Haynes 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 HnGS. Two Nortek Aquadopp® acoustic Doppler current profilers (ADCPs) were positioned in separate locations in San Pedro Bay, one (CM1) approximately 2.1 km (1.3 mi) from shore off the entrance to Alamitos Bay at a depth of –12.4 m (–40.7 ft) MLLW, and a second unit (CM2) approximately 3.2 km (2.0 mi) from shore off the San Gabriel River mouth at a depth of -16.2 m (–53.1 ft) MLLW (Figure 3.3-2). Both stations were commissioned on January 10, 2006. Station CM2 was decommissioned on January 8, 2007 and Station CM1 was decommissioned on January 11, 2007. Data were downloaded on May 2, 2006 and August 31, 2006. From May 2–5, 2006 Station CM1 did not collect current data due to operational error after the data download. The unit at CM1 had an operating frequency of 1 MHz, while the unit at CM2 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 HnGS (Stations CM 1 and CM 2).

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 1	1 MHz	12.4	15	1.0	15	0.8	87%	180	1.0
CM 2	600 kHz	16.2	20	1.0	20	1.4	100%	300	1.0

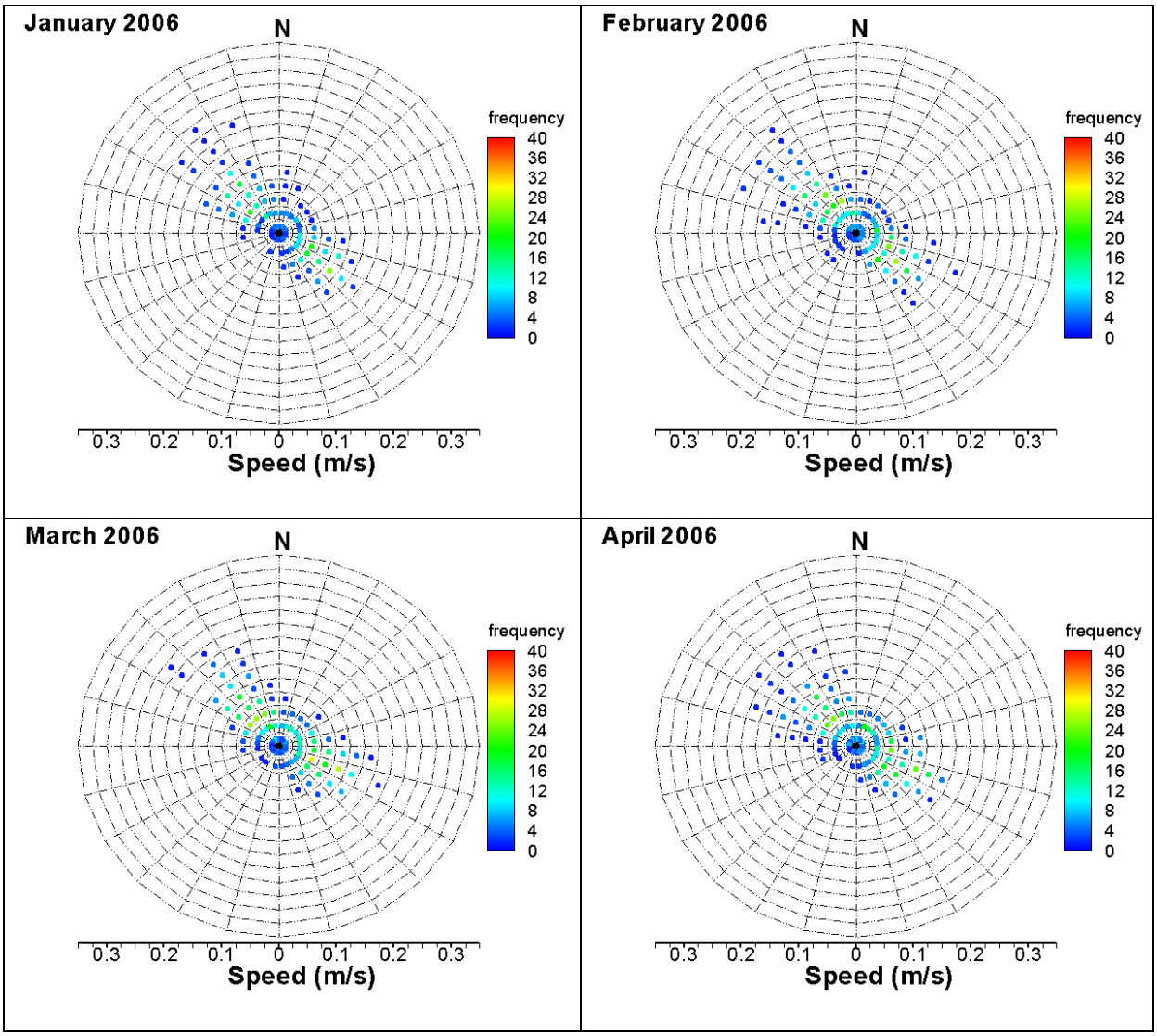


Figure A1-1. Hourly estimates of water column speed and direction at location CM 1, January – April, 2006. Frequency is number of hourly observations.

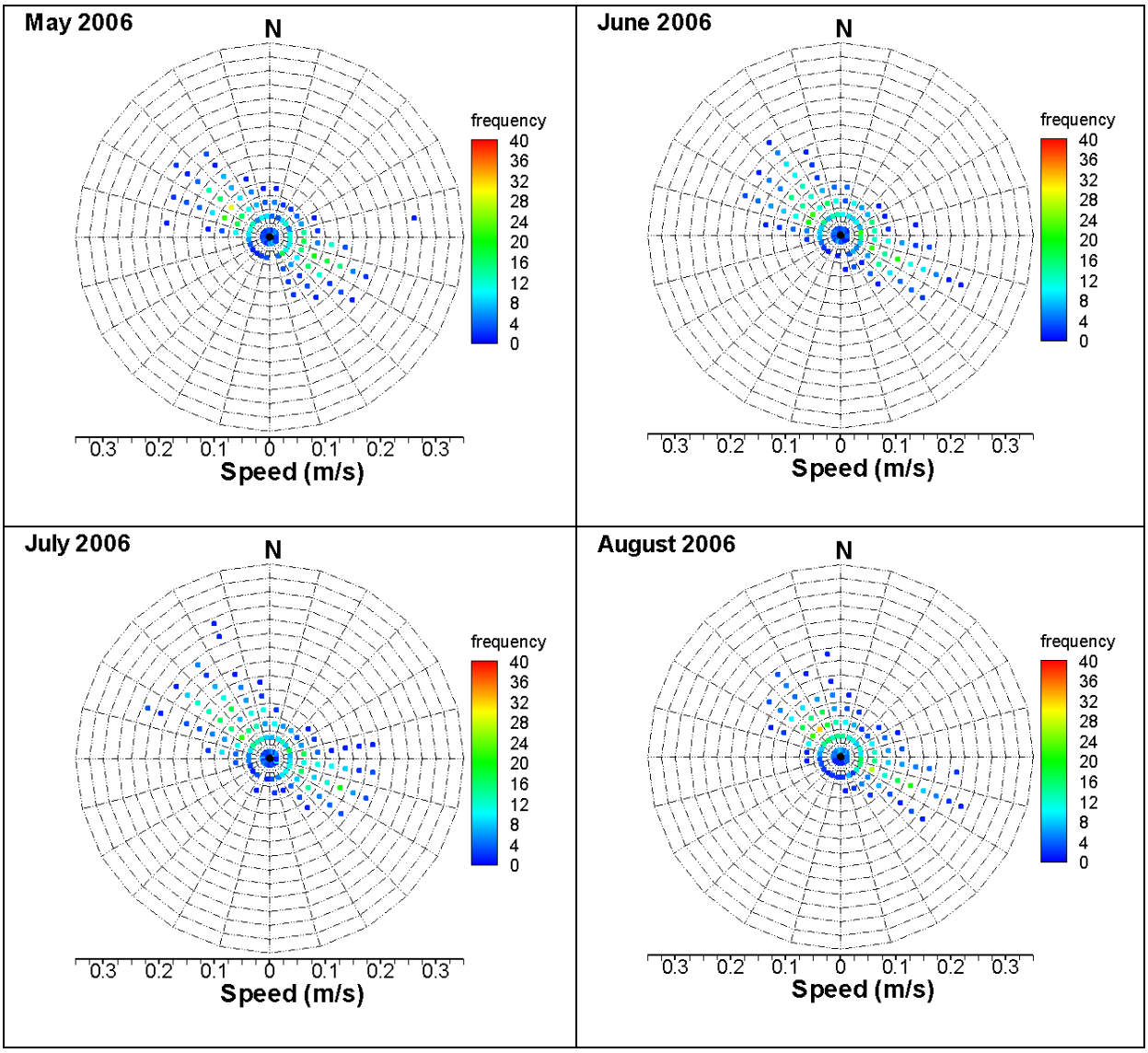


Figure A1-2. Hourly estimates of water column speed and direction at location CM 1, May – August 2006. Frequency is number of hourly observations.

