

El Segundo Generating Station

Appendix A

Physical Oceanographic Data

A1. Source Water Currents

A2. Source Water Temperatures from ADCP Instruments

Appendix A1

Source Water Currents

Physical oceanographic data were collected from the source water body to describe current regimes that can affect larval transport in the vicinity of the ESGS. Two Nortek Aquadopp® acoustic Doppler current profilers (ADCPs) were positioned in separate locations, one (CM 3) approximately 2.3 km (1.4 mi) from shore at a depth of –24.4 m (–80.0 ft) MLLW, and a second unit (CM 4) approximately 1.1 km (2.0 mi) from at a depth of –12.8 m (–41.9 ft) MLLW. The latitudes and longitudes of the two stations were 33.89020°N, -118.44324°W and 33.89442°N, -118.43126°W. Both stations were commissioned on January 10, 2006. Station CM 3 was decommissioned on January 12, 2007 and Station CM 4 was decommissioned on January 22, 2007. Data were downloaded on February 3, 2006, May 3, 2006, and July 18, 2006, and September 1, 2006. The unit at CM 4 had an operating frequency of 1 MHz, while the unit at CM 3 had an operating frequency of 600 kHz (Table A1-1). Both units collected data at hourly intervals in a usable range that extended from 0.5 m (1.6 ft) from the ADCP to somewhat less than 90% of the distance to the surface. The half-power full beam-width was 2.4 degrees for both units. Water temperature and water depth (pressure) were also measured concurrently by the units. Water temperatures were calibrated over an approximately four-month period from September 2006 to January 2007 using two calibrated Starr-Oddi thermistors. Pressure measurements were adjusted using barometric pressure data measured at the Los Angeles International Airport and corrected for sea level.

Table A1-1. ADCP deployment parameters for current meters in the vicinity of ESGS (Stations CM 3 and CM 4).

Unit	Oper. Freq.	Deploy depth (m)	Cells (#)	Cell size (m)	Max. range (m)	Cell precision (cm/s)	Ping rate	Averaging Interval (s)	Repetition rate (hr)
CM 3	600 kHz	24.4	15	1.0	15	1.4	100%	280	1.0
CM 4	1 MHZ	12.8	26	1.0	26	0.8	87%	180	1.0

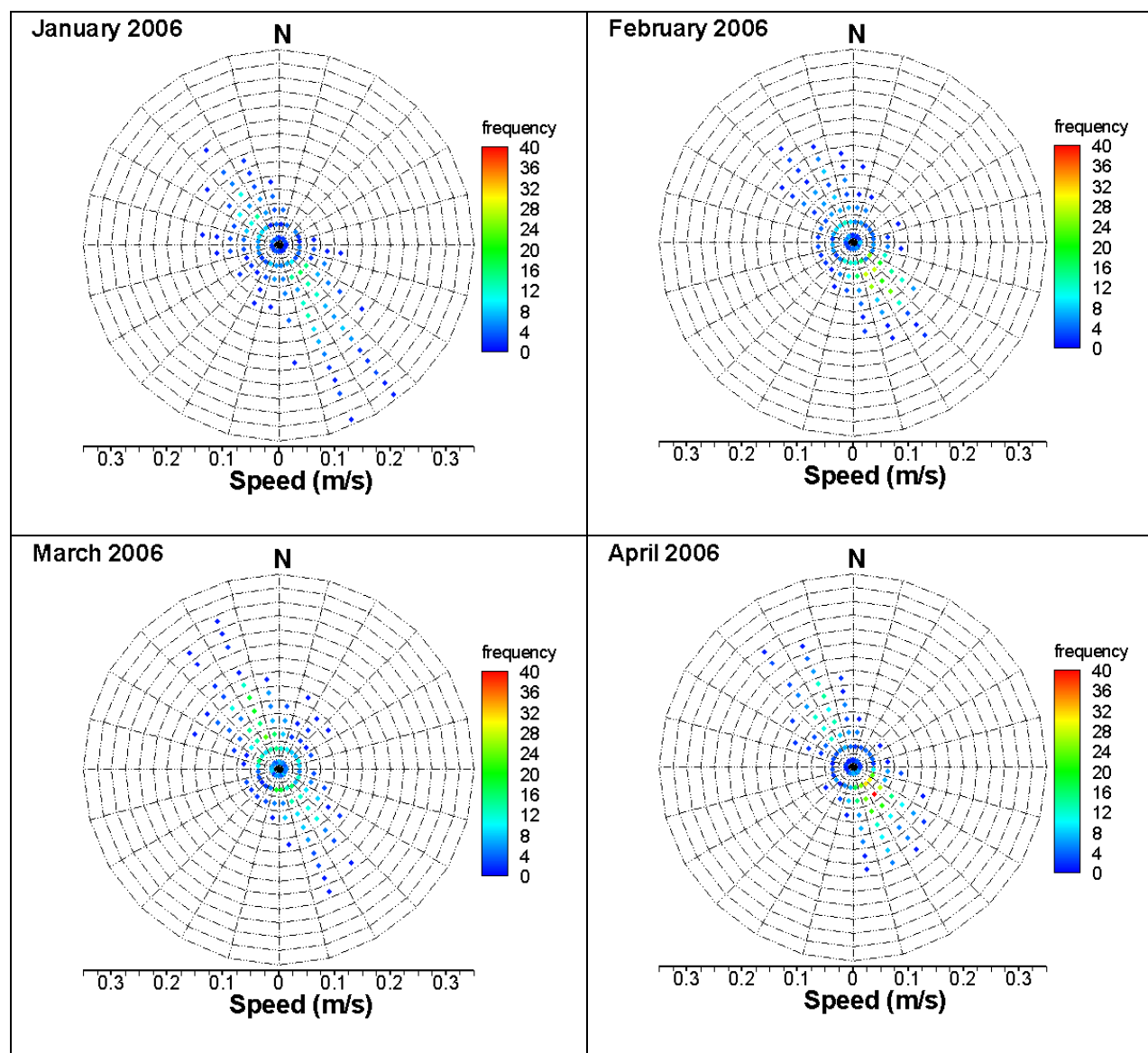


Figure A1-1. Hourly estimates of water column speed and direction at location CM 3, January to April 2006. Frequency is number of hourly observations.

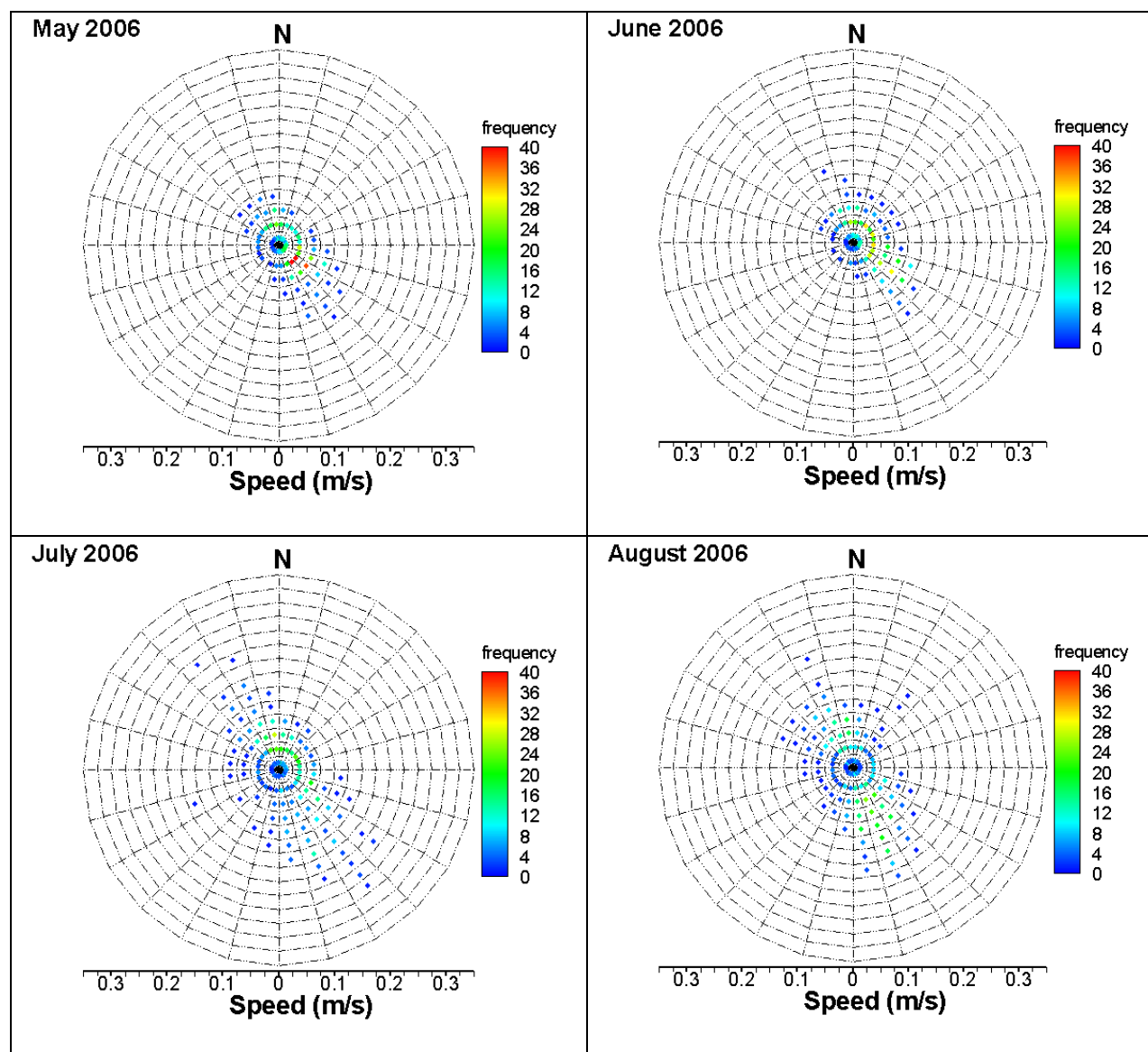


Figure A1-2. Hourly estimates of water column speed and direction at location CM 3, May to August 2006. Frequency is number of hourly observations.

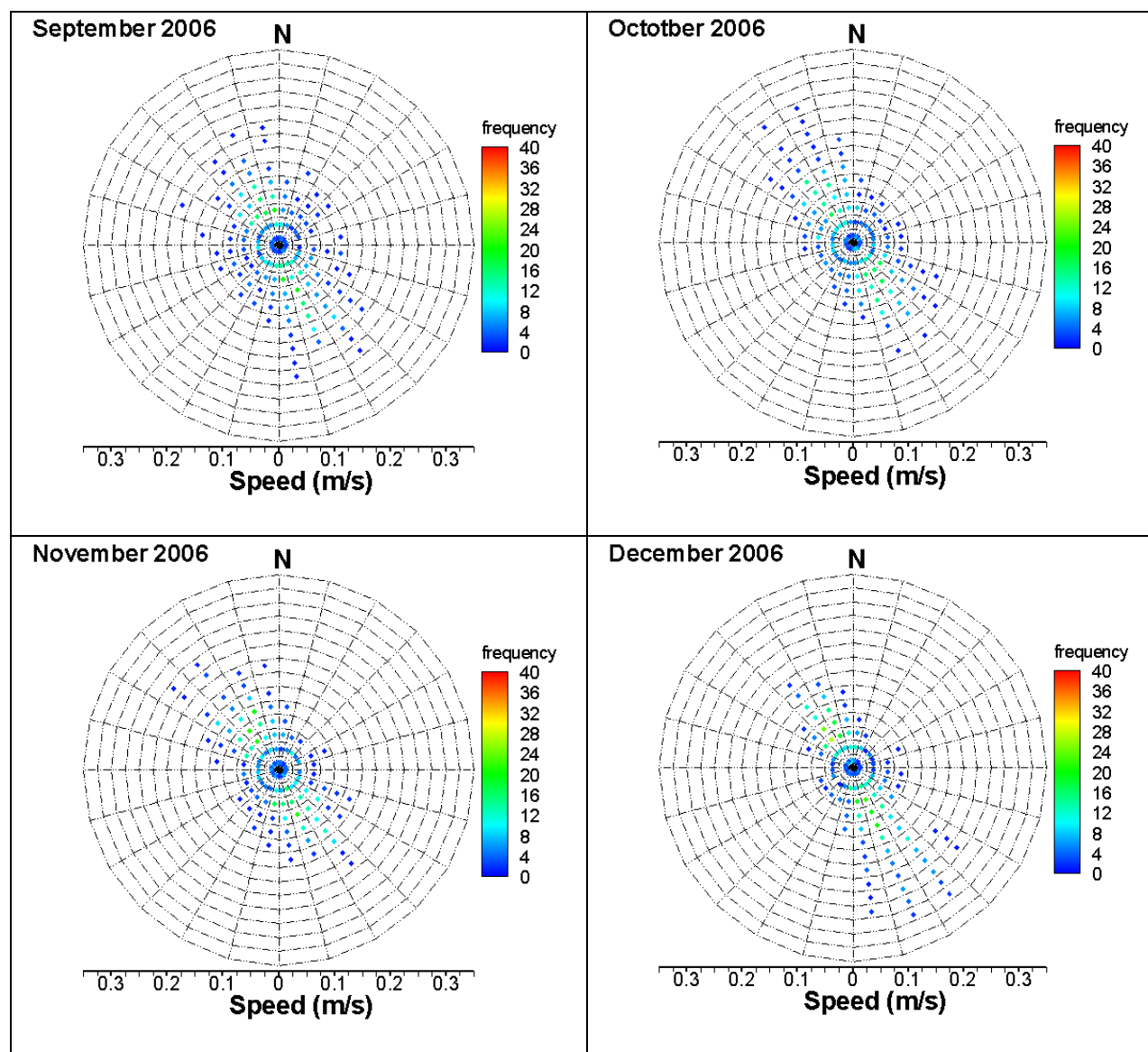


Figure A1-3. Hourly estimates of water column speed and direction at location CM 3, September to December 2006. Frequency is number of hourly observations.

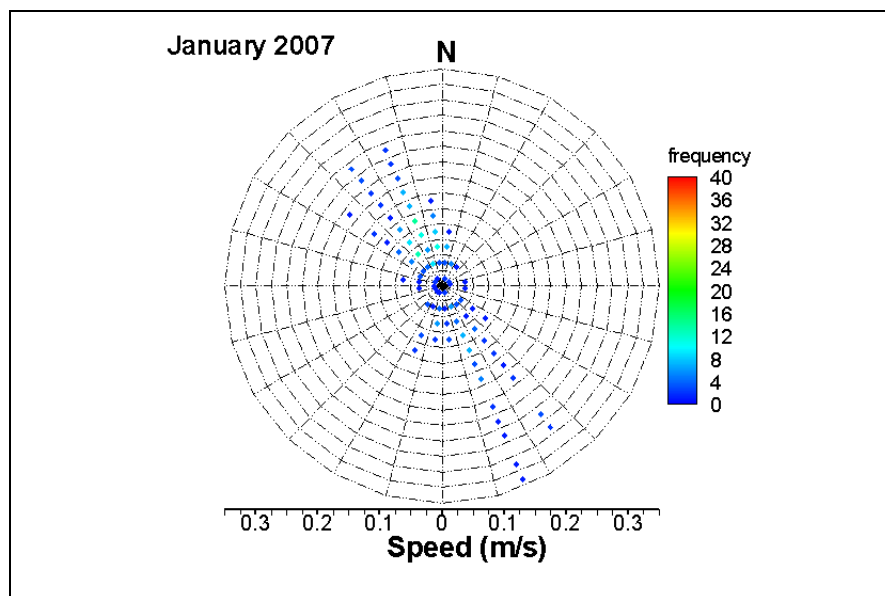


Figure A1-4. Hourly estimates of water column speed and direction at location CM 3, January 2007. Frequency is number of hourly observations.

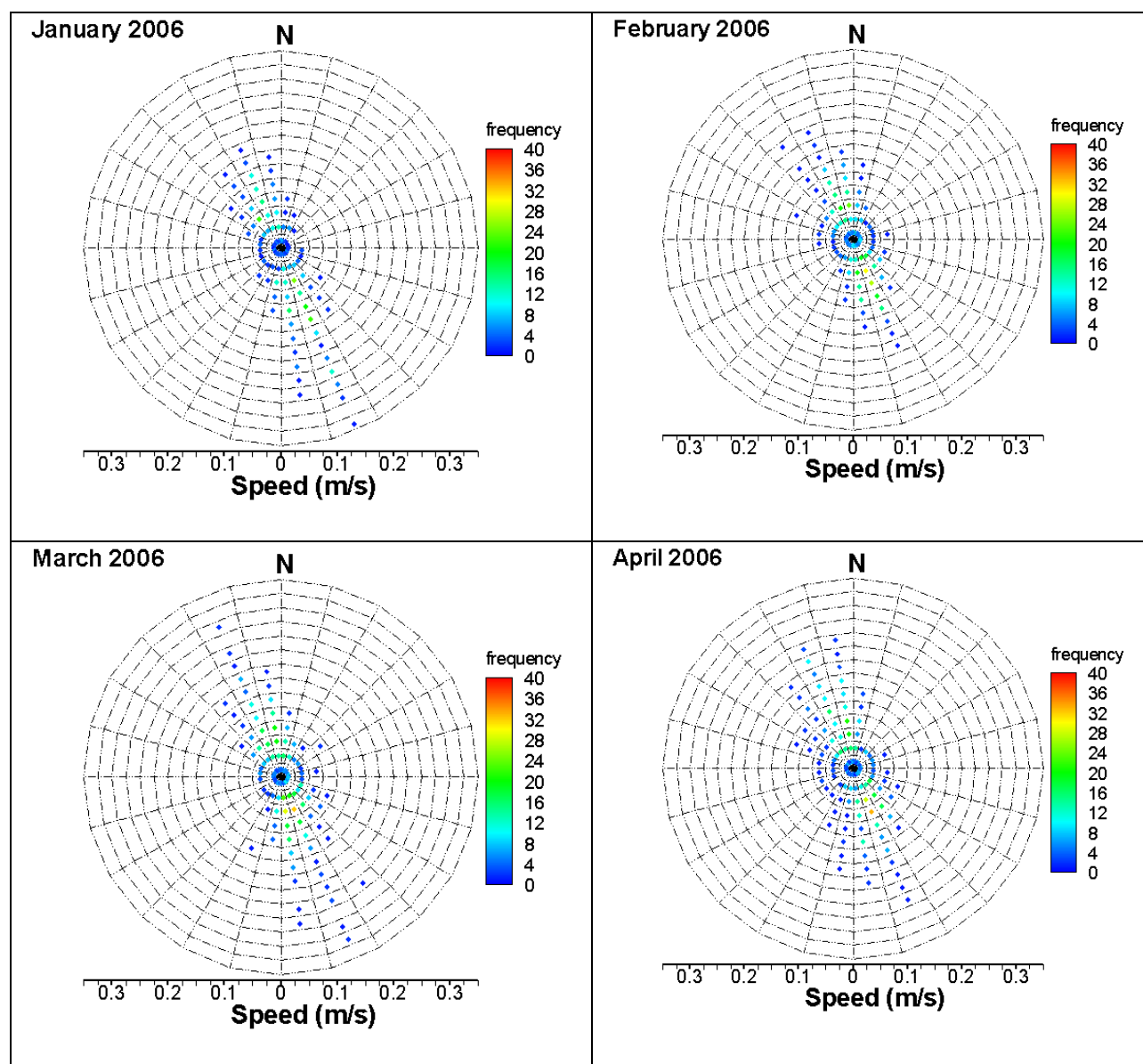


Figure A1-5. Hourly estimates of water column speed and direction at location CM 4, January to April 2006. Frequency is number of hourly observations.

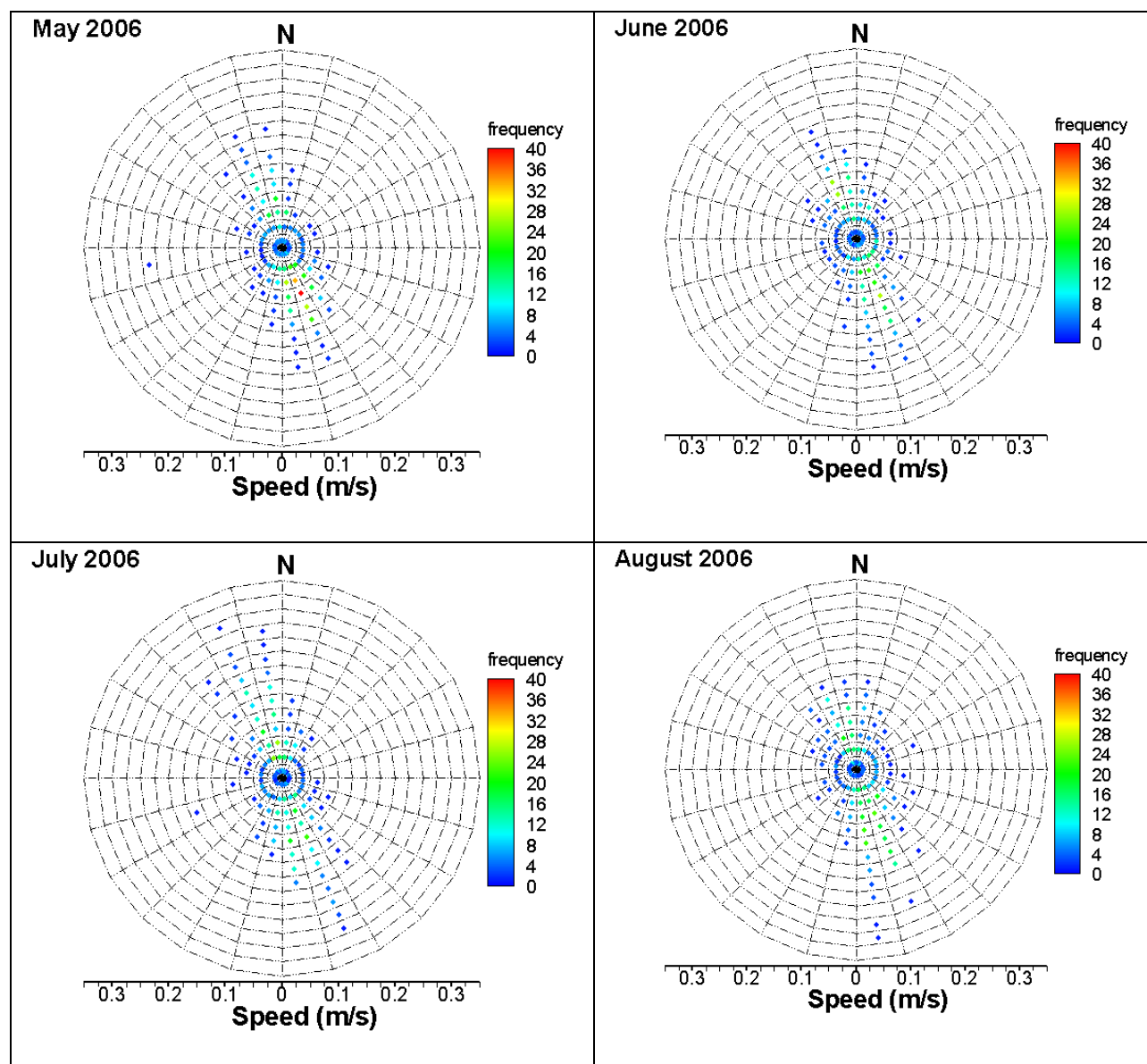


Figure A1-6. Hourly estimates of water column speed and direction at location CM 4, May to August 2006. Frequency is number of hourly observations.

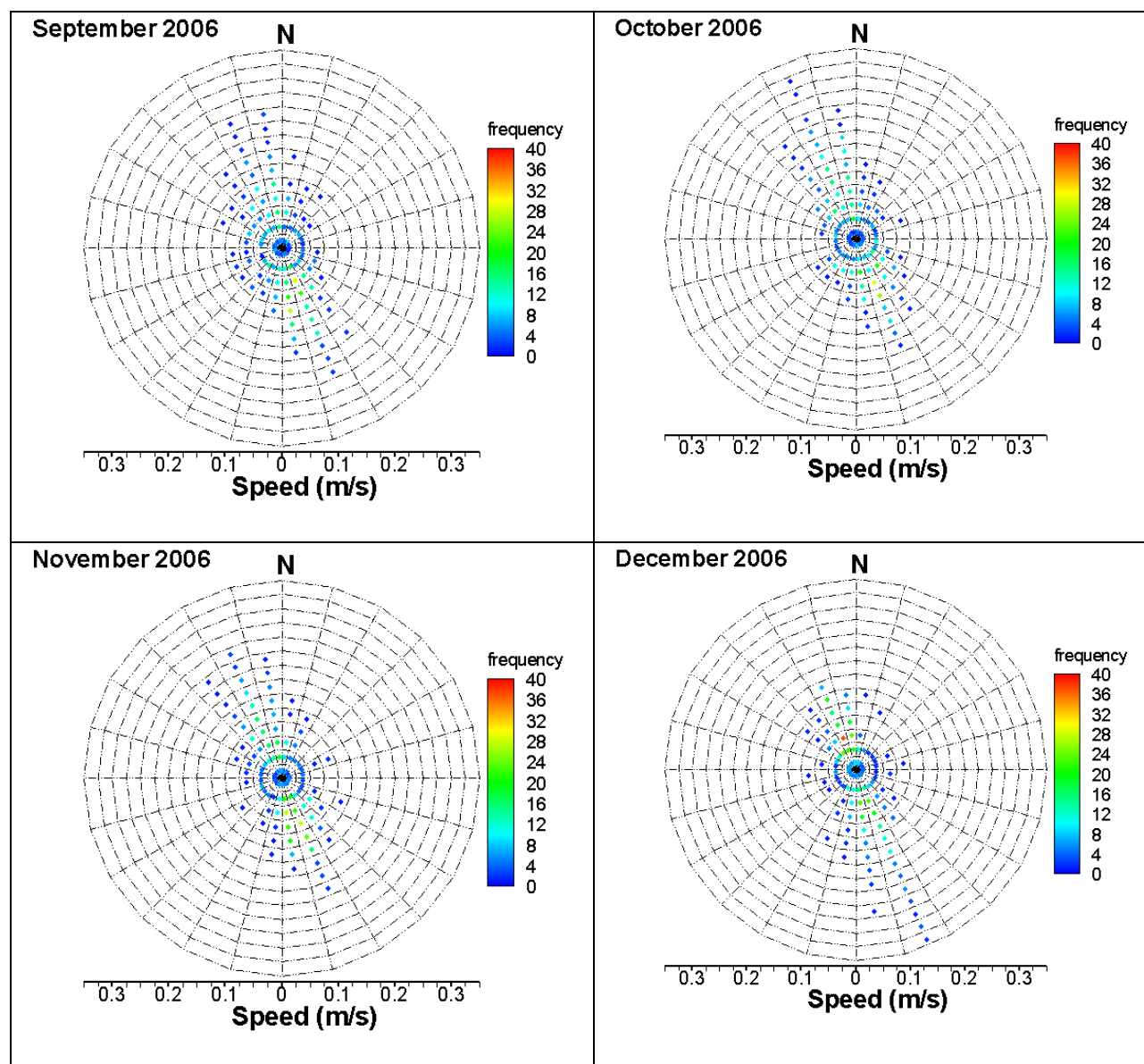


Figure A1-7. Hourly estimates of water column speed and direction at location CM 4, September to December 2006. Frequency is number of hourly observations.

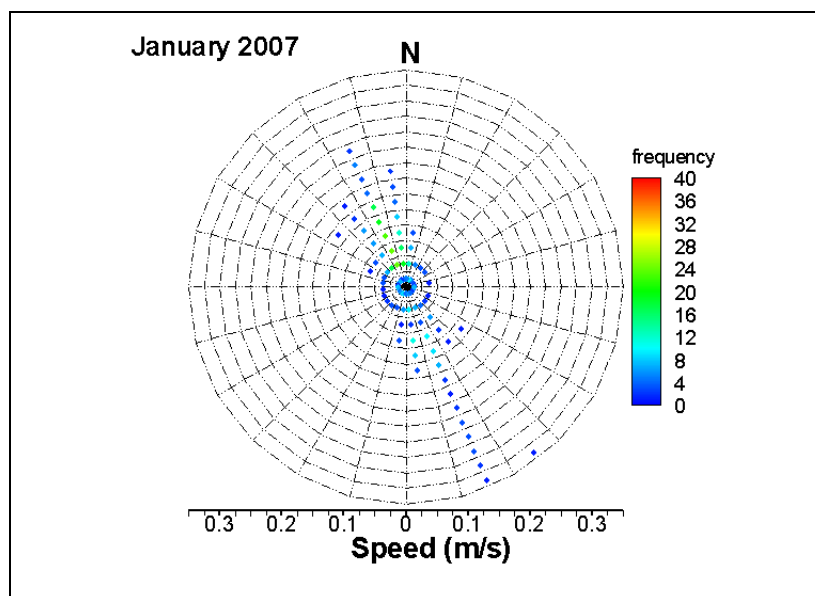


Figure A1-8. Hourly estimates of water column speed and direction at location CM 4, January 2007. Frequency is number of hourly observations.

Appendix A2

Source Water Temperatures from ADCP Instruments

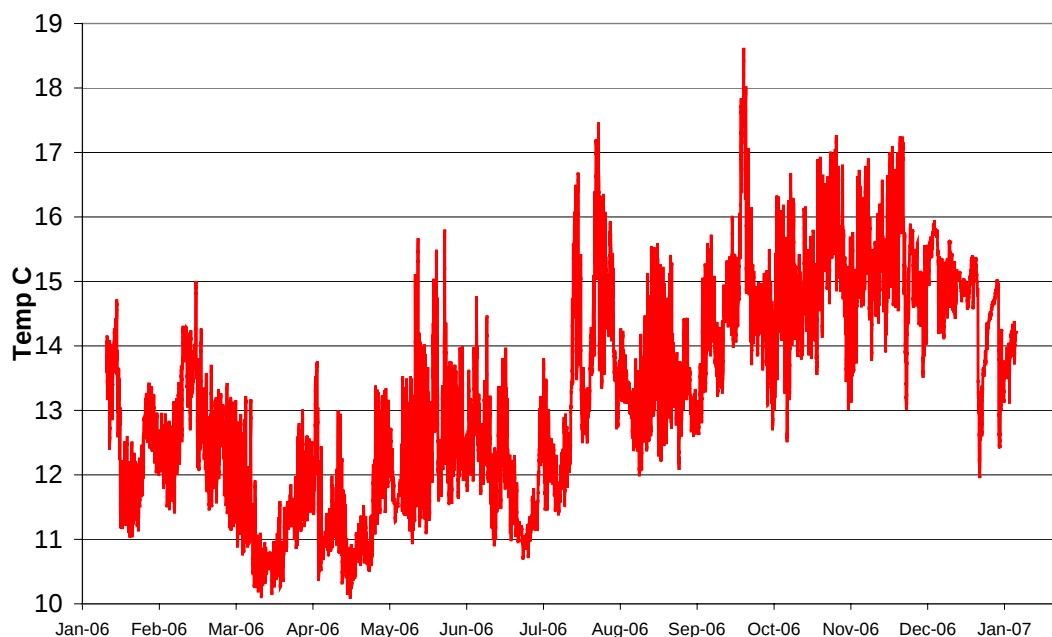


Figure A2-1. Yearly temperature from January 2006 to January 2007 at CM 3.

Table A2-1. Monthly and yearly mean temperatures recorded from January 2006 through January 2007 at CM 3.

Month	Mean	Standard Dev	Max	Min
January	12.51	0.87	14.70	11.04
February	12.82	0.72	14.98	11.41
March	11.24	0.71	13.20	10.11
April	11.23	0.68	13.74	10.10
May	12.41	0.84	15.79	10.93
June	12.11	0.78	14.76	10.71
July	13.18	1.48	17.44	11.15
August	13.45	0.75	15.93	12.00
September	14.43	1.18	18.60	12.61
October	14.83	0.93	17.05	12.51
November	15.25	0.87	17.26	13.03
December	14.88	0.73	15.93	11.96
January 07	14.05	0.62	15.01	12.43
Total Year	13.24	1.61	18.60	10.10

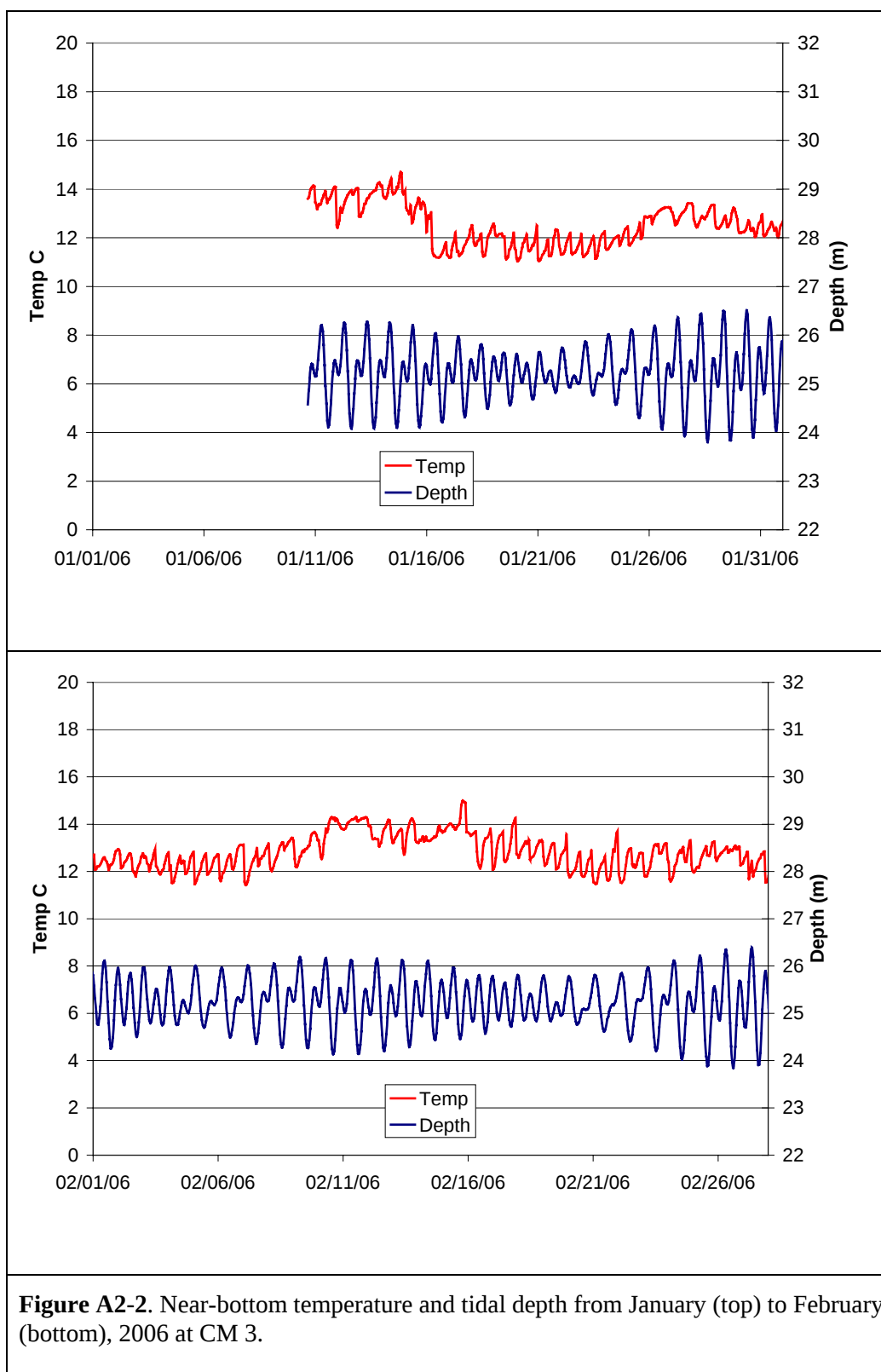
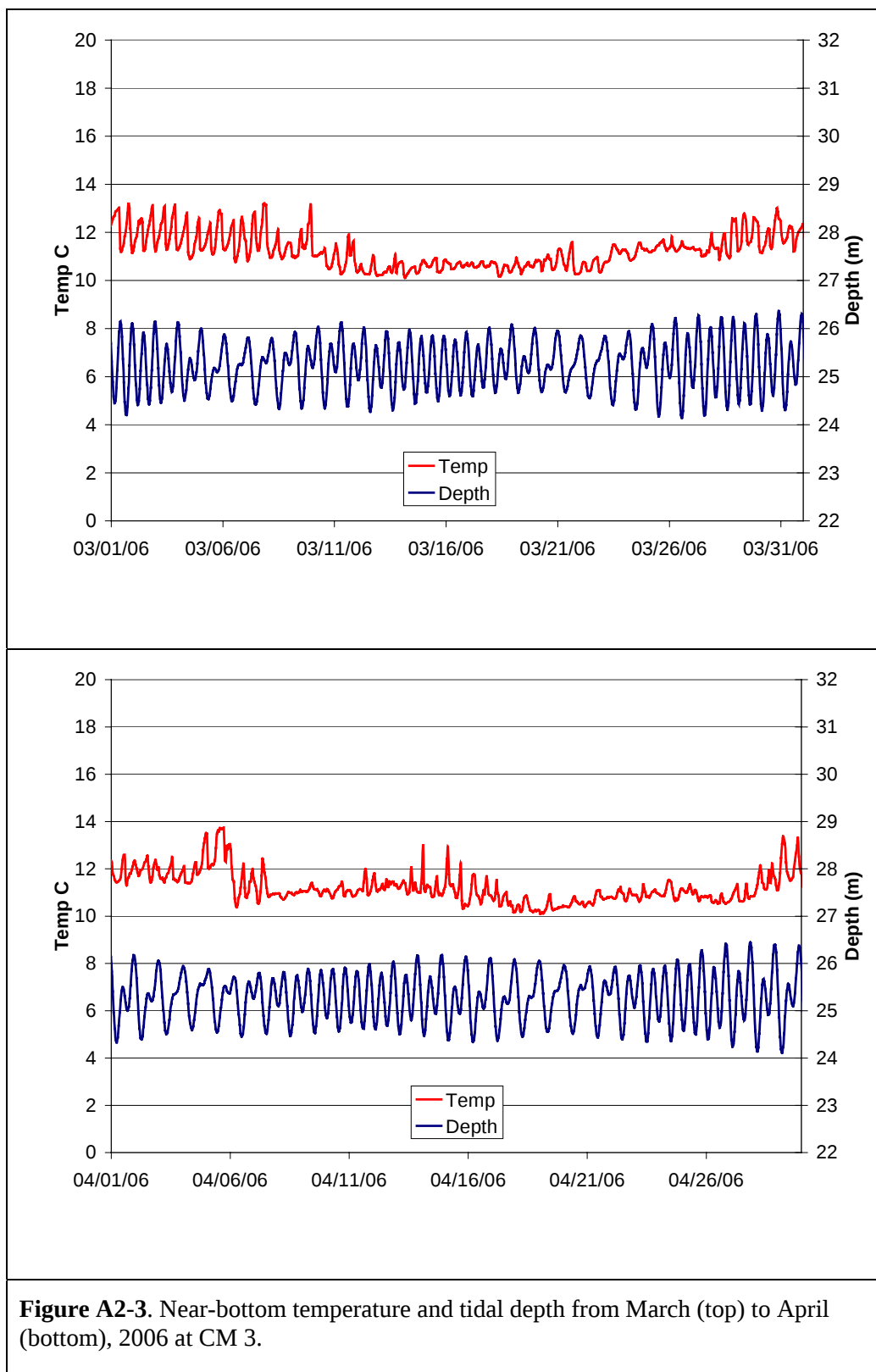
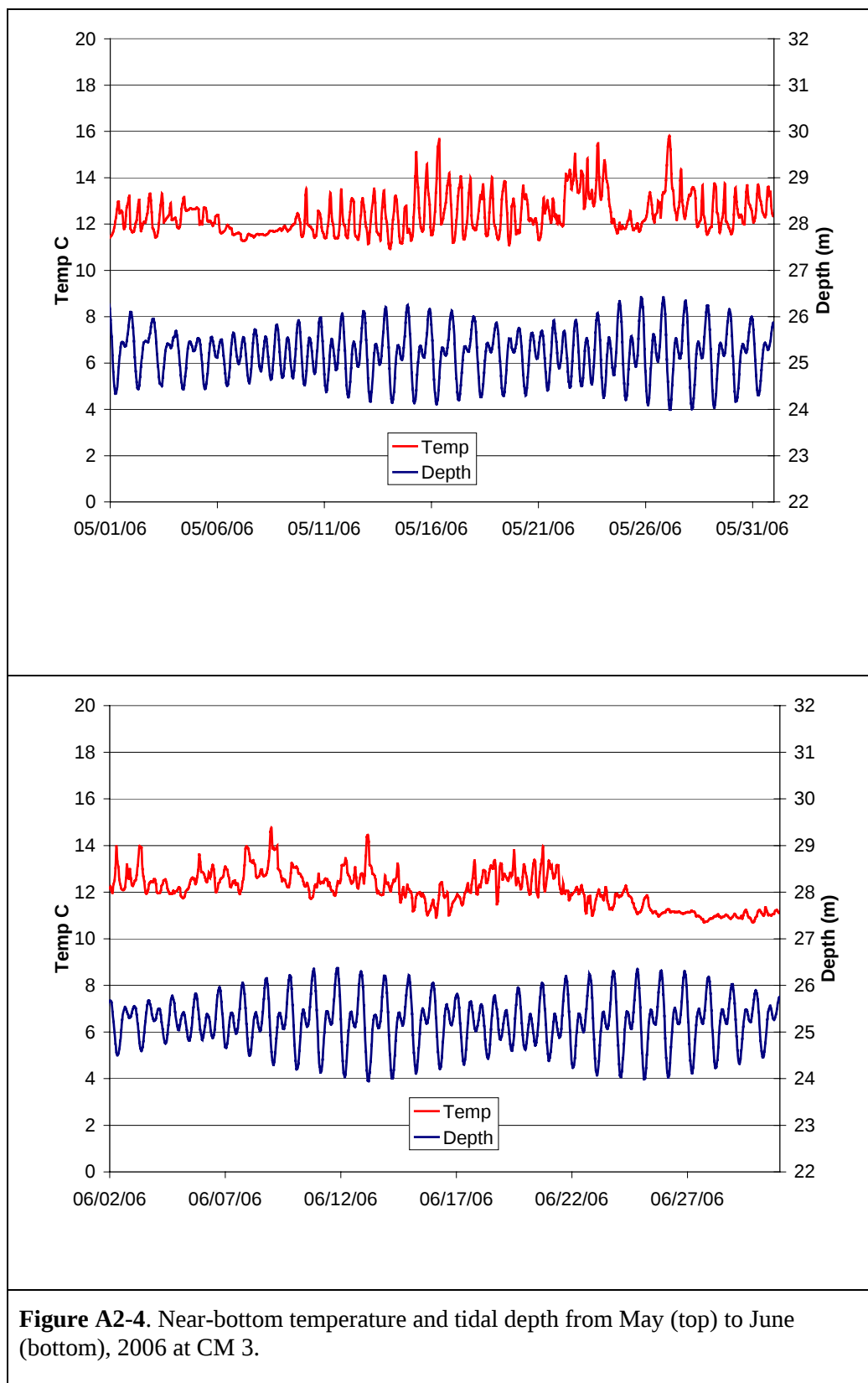


Figure A2-2. Near-bottom temperature and tidal depth from January (top) to February (bottom), 2006 at CM 3.





