	25
35	56	20	40	55	20
			48	55	20

<u>Depth</u>	<u>W-5</u> <u>Temp.</u> <u>(°F)</u>	<u>Vis.</u> <u>(Ft.)</u>	<u>Depth</u>	<u>W-6</u> <u>Temp.</u> <u>(°F)</u>	<u>Vis.</u> <u>(Ft.)</u>
SS	59	40 (leptopel)	SS	59	40
10	58	40	10	58	40
20	57	40	20	58	30
30	57	20	30	56	30 (leptopel)
40	56	20	40	54	20
47	56	15	47	54	10

TABLE 3.

City of Watsonville Ocean Outfall, September 20, 1971

## Diver Observation and Diver Pick-up

Scientific name	Station and abundance *				Remarks
	W-2	W-3	W-5	W-6	
ALGAE					
Rhodophyta (unident.)	P				
COELENTERATA					
Anthozoa (unident.)	((P))				
<u>Epiactis prolifera</u>	10				
Hydrozoa (unident.)	P				
POLYCHAETA					
<u>Diopatra</u> sp.			1		
<u>Dodecaceria fewksii</u>	A				
Polychaeta (unident.)	A, (2)	A, (40), [1]	P, (P), [2]	P, (6)	
Sabellidae (unident.)	P	P			
SIPUNCULIDA					
Sipunculida (unident.)	[3]				
CRUSTACEA					
<u>Cancer gracilis</u>	1	1			
Caprellidae (unident.)	P	[P]	[P]		Collected incidentally at Station W-2

TABLE 3-contd.

Scientific name	Station and abundance *				Remarks
	W-2 (P)	W-3	W-5	W-6	
Cirripedia (unident.)					
Cumacea (unident.)				P	collected incidentally
Decapoda - larva (unident.)				P	collected incidentally
<u>Edotea sublittoralis</u>		[1]			
Gammaridae (unident.)	P	[4]	[2]		collected incidentally at Station W-2
Isopoda (unident.)	P				
<u>Lironeca californica</u>	P				parasitic in gill cavities of <u>Citharichthys</u> sp.
<u>Lironeca vulgaris</u>		P		P	" " "
Ostracoda (unident.)	P	[113]	P,[57]		collected incidentally at Station W-2
Paguridae (unident.)			1	(1)	
<u>Pagurus</u> sp.		8			
<u>Pinnixa weymouthi</u>	A	1			
MOLLUSCA					
<u>Barleeia</u> sp.					collected incidentally
Hermisenda crassicornis	2,((A))				
• Leptopecten latiauratus	1				
Mopalia muscosa	1				
Mytilus edulis	2				



TABLE 3-contd.

Scientific	Station and abundance *				Remarks
	W-2	W-3	W-5	W-6	
<u>Nassarius</u> sp.		1			
Nudibranchia (unident.)	1				
Pelecypoda (unident.)	P	P	P		collected incidentally
Pelecypoda - juv. (unident.)					
Type A		[31]	[28]		
Type B		[48]	[22]		
Type C			[2]		
Type D		[2]	[22]		
PHORONIDA					
Phoronis vancouverensis	A				collected incidentally
ECHINODERMATA					
<u>Dendraster excentricus</u>		[1]			
<u>Pisaster brevispinus</u>	9	((1))	3	1,((2))	
Pisaster ochraceus	((1))				
ASCIDIACEA					
Ascidia (unident.)	P				
EGG CASES - INVERTEBRATE					
Egg cases, invertebrate (unident.)		P			

TABLE 3-contd.

Scientific	Station and abundance *				Remarks
	W-2	W-3	W-5	W-6	
VERTEBRATA					
<u>Artedius notospilotus</u>	2				
<u>Citharichthys sp.</u>	4, (1)	9, (P)	A	A	
<u>Citharichthys sordidus</u>	1	1	6	1	
<u>Citharichthys stigmaeus</u>			12	10	

\* Abundance symbols

A = Abundant - numerous and evenly distributed throughout the sample

P = Present - present in area but relative abundance not estimated

() = Quadrat

(( )) = Extralimital observation

[ ] = Infauna sample

TABLE 4

City of Watsonville Ocean Outfall Ponar Grab Samples  
September 20, 1971

	<u>W-2</u>	<u>W-3</u>	<u>W-5</u>	<u>W-6</u>
POLYCHAETA				
<u>Chaetozone setosa</u>	3			
<u>Chone mollis</u>	1			
<u>Chone</u> sp.			1	
<u>Glycera</u> sp.		2		
<u>Glycera tessellata</u>				2
<u>Haploscoloplos elongatus</u>		2	1	
Lumbrinderidae (unident.)			1	
<u>Lumbrineris</u> sp.		1		4
<u>Magelona sacculata</u>	1	5	2	7
<u>Nepthys parva</u>	5			1
<u>Nothria iridescens</u>				1
<u>Prionospio pygmaeus</u>	3	2		1
Sigalionidae (unident.)			1	2
<u>Spiophanes bombyx</u>	2			1
<u>Thalenessa spinosa</u>	6	2		
Polychaete totals	21	14	6	19
SIPUNCULIDA				
Sipunculida (unident.)				1
CRUSTACEA				
Caprellidae (unident.)	1	2		21
Cumacea (unident.)	3		2	
<u>Edotea sublittoralis</u>				2
Gammaridae (unident.)	15	9	9	83
Isopoda (unident.)		1	4	

	<u>W-2</u>	<u>W-3</u>	<u>W-5</u>	<u>W-6</u>
Ostracoda (unident.)	11	56	59	77
<u>Pagurus</u> sp.	1			
Pycnogonida (unident.)				1
Zoea larvae (unident.)		1		1
Crustacea totals	31	69	74	185
MOLLUSCA				
<u>Barleeia</u> sp.		1		
<u>Nassarius mendicus</u>	1			
<u>Olivella</u> sp.	1		1	
Gastropoda totals	2	1	1	0
Pelecypoda - juv. (unident.)				
Type A	29	3	24	36
Type B	6	21	35	55
Type C	23	24	24	67
<u>Trachycardium quadragenarium</u>		1		1
Pelecypoda totals	58	49	83	159
PHORONIDA				
Phoronida (unident.)		1		
ECHINODERMATA				
<u>Dendraster excentricus</u>	32		1	
Total Individuals	144	134	165	364
Total Taxa	18	17	14	19

were among the crustaceans and pelecypods. Since all of these samples totaled approximately two liters of material, the differences may be attributable to the location of the stations in relation to the outfall. This conclusion must be treated with care, since no replicate samples were taken, and no historical data is available to confirm the conclusion. It is equally probable that sampling error could account for this variance, which suggests a need for a more intensive sampling effort to resolve the discrepancies.

#### CONCLUSIONS

The qualitative impressions of the biologist-divers suggest that the area is supporting a normal biota for an open-coast sandy beach. Analysis of the microfauna indicates the possibility of some effects attributable to the outfall. A more detailed survey of the area will be required to resolve this question for no conclusion can be drawn from one seemingly aberrant station.

#### ACKNOWLEDGMENTS

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