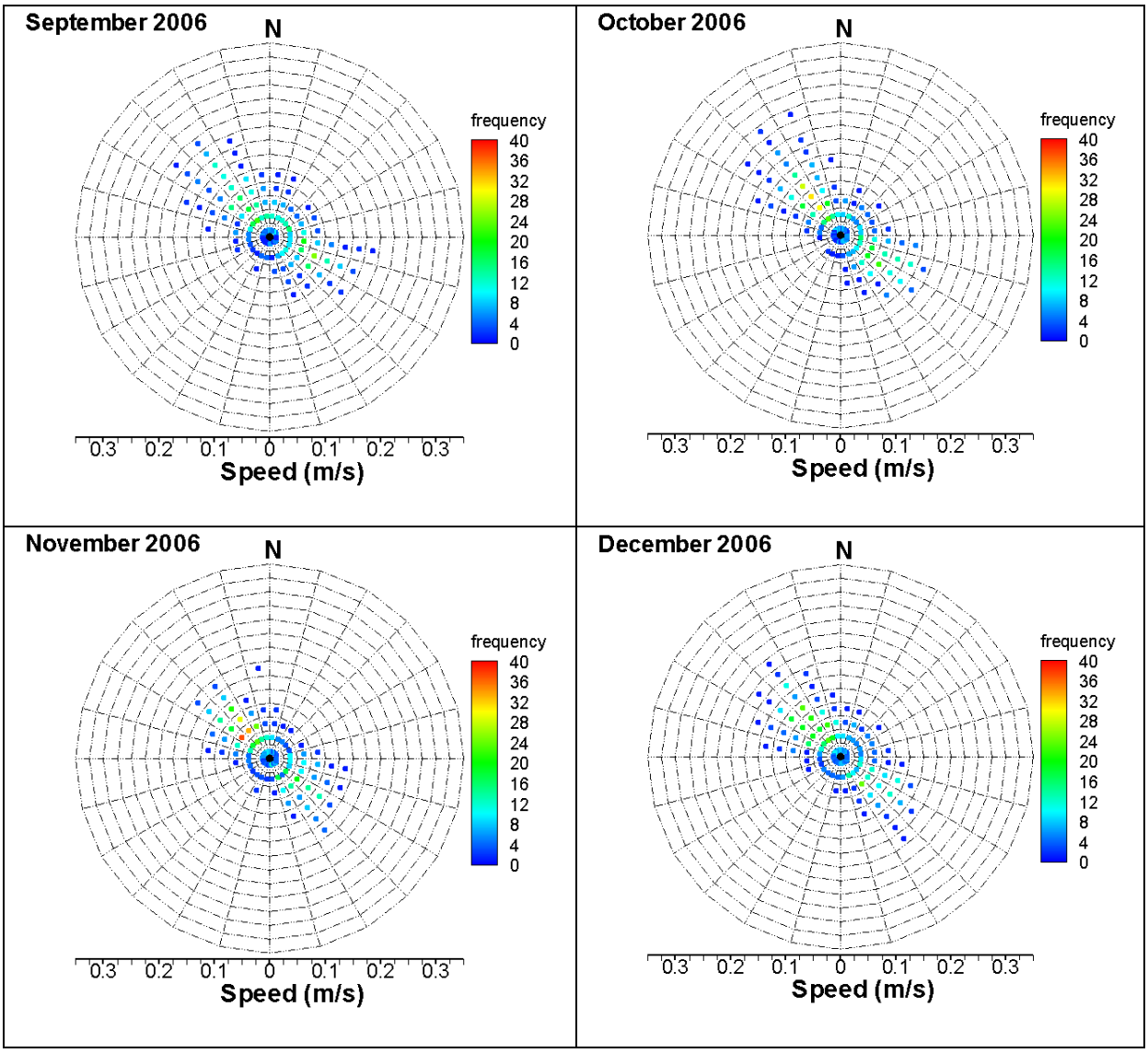


Figure A1-3. Hourly estimates of water column speed and direction at location CM 1, September – December 2006. Frequency is number of hourly observations.