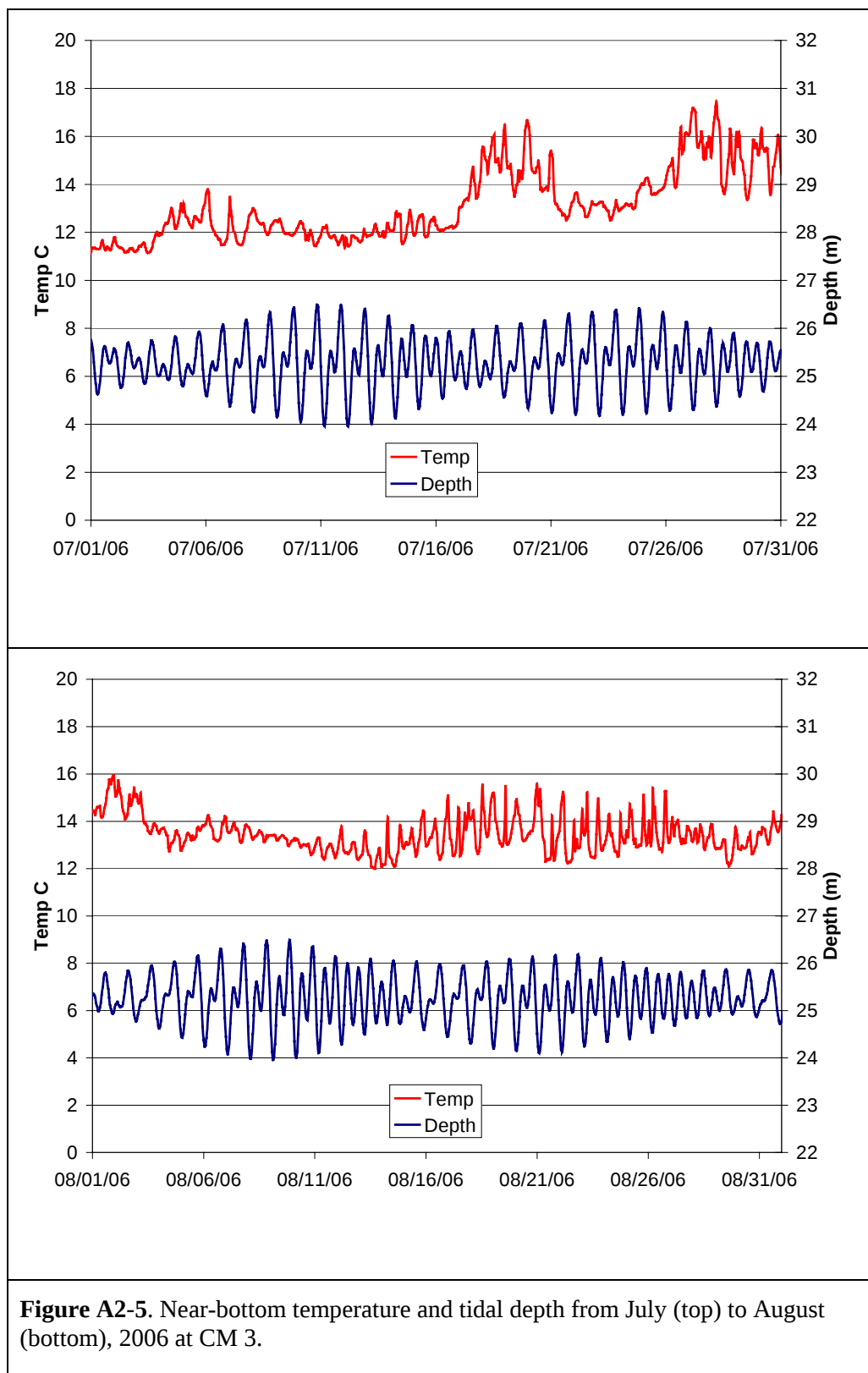


Figure A2-5. Near-bottom temperature and tidal depth from July (top) to August (bottom), 2006 at CM 3.

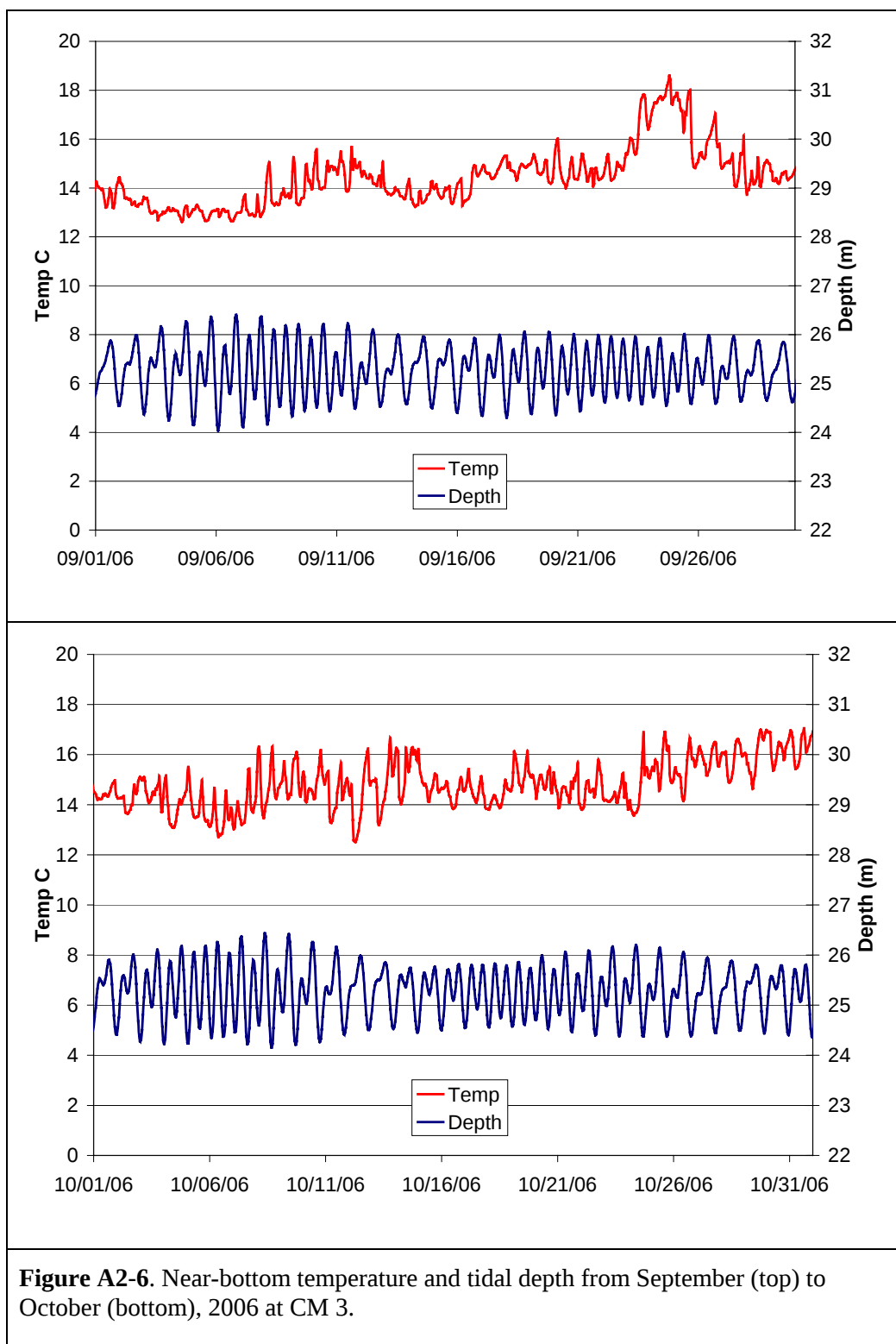


Figure A2-6. Near-bottom temperature and tidal depth from September (top) to October (bottom), 2006 at CM 3.

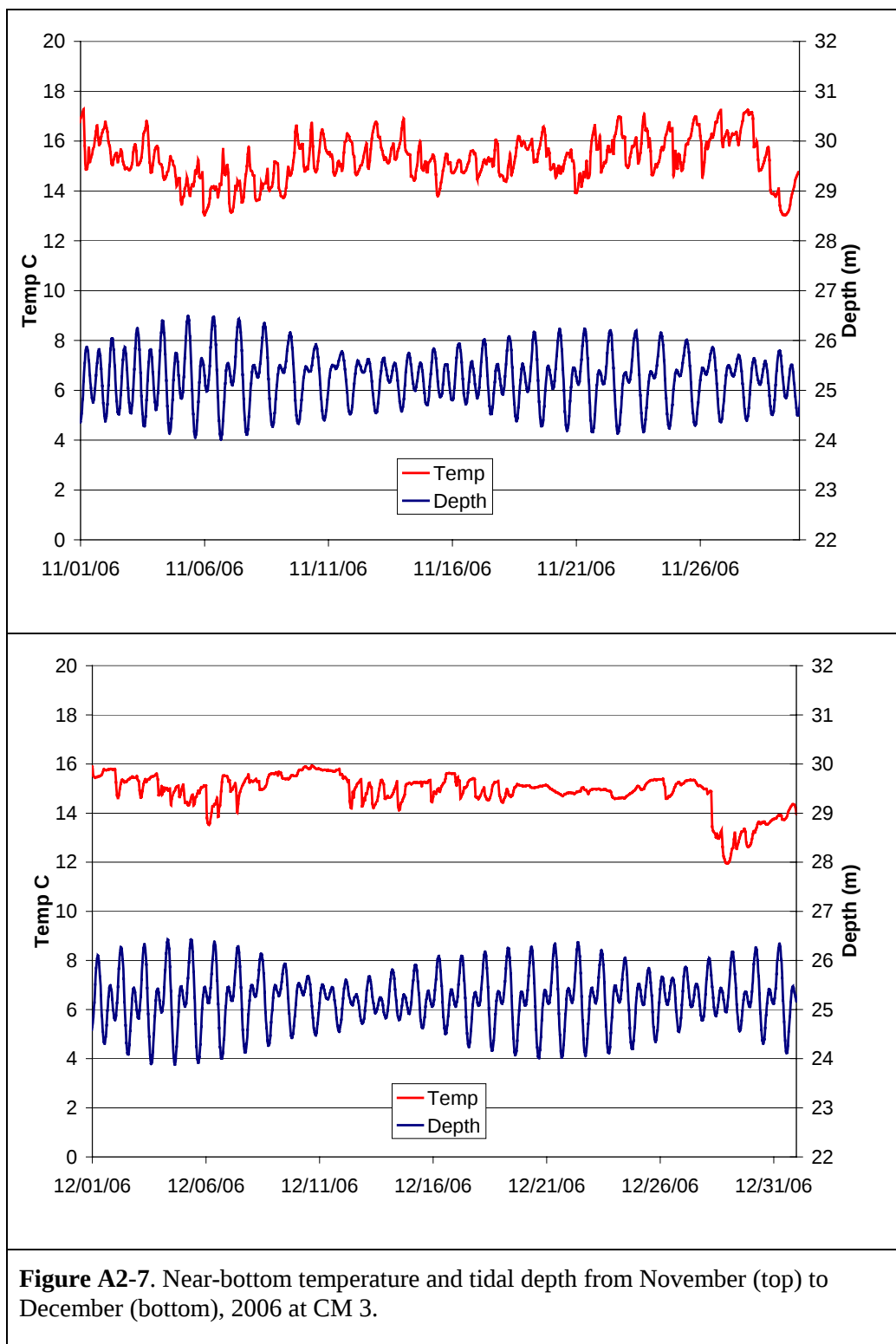
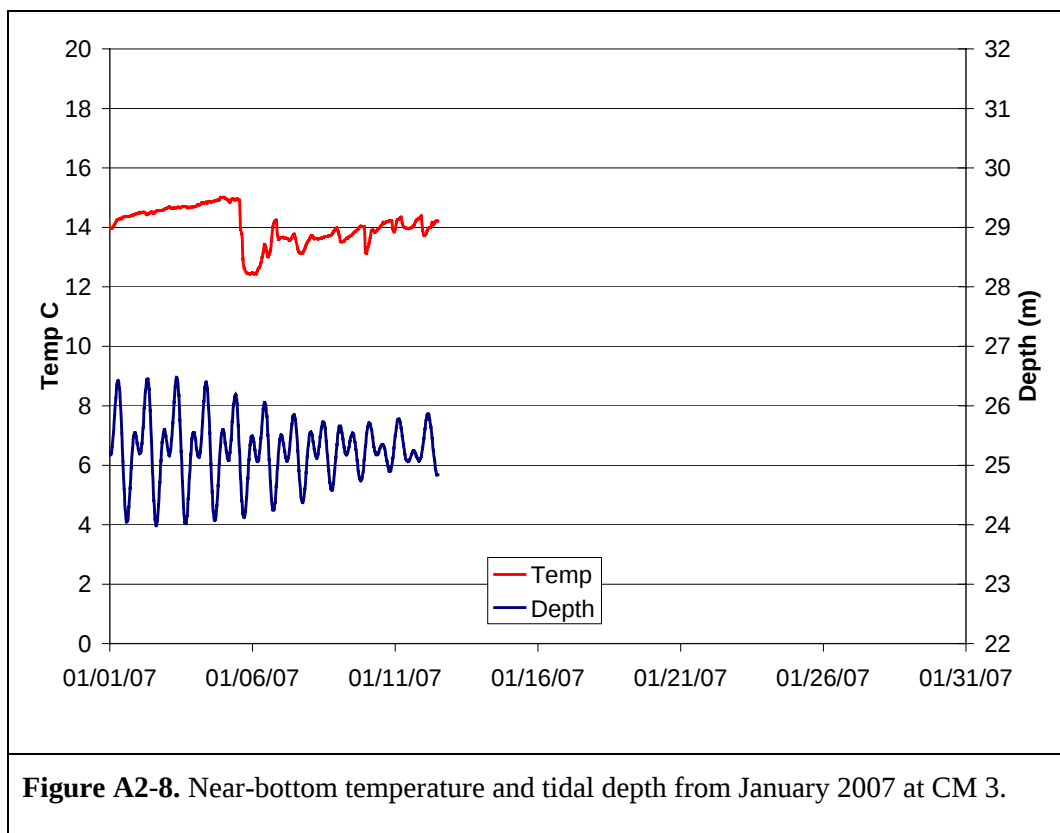


Figure A2-7. Near-bottom temperature and tidal depth from November (top) to December (bottom), 2006 at CM 3.



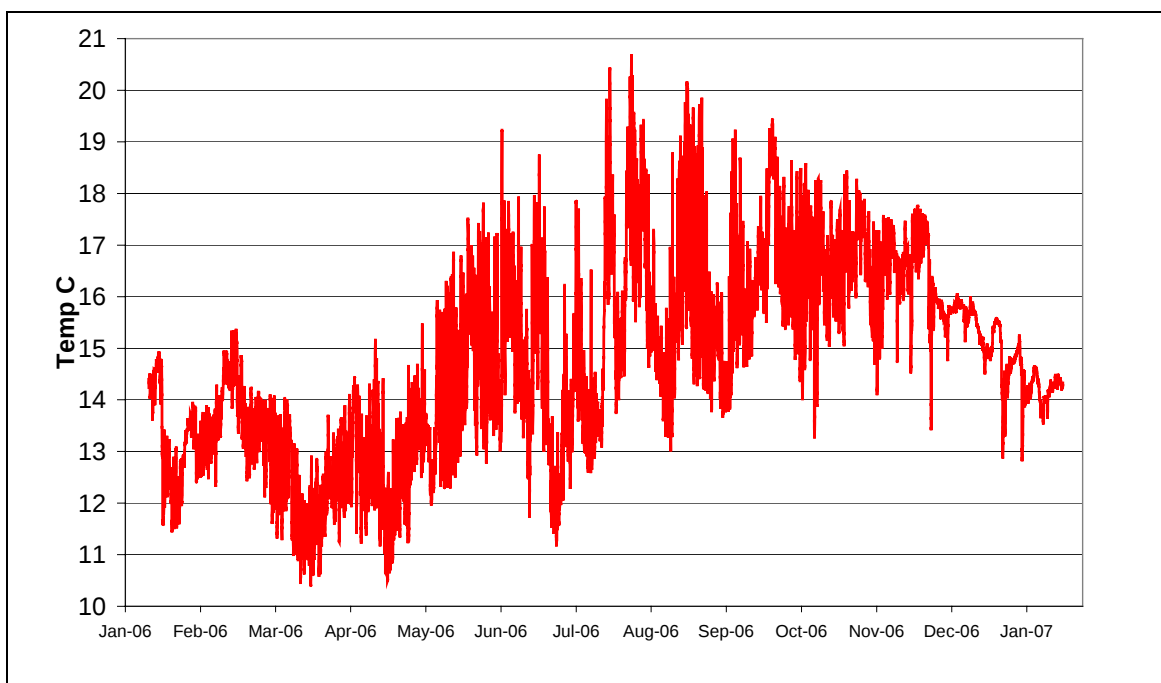


Figure A2-9. Annual temperature from January 2006 to January 2007 at CM 4.

Table A2-2. Monthly and yearly mean temperatures recorded from January 2006 through January 2007 at CM 4.

Month	Mean	Standard Dev	Max	Min
January	13.21	0.93	14.92	11.45
February	13.74	0.66	15.35	12.13
March	12.23	1.87	14.11	10.41
April	12.55	0.93	15.16	10.49
May	14.27	1.28	17.82	11.98
June	14.53	1.65	19.23	11.19
July	15.24	1.91	20.67	12.30
August	15.93	1.59	20.12	13.03
September	16.15	1.32	19.43	13.68
October	16.53	0.93	18.63	13.28
November	16.54	0.81	17.87	13.44
December	15.38	0.56	16.16	12.89
January 07	14.32	0.39	15.25	12.82
Total Year	14.71	1.83	20.67	10.41

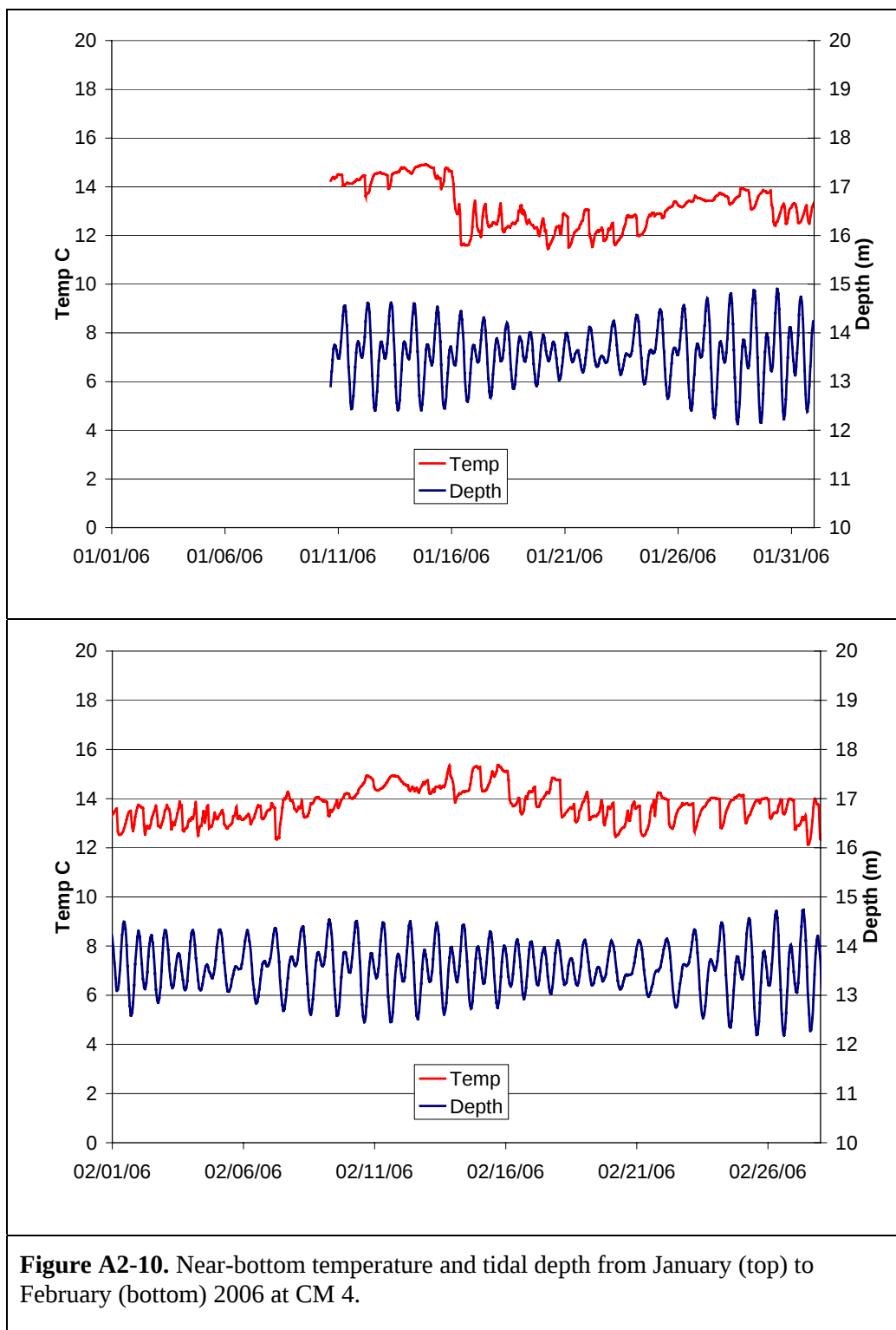


Figure A2-10. Near-bottom temperature and tidal depth from January (top) to February (bottom) 2006 at CM 4.

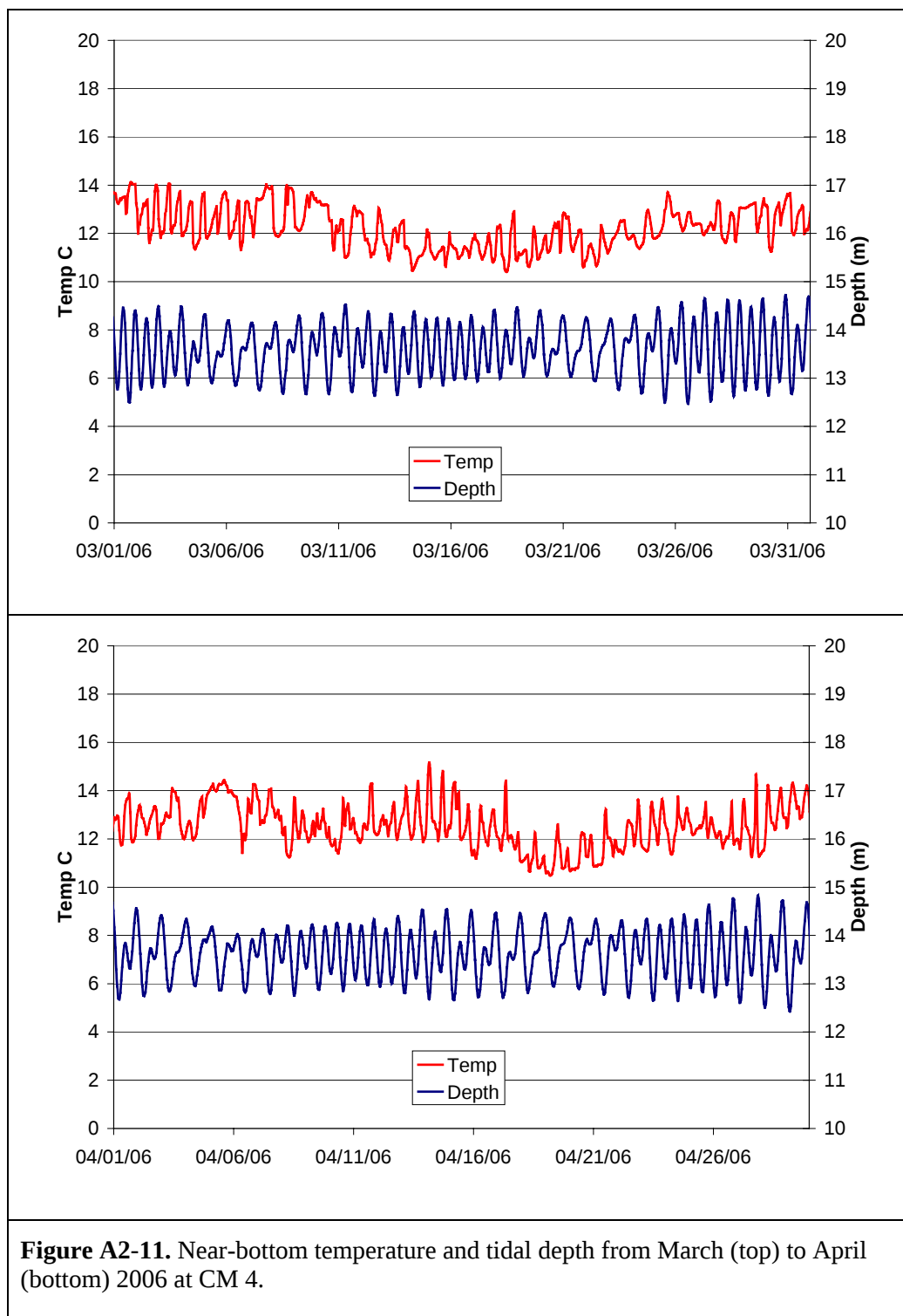
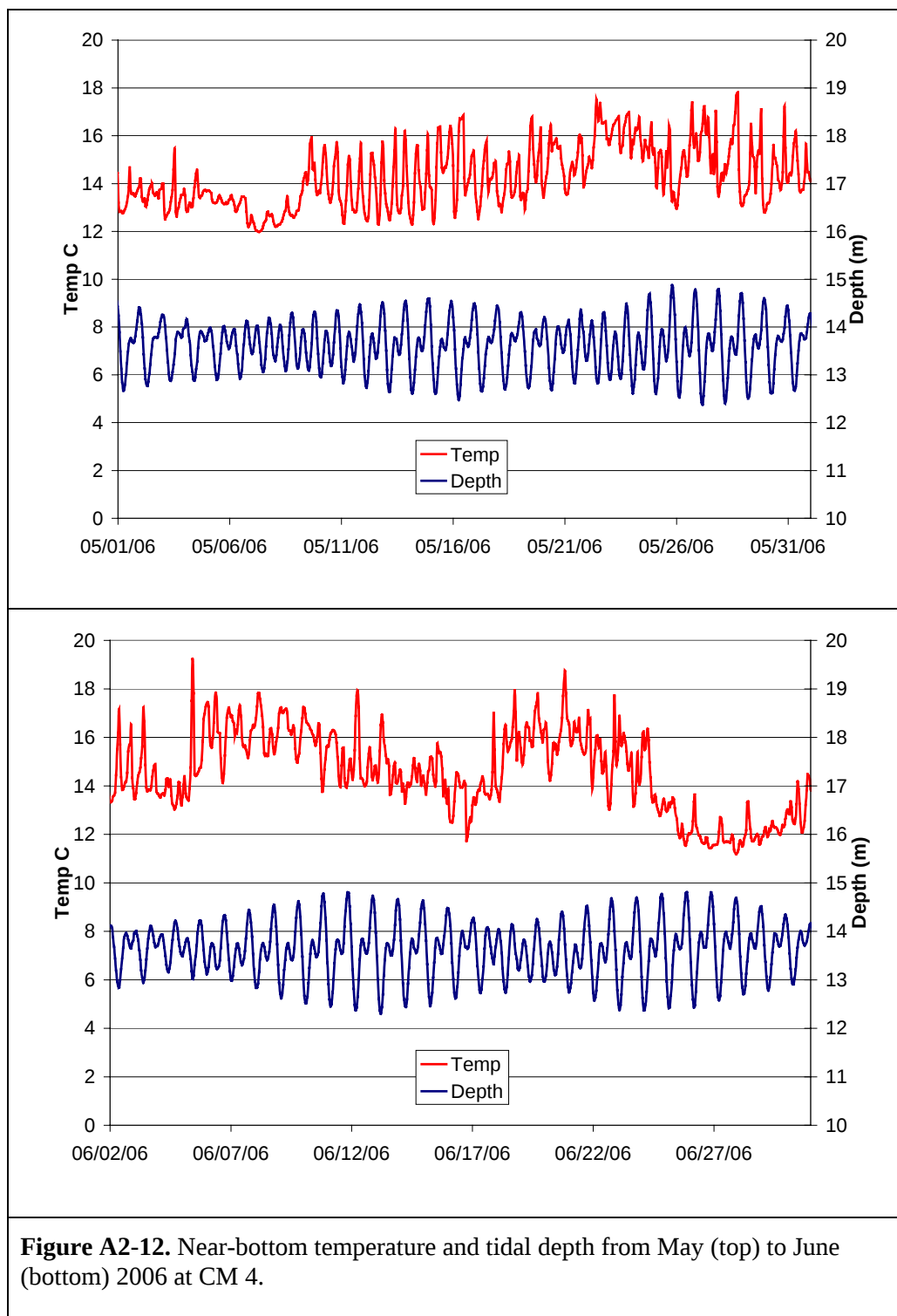


Figure A2-11. Near-bottom temperature and tidal depth from March (top) to April (bottom) 2006 at CM 4.



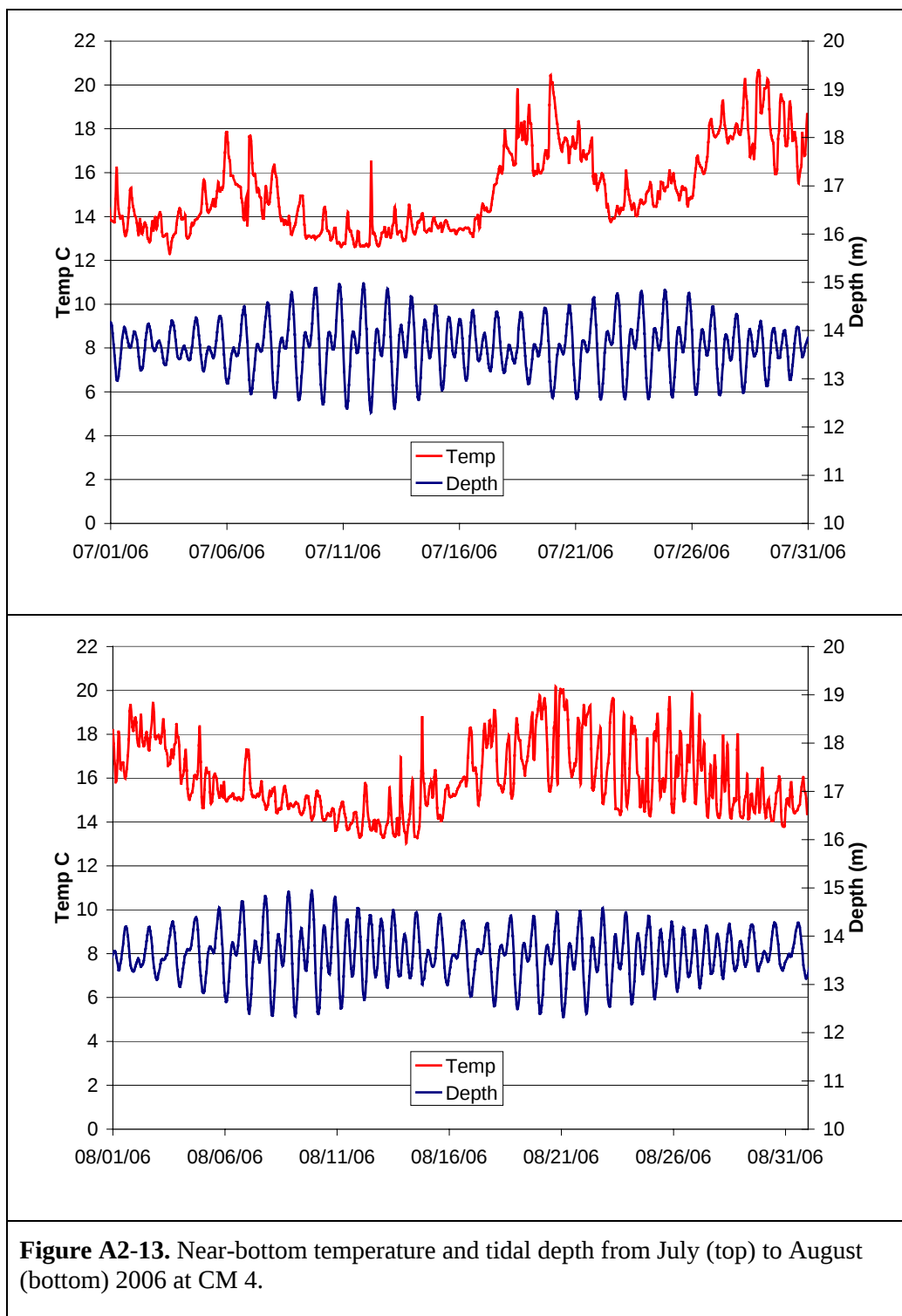


Figure A2-13. Near-bottom temperature and tidal depth from July (top) to August (bottom) 2006 at CM 4.

