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***Bottom Trawling
in Half Moon Bay,
Grays Harbor,
Washington, 12 April 1994***

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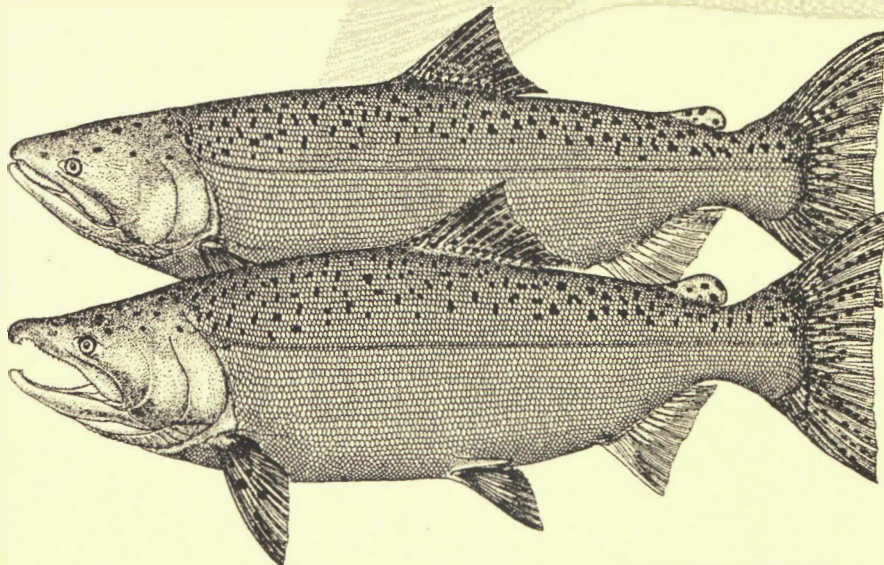
**National Marine
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Seattle, Washington

by
Robert L. Emmett
and Paul J. Bentley

September 1994

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**BOTTOM TRAWLING IN HALF MOON BAY,
GRAYS HARBOR, WASHINGTON, 12 APRIL 1994**

by

**Robert L. Emmett
and
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INTRODUCTION

The U.S. Army Corps of Engineers (COE) is evaluating methods to slow erosion near the South Jetty at the entrance to Grays Harbor, Washington. One way to accomplish this is to use material dredged from Grays Harbor to construct an underwater berm in Half Moon Bay of Grays Harbor, if deposition of dredged material is not detrimental to living marine resources (Fig. 1). The underwater sediment berm should help reduce erosion near the South Jetty by providing a sediment supply for accretion on the shores and nearshore areas. However, the habitat that would be covered by this berm is also habitat for Dungeness crab, *Cancer magister*. Thus, prior to depositing dredged material, the COE requested that the National Marine Fisheries Service (NMFS) survey the proposed dredged-material disposal area for marine fishes and Dungeness crabs, to provide near real time information on Dungeness crab abundance and distribution, so that critical shoreline stabilization could be accomplished in a timely manner. If Dungeness crabs were found to be abundant, deposition of dredged material would have been postponed until crab densities declined.

METHODS

Dungeness crabs and marine fishes were collected with a 3.1-m beam trawl (Gunderson et al. 1985) towed by the 17.7-m-long COE vessel SHOALHUNTER. Five trawls were conducted within an hour of both low slack and high slack tides. When water currents were present, the trawl was towed into the current. Trawls were 5 minutes long. Trawling locations were identified by dividing the proposed