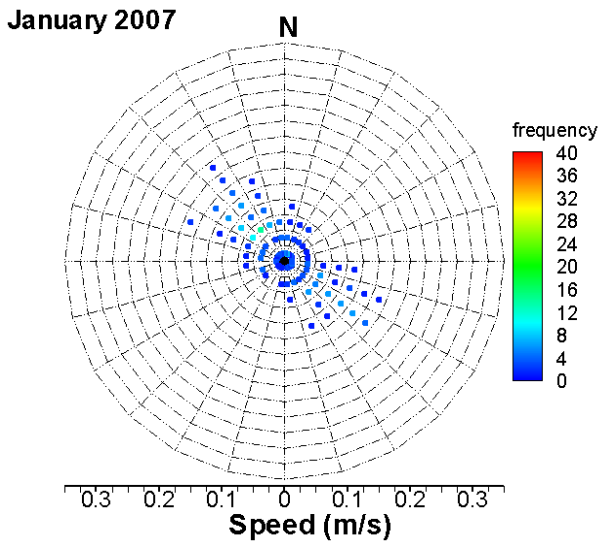


Figure A1-4. Hourly estimates of water column speed and direction at location CM 1, January 2007. Frequency is number of hourly observations.

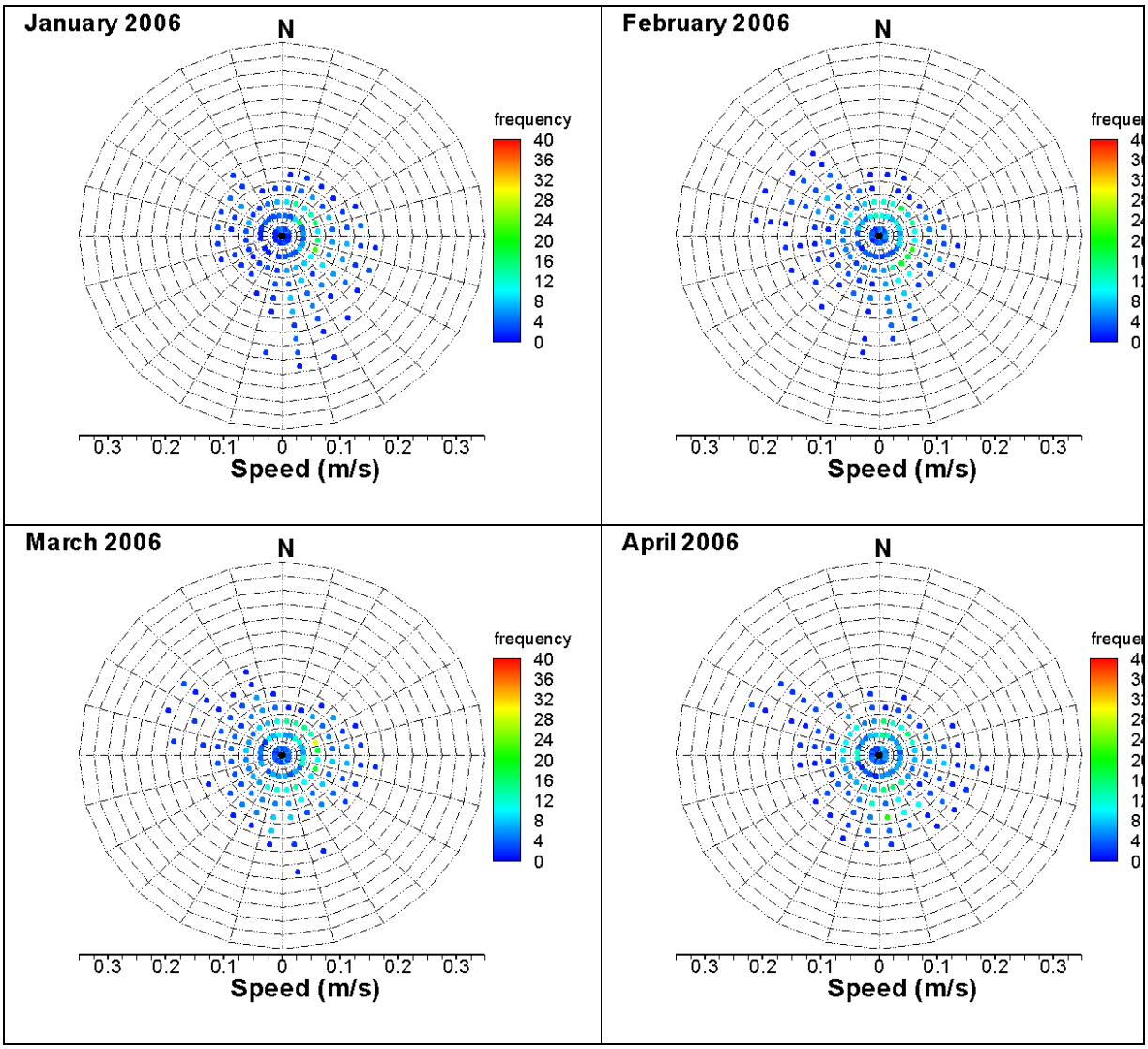


Figure A1-5. Hourly estimates of water column speed and