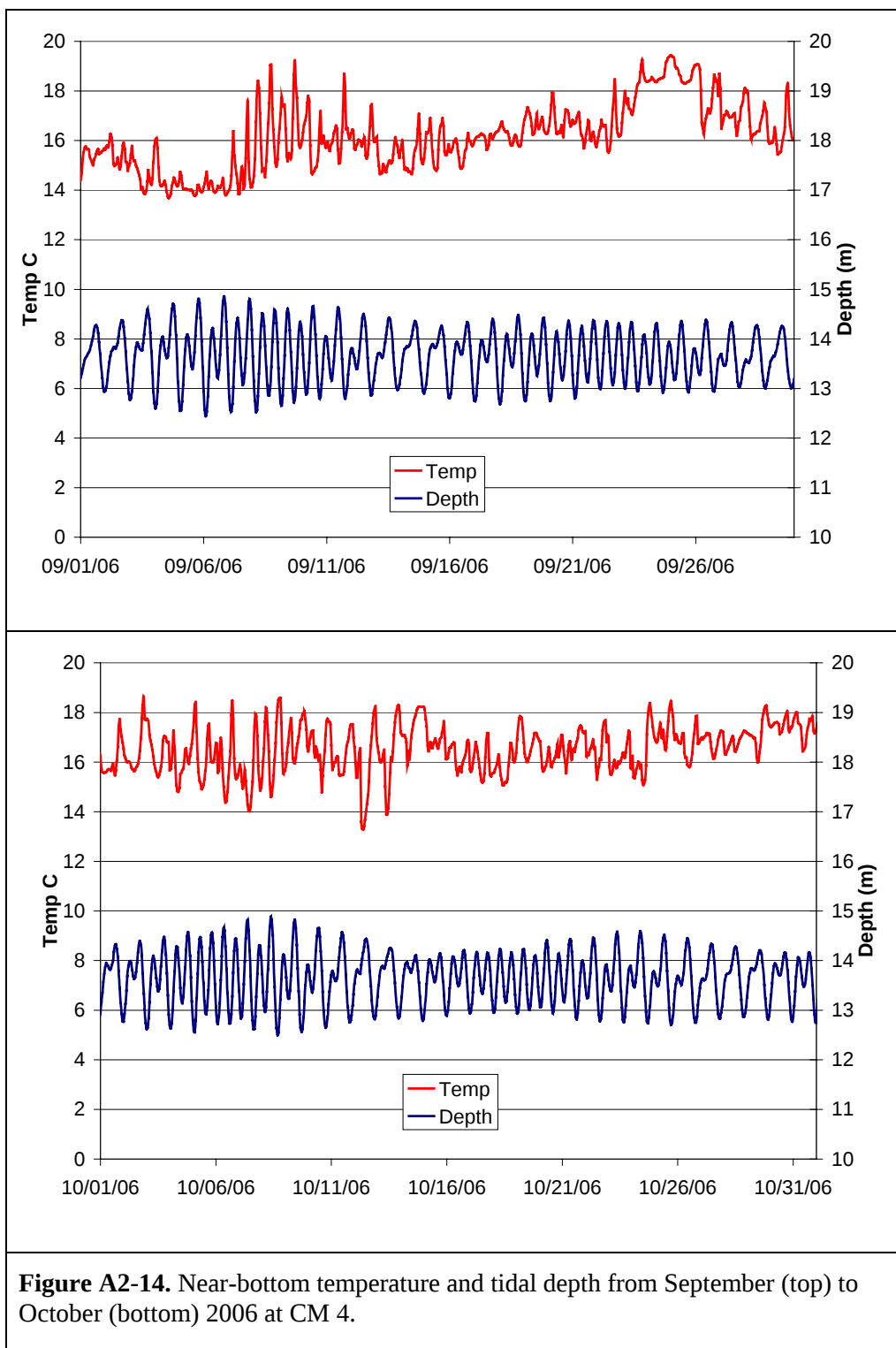
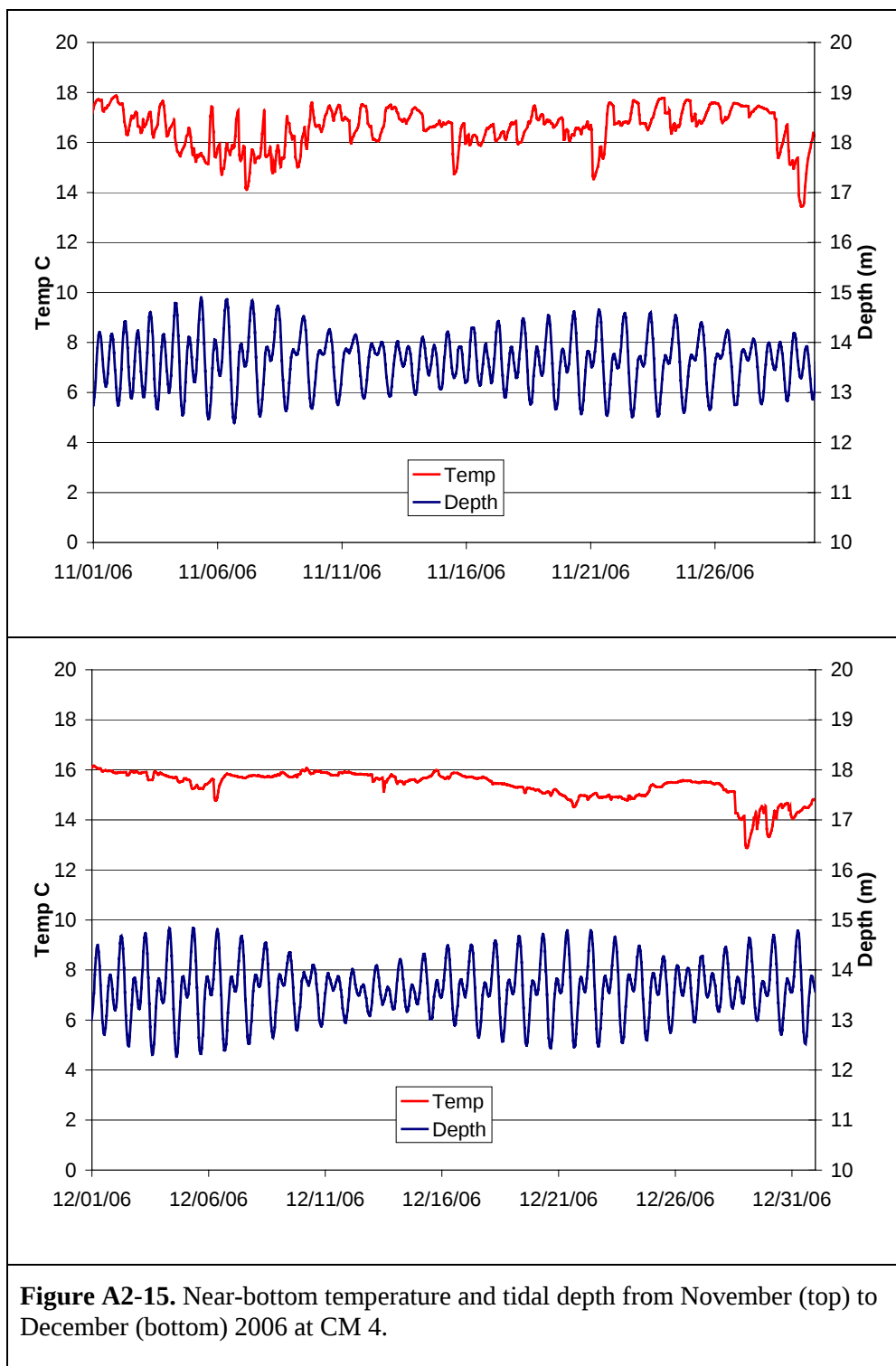
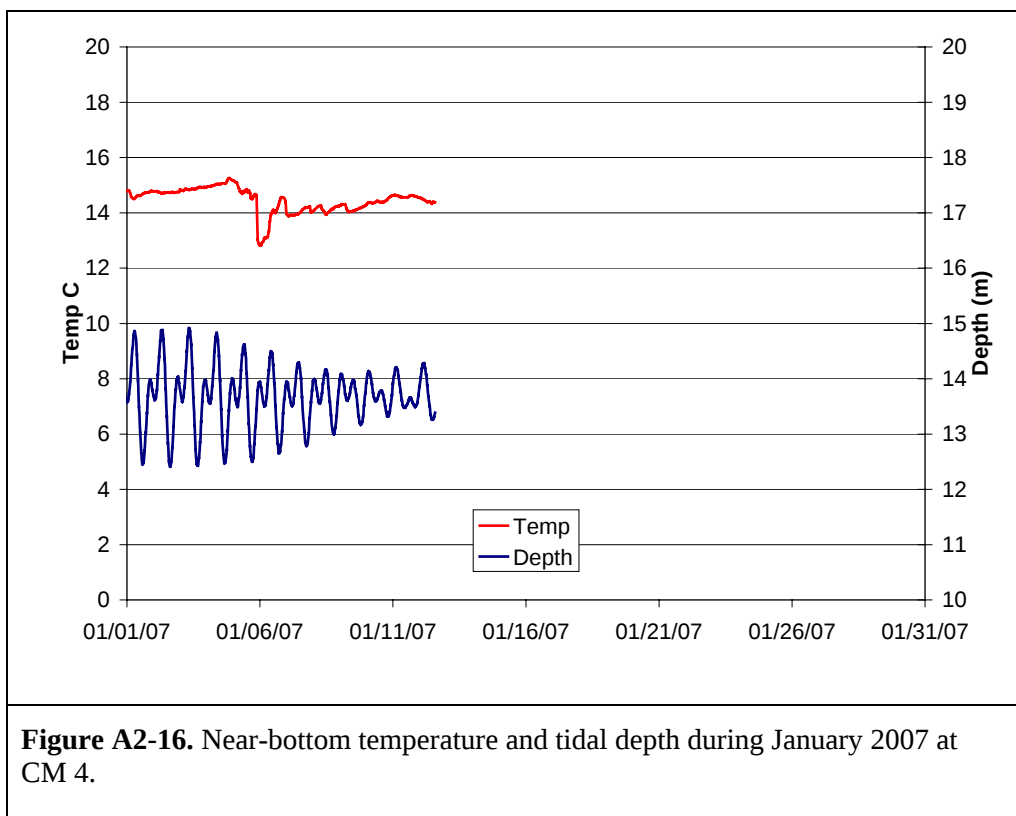


Figure A2-14. Near-bottom temperature and tidal depth from September (top) to October (bottom) 2006 at CM 4.





El Segundo Generating Station

Appendix B

Field Sampling and Sample Processing Procedures

- B1. Entrainment Field Sampling
- B2. Entrainment Sample Sorting
- B3. Entrainment Sample Identification
- B4. Impingement Field Sampling

APPENDIX B1: PROCEDURE FOR COLLECTING PLANKTON SAMPLES FOR ENTRAINMENT STUDIES

1.0 PURPOSE

The purpose of this document is to define the steps and equipment necessary to accurately collect plankton samples using a wheeled bongo frame near the El Segundo Generating Station (ESGS).

2.0 RESPONSIBILITIES

2.1 Task/Field leader:

- Notify the station of the proposed sampling dates.
- Schedule and coordinate sampling surveys and notifying the U.S. Coast Guard prior to sampling.
- Verify that all investigating biologists conducting the sampling have read and understand these procedures.
- Verify that procedures have been followed during sample collection and that the sampling has been conducted safely.
- Verify that information on data sheets have been reviewed and properly recorded.

2.2 Investigating biologist:

- Conduct sampling using the following procedures.

3.0 ESGS CONTACT INFORMATION

Name	Cell/Outside Line
Alex Sanchez	
Shift Supervisor	(310) 615-6313
U3&4 Control Room	(310) 615-6303

4.0 PROCEDURES

4.1 Mobilization

- a. Notify plant personnel of the dates of field sampling prior to the sampling day.
- b. Ensure there are enough jars, labels, and preservative (formalin) for the sample collection. Print the required number of blank field data sheets on waterproof paper.
- c. Inspect the wheeled bongo frame, nets and codends for any damage. If damaged, repairs must be made before sampling begins. Ensure that the flowmeters have been calibrated within the past 90 days and that they are operational. Attach a flowmeter in approximately the center of each frame mouth.
- d. Ensure that all additional equipment (Table B1-1) is in good operating condition. Make repairs if necessary.

4.2 Sample Collection

- a. Samples will be collected every six hours in a 24-hr period (four cycles) according to the schedule developed by the Task Leader. A survey team consists of at least a boat driver and two investigating biologists to conduct the sampling.
- b. Locate the station using the latitude/longitude coordinates. Determine the water depth with the fathometer and record the water depth on the field data sheet.
- c. Ensure that the winch line and a weight (15-20 lb salmon ball) are securely attached to the center of the bongo frame. Ensure that the nets, codends and flowmeters are securely attached. The nets should be 333- μ m mesh.
- d. Record each flowmeter's serial number on the field data sheet (Attachment B1-1). Record the number from the flowmeter counter spins on the field data sheet prior to lowering the frame into the water. Record the start time (local time) on the field data sheet.
- e. Using the measured marks on the winch cable, lower the frame and nets through the water column until the wheels on the sides of the frame are on the bottom. When the cable starts to slack, the boat is motored forward and the cable is retrieved trying to maintain a 45-degree tow angle. When the frame reaches the surface, carefully pull it into the boat. Verify that the nets have not picked up any sediment from the bottom. If there is any sediment in the nets or codends, discard both samples by detaching the codends and rinsing the nets of collected material and then reattach the codends. Repeat the sample collection at that station.
- f. Check that the number of spins on each flowmeter counter to verify that the target volume of 15-20 m³ has been collected (number of spins should be about 2,000). If the target volume has not been met with one tow, subsequent tows will be performed at the station until the target volume has been collected.
- g. If the correct volume has been collected record the end number of spins from each flowmeter on the field data sheet. Subtract the initial number of spins from the end number and record the total on the field data sheet. If the integrity of either or both flowmeter readings is questionable (e.g., seaweed wrapped around the propellers), discard both samples by detaching the codends and rinsing the nets of collected material and then reattach the codends. Repeat the sample collection at that station.
- h. Record the end time (local time) on the field data sheet.
- i. Beginning at the top of the net, rinse the collected material down into the codend. Since the wash water is not filtered and may contain plankton, rinse the net from the outside ensuring that unfiltered water does not contaminate the sample. Inspect the net to ensure that it has been thoroughly rinsed. Samples will then be carefully transferred to prelabeled jars with preprinted internal labels. The sample from each net will be placed in separate labeled jars.
- j. Detach the codend from net #1 and rinse the sample from the codend into a labeled sample jar using a squirt bottle containing seawater. Then, using a graduated cylinder or other measuring device, add enough formalin to make a 10%-formalin seawater solution. Rinse and inspect the codend of net #1 before reattaching to the net. Follow the same procedure for net #2. Sample preservation should be completed soon after collection.
- k. If the collected material will fill over $\frac{1}{2}$ of the sample jar, split the sample into at least two labeled jars so that there is enough ethanol for proper preservation.
- l. Ensure that the sample jar contains both an inner label and an exterior label.
- m. The following is an explanation of the coding for the field datasheet survey and station numbers and jar labels:
 1. Each survey number on the data sheet consists of a series of 5 letters followed by 2 numbers (SMBEA##). The first three letters are "SMB" refers to Santa Monica Bay, and the "EA" refers to entrainment abundance. The two numbers refer to the survey number with the first survey being 01. The survey number increases by one for each new 24-hour sampling effort.

2. The station designation consists of a letter-number-letter-number combination. This letter/numbering system was set up for all three Santa Monica Bay generating stations (Scattergood, El Segundo, and Redondo Beach). The first letter refers to the station being an Outer, Mid, Shore, Harbor, or Entrainment station (see map in Attachment B1-2). The first number refers to the number of the station that links to the station letter. The numbers for each of the stations listed above are as follows:

Station letter	Station number
Outer	1-5
Mid	1-3
Shore	1-7
Harbor	1-2
Entrainment	1-4

3. Entrainment Station E1 is located near Scattergood's intake structure, E2 and E3 are at El Segundo, and E4 is at Redondo Beach.
 4. The second letter designates the replicate, either "A" or "B". The source water stations only have one sample so always use the letter "A". There are two samples collected at the entrainment location so the letters "A" and "B" will be used to separate these two replicates. The second number designates the net number, either "1" or "2." For example, O3A1 means that the sample was collected from Station O3, Sample A, and Net 1.
 5. The date of sampling will correspond to the actual start date of each sample. At the start of a new day (midnight), use a new field data sheet.
- n. Deliver the samples to the laboratory at the completion of the sampling effort.

4.3 Sample Voiding in the Field

- a. Samples should be voided if any of the following occurs: 1) possible flowmeter obstruction due to kelp or other debris on the propeller, 2) obviously malfunctioning or damaged flowmeters; 3) damaged (torn) nets found after a sample is collected; 4) large quantities of sediment in the net that were collected when the wheeled bongo frame was on the bottom; 5) gear failure which prevents completion of any tows/hauls; 6) an incident or situation which may prevent reliable data collection; 7) an incident or situation which may jeopardize the safety of sampling personnel.
- b. If a hole or tear is found in the net mesh, mark the damaged area and either repair or replace the net. Discard both samples and repeat the sample collection. Record this on the data sheet.
- c. The number of flowmeter spins from the paired bongo nets needs to be checked in the field to confirm that the measured volumes were similar.

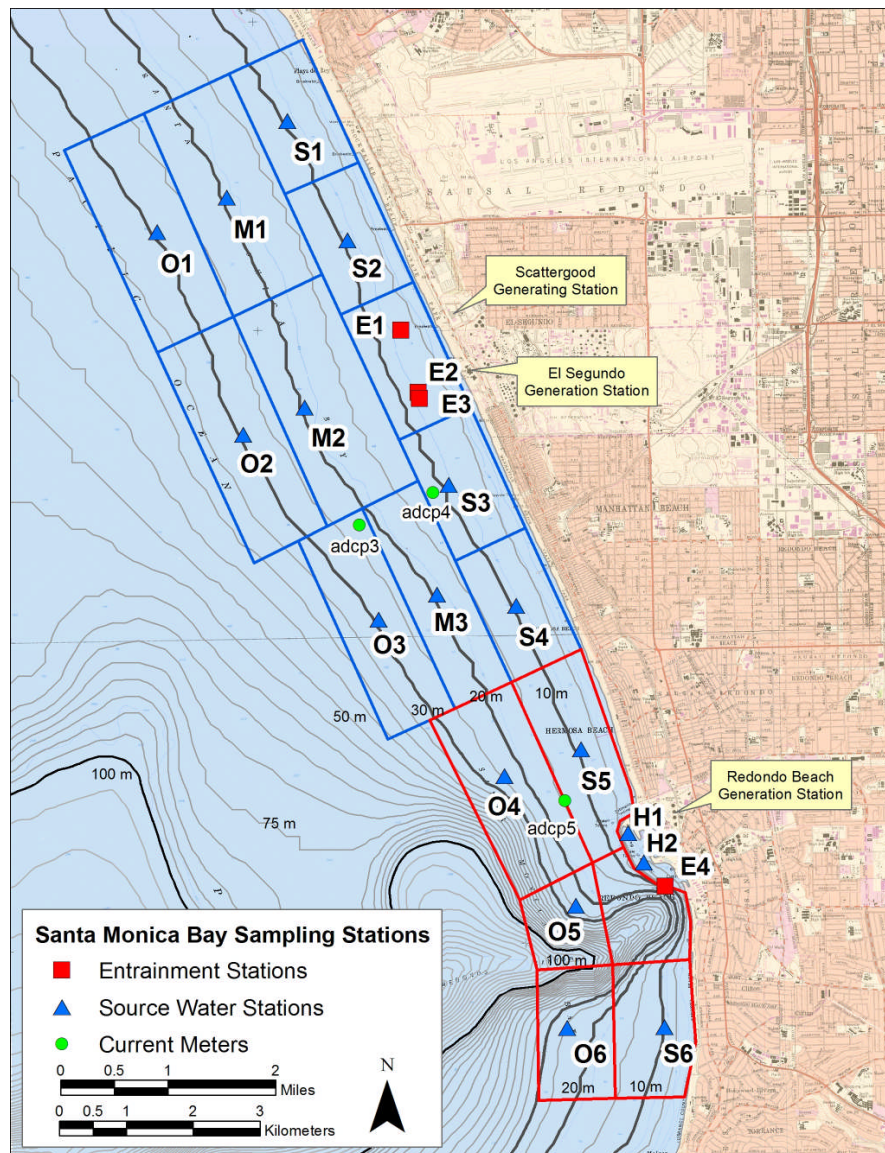
Table B1-1. Equipment List.

1. Wheeled bongo net frame, attached 333/335 micron mesh nets, codends, and calibrated flowmeters (include at least 1 back up net and flowmeter)
2. Winch (davits) and line for net deployment and retrieval
3. Stock solution of formalin
4. Squeeze bottles
5. Labeled jars for sample storage
6. Data sheets, pencils, permanent markers, and labels
7. Wash-down pump
8. Watch
9. Fathometer
10. GPS

Santa Monica Bay Entrainment Abundance Field Data Sheet - El Segundo (ESGS), Redondo Beach (RBGS), & Scattergood (SGS)

Sheet #: _____ Date: _____ Mesh: 0.335 mm Flowmeter 1: _____ Conversion 1: _____
Survey #: S M B E A Crew: _____ Net Dia.: 0.60 m Flowmeter 2: _____ Conversion 2: _____

Station (A#A#)	Flowmeter Start	Flowmeter End	Total Flow	Volume (cu. m)	Sample Number	Cycle (1-4)	Temp °C	Salinity (ppt)	Tide (E, F, HS, LS)	Station Depth (ft)	Start Time (PST)	End Time (PST)	Total (min)
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<u>1</u>													
<u>2</u>					</								



Attachment B1-2. Map of Santa Monica Bay stations.

APPENDIX B2: PROCEDURE FOR SORTING PLANKTON SAMPLES IN THE LABORATORY

1.0 PURPOSE

The purpose of this procedure is to define the steps for sorting target organisms from plankton samples collected at El Segundo Generating Station, and to describe the Quality Control Program (QC) used to monitor the sorting accuracy of individual sorters.

2.0 RESPONSIBILITIES

- Laboratory Supervisor is responsible for assuring that plankton sample sorting is in accordance with written procedures.
- The Quality Control Supervisor is responsible for implementing the Quality Control Program, which monitors sorting accuracy in accordance with written procedures.
- Investigating biologists are responsible for sorting samples in accordance with written procedures.

3.0 INSTRUCTIONS

3.1 Sorting Procedures

3.1.1 Sample Processing

- a. Ensure that the proper equipment necessary for sample processing is available (Table B2-1).
- b. Samples that were originally fixed in formaldehyde after collection must be transferred to 70% ethanol before laboratory processing. This is done outside to lessen the exposure to formaldehyde fumes. Only qualified personnel who have read and signed the information about the hazards of working with formaldehyde may transfer samples.
 1. A funnel with the appropriate mesh size attached to its bottom opening is placed into a jar or can. The mesh must not be larger than that used during sample collection. Place the jar and funnel in a tray so the sample can be retrieved if spillage occurs.
 2. Pour the sample carefully into the canning funnel. The sample jar and jar lid are rinsed with water, directing the water and organisms into the funnel. Rinse the sample with water to flush the formaldehyde from the sample.
 3. Rinse the sample into a labeled jar with 70% ethanol from a squeeze bottle. Make certain that the jar has both an inner label and a jar top label. Additional ethanol is added to the sample jar to cover the sample.
 4. The waste formaldehyde and rinse water is then discarded into the appropriate hazardous waste container.
- c. Consult the sorting schedule posted in the processing laboratory to determine sorting priorities.
- d. Sign out the sample in the Laboratory Tracking MS Excel file and the Laboratory Sample Tracking Sheet (Attachment B2-1) by writing your initials under the 'sorter' column. Transcribe information from the sample label into the Sorter's Log Book (Attachment B2-2) and into the sorter's notebook (each sorter has separate log sheets and a notebook for this purpose).

- e. Take two clean canning funnels with attached mesh netting, one labeled 'sorted' and the other labeled 'unsorted'. The mesh size should be no larger than that used to collect the samples.
- f. Place the 'unsorted' canning funnel over the 'used alcohol' bottle and funnel, which is located in a dish so samples can be retrieved if a spill occurs. Pour the sample into the canning funnel. The canning funnel will contain the material to be sorted, while the ethanol will drain into the 'used alcohol' bottle.
- g. Using 70% ethanol or 70% used alcohol in a squeeze bottle, rinse any remaining sample from the sample jar, the jar lid and inner sample label into the canning funnel containing the unsorted sample.
- h. Place the 'unsorted' funnel containing the sample and the empty 'sorted' funnel into individual glass bowls in a tray. Make sure the sample is covered with water so it will not dehydrate during processing.
- i. Using forceps, transfer a small amount of the sample from the 'unsorted' funnel to the sorting tray. Add enough water to cover the sample. Distribute the sample in the sorting tray.
- j. Place the sorting tray on the base of the dissecting microscope. Adjust the magnification so that the field of view is slightly larger than the width of an individual marked grid.
- k. Arrange the light source to provide adequate illumination.
- l. Carefully scan the entire sorting tray using the grids for orientation. Remove the target organism with forceps and place them either into a shell vial containing 70% ethanol or into a small dish containing water. Count the organisms as they are removed. A list of what target organisms and when to pull them is posted in the lab.
- m. Log the number of organisms removed from the sample in the sorter notebook.
- n. Scan the tray a second time. If target organisms are found on the second pass, repeat a third time. Continue this process until a scan does not produce any additional target organisms.
- o. Once sorted, pour the sorted sample into the 'sorted' funnel and rinse with a small amount of water. Take a second aliquot from the 'unsorted' funnel as described above. Repeat the above steps until the entire sample has been sorted.
- p. If the sorter thinks there will be more than 500 fish eggs in a sample then the sample may be "sub sampled" for eggs. When "sub sampling" the sample should be processed first for fish larvae and selected invertebrate larvae. When ready to "sub sample" put the sorted sample back in the original sample jar and fill the jar with 70% ethanol up to the lip of the jar. Jar size varies, but they will typically be 500 ml (if sizes varies there will be a posting in the lab). A 'sub sample' should be 10 percent of the sample volume so the sorter will use the aliquot transfer pipette with the 10 ml attachment and take 5 aliquots. The sample should be stirred up in order to get a fair amount of sample in the aliquot. Once the aliquot is processed for fish eggs it may be returned to the original sample jar with the rest of the sorted sample. Make sure it is noted in the logbook and record the total volume of the sample and the volume of the sub sample. There will be an extra data sheet in the laboratory tracking sheets and a column in the MS Excel tracking sheets to record the sub sample information. On top of the sample jar put a white dot with survey number, sample number, sorters initials, sub sample date, and "SS".
- q. When the sorting has been completed, the sorted organisms should be placed into a shell vial containing 70% ethanol. Fill the shell vial completely with clean 70% ethanol then place cotton into the top end of the vial to keep the organisms inside. Place the vial into a labeled snap cap containing 70% ethanol. Make sure the shell vial and cotton are completely covered with 70% ethanol.

- r. Label each jar lid with the appropriate colored dot label. Prepare a waterproof inner label for the jar containing the shell vial. Both labels should contain the following information:
 - 1. Survey number
 - 2. Collection date
 - 3. Station, cycle and sample number
 - 4. Collection start time
 - 5. Jar number (if more than one jar)
 - 6. Sorter's initials
 - 7. Number of organisms in shell vial
- s. The total number of sorted organisms and the total time required to process the sample is recorded in the sorter's notebook.
- t. Put the sorted sample back into the original sample jar. Used alcohol may be used to fill sample jar to at least $\frac{3}{4}$ full. Rinse any remaining sample from the funnel into the jar using a squirt bottle containing ethanol. Make sure the inner waterproof label is in the sample jar. Thoroughly clean the funnels of all remaining sample.
- u. If a sample must be stored before completion:
 - 1. Put the sorted portion of the sample back into the original sample jar. Rinse any remaining material from the funnel into the jar using a squirt bottle containing ethanol. Make sure that the sample is adequately covered with ethanol.
 - 2. Put the unsorted sample into a second jar. Rinse any sample from the 'unsorted' funnel into the jar using a squirt bottle containing ethanol. Using a dot label, label the jar lid with the sample identification information, sorter's initials, and the word "unsorted". Make an additional inner label with the sample identification information and marked 'unsorted'. Place the label inside the jar with the 'unsorted' sample. Make certain that the 'unsorted' sample is adequately covered with ethanol.
 - 3. The sorted and unsorted portion of the sample should be stored until sorting can continue.

3.1.2 Once the sample is completed, place an appropriately colored dot label on the jar top with the sorter's initials and date of sorting. Return the jar to the box from which it was originally removed.

- a. Transcribe the information recorded in the sorter's notebook to the computer on the Laboratory Tracking Sheets and the Quality Control log and on the Laboratory Sample Tracking Sheet (Attachment B2-1), and to the Sorter's Log (Attachment B3-2).

3.2 Sorting Quality Control Program

3.2.1 QC Sorting Criteria

- a. The first ten samples that are sorted by an individual are completely resorted by a designated QC sorter. A sorter is allowed to miss one target organism when the original sorted count is 1–19. For original counts above 20 a sorter must maintain a sorting accuracy of 90%.
- b. After the sorter has passed 10 consecutive sorts, the program is switched to a '1 sample in 10' QC program for that sorter. After the sorter has completed another 10 samples, one sample is randomly selected by the designated QC sorter for a QC resort.
- c. If the sorter maintains the 90% accuracy sorting rate for this sample, then the sorter continues in the '1 sample in 10' QC mode.

- d. If a sample does not meet the 90% accuracy rate their subsequent samples will be resorted until 10 consecutive samples meet the criteria.

3.2.2 QC Resorting

- a. Sorting procedures used during the QC resort are the same as the sorting procedures described in Section 3.1.
- b. All fish and selected invertebrate larvae that were missed by the sorter are removed during the QC resort.
- c. For the QC process, a larval fish is defined as having a head plus at least 50% of the body. Any parts without a head and/or less than 50% of the body will be considered fragments and will not be counted against the original sorter as a missed fish. However, it is important for each sorter to remove all fish and fragments from each sample that is sorted and correctly record them as # fish / # fragments in the sorter's notebook and on the tracking sheet.
- d. Any vials of fish larvae or selected invertebrate larvae generated from the resort are labeled with an orange dot label, and labeled as described in the sorting procedures with the addition of "QC" added to the label.
- e. An orange dot label should also be placed on the top of the jar of the sample that was resorted and labeled with the QC person's initials, survey number, sample number, and date the resort was completed.
- f. The vials are stored in the appropriate location.

3.3 Waste Disposal

- 3.3.1 No formaldehyde or water contaminated with formaldehyde should be disposed of into the sewage system. Dispose of any water contaminated with this chemical in the designated waste water container to be disposed of at a local hazardous materials waste depository.

4.0 RECORDS

- 4.1 All data sheets are later reviewed by the Lab Manager or designated staff.
- 4.2 Original data sheets are permanently stored.

Table B2-1. Equipment List

1. Tray or dish
2. Bowls
3. Sample jars
4. Two canning funnels with attached plankton mesh netting, labeled with mesh size, and labeled 'sorted' and 'unsorted'
5. Squeeze bottle containing 70 percent ethanol (denatured)
6. Squeeze bottle containing fresh water
7. Sorting tray or petri dish marked with a sorting grid
8. Dissecting microscope with light source
9. Glass shell vials and cotton
10. Jar/vials with lids
11. Forceps
12. Waterproof labels
13. Dot labels
14. Sorter's notebook
15. Plankton splitter

Survey: _____

[illegible]

Attachment B2-1. Lab Tracking Sheet

Name: _____

[illegible]**Attachment B2-2 Sorter's Log Sheet**

APPENDIX B3: PROCEDURES FOR THE IDENTIFICATION OF LARVAL FISHES and TARGET INVERTEBRATES

1.0 PURPOSE

The purpose of these procedures is to define the steps for identifying planktonic organisms, and to describe the Quality Control (QC) Program used to monitor the accuracy of each individual's identification performance.

2.0 RESPONSIBILITIES

- The Lead Taxonomist is responsible for assuring that plankton identifications are performed in accordance with written procedures and for implementing the Quality Control Program.
- Investigating biologists are responsible for plankton identifications and for monitoring accuracy in accordance with written procedures.

3.0 INSTRUCTIONS

3.1 Identification procedures for larval fishes, *Cancer* spp. crab and *Panulirus* lobsters.

- a. Ensure that the proper equipment necessary for the identification of target organisms is available (Table B3-1).
- b. The fish and target invertebrates from each sample are kept in separate containers and processed following this procedure in essentially the same manner.
- c. The container of target organisms to be identified is carefully emptied into a dish. The dish is placed on the microscope stage and the lighting adjusted to provide adequate illumination.
- d. Each target organism is identified to the lowest taxonomic classification possible. The total number of each taxon is recorded on the Entrainment /Source Water Plankton Tow Lab Data Sheet (Attachment B3-1).
- e. All individuals of each identified taxon of larvae from a sample should be put into a shell vial containing 100% ethanol. Each vial should contain a label with the taxon name and sample number. Cotton should be pushed into the upper end of the vial to keep the label and organisms enclosed.
- f. Mutilated larvae (partial organisms that are missing body parts and are unable to be identified) are placed in a separate labeled vial. Whole larvae that are unidentified, are placed in a separate labeled vial.
- g. All vials containing target organisms from an individual sample should be put into a labeled jar containing enough ethanol to cover the vials. The jar should contain both an inside label and a label attached to the outside of the lid denoting the sample number, date and time collected, and identifier's initials. Tighten the jar lid to prevent evaporation of the preservative. Samples with many different fish taxa may require more than one labeled jar.
- h. On the Laboratory Sample Tracking Sheet, record the identifier's initials and date sample was logged in. The identifier's log will contain the total number of larvae identified and the date identified. If more than one day was needed to complete the identification, record the date the sample identification was completed.
- i. Place the jar into the appropriate box containing identified samples.

- j. Dispose of any liquids containing ethanol into the appropriate waste container.

3.2 Identification Quality Control (QC) Program

3.2.1 Fishes

- a. The first ten samples of larval fishes that are identified by an individual identifying biologist will be completely re-identified by a designated identification QC biologist. A total of at least 50 individuals from at least 5 taxa (50/5 criteria) must be present in these first ten samples. If the first 10 consecutive samples do not pass the 50/5 criteria, additional samples must be re-identified until this criteria is met.
- b. The identifying biologist must maintain a 95% identification accuracy level in these first 10 samples. For all samples, if a sample contains between 1–19 larvae, one larvae can be misidentified and the sample will not fail the QC check.
- c. If the identifying biologist identifies a larval fish to a certain family or genus and subsequently the identification QC biologist is able to refine the identification to a lower taxonomic level, this will not be considered a misidentification pertaining to the 95% identification accuracy level. A misidentification will be one in which the identifying biologist identifies the fish as belonging to a certain family, genus or species, and then the identification QC biologist determines that the initial identification was incorrect and changes the identification to a different family, genus or species or changes it to a higher taxonomic group.
- d. After the identifying biologist has passed 10 consecutive samples, the program is switched to a “1 sample in 10” QC program. After the identifying biologist has completed another 10 samples, one sample is randomly selected by the designated identification QC biologist for a QC review.
- e. If this sample maintains the 95% accuracy level as determined by the identification QC biologist, then the identifying biologist continues in the “1 sample in 10” QC mode. If a sample does not meet the 95% accuracy level, their subsequent samples will be re-identified until 10 consecutive samples meet this level of accuracy.
- f. Any misidentified fish found by the identification QC biologist, will be placed into the appropriate labeled vial for that sample. This information will be recorded on the Fish Identification Data Sheet.

3.2.2 *Cancer* spp. and *Panulirus* spp.

- a. The first ten samples identified by an individual identifying biologist will be completely re-identified by a designated identification QC biologist.
- b. The identifying biologist must maintain a 95% accuracy level in these first 10 samples. For all samples, if a sample contains between 1-19 larvae, one larvae can be misidentified and the sample will not fail the QC check.
- c. After the identifying biologist has passed 10 consecutive samples, the program is switched to a “1 sample in 10” QC program. After the identifying biologist has completed another 10 samples, one sample is randomly selected by the designated identification QC biologist for a QC review.
- d. If this sample maintains the 95% accuracy level as determined by the identification QC biologist, then the identifying biologist continues in the “1 sample in 10” QC mode.
- e. If an identifier’s sample does not meet the 95% accuracy level, their subsequent samples will be re-identified until 10 consecutive samples meet this level.

- f. Any misidentified larva found by the identification QC biologist, will be placed into the appropriate labeled vial for that sample and recorded on the appropriate laboratory identification data sheet.

3.3 Larval Fish Measuring

3.3.1 Larval Fish Measuring Procedure

- a. Turn on the computer, camera, and light source at the measuring station.
- b. Consult the measuring schedule near the measuring station to determine measuring priorities and retrieve the binder containing the appropriate data sheets.
- c. Locate the box containing the fish to be measured and place it in a easily accessible area close to the measuring station.
- d. Open the Optimas Image Analysis or ImageJ software by clicking with the mouse on the appropriate software icon.
- e. Open the Larval Fish Measuring macro in Optimas, or the FishMeasure2 macro in ImageJ and follow the macros' directions.
- f. Select the jar of fish to be measured and consult the jar label. Compare data on the jar label with the inner label and the data sheet for this sample. Consult an identifier regarding discrepancies between labels.
- g. Enter the data queried for by the macro including the last five digits of the serial number, the measurer's initials, the data sheet sequence number and the species code.
- h. Open the jar and remove the vials for the target taxa to be measured as per the posted list. Place the vials in a rack designed to allow the vials to maintain an upright posture so as to reduce spillage.
- i. Select the first vial to be measured. Remove the cotton and the label. Compare the label with the data sheet for confirmation.
- j. Empty the vial into a shallow dish. Remove any fish that have adhered to the vial, cotton, the label, or any tools used in the transferring process and place the fish in the dish. Add alcohol to the dish if necessary to prevent desiccation.
- k. If the number of larval fish in the vial exceeds what can be reasonably measured on a single image capture, transfer some of the fish to another glass dish and immerse them in alcohol.
- l. Place the dish on the stage of the microscope. Arrange the fish so that all fish appear on the screen. Adjust the zoom, focus, and lighting for the best possible image. If this is the first group of larval fish being measured, or if the magnification has been changed, it is necessary to re-calibrate. Place the micrometer on the stage of the microscope and re-calibrate by drawing a line from one of the micrometers millimeter marks to another, noting the distance between the two marks, and entering that value when queried. Replace the dish containing the larval fish to be measured.
- m. Measure larval fish by drawing a line from the pre-maxillary to the end of the notochord, being careful to follow the contours of the fish. If the fish is too damaged to find either the pre-maxillary or to estimate the path taken by the notochord, do not measure, and proceed to the next larval fish. If the line does not adequately approximate the larval fish's length it must be re-measured.
- n. Note the program's display of the measurement, check that it seems reasonable. If it does not seem reasonable, it may be necessary to re-calibrate and re-measure. If the

problem persists, contact an identifier. Make note of any problems in measuring and post near the measuring station.

- o. The macro will store the measurement in separate data files along with the necessary sample information.
- p. Repeat the above steps for all fish in the dish.
- q. When all larval fish in the dish have been measured, fill the vial that originally contained the fish with alcohol and transfer the measured fish to the vial.
- r. If the larval fish from this vial have been segregated into two or more groups, place another group into the dish, being careful to submerge them in alcohol, and measure as above. Do not measure more than fifty larval fish of any one taxon from each survey.

4.0 RECORDS

- 4.1 All data sheets are later reviewed by the Lab Manager or designated staff.
- 4.1 Original data sheets are permanently stored.

Table B3-1. Equipment List

1. Dissecting microscope, with camera attachment connected to computer equipped with Optimas 6.2 or ImageJ if measuring larvae
2. Light source
3. Micrometer
4. Sorting tray or petri dish
5. Squeeze bottle containing 70% ethanol (denatured)
6. Glass shell vials
7. Holder for shell vials
8. Jar containing target organisms to be identified
9. Cotton
10. Forceps
11. Waterproof labels
12. Dot labels
13. Data sheets
14. Identifier's log sheet
15. Taxonomic references

Sheet: [illegible]

Attachment B3-1. Entrainment /Source Water Plankton Tow Lab Data Sheet

APPENDIX B4: IMPINGEMENT FIELD SAMPLING PROCEDURES

1.0 PURPOSE

The purpose of this document is to identify the procedures and equipment necessary to accurately collect and process impingement samples at the El Segundo Generating Station (ESGS).

2.0 RESPONSIBILITIES

2.1 Task/Field leader:

- Contact plant to obtain clearance for personnel that will be conducting the sampling.
- Verify that all investigating biologists conducting the sampling have read and understand these procedures.
- Verify that procedures have been followed during sample collection and that the sampling has been conducted safely.

2.2 Investigating biologist:

- Conduct sampling using the following procedures.

3.0 ESGS CONTACT INFORMATION

Name	Cell/Outside Line
Alex Sanchez	
Shift Supervisor	(310) 615-6313
U3&4 Control Room	(310) 615-6303

4.0 PROCEDURES

Impingement sampling will only be undertaken once per month when there is water passing through the traveling screens for Unit 1&2 or 3&4. If only one pump is in operation, proceed with sample collection using the following procedures. Each normal operation impingement survey consists of an initial cleaning period followed by four 6-hr sampling cycles. Table B4-1 presents the proposed schedule for each survey.

4.1 Mobilization

- a. Notify plant personnel of the dates, times, and names of the biologists that will be onsite during each survey. All personnel will require a photo identification (driver's license, passport, etc.) to obtain access to the plant site.
- b. The equipment listed in Table B4-2 is required for sampling and should be checked before leaving for the plant. Verify that any scales used for the sampling have been calibrated within the previous three months.

4.2 Traveling Screen Sample Collection

- a. Material impinged at Units 1&2 and Units 3&4 is rinsed from the traveling screens (TS) into metal traveling screen collection baskets (Figures B4-1 and B4-2 respectively). The bar rack area does not require daily cleaning, thus no collections will be conducted from this area.