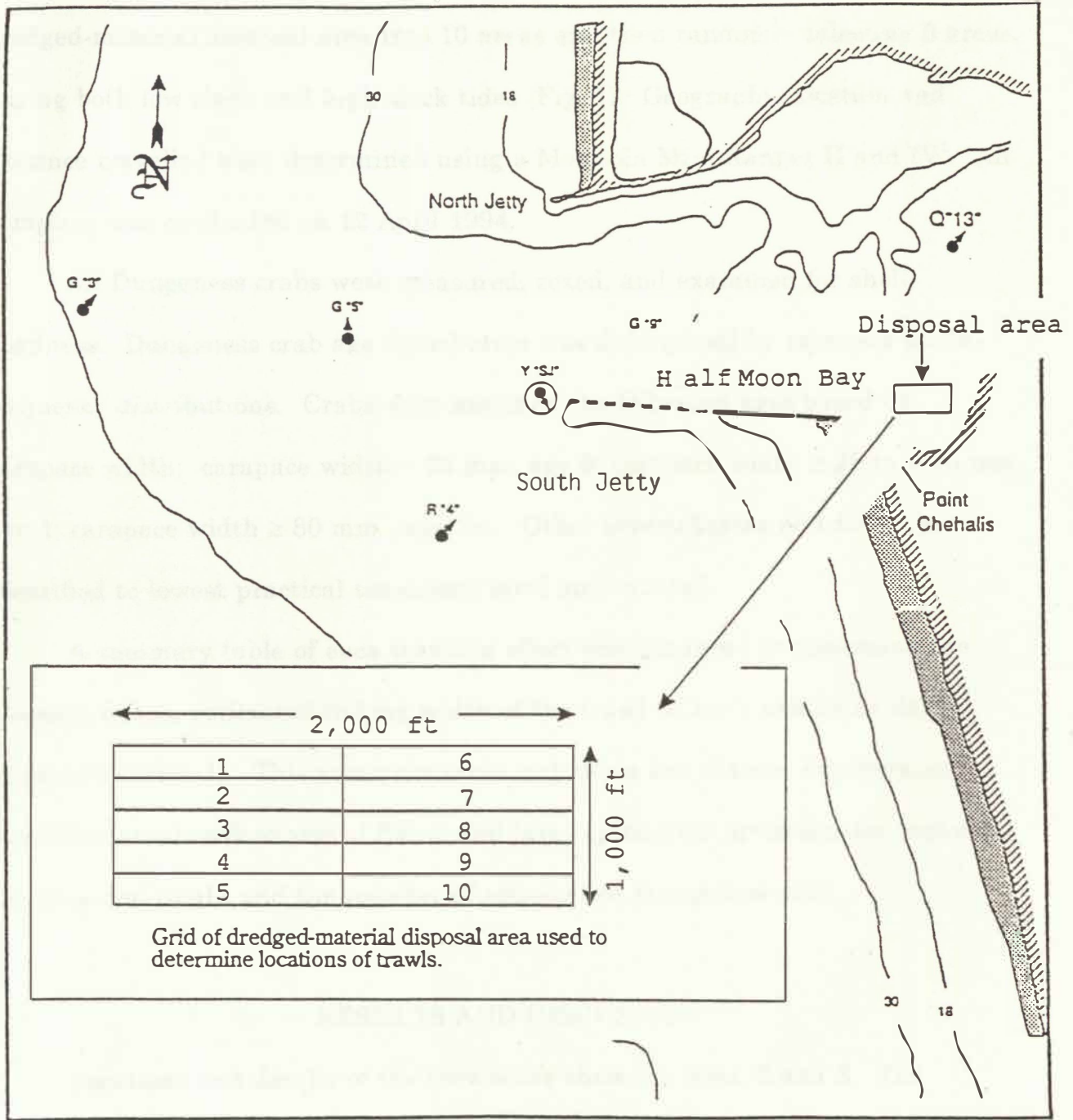


Figure 1.— Location of the proposed dredged-material disposal area in Half Moon Bay, Grays Harbor, Washington. Depths are shown in feet.

dredged-material disposal area into 10 areas and then randomly selecting 5 areas, during both low slack and high slack tides (Fig. 1). Geographic location and distance travelled were determined using a Motorola Mini-Ranger II and IV¹. All sampling was conducted on 12 April 1994.

All Dungeness crabs were measured, sexed, and examined for shell hardness. Dungeness crab age distribution was determined by carapace width-frequency distributions. Crabs were assigned the following ages based on carapace width: carapace width < 25 mm, age 0; carapace width \geq 25 to < 80 mm, age 1; carapace width \geq 80 mm, age 2+. Other invertebrates and fishes were identified to lowest practical taxonomic level and counted.

A summary table of each trawling effort was produced documenting the distance fished, estimated fishing width of the trawl (2.3 m), and catch data (Appendix Table 1). This summary table includes a list of taxa, numbers and densities (numbers/hectare) of fishes and large epibenthic invertebrates captured (by taxa and total), and the number of soft-shelled Dungeness crab.

