

APPENDIX 4

TRAWLING PROGRAM

The Trawling Program consists of quarterly trawl surveys of the demersal fish and epibenthic macroinvertebrates of the Palos Verdes shelf.

Quarterly trawls were conducted during February, May, August, and November 2005. Single ten-minute duration trawls were taken at 16 stations on the Palos Verdes Shelf. The stations are fixed sites at depths of 23, 61, 137, and 305 m arrayed along four transects perpendicular to shore. Sampling at sites in the first three depths is required under the NPDES monitoring program. Sampling site locations are illustrated in Chapter 4, Figure 4.1 of this report. Latitude and longitude of trawl tracks are included in the accompanying data files (see data CD).

All fish and invertebrates captured are identified to the lowest possible taxon, enumerated, and weighed to the nearest 0.1 kilogram. Board standard length is determined for each fish and all organisms (fish and invertebrates) are examined for evidence of disease or anomalies. Seafloor debris collected in the trawl is characterized and the abundance and weight estimated.

Survey methods are described below. All data derived from the trawl samples are provided on the accompanying CD. Descriptions of the data file formats are provided below.

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SURVEY METHODS

POSITIONING AND NAVIGATION: Positioning on station is accomplished by means of a Differential Global Position Satellite (DGPS) navigation system confirmed by fathometer and two to three axis visual ranges.

SAMPLING EQUIPMENT: Trawling is conducted from aboard the Districts' 20 meter monitoring vessel, the R/V *OCEAN SENTINEL*. The trawl used in this program is a regionally standardized otter trawl with a double seam (four seams) net with a 25 ft head-rope; balloon with tapered panels in body and wings; 6 or more plastic floats on head-rope, 4 to 5 foot leglines; foot-rope with chain; no tickler chain, Texas style; body and bag mesh: 1.5 inch stretch; cod-end liner mesh: 0.5 inch stretch; all nylon; dark color. The otter trawl is deployed by means of a hydrographic winch carrying 3/8 in. wire rope.

SAMPLE COLLECTION: At each trawling site, otter trawl deployment is begun at a pre-determined location that is at some distance from the actual station. This assures that the deployment of net and wire is complete as the vessel reaches the station. The scope to depth ratios used are 6:1 for 23 to 27 m stations, 4.5:1 for 60 m stations, 4.3:1 for 137 m stations, and 3.2:1 for 305 m stations. After sufficient scope is laid out, the vessel passes over the beginning of the station and the sampling begins. Trawling proceeds at a speed of approximately 2 knots for 10 minutes. The vessel is kept on a course parallel to the depth contour of the station.

Upon retrieval of the trawl, the cod-end is emptied into a seawater holding tank. From this tank all organisms are sorted into species lots. All fish species are identified, enumerated, measured (standard length), and weighed to the nearest 0.1 kg by species lot. Standard lengths of fish are reported in size classes of 1.0 cm intervals. The first centimeter size class (size class number 1) extends from >0 to 1.0 cm, size class 2 extends from >1.0 to 2.0 cm, and so forth. All epibenthic macroinvertebrates are identified, enumerated, and weighed to the nearest 0.1 kg by species lots. All organisms are examined for unusual appearance, tumors, lesions, fin erosion, or other anomalies. All data are recorded on field data sheets. Specimens for the voucher collection and any animals that cannot be positively identified in the field are returned to the Marine Biology Laboratory.

To provide QA/QC, a voucher collection of organisms taken in trawls from the Palos Verdes shelf is maintained in the Marine Biology Lab. In addition, the Districts' taxonomists are active members of the Southern California Association of Marine Invertebrate Taxonomists and maintain active contact with other research and monitoring groups conducting trawls in the Southern California Bight.

Debris collected by trawl is classified into natural and anthropogenic categories. Natural debris included marine vegetation, terrestrial vegetation, and benthic debris. Anthropogenic debris categories were cans, fishing gear, glass bottles, paper, plastic, lumber, metal debris and "other". The amount of debris is reported in estimated abundance and weight classes.

DESCRIPTION of DATA FILES

All data from the Trawl surveys collected during 2005 are provided on the CD accompanying this report. The following descriptions explain the formatting of each of the data files covering Trawl data. Data files are in comma separated value file (.CSV) format. Each file begins with a header row providing the field names for the data records. A brief definition of each field name is provided below. The term “sample” is a generic one, which, in the Trawl program, acts as a synonym for an individual trawl at a specific site.

Following the header row the data records begin. Data values can be either alpha, alphanumeric characters or numeric. Any missing data values appear as “,” (*i.e.*, nothing between the commas). A comma does not follow the last data value.

FILE 1: FISH ABUNDANCE AND SIZE CLASS

Number of Data Records (excluding header row) = 3579

Header Row Field Definitions:

Survey: Name of survey during which sample collected. Trawls are by quarter.