- b. Make sure that the collection basket has been emptied prior to the survey. If there is any debris in it, contact an operator to have them remove the basket using a crane so that it can be emptied.
- c. The initial screenwash is for cleaning purposes only; do not process any materials from the sump after the cleaning rinse. The time at the end of the initial TS rinse is the beginning of Cycle 1. Record this on the appropriate datasheet.
- d. The mesh in the collection basket has a larger mesh than the mesh of the TS. Secure a mesh net/vexar basket (with mesh of the same size or smaller than the TS mesh) inside of the metal basket so that impinged materials can easily be removed. If the debris load is too heavy for the mesh net/vexar basket or it is damaged and materials accumulate in the metal basket, make sure an operator is available to use a crane to pull the metal basket out for sample collection.
- e. Have plant personnel activate the TS wash system thirty minutes prior to the end of each cycle so that all impinged material is rinsed from the screens into the collection basket.
- f. Remove all impinged fish and invertebrates from the impinged debris.
- g. Replace the mesh net/vexar basket in the rectangular sump before initiation of the screenwash for the next cycle.
- h. All collected impinged material will be processed using the procedures in following section.

4.3 Sample Processing

- a. Remove all fishes and invertebrates from the impinged debris. Record the volume of the debris (gallons) on the datasheet. Also record the composition and percentage of the debris.
- b. All fishes, crabs, shrimps and prawns, and cephalopod mollusks are identified, counted, measured (see measurement criteria below), and weighed. This information is recorded on the appropriate datasheet. All other invertebrates are identified and recorded as present by entering a "P" in the count box.

Organism Group	Length Measuring Criteria
Fishes	Total body length for sharks, disc width for skates and rays and standard lengths for bony fishes
Crabs	Maximum carapace width
Spiny lobster and Shrimps	Carapace length, measured from the anterior margin of carapace between the eyes to the posterior margin of the carapace
Octopus	Maximum "arm" spread, measured from the tip of one tentacle to the tip of the opposite tentacle
Squid	Dorsal mantle length, measured from the edge of the mantle to the posterior end of the body

- c. Record all organism names on the appropriate datasheet, using their scientific names whenever possible. The taxa codes are recorded after the datasheets are returned to the office.
- d. Make certain of all identifications before recording the name on the datasheets. If an organism cannot be positively identified it should be saved. The voucher specimen should be placed in a plastic bag with a waterproof label indicating the location, cycle, date, time, and the initials of the collector. If personnel on the next cycle can positively identify the organism record the organism's name on the datasheet. If positive identification cannot be made the organism is returned to the laboratory for identification.
- e. If a large number (more than 30) of any individual countable species is collected during a cycle, individually measure and weigh 30 randomly selected individuals of this species and then count

and measure the remaining individuals and record this information on a separate line on the datasheet. For example: if 198 deepbody anchovies were collected, randomly select 30 individuals and record on the first row *Anchoa compressa*, count = 1, Length = standard length (the distance from the tip of the snout to the posterior vertical margin of the hypural plate) to the nearest mm, weight = weight to nearest gram, sex = “-” (if the sex cannot be determined without dissection, record a “-”), and condition = alive (A), dead (D), or mutilated (M). Continue this procedure for the other 29 randomly chosen deepbody anchovies. Then batch weigh the remaining individual. If all of the individuals are alive, put an “A” in the Cond. box. If some are dead and some mutilated, use additional rows to fill in the appropriate information in the corresponding row(s).

- f. Determine the sex of the countable organisms to the extent possible without dissection. Assign the letter M to refer to males, F for females, J for juveniles, G for gravid. Put a “-” if the sex cannot be determined without dissection.
- g. Record the condition of each countable organisms: A for alive; D for dead; M for mutilated. If an individual is mutilated, do not measure the length. If there are more than 30 non-mutilated individuals, the mutilated individual(s) can be weighed with the batch weight of the additional individuals. If there are less than 30 non-mutilated individuals, record the weight of the mutilated individual(s) but not their lengths.
- h. Record any anomalies or other notes (encountered in each cycle) in the notes section on the datasheet.
- i. At the end of each cycle verify that: a) the sampling procedures have been followed correctly, b) the data has been recorded correctly and legibly, and then c) sign and date the “Reviewed by/Date” section at the bottom of the datasheet.
- j. Put all dead animals and discarded debris in trash dumpsters. Make sure to double bag the material as collection of the trash may not occur for several days.
- k. Quality control (QC) checks will be performed on at least a quarterly basis to verify all organisms are being removed from the debris and that the correct identification, enumeration, length and weight measurements of the organisms are being recorded on the datasheet. The QC team will randomly choose the actual impingement cycles that will be checked and will resort the debris for any missed organisms. All organisms will then be identified, remeasured and reweighed by the QC team to ensure that the data is being recorded correctly. If a sampling team fails a QC check, they will be retrained on fish identification and sample collection. QC checks will be performed on the sampling team until they pass the QC requirements. The QC checks will be fully documented and reported to the Project Manager.

4.4 General

- a. All information recorded on the datasheets must be written legibly with a pencil.
- b. Keep information separate for each cycle
- c. The survey number will be determined based on the week corresponding to that survey (eg., week 1 = survey 1). Make sure the correct survey number is recorded.
- d. Make certain that the unit #s and cycle numbers are correct on the datasheet you are using. Record the date and time for the start and end of each screen wash (generally 15 to 20 minutes) and cycle duration times (generally 6 hours). Each 24-hr survey is divided into 4 six-hour cycles.
- e. Record the names of all personnel present during each cycle.
- f. Use military time (0000 – 2400) to record every cycle collected. Record all times as local time (Pacific Standard Time or Pacific Daylight Time).

- g. During each screen wash, verify that the screens are operating properly (the screens should be moving and the water should be spraying). Check with the operator to find out how many circulating water pumps are operating.
- h. If a survey cannot be completed or is cancelled, make a note on the appropriate data sheet explaining the reason for the cancellation. Write the survey number that corresponds to that week, date and sign the datasheet.
- i. At the end of each screen wash, record the relevant meteorological data.
- j. If the traveling screens trip before the 6-hour cycle is over, collect all material and process it as part of the upcoming cycle. If possible, have the screen wash system run at the scheduled times.

4.5 Heat Treatments

During heat treatments follow the same procedures as during normal impingement sampling. Use a separate data sheet for each species collected. A single data sheet can be used for several species if low numbers of these species are collected.

If an extremely large amount of material is collected in the sump basket, sub-sampling of the most abundant fishes/shellfishes should occur to minimize the time taken to process the sample. Sub-sampling procedures are as follows:

- a. Remove the less abundant fishes/shellfishes from the impinged material; and record as individuals on the datasheets.
- b. Collect a sub-sample (for example, two 3-gallon sub-samples) from the pile of impinged material. Make sure to randomly sample the pile by collecting organisms from different areas of the pile. Discard the remaining material and record the volume discarded on the data sheets.
- c. The number and weight of the organisms collected from each sub-sample should not be recorded with the other data. Record the sub-sample data on a separate datasheet. Make certain that record of the organisms from the sub-samples can be linked back to the quantity of material discarded and not sampled.

Table B4-1. Target schedule for 24-hour impingement sampling effort (schedule assumes that at least one circulating water pump is in operation). Based on 30 minutes for complete rotation of travel screens at each unit.

Time	Units 1&2	Units 3&4
6:00	Rinse and Clean	
6:30	Start Cycle 1	Rinse and Clean
7:00		Start Cycle 1
7:30		
8:00		
8:30		
9:00		
9:30		
10:00		
10:30		
11:00		
11:30		
12:00	Rinse Cycle 1	
12:30	Start Cycle 2	Rinse Cycle 1
13:00	Process Cycle 1	Start Cycle 2
13:30		Process Cycle 1
14:00		
14:30		
15:00		
15:30		
16:00		
16:30		
17:00		
17:30		
18:00	Rinse Cycle 2	
18:30	Start Cycle 3	Rinse Cycle 2
19:00	Process Cycle 2	Start Cycle 3
19:30		Process Cycle 2
20:00		
20:30		
21:00		
21:30		
22:00		
22:30		
23:00		
23:30		
0:00	Rinse Cycle 3	
0:30	Start Cycle 4	Rinse Cycle 3
1:00	Process Cycle 3	Start Cycle 4
1:30		Process Cycle 3
2:00		
2:30		
3:00		
3:30		
4:00		
4:30		
5:00		
5:30		
6:00	Rinse Cycle 4	
6:30	Process Cycle 4	Rinse Cycle 4
7:00		Process Cycle 4
7:30		

Note: Schedule is separated into 30-minute increments to show activities associated with each cleaning and collection cycle at the two sets of traveling screens.

Table B4-2. Equipment List.

1. Datasheets printed on waterproof paper
2. Pencils
3. Scales (Electronic and spring)
4. Measuring boards
5. Fish and invertebrate identification keys
6. Buckets and plastic totes
7. Floodlights and extension cords
8. Calipers
9. Calculator
10. Hardhats
11. Safety Glasses
12. Rubber/latex gloves
13. Clipboard



Figure B4-1. Units 1&2 traveling screen collection basket.



Figure B4-2. Units 3&4 traveling screen collection basket under central green grate.

El Segundo Generating Station

Appendix C

Model Parameterization

- C1. Estimating Total Entrainment
- C2. Estimating Proportional Entrainment
and the ETM Calculations
- C3. Demographic Model Calculations

Appendix C1

Estimating Total Entrainment

The following section describes calculations used for assessing entrainment effects at the El Segundo Generating Station (ESGS). The equations are presented in a general form that is applicable to sample designs that may have differing numbers of stations, sampling periods, or replicates. The ESGS entrainment study will sample two stations.

A general form can be written for summing entrainment over stations at an intake or entrainment site using cycles within a day and days within time periods. Let

i = period ($i = 1, \dots, N$);

j = day within period ($j = 1, \dots, N_i$);

k = cycle within day ($k = 1, \dots, N_{ij}$);

l = station ($l = 1, \dots, N_{ijk}$);

m = volume at station within cycle ($m = 1, \dots, N_{ijkl}$).

The total larval entrainment at an intake source can be expressed as

$$E_T = \sum_{i=1}^N \sum_{j=1}^{N_i} \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \rho_{ijkl} V_{ijkl} \quad (A1)$$

where

ρ_{ijkl} = density of larvae at the l th station within the k th cycle on the j th day in the i th time period;

V_{ijkl} = volume of water passing the at the l th station within the k th cycle on the j th day in the i th time period.

This summation assumes that stations represent the total intake volume of the power plant. It also assumes that the larval density in the volume of water passing a station is constant over time and

space over any cycle. An estimate of the total larval entrainment can be made by taking n_{ijkl} samples of the N_{ijkl} volumes passing a station as

$$\hat{E}_T = \sum_{i=1}^N \sum_{j=1}^{N_i} \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \frac{V_{ijkl}}{n_{ijkl}} \sum_{m=1}^{n_{ijkl}} \rho_{ijklm} \quad (A2)$$

If we also assume that entrainment volume is constant and the same at all stations then

$$\hat{E}_T = \sum_{i=1}^N V_{ijkl} \sum_{j=1}^{N_i} \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \frac{1}{n_{ijkl}} \sum_{m=1}^{n_{ijkl}} \rho_{ijklm} \quad (A3)$$

Strata will be defined as the stations and cycles with constant N_{ij} and N_{ijk} . In addition, we sample n_i days of the N_i possible during a period so that

$$\begin{aligned} \hat{E}_T &= \sum_{i=1}^N N_i N_{ij} N_{ijk} V_{ijkl} \frac{1}{n_i} \sum_{j=1}^{N_i} \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \left(\frac{1}{N_{ij} N_{ijk} n_{ijkl}} \right) \sum_{m=1}^{n_{ijkl}} \rho_{ijklm} \\ &= \sum_{i=1}^N V_i \frac{1}{n_i} \sum_{j=1}^{N_i} \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \left(\frac{1}{N_{ij} N_{ijk} n_{ijkl}} \right) \sum_{m=1}^{n_{ijkl}} \rho_{ijklm} \end{aligned} \quad (A4)$$

where

$$V_i = \sum_{j=1}^{N_i} \sum_{l=1}^{N_{ij}} \sum_{k=1}^{N_{ijk}} V_{ijkl}$$

If only one day per period is sampled Equation A4 can be expressed as

$$\begin{aligned} \hat{E}_T &= \sum_{i=1}^N V_i \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \left(\frac{1}{N_{ij} N_{ijk} n_{ijkl}} \right) \sum_{m=1}^{n_{ijkl}} \rho_{ijklm} \\ &= \sum_{i=1}^N V_i \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \left(\frac{1}{N_{ij} N_{ijk}} \right) \hat{\rho}_{ijkl} \end{aligned} \quad (A5)$$

with estimated variance

$$\widehat{Var}(\hat{E}_T) = \sum_{i=1}^N V_i^2 \sum_{k=1}^{N_{ij}} \sum_{l=1}^{N_{ijk}} \left(\frac{1}{N_{ij} N_{ijk}} \right)^2 \left(1 - \frac{n_{ijkl}}{N_{ijkl}} \right) \frac{\widehat{Var}(\rho_{ijkl})}{n_{ijkl}} \quad (A6)$$

where

$$\widehat{Var}(\rho_{ijkl}) = \frac{\sum_{m=1}^{n_{ijkl}} (\rho_{ijklm} - \hat{\rho}_{ijkl})^2}{(n_{ijkl} - 1)};$$

$$\hat{\rho}_{ijkl} = \frac{\sum_{m=1}^{n_{ijkl}} \rho_{ijklm}}{n_{ijkl}}.$$

Estimates of E_T based on Equation A5 will be used in *FH* and *AEL* calculations to estimate annual effects of entrainment on fishes and invertebrates. Equation A6 will underestimate the true variance because it does not include within-period variance. In practice, we ignore the finite population correction, $\left(1 - \frac{n_{ijkl}}{N_{ijkl}}\right)$ because N_{ijkl} is large. Estimators similar to Equation A5 and

Equation A6 are used for calculating survey period estimates of intake and source populations for use in ETM calculations.

Appendix C2

Estimating Proportional Entrainment and the *ETM* Calculations

The empirical transport model (*ETM*) is used to estimate the total mortality probability for larvae from power plant entrainment. The estimate is based on periodic estimates of the probability of entrainment mortality based on daily samples. In the following calculations we assume all larvae entrained die. Generally, sampling takes place over the course of a year so that larval mortality of various species is estimated.

The daily probability of entrainment can be defined as

$$PE_i = \frac{\text{abundance of entrained larvae}_i}{\text{abundance of larvae in source population}_i}$$

= probability of entrainment in *i*th time period ($i = 1, \dots, N$).

In turn, the daily probability can be estimated and expressed as

$$PE_i = \frac{\widehat{E}_i}{\widehat{R}_i} \tag{B1}$$

where

$\widehat{E}_i$ = estimated abundance of larvae entrained in the *i*th time period ($i = 1, \dots, N$);

$\widehat{R}_i$ = estimated abundance of larvae at risk of entrainment from the source population in the *i*th time period ($i = 1, \dots, N$).

Estimating Daily Entrainment

The estimate of total El Segundo Generating Station (ESGS) entrainment on day *j* in period *i* can be expressed from equation (A4) as

$$\begin{aligned}\widehat{E}_{ij} &= \sum_{k=1}^4 \sum_{l=1}^1 V_{ijkl} \frac{1}{3} \sum_{m=1}^3 \rho_{ijklm} \\ &= V_{ij} \sum_{k=1}^4 \sum_{l=1}^1 \left(\frac{1}{12} \right) \sum_{m=1}^3 \rho_{ijklm}\end{aligned}\tag{B2}$$

with associated variance

$$Var\left(\widehat{E}_{ij} \mid E_{ij}\right) = V_{ij}^2 \sum_{k=1}^4 \sum_{l=1}^1 \left(\frac{1}{12} \right)^2 \left(1 - \frac{3}{N_{ijkl}} \right) S_{\rho_{ijkl}}^2\tag{B3}$$

that can be estimated by

$$\widehat{Var}\left(\widehat{E}_{ij}\right) = V_{ij}^2 \sum_{k=1}^4 \sum_{l=1}^1 \left(\frac{1}{12} \right)^2 \left(1 - \frac{3}{N_{ijkl}} \right) s_{\rho_{ijkl}}^2.\tag{B4}$$

The finite population correction [i.e., $\left(1 - \frac{3}{N_{ijk}} \right)$] can be ignored because N_{ijkl} is exceedingly large. Only one day is sampled per period. The period estimated entrainment and variance are

$$\widehat{E}_i = V_i \sum_{k=1}^4 \sum_{l=1}^1 \left(\frac{1}{12} \right) \sum_{m=1}^3 \rho_{ijklm}\tag{B5}$$

$$\widehat{Var}\left(\widehat{E}_i\right) = V_i^2 \sum_{k=1}^4 \sum_{l=1}^1 \left(\frac{1}{12} \right)^2 s_{\rho_{ijkl}}^2.\tag{B6}$$

Estimating Numbers of Larvae at Risk

With the defined and agreed-upon sources of Santa Monica Bay (S) larvae, the daily abundance of larvae at risk can be estimated by

$$\widehat{R}_{ij} = V_S \cdot \widehat{\rho}_{Sij}\tag{B7}$$

where V_S denotes daily exchanged and static volumes at Santa Monica Bay (S), and $\widehat{\rho}$ denotes an estimate of average density in each respective source water bodies. The variance of Expression B7 can be written as

$$Var\left(\widehat{R}_{ij} \mid R_{ij}\right) = V_S^2 \cdot Var\left(\widehat{\rho}_{Sij} \mid \bar{\rho}_{Sij}\right)\tag{B8}$$

The individual variances within Formula B8 describe temporal-spatial variance in density within the source population during the day of sampling. Ten source water locations are sampled in Santa Monica Bay. Ideally, tow samples would be collected randomly through time and space

during a sampling day over a potential source population. However, practical limitations due to sampling a large area required a directed and fixed time and location sampling scheme. Our source water estimates of population and variance are made for each period using only one day, i.e. $\widehat{R}_i = \widehat{R}_{ij}$ and $\widehat{Var}(\widehat{R}_i) = Var(\widehat{R}_{ij} | R_{ij})$.

Period Entrainment and ETM Calculations

By dividing estimated period entrainment (B5) by the corresponding source population (B7) an estimate of entrainment mortality can be written as

$$\widehat{PE}_i = \frac{\widehat{E}_i}{\widehat{R}_i} \quad (B9)$$

Variance for the Estimate of PE_i

The variance for the period estimate of $\widehat{PE}_i$ can be expressed as

$$Var(\widehat{PE}_i | PE_i) = Var\left(\frac{\widehat{E}_i}{\widehat{R}_{ij}} \middle| E_i, R_i\right).$$

Assuming zero covariance between the entrainment and source and using the delta method (Seber 1982), the variance of an estimator formed from a quotient (like $\widehat{PE}_i$) can be effectively approximated by

$$Var\left(\frac{A}{B}\right) \approx Var(A) \left(\frac{\partial \left[\frac{A}{B}\right]}{\partial A}\right)^2 + Var(B) \left(\frac{\partial \left[\frac{A}{B}\right]}{\partial B}\right)^2.$$

The delta method approximation of $Var(\widehat{PE}_i)$ is shown as

$$Var(\widehat{PE}_i) = Var\left(\frac{\widehat{E}_i}{V_s \cdot \widehat{\rho}_{S_i}}\right)$$

where by the Delta method can be approximated by

$$\widehat{Var}(\widehat{PE}_i) \approx \widehat{Var}(\widehat{E}_i) \left(\frac{1}{V_s \cdot \widehat{\rho}_{s_i}} \right)^2 + \widehat{Var}(V_s \cdot \widehat{\rho}_{s_i}) \left(\frac{-\widehat{E}_i}{V_s \cdot (\widehat{\rho}_{s_i})^2} \right)^2 \quad (B10)$$

and is equivalent to

$$= PE_i^2 \left[CV(\widehat{E}_i)^2 + CV(V_s \cdot \widehat{\rho}_{s_i})^2 \right]$$

where

$$\widehat{R}_i = V_s \cdot \widehat{\rho}_{s_{ij}} \quad \text{and}$$

$$CV(\widehat{\theta}|\theta) = \frac{\widehat{Var}(\widehat{\theta}|\theta)}{\widehat{\theta}^2}.$$

Regardless of whether the species has a single spawning period per year or multiple overlapping spawnings the estimate of total larval entrainment mortality can be expressed by

$$\widehat{P}_M = 1 - \sum_{i=1}^N \widehat{f}_i (1 - \widehat{PE}_i)^q \quad (B11)$$

where

q = number of days of larval life, and

$\widehat{f}_i$ = estimated annual fraction of total larvae hatched during the i th survey period.

Formula (B11) is based on the total probability law where

$$P(A) = \sum_{i=1}^N P(A|B_i) \cdot P(B_i).$$

In the above example, the event A is larval survival and event B is hatching with $P(B)$

estimated by $\widehat{f}_i$ where

$$\widehat{f}_i = \frac{\widehat{E}_i}{\widehat{E}_T},$$

where $\widehat{E}_i$ = estimated entrainment for the i th survey period. Then based on the Delta method

$$\begin{aligned}
 \widehat{Var}(\widehat{f}_i) &= \widehat{Var} \left[\frac{\widehat{E}_i}{\widehat{E}_T} \right] \\
 &= \widehat{Var} \left[\frac{\widehat{E}_i}{\widehat{E}_i + \sum_{j \neq i}^N \widehat{E}_j} \right] \\
 &= \widehat{f}_i^2 (1 - \widehat{f}_i)^2 \left[\frac{\widehat{Var}(\widehat{E}_i)}{\widehat{E}_i^2} + \frac{\widehat{Var}(\widehat{E}_T)}{\widehat{E}_T^2} \right].
 \end{aligned}$$

The estimates of PE_i and f_i and their respective variance estimates can be combined in an estimate of the variance for $\widehat{P}_M$ following the Delta method (Seber 1982) for variance and covariance as follows:

$$\begin{aligned}
 \widehat{Var}(\widehat{P}_M) &= \widehat{Var} \left(1 - \sum_{i=1}^N \widehat{f}_i (1 - \widehat{PE}_i)^q \right) \\
 &= \widehat{Var} \left(\sum_{i=1}^N \widehat{f}_i (1 - \widehat{PE}_i)^q \right) \\
 &= \sum_{i=1}^N \left[\widehat{Var}(\widehat{f}_i) (1 - \widehat{PE}_i)^{2q} \right] \\
 &\quad + \sum_{i=1}^N \left[\widehat{Var}(\widehat{PE}_i) (\widehat{f}_i q (1 - \widehat{PE}_i)^{q-1})^2 \right] \\
 &\quad + 2 \sum_{i=1}^N \sum_{j>i}^N \text{cov}(\widehat{f}_i, \widehat{f}_j) (1 - \widehat{PE}_j)^q (1 - \widehat{PE}_i)^q \quad \text{where} \\
 \text{cov}(\widehat{f}_i, \widehat{f}_j) &= \left(\frac{1}{\widehat{E}_T} \right)^2 \left[\widehat{f}_i \widehat{f}_j \widehat{Var} \left(\sum_{g \neq i, j}^N \widehat{E}_g \right) + \widehat{f}_i (1 - \widehat{f}_j) \widehat{E}_i + \widehat{f}_j (1 - \widehat{f}_i) \widehat{E}_j \right].
 \end{aligned}$$

Appendix C3

Demographic Model Calculations

Fecundity Hindcasting (FH)

The estimated total larval entrainment for a species ($\widehat{E}_T$) was used to estimate the number of breeding females needed to produce the number of larvae entrained. The estimated number of breeding females ($\widehat{FH}$) whose fecundity was equal to the estimated total loss of entrained larvae is calculated as follows:

$$\widehat{FH} = \frac{\widehat{E}_T}{\widehat{TLF} \cdot \prod_{i=1}^n S_i} \quad (C1)$$

where

n = number of larval stages vulnerable to entrainment,

$\widehat{E}_T$ = estimated total entrainment,

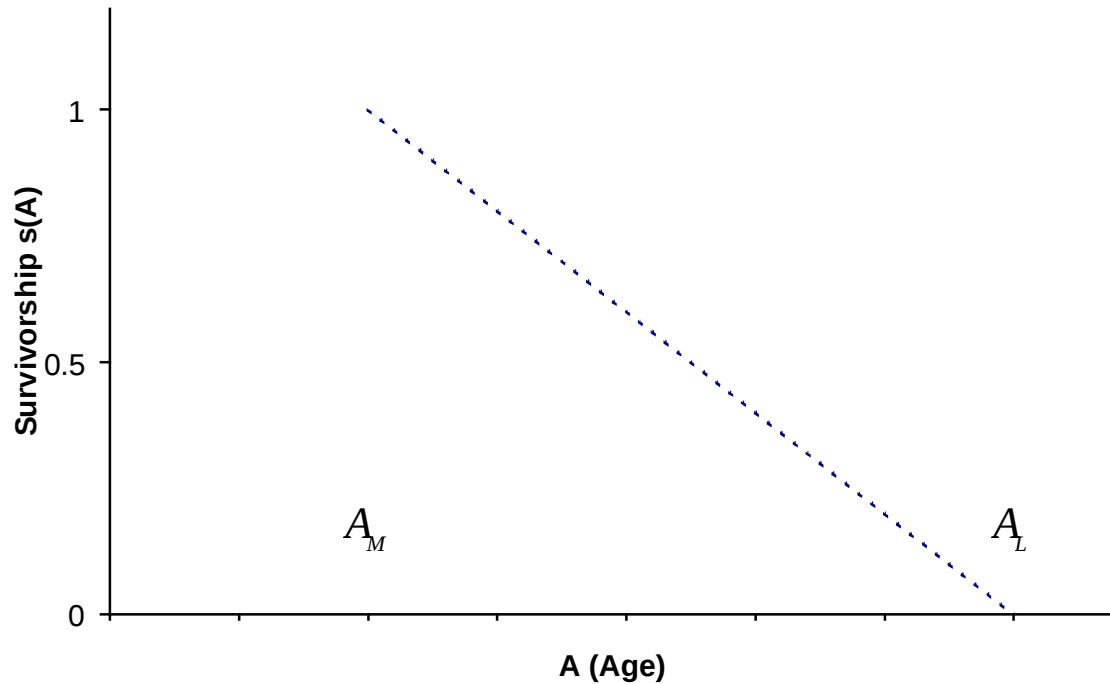
S_i = survival rate from eggs to larvae of the i th stage, and

$\widehat{TLF}$ = estimated total life time fecundity for females, equivalent to the average number of eggs spawned per female over their reproductive years.

Equation C1 is based on the simplified case of a single synchronized spawning by a species. For species with overlapping or continuous spawning, larval abundance would have to be specified by week and age class (i.e., $\widehat{E}_{ij}$). However, we used the mean size of all larvae entrained to estimate a representative age of larvae, and then estimated a survival rate to this representative age. Two input parameters in Equation C1 that may not be available for many species, and thus may limit the method, are lifetime fecundity (TLF) and survival rates (S_i) from spawning to entrainment.

In practice, survival was estimated by either one or several age classes, depending on the data source, to the estimated age at entrainment. The expected total lifetime fecundity $E(TLF)$ was

approximated by modeling a linear survivorship for a female once she reached the age of maturity, and using a constant number of eggs produced per year.



The number of eggs produced per year was approximated as the average number of eggs per year. Thus

$$\begin{aligned}\widehat{TLF} &= \int_{A_M}^{A_L} F(A) s(A) dA \\ &= \bar{F} \int_{A_M}^{A_L} \frac{A_L - A}{A_L - A_M} dA \\ &= \bar{F} \left(\frac{A_L - A_M}{2} \right)\end{aligned}$$

where

$s(A)$ = survivorship of a female;

$F(A)$ = eggs produced;

A_M = age of maturity; and

A_L = age at death.

In other words,

$$\begin{aligned}
 \widehat{TLF} &= \text{Estimated Total Lifetime Fecundity} \\
 &= \text{Average eggs/year} \cdot \text{Average number of years of reproductive life} \\
 &= \text{Average eggs/year} \cdot \left(\frac{\text{Longevity} - \text{Age at maturation}}{2} \right).
 \end{aligned} \tag{C2}$$

The expected length of reproductive life was approximated as the midpoint between the times of maturation and longevity. The approximation of linear survivorship between these events implies uniform survival. For exploited species such as northern anchovy and sardine, the expected number of years of reproductive life may be much less than predicted using this assumption.

Simulation, comparing exponential survival, shows that the calculation of $\widehat{TLF}$ will be negatively biased for species with short reproductive lifespans, and positively biased for those with longer durations.

The variance of $\widehat{FH}$ was approximated by the Delta method (Seber 1982):

$$\widehat{Var}(\widehat{FH}) = (\widehat{FH})^2 \left[CV^2(\hat{E}_T) + \sum_{j=1}^n CV^2(\hat{S}_j) + CV^2(\hat{F}) + \left(\frac{\widehat{Var}(A_L) + \widehat{Var}(A_M)}{(A_L - A_m)^2} \right) \right]$$

where

$CV(\hat{E}_T)$ = CV of estimated entrainment (estimated by $CV(\hat{I})$ when available),

$CV(\hat{S}_j)$ = CV of estimated survival of eggs and larvae up to entrainment,

$CV(\hat{F})$ = CV of estimated average annual fecundity,

A_M = age at maturation, and

A_L = age at maturity.

The behavior of the estimator for FH appears log-linear, suggesting that an approximate confidence interval can be based on the assumptions that $\ln(\widehat{FH})$ is normally distributed and uses the pivotal quantity

$$Z = \frac{\ln \widehat{FH} - \ln FH}{\sqrt{\frac{\widehat{Var}(\widehat{FH})}{\widehat{FH}^2}}}.$$

A 90% confidence interval for FH was estimated by solving for FH and setting Z equal to ± 1.645 , i.e.

$$\widehat{FH} \cdot e^{-1.645 \sqrt{\frac{\widehat{Var}(\widehat{FH})}{\widehat{FH}^2}}} \text{ to } \widehat{FH} \cdot e^{+1.645 \sqrt{\frac{\widehat{Var}(\widehat{FH})}{\widehat{FH}^2}}}.$$

Adult Equivalent Loss (AEL)

The *AEL* approach uses estimates of the abundance of entrained or impinged organisms to forecast the loss of equivalent numbers of adults. Starting with the number of age class j larvae entrained ($\widehat{E}_j$), it is conceptually easy to convert these numbers to an equivalent number of adults lost ($\widehat{AEL}$) at some specified age class from the formula:

$$\widehat{AEL} = \sum_{j=1}^n \widehat{E}_j \widehat{S}_j \quad (C3)$$

where

n = number of age classes,

$\widehat{E}_j$ = estimated number of larvae lost in age class j , and

$\widehat{S}_j$ = survival rate for the j th age class to adulthood (Goodyear 1978).

Age-specific survival rates from larval stage to recruitment into the fishery (through juvenile and early adult stages) must be included in this assessment method. For some commercial species, survival rates are known for adults in the fishery; but for most species, age-specific larval survivorship has not been well described.

When age-specific survival rates from larval stage to recruitment into the fishery were available, *AEL* was calculated using survival from a representative age of the entrained larvae at ESGS. This age was calculated by dividing the average larval length at entrainment (minus hatch length) by a literature-based growth rate. Age-specific survivorship for any interval of time (t) was then calculated following the formula (Ricker 1975)

$$\frac{N_t}{N_0} = e^{-Zt}$$

where

N_t = number of animals in the population at time t ,
 N_0 = number of animals in the population at time $t = 0$,
 $\frac{N_t}{N_0} = S$ (finite survivorship to time t),
 $e = 2.71828...$ (base of the natural log), and
 Z = instantaneous mortality rate.

Survivorship to recruitment, to an adult age, was apportioned into several age stages, and AEL was calculated using the total entrainment as

$$\widehat{AEL} = \hat{E}_T \prod_{j=1}^n \hat{S}_j \quad (C4)$$

where

n = number of age classes from entrainment to recruitment and
 $\hat{S}_j$ = survival rate from the beginning to end of the j th age class.

The variance of $\widehat{AEL}$ can be estimated using a Taylor series approximation (Delta method of Seber 1982) as

$$\widehat{Var}(\widehat{AEL}) = \widehat{AEL}^2 \left(CV^2(\hat{E}_T) + \sum_{j=1}^n CV^2(\hat{S}_j) \right). \quad (C5)$$

An alternative analysis would be to compare $\widehat{AEL}$ with the size of the adult population of interest or with fishery harvest data. This method converts numbers of adult losses into fractional loss of the population of interest (e.g., stock assessment). However, information describing adult stocks is limited for many species, and independent field estimates of survival from time of entrainment to adulthood are not available for some species. For some species where such information is unavailable, we can estimate this parameter by assuming a stationary population where an adult female must produce two adults (i.e., one male and one female). Overall survival (S_T) can then be estimated from total lifetime fecundity (TLF) by the quantity

$$\hat{S}_T = \frac{2}{TLF} = \hat{S}_{egg} \cdot \hat{S}_{larvae} \cdot \hat{S}_{adult},$$

which leads to

$$\hat{S}_{adult} = \frac{2}{\widehat{TLF} \cdot \hat{S}_{egg} \cdot \hat{S}_{larvae}}. \quad (C6)$$

Substituting Equation 11 into the overall form of the *AEL* equation where

$$\widehat{AEL} = \hat{E}_T \cdot \hat{S}_{adult} \quad (C7)$$

yields

$$\widehat{AEL} = \frac{2(\hat{E}_T)}{\hat{S}_{egg} \cdot \hat{S}_{larva} \cdot \widehat{TLF}}$$

where

$$\widehat{AEL} \equiv 2\widehat{FH} . \quad (C8)$$

Without independent adult survival rates and assuming a 50:50 sex ratio, $\widehat{AEL}$ and $\widehat{FH}$ are deterministically related according to Equation 13, with an associated standard error of $\widehat{SE}(\widehat{AEL}) = 2\widehat{SE}(\widehat{FH})$. Equation 13 should be aligned so that the average female age is also the age of recruitment used in computing $\widehat{AEL}$. This alignment is accomplished by solving the simple exponential survival equation (Ricker 1975)

$$N_t = N_0 \cdot e^{-Z(t-t_0)}$$

by substituting numbers of either equivalent adults or hindcast females, their associated ages, and mortality rates into the equation where,

N_t = number of adults at time t ,

N_0 = number of adults at time t_0 ,

Z = instantaneous rate of natural mortality, and

t = age of hindcast animals (FH) or extrapolated age of animals (AEL).

This allows for the alignment of ages in either direction such that $2FH \equiv AEL$ since they are either hindcast or extrapolated to the same age.

The estimates of mortality calculated from the *AEL* and *FH* approaches can be compared for the same time periods for taxa where independent estimates are available for (1) survival from entrainment to recruitment into the fishery and (2) entrainment back to hatching. These comparisons serve as a method of cross-validation for the demographic approaches to impact assessment.