RESULTS AND DISCUSSION

Locations and depths of the trawls are shown in Figs. 2 and 3. The currents and the numerous commercial crab pots deployed did not permit trawling in straight lines.

Seventeen fish and invertebrate taxa were identified during the survey

¹ Reference to trade names does not imply endorsement by NOAA, National Marine Fisheries Service.

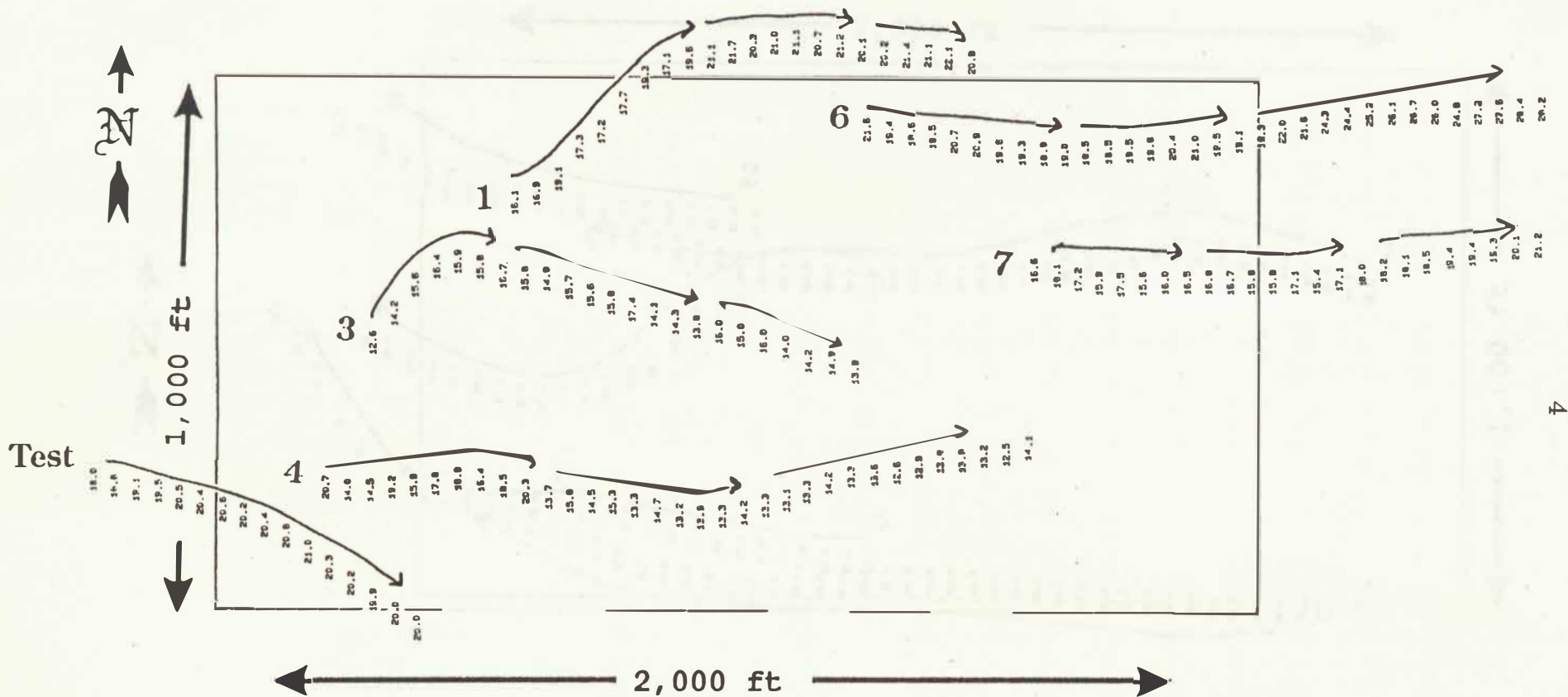


Figure 2.—Locations of six 3.1-m beam trawls conducted during and near low slack tide in a proposed dredged-material disposal site (see Figure 1) in Half Moon Bay, Grays Harbor, Washington, 12 April 1994. Arrows indicate the direction of the trawls, large numbers indicate stations, and the number series indicate depths in feet. Also shown is an initial test trawl.