Site: Identifies specific site from which sample collected

Species: Name of species to which data record applies (may be a higher taxonomic category)

Size_Class: Standard length size class

Size_Class_Units: Unit of measurement for size class; CM=centimeter

Abundance: Number of individual(s) of the taxon reported

Fin_Erosion: Indicates whether fish reported in record exhibited signs of fin erosion disease. Y = Yes; N= No

Tumor: Indicates whether fish reported in record exhibited external growths. Y = Yes; N= No

External_Parasite: Indicates whether fish reported in record had external parasites. Y = Yes; N= No

Skeletal_Deformity: Indicates whether the fish reported in record had skeletal deformities such as spinal curvature, bent or clubbed fin rays, or deformations of the mouth. Y = Yes; N= No

Black_Lesion: indicates whether fish reported in record exhibited signs of black lesions. Y = Yes; N= No

Other_Lesions: Indicates whether fish reported in the record exhibited signs of other lesions not reported in other anomaly fields. Y = Yes; N= No

Color_Anomaly: Indicates whether fish reported in record exhibited anomalous distributions of skin pigmentation such as ambicoloration or albinism. Y = Yes; N= No

Other_Anomalies: Indicates whether fish reported in record exhibited anomalies otherwise not accounted for in other anomaly fields. Y = Yes; N= No

Data_Quality: Quality rating of the data. A= High quality data for use without qualification; B = Questionable data quality that may be used but see metadata for qualifications; C= Highly questionable data, do not use, see metadata for explanation.; D= unknown data quality

Phylum: Taxonomic phylum to which taxon reported in record belongs

Class: Taxonomic class to which taxon reported in record belongs

Order: Taxonomic order to which taxon reported in record belongs

Family: Taxonomic family to which taxon reported in record belongs

Sampling_Date: Date on which trawl occurred in the field in MM/DD/YY.

Sampling_Depth: Depth of trawl at start of trawl

Units_Depth: Unit of measurement for depth; M=meter

Trawl_Start_Time: The time at which the trawl begins

Starting_Latitude: Latitude in decimal degrees where trawl begins (+ number =N).

Starting_Longitude: Longitude in decimal degrees where trawl begins (-number=W).

Ending_Latitude: Latitude in decimal degrees where trawl ends (+ number =N) .

Ending_Longitude: Longitude in decimal degrees where trawl ends (-number=W)

Trawl_End_Time: Time at which the trawl ends

Duration: Length of trawl from Trawl_Start_Time to Trawl_End_Time

Duration_Units: Unit of time for duration

Sample_Comments: Comments relevant to the sample

File 2: INVERTEBRATE ABUNDANCE

Number of Data Records (excluding header row) = 749

Header Row Field Definitions:

Survey: Name of survey during which sample collected. Trawls are by quarter.

Site: Identifies specific site from which sample collected

Species: Name of species to which data record applies (may be a higher taxonomic category)

Abundance: Number of individual(s) of the taxon reported

External_Parasite: Indicates whether invertebrate reported in record had external parasites. Y = Yes; N= No

Burnspot_Disease: Indicates whether invertebrate reported in the record exhibited signs of burnspot disease. Y = Yes; N= No

Other_Anomalies: Indicates whether invertebrate reported in record exhibited anomalies otherwise not accounted for in other anomaly fields. Y = Yes; N= No

Data_Quality: Quality rating of the data. A= High quality data for use without qualification; B = Questionable data quality that may be used but see metadata for qualifications; C= Highly questionable data, do not use, see metadata for

explanation.; D= unknown data quality

Phylum: Taxonomic phylum to which taxon reported in record belongs

Class: Taxonomic class to which taxon reported in record belongs

Order: Taxonomic order to which taxon reported in record belongs

Family: Taxonomic family to which taxon reported in record belongs

Sampling_Date: Date on which trawl occurred in the field in MM/DD/YY.

Sampling_Depth: Depth of trawl at start of trawl

Units_Depth: Unit of measurement for depth; M=meter

Trawl_Start_Time: The time at which the trawl begins

Starting_Latitude: Latitude in decimal degrees where trawl begins (+ number =N).

Starting_Longitude: Longitude in decimal degrees where trawl begins (-number=W).

Ending_Latitude: Latitude in decimal degrees where trawl ends (+ number =N).

Ending_Longitude: Longitude in decimal degrees where trawl ends (-number=W).

Trawl_End_Time: Time at which the trawl ends

Duration: Length of trawl from Trawl_Start_Time to Trawl_End_Time

Duration_Units: Unit of time for duration

Sample_Comments: Comments relevant to the sample

FILE 3: FISH BIOMASS

Number of Data Records (excluding header row) = 825

Header Row Field Definitions:

Survey: Name of survey during which sample collected. Trawls are by quarter.