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El Segundo Generating Station

Appendix D

Entrainment Data

D1. Data by Survey and Station

D2. Calculated Total Annual Entrainment and Standard Error
Data

Appendix D1. Data by Survey and Station

Survey: SMBEA02
Start Date: 1/25/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	2	3.62
<i>Stenobranchius leucopsarus</i>	northern lampfish	1	1.48
		Total Fishes: 3	
Eggs			
Paralichthyidae unid. (eggs)	sand flounder eggs	1,335	2,171.65
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	122	207.15
<i>Genyonemus lineatus</i> (eggs)	white croaker eggs	50	81.17
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	13	20.86
fish eggs unid.	unidentified fish eggs	13	19.74
<i>Paralichthys californicus</i> (eggs)	California halibut eggs	8	12.51
Engraulidae unid. (eggs)	anchovy eggs	2	3.27
		Total Eggs: 1,543	
Target Invertebrates			
No Invertebrates			

Survey: SMBEA02
Start Date: 1/25/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	4	8.33
<i>Paralichthys californicus</i>	California halibut	2	3.57
<i>Merluccius productus</i>	Pacific hake	1	1.87
<i>Atherinopsis californiensis</i>	jacksmelt	1	1.75
Atherinopsidae unid.	silversides	1	1.70
<i>Citharichthys stigmaeus</i>	speckled sanddab	1	1.67
<i>Pleuronichthys guttulatus</i>	diamond turbot	1	1.52
		Total Fishes: 11	
Target Invertebrates			
No Invertebrates			

Survey: SMBEA02
Start Date: 1/25/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	12	18.90
<i>Pleuronichthys guttulatus</i>	diamond turbot	2	3.08
<i>Citharichthys sordidus</i>	Pacific sanddab	2	2.97
Atherinopsidae unid.	silversides	1	1.78
Bathymasteridae unid.	ronquils	1	1.69
<i>Engraulis mordax</i>	northern anchovy	1	1.37
<i>Stenobranchius leucopsarus</i>	northern lampfish	1	1.37
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	1	1.31
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.31
<i>Sebastes</i> spp.	rockfishes	1	1.31
		Total Fishes: 23	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	3	4.39
<i>Loligo opalescens</i>	market squid	3	4.22
		Total Target Invertebrates: 6	

Survey: SMBEA02
Start Date: 1/25/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	2	3.00
<i>Atherinopsis californiensis</i>	jacksmelt	2	2.94
Gobiidae unid.	gobies	2	2.74
<i>Genyonemus lineatus</i>	white croaker	1	1.47
		Total Fishes: 7	
Target Invertebrates			
No Invertebrates			

Survey: SMBEA04
Start Date: 2/23/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Gobiidae unid.	gobies	36	57.46
<i>Pleuronichthys guttulatus</i>	diamond turbot	26	42.36
<i>Citharichthys stigmaeus</i>	speckled sanddab	4	6.09
<i>Atherinopsis californiensis</i>	jacksmelt	3	4.94
<i>Genyonemus lineatus</i>	white croaker	3	4.80
larval fish fragment	unidentified larval fishes	1	1.68
Cottidae unid.	sculpins	1	1.67
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	1	1.65
<i>Hypsoblennius</i> spp.	combt tooth blennies	1	1.61
<i>Citharichthys</i> spp.	sanddabs	1	1.55
<i>Paralichthys californicus</i>	California halibut	1	1.55
Sciaenidae unid.	croakers	1	1.55
<i>Syngnathus</i> spp.	pipefishes	1	1.44
		Total Fishes: 80	
Eggs			
Paralichthyidae unid. (eggs)	sand flounder eggs	6,251	10,291.25
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	1,160	1,860.57
<i>Genyonemus lineatus</i> (eggs)	white croaker eggs	76	126.70
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	15	25.54
<i>Paralichthys californicus</i> (eggs)	California halibut eggs	9	14.51
fish eggs unid.	unidentified fish eggs	7	10.90
		Total Eggs: 7,518	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	6	9.28
<i>Cancer gracilis</i> (megalops)	slender crab megalops	1	1.65
unidentified crab (megalops)	unidentified crab megalops	1	1.55
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	1	1.55
Majidae unid. (megalops)	spider crab megalops	1	1.52
<i>Emerita analoga</i> (megalops)	mole crabs megalops	1	1.44
		Total Target Invertebrates: 11	

Survey: SMBEA04
Start Date: 2/23/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	5	8.81
<i>Genyonemus lineatus</i>	white croaker	4	5.78
<i>Atherinopsis californiensis</i>	jacksmelt	2	3.05
<i>Paralichthys californicus</i>	California halibut	2	3.02
<i>Sebastes</i> spp.	rockfishes	2	2.81
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.77
<i>Citharichthys stigmaeus</i>	speckled sanddab	1	1.72
<i>Parophrys vetulus</i>	English sole	1	1.72
larval/post-larval fish unid.	larval fishes	1	1.60
		Total Fishes: 19	
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	1	1.60
		Total Target Invertebrates: 1	

Survey: SMBEA04
Start Date: 2/23/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	7	9.67
<i>Lepidogobius lepidus</i>	bay goby	4	5.49
<i>Paralichthys californicus</i>	California halibut	3	3.84
<i>Pleuronichthys ritteri</i>	spotted turbot	2	2.56
<i>Isopsetta isolepis</i>	butter sole	2	2.51
Gobiidae unid.	gobies	2	2.46
Paralichthyidae unid.	sand flounders	1	1.61
<i>Hypsoblennius</i> spp.	combtooth blennies	1	1.40
<i>Atherinopsis californiensis</i>	jacksmelt	1	1.29
<i>Pleuronichthys guttulatus</i>	diamond turbot	1	1.24
Pleuronectiformes unid.	flatfishes	1	1.22
Sciaenidae unid.	croakers	1	1.22
		Total Fishes: 26	
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	1	1.39
Porcellanidae unid. (megalops)	porcelain crab megalops	1	1.39
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	1	1.39
		Total Target Invertebrates: 3	

El Segundo Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: SMBEA04
Start Date: 2/23/2006

Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	9	14.10
<i>Atherinopsis californiensis</i>	jacksmelt	6	9.86
<i>Genyonemus lineatus</i>	white croaker	5	7.72
Gobiidae unid.	gobies	3	4.67
<i>Engraulis mordax</i>	northern anchovy	1	1.69
<i>Paralichthys californicus</i>	California halibut	1	1.57
<i>Typhlogobius californiensis</i>	blind goby	1	1.51
Pleuronectidae unid.	righteye flounders	1	1.50
		Total Fishes: 27	
Target Invertebrates			
<i>Emerita analoga</i> (megalops)	mole crabs megalops	2	3.51
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	2	3.36
Porcellanidae unid. (megalops)	porcelain crab megalops	1	1.76
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	1	1.69
		Total Target Invertebrates: 6	

Survey: SMBEA06
Start Date: 3/22/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	442	534.34
<i>Stenobranchius leucopsarus</i>	northern lampfish	74	87.56
<i>Parophrys vetulus</i>	English sole	42	48.42
Pleuronectidae unid.	righteye flounders	31	35.71
<i>Engraulis mordax</i>	northern anchovy	23	28.34
Sciaenidae unid.	croakers	19	22.55
<i>Merluccius productus</i>	Pacific hake	17	22.34
<i>Lepidogobius lepidus</i>	bay goby	15	19.68
<i>Pleuronichthys verticalis</i>	hornyhead turbot	15	16.84
<i>Paralichthys californicus</i>	California halibut	13	15.01
<i>Atherinopsis californiensis</i>	jacksmelt	13	14.72
Atherinopsidae unid.	silversides	11	13.43
Gobiidae unid.	gobies	10	13.20
larval fish - damaged	unidentified larval fishes	6	7.24
<i>Citharichthys stigmaeus</i>	speckled sanddab	6	7.16
<i>Pleuronichthys guttulatus</i>	diamond turbot	6	6.58
Pleuronectiformes unid.	flatfishes	4	4.65
<i>Microstomus pacificus</i>	Dover sole	4	4.38
larval fish fragment	unidentified larval fishes	3	4.37
<i>Sebastes</i> spp.	rockfishes	2	2.33
larvae, unidentified yolksac	unidentified yolksac larvae	2	2.26
Engraulidae unid.	anchovies	2	2.12
<i>Gillichthys mirabilis</i>	longjaw mudsucker	1	1.44
<i>Ruscarius creaseri</i>	roughcheek sculpin	1	1.44
larval/post-larval fish unid.	larval fishes	1	1.14
Bathymasteridae unid.	ronquils	1	1.12
<i>Pleuronichthys</i> spp.	turbots	1	1.12
<i>Pleuronichthys ritteri</i>	spotted turbot	1	1.09
<i>Typhlogobius californiensis</i>	blind goby	1	1.00
<i>Hypsoblennius</i> spp.	combtooth blennies	1	0.99
Total Fishes: 768			
Eggs			
fish eggs unid.	unidentified fish eggs	9,861	11,552.80
Paralichthyidae unid. (eggs)	sand flounder eggs	1,376	1,556.68
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	1,187	1,407.76
Sciaenidae unid. (eggs)	croaker eggs	840	991.99
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	688	828.39
Engraulidae unid. (eggs)	anchovy eggs	192	228.79
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	143	163.68
Pleuronectidae unid. (eggs)	righteye flounder eggs	13	15.51
Bathylagidae (eggs)	blacksmelt eggs	1	1.17
<i>Lyopsetta exilis</i> (eggs)	slender sole eggs	1	1.09
<i>Merluccius</i> spp. (eggs)	hake eggs	1	1.06

(continued)

Survey: SMBEA06
Start Date: 3/22/2006
Stations: E2 - E3 (continued)

E2 - E3 (continued)			Mean
Taxon	Common Name	Count	Concentration (#/1,000m ³)
Eggs (continued)			
<i>Genyonemus lineatus</i> (eggs)	white croaker eggs	1	0.99
		Total Eggs: 14,304	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	39	48.69
unidentified crab (megalops)	unidentified crab megalops	6	6.35
<i>Emerita analoga</i> (megalops)	mole crabs megalops	4	4.84
Majidae unid. (megalops)	spider crab megalops	3	3.27
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	2	2.25
<i>Pachycheles rudis</i> (megalops)	thickclaw porcelain crab	1	1.06
		Total Target Invertebrates: 55	

Survey: SMBEA06
Start Date: 3/22/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Parophrys vetulus</i>	English sole	543	670.20
<i>Genyonemus lineatus</i>	white croaker	308	384.71
<i>Engraulis mordax</i>	northern anchovy	72	75.25
<i>Stenobranchius leucopsarus</i>	northern lampfish	58	69.89
larval fish fragment	unidentified larval fishes	50	61.91
Pleuronectidae unid.	righteye flounders	37	48.27
<i>Pleuronichthys verticalis</i>	hornyhead turbot	35	40.05
<i>Paralichthys californicus</i>	California halibut	27	31.89
<i>Citharichthys stigmaeus</i>	speckled sanddab	25	27.33
larval fish - damaged	unidentified larval fishes	19	23.69
<i>Merluccius productus</i>	Pacific hake	19	22.72
<i>Pleuronichthys</i> spp.	turbots	19	21.67
<i>Icelinus</i> spp.	sculpins	15	19.88
larvae, unidentified yolksac	unidentified yolksac larvae	14	18.88
Sciaenidae unid.	croakers	10	13.71
<i>Bathylagus ochotensis</i>	popeye blacksmelt	8	11.98
<i>Citharichthys</i> spp.	sanddabs	5	7.91
<i>Pleuronichthys guttulatus</i>	diamond turbot	5	6.85
<i>Lepidogobius lepidus</i>	bay goby	6	6.84
<i>Pleuronichthys ritteri</i>	spotted turbot	5	6.46
Pleuronectiformes unid.	flatfishes	5	6.15
<i>Sebastes</i> spp.	rockfishes	4	5.07
Engraulidae unid.	anchovies	5	4.38
<i>Odontopyxis trispinosa</i>	pygmy poacher	3	3.52
<i>Citharichthys sordidus</i>	Pacific sanddab	2	2.82
<i>Hypsoblennius</i> spp.	combtooth blennies	3	2.75
Gobiidae unid.	gobies	3	2.74
<i>Semicossyphus pulcher</i>	California sheephead	2	2.53
<i>Isopsetta isolepis</i>	butter sole	2	2.43
<i>Leuroglossus stilbius</i>	California smoothtongue	2	2.27
<i>Lyopsetta exilis</i>	slender sole	2	1.94
<i>Typhlogobius californiensis</i>	blind goby	2	1.82
<i>Argentina sialis</i>	Pacific argentine	1	1.64
<i>Atherinopsis californiensis</i>	jacksmelt	1	1.64
<i>Liparis</i> spp.	snailfishes	1	1.64
Ophidiidae unid.	cusk-eels	1	1.64
Bathymasteridae unid.	ronquils	1	1.39
<i>Seriphus politus</i>	queenfish	1	1.26
<i>Gillichthys mirabilis</i>	longjaw mudsucker	1	1.25
Labrisomidae unid.	labrisomid blennies	1	1.25
<i>Ruscarius creaseri</i>	roughcheek sculpin	1	1.25
Paralichthyidae unid.	sand flounders	1	0.81
		Total Fishes: 1,325	

(continued)

Survey: SMBEA06
Start Date: 3/22/2006
Stations: M1-M3 (continued)

M1-M3 (continued)			Mean
Taxon	Common Name	Count	Concentration (#/1,000m ³)
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	13	20.72
Majidae unid. (megalops)	spider crab megalops	10	11.32
unidentified crab (megalops)	unidentified crab megalops	8	8.62
Paguridae unid. (megalops)	hermit crab megalops	6	7.49
<i>Loligo opalescens</i>	market squid	8	7.35
<i>Emerita analoga</i> (megalops)	mole crabs megalops	6	6.82
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	4	6.65
<i>Cancer gracilis</i> (megalops)	slender crab megalops	2	2.66
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	2	1.82
Anomura unid. (megalops)	anomuran crab megalops	1	1.73
Diogenidae (megalops)	left-handed hermit crabs	1	1.02
Total Target Invertebrates:		61	

Survey: SMBEA06
Start Date: 3/22/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Parophrys vetulus</i>	English sole	594	562.37
<i>Genyonemus lineatus</i>	white croaker	203	199.87
<i>Engraulis mordax</i>	northern anchovy	111	101.87
larval fish fragment	unidentified larval fishes	92	92.26
Pleuronectidae unid.	righteye flounders	97	91.61
<i>Citharichthys stigmaeus</i>	speckled sanddab	97	87.07
<i>Stenobranchius leucopsarus</i>	northern lampfish	72	68.63
<i>Merluccius productus</i>	Pacific hake	72	68.37
<i>Pleuronichthys verticalis</i>	hornyhead turbot	36	35.71
Pleuronectiformes unid.	flatfishes	30	32.10
larval fish - damaged	unidentified larval fishes	32	30.98
larvae, unidentified yolksac	unidentified yolksac larvae	31	29.53
<i>Pleuronichthys</i> spp.	turbots	27	25.21
Sciaenidae unid.	croakers	23	24.60
<i>Paralichthys californicus</i>	California halibut	21	20.23
<i>Sebastes</i> spp.	rockfishes	19	19.78
Bathymasteridae unid.	ronquils	12	10.63
<i>Citharichthys</i> spp.	sanddabs	9	9.79
<i>Bathylagus ohotensis</i>	popeye blacksmelt	6	6.06
<i>Icelinus</i> spp.	sculpins	6	5.46
<i>Pleuronichthys ritteri</i>	spotted turbot	6	5.29
<i>Odontopyxis trispinosa</i>	pygmy poacher	4	4.89
Engraulidae unid.	anchovies	3	4.31
<i>Pleuronichthys guttulatus</i>	diamond turbot	4	4.21
Ophidiidae unid.	cusk-eels	3	3.78
Myctophidae unid.	lanternfishes	4	3.38
<i>Microstomus pacificus</i>	Dover sole	4	3.27
Bathylagidae unid.	blacksmelt	3	2.63
<i>Leuroglossus stilbius</i>	California smoothtongue	3	2.54
<i>Typhlogobius californiensis</i>	blind goby	3	2.54
Chitonotus / Icelinus	sculpins	3	2.53
<i>Citharichthys sordidus</i>	Pacific sanddab	2	1.80
<i>Lepidogobius lepidus</i>	bay goby	2	1.80
larval/post-larval fish unid.	larval fishes	2	1.79
<i>Clinocottus</i> spp.	sculpins	1	1.69
<i>Atherinopsis californiensis</i>	jacksmelt	1	1.45
Chaenopsidae unid.	tube blennies	1	1.45
Cottidae unid.	sculpins	1	1.45
<i>Syngnathus</i> spp.	pipefishes	1	1.45
<i>Zaniolepis</i> spp.	combfishes	1	1.06
<i>Hypsoblennius</i> spp.	combtooth blennies	1	0.93
Hexagrammidae unid.	greenlings	1	0.89
<i>Isopsetta isolepis</i>	butter sole	1	0.89
<i>Clinocottus analis</i>	wooly sculpin	1	0.88

(continued)

Survey: SMBEA06
Start Date: 3/22/2006
Stations: O1-O3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes (continued)			
<i>Icelinus quadriseriatus</i>	yellowchin sculpin	1	0.88
<i>Zaniolepis frenata</i>	shortspine combfish	1	0.88
<i>Gibbonsia</i> spp.	clinid kelpfishes	1	0.74
Gobiidae unid.	gobies	1	0.74
		Total Fishes: 1,650	
Target Invertebrates			
Majidae unid. (megalops)	spider crab megalops	25	21.59
<i>Loligo opalescens</i>	market squid	8	8.69
unidentified crab (megalops)	unidentified crab megalops	9	8.14
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	6	6.19
Paguridae unid. (megalops)	hermit crab megalops	2	1.88
<i>Emerita analoga</i> (megalops)	mole crabs megalops	1	0.93
		Total Target Invertebrates: 51	

Survey: SMBEA06
Start Date: 3/22/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	513	622.26
<i>Parophrys vetulus</i>	English sole	88	107.79
<i>Stenobranchius leucopsarus</i>	northern lampfish	88	104.38
Gobiidae unid.	gobies	52	63.16
<i>Lepidogobius lepidus</i>	bay goby	33	38.73
<i>Paralichthys californicus</i>	California halibut	19	23.45
<i>Engraulis mordax</i>	northern anchovy	18	23.13
Pleuronectidae unid.	righteye flounders	18	21.60
larval fish fragment	unidentified larval fishes	15	20.07
<i>Merluccius productus</i>	Pacific hake	16	19.24
<i>Pleuronichthys</i> spp.	turbots	8	9.79
<i>Pleuronichthys verticalis</i>	hornyhead turbot	7	8.14
Sciaenidae unid.	croakers	7	7.60
<i>Pleuronichthys guttulatus</i>	diamond turbot	7	7.41
<i>Citharichthys stigmaeus</i>	speckled sanddab	6	7.37
<i>Atherinopsis californiensis</i>	jacksmelt	6	7.35
larvae, unidentified yolksac	unidentified yolksac larvae	6	6.61
larval fish - damaged	unidentified larval fishes	4	4.61
<i>Citharichthys sordidus</i>	Pacific sanddab	3	3.47
<i>Lyopsetta exilis</i>	slender sole	2	2.76
Engraulidae unid.	anchovies	2	2.58
Pleuronectiformes unid.	flatfishes	2	2.37
<i>Isopsetta isolepis</i>	butter sole	2	2.34
<i>Atherinops affinis</i>	topsmelt	2	2.25
<i>Hypsoblennius</i> spp.	combtooth blennies	2	2.16
<i>Scorpaenichthys marmoratus</i>	cabezon	1	1.74
<i>Oligocottus</i> spp.	sculpins	1	1.51
<i>Citharichthys</i> spp.	sanddabs	1	1.41
Paralichthyidae unid.	sand flounders	1	1.41
<i>Pleuronichthys ritteri</i>	spotted turbot	1	1.38
<i>Bathylagus ochotensis</i>	popeye blacksmelt	1	1.21
Chitonotus / Icelinus	sculpins	1	1.17
Syngnathidae unid.	pipefishes	1	1.17
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	1	1.12
<i>Liparis mucosus</i>	slimy snailfish	1	1.06
<i>Sebastes</i> spp.	rockfishes	1	1.06
larval/post-larval fish unid.	larval fishes	1	1.01
<i>Zaniolepis frenata</i>	shortspine combfish	1	1.01
Ophidiidae unid.	cusk-eels	1	0.99
<i>Leuroglossus stilbius</i>	California smoothtongue	1	0.93
		Total Fishes: 941	

(continued)

Survey: SMBEA06
Start Date: 3/22/2006
Stations: S1-S4 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	19	22.18
<i>Emerita analoga</i> (megalops)	mole crabs megalops	11	12.13
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	9	11.92
unidentified crab (megalops)	unidentified crab megalops	6	7.58
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	2	2.41
<i>Cancer productus</i> (megalops)	red rock crab megalops	1	1.08
Grapsidae unid. (megalops)	shore crab megalops	1	1.01
Paguridae unid. (megalops)	hermit crab megalops	1	1.01
Total Target Invertebrates: 50			

Survey: SMBEA08
Start Date: 4/19/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	532	808.26
<i>Engraulis mordax</i>	northern anchovy	321	513.55
Gobiidae unid.	gobies	108	161.93
Engraulidae unid.	anchovies	44	73.63
<i>Stenobranchius leucopsarus</i>	northern lampfish	30	48.04
larvae, unidentified yolksac	unidentified yolksac larvae	19	29.82
<i>Hypsoblennius</i> spp.	combtooth blennies	17	26.03
<i>Atherinopsis californiensis</i>	jacksmelt	16	22.70
larval fish fragment	unidentified larval fishes	14	21.99
<i>Citharichthys stigmaeus</i>	speckled sanddab	14	21.46
larval/post-larval fish unid.	larval fishes	13	21.18
<i>Paralichthys californicus</i>	California halibut	9	13.85
<i>Lepidogobius lepidus</i>	bay goby	9	13.71
Pleuronectidae unid.	righteye flounders	8	12.56
<i>Parophrys vetulus</i>	English sole	7	10.52
Sciaenidae unid.	croakers	5	8.91
Atherinopsidae unid.	silversides	5	7.62
<i>Icelinus</i> spp.	sculpins	2	2.83
Bathymasteridae unid.	ronquils	1	1.94
<i>Citharichthys</i> spp.	sanddabs	1	1.94
<i>Cottus asper</i>	prickly sculpin	1	1.94
Labrisomidae unid.	labrisomid blennies	1	1.83
<i>Merluccius productus</i>	Pacific hake	1	1.83
Pleuronectiformes unid.	flatfishes	1	1.83
Chaenopsidae unid.	tube blennies	1	1.74
<i>Gillichthys mirabilis</i>	longjaw mudsucker	1	1.74
<i>Semicossyphus pulcher</i>	California sheephead	1	1.74
larval fish - damaged	unidentified larval fishes	1	1.57
<i>Gibbonsia</i> spp.	clinid kelpfishes	1	1.56
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.49
<i>Acanthogobius flavimanus</i>	yellowfin goby	1	1.49
<i>Typhlogobius californiensis</i>	blind goby	1	1.49
<i>Sphyræna</i> spp.	barracudas	1	1.05
Total Fishes: 1,188			
Eggs			
fish eggs unid.	unidentified fish eggs	3,331	10,680.02
Engraulidae unid. (eggs)	anchovy eggs	1,579	5,098.98
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	957	3,086.07
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	278	885.30
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	220	710.18
Paralichthyidae unid. (eggs)	sand flounder eggs	54	155.10
Sciaenidae unid. (eggs)	croaker eggs	37	108.31
Total Eggs: 6,456			

(continued)

Survey: SMBEA08
Start Date: 4/19/2006
Stations: E2 - E3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	59	82.71
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	41	66.03
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	18	26.32
Majidae unid. (megalops)	spider crab megalops	10	14.34
<i>Emerita analoga</i> (megalops)	mole crabs megalops	7	10.72
Paguridae unid. (megalops)	hermit crab megalops	6	9.00
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	6	8.93
Porcellanidae unid. (megalops)	porcelain crab megalops	5	7.48
unidentified crab (megalops)	unidentified crab megalops	3	4.44
Brachyura unid. (megalops)	unidentified crab megalops	2	2.47
Grapsidae unid. (megalops)	shore crab megalops	1	1.90
<i>Loligo opalescens</i>	market squid	1	1.42
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	1	1.35
Total Target Invertebrates: 160			

Survey: SMBEA08
Start Date: 4/19/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	352	581.17
<i>Engraulis mordax</i>	northern anchovy	215	353.52
Engraulidae unid.	anchovies	170	283.34
<i>Icelinus</i> spp.	sculpins	49	76.93
<i>Paralichthys californicus</i>	California halibut	44	74.13
larvae, unidentified yolksac	unidentified yolksac larvae	43	72.79
<i>Parophrys vetulus</i>	English sole	22	37.59
<i>Citharichthys stigmaeus</i>	speckled sanddab	21	34.83
Pleuronectidae unid.	righteye flounders	19	32.16
Sciaenidae unid.	croakers	17	28.50
larval fish fragment	unidentified larval fishes	16	26.29
<i>Stenobranchius leucopsarus</i>	northern lampfish	10	16.86
<i>Pleuronichthys verticalis</i>	hornyhead turbot	7	10.87
<i>Hypsoblennius</i> spp.	combtooth blennies	7	10.74
<i>Pleuronichthys ritteri</i>	spotted turbot	5	8.22
Chitonotus / <i>Icelinus</i>	sculpins	4	6.56
<i>Bathylagus ochotensis</i>	popeye blacksmelt	4	6.54
Bathymasteridae unid.	ronquils	3	5.00
Pleuronectiformes unid.	flatfishes	3	4.94
<i>Chitonotus pugetensis</i>	roughback sculpin	3	4.92
<i>Leuroglossus stilbuis</i>	California smoothtongue	3	4.77
<i>Atherinopsis californiensis</i>	jacksmelt	2	3.73
Gobiidae unid.	gobies	2	3.73
<i>Gillichthys mirabilis</i>	longjaw mudsucker	2	3.28
<i>Merluccius productus</i>	Pacific hake	2	3.28
<i>Pleuronichthys guttulatus</i>	diamond turbot	2	3.19
<i>Lyopsetta exilis</i>	slender sole	2	3.12
<i>Pleuronichthys</i> spp.	turbots	1	1.94
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.72
<i>Sebastes</i> spp.	rockfishes	1	1.72
Atherinopsidae unid.	silversides	1	1.64
Ophidiidae unid.	cusk-eels	1	1.64
larval fish - damaged	unidentified larval fishes	1	1.63
Paralichthyidae unid.	sand flounders	1	1.63
<i>Typhlogobius californiensis</i>	blind goby	1	1.63
<i>Artedius lateralis</i>	smoothhead sculpin	1	1.60
larval/post-larval fish unid.	larval fishes	1	1.49
Cottidae unid.	sculpins	1	1.47
		Total Fishes: 1,040	

(continued)

Survey: SMBEA08
Start Date: 4/19/2006
Stations: M1-M3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	149	224.35
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	29	48.21
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	27	37.93
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	17	26.95
Paguridae unid. (megalops)	hermit crab megalops	13	20.99
Majidae unid. (megalops)	spider crab megalops	7	11.43
<i>Emerita analoga</i> (megalops)	mole crabs megalops	6	10.72
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	5	8.14
<i>Loligo opalescens</i>	market squid	5	7.25
Grapsidae unid. (megalops)	shore crab megalops	4	6.41
<i>Cancer gracilis</i> (megalops)	slender crab megalops	2	3.40
Brachyura unid. (megalops)	unidentified crab megalops	1	1.76
Diogenidae (megalops)	left-handed hermit crabs	1	1.76
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	1	1.64
Porcellanidae unid. (megalops)	porcelain crab megalops	1	1.64
unidentified crab (megalops)	unidentified crab megalops	1	1.64
Total Target Invertebrates: 269			

Survey: SMBEA08
Start Date: 4/19/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Engraulis mordax</i>	northern anchovy	175	232.99
<i>Genyonemus lineatus</i>	white croaker	156	208.42
<i>Icelinus</i> spp.	sculpins	97	129.30
<i>Parophrys vetulus</i>	English sole	60	74.40
Engraulidae unid.	anchovies	44	64.29
larvae, unidentified yolksac	unidentified yolksac larvae	44	59.59
<i>Paralichthys californicus</i>	California halibut	33	43.52
Pleuronectidae unid.	righteye flounders	27	38.27
<i>Citharichthys stigmaeus</i>	speckled sanddab	14	19.53
Bathymasteridae unid.	ronquils	13	16.96
<i>Leuroglossus stilbius</i>	California smoothtongue	10	12.58
<i>Merluccius productus</i>	Pacific hake	8	10.32
Sciaenidae unid.	croakers	5	7.28
larval/post-larval fish unid.	larval fishes	5	7.09
<i>Lyopsetta exilis</i>	slender sole	5	6.97
<i>Stenobranchius leucopsarus</i>	northern lampfish	6	6.92
<i>Pleuronichthys verticalis</i>	hornyhead turbot	5	6.57
<i>Pleuronichthys</i> spp.	turbots	4	5.98
<i>Bathylagus ochotensis</i>	popeye blacksmelt	4	4.91
<i>Zaniolepis frenata</i>	shortspine combfish	4	4.65
<i>Hypsoblennius</i> spp.	combt tooth blennies	3	4.40
<i>Pleuronichthys guttulatus</i>	diamond turbot	3	4.23
<i>Ruscarius creaseri</i>	roughcheek sculpin	4	4.23
<i>Pleuronichthys ritteri</i>	spotted turbot	3	4.19
<i>Lepidopsetta bilineata</i>	rock sole	2	2.65
<i>Lepidogobius lepidus</i>	bay goby	1	1.62
Ophidiidae unid.	cusk-eels	1	1.62
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	1.62
Bathylagidae unid.	blacksmelt	1	1.51
Chitonotus / <i>Icelinus</i>	sculpins	1	1.51
<i>Chitonotus pugetensis</i>	roughback sculpin	1	1.51
<i>Icelinus quadriseriatus</i>	yellowchin sculpin	1	1.51
<i>Syngnathus</i> spp.	pipefishes	1	1.29
Gobiidae unid.	gobies	1	1.28
<i>Odontopyxis trispinosa</i>	pygmy poacher	1	1.28
<i>Sebastes</i> spp.	rockfishes	1	1.18
<i>Artedius lateralis</i>	smoothhead sculpin	1	1.06
larval fish fragment	unidentified larval fishes	1	1.06
		Total Fishes: 747	

(continued)

Survey: SMBEA08
Start Date: 4/19/2006
Stations: O1-O3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	126	152.67
<i>Loligo opalescens</i>	market squid	58	73.83
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	38	50.49
Paguridae unid. (megalops)	hermit crab megalops	15	20.77
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	12	15.39
<i>Cancer gracilis</i> (megalops)	slender crab megalops	5	7.38
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	5	6.88
Majidae unid. (megalops)	spider crab megalops	4	6.12
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	4	4.92
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	2	2.92
Porcellanidae unid. (megalops)	porcelain crab megalops	2	2.54
<i>Emerita analoga</i> (megalops)	mole crabs megalops	1	1.62
Diogenidae (megalops)	left-handed hermit crabs	1	1.39
unidentified crab (megalops)	unidentified crab megalops	1	1.36
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	1	1.28
Total Target Invertebrates: 275			

Survey: SMBEA08
Start Date: 4/19/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	604	811.91
<i>Engraulis mordax</i>	northern anchovy	420	603.27
Engraulidae unid.	anchovies	136	168.09
Gobiidae unid.	gobies	80	110.44
larvae, unidentified yolksac	unidentified yolksac larvae	37	53.83
<i>Citharichthys stigmaeus</i>	speckled sanddab	26	37.68
<i>Stenobranchius leucopsarus</i>	northern lampfish	25	35.35
<i>Hypsoblennius</i> spp.	combtooth blennies	24	34.97
<i>Paralichthys californicus</i>	California halibut	20	31.20
<i>Atherinopsis californiensis</i>	jacksmelt	17	24.88
Atherinopsidae unid.	silversides	14	19.33
<i>Lepidogobius lepidus</i>	bay goby	13	18.64
Sciaenidae unid.	croakers	14	18.40
larval fish fragment	unidentified larval fishes	11	16.25
Pleuronectidae unid.	righteye flounders	11	15.96
<i>Pleuronichthys guttulatus</i>	diamond turbot	4	5.25
<i>Parophrys vetulus</i>	English sole	4	5.11
<i>Pleuronichthys ritteri</i>	spotted turbot	2	3.24
Labrisomidae unid.	labrisomid blennies	2	2.73
larval fish - damaged	unidentified larval fishes	2	2.44
Pleuronectiformes unid.	flatfishes	2	2.44
<i>Bathylagus ochotensis</i>	popeye blacksmelt	1	1.50
larval/post-larval fish unid.	larval fishes	1	1.48
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	1.48
<i>Icelinus</i> spp.	sculpins	1	1.31
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.29
Total Fishes: 1,473			
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	280	383.30
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	68	92.44
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	29	39.96
Majidae unid. (megalops)	spider crab megalops	19	26.46
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	13	17.61
Paguridae unid. (megalops)	hermit crab megalops	11	14.07
<i>Emerita analoga</i> (megalops)	mole crabs megalops	8	11.23
Brachyura unid. (megalops)	unidentified crab megalops	7	9.58
Porcellanidae unid. (megalops)	porcelain crab megalops	5	6.56
Grapsidae unid. (megalops)	shore crab megalops	3	3.88
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	2	2.76
Diogenidae (megalops)	left-handed hermit crabs	2	2.44
unidentified crab (megalops)	unidentified crab megalops	2	2.26
Total Target Invertebrates: 449			

Survey: SMBEA10
Start Date: 5/16/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Engraulidae unid.	anchovies	264	371.65
<i>Engraulis mordax</i>	northern anchovy	20	26.90
<i>Hypsoblennius</i> spp.	combt tooth blennies	11	14.95
larval fish fragment	unidentified larval fishes	9	11.76
larvae, unidentified yolk sac	unidentified yolk sac larvae	4	5.63
<i>Citharichthys stigmaeus</i>	speckled sanddab	4	5.33
larval fish - damaged	unidentified larval fishes	3	4.70
<i>Genyonemus lineatus</i>	white croaker	2	2.86
Sciaenidae unid.	croakers	2	2.66
<i>Zaniolepis</i> spp.	combfishes	2	2.57
<i>Cheilotrema saturnum</i>	black croaker	1	1.47
<i>Leuresthes tenuis</i>	California grunion	1	1.41
<i>Citharichthys</i> spp.	sanddabs	1	1.38
<i>Atherinopsis californiensis</i>	jacksmelt	1	1.29
Labridae unid.	wrasses	1	1.29
<i>Paralichthys californicus</i>	California halibut	1	1.29
<i>Pleuronichthys guttulatus</i>	diamond turbot	1	1.29
		Total Fishes: 328	
Eggs			
fish eggs unid.	unidentified fish eggs	3,063	8,471.77
Engraulidae unid. (eggs)	anchovy eggs	2,596	7,082.81
Paralichthyidae unid. (eggs)	sand flounder eggs	301	846.25
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	83	230.66
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	79	225.92
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	79	209.54
Sciaenidae unid. (eggs)	croaker eggs	30	86.18
		Total Eggs: 6,231	
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	9	11.79
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	4	5.36
unidentified crab (megalops)	unidentified crab megalops	1	1.38
		Total Target Invertebrates: 14	

Survey: SMBEA10
Start Date: 5/16/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Engraulidae unid.	anchovies	633	959.90
<i>Engraulis mordax</i>	northern anchovy	108	167.46
<i>Hypsoblennius</i> spp.	combt tooth blennies	22	32.41
<i>Chitonotus</i> / <i>Icelinus</i>	sculpins	17	25.31
<i>Genyonemus lineatus</i>	white croaker	16	24.84
larvae, unidentified yolksac	unidentified yolksac larvae	9	13.71
<i>Paralichthys californicus</i>	California halibut	7	10.42
larval fish fragment	unidentified larval fishes	6	9.10
<i>Zaniolepis</i> spp.	combfishes	6	8.89
<i>Citharichthys stigmaeus</i>	speckled sanddab	6	8.72
Sciaenidae unid.	croakers	3	4.51
<i>Pleuronichthys ritteri</i>	spotted turbot	3	4.48
<i>Icelinus quadriseriatus</i>	yellowchin sculpin	2	3.65
<i>Typhlogobius californiensis</i>	blind goby	2	3.31
Hexagrammidae unid.	greenlings	2	2.89
<i>Gillichthys mirabilis</i>	longjaw mudsucker	2	2.88
larval/post-larval fish unid.	larval fishes	2	2.88
<i>Seriphus politus</i>	queenfish	2	2.84
<i>Peprilus simillimus</i>	Pacific butterfish	2	2.73
<i>Atractoscion nobilis</i>	white seabass	1	1.70
larval fish - damaged	unidentified larval fishes	1	1.70
Cottidae unid.	sculpins	1	1.56
Gobiidae unid.	gobies	1	1.56
Atherinopsidae unid.	silversides	1	1.52
<i>Cheilotrema saturnum</i>	black croaker	1	1.52
<i>Pleuronichthys</i> spp.	turbots	1	1.52
<i>Icelinus</i> spp.	sculpins	1	1.48
<i>Citharichthys</i> spp.	sanddabs	1	1.32
		Total Fishes: 859	
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	30	43.60
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	7	10.70
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	2	2.89
unidentified crab (megalops)	unidentified crab megalops	2	2.84
<i>Emerita analoga</i> (megalops)	mole crabs megalops	1	1.56
Majidae unid. (megalops)	spider crab megalops	1	1.56
Paguridae unid. (megalops)	hermit crab megalops	1	1.44
<i>Cancer</i> spp. (megalops)	cancer crabs megalops	1	1.40
		Total Target Invertebrates: 45	

Survey: SMBEA10
Start Date: 5/16/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Engraulidae unid.	anchovies	1,405	1,944.42
<i>Engraulis mordax</i>	northern anchovy	275	341.15
<i>Genyonemus lineatus</i>	white croaker	27	38.88
<i>Paralichthys californicus</i>	California halibut	21	26.82
<i>Hypsoblennius</i> spp.	combt tooth blennies	11	16.73
<i>Citharichthys stigmaeus</i>	speckled sanddab	9	12.36
<i>Pleuronichthys verticalis</i>	hornyhead turbot	4	8.33
<i>Pleuronichthys ritteri</i>	spotted turbot	6	7.72
<i>Icelinus quadriseriatus</i>	yellowchin sculpin	5	6.44
<i>Pleuronichthys</i> spp.	turbots	4	6.43
larval fish fragment	unidentified larval fishes	5	6.39
Gobiidae unid.	gobies	4	5.55
Pleuronectidae unid.	righteye flounders	4	5.21
Pleuronectiformes unid.	flatfishes	3	4.97
<i>Zaniolepis</i> spp.	combfishes	3	3.96
larvae, unidentified yolksac	unidentified yolksac larvae	3	3.86
Sciaenidae unid.	croakers	3	3.25
Cottidae unid.	sculpins	2	2.78
<i>Parophrys vetulus</i>	English sole	2	2.70
<i>Pleuronichthys guttulatus</i>	diamond turbot	2	2.59
<i>Atractoscion nobilis</i>	white seabass	2	2.35
<i>Zaniolepis latipinnis</i>	longspine combfish	2	1.80
<i>Gillichthys mirabilis</i>	longjaw mudsucker	1	1.45
Chitonotus / Icelinus	sculpins	1	1.34
<i>Citharichthys</i> spp.	sanddabs	1	1.33
<i>Hypsypops rubicundus</i>	garibaldi	1	1.32
<i>Zaniolepis frenata</i>	shortspine combfish	1	1.30
<i>Peprilus simillimus</i>	Pacific butterfish	1	0.90
Total Fishes: 1,808			
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	52	49.04
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	5	9.27
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	6	8.36
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	3	3.89
unidentified crab (megalops)	unidentified crab megalops	2	3.01
<i>Emerita analoga</i> (megalops)	mole crabs megalops	2	1.80
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	1	1.39
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	1	1.27
Total Target Invertebrates: 72			

Survey: SMBEA10
Start Date: 5/16/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Engraulidae unid.	anchovies	186	262.57
<i>Engraulis mordax</i>	northern anchovy	51	68.42
<i>Hypsoblennius</i> spp.	combt tooth blennies	33	50.32
<i>Genyonemus lineatus</i>	white croaker	14	22.02
larval fish fragment	unidentified larval fishes	9	12.24
Gobiidae unid.	gobies	7	11.17
Chitonotus / Icelinus	sculpins	7	11.11
Sciaenidae unid.	croakers	4	5.75
larvae, unidentified yolksac	unidentified yolksac larvae	4	5.42
Atherinopsidae unid.	silversides	3	4.33
<i>Hypsypops rubicundus</i>	garibaldi	2	2.85
<i>Cheilotrema saturnum</i>	black croaker	2	2.82
larval fish - damaged	unidentified larval fishes	2	2.71
<i>Peprilus simillimus</i>	Pacific butterfish	2	2.70
<i>Zaniolepis frenata</i>	shortspine combfish	2	2.70
<i>Seriphus politus</i>	queenfish	1	1.70
<i>Pleuronichthys</i> spp.	turbots	1	1.44
<i>Paralichthys californicus</i>	California halibut	1	1.40
<i>Semicossyphus pulcher</i>	California sheephead	1	1.40
<i>Atractoscion nobilis</i>	white seabass	1	1.38
<i>Citharichthys stigmaeus</i>	speckled sanddab	1	1.25
		Total Fishes:	334
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	18	24.80
unidentified crab (megalops)	unidentified crab megalops	3	4.80
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	3	4.23
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	3	4.16
Diogenidae (megalops)	left-handed hermit crabs	1	1.40
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	1.38
		Total Target Invertebrates:	29

Survey: SMBEA12
Start Date: 6/14/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Sciaenidae unid.	croakers	89	168.53
larvae, unidentified yolk sac	unidentified yolk sac larvae	77	152.96
<i>Seriphus politus</i>	queenfish	34	80.16
<i>Hypsoblennius</i> spp.	combtooth blennies	39	77.08
<i>Cheilotrema saturnum</i>	black croaker	23	48.00
larval fish fragment	unidentified larval fishes	27	46.88
<i>Pleuronichthys</i> spp.	turbots	21	42.66
<i>Paralichthys californicus</i>	California halibut	21	40.25
<i>Sphyrna argentea</i>	Pacific barracuda	14	27.48
<i>Citharichthys stigmatosus</i>	speckled sanddab	9	21.32
Gobiidae unid.	gobies	8	15.39
<i>Pleuronichthys verticalis</i>	hornyhead turbot	4	10.21
<i>Engraulis mordax</i>	northern anchovy	4	6.98
Engraulidae unid.	anchovies	2	5.43
<i>Hippoglossina stomata</i>	bigmouth sole	2	3.19
<i>Syngnathus</i> spp.	pipefishes	2	3.08
<i>Gibbonsia</i> spp.	clinid kelpfishes	1	2.93
larval/post-larval fish unid.	larval fishes	1	2.72
<i>Pleuronichthys ritteri</i>	spotted turbot	1	2.50
<i>Umbrina roncadore</i>	yellowfin croaker	1	2.50
<i>Diaphus theta</i>	California headlight fish	1	2.14
<i>Stenobranchius leucopsarus</i>	northern lampfish	1	2.14
<i>Menticirrhus undulatus</i>	California corbina	1	1.65
Myctophidae unid.	lanternfishes	1	1.65
<i>Pleuronichthys guttulatus</i>	diamond turbot	1	1.54
Atherinopsidae unid.	silversides	1	1.53
<i>Icelinus</i> spp.	sculpins	1	1.53
		Total Fishes: 387	
Eggs			
fish eggs unid.	unidentified fish eggs	3,047	13,030.80
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	348	1,283.32
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	86	360.67
Paralichthyidae unid. (eggs)	sand flounder eggs	46	177.74
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	31	125.76
Serranidae (eggs)	sea bass eggs	2	6.96
Engraulidae unid. (eggs)	anchovy eggs	1	4.51
Sciaenidae unid. (eggs)	croaker eggs	1	3.15
		Total Eggs: 3,562	
Target Invertebrates			
Paguridae unid. (megalops)	hermit crab megalops	5	13.26
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	5	10.58
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	5	7.67
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	2	4.46
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	2	3.19

(continued)

Survey: SMBEA12
Start Date: 6/14/2006
Stations: E2 - E3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates (continued)			
Porcellanidae unid. (megalops)	porcelain crab megalops	2	3.07
<i>Cancer</i> spp. (megalops)	cancer crabs megalops	1	2.93
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	1	2.54
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	1	1.65
Total Target Invertebrates:		24	