(Table 1, Appendix Table 1). The highest density of Dungeness crabs occurred at Station 1 during low slack tide (Table 2). The lowest density of Dungeness crabs occurred at Station 7 near high slack tide (Table 2). Overall, Dungeness crab densities were low. Mean Dungeness crab densities were higher near low slack tide (147 crabs/hectare) than high slack tide (66 crabs/hectare)(Table 2). Total fish and invertebrate densities were also greater near low slack tide (Table 2).

Only three of the 77 Dungeness crabs captured were soft-shelled (Appendix Table 1). Thirty percent were males and 70% were female. Most Dungeness crabs had a carapace width > 85 mm and were age 2+ (Fig. 4). Only a few age-0 Dungeness crab and megalopae were captured (Appendix Table 1). The major settlement period (transition from planktonic to benthic life form) for this species probably had not yet occurred.

This report does not constitute NMFS's formal comments under the Fish and Wildlife Coordination Act or the National Environmental Policy Act.

Table 1.—Fishes and large epibenthic invertebrates captured by 3.1-m beam trawl at a proposed dredged-material disposal site at Half Moon Bay, Grays Harbor, Washington, 12 April 1994.

Common name	Scientific name
Unidentified juv. smelt	Osmeridae
Threespine stickleback	<i>Gasterosteus aculeatus</i>
Bay pipefish	<i>Syngnathus leptorhynchus</i>
Spotfin surfperch	<i>Hyperprosopon anale</i>
Saddleback gunnel	<i>Pholis ornata</i>
Pacific sand lance	<i>Ammodytes hexapterus</i>
Unidentified rockfish	Scorpaenidae
Kelp greenling	<i>Hexagrammos decagrammus</i>
Pacific staghorn sculpin	<i>Leptocottus armatus</i>
Unidentified snailfish	Cyclopteridae
Speckled sanddab	<i>Citharichthys stigmaeus</i>
English sole	<i>Pleuronectes vetulus</i>
Sand sole	<i>Psettichthys melanostictus</i>
Unid. Pleuronectidae	Pleuronectidae
Dungeness crab (age 0)	<i>Cancer magister</i>
Dungeness crab (age 1)	<i>Cancer magister</i>
Dungeness crab (age 2+)	<i>Cancer magister</i>
Dungeness crab megalops	<i>Cancer magister</i>
Red rock crab	<i>Cancer productus</i>
Crangonidae	Crangonidae

Table 2.-Densities (number/hectare) of fishes and epibenthic organisms captured by a 3.1-m beam trawl in Half Moon Bay, Grays Harbor, Washington, 12 April 1994.

Low slack			
Station	Number of Dungeness crab/hectare	Number of fishes and other invertebrates /hectare	Total number/hectare
1	300	1,153	1,453
3	30	25,420	25,450
4	101	872	973
6	84	38,486	38,570
7	220	18,380	18,600
Mean	<u>147</u>	<u>16,862</u>	<u>17,009</u>
High slack			
2	87	17,322	17,409
3	98	13,759	13,857
5	58	18,386	18,444
7	10	12,002	12,012
10	79	8,075	8,154
Mean	<u>66</u>	<u>13,909</u>	<u>13,975</u>