direction at location CM 2, January – April, 2006. Frequency is number of hourly observations.

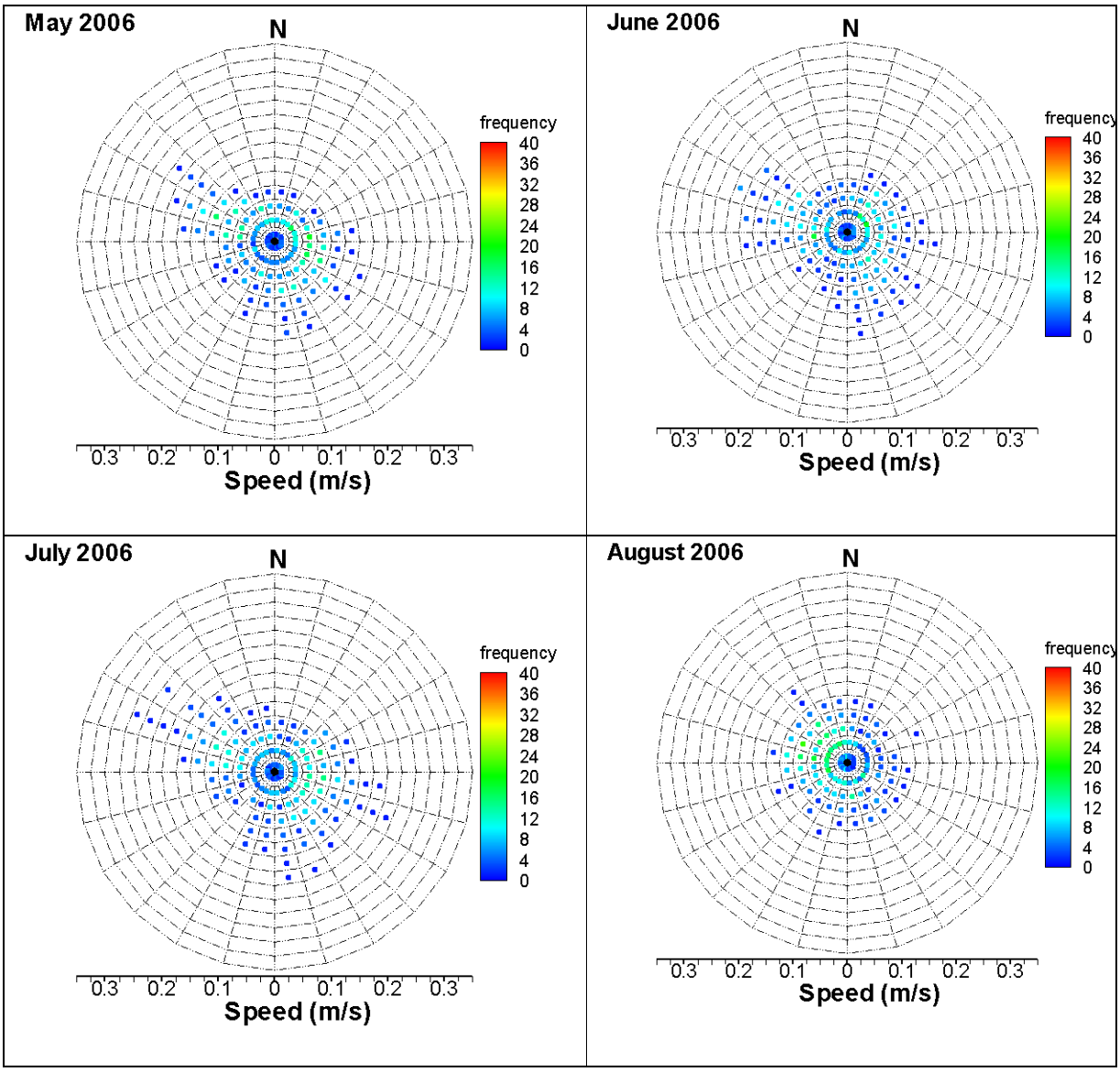


Figure A1-6. Hourly estimates of water column speed and direction at location CM 2, May – August 2006. Frequency is number of hourly observations.