Survey: SMBEA12
Start Date: 6/14/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Sciaenidae unid.	croakers	61	235.27
<i>Seriphus politus</i>	queenfish	48	133.33
<i>Hypsoblennius</i> spp.	combt tooth blennies	50	119.46
<i>Citharichthys stigmaeus</i>	speckled sanddab	36	119.27
<i>Paralichthys californicus</i>	California halibut	25	97.93
larvae, unidentified yolksac	unidentified yolksac larvae	30	91.39
<i>Sphyræna argentea</i>	Pacific barracuda	21	63.10
<i>Pleuronichthys verticalis</i>	hornyhead turbot	14	41.06
<i>Engraulis mordax</i>	northern anchovy	12	30.44
<i>Icelinus</i> spp.	sculpins	5	21.56
larval fish fragment	unidentified larval fishes	7	21.46
<i>Citharichthys sordidus</i>	Pacific sanddab	3	16.86
<i>Stenobranchius leucopsarus</i>	northern lampfish	4	15.55
<i>Pleuronichthys</i> spp.	turbots	3	13.04
<i>Lepidogobius lepidus</i>	bay goby	1	6.59
Myctophidae unid.	lanternfishes	1	6.59
Engraulidae unid.	anchovies	2	5.81
<i>Zaniolepis frenata</i>	shortspine combfish	2	4.68
Chitonotus / <i>Icelinus</i>	sculpins	1	4.55
<i>Parophrys vetulus</i>	English sole	1	4.55
<i>Semicossyphus pulcher</i>	California sheephead	2	4.48
Ophidiidae unid.	cusk-eels	2	4.27
larval fish - damaged	unidentified larval fishes	1	3.68
<i>Cheilotrema saturnum</i>	black croaker	1	2.34
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	2.34
<i>Genyonemus lineatus</i>	white croaker	1	2.14
larval/post-larval fish unid.	larval fishes	1	2.14
<i>Oxyjulis californica</i>	senorita	1	2.14
		Total Fishes:	337
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	7	19.92
Majidae unid. (megalops)	spider crab megalops	3	11.00
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	3	8.99
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	2	4.27
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	1	3.68
Brachyura unid. (megalops)	unidentified crab megalops	1	2.14
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	1	2.14
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	1	2.14
		Total Target Invertebrates:	19

Survey: SMBEA12
Start Date: 6/14/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Seriphus politus</i>	queenfish	73	224.84
<i>Hypsoblennius</i> spp.	combt tooth blennies	55	156.94
<i>Engraulis mordax</i>	northern anchovy	39	119.39
<i>Citharichthys stigmaeus</i>	speckled sanddab	31	93.32
<i>Pleuronichthys verticalis</i>	hornyhead turbot	24	91.76
<i>Paralichthys californicus</i>	California halibut	27	90.43
<i>Pleuronichthys</i> spp.	turbots	23	74.74
Sciaenidae unid.	croakers	23	69.09
<i>Icelinus</i> spp.	sculpins	21	62.53
<i>Sphyrna argentea</i>	Pacific barracuda	21	57.90
larvae, unidentified yolksac	unidentified yolksac larvae	16	44.41
<i>Citharichthys sordidus</i>	Pacific sanddab	15	42.06
Engraulidae unid.	anchovies	7	24.05
<i>Citharichthys</i> spp.	sanddabs	5	14.87
<i>Pleuronichthys ritteri</i>	spotted turbot	4	13.26
larval fish fragment	unidentified larval fishes	5	12.45
<i>Symphurus atricauda</i>	California tonguefish	4	12.07
<i>Atractoscion nobilis</i>	white seabass	3	7.50
<i>Genyonemus lineatus</i>	white croaker	3	7.47
<i>Zaniolepis frenata</i>	shortspine combfish	2	7.21
<i>Stenobranchius leucopsarus</i>	northern lampfish	2	7.18
unidentified fish, damaged	unidentified damaged fish	2	5.04
Pleuronectiformes unid.	flatfishes	1	5.03
Myctophidae unid.	lanternfishes	2	4.98
<i>Lepidogobius lepidus</i>	bay goby	2	4.95
<i>Peprilus simillimus</i>	Pacific butterfish	2	4.86
<i>Umbrina roncadore</i>	yellowfin croaker	1	4.69
<i>Chitonotus</i> / <i>Icelinus</i>	sculpins	1	3.53
<i>Parophrys vetulus</i>	English sole	1	3.53
<i>Cheilotrema saturnum</i>	black croaker	1	2.52
<i>Icelinus quadriseriatus</i>	yellowchin sculpin	1	2.52
<i>Roncadore stearnsi</i>	spotfin croaker	1	2.52
<i>Sebastes</i> spp.	rockfishes	1	2.52
<i>Artedius lateralis</i>	smoothhead sculpin	1	2.49
Gobiidae unid.	gobies	1	2.49
<i>Hippoglossina stomata</i>	bigmouth sole	1	2.49
Labridae unid.	wrasses	1	2.49
larval/post-larval fish unid.	larval fishes	1	2.49
<i>Brosomphycis marginata</i>	red brotula	1	2.43
<i>Oxyjulis californica</i>	senorita	1	2.43
		Total Fishes:	426

(continued)

Survey: SMBEA12
Start Date: 6/14/2006
Stations: O1-O3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	11	38.52
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	9	28.15
Majidae unid. (megalops)	spider crab megalops	7	19.91
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	4	16.01
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	2	10.05
Grapsidae unid. (megalops)	shore crab megalops	3	9.98
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	3	9.95
Brachyura unid. (megalops)	unidentified crab megalops	2	7.46
<i>Cancer gracilis</i> (megalops)	slender crab megalops	2	7.46
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	5.03
Pinnotheridae (megalops)	pea crab megalops	1	3.53
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	1	2.52
Paguridae unid. (megalops)	hermit crab megalops	1	2.49
Total Target Invertebrates: 47			

Survey: SMBEA12
Start Date: 6/14/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
Sciaenidae unid.	croakers	155	310.86
larvae, unidentified yolksac	unidentified yolksac larvae	80	143.51
<i>Seriphus politus</i>	queenfish	50	105.56
<i>Citharichthys stigmaeus</i>	speckled sanddab	48	90.31
<i>Paralichthys californicus</i>	California halibut	36	68.20
Gobiidae unid.	gobies	37	66.00
larval fish fragment	unidentified larval fishes	26	56.10
<i>Cheilotrema saturnum</i>	black croaker	12	25.73
<i>Sphyræna argentea</i>	Pacific barracuda	10	20.58
<i>Hypsoblennius</i> spp.	combt tooth blennies	10	16.67
larval fish - damaged	unidentified larval fishes	8	16.05
<i>Pleuronichthys</i> spp.	turbots	7	12.31
<i>Icelinus</i> spp.	sculpins	7	11.81
<i>Umbrina roncadore</i>	yellowfin croaker	4	9.14
Atherinopsidae unid.	silversides	3	8.08
<i>Hypsypops rubicundus</i>	garibaldi	3	6.12
<i>Menticirrhus undulatus</i>	California corbina	3	6.12
<i>Oxyjulis californica</i>	senorita	3	5.81
<i>Pleuronichthys guttulatus</i>	diamond turbot	1	3.97
<i>Pleuronichthys verticalis</i>	hornyhead turbot	2	3.31
<i>Symphurus atricauda</i>	California tonguefish	1	2.04
Engraulidae unid.	anchovies	1	1.73
<i>Pleuronichthys ritteri</i>	spotted turbot	1	1.73
<i>Engraulis mordax</i>	northern anchovy	1	1.59
<i>Genyonemus lineatus</i>	white croaker	1	1.52
Pleuronectiformes unid.	flatfishes	1	1.52
<i>Typhlogobius californiensis</i>	blind goby	1	1.52
<i>Citharichthys</i> spp.	sanddabs	1	1.50
<i>Zaniolepis frenata</i>	shortspine combfish	1	1.50
		Total Fishes: 514	
Target Invertebrates			
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	8	12.37
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	8	12.31
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	8	12.21
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	8	12.14
Paguridae unid. (megalops)	hermit crab megalops	6	9.18
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	3	4.70
Porcellanidae unid. (megalops)	porcelain crab megalops	3	4.54
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	1	1.59
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	1.52
Grapsidae unid. (megalops)	shore crab megalops	1	1.52
		Total Target Invertebrates: 47	

Survey: SMBEA14
Start Date: 7/12/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
larvae, unidentified yolksac	unidentified yolksac larvae	69	100.47
Sciaenidae unid.	croakers	34	50.77
<i>Paralichthys californicus</i>	California halibut	31	47.44
<i>Pleuronichthys</i> spp.	turbots	18	28.47
larval fish fragment	unidentified larval fishes	18	26.15
Haemulidae unid.	grunts	10	15.91
<i>Hypsoblennius</i> spp.	combtooth blennies	9	15.70
<i>Cheilotrema saturnum</i>	black croaker	7	12.86
<i>Xystreurus liolepis</i>	fantail sole	7	11.79
<i>Paralabrax</i> spp.	sand bass	7	10.31
<i>Pleuronichthys ritteri</i>	spotted turbot	5	6.97
<i>Citharichthys stigmaeus</i>	speckled sanddab	5	6.28
Gobiidae unid.	gobies	3	5.30
larval/post-larval fish unid.	larval fishes	3	4.51
<i>Menticirrhus undulatus</i>	California corbina	2	3.33
<i>Zaniolepis</i> spp.	combfishes	2	3.25
<i>Seriphus politus</i>	queenfish	2	3.01
<i>Symphurus atricauda</i>	California tonguefish	2	2.86
<i>Genyonemus lineatus</i>	white croaker	2	2.81
<i>Engraulis mordax</i>	northern anchovy	2	2.73
Pleuronectiformes unid.	flatfishes	1	1.96
<i>Psettichthys melanostictus</i>	sand sole	1	1.71
<i>Syngnathus leptorhynchus</i>	bay pipefish	1	1.63
<i>Hypsoblennius jenkinsi</i>	mussel blenny	1	1.27
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.27
Engraulidae unid.	anchovies	1	1.10
Pleuronectidae unid.	righteye flounders	1	1.10
		Total Fishes: 245	
Eggs			
fish eggs unid.	unidentified fish eggs	3,010	8,855.70
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	926	2,737.41
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	156	465.87
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	154	456.39
Engraulidae unid. (eggs)	anchovy eggs	23	72.69
<i>Paralabrax</i> spp. (eggs)	sand bass eggs	2	5.67
<i>Sphyræna argentea</i> (eggs)	Pacific barracuda eggs	1	3.18
		Total Eggs: 4,272	
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	58	87.55
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	24	37.69
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	10	15.58
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	9	14.59
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	8	11.51
Porcellanidae unid. (megalops)	porcelain crab megalops	6	8.52

(continued)

Survey: SMBEA14
Start Date: 7/12/2006
Stations: E2 - E3 (continued)

E2 - E3 (continued)			Mean
Taxon	Common Name	Count	Concentration (#/1,000m ³)
Target Invertebrates (continued)			
Cancer anthonyi (megalops)	yellow crab megalops	6	7.78
Majidae unid. (megalops)	spider crab megalops	3	4.48
Panulirus interruptus (phyllosome)	California spiny lobster	2	4.34
Grapsidae unid. (megalops)	shore crab megalops	3	3.83
Petrolisthes spp. (megalops)	porcelain crab megalops	1	1.63
Total Target Invertebrates:		130	

Survey: SMBEA14
Start Date: 7/12/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
larvae, unidentified yolksac	unidentified yolksac larvae	294	411.77
<i>Paralabrax</i> spp.	sand bass	203	280.25
Sciaenidae unid.	croakers	189	255.43
<i>Seriphus politus</i>	queenfish	175	238.01
Haemulidae unid.	grunts	104	146.94
<i>Paralichthys californicus</i>	California halibut	96	136.14
<i>Pleuronichthys verticalis</i>	hornyhead turbot	61	83.21
<i>Citharichthys stigmaeus</i>	speckled sanddab	53	74.53
<i>Hypsoblennius</i> spp.	combt tooth blennies	44	64.00
larval fish - damaged	unidentified larval fishes	43	58.39
<i>Symphurus atricauda</i>	California tonguefish	33	45.50
<i>Genyonemus lineatus</i>	white croaker	18	26.10
<i>Umbrina roncadore</i>	yellowfin croaker	18	24.80
<i>Pleuronichthys ritteri</i>	spotted turbot	18	23.32
<i>Xystreurus liolepis</i>	fantail sole	12	15.85
<i>Cheilotrema saturnum</i>	black croaker	11	14.31
Engraulidae unid.	anchovies	7	11.06
<i>Pleuronichthys</i> spp.	turbots	8	10.07
Gobiidae unid.	gobies	6	9.60
larval fish fragment	unidentified larval fishes	7	8.71
Ophidiidae unid.	cusk-eels	6	8.18
<i>Peprilus simillimus</i>	Pacific butterfish	5	7.42
Paralichthyidae unid.	sand flounders	5	7.26
larval/post-larval fish unid.	larval fishes	5	6.58
<i>Chitonotus</i> / <i>Icelinus</i>	sculpins	3	5.33
<i>Sphyræna argentea</i>	Pacific barracuda	3	5.14
<i>Semicossyphus pulcher</i>	California sheephead	3	4.50
<i>Oxyjulis californica</i>	senorita	3	4.31
<i>Hypsypops rubicundus</i>	garibaldi	2	3.25
<i>Anisotremus davidsonii</i>	sargo	2	2.95
<i>Typhlogobius californiensis</i>	blind goby	2	2.93
<i>Zaniolepis</i> spp.	combfishes	2	2.81
Pleuronectiformes unid.	flatfishes	2	2.57
<i>Atractoscion nobilis</i>	white seabass	2	2.56
<i>Platichthys stellatus</i>	starry flounder	2	2.36
Cynoglossidae unid.	tongue soles	1	1.75
<i>Pleuronichthys guttulatus</i>	diamond turbot	1	1.61
Labrisomidae unid.	labrisomid blennies	1	1.50
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.43
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	1.43
Pleuronectidae unid.	righteye flounders	1	1.38
<i>Odontopyxis trispinosa</i>	pygmy poacher	1	1.29
<i>Hypsoblennius jenkinsi</i>	mussel blenny	1	1.18
<i>Roncadore stearnsi</i>	spotfin croaker	1	1.08

(continued)

Survey: SMBEA14
Start Date: 7/12/2006
Stations: M1-M3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes (continued)			
<i>Sebastes</i> spp.	rockfishes	1	1.08
<i>Syngnathus</i> spp.	pipefishes	1	1.08
Total Fishes: 1,458			
Target Invertebrates			
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	109	154.41
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	97	145.09
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	64	92.90
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	42	64.11
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	24	36.46
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	21	32.07
Porcellanidae unid. (megalops)	porcelain crab megalops	12	20.25
Majidae unid. (megalops)	spider crab megalops	14	19.76
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	9	14.56
Brachyura unid. (megalops)	unidentified crab megalops	5	7.96
Paguridae unid. (megalops)	hermit crab megalops	3	4.40
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	3	4.34
Diogenidae (megalops)	left-handed hermit crabs	1	1.83
<i>Emerita analoga</i> (megalops)	mole crabs megalops	1	1.29
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	1	1.29
<i>Portunus xantusii</i> (megalops)	Xantus' swimming crab	1	1.29
<i>Cancer</i> spp. (megalops)	cancer crabs megalops	1	1.08
Total Target Invertebrates: 408			

Survey: SMBEA14
Start Date: 7/12/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Seriphus politus</i>	queenfish	139	191.33
larvae, unidentified yolksac	unidentified yolksac larvae	143	189.11
<i>Paralichthys californicus</i>	California halibut	119	147.90
<i>Paralabrax</i> spp.	sand bass	104	135.46
Haemulidae unid.	grunts	84	111.32
<i>Pleuronichthys verticalis</i>	hornyhead turbot	73	94.81
Sciaenidae unid.	croakers	45	60.13
<i>Pleuronichthys ritteri</i>	spotted turbot	36	49.34
<i>Citharichthys stigmaeus</i>	speckled sanddab	36	46.26
larval fish - damaged	unidentified larval fishes	25	31.56
Engraulidae unid.	anchovies	19	29.26
<i>Hypsoblennius</i> spp.	combt tooth blennies	19	25.24
<i>Xystreurus liolepis</i>	fantail sole	18	21.67
<i>Symphurus atricauda</i>	California tonguefish	12	16.06
<i>Genyonemus lineatus</i>	white croaker	14	15.85
larval fish fragment	unidentified larval fishes	12	14.77
<i>Pleuronichthys</i> spp.	turbots	7	10.59
<i>Sphyræna argentea</i>	Pacific barracuda	9	10.59
<i>Umbrina roncadore</i>	yellowfin croaker	8	10.33
<i>Cheilotrema saturnum</i>	black croaker	6	8.10
<i>Oxyjulis californica</i>	senorita	4	5.22
<i>Engraulis mordax</i>	northern anchovy	3	4.99
<i>Menticirrhus undulatus</i>	California corbina	2	4.83
Gobiidae unid.	gobies	3	4.28
Chitonotus / Icelinus	sculpins	3	4.02
Paralichthyidae unid.	sand flounders	3	3.33
<i>Icelinus quadriseriatus</i>	yellowchin sculpin	2	3.21
Ophidiidae unid.	cusk-eels	2	2.20
Pleuronectiformes unid.	flatfishes	2	2.01
<i>Roncadore stearnsi</i>	spotfin croaker	1	1.78
Cottidae unid.	sculpins	1	1.61
<i>Odontopyxis trispinosa</i>	pygmy poacher	1	1.61
<i>Peprilus simillimus</i>	Pacific butterfish	1	1.55
<i>Typhlogobius californiensis</i>	blind goby	1	1.55
larval/post-larval fish unid.	larval fishes	1	1.43
<i>Gibbonsia</i> spp.	clinid kelpfishes	1	1.13
Labrisomidae unid.	labrisomid blennies	1	1.13
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.07
<i>Hypsypops rubicundus</i>	garibaldi	1	0.93
		Total Fishes: 962	

(continued)

Survey: SMBEA14
Start Date: 7/12/2006
Stations: O1-O3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates			
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	255	381.26
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	201	256.37
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	162	224.70
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	134	188.01
Majidae unid. (megalops)	spider crab megalops	81	115.40
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	73	98.25
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	54	74.55
Brachyura unid. (megalops)	unidentified crab megalops	10	13.97
<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops	9	12.02
Grapsidae unid. (megalops)	shore crab megalops	6	9.95
Diogenidae (megalops)	left-handed hermit crabs	6	8.56
Paguridae unid. (megalops)	hermit crab megalops	6	8.14
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	6	7.62
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	5	7.29
<i>Loligo opalescens</i>	market squid	3	4.30
Porcellanidae unid. (megalops)	porcelain crab megalops	2	3.51
<i>Portunus xantusii</i> (megalops)	Xantus' swimming crab	2	2.57
<i>Cancer</i> spp. (megalops)	cancer crabs megalops	1	1.43
<i>Cancer gracilis</i> (megalops)	slender crab megalops	1	1.33
Total Target Invertebrates: 1,017			

Survey: SMBEA14
Start Date: 7/12/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
larvae, unidentified yolksac	unidentified yolksac larvae	253	359.35
Sciaenidae unid.	croakers	45	60.86
<i>Paralichthys californicus</i>	California halibut	42	53.52
<i>Paralabrax</i> spp.	sand bass	38	50.73
<i>Hypsoblennius</i> spp.	combtooth blennies	35	46.76
Haemulidae unid.	grunts	26	34.92
<i>Seriphus politus</i>	queenfish	20	25.82
larval fish fragment	unidentified larval fishes	17	24.09
<i>Citharichthys stigmaeus</i>	speckled sanddab	14	19.71
<i>Umbrina roncadore</i>	yellowfin croaker	13	18.49
Gobiidae unid.	gobies	12	18.41
<i>Symphurus atricauda</i>	California tonguefish	10	14.81
<i>Menticirrhus undulatus</i>	California corbina	10	13.90
<i>Pleuronichthys verticalis</i>	hornyhead turbot	10	12.91
<i>Pleuronichthys</i> spp.	turbots	8	10.32
<i>Cheilotrema saturnum</i>	black croaker	7	9.05
<i>Pleuronichthys ritteri</i>	spotted turbot	6	7.03
larval fish - damaged	unidentified larval fishes	5	5.90
<i>Genyonemus lineatus</i>	white croaker	4	5.45
<i>Xystreurus liolepis</i>	fantail sole	4	4.57
<i>Oxyjulis californica</i>	senorita	3	4.34
<i>Semicossyphus pulcher</i>	California sheephead	2	2.87
Engraulidae unid.	anchovies	2	2.28
<i>Typhlogobius californiensis</i>	blind goby	1	1.61
<i>Halichoeres semicinctus</i>	rock wrasse	1	1.50
Labrisomidae unid.	labrisomid blennies	1	1.47
<i>Gobiesox</i> spp.	clingfishes	1	1.39
<i>Sphyræna argentea</i>	Pacific barracuda	1	1.25
<i>Engraulis mordax</i>	northern anchovy	1	1.04
<i>Xenistius californiensis</i>	salema	1	1.04
		Total Fishes: 593	
Target Invertebrates			
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	19	23.30
<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops	14	19.10
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	11	16.23
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	10	14.24
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	10	13.72
Porcellanidae unid. (megalops)	porcelain crab megalops	4	5.83
Majidae unid. (megalops)	spider crab megalops	4	5.48
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	2	3.18
Brachyura unid. (megalops)	unidentified crab megalops	2	2.99
Grapsidae unid. (megalops)	shore crab megalops	1	1.61
		Total Target Invertebrates: 77	

Survey: SMBEA16
Start Date: 8/9/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
larvae, unidentified yolksac	unidentified yolksac larvae	242	345.80
<i>Paralabrax</i> spp.	sand bass	106	157.13
Sciaenidae unid.	croakers	64	91.63
<i>Oxyjulis californica</i>	senorita	37	55.11
<i>Seriphus politus</i>	queenfish	33	45.49
Ophidiidae unid.	cusk-eels	30	44.29
Haemulidae unid.	grunts	32	42.64
<i>Sphyræna argentea</i>	Pacific barracuda	24	34.95
<i>Citharichthys stigmaeus</i>	speckled sanddab	22	32.46
<i>Paralichthys californicus</i>	California halibut	21	32.40
<i>Menticirrhus undulatus</i>	California corbina	19	27.00
larval fish fragment	unidentified larval fishes	17	26.23
<i>Hypsoblennius</i> spp.	combt tooth blennies	16	23.04
<i>Semicossyphus pulcher</i>	California sheephead	10	14.78
<i>Symphurus atricauda</i>	California tonguefish	8	12.19
<i>Ophidion scrippsae</i>	basketweave cusk-eel	8	11.76
larval/post-larval fish unid.	larval fishes	7	10.69
Labridae unid.	wrasses	6	8.48
<i>Halichoeres semicinctus</i>	rock wrasse	5	7.62
<i>Xystreurus liolepis</i>	fantail sole	4	6.59
<i>Cheilotrema saturnum</i>	black croaker	2	2.63
<i>Pleuronichthys</i> spp.	turbots	2	2.63
Clupeiformes unid.	herrings and anchovies	1	1.67
Engraulidae unid.	anchovies	1	1.67
Gobiidae unid.	gobies	1	1.53
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	1.53
<i>Sardinops sagax</i>	Pacific sardine	1	1.46
<i>Anisotremus davidsonii</i>	sargo	1	1.45
larval fish - damaged	unidentified larval fishes	1	1.45
Cynoglossidae unid.	tongue soles	1	1.31
<i>Hypsypops rubicundus</i>	garibaldi	1	1.19
Total Fishes: 724			
Eggs			
fish eggs unid.	unidentified fish eggs	2,496	7,205.26
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	845	2,408.73
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	193	561.11
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	55	166.86
<i>Sphyræna argentea</i> (eggs)	Pacific barracuda eggs	41	121.63
<i>Paralabrax</i> spp. (eggs)	sand bass eggs	19	59.10
Sciaenidae unid. (eggs)	croaker eggs	11	29.25
Paralichthyidae unid. (eggs)	sand flounder eggs	9	24.99
Atherinopsidae unid. (eggs)	silverside eggs	1	3.12
<i>Pleuronichthys guttulatus</i> (eggs)	diamond turbot eggs	1	2.96
Labridae unid. (eggs)	wrasse eggs	1	2.79

(continued)

Survey: SMBEA16
Start Date: 8/9/2006
Stations: E2 - E3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Eggs (continued)			
<i>Pleuronichthys coenosus</i> (eggs)	c-o turbot eggs	1	2.73
		Total Eggs: 3,673	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	6	8.54
Majidae unid. (megalops)	spider crab megalops	2	3.09
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	1	1.49
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	1	1.45
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	1	1.29
		Total Target Invertebrates: 11	

Survey: SMBEA16
Start Date: 8/9/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Hypsoblennius</i> spp.	combtooth blennies	53	99.49
larvae, unidentified yolk sac	unidentified yolk sac larvae	31	57.23
<i>Paralichthys californicus</i>	California halibut	17	29.34
Sciaenidae unid.	croakers	17	27.99
<i>Engraulis mordax</i>	northern anchovy	14	25.12
<i>Hypsoblennius jenkinsi</i>	mussel blenny	12	22.29
<i>Paralabrax</i> spp.	sand bass	11	19.54
larval fish fragment	unidentified larval fishes	8	18.03
<i>Pleuronichthys ritteri</i>	spotted turbot	8	15.35
<i>Citharichthys stigmaeus</i>	speckled sanddab	7	13.35
<i>Oxyjulis californica</i>	senorita	5	9.90
<i>Chromis punctipinnis</i>	blacksmith	6	8.73
<i>Typhlogobius californiensis</i>	blind goby	4	7.54
Ophidiidae unid.	cusk-eels	3	5.66
<i>Pleuronichthys</i> spp.	turbots	3	5.23
Haemulidae unid.	grunts	3	5.21
<i>Xystreus liolepis</i>	fantail sole	3	4.78
Gobiidae unid.	gobies	2	4.11
Engraulidae unid.	anchovies	2	3.93
<i>Sphyrna argentea</i>	Pacific barracuda	2	3.31
<i>Symphurus atricauda</i>	California tonguefish	2	3.30
<i>Genyonemus lineatus</i>	white croaker	2	2.95
<i>Xenistius californiensis</i>	salema	1	2.28
Labridae unid.	wrasses	1	2.27
<i>Seriphus politus</i>	queenfish	1	2.27
<i>Hypsypops rubicundus</i>	garibaldi	1	1.83
<i>Rhinogobiops nicholsi</i>	blackeye goby	1	1.83
<i>Sardinops sagax</i>	Pacific sardine	1	1.83
<i>Icelinus</i> spp.	sculpins	1	1.65
Pleuronectidae unid.	righteye flounders	1	1.65
<i>Menticirrhus undulatus</i>	California corbina	1	1.56
<i>Lepidogobius lepidus</i>	bay goby	1	1.47
Myctophidae unid.	lanternfishes	1	1.47
		Total Fishes: 226	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	67	119.31
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	29	53.66
Majidae unid. (megalops)	spider crab megalops	12	21.33
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	5	8.16
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	2	3.73
Brachyura unid. (megalops)	unidentified crab megalops	2	3.39
Grapsidae unid. (megalops)	shore crab megalops	2	3.39
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	1	2.28
<i>Portunus xantusii</i> (megalops)	Xantus' swimming crab	1	2.27

(continued)

Survey: SMBEA16
Start Date: 8/9/2006
Stations: M1-M3 (continued)

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Target Invertebrates (continued)			
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	2.16
<i>Cancer gracilis</i> (megalops)	slender crab megalops	1	2.16
Diogenidae (megalops)	left-handed hermit crabs	1	1.65
		Total Target Invertebrates:	124

Survey: SMBEA16
Start Date: 8/9/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Hypsoblennius</i> spp.	combt tooth blennies	24	35.94
<i>Engraulis mordax</i>	northern anchovy	14	21.15
larvae, unidentified yolksac	unidentified yolksac larvae	11	14.86
<i>Paralichthys californicus</i>	California halibut	7	10.23
<i>Diaphus theta</i>	California headlight fish	5	6.30
larval fish fragment	unidentified larval fishes	3	4.26
<i>Genyonemus lineatus</i>	white croaker	3	4.09
<i>Pleuronichthys ritteri</i>	spotted turbot	3	4.08
Engraulidae unid.	anchovies	3	3.89
<i>Pleuronichthys verticalis</i>	hornyhead turbot	2	3.36
<i>Lepidogobius lepidus</i>	bay goby	2	3.15
<i>Pleuronichthys</i> spp.	turbots	2	3.09
Sciaenidae unid.	croakers	2	2.92
<i>Sardinops sagax</i>	Pacific sardine	2	2.90
Gobiidae unid.	gobies	1	1.76
<i>Oxyjulis californica</i>	senorita	1	1.60
Pleuronectidae unid.	righteye flounders	1	1.60
<i>Rhinogobiops nicholsi</i>	blackeye goby	1	1.47
<i>Chromis punctipinnis</i>	blacksmith	1	1.46
<i>Paralabrax clathratus</i>	kelp bass	1	1.46
<i>Seriphus politus</i>	queenfish	1	1.46
<i>Hypsypops rubicundus</i>	garibaldi	1	1.41
Ophidiidae unid.	cusk-eels	1	1.41
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.15
<i>Paralabrax</i> spp.	sand bass	1	1.15
Total Fishes: 94			
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	100	154.92
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	73	108.20
Majidae unid. (megalops)	spider crab megalops	9	14.70
Grapsidae unid. (megalops)	shore crab megalops	9	13.19
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	6	9.13
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	4	5.70
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	2	3.07
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	2	2.83
Brachyura unid. (megalops)	unidentified crab megalops	1	1.54
<i>Cancer gracilis</i> (megalops)	slender crab megalops	1	1.52
<i>Cancer oregonensis</i> (megalops)	pygmy rock crab	1	1.52
Paguridae unid. (megalops)	hermit crab megalops	1	1.46
<i>Pinnotheres</i> spp. (megalops)	pea crab megalops	1	1.46
<i>Portunus xantusii</i> (megalops)	Xantus' swimming crab	1	1.41
<i>Loligo opalescens</i>	market squid	1	1.15
Total Target Invertebrates: 212			

Survey: SMBEA16
Start Date: 8/9/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
larvae, unidentified yolksac	unidentified yolksac larvae	247	376.32
<i>Paralabrax</i> spp.	sand bass	98	151.46
Sciaenidae unid.	croakers	70	105.62
<i>Hypsoblennius</i> spp.	combtooth blennies	34	52.22
<i>Paralichthys californicus</i>	California halibut	22	35.35
<i>Sphyrna argentea</i>	Pacific barracuda	21	32.56
Ophidiidae unid.	cusk-eels	19	29.80
<i>Hypsypops rubicundus</i>	garibaldi	19	28.93
<i>Symphurus atricauda</i>	California tonguefish	15	23.98
<i>Citharichthys stigmaeus</i>	speckled sanddab	13	20.56
<i>Oxyjulis californica</i>	senorita	14	20.54
Haemulidae unid.	grunts	12	19.13
<i>Menticirrhus undulatus</i>	California corbina	10	16.01
<i>Halichoeres semicinctus</i>	rock wrasse	9	14.62
larval/post-larval fish unid.	larval fishes	8	13.63
<i>Xenistius californiensis</i>	salema	9	12.91
<i>Engraulis mordax</i>	northern anchovy	7	10.75
larval fish fragment	unidentified larval fishes	7	10.36
<i>Semicossyphus pulcher</i>	California sheephead	5	8.06
Labridae unid.	wrasses	5	7.91
<i>Seriphus politus</i>	queenfish	4	6.44
<i>Pleuronichthys ritteri</i>	spotted turbot	4	6.24
<i>Cheilotrema saturnum</i>	black croaker	4	5.41
<i>Pleuronichthys</i> spp.	turbots	3	4.96
Paralichthyidae unid.	sand flounders	2	3.50
<i>Ophidion scrippsae</i>	basketweave cusk-eel	2	3.24
<i>Xystreurus liolepis</i>	fantail sole	2	3.21
Gobiidae unid.	gobies	2	3.03
Pleuronectidae unid.	righteye flounders	2	2.94
<i>Citharichthys</i> spp.	sanddabs	1	1.75
larval fish - damaged	unidentified larval fishes	1	1.75
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.75
<i>Sardinops sagax</i>	Pacific sardine	1	1.75
<i>Chilara taylori</i>	spotted cusk-eel	1	1.71
Engraulidae unid.	anchovies	1	1.48
<i>Girella nigricans</i>	opaleye	1	1.48
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	1.37
		Total Fishes: 677	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	13	20.73
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	6	9.97
Majidae unid. (megalops)	spider crab megalops	6	9.50
Diogenidae (megalops)	left-handed hermit crabs	1	1.48
		Total Target Invertebrates: 26	

Survey: SMBEA19
Start Date: 9/20/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
larvae, unidentified yolk sac	unidentified yolk sac larvae	106	137.27
<i>Paralabrax</i> spp.	sand bass	77	99.64
larval fish - damaged	unidentified larval fishes	14	17.63
<i>Paralichthys californicus</i>	California halibut	9	13.18
Paralichthyidae unid.	sand flounders	6	7.90
larval fish fragment	unidentified larval fishes	5	6.68
<i>Hypsoblennius</i> spp.	combtooth blennies	5	6.52
<i>Xystreurus liolepis</i>	fantail sole	5	6.49
Engraulidae unid.	anchovies	5	6.38
<i>Citharichthys stigmaeus</i>	speckled sanddab	4	5.39
Labridae unid.	wrasses	4	5.24
Haemulidae unid.	grunts	2	3.09
<i>Peprilus simillimus</i>	Pacific butterfish	2	2.83
Gobiidae unid.	gobies	2	2.49
<i>Pleuronichthys guttulatus</i>	diamond turbot	2	2.42
<i>Oxyjulis californica</i>	senorita	2	2.33
<i>Sphyrna argentea</i>	Pacific barracuda	1	1.50
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.29
<i>Genyonemus lineatus</i>	white croaker	1	1.27
<i>Pleuronichthys ritteri</i>	spotted turbot	1	1.27
<i>Pleuronichthys</i> spp.	turbots	1	1.20
<i>Semicossyphus pulcher</i>	California sheephead	1	1.06
		Total Fishes: 256	
Eggs			
fish eggs unid.	unidentified fish eggs	2,193	5,739.29
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	799	2,053.64
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	215	557.69
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	136	371.43
Paralichthyidae unid. (eggs)	sand flounder eggs	59	171.81
Sciaenidae unid. (eggs)	croaker eggs	39	116.92
<i>Paralabrax</i> spp. (eggs)	sand bass eggs	21	55.17
Labridae unid. (eggs)	wrasse eggs	4	11.32
		Total Eggs: 3,466	
Target Invertebrates			
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	1.35
<i>Emerita analoga</i> (megalops)	mole crabs megalops	1	1.29
Grapsidae unid. (megalops)	shore crab megalops	1	1.20
<i>Hemigrapsus oregonensis</i> (megs.)	yellow shore crab megalops	1	1.02
		Total Target Invertebrates: 4	

Survey: SMBEA19
Start Date: 9/20/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Paralabrax</i> spp.	sand bass	211	388.23
larvae, unidentified yolksac	unidentified yolksac larvae	81	152.37
<i>Paralichthys californicus</i>	California halibut	30	52.84
<i>Citharichthys stigmaeus</i>	speckled sanddab	26	47.12
<i>Seriphus politus</i>	queenfish	25	46.54
Haemulidae unid.	grunts	18	34.68
<i>Genyonemus lineatus</i>	white croaker	17	30.29
Engraulidae unid.	anchovies	15	27.87
Sciaenidae unid.	croakers	11	19.32
<i>Pleuronichthys ritteri</i>	spotted turbot	10	18.86
<i>Oxyjulis californica</i>	senorita	9	16.68
larval fish fragment	unidentified larval fishes	9	15.28
<i>Symphurus atricauda</i>	California tonguefish	7	13.64
<i>Xystreurus liolepis</i>	fantail sole	6	11.31
<i>Hypsoblennius</i> spp.	combtooth blennies	6	10.38
<i>Citharichthys sordidus</i>	Pacific sanddab	5	9.05
<i>Semicossyphus pulcher</i>	California sheephead	5	9.03
larval fish - damaged	unidentified larval fishes	4	6.76
<i>Pleuronichthys verticalis</i>	hornyhead turbot	3	5.44
<i>Halichoeres semicinctus</i>	rock wrasse	3	5.35
<i>Sphyræna argentea</i>	Pacific barracuda	2	4.53
Ophidiidae unid.	cusk-eels	2	3.63
<i>Chromis punctipinnis</i>	blacksmith	1	2.23
Gobiidae unid.	gobies	1	1.81
<i>Pleuronichthys</i> spp.	turbots	1	1.81
<i>Scorpaena guttata</i>	California scorpionfish	1	1.81
Pleuronectiformes unid.	flatfishes	1	1.78
Labridae unid.	wrasses	1	1.73
Paralichthyidae unid.	sand flounders	1	1.73
<i>Pleuronichthys guttulatus</i>	diamond turbot	1	1.63
<i>Engraulis mordax</i>	northern anchovy	1	1.49
		Total Fishes: 514	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	2	3.80
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	2	3.63
Majidae unid. (megalops)	spider crab megalops	1	2.30
Brachyura unid. (megalops)	unidentified crab megalops	1	1.78
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	1.73
<i>Loligo opalescens</i>	market squid	1	1.63
		Total Target Invertebrates: 8	

Survey: SMBEA19
Start Date: 9/20/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Paralabrax</i> spp.	sand bass	91	150.18
<i>Genyonemus lineatus</i>	white croaker	53	92.99
larvae, unidentified yolk sac	unidentified yolk sac larvae	23	38.59
Engraulidae unid.	anchovies	20	33.09
<i>Paralichthys californicus</i>	California halibut	18	30.92
<i>Seriphus politus</i>	queenfish	10	16.80
Gobiidae unid.	gobies	9	16.24
larval fish - damaged	unidentified larval fishes	7	12.30
<i>Halichoeres semicinctus</i>	rock wrasse	7	12.08
<i>Citharichthys stigmatæus</i>	speckled sanddab	7	11.52
<i>Chromis punctipinnis</i>	blacksmith	6	10.00
<i>Oxyjulis californica</i>	senorita	6	9.26
<i>Pleuronichthys ritteri</i>	spotted turbot	5	7.91
<i>Symphurus atricauda</i>	California tonguefish	5	7.46
<i>Hypsoblennius</i> spp.	combt tooth blennies	4	6.45
<i>Pleuronichthys guttulatus</i>	diamond turbot	4	6.45
<i>Citharichthys sordidus</i>	Pacific sanddab	3	5.20
Haemulidae unid.	grunts	3	4.96
<i>Triphoturus mexicanus</i>	Mexican lampfish	3	4.66
<i>Peprilus simillimus</i>	Pacific butterflyfish	3	4.64
Ophidiidae unid.	cusk-eels	3	4.61
larval fish fragment	unidentified larval fishes	3	4.60
<i>Pleuronichthys verticalis</i>	hornyhead turbot	2	4.06
<i>Paralabrax maculatofasciatus</i>	spotted sand bass	2	3.61
Sciaenidae unid.	croakers	2	3.42
<i>Hypsoblennius jenkinsi</i>	mussel blenny	2	3.35
<i>Semicossyphus pulcher</i>	California sheephead	2	3.12
<i>Hippoglossina stomata</i>	bigmouth sole	1	2.03
<i>Citharichthys</i> spp.	sanddabs	1	1.80
<i>Chitonotus</i> / <i>Icelinus</i>	sculpins	1	1.78
Labridae unid.	wrasses	1	1.78
<i>Engraulis mordax</i>	northern anchovy	1	1.67
<i>Pleuronichthys</i> spp.	turbots	1	1.62
<i>Diaphus theta</i>	California headlight fish	1	1.51
Pleuronectidae unid.	righteye flounders	1	1.46
<i>Rhinogobiops nicholsi</i>	blackeye goby	1	1.46
Pleuronectiformes unid.	flatfishes	1	1.40
		Total Fishes: 313	
Target Invertebrates			
Majidae unid. (megalo ps)	spider crab megalops	5	8.37
<i>Pugettia</i> spp. (megalo ps)	kelp crabs megalops	5	8.02
<i>Pinnixa</i> spp. (megalo ps)	pea crabs megalops	4	6.48
<i>Lophopanopeus</i> spp. (megalo ps)	black-clawed crab megalops	2	3.45
<i>Cancer anthonyi</i> (megalo ps)	yellow crab megalops	2	3.24