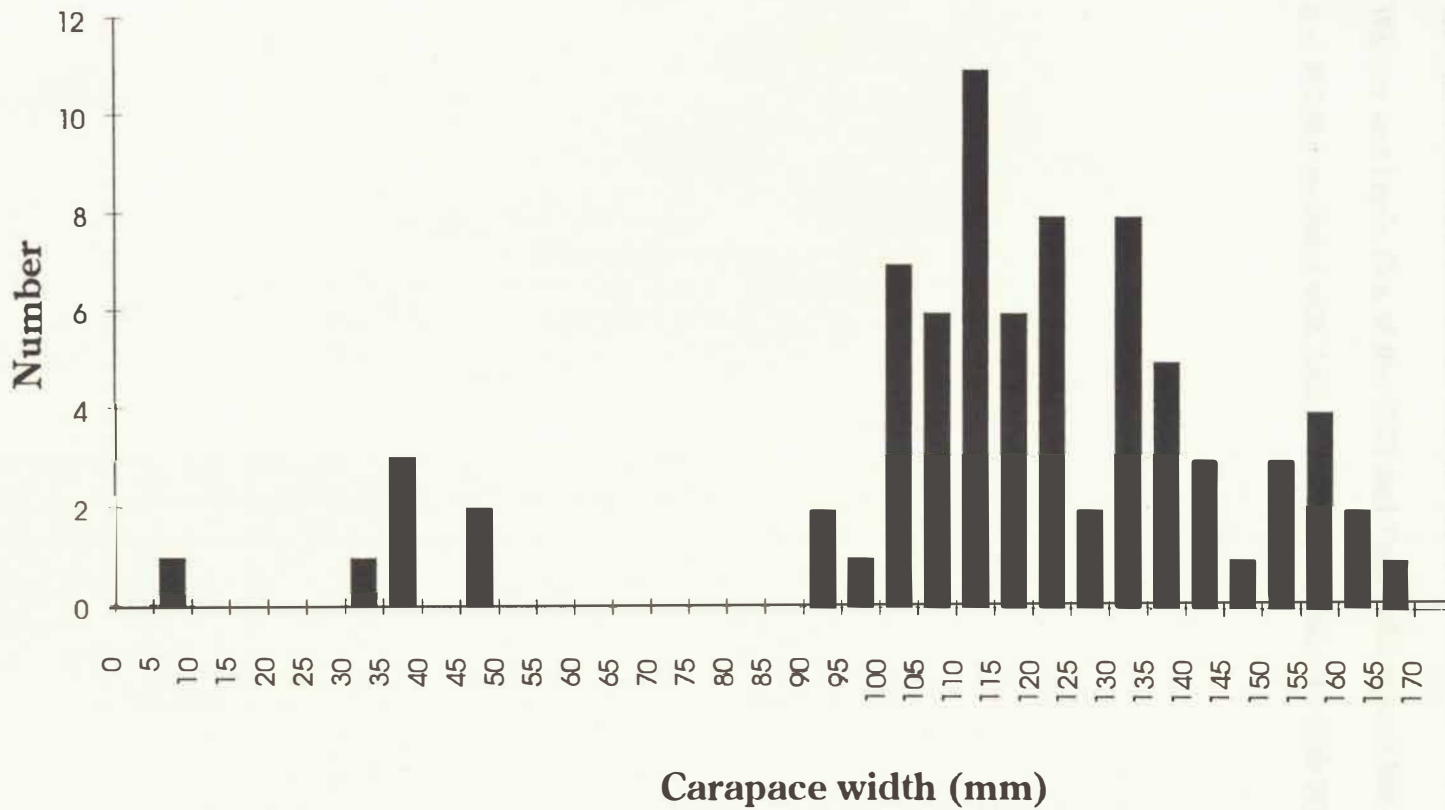


Figure 4.- Carapace width frequency distribution of Dungeness crabs captured in Half Moon Bay, Grays Harbor, Washington on 12 April 1994 using a 3.1 m beam trawl.

ACKNOWLEDGMENTS

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Appendix Table 1. Summary of 3.1-m beam trawling efforts at a proposed dredged-material disposal site in Half Moon Bay, Grays Harbor, Washington, 12 April 1994.

Station: 1
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 0815
 Tide stage: Low slack
 Depth: 5.8 m
 Distance traveled: 275 m

Species	No. captured	No. of soft crabs	No. per hectare
Threespine stickleback	3		47
Spotfin surfperch	1		16
Speckled sanddab	52		822
English sole	6		95
Sand sole	3		47
Unid. Pleuronectidae	8		126
Dungeness crab (age 1)	3		47
Dungeness crab (age 2+)	16	2	253
TOTALS	92	2	1,453

Station: 3
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 0840
 Tide stage: Low slack
 Depth: 6.1 m
 Distance traveled: 287 m

Species	No. captured	No. of soft crabs	No. per hectare
Pacific staghorn sculpin	1		15
Unidentified snailfish	1		15
Speckled sanddab	52		788
English sole	9		136
Unid. Pleuronectidae	13		197
Dungeness crab (age 1)	1		15
Dungeness crab megalops	1		15
Red rock crab	2		30
Crangonidae	1,600		24,239
TOTALS	1,680		25,450

Appendix Table 1.--Continued.