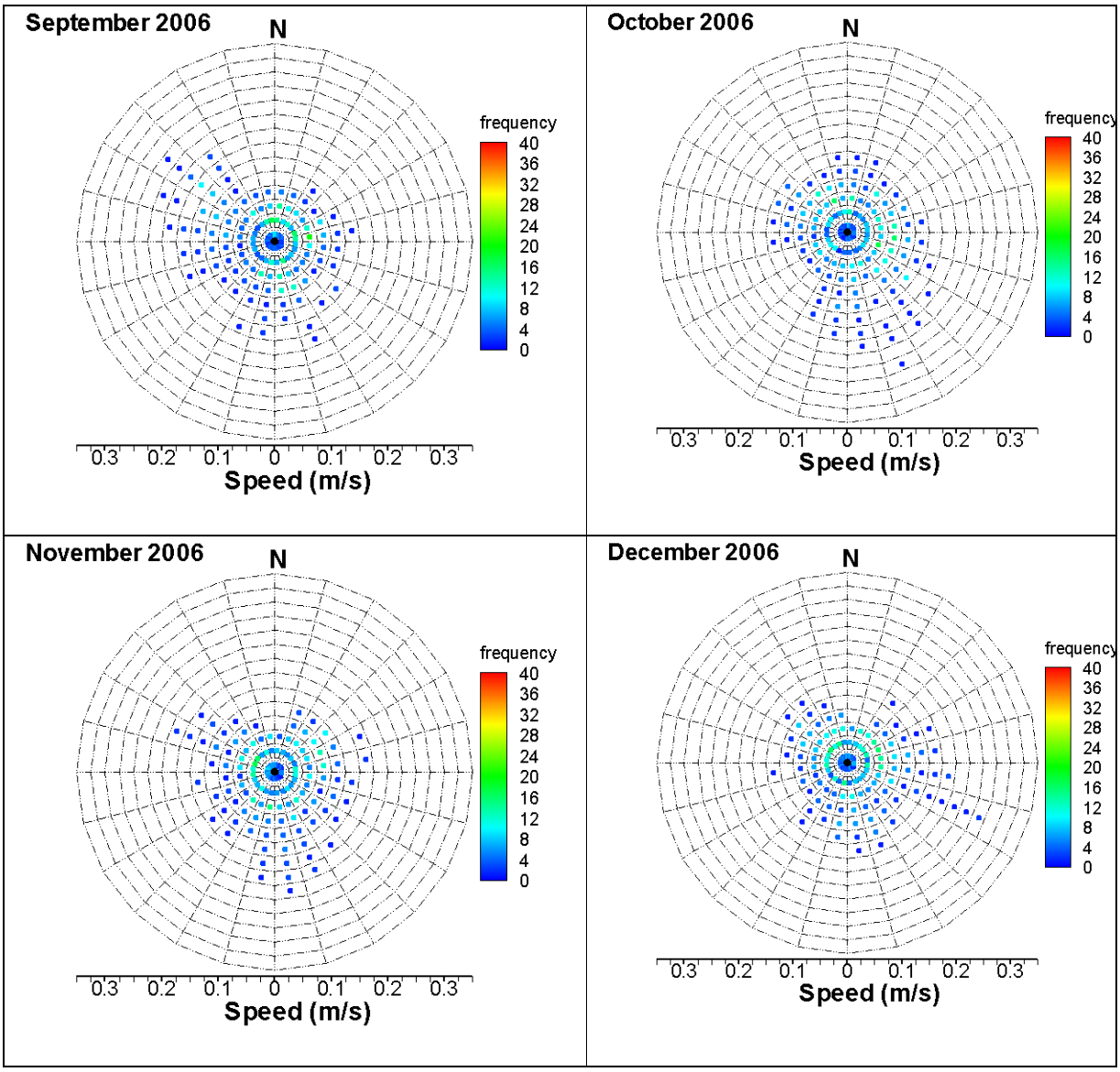


Figure A1-7. Hourly estimates of water column speed and direction at location CM 2, September – December 2006. Frequency is number of hourly observations.