(continued)

Survey: SMBEA19
Start Date: 9/20/2006
Stations: O1-O3 (continued)

01-03 (continued)			Mean
Taxon	Common Name	Count	Concentration (#/1,000m ³)
Target Invertebrates (continued)			
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	2	3.02
<i>Loligo opalescens</i>	market squid	1	1.78
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	1.67
<i>Emerita analoga</i> (megalops)	mole crabs megalops	1	1.62
Brachyura unid. (megalops)	unidentified crab megalops	1	1.51
Grapsidae unid. (megalops)	shore crab megalops	1	1.51
Total Target Invertebrates:		25	

Survey: SMBEA19
Start Date: 9/20/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Paralabrax</i> spp.	sand bass	124	166.10
larvae, unidentified yolksac	unidentified yolksac larvae	81	105.94
<i>Paralichthys californicus</i>	California halibut	11	14.89
<i>Hypsoblennius</i> spp.	combtooth blennies	11	14.09
<i>Symphurus atricauda</i>	California tonguefish	10	13.46
<i>Citharichthys stigmaeus</i>	speckled sanddab	8	11.30
Haemulidae unid.	grunts	8	9.44
<i>Oxyjulis californica</i>	senorita	7	9.23
Engraulidae unid.	anchovies	6	8.09
<i>Pleuronichthys guttulatus</i>	diamond turbot	6	7.50
larval fish - damaged	unidentified larval fishes	5	7.04
<i>Seriphus politus</i>	queenfish	4	5.52
<i>Sphyræna argentea</i>	Pacific barracuda	3	4.08
larval fish fragment	unidentified larval fishes	3	3.89
Sciaenidae unid.	croakers	3	3.88
<i>Halichoeres semicinctus</i>	rock wrasse	2	2.82
<i>Pleuronichthys ritteri</i>	spotted turbot	2	2.81
Ophidiidae unid.	cusk-eels	2	2.74
<i>Citharichthys sordidus</i>	Pacific sanddab	2	2.70
Labrisomidae unid.	labrisomid blennies	2	2.64
<i>Genyonemus lineatus</i>	white croaker	2	2.52
Pleuronectidae unid.	righteye flounders	1	1.58
<i>Chilara taylori</i>	spotted cusk-eel	1	1.44
Paralichthyidae unid.	sand flounders	1	1.44
Gobiidae unid.	gobies	1	1.30
<i>Platichthys stellatus</i>	starry flounder	1	1.30
<i>Pleuronichthys</i> spp.	turbots	1	1.29
<i>Xystreurus liolepis</i>	fantail sole	1	1.29
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.24
Labridae unid.	wrasses	1	1.03
		Total Fishes: 311	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	2	2.74
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	1	1.41
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	1.30
Grapsidae unid. (megalops)	shore crab megalops	1	1.21
		Total Target Invertebrates: 5	

Survey: SMBEA21
Start Date: 10/18/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	23	28.53
<i>Hypsoblennius</i> spp.	combtooth blennies	18	21.42
larvae, unidentified yolk sac	unidentified yolk sac larvae	9	11.17
<i>Paralabrax</i> spp.	sand bass	8	9.42
<i>Paralichthys californicus</i>	California halibut	7	8.59
<i>Citharichthys stigmaeus</i>	speckled sanddab	7	8.10
<i>Genyonemus lineatus</i>	white croaker	5	6.19
<i>Engraulis mordax</i>	northern anchovy	4	5.08
Gobiidae unid.	gobies	4	4.87
Engraulidae unid.	anchovies	3	3.39
<i>Pleuronichthys ritteri</i>	spotted turbot	2	2.67
Paralichthyidae unid.	sand flounders	2	2.60
larval fish fragment	unidentified larval fishes	2	2.47
<i>Semicossyphus pulcher</i>	California sheephead	2	2.34
Labrisomidae unid.	labrisomid blennies	1	1.43
Pleuronectidae unid.	righteye flounders	1	1.35
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.32
Labridae unid.	wrasses	1	1.26
<i>Hippoglossina stomata</i>	bigmouth sole	1	1.22
<i>Lepidogobius lepidus</i>	bay goby	1	1.20
larval fish - damaged	unidentified larval fishes	1	1.07
Pleuronectiformes unid.	flatfishes	1	1.07
<i>Oxyjulis californica</i>	senorita	1	1.02
<i>Xystreurus liolepis</i>	fantail sole	1	1.02
		Total Fishes: 106	
Eggs			
fish eggs unid.	unidentified fish eggs	3,490	8,607.12
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	396	971.31
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	200	486.42
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	179	444.59
Paralichthyidae unid. (eggs)	sand flounder eggs	110	281.34
Engraulidae unid. (eggs)	anchovy eggs	16	38.68
Sciaenidae unid. (eggs)	croaker eggs	9	23.59
Labridae unid. (eggs)	wrasse eggs	5	12.74
		Total Eggs: 4,405	
Target Invertebrates			
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	2	2.51
<i>Hemigrapsus oregonensis</i> (megs.)	yellow shore crab megalops	2	2.38
<i>Grapsidae</i> unid. (megalops)	shore crab megalops	1	1.35
		Total Target Invertebrates: 5	

Survey: SMBEA21
Start Date: 10/18/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	96	149.22
<i>Paralichthys californicus</i>	California halibut	51	79.26
<i>Engraulis mordax</i>	northern anchovy	41	65.98
larvae, unidentified yolksac	unidentified yolksac larvae	28	44.80
<i>Citharichthys stigmaeus</i>	speckled sanddab	25	42.62
<i>Pleuronichthys guttulatus</i>	diamond turbot	20	33.33
<i>Xystreurys liolepis</i>	fantail sole	17	24.90
<i>Hypsoblennius</i> spp.	combtooth blennies	15	23.66
<i>Pleuronichthys ritteri</i>	spotted turbot	13	21.69
<i>Paralabrax</i> spp.	sand bass	11	19.07
<i>Pleuronichthys verticalis</i>	hornyhead turbot	8	13.92
Paralichthyidae unid.	sand flounders	8	13.70
Gobiidae unid.	gobies	6	10.83
larval fish fragment	unidentified larval fishes	4	5.96
Ophidiidae unid.	cusk-eels	3	5.22
<i>Pleuronichthys</i> spp.	turbots	3	4.71
larval fish - damaged	unidentified larval fishes	3	4.33
<i>Semicossyphus pulcher</i>	California sheephead	2	3.40
<i>Hippoglossina stomata</i>	bigmouth sole	2	3.00
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	2.03
Chaenopsidae unid.	tube blennies	1	1.85
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.82
Pleuronectiformes unid.	flatfishes	1	1.62
Engraulidae unid.	anchovies	1	1.54
		Total Fishes: 361	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	4	6.67
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	2	3.68
Brachyura unid. (megalops)	unidentified crab megalops	1	1.85
Grapsidae unid. (megalops)	shore crab megalops	1	1.82
<i>Loligo opalescens</i>	market squid	1	1.44
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	1	1.24
		Total Target Invertebrates: 10	

Survey: SMBEA21
Start Date: 10/18/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	53	80.71
<i>Engraulis mordax</i>	northern anchovy	26	40.29
<i>Paralichthys californicus</i>	California halibut	25	37.22
<i>Pleuronichthys ritteri</i>	spotted turbot	17	27.18
<i>Hypsoblennius</i> spp.	combtooth blennies	10	14.78
<i>Citharichthys stigmaeus</i>	speckled sanddab	7	11.09
<i>Paralabrax</i> spp.	sand bass	6	8.84
<i>Pleuronichthys verticalis</i>	hornyhead turbot	5	7.67
<i>Citharichthys sordidus</i>	Pacific sanddab	4	6.35
<i>Xystreurys liolepis</i>	fantail sole	4	6.01
<i>Pleuronichthys</i> spp.	turbots	3	5.20
larvae, unidentified yolksac	unidentified yolksac larvae	3	4.97
Gobiidae unid.	gobies	3	4.58
larval fish fragment	unidentified larval fishes	3	4.37
Engraulidae unid.	anchovies	2	3.07
Ophidiidae unid.	cusk-eels	2	2.95
<i>Hippoglossina stomata</i>	bigmouth sole	2	2.90
<i>Xenistius californiensis</i>	salema	1	2.07
Sciaenidae unid.	croakers	1	1.68
<i>Menticirrhus undulatus</i>	California corbina	1	1.50
<i>Chromis punctipinnis</i>	blacksmith	1	1.45
<i>Cyclothone signata</i>	showy bristlemouth	1	1.45
Pleuronectidae unid.	righteye flounders	1	1.39
<i>Triphoturus mexicanus</i>	Mexican lampfish	1	1.39
		Total Fishes: 182	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	5	7.78
<i>Loligo opalescens</i>	market squid	4	6.86
Majidae unid. (megalops)	spider crab megalops	2	2.86
Grapsidae unid. (megalops)	shore crab megalops	2	2.83
Brachyura unid. (megalops)	unidentified crab megalops	1	1.79
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	1.50
		Total Target Invertebrates: 15	

Survey: SMBEA21
Start Date: 10/18/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Citharichthys stigmaeus</i>	speckled sanddab	52	58.55
<i>Hypsoblennius</i> spp.	combtooth blennies	29	33.91
larvae, unidentified yolksac	unidentified yolksac larvae	26	30.56
<i>Engraulis mordax</i>	northern anchovy	23	26.78
<i>Pleuronichthys guttulatus</i>	diamond turbot	23	25.90
<i>Paralabrax</i> spp.	sand bass	18	21.01
<i>Genyonemus lineatus</i>	white croaker	18	20.28
Gobiidae unid.	gobies	15	18.72
<i>Paralichthys californicus</i>	California halibut	8	8.99
<i>Pleuronichthys ritteri</i>	spotted turbot	8	8.91
larval fish fragment	unidentified larval fishes	6	6.73
Sciaenidae unid.	croakers	3	3.51
<i>Pleuronichthys verticalis</i>	hornyhead turbot	2	2.26
Pleuronectidae unid.	righteye flounders	1	1.30
<i>Pleuronichthys</i> spp.	turbots	1	1.27
Atherinopsidae unid.	silversides	1	1.20
<i>Hippoglossina stomata</i>	bigmouth sole	1	1.15
<i>Xystreurus liolepis</i>	fantail sole	1	1.13
<i>Diaphus theta</i>	California headlight fish	1	1.10
Engraulidae unid.	anchovies	1	1.10
larval fish - damaged	unidentified larval fishes	1	1.10
Paralichthyidae unid.	sand flounders	1	1.10
		Total Fishes:	240
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	4	5.04
<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster	1	1.13
		Total Target Invertebrates:	5

Survey: SMBEA23
Start Date: 11/15/2006
Stations: E2 - E3

E2 - E3		Mean Concentration	
Taxon	Common Name	Count	(#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	27	36.70
Gobiidae unid.	gobies	6	7.63
<i>Hypsoblennius</i> spp.	combtooth blennies	5	6.57
<i>Citharichthys stigmaeus</i>	speckled sanddab	4	5.73
<i>Genyonemus lineatus</i>	white croaker	3	4.10
<i>Pleuronichthys ritteri</i>	spotted turbot	2	2.75
larval fish - damaged	unidentified larval fishes	2	2.55
larvae, unidentified yolksac	unidentified yolksac larvae	1	1.40
larval fish fragment	unidentified larval fishes	1	1.39
Pleuronectiformes unid.	flatfishes	1	1.39
<i>Gibbonsia</i> spp.	clinid kelpfishes	1	1.35
Engraulidae unid.	anchovies	1	1.35
Sciaenidae unid.	croakers	1	1.34
larval/post-larval fish unid.	larval fishes	1	1.34
<i>Semicossyphus pulcher</i>	California sheephead	1	1.34
Paralichthyidae unid.	sand flounders	1	1.29
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	1	1.25
		Total Fishes: 59	
Eggs			
fish eggs unid.	unidentified fish eggs	839	2,290.38
Paralichthyidae unid. (eggs)	sand flounder eggs	445	1,202.04
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	52	138.17
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	18	47.41
Sciaenidae unid. (eggs)	croaker eggs	12	33.67
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	4	11.39
		Total Eggs: 1,370	
Target Invertebrates			
<i>Portunus xantusii</i> (megalops)	Xantus' swimming crab	2	2.68
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	1.35
		Total Target Invertebrates: 3	

Survey: SMBEA23
Start Date: 11/15/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	122	220.90
larval fish fragment	unidentified larval fishes	13	23.26
Sciaenidae unid.	croakers	9	17.33
<i>Engraulis mordax</i>	northern anchovy	8	15.39
<i>Citharichthys stigmaeus</i>	speckled sanddab	8	14.77
Engraulidae unid.	anchovies	8	14.28
<i>Hypsoblennius</i> spp.	combtooth blennies	7	12.59
larvae, unidentified yolksac	unidentified yolksac larvae	6	11.06
<i>Paralichthys californicus</i>	California halibut	6	10.84
<i>Chromis punctipinnis</i>	blacksmith	5	9.46
<i>Pleuronichthys guttulatus</i>	diamond turbot	4	7.32
<i>Pleuronichthys</i> spp.	turbots	3	5.47
Gobiidae unid.	gobies	3	5.34
<i>Gillichthys mirabilis</i>	longjaw mudsucker	2	3.54
<i>Xystreurus liolepis</i>	fantail sole	2	3.50
larval fish - damaged	unidentified larval fishes	1	2.02
<i>Citharichthys</i> spp.	sanddabs	1	1.93
Pleuronectiformes unid.	flatfishes	1	1.92
<i>Citharichthys sordidus</i>	Pacific sanddab	1	1.89
<i>Semicossyphus pulcher</i>	California sheephead	1	1.83
<i>Nannobranchium</i> spp.	lanternfishes	1	1.78
larval/post-larval fish unid.	larval fishes	1	1.75
Ophidiidae unid.	cusk-eels	1	1.75
		Total Fishes: 214	
Target Invertebrates			
Brachyura unid. (megalops)	unidentified crab megalops	1	1.89
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	1.89
Majidae unid. (megalops)	spider crab megalops	1	1.65
		Total Target Invertebrates: 3	

Survey: SMBEA23
Start Date: 11/15/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	301	474.02
<i>Engraulis mordax</i>	northern anchovy	15	26.27
larval fish fragment	unidentified larval fishes	17	25.60
Sciaenidae unid.	croakers	14	24.47
Engraulidae unid.	anchovies	14	20.93
larvae, unidentified yolksac	unidentified yolksac larvae	11	16.47
Ophidiidae unid.	cusk-eels	8	13.52
<i>Paralichthys californicus</i>	California halibut	8	13.44
<i>Chromis punctipinnis</i>	blacksmith	8	13.10
<i>Pleuronichthys</i> spp.	turbots	8	13.10
<i>Hypsoblennius</i> spp.	combtooth blennies	3	4.94
Pleuronectiformes unid.	flatfishes	3	4.73
<i>Lythrypnus zebra</i>	zebra goby	2	3.43
Pleuronectidae unid.	righteye flounders	2	3.38
<i>Lepidogobius lepidus</i>	bay goby	2	3.21
<i>Girella nigricans</i>	opaleye	2	3.16
<i>Citharichthys sordidus</i>	Pacific sanddab	2	2.93
Pomacentridae unid.	damsel fishes	1	2.06
<i>Sebastes</i> spp.	rockfishes	1	2.06
<i>Stenobranchius leucopsarus</i>	northern lampfish	1	1.82
<i>Citharichthys</i> spp.	sanddabs	1	1.80
larval/post-larval fish unid.	larval fishes	1	1.60
<i>Zaniolepis frenata</i>	shortspine combfish	1	1.51
Myctophidae unid.	lanternfishes	1	1.47
<i>Argentina sialis</i>	Pacific argentine	1	1.37
<i>Icelinus quadriseriatus</i>	yellowchin sculpin	1	1.26
		Total Fishes: 429	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	3	5.11
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	1.82
Majidae unid. (megalops)	spider crab megalops	1	1.82
		Total Target Invertebrates: 5	

Survey: SMBEA23
Start Date: 11/15/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	30	39.65
<i>Genyonemus lineatus</i>	white croaker	26	34.58
<i>Citharichthys stigmaeus</i>	speckled sanddab	13	17.03
Gobiidae unid.	gobies	9	11.60
larvae, unidentified yolksac	unidentified yolksac larvae	6	8.01
<i>Engraulis mordax</i>	northern anchovy	5	6.95
<i>Hypsoblennius</i> spp.	combtooth blennies	5	6.57
larval fish fragment	unidentified larval fishes	5	6.49
Pleuronectidae unid.	righteye flounders	4	5.28
Labridae unid.	wrasses	3	4.24
<i>Paralichthys californicus</i>	California halibut	3	4.05
<i>Girella nigricans</i>	opaleye	2	2.77
<i>Pleuronichthys ritteri</i>	spotted turbot	2	2.60
Sciaenidae unid.	croakers	1	1.38
<i>Chilara taylori</i>	spotted cusk-eel	1	1.31
<i>Chromis punctipinnis</i>	blacksmith	1	1.31
Engraulidae unid.	anchovies	1	1.31
larval fish - damaged	unidentified larval fishes	1	1.31
<i>Sebastes</i> spp.	rockfishes	1	1.28
<i>Pleuronectes</i> spp.	righteye flounders	1	1.22
		Total Fishes:	120
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	4	5.12
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	3	3.96
Majidae unid. (megalops)	spider crab megalops	1	1.46
		Total Target Invertebrates:	8

Survey: SMBEA25
Start Date: 12/13/2006
Stations: E2 - E3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Pleuronichthys guttulatus</i>	diamond turbot	20	24.36
<i>Hypsoblennius</i> spp.	combtooth blennies	18	21.63
Atherinopsidae unid.	silversides	11	14.06
<i>Genyonemus lineatus</i>	white croaker	11	12.87
Gobiidae unid.	gobies	8	9.83
<i>Atherinopsis californiensis</i>	jacksmelt	6	6.93
<i>Pleuronichthys ritteri</i>	spotted turbot	2	2.56
<i>Engraulis mordax</i>	northern anchovy	2	2.44
Sciaenidae unid.	croakers	1	1.18
larvae, unidentified yolksac	unidentified yolksac larvae	1	1.14
<i>Zaniolepis</i> spp.	combfishes	1	1.12
Cottidae unid.	sculpins	1	1.11
<i>Pleuronichthys</i> spp.	turbots	1	1.05
		Total Fishes: 83	
Eggs			
fish eggs unid.	unidentified fish eggs	368	872.15
Paralichthyidae unid. (eggs)	sand flounder eggs	46	107.01
<i>Citharichthys</i> spp. (eggs)	sanddab eggs	14	35.24
Sciaenidae unid. (eggs)	croaker eggs	13	31.47
<i>Pleuronichthys</i> spp. (eggs)	turbot eggs	7	16.46
		Total Eggs: 448	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	7	9.22
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	2	2.78
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	2	2.51
Grapsidae unid. (megalops)	shore crab megalops	1	1.40
Brachyura unid. (megalops)	unidentified crab megalops	1	1.32
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	1.28
		Total Target Invertebrates: 14	

Survey: SMBEA25
Start Date: 12/13/2006
Stations: M1-M3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	175	293.54
<i>Engraulis mordax</i>	northern anchovy	17	27.91
Engraulidae unid.	anchovies	14	24.02
larval fish fragment	unidentified larval fishes	8	13.40
<i>Pleuronichthys ritteri</i>	spotted turbot	6	10.37
<i>Paralichthys californicus</i>	California halibut	5	8.73
<i>Pleuronichthys guttulatus</i>	diamond turbot	5	8.47
Gobiidae unid.	gobies	4	6.84
larvae, unidentified yolksac	unidentified yolksac larvae	4	6.81
<i>Lepidogobius lepidus</i>	bay goby	2	3.40
<i>Hypsoblennius</i> spp.	combt tooth blennies	2	3.38
<i>Citharichthys stigmaeus</i>	speckled sanddab	2	3.25
Sciaenidae unid.	croakers	2	3.12
larval fish - damaged	unidentified larval fishes	2	3.06
<i>Citharichthys</i> spp.	sanddabs	1	1.81
Paralichthyidae unid.	sand flounders	1	1.81
Atherinopsidae unid.	silversides	1	1.73
larval/post-larval fish unid.	larval fishes	1	1.72
Pleuronectidae unid.	righteye flounders	1	1.72
<i>Stenobrachius leucopsarus</i>	northern lampfish	1	1.72
<i>Clinocottus</i> spp.	sculpins	1	1.66
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	1.53
		Total Fishes: 256	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	34	60.04
Majidae unid. (megalops)	spider crab megalops	5	8.91
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	3	4.79
Brachyura unid. (megalops)	unidentified crab megalops	1	1.72
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	1.72
Paguridae unid. (megalops)	hermit crab megalops	1	1.65
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	1	1.47
		Total Target Invertebrates: 46	

Survey: SMBEA25
Start Date: 12/13/2006
Stations: O1-O3

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	208	324.26
<i>Engraulis mordax</i>	northern anchovy	27	42.41
larval fish fragment	unidentified larval fishes	20	31.24
Sciaenidae unid.	croakers	14	23.43
Engraulidae unid.	anchovies	10	16.21
<i>Pleuronichthys ritteri</i>	spotted turbot	5	8.08
<i>Citharichthys stigmaeus</i>	speckled sanddab	5	7.77
Gobiidae unid.	gobies	5	7.35
<i>Pleuronichthys</i> spp.	turbots	2	3.22
<i>Citharichthys</i> spp.	sanddabs	2	3.11
<i>Hypsoblennius</i> spp.	combt tooth blennies	2	3.00
<i>Paralichthys californicus</i>	California halibut	2	2.94
Labrisomidae unid.	labrisomid blennies	1	1.71
Pleuronectidae unid.	righteye flounders	1	1.60
Cottidae unid.	sculpins	1	1.55
larvae, unidentified yolksac	unidentified yolksac larvae	1	1.51
<i>Lepidogobius lepidus</i>	bay goby	1	1.51
<i>Sebastes</i> spp.	rockfishes	1	1.50
larval/post-larval fish unid.	larval fishes	1	1.39
		Total Fishes:	309
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	32	48.58
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	7	10.72
Majidae unid. (megalops)	spider crab megalops	3	4.97
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	2	3.32
<i>Cancer antennarius</i> (megalops)	brown rock crab megalops	2	3.26
Brachyura unid. (megalops)	unidentified crab megalops	1	1.71
Grapsidae unid. (megalops)	shore crab megalops	1	1.71
Paguridae unid. (megalops)	hermit crab megalops	1	1.44
		Total Target Invertebrates:	49

Survey: SMBEA25
Start Date: 12/13/2006
Stations: S1-S4

Taxon	Common Name	Count	Mean Concentration (#/1,000m ³)
Fishes			
<i>Genyonemus lineatus</i>	white croaker	30	35.69
Gobiidae unid.	gobies	25	27.98
<i>Hypsoblennius</i> spp.	combtooth blennies	14	15.51
<i>Pleuronichthys guttulatus</i>	diamond turbot	10	13.16
Atherinopsidae unid.	silversides	6	7.85
larval fish fragment	unidentified larval fishes	6	7.20
<i>Atherinopsis californiensis</i>	jacksmelt	4	5.22
<i>Leuresthes tenuis</i>	California grunion	3	4.01
<i>Engraulis mordax</i>	northern anchovy	3	3.34
Sciaenidae unid.	croakers	3	3.15
Engraulidae unid.	anchovies	2	2.40
<i>Citharichthys stigmaeus</i>	speckled sanddab	2	2.26
larval fish - damaged	unidentified larval fishes	2	2.18
<i>Pleuronichthys</i> spp.	turbots	1	1.31
larvae, unidentified yolksac	unidentified yolksac larvae	1	1.25
<i>Gibbonsia</i> spp.	clinid kelpfishes	1	1.11
<i>Pleuronichthys ritteri</i>	spotted turbot	1	1.11
Pleuronectidae unid.	righteye flounders	1	1.07
		Total Fishes: 115	
Target Invertebrates			
<i>Pugettia</i> spp. (megalops)	kelp crabs megalops	15	18.54
Majidae unid. (megalops)	spider crab megalops	5	6.08
Grapsidae unid. (megalops)	shore crab megalops	3	3.60
<i>Pinnixa</i> spp. (megalops)	pea crabs megalops	1	1.34
<i>Cancer anthonyi</i> (megalops)	yellow crab megalops	1	1.25
Brachyura unid. (megalops)	unidentified crab megalops	1	1.11
<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops	1	1.09
		Total Target Invertebrates: 27	

Appendix D2. Calculated Annual Entrainment and Standard Error Data

Table D2-1. Calculated Total Annual Entrainment and Standard Error Data for Fish Larvae and Eggs. Estimates provided for All Units based on actual cooling water intake flow volumes and for Units 3 & 4 only based on actual and design (maximum) cooling water intake flow volumes.

Taxon	Common Name	Annual Entrainment Actual Flows (All Units)	Standard Error	Annual Entrainment Actual Flows (Units 3 & 4)	Standard Error	Annual Entrainment Design Flows (Units 3 & 4)	Standard Error
Larval Fish							
<i>Genyonemus lineatus</i>	white croaker	44,365,993	2,385,477	36,886,189	2,018,313	57,674,813	2,939,101
Engraulidae unid.	anchovies	36,589,361	1,759,118	30,806,088	1,505,760	44,566,730	2,025,423
unidentified larvae, yolksac	unidentified yolksac larvæ	32,877,925	1,086,844	27,954,526	955,506	38,410,225	1,051,929
Sciaenidae unid.	croakers	15,122,724	1,016,195	13,080,938	894,112	15,708,573	956,566
<i>Paralabrax</i> spp.	sand bass	10,753,540	502,321	8,932,843	435,911	14,393,420	576,801
Gobiidae unid.	gobies	8,553,040	339,939	6,997,707	290,743	12,043,151	401,817
<i>Hypsoblennius</i> spp.	combtooth blennies	7,451,656	442,735	6,180,886	387,875	9,927,668	460,269
unidentified larvae, damaged	unidentified damaged	7,095,438	345,395	6,018,166	302,477	8,381,958	341,730
<i>Paralichthys californicus</i>	California halibut	6,869,726	305,706	5,863,484	268,193	7,790,992	303,092
<i>Seriphus politus</i>	queenfish	5,807,906	506,192	5,038,592	444,916	5,915,819	482,123
<i>Citharichthys</i> spp.	sanddabs	4,476,374	166,388	3,738,404	143,824	5,698,399	191,732
<i>Stenobranchius leucopsarus</i>	northern lampfish	4,240,824	258,444	3,493,114	216,224	5,754,218	337,225
<i>Pleuronichthys</i> spp.	turbots	3,390,551	268,255	2,960,303	236,155	3,319,412	250,137
<i>Sphyræna argentea</i>	Pacific barracuda	2,923,078	176,152	2,516,814	153,124	3,130,058	186,285
<i>Cheilotrema saturnum</i>	black croaker	2,889,237	281,216	2,528,784	247,567	2,771,788	263,178
Haemulidae unid.	grunts	2,788,973	196,935	2,389,078	171,406	3,087,266	206,260
<i>Oxyjulis californica</i>	senorita	2,628,016	81,560	2,229,112	70,640	3,076,665	89,430
Atherinopsidae unid.	silversides	2,361,934	180,016	1,839,312	149,910	4,145,527	297,859
<i>Pleuronichthys guttulatus</i>	diamond turbot	2,148,380	72,431	1,288,095	52,334	6,768,632	206,000
Ophidiidae unid.	cusk-eels	2,051,192	84,313	1,747,031	73,024	2,338,910	91,710
<i>Parophrys vetulus</i>	English sole	1,685,987	131,436	1,371,804	107,210	2,416,978	190,668
larval/post-larval fish unid.	larval fishes	1,638,736	135,633	1,396,081	116,872	1,867,946	150,056
Pleuronectidae unid.	righteye flounders	1,477,214	94,582	1,205,683	78,449	2,089,182	128,711

(table continued)

Table D2-1 (continued). Calculated Total Annual Entrainment and Standard Error Data.

Taxon	Common Name	Annual Entrainment	Standard Error	Annual Entrainment	Standard Error	Annual Entrainment	Standard Error
		Actual Flows (All Units)		Actual Flows (Units 3 & 4)		Design Flows (Units 3 & 4)	
<i>Menticirrhus undulatus</i>	California corbina	1,475,529	69,088	1,262,690	60,052	1,636,675	72,905
<i>Xystreurus liolepis</i>	fantail sole	1,039,682	79,688	882,753	69,980	1,232,319	87,351
<i>Lepidogobius lepidus</i>	bay goby	1,036,482	109,867	850,455	89,520	1,431,791	160,224
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1,011,497	94,286	843,859	82,179	1,294,165	97,360
<i>Semicossyphus pulcher</i>	California sheephead	812,007	48,682	673,980	42,085	1,065,730	55,371
<i>Symphurus atricauda</i>	California tonguefish	755,046	35,887	646,635	31,326	833,654	36,393
<i>Merluccius productus</i>	Pacific hake	667,807	64,846	539,453	52,596	987,186	95,982
Labridae unid.	wrasses	598,847	28,785	493,382	24,980	831,640	37,546
<i>Pleuronichthys ritteri</i>	spotted turbot	578,822	44,902	464,029	29,809	902,867	51,284
<i>Ophidion scrippsae</i>	basketweave cusk-eel	544,846	34,417	464,053	39,195	621,270	37,437
<i>Halichoeres semicinctus</i>	rock wrasse	353,013	16,375	300,667	14,183	402,530	17,812
Pleuronectiformes unid.	flatfishes	305,428	27,572	246,518	23,296	453,174	36,029
Paralichthyidae unid.	sand flounders	267,300	29,059	195,727	25,352	581,524	44,248
<i>Zaniolepis</i> spp.	combfishes	247,526	32,879	207,136	28,637	317,203	34,876
<i>Syngnathus</i> spp.	pipefishes	235,368	30,141	201,654	26,412	259,251	30,047
<i>Gibbonsia</i> spp.	clinid kelpfishes	203,962	27,585	171,922	24,112	246,524	28,597
<i>Icelinus</i> spp.	sculpins	171,061	23,900	147,123	20,672	184,341	25,703
<i>Hippoglossina stomata</i>	bigmouth sole	149,817	27,228	125,618	23,936	186,083	27,232
<i>Microstomus pacificus</i>	Dover sole	117,828	13,270	94,641	10,737	178,298	19,811
<i>Umbrina roncadore</i>	yellowfin croaker	111,057	21,310	97,336	18,761	105,511	19,940
<i>Gillichthys mirabilis</i>	longjaw mudsucker	102,243	14,466	85,040	12,225	132,449	17,939
Bathymasteridae unid.	ronquils	100,741	14,920	84,161	12,693	127,681	17,812
<i>Diaphus theta</i>	California headlight fish	95,116	18,251	83,364	16,068	90,366	17,078
<i>Peprilus simillimus</i>	Pacific butterfish	83,690	10,240	65,697	8,975	149,529	14,714
<i>Typhlogobius californiensis</i>	blind goby	81,022	11,749	67,564	9,970	103,625	14,233
<i>Psettichthys melanostictus</i>	sand sole	77,669	14,757	68,275	12,993	72,233	13,651

(table continued)

Table D2-1 (continued). Calculated Total Annual Entrainment and Standard Error Data.

Taxon	Common Name	Annual Entrainment Actual Flows	Standard Error	Annual Entrainment Actual Flows	Standard Error	Annual Entrainment Design Flows	Standard Error
		(All Units)		(Units 3 & 4)		(Units 3 & 4)	
Clupeiformes unid.	herrings and anchovies	77,535	13,739	66,037	11,899	88,410	14,944
Labrisomidae unid.	labrisomid blennies	76,054	13,056	58,169	11,105	137,706	18,538
Myctophidae unid.	lanternfishes	73,538	14,111	64,453	12,423	69,866	13,203
<i>Triphoturus mexicanus</i>	Mexican lampfish	70,944	12,571	60,424	10,888	80,895	13,674
<i>Cottus asper</i>	prickly sculpin	70,510	13,705	59,878	11,762	81,936	15,484
<i>Sardinops sagax</i>	Pacific sardine	67,493	11,959	57,484	10,358	76,960	13,009
<i>Anisotremus davidsonii</i>	sargo	67,298	11,925	57,318	10,328	76,737	12,971
Chaenopsidae unid.	tube blennies	63,406	12,324	53,845	10,577	73,680	13,924
<i>Sebastes</i> spp.	rockfishes	62,674	7,085	50,341	5,732	94,838	10,577
<i>Hypsypops rubicundus</i>	garibaldi	54,943	9,736	46,796	8,432	62,650	10,590
<i>Acanthogobius flavimanus</i>	yellowfin goby	54,042	10,504	45,894	9,015	62,800	11,868
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	44,295	6,541	28,359	4,607	122,543	16,527
Cottidae unid.	sculpins	42,550	6,321	25,044	4,457	141,174	17,230
<i>Ruscarius creaseri</i>	roughcheek sculpin	38,838	7,576	31,195	6,130	58,769	11,310
Total		222,275,332		186,532,003		276,934,913	
Fish Eggs							
fish eggs unid.	unidentified fish eggs	2,565,757,298	56,960,946	2,126,699,674	49,499,568	3,405,009,564	62,392,484
Sciaenidae / Paralichthyidae / Labridae	fish eggs	483,931,072	14,470,203	407,914,231	12,575,428	592,934,824	16,071,471
Engraulidae unid.	anchovy eggs	432,212,026	23,593,521	363,479,754	20,110,051	529,013,191	27,930,305
Paralichthyidae unid.	sand flounder eggs	347,101,345	6,386,161	252,841,920	4,705,394	726,152,480	14,090,911
<i>Citharichthys</i> spp.	sanddab eggs	165,393,976	4,814,971	131,272,426	4,078,409	264,875,098	6,919,299
<i>Pleuronichthys</i> spp.	turbot eggs	140,959,171	3,566,828	115,111,117	3,089,224	200,392,640	4,027,834
Sciaenidae unid.	croaker eggs	39,447,603	984,195	31,614,098	847,275	60,894,283	1,223,471
<i>Sphyræna argentea</i>	Pacific barracuda eggs	5,777,626	450,073	4,924,839	389,835	6,557,694	489,305
<i>Paralabrax</i> spp.	sand bass eggs	4,935,308	450,414	4,109,380	390,643	6,568,642	501,342
<i>Genyonemus lineatus</i>	white croaker eggs	4,498,770	208,476	3,319,629	164,120	9,067,268	370,437
<i>Paralichthys californicus</i>	California halibut eggs	602,696	59,364	449,338	47,685	1,179,277	96,866

(table continued)

Table D2-1 (continued). Calculated Total Annual Entrainment and Standard Error Data.

Taxon	Common Name	Annual Entrainment Actual Flows	Standard Error	Annual Entrainment Actual Flows	Standard Error	Annual Entrainment Design Flows	Standard Error
		(All Units)		(Units 3 & 4)		(Units 3 & 4)	
Labridae unid.	wrasse eggs	549,366	75,076	388,228	64,895	1,283,731	129,950
Pleuronectidae unid.	righteye flounder eggs	417,594	52,505	335,419	42,481	631,905	78,383
Atherinopsidae unid.	silverside eggs	144,521	25,609	123,091	22,180	164,793	27,855
<i>Pleuronichthys guttulatus</i>	diamond turbot eggs	136,981	24,272	116,669	21,023	156,195	26,402
<i>Pleuronichthys coenosus</i>	c-o turbot eggs	126,221	22,366	107,505	19,371	143,926	24,328
Bathylagidae	blacksmelt eggs	31,583	6,161	25,368	4,985	47,791	9,197
<i>Lyopsetta exilis</i>	slender sole eggs	29,430	5,741	23,639	4,645	44,534	8,571
<i>Merluccius</i> spp.	hake eggs	28,506	5,561	22,897	4,499	43,136	8,302
Total		4,192,081,093		3,442,879,223		5,805,160,975	

Table D2-2. Calculated Total Annual Entrainment and Standard Error Data for Shellfish Larvae. Estimates provided for All Units based on actual cooling water intake flow volumes and for Units 3 & 4 only based on actual and design (maximum) cooling water intake flow volumes.