Station: 4
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 0855
 Tide stage: Low slack
 Depth: 6.1 m
 Distance traveled: 428 m

Species	No. captured	No. of soft crabs	No. per hectare
Unidentified juv. smelt	1		10
Spotfin surfperch	1		10
Saddleback gunnel	1		10
Kelp greenling	2		20
Unidentified snailfish	3		30
Speckled sanddab	61		620
English sole	7		71
Larval flatfish	9		91
Dungeness crab (age 0)	1		10
Dungeness crab (age 2+)	7		71
Dungeness crab megalops	2		20
Red rock crab	1		10
TOTALS	96		973

Station: 6
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 0910
 Tide stage: Low slack
 Depth: 4.6 m
 Distance traveled: 411 m

Species	No. captured	No. of soft crabs	No. per hectare
Spotfin surfperch	1		11
Pacific sand lance	3		32
Unidentified rockfish	1		11
Unidentified snailfish	1		11
Speckled sanddab	92		973
English sole	7		74
Sand sole	2		21
Unid. Pleuronectidae	11		116
Dungeness crab (age 1)	2		21
Dungeness crab (age 2+)	6	1	63
Crangonidae	3,520		37,237
TOTALS	3,646	1	38,570

Appendix Table 1.--Continued.

Station: 7
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 0928
 Tide stage: Low slack
 Depth: 4.6 m
 Distance traveled: 317 m

Species	No. captured	No. of soft crabs	No. per hectare
Bay pipefish	1		14
Pacific sand lance	1		14
Speckled sanddab	59		809
English sole	19		261
Dungeness crab (age 2+)	15		206
Dungeness crab megalops	1		14
Crangonidae	1,260		17,282
TOTALS	1,356		18,600

Station: 2
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 1440
 Tide stage: High slack
 Depth: 6.1 m
 Distance traveled: 250 m

Species	No. captured	No. of soft crabs	No. per hectare
Speckled sanddab	29		504
English sole	3		52
Sand sole	4		70
Dungeness crab (age 2+)	5		87
Crangonidae	960		16,696
TOTALS	1,001		17,409

Appendix Table 1.--Continued.

Station: 3

Gear: 3.1-m beam trawl

Date: 12 Apr 1994

Time: 1455

Tide stage: High slack

Depth: 6.1 m

Distance traveled: 310 m

Species	No. captured	No. of soft crabs	No. per hectare
Saddleback gunnel	1		14
Speckled sanddab	26		365
Sand sole	3		42
Unid. Pleuronectidae	3		42
Dungeness crab (age 2+)	7		98
Red rock crab	4		56
Crangonidae	944		13,240
TOTALS	988		13,857

Station: 5

Gear: 3.1-m beam trawl

Date: 12 Apr 1994

Time: 1514

Tide stage: High slack

Depth: 7.9 m

Distance traveled: 376 m

Species	No. captured	No. of soft crabs	No. per hectare
Speckled sanddab	96		1,110
English sole	30		347
Sand sole	2		23
Unid. Pleuronectidae	12		139
Dungeness crab (age 2+)	5		58
Red rock crab	2		23
Crangonidae	1,448		16,744
TOTALS	1,595		18,444

Appendix Table 1.--Continued.

Station: 7
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 1533
 Tide stage: High slack
 Depth: 6.7 m
 Distance traveled: 447 m

Species	No. captured	No. of soft crabs	No. per hectare
Speckled sanddab	8		78
English sole	3		29
Sand sole	4		39
Unid. Pleuronectidae	13		126
Dungeness crab (age 2+)	1		10
Crangonidae	1,206		11,730
TOTALS	1,235		12,012

Station: 10
 Gear: 3.1-m beam trawl
 Date: 12 Apr 1994
 Time: 1548
 Tide stage: High slack
 Depth: 6.1 m
 Distance traveled: 498 m

Species	No. captured	No. of soft crabs	No. per hectare
Speckled sanddab	55		480
English sole	43		375
Sand sole	9		79
Unid. Pleuronectidae	18		157
Dungeness crab (age 2+)	8		70
Dungeness crab megalops	1		9
Crangonidae	800		6,984
TOTALS	934		8,154