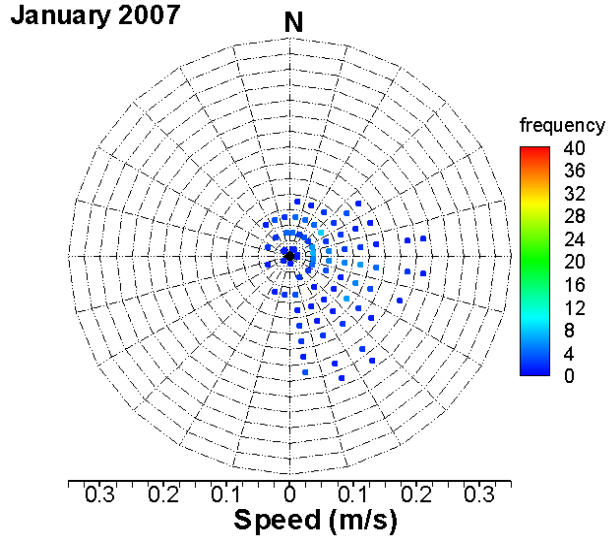


Figure A1.8. Hourly estimates of water column speed and direction at location CM 2, January 2007. Frequency is number of hourly observations.

Appendix A2
Source Water Temperatures from ADCP Instruments

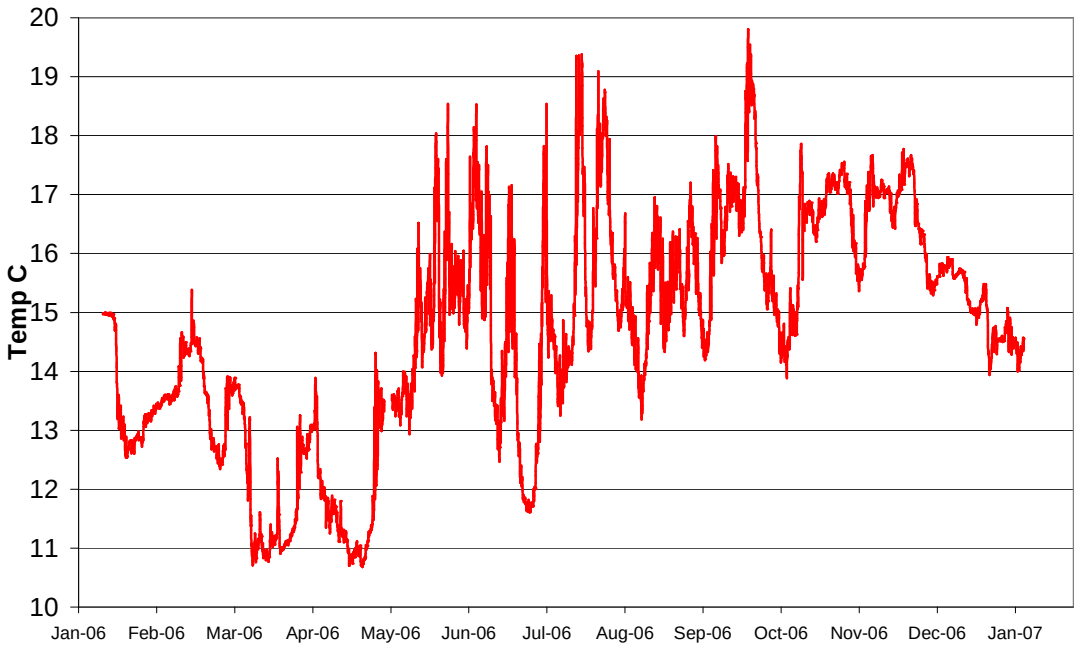


Figure A2-1. Annual temperature January 2006 through January 2007 at CM 1.

Table A2-1. Monthly and yearly mean temperatures recorded from January 2006 through January 2007 at CM1.