Taxon	Common Name	Annual	Standard Error	Annual	Standard Error	Annual	Standard Error
		Entrainment Actual Flows (All Units)		Entrainment Actual Flows (Units 3 & 4)		Entrainment Design Flows (Units 3 & 4)	
Shellfish							
<i>Pinnixa</i> spp.	pea crabs megalops	7,681,714	863,876	6,622,400	756,068	8,170,052	
<i>Pugettia</i> spp.	kelp crabs megalops	5,156,073	271,174	4,263,545	229,112	6,923,911	
<i>Pachycheles</i> spp.	porcelain crabs megalops	2,209,439	337,657	1,935,713	297,272	2,104,880	
<i>Cancer</i> spp.	cancer crabs megalops	1,860,530	224,302	1,577,364	197,196	2,205,141	
Majidae unid.	spider crab megalops	982,451	84,104	832,284	72,488	1,156,103	
<i>Pinnotheres</i> spp.	pea crab megalops	957,020	43,346	812,721	37,202	1,112,100	
Paguridae unid.	hermit crab megalops	916,469	119,145	794,334	104,638	940,030	
<i>Lophopanopeus</i> spp.	black-clawed crab megalops	830,481	107,368	726,419	94,497	800,333	
Porcellanidae unid.	porcelain crab megalops	795,187	69,618	690,551	61,079	805,329	
<i>Emerita analoga</i>	mole crabs megalops	582,933	61,481	482,451	52,560	778,761	
<i>Petrolisthes</i> spp.	porcelain crab megalops	471,903	51,245	404,955	44,154	515,655	
unidentified crab	unidentified crab megalops	405,052	39,514	331,004	32,418	569,827	
Grapsidae unid.	shore crab megalops	350,720	36,867	274,199	32,196	605,635	
<i>P. interruptus</i> (phyllosome)	California spiny lobster	265,951	25,812	231,901	22,644	261,835	
Brachyura unid.	unidentified crab megalops	105,928	10,877	82,542	9,200	187,850	
<i>Loligo opalescens</i>	market squid	51,473	10,005	43,712	8,586	59,814	
<i>Portunus xantusii</i>	Xantus' swimming crab	33,941	4,412	19,221	3,182	113,193	
<i>Pachycheles rudis</i>	thickclaw porcelain crab	28,506	5,561	22,897	4,499	43,136	
		23,685,773		20,148,213		27,353,585	

El Segundo Generating Station

Appendix E

Impingement Data

E1. Normal Operation Impingement Data

E2. Heat Treatment Impingement Data

Appendix E1. Normal Operation Impingement Data

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 01

Date: January 27-28, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	<i>Scorpaena guttata</i>	California scorpionfish	1	0.033
			1	0.033

Units 3&4 No Fish

Shellfish

Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	7	1.805
	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	18	0.015
	<i>Panulirus interruptus</i>	California spiny lobster	2	0.804
			27	2.624
Units 3&4	<i>Cancer antennarius</i>	Pacific rock crab	62	7.443
	<i>Portunus xantusii</i>	Xantus swimming crab	3	0.054
			65	7.497

Other Macroinvertebrates

Units 1&2	<i>Acanthodoris rhodoceras</i>	black-tipped spiny doris	2	0.002
	<i>Crassadoma gigantea</i>	giant rock scallop	1	0.001
	<i>Doriopsilla albopunctata</i>	salted yellow doris	1	0.001
	<i>Doriopsilla gemela</i>	yellow gilled doris	1	0.001
	Leptopecten	scallop, unid.	1	0.001
	<i>Ophiothrix spiculata</i>	shiny brittle star	5	0.002
	Ophiuroidea	brittle star, unid.	5	0.002
	<i>Polyorchis penicillatus</i>	red jellyfish	2	0.006
	Pycnogonida	sea spider, unid.	1	0.001
			19	0.017
Units 3&4	<i>Hermisenda crassicornis</i>	hermissenda	6	0.002
	<i>Parastichopus parvimensis</i>	warty sea cucumber	1	0.011
	<i>Polyorchis penicillatus</i>	red jellyfish	1	0.004
			8	0.017

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 02
Date: February 7-8, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	No Fish			
Units 3&4	No Fish			

Shellfish

Units 1&2	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	1	0.001
			1	0.001
Units 3&4	<i>Portunus xantusii</i>	Xantus swimming crab	2	0.049
			2	0.049

Other Macroinvertebrates

Units 1&2	<i>Crassadoma gigantea</i>	giant rock scallop	2	0.002
			2	0.002

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 03

Date: March 9-10, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	<i>Chromis punctipinnis</i>	blacksmith	1	0.067
	<i>Scorpaena guttata</i>	California scorpionfish	2	0.319
			3	0.386
Units 3&4	<i>Syngnathus</i> sp	pipefish, unid.	2	0.005
			2	0.005
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	2	0.442
	<i>Cancer anthonyi</i>	yellow crab	2	0.488
	<i>Crangon nigromaculata</i>	blackspotted bay shrimp	1	0.001
	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	5	0.004
	<i>Loligo opalescens</i>	California market squid	1	0.013
	<i>Lysmata californica</i>	red rock shrimp	1	0.001
			12	0.949
Units 3&4	<i>Blepharipoda occidentalis</i>	spiny mole crab	1	0.004
	<i>Crangon nigromaculata</i>	blackspotted bay shrimp	6	0.014
	<i>Loligo opalescens</i>	California market squid	1	0.025
	<i>Portunus xantusii</i>	Xantus swimming crab	1	0.014
			9	0.057
Other Macroinvertebrates				
Units 1&2	<i>Hermisenda crassicornis</i>	hermissenda	1	0.008
	<i>Triopha maculata</i>	spotted triopha	2	0.003
			3	0.011
Units 3&4	<i>Hermisenda crassicornis</i>	hermissenda	1,172	0.14
			1,172	0.14

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 04
Date: April 13-14, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	<i>Scorpaena guttata</i>	California scorpionfish	1	0.025
			1	0.025
Units 3&4	<i>Myliobatis californica</i>	bat ray	1	0.437
	<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	0.482
			2	0.919
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	1	0.230
	<i>Lysmata californica</i>	red rock shrimp	1	0.001
	<i>Pagurus</i> sp	hermit crab, unid.	1	0.001
			3	0.232
Units 3&4	<i>Pachygrapsus crassipes</i>	striped shore crab	2	0.017
	<i>Panulirus interruptus</i>	California spiny lobster	1	0.188
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	1	0.001
			4	0.206
Other Macroinvertebrates				
Units 1&2	<i>Crassadoma gigantea</i>	giant rock scallop	1	0.007
	<i>Leptopecten</i> sp	scallop, unid.	2	0.003
			3	0.010
Units 3&4	<i>Ammothea hilgendorfi</i>	sea spider	1	0.001
	<i>Aurelia aurita</i>	moon jelly	1	0.325
	Cnidaria	sea jelly, unid.	1	0.001
	<i>Leptopecten</i> sp	scallop, unid.	1	0.001
			4	0.328

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 05

Date: May 9-10, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)

Units 1&2	No Fish			
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Units 3&4	No Fish			
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Shellfish

Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	3	0.571
	<i>Cancer gracilis</i>	graceful crab	1	0.053
	<i>Pachygrapsus crassipes</i>	striped shore crab	1	0.02
			5	0.644

Units 3&4	<i>Cancer antennarius</i>	Pacific rock crab	1	0.003
	<i>Pachygrapsus crassipes</i>	striped shore crab	1	0.020
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	2	0.003
			4	0.026

Other Macroinvertebrates

Units 1&2	<i>Parastichopus parvimensis</i>	warty sea cucumber	1	0.109
			1	0.109
Units 3&4	<i>Chrysaora colorata</i>	purple-striped jellyfish	1	0.762
	<i>Dendronotus frondosus</i>	leafy dendronotid	27,505	2.220
	<i>Dendronotus iris</i>	giant-frond-aeolis	1	0.006
	<i>Flabellina trilineata</i>	threeline aeolis	2,239	0.106
	<i>Hermisenda crassicornis</i>	hermissenda	14,712	0.634
	Nudibranchia	nudibranch, unid.	2,000	0.377
		46,458	4.105	

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 06

Date: June 8-9, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	No Fish			
Units 3&4	<i>Myliobatis californica</i>	bat ray	1	0.299
	<i>Phanerodon furcatus</i>	white seaperch	1	0.008
	<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	0.025
			3	0.332
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	8	1.745
	<i>Cancer anthonyi</i>	yellow crab	1	0.170
	<i>Panulirus interruptus</i>	California spiny lobster	1	0.541
			10	2.456
Units 3&4	<i>Portunus xantusii</i>	Xantus swimming crab	1	0.022
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	1	0.001
			2	0.023
Other Macroinvertebrates				
Units 1&2	<i>Pisaster brevispinus</i>	short-spined sea star	1	0.044
			1	0.044

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 07
Date: July 10-11, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	No Fish			
Units 3&4	<i>Rhacochilus toxotes</i>	rubberlip seaperch	4	0.048
			4	0.048
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	3	0.902
	<i>Cancer anthonyi</i>	yellow crab	3	1.002
	<i>Cancer gracilis</i>	graceful crab	2	0.180
	<i>Panulirus interruptus</i>	California spiny lobster	1	0.688
			9	2.772
Units 3&4	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	1	0.001
	<i>Lysmata californica</i>	red rock shrimp	1	0.002
	<i>Panulirus interruptus</i>	California spiny lobster	2	0.388
			4	0.391
Other Macroinvertebrates				
Units 3&4	<i>Hermisenda crassicornis</i>	hermissenda	10	0.006
	<i>Leptopecten</i> sp	scallop, unid.	2	0.019
			12	0.025

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 08
Date: August 2-3, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	No Fish			
Units 3&4	No Fish			
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	7	1.604
	<i>Loxorhynchus grandis</i>	sheep crab	1	1.650
	<i>Lysmata californica</i>	red rock shrimp	1	0.001
	<i>Panulirus interruptus</i>	California spiny lobster	2	1.550
			11	4.805
Units 3&4	No Shellfish			

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 09

Date: September 14-15, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	<i>Scorpaena guttata</i>	California scorpionfish	1	0.415
			1	0.415
Units 3&4	<i>Chromis punctipinnis</i>	blacksmith	3	0.010
	<i>Paralabrax clathratus</i>	kelp bass	2	0.002
			5	0.012
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	3	0.649
	<i>Panulirus interruptus</i>	California spiny lobster	1	0.556
			4	1.205
Units 3&4	<i>Betaeus longidactylus</i>	visored shrimp	2	0.002
	<i>Cancer antennarius</i>	Pacific rock crab	1	0.015
	<i>Cancer anthonyi</i>	yellow crab	3	0.006
	<i>Cancer jordani</i>	hairy rock crab	2	0.006
	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	4	0.001
	<i>Heteracrypta occidentalis</i>	sandflat elbow crab	1	0.001
	<i>Lysmata californica</i>	red rock shrimp	6	0.002
	<i>Podochela hemphill</i>	hemphill kelp crab	13	0.009
	<i>Portunus xantusii</i>	Xantus swimming crab	3	0.008
	<i>Pugettia producta</i>	northern kelp crab	1	0.001
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	10	0.002
			46	0.053
Other Macroinvertebrates				
Units 3&4	Cnidaria	sea jelly, unid.	1	0.005
	<i>Hermisenda crassicornis</i>	hermissenda	135	0.045
	<i>Leptopecten</i> sp	scallop, unid.	14	0.001
	<i>Navanax inermis</i>	California aglaja	1	0.006
	<i>Polycera atra</i>	orange-spike polycera	1	0.001
			152	0.058

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 10
Date: October 12-13, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	No Fish			
Units 3&4	No Fish			
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	1	0.403
			1	0.403
Units 3&4	<i>Alpheus californiensis</i>	mudflat snapping shrimp	1	0.001
	<i>Betaeus longidactylus</i>	visored shrimp	6	0.002
	<i>Cancer antennarius</i>	Pacific rock crab	2	0.035
	<i>Cancer anthonyi</i>	yellow crab	29	0.440
	<i>Cancer jordani</i>	hairy rock crab	1	0.008
	<i>Hemigrapsus oregonensis</i>	yellow shore crab	1	0.009
	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	1	0.001
	<i>Lophopanopeus bellus</i>	blackclaw crestleg crab	9	0.005
	<i>Lysmata californica</i>	red rock shrimp	7	0.005
	<i>Pachygrapsus crassipes</i>	striped shore crab	4	0.019
	<i>Portunus xantusii</i>	Xantus swimming crab	3	0.029
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	7	0.006
			71	0.560
Other Macroinvertebrates				
Units 3&4	<i>Navanax inermis</i>	California aglaja	2	0.010
			2	0.010

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 11
Date: November 29-30, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	No Fish			
Units 3&4	<i>Hypsoblennius gilberti</i>	rockpool blenny	2	0.037
			2	0.037
Shellfish				
Units 1&2	<i>Cancer antennarius</i>	Pacific rock crab	1	0.307
	<i>Cancer anthonyi</i>	yellow crab	1	0.239
	<i>Loxorhynchus grandis</i>	sheep crab	1	0.260
	<i>Octopus bimaculatus/bimaculoides</i>	California two-spot octopus	1	0.275
			4	1.081
Units 3&4	<i>Cancer antennarius</i>	Pacific rock crab	385	13.546
	<i>Cancer anthonyi</i>	yellow crab	125	4.329
	<i>Lysmata californica</i>	red rock shrimp	12	0.021
	<i>Pachygrapsus crassipes</i>	striped shore crab	6	0.039
			528	17.935
Other Macroinvertebrates				
Units 1&2	<i>Parastichopus parvimensis</i>	warty sea cucumber	1	0.207
			1	0.207

El Segundo Generating Station – Normal Operation Impingement Data

Survey: 12
Date: December 21-22, 2006

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
Units 1&2	No Fish			
Units 3&4	<i>Hypsoblennius gentilis</i>	bay blenny	1	0.003
	<i>Hypsoblennius gilberti</i>	rockpool blenny	1	0.012
	<i>Hypsoblennius jenkinsi</i>	mussel blenny	1	0.002
	<i>Paralabrax clathratus</i>	kelp bass	1	0.021
			4	0.038
Shellfish				
Units 1&2	<i>Cancer anthonyi</i>	yellow crab	1	0.264
	<i>Lysmata californica</i>	red rock shrimp	1	0.003
	<i>Octopus bimaculatus/bimaculoides</i>	California two-spot octopus	1	0.029
			3	0.296
Units 3&4	<i>Betaeus longidactylus</i>	visored shrimp	10	0.006
	<i>Cancer amphioetus</i>	bigtooth rock crab	4	0.118
	<i>Cancer antennarius</i>	Pacific rock crab	6	0.179
	<i>Cancer anthonyi</i>	yellow crab	30	1.926
	<i>Lophopanopeus bellus</i>	blackclaw crestleg crab	9	0.005
	<i>Lophopanopeus leucomanus</i>	knobkneed crestleg crab	2	0.002
	<i>Lysmata californica</i>	red rock shrimp	27	0.060
	<i>Pachygrapsus crassipes</i>	striped shore crab	2	0.003
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	1	0.001
			91	2.300

Appendix E2. Heat Treatment Impingement Data

El Segundo Generating Station – Heat Treatment Impingement Data

Date: January 12, 2006 Units 3&4

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
	<i>Amphistichus argenteus</i>	barred surfperch	1	0.065
	<i>Anisotremus davidsonii</i>	sargo	2	0.591
	<i>Brachyistius frenatus</i>	kelp perch	3	0.056
	<i>Chromis punctipinnis</i>	blacksmith	51	3.349
	<i>Embiotoca jacksoni</i>	black perch	26	9.892
	<i>Engraulis mordax</i>	northern anchovy	1	0.020
	<i>Hyperprosopon argenteum</i>	walleye surfperch	8	0.260
	<i>Hypsoblennius gilberti</i>	rockpool blenny	4	0.051
	<i>Medialuna californiensis</i>	halfmoon	1	0.352
	<i>Myliobatis californica</i>	bat ray	1	1.550
	<i>Oxyjulis californica</i>	senorita	4	0.159
	<i>Paralabrax clathratus</i>	kelp bass	11	4.573
	<i>Paralabrax nebulifer</i>	barred sand bass	2	1.089
	<i>Peprilus simillimus</i>	Pacific pompano	4	0.054
	<i>Phanerodon furcatus</i>	white seaperch	16	1.529
	<i>Platyrrhinoidis triseriata</i>	thornback	1	0.632
	<i>Rhacochilus vacca</i>	pile perch	2	0.668
	<i>Roncador stearnsii</i>	spotfin croaker	2	0.288
	<i>Scomber japonicus</i>	Pacific chub mackerel	1	0.073
	<i>Scorpaena guttata</i>	California scorpionfish	13	2.471
	<i>Sebastes auriculatus</i>	brown rockfish	4	1.533
	<i>Semicossyphus pulcher</i>	California sheephead	1	1.163
	<i>Seriphus politus</i>	queenfish	34	0.761
	<i>Xenistius californiensis</i>	salema	2	0.082
			195	31.261

Shellfish	Taxon	Common Name	Abundance	Biomass (kg)
	<i>Cancer anthonyi</i>	yellow crab	222	17.591
	<i>Cancer gracilis</i>	graceful crab	1	0.004
		California two-spot		
	<i>Octopus bimaculatus/bimaculoides</i>	octopus	1	0.058
	<i>Pachygrapsus crassipes</i>	striped shore crab	4	0.039
	<i>Portunus xantusii</i>	Xantus swimming crab	1	0.031
			229	17.723

Other Macroinvertebrates	Taxon	Common Name	Abundance	Biomass (kg)
	<i>Parastichopus parvimensis</i>	warty sea cucumber	6	0.925
			6	0.925

El Segundo Generating Station – Heat Treatment Impingement Data

Date: April 7, 2006 Units 3&4

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
	<i>Atherinops affinis</i>	topsmelt	5	0.174
	<i>Atherinopsis californiensis</i>	jacksmelt	9	1.237
	<i>Cheilotrema saturnum</i>	black croaker	1	0.048
	<i>Chromis punctipinnis</i>	blacksmith	7	0.953
	<i>Cymatogaster aggregata</i>	shiner perch	1	0.001
	<i>Embiotoca jacksoni</i>	black perch	7	0.931
	<i>Engraulis mordax</i>	northern anchovy	77	1.117
	<i>Hyperprosopon argenteum</i>	walleye surfperch	24	1.715
	<i>Leuresthes tenuis</i>	California grunion	1	0.017
	<i>Medialuna californiensis</i>	halfmoon	1	0.344
	<i>Myliobatis californica</i>	bat ray	1	0.52
	<i>Ophidion scrippsae</i>	basketweave cusk-eel	1	0.014
	<i>Paralabrax clathratus</i>	kelp bass	1	0.658
	<i>Paralichthys californicus</i>	California halibut	1	0.042
	<i>Peprilus simillimus</i>	Pacific pompano	3	0.079
	<i>Phanerodon furcatus</i>	white seaperch	15	1.727
	<i>Platyrrhinoidis triseriata</i>	thornback	2	0.551
	<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	0.062
	<i>Rhacochilus toxotes</i>	rubberlip seaperch	11	4.319
	<i>Rhacochilus vacca</i>	pile perch	16	2.356
	<i>Seriphus politus</i>	queenfish	47	0.688
	<i>Synodus lucioceps</i>	California lizardfish	4	0.039
			236	17.592
Shellfish	Taxon	Common Name	Abundance	Biomass (kg)
	<i>Cancer anthonyi</i>	yellow crab	1	0.051
	<i>Crangon nigromaculata</i>	blackspotted bay shrimp	7	0.022
	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	8	0.004
	<i>Lysmata californica</i>	red rock shrimp	5	0.005
	<i>Pachygrapsus crassipes</i>	striped shore crab	1	0.012
	<i>Panulirus interruptus</i>	California spiny lobster	7	3.470
	<i>Portunus xantusii</i>	Xantus swimming crab	3	0.032
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	36	0.031
			68	3.627

El Segundo Generating Station – Heat Treatment Impingement Data

Date:	April 7, 2006	Units 3&4	Survey Totals	
Macroinvertebrates	Taxon	Common Name	Abundance	Biomass (kg)
	<i>Dendronotus iris</i>	giant-frond-aeolis	1	0.006
	<i>Hermisenda crassicornis</i>	hermissenda	67	0.134
	<i>Triopha maculata</i>	spotted triopha	5	0.016
			73	0.156

El Segundo Generating Station – Heat Treatment Impingement Data

Date: June 2, 2006 Units 3&4

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
	<i>Atherinopsis californiensis</i>	jacksmelt	10	1.819
	<i>Balistes polylepis</i>	finescale triggerfish	1	1.626
	<i>Cheilotrema saturnum</i>	black croaker	9	2.116
	<i>Chromis punctipinnis</i>	blacksmith	4	0.425
	<i>Citharichthys stigmaeus</i>	speckled sanddab	15	0.039
	<i>Cymatogaster aggregata</i>	shiner perch	97	0.403
	<i>Embiotoca jacksoni</i>	black perch	44	10.948
	<i>Girella nigricans</i>	opaleye	1	0.990
	<i>Hyperprosopon argenteum</i>	walleye surfperch	1	0.001
	<i>Medialuna californiensis</i>	halfmoon	1	0.333
	<i>Myliobatis californica</i>	bat ray	2	2.210
	<i>Paralabrax clathratus</i>	kelp bass	10	6.499
	<i>Parophrys vetulus</i>	English sole	3	0.013
	<i>Peprilus simillimus</i>	Pacific pompano	8	0.368
	<i>Phanerodon furcatus</i>	white seaperch	2	0.002
	<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	0.132
	<i>Rhacochilus toxotes</i>	rubberlip seaperch	10	1.858
	<i>Rhacochilus vacca</i>	pile perch	10	1.621
	<i>Sardinops sagax</i>	Pacific sardine	10	0.144
	<i>Scomber japonicus</i>	Pacific chub mackerel	4	0.971
	<i>Sebastes auriculatus</i>	brown rockfish	1	0.233
	<i>Sebastes miniatus</i>	vermillion rockfish	3	0.022
	<i>Semicossyphus pulcher</i>	California sheephead	1	0.169
	<i>Seriphus politus</i>	queenfish	22	0.749
	<i>Trachurus symmetricus</i>	jack mackerel	11	1.395
	<i>Urobatis halleri</i>	round stingray	3	2.536
	<i>Xenistius californiensis</i>	salema	1	0.097
			285	37.719

Shellfish	Taxon	Common Name	Abundance	Biomass (kg)
	<i>Cancer antennarius</i>	Pacific rock crab	4	0.006
	<i>Cancer anthonyi</i>	yellow crab	6	0.009
	<i>Cancer gracilis</i>	graceful crab	53	0.127
	<i>Cancer productus</i>	red rock crab	6	0.008
	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	128	0.081
	<i>Lysmata californica</i>	red rock shrimp	105	0.136

Shellfish (cont.)	Taxon	Common Name	Abundance	Biomass (kg)
	<i>Octopus bimaculatus/bimaculoides</i>	California two-spot octopus	3	0.014
	<i>Pachygrapsus crassipes</i>	striped shore crab	11	0.125
	<i>Panulirus interruptus</i>	striped shore crab	13	9.714
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	76	0.190
			405	10.41

El Segundo Generating Station – Heat Treatment Impingement Data

Date: July 27, 2006 Units 3&4

Fish	Taxon	Common Name	Survey Totals	
			Abundance	Biomass (kg)
	<i>Cheilotrema saturnum</i>	black croaker	10	3.036
	<i>Chromis punctipinnis</i>	blacksmith	1	0.083
	<i>Clinocottus analis</i>	woolly sculpin	1	0.001
	<i>Embiotoca jacksoni</i>	black perch	65	22.054
	<i>Girella nigricans</i>	opaleye	6	6.347
	<i>Hyperprosopon argenteum</i>	walleye surfperch	1	0.067
	<i>Hypsoblennius gilberti</i>	rockpool blenny	3	0.002
	<i>Medialuna californiensis</i>	halfmoon	2	0.554
	<i>Menticirrhus undulatus</i>	California corbina	4	1.507
	<i>Myliobatis californica</i>	bat ray	31	19.995
	<i>Oxyjulis californica</i>	senorita	2	0.112
	<i>Paralabrax clathratus</i>	kelp bass	54	25.09
	<i>Paralabrax nebulifer</i>	barred sand bass	3	1.489
	<i>Phanerodon furcatus</i>	white seaperch	4	0.582
	<i>Rhacochilus toxotes</i>	rubberlip seaperch	2	0.777
	<i>Rhacochilus vacca</i>	pile perch	2	0.331
	<i>Scorpaena guttata</i>	California scorpionfish	5	1.868
	<i>Sebastes auriculatus</i>	brown rockfish	2	0.630
	<i>Umbrina roncadore</i>	yellowfin croaker	1	0.400
	<i>Urobatis halleri</i>	round stingray	1	0.100
			200	85.025

Shellfish	Taxon	Common Name	Abundance	Biomass (kg)
	<i>Cancer amphioetus</i>	bigtooth rock crab	1	0.002
	<i>Cancer antennarius</i>	Pacific rock crab	3	0.071
	<i>Cancer anthonyi</i>	yellow crab	146	0.381
	<i>Cancer gracilis</i>	graceful crab	21	0.032
	<i>Cancer jordani</i>	hairy rock crab	1	0.002
	<i>Hemigrapsus oregonensis</i>	yellow shore crab	1	0.001
	<i>Heptacarpus palpator</i>	intertidal coastal shrimp	9	0.003
	<i>Heptacarpus</i> sp	coastal shrimp, unid.	1	0.001
	<i>Lysmata californica</i>	red rock shrimp	43	0.024
		California two-spot		
	<i>Octopus bimaculatus/bimaculoides</i>	octopus	2	0.006
	<i>Pachygrapsus crassipes</i>	striped shore crab	1	0.027
	<i>Panulirus interruptus</i>	California spiny lobster	18	9.187
	<i>Pugettia producta</i>	northern kelp crab	1	0.077
	<i>Pyromaia tuberculata</i>	tuberculate pear crab	10	0.010
			258	9.824

El Segundo Generating Station

Appendix F

Master Species List

F1. Entrainment Master Species List

F2. Impingement Master Species List –
Invertebrates

F3. Impingement Master Species List - Fishes

Appendix F1

Master Species List of organisms identified in the entrainment samples.

TaxaName	Taxon	Common Name
Cephalopoda	<i>Loligo opalescens</i>	market squid
Decapoda	unidentified crab (megalops)	unid. crab megalops
Palinuridae	<i>Panulirus interruptus</i> (phyllosome)	California spiny lobster (larval)
Anomura	Anomura unid. (megalops)	crustaceans
Paguridae	Paguridae unid. (megalops)	hermit crab megalops
Porcellanidae	<i>Pachycheles rudis</i> (megalops)	thickclaw porcelain crab megalops
	<i>Pachycheles</i> spp. (megalops)	porcelain crabs megalops
	<i>Petrolisthes</i> spp. (megalops)	porcelain crab megalops
	Porcellanidae unid. (megalops)	porcelain crab megalops
Hippidae	<i>Emerita analoga</i> (megalops)	mole crabs megalops
Diogenidae	Diogenidae (megalops)	left-handed hermit crabs megalops
Brachyura	Brachyura unid. (megalops)	unidentified crab megalops
Majidae	<i>Pugettia</i> spp. (megalops)	kelp crabs megalops
Cancridae	<i>Cancer antennarius</i> (megalops)	brown rock crab megalops
	<i>Cancer anthonyi</i> (megalops)	yellow crab megalops
	<i>Cancer gracilis</i> (megalops)	slender crab megalops
	<i>Cancer oregonensis</i> (megalops)	pygmy rock crab
	<i>Cancer productus</i> (megalops)	red rock crab megalops
	<i>Cancer</i> spp. (megalops)	cancer crabs megalops
Portunidae	<i>Portunus xantusii</i> (megalops)	Xantus' swimming crab megalops
Xanthidae	<i>Lophopanopeus</i> spp. (megalops)	black-clawed crab megalops
Pinnotheridae	<i>Pinnixa</i> spp. (megalops)	pea crabs megalops
	<i>Pinnotheres</i> spp. (megalops)	pea crab megalops
	Pinnotheridae (megalops)	pea crab megalops
Grapsidae	Grapsidae unid. (megalops)	shore crab megalops
	<i>Hemigrapsus oregonensis</i> (megalops)	yellow shore crab megalops
Osteichthys	fish eggs unid.	unidentified fish eggs
	larvae, unidentified yolksac	unidentified yolksac larvae
	larval fish - damaged	unidentified larval fishes
	larval fish fragment	unidentified larval fishes
	larval/post-larval fish unid.	larval fishes
Acanthoptergii	Sciaenidae / Paralichthyidae / Labridae (eggs)	fish eggs
Clupeiformes	Clupeiformes unid.	herrings and anchovies
Clupeidae	<i>Sardinops sagax</i>	Pacific sardine
Engraulidae	Engraulidae unid.	anchovies
	Engraulidae unid. (eggs)	anchovy eggs
	<i>Engraulis mordax</i>	northern anchovy

(table continued)

Appendix F1 (continued). Master Species List of organisms identified in the entrainment samples.

TaxaName	Taxon	Common Name
Argentinidae	<i>Argentina sialis</i>	Pacific argentine
Bathylagidae	Bathylagidae (eggs)	blacksmelt eggs
	Bathylagidae unid.	blacksmelt
	<i>Bathylagus ochotensis</i>	popeye blacksmelt
	<i>Leuroglossus stilbuis</i>	California smoothtongue
Gonostomatidae	<i>Cyclothone signata</i>	showy bristlemouth
Myctophidae	<i>Diaphus theta</i>	California headlight fish
	Myctophidae unid.	lanternfishes
	<i>Nannobranchium</i> spp.	lanternfishes
	<i>Stenobranchius leucopsarus</i>	northern lampfish
	<i>Triphoturus mexicanus</i>	Mexican lampfish
Gobiesocidae	<i>Gobiesox</i> spp.	clingfishes
Merlucciidae	<i>Merluccius productus</i>	Pacific hake
	<i>Merluccius</i> spp. (eggs)	hake eggs
Ophidiidae	<i>Chilara taylori</i>	spotted cusk-eel
	Ophidiidae unid.	cusk-eels
	<i>Ophidion scrippsae</i>	basketweave cusk-eel
Bythitidae	<i>Brosomphycis marginata</i>	red brotula
Atherinopsidae	<i>Atherinops affinis</i>	topsmelt
	Atherinopsidae unid.	silversides
	Atherinopsidae unid. (eggs)	silverside eggs
	<i>Atherinopsis californiensis</i>	jacksmelt
	<i>Leuresthes tenuis</i>	California grunion
Syngnathidae	Syngnathidae unid.	pipefishes
	<i>Syngnathus leptorhynchus</i>	bay pipefish
	<i>Syngnathus</i> spp.	pipefishes
Scorpaenidae	<i>Scorpaena guttata</i>	California scorpionfish
	<i>Sebastes</i> spp.	rockfishes
Hexagrammidae	Hexagrammidae unid.	greenlings
	<i>Zaniolepis frenata</i>	shortspine combfish
	<i>Zaniolepis latipinnis</i>	longspine combfish
	<i>Zaniolepis</i> spp.	combfishes
Cottidae	<i>Artedius lateralis</i>	smoothhead sculpin
	Chitonotus / Icelinus	sculpins
	<i>Chitonotus pugetensis</i>	roughback sculpin
	<i>Clinocottus analis</i>	wooly sculpin
	<i>Clinocottus</i> spp.	sculpins
	Cottidae unid.	sculpins
	<i>Cottus asper</i>	prickly sculpin
	<i>Icelinus quadriseriatus</i>	yellowchin sculpin
	<i>Icelinus</i> spp.	sculpins
	<i>Leptocottus armatus</i>	Pacific staghorn sculpin

(table continued)

Appendix F1 (continued). Master Species List of organisms identified in the entrainment samples.

TaxaName	Taxon	Common Name
Cottidae	<i>Oligocottus</i> spp.	sculpins
	<i>Ruscarius creaseri</i>	roughcheek sculpin
Cottidae	<i>Scorpaenichthys marmoratus</i>	cabezon
Agonidae	<i>Odontopyxis trispinosa</i>	pygmy poacher
Cyclopteridae	<i>Liparis mucosus</i>	slimy snailfish
	<i>Liparis</i> spp.	snailfishes
Serranidae	<i>Paralabrax clathratus</i>	kelp bass
	<i>Paralabrax maculatofasciatus</i>	spotted sand bass
	<i>Paralabrax</i> spp.	sand bass
	<i>Paralabrax</i> spp. (eggs)	sand bass eggs
	Serranidae (eggs)	sea bass eggs
Haemulidae	<i>Anisotremus davidsonii</i>	sargo
	Haemulidae unid.	grunts
	<i>Xenistius californiensis</i>	salema
Sciaenidae	<i>Atractoscion nobilis</i>	white seabass
	<i>Atractoscion nobilis</i> (Sciaenidae)	white seabass
	<i>Cheilotrema saturnum</i>	black croaker
	<i>Genyonemus lineatus</i>	white croaker
	<i>Genyonemus lineatus</i> (eggs)	white croaker eggs
	<i>Menticirrhus undulatus</i>	California corbina
	<i>Roncador stearnsi</i>	spotfin croaker
	Sciaenidae unid.	croakers
	Sciaenidae unid. (eggs)	croaker eggs
	<i>Seriphus politus</i>	queenfish
	<i>Umbrina roncador</i>	yellowfin croaker
Kyphosidae	<i>Girella nigricans</i>	opaleye
Pomacentridae	<i>Chromis punctipinnis</i>	blacksmith
	<i>Hypsypops rubicundus</i>	garibaldi
	Pomacentridae unid.	damsel-fishes
Sphyraenidae	<i>Sphyraena argentea</i>	Pacific barracuda
	<i>Sphyraena argentea</i> (eggs)	Pacific barracuda eggs
	<i>Sphyraena</i> spp.	barracudas
Labridae	<i>Halichoeres semicinctus</i>	rock wrasse
	Labridae unid.	wrasses
	Labridae unid. (eggs)	wrasse eggs
	<i>Oxyjulis californica</i>	senorita
	<i>Semicossyphus pulcher</i>	California sheephead
Bathymasteridae	Bathymasteridae unid.	ronquils
Blenniidae	<i>Hypsoblennius jenkinsi</i>	mussel blenny
	<i>Hypsoblennius</i> spp.	combtooth blennies
Clinidae	<i>Gibbonsia</i> spp.	clinid kelpfishes
Chaenopsidae	Chaenopsidae unid.	tube blennies

(table continued)

Appendix F1 (continued). Master Species List of organisms identified in the entrainment samples.

TaxaName	Taxon	Common Name
Labrisomidae	Labrisomidae unid.	labrisomid blennies
Gobiidae	<i>Acanthogobius flavimanus</i>	yellowfin goby
	<i>Gillichthys mirabilis</i>	longjaw mudsucker
	Gobiidae unid.	gobies
Gobiidae	<i>Lepidogobius lepidus</i>	bay goby
	<i>Lythrypnus zebra</i>	zebra goby
	<i>Rhinogobiops nicholsi</i>	blackeye goby
	<i>Typhlogobius californiensis</i>	blind goby
Stromateidae	<i>Peprilus simillimus</i>	Pacific butterfish
Pleuronectiformes	Pleuronectiformes unid.	flatfishes
Pleuronectidae	<i>Isopsetta isolepis</i>	butter sole
	<i>Lepidopsetta bilineata</i>	rock sole
	<i>Lyopsetta exilis</i>	slender sole
	<i>Lyopsetta exilis</i> (eggs)	slender sole eggs
	<i>Microstomus pacificus</i>	Dover sole
	<i>Parophrys vetulus</i>	English sole
	<i>Platichthys stellatus</i>	starry flounder
	Pleuronectes spp.	righteye flounders
	Pleuronectidae unid.	righteye flounders
	Pleuronectidae unid. (eggs)	righteye flounder eggs
	<i>Pleuronichthys coenosus</i> (eggs)	c-o turbot eggs
	<i>Pleuronichthys guttulatus</i>	diamond turbot
	<i>Pleuronichthys guttulatus</i> (eggs)	diamond turbot eggs
	<i>Pleuronichthys ritteri</i>	spotted turbot
	<i>Pleuronichthys</i> spp.	turbots
	<i>Pleuronichthys</i> spp. (eggs)	turbot eggs
	<i>Pleuronichthys verticalis</i>	hornyhead turbot
	<i>Psettichthys melanostictus</i>	sand sole
Paralichthyidae	<i>Citharichthys sordidus</i>	Pacific sanddab
	<i>Citharichthys</i> spp.	sanddabs
	<i>Citharichthys</i> spp. (eggs)	sanddab eggs
	<i>Citharichthys stigmaeus</i>	speckled sanddab
	<i>Hippoglossina stomata</i>	bigmouth sole
	Paralichthyidae unid.	sand flounders
	Paralichthyidae unid. (eggs)	sand flounder eggs
	<i>Paralichthys californicus</i>	California halibut
	<i>Paralichthys californicus</i> (eggs)	California halibut eggs
	<i>Xystreurus liolepis</i>	fantail sole
Cynoglossidae	Cynoglossidae unid.	tongue soles
	<i>Symphurus atricauda</i>	California tonguefish

Appendix F2

Master Species List of invertebrates identified in the impingement samples.

Taxon	Common Name
<i>Acanthodoris rhodoceras</i>	black-tipped spiny doris
<i>Alpheus californiensis</i>	mudflat snapping shrimp
<i>Ammothoa hilgendorfi</i>	sea spider
<i>Aurelia aurita</i>	moon jelly
<i>Betaeus longidactylus</i>	visored shrimp
<i>Blepharipoda occidentalis</i>	spiny mole crab
<i>Cancer amphioetus</i>	bigtooth rock crab
<i>Cancer antennarius</i>	Pacific rock crab
<i>Cancer anthonyi</i>	yellow crab
<i>Cancer gracilis</i>	graceful crab
<i>Cancer jordani</i>	hairy rock crab
<i>Cancer productus</i>	red rock crab
<i>Chrysaora colorata</i>	purple-striped jellyfish
Cnidaria	sea jelly, unid.
<i>Crangon nigromaculata</i>	blackspotted bay shrimp
<i>Crassadoma gigantea</i>	giant rock scallop
<i>Dendronotus frondosus</i>	leafy dendronotid
<i>Dendronotus iris</i>	giant-frond-aeolis
<i>Doriopsilla albopunctata</i>	salted yellow doris
<i>Doriopsilla gemela</i>	yellow gilled doris
<i>Flabellina trilineata</i>	threeline aeolis
<i>Girella nigricans</i>	opaleye
<i>Hemigrapsus oregonensis</i>	yellow shore crab
<i>Heptacarpus palpator</i>	intertidal coastal shrimp
<i>Heptacarpus</i> sp	coastal shrimp, unid.
<i>Hermisenda crassicornis</i>	hermissenda
Leptopecten	scallop, unid.
<i>Leptopecten</i> sp	scallop, unid.
<i>Loligo opalescens</i>	California market squid
<i>Lophopanopeus bellus</i>	blackclaw crestleg crab
<i>Lophopanopeus leucomanus</i>	knobkneed crestleg crab
<i>Loxorhynchus grandis</i>	sheep crab
<i>Lysmata californica</i>	red rock shrimp
<i>Navanax inermis</i>	California aglaja
Nudibranchia	nudibranch, unid.
<i>Octopus bimaculatus/bimaculoides</i>	California two-spot octopus
<i>Ophiothrix spiculata</i>	shiny brittle star

(table continued)

Taxon	Common Name
<i>Ophiuroidea</i>	brittle star, unid.
<i>Pachygrapsus crassipes</i>	striped shore crab
<i>Pagurus</i> sp	hermit crab, unid.
<i>Panulirus interruptus</i>	California spiny lobster
<i>Parastichopus parvimensis</i>	warty sea cucumber
<i>Pisaster brevispinus</i>	short-spined sea star
<i>Podochela hemphill</i>	hemphill kelp crab
<i>Polycera atra</i>	orange-spike polycera
<i>Polyorchis penicillatus</i>	red jellyfish
<i>Portunus xantusii</i>	Xantus swimming crab
<i>Pugettia producta</i>	northern kelp crab
<i>Pycnogonida</i>	sea spider, unid.
<i>Pyromaia tuberculata</i>	tuberculate pear crab
<i>Triopha maculata</i>	spotted triopha

Appendix F3

Master Species List of fishes identified in the impingement samples.

Taxon	Common Name
<i>Amphistichus argenteus</i>	barred surfperch
<i>Anisotremus davidsonii</i>	sargo
<i>Atherinops affinis</i>	topsmelt
<i>Atherinopsis californiensis</i>	jacksmelt
<i>Balistes polylepis</i>	finescale triggerfish
<i>Brachyistius frenatus</i>	kelp perch
<i>Cheilotrema saturnum</i>	black croaker
<i>Chromis punctipinnis</i>	blacksmith
<i>Citharichthys stigmaeus</i>	speckled sanddab
<i>Clinocottus analis</i>	woolly sculpin
<i>Cymatogaster aggregata</i>	shiner perch
<i>Embiotoca jacksoni</i>	black perch
<i>Engraulis mordax</i>	northern anchovy
<i>Girella nigricans</i>	opaleye
<i>Hyperprosopon argenteum</i>	walleye surfperch
<i>Hypsoblennius gentilis</i>	bay blenny
<i>Leuresthes tenuis</i>	California grunion
<i>Medialuna californiensis</i>	halfmoon
<i>Menticirrhus undulatus</i>	California corbina
<i>Myliobatis californica</i>	bat ray
<i>Ophidion scrippsae</i>	basketweave cusk-eel
<i>Oxyjulis californica</i>	senorita
<i>Paralabrax clathratus</i>	kelp bass
<i>Paralabrax nebulifer</i>	barred sand bass
<i>Paralichthys californicus</i>	California halibut
<i>Parophrys vetulus</i>	English sole
<i>Peprilus simillimus</i>	Pacific pompano
<i>Phanerodon furcatus</i>	white seaperch
<i>Platyrhinoidis triseriata</i>	thornback
<i>Pleuronichthys verticalis</i>	hornyhead turbot
<i>Rhacochilus toxotes</i>	rubberlip seaperch
<i>Rhacochilus vacca</i>	pile perch
<i>Roncador stearnsii</i>	spotfin croaker
<i>Sardinops sagax</i>	Pacific sardine
<i>Scomber japonicus</i>	Pacific chub mackerel
<i>Scorpaena guttata</i>	California scorpionfish
<i>Sebastes auriculatus</i>	brown rockfish

(table continued)

Taxon	Common Name
<i>Sebastes miniatus</i>	vermillion rockfish
<i>Semicossyphus pulcher</i>	California sheephead
<i>Seriphus politus</i>	queenfish
<i>Syngnathus</i> sp	pipefish, unid.
<i>Synodus lucioceps</i>	California lizardfish
<i>Trachurus symmetricus</i>	jack mackerel
<i>Umbrina roncadore</i>	yellowfin croaker
<i>Urobatis halleri</i>	round stingray
<i>Xenistius californiensis</i>	salema