Site: Identifies specific site from which sample collected

Species: Name of species to which data record applies (may be a higher taxonomic category)

Biomass_Qualifier: Qualifies value reported in Biomass field.

Biomass: Total wet-weight biomass for taxon reported

Biomass_Units: Unit of measurement for biomass; KG=kilograms

Data_Quality: Quality rating of the data. A= High quality data for use without qualification; B = Questionable data quality that may be used but see metadata for qualifications; C= Highly questionable data, do not use, see metadata for explanation.; D= unknown data quality

Phylum: Taxonomic phylum to which taxon reported in record belongs

Class: Taxonomic class to which taxon reported in record belongs

Order: Taxonomic order to which taxon reported in record belongs

Family: Taxonomic family to which taxon reported in record belongs

Sampling_Date: Date on which trawl occurred in the field in MM/DD/YY.

Sampling_Depth: Depth of trawl at start of trawl

Units_Depth: Unit of measurement for depth; M=meter

Trawl_Start_Time: The time at which the trawl begins

Starting_Latitude: Latitude in decimal degrees where trawl begins (+ number =N).
Starting_Longitude: Longitude in decimal degrees where trawl begins (-number=W).
Ending_Latitude: Latitude in decimal degrees where trawl ends (+ number =N).
Ending_Longitude: Longitude in decimal degrees where trawl ends (-number=W).
Trawl_End_Time: Time at which the trawl ends
Duration: Length of trawl from Trawl_Start_Time to Trawl_End_Time
Duration_Units: Unit of time for duration
Sample_Comments: Comments relevant to the sample

FILE 4: INVERTEBRATE BIOMASS

Number of Data Records (excluding headers) = 749

Header Row Field Definitions:

Survey: Name of survey during which sample collected. Trawls are by quarter.
Site: Identifies specific site from which sample collected
Species: Name of species to which data record applies (may be a higher taxonomic category)
Biomass_Qualifier: Qualifies value reported in Biomass field.
Biomass: Total wet-weight biomass for taxon reported
Biomass_Units: Unit of measurement for biomass; KG=kilograms
Data_Quality: Quality rating of the data. A= High quality data for use without qualification; B = Questionable data quality that may be used but see metadata for qualifications; C= Highly questionable data, do not use, see metadata for explanation.; D= unknown data quality
Phylum: Taxonomic phylum to which taxon reported in record belongs
Class: Taxonomic class to which taxon reported in record belongs
Order: Taxonomic order to which taxon reported in record belongs
Family: Taxonomic family to which taxon reported in record belongs
Sampling_Date: Date on which trawl occurred in the field in MM/DD/YY.
Sampling_Depth: Depth of trawl at start of trawl
Units_Depth: Unit of measurement for depth; M=meter
Trawl_Start_Time: The time at which the trawl begins
Starting_Latitude: Latitude in decimal degrees where trawl begins (+ number =N).
Starting_Longitude: Longitude in decimal degrees where trawl begins (-number=W).
Ending_Latitude: Latitude in decimal degrees where trawl ends (+ number =N).
Ending_Longitude: Longitude in decimal degrees where trawl ends (-number=W).
Trawl_End_Time: Time at which the trawl ends
Duration: Length of trawl from Trawl_Start_Time to Trawl_End_Time
Duration_Units: Unit of time for duration
Sample_Comments: Comments relevant to the sample

FILE 5: DEBRIS

Number of Data Records (excluding headers) = 132

Header Row Field Definitions:

Survey: Name of survey during which sample collected. Trawls are by quarter.

Site: Identifies specific site from which sample collected

Debris_Type: Category of debris type

Abun_Designation: A semi-quantitative estimate of abundance

Weight_Designation: A semi-quantitative estimate of weight

Data_Quality: Quality rating of the data. A= High quality data for use without qualification; B = Questionable data quality that may be used but see metadata for qualifications; C= Highly questionable data, do not use, see metadata for explanation; D= unknown data quality

Debris_Comments: Comments on debris record

Sampling_Date: Date on which trawl occurred in the field in MM/DD/YY.

Sampling_Depth: Depth of trawl at start of trawl

Units_Depth: Unit of measurement for depth; M=meter

Trawl_Start_Time: The time at which the trawl begins

Starting_Latitude: Latitude in decimal degrees where trawl begins (+ number =N).

Starting_Longitude: Longitude in decimal degrees where trawl begins (-number=W).

Ending_Latitude: Latitude in decimal degrees where trawl ends (+ number =N).

Ending_Longitude: Longitude in decimal degrees where trawl ends (-number=W).

Trawl_End_Time: Time at which the trawl ends

Duration: Length of trawl from Trawl_Start_Time to Trawl_End_Time

Duration_Units: Unit of time for duration

Sample_Comments: Comments relevant to the sample