Month	Mean	Standard Dev	Max	Min
January	13.50	0.86	15.00	12.54
February	13.64	0.67	15.38	12.34
March	11.95	1.09	13.91	10.71
April	11.76	0.86	14.29	10.68
May	14.72	1.20	18.54	12.93
June	14.49	1.83	18.52	11.61
July	15.51	1.74	19.38	12.00
August	15.20	0.77	16.94	13.18
September	16.58	1.23	19.80	14.19
October	16.08	1.09	17.86	13.88
November	16.85	0.57	17.77	15.36
December	15.40	0.51	16.41	13.94
January 07	14.49	0.18	15.07	14.00
Total Year	**14.67**	**1.93**	**19.80**	**10.68**

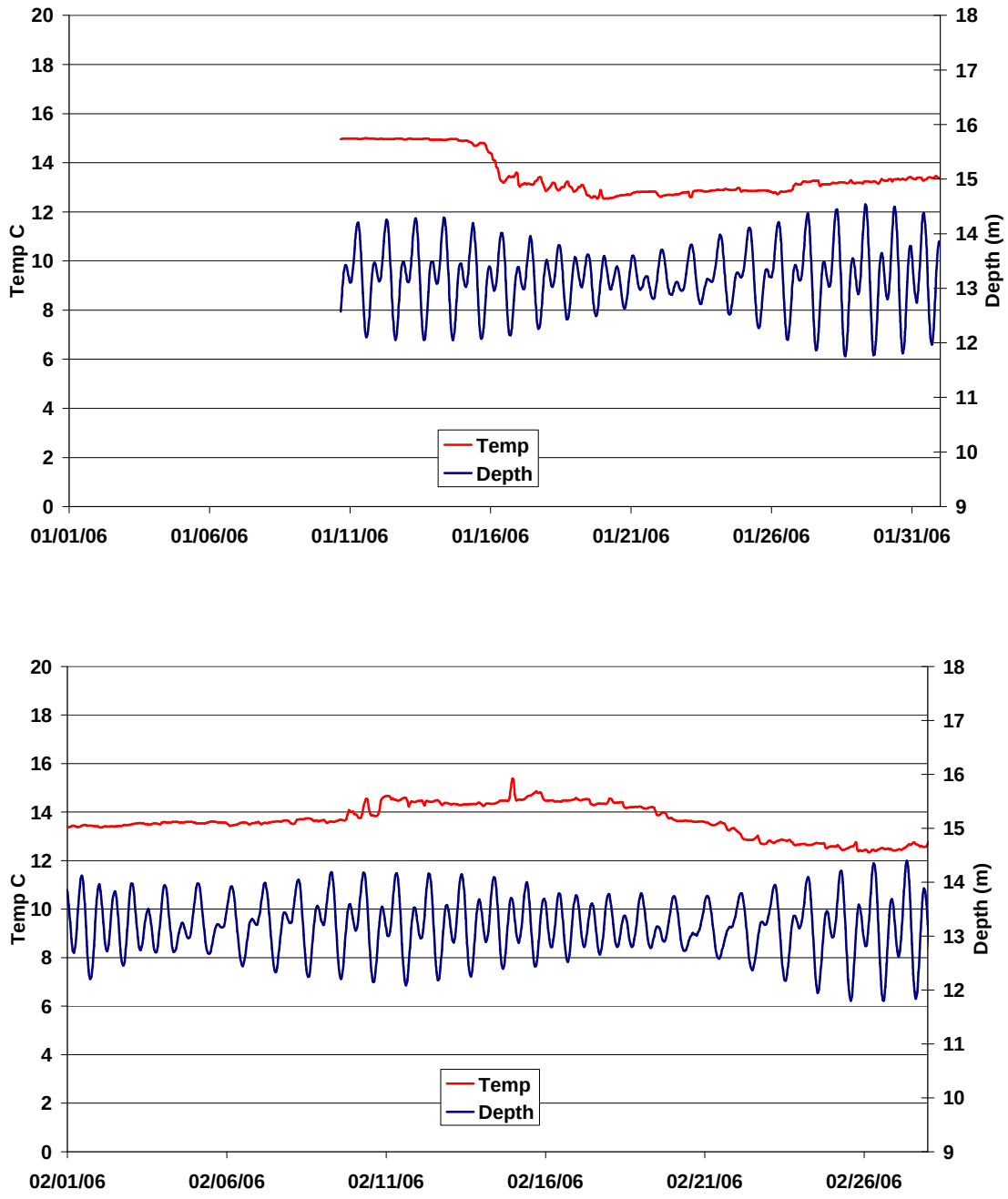


Figure A2-1. Near-bottom temperature and tidal depth from January (top) through February (bottom) 2006 at CM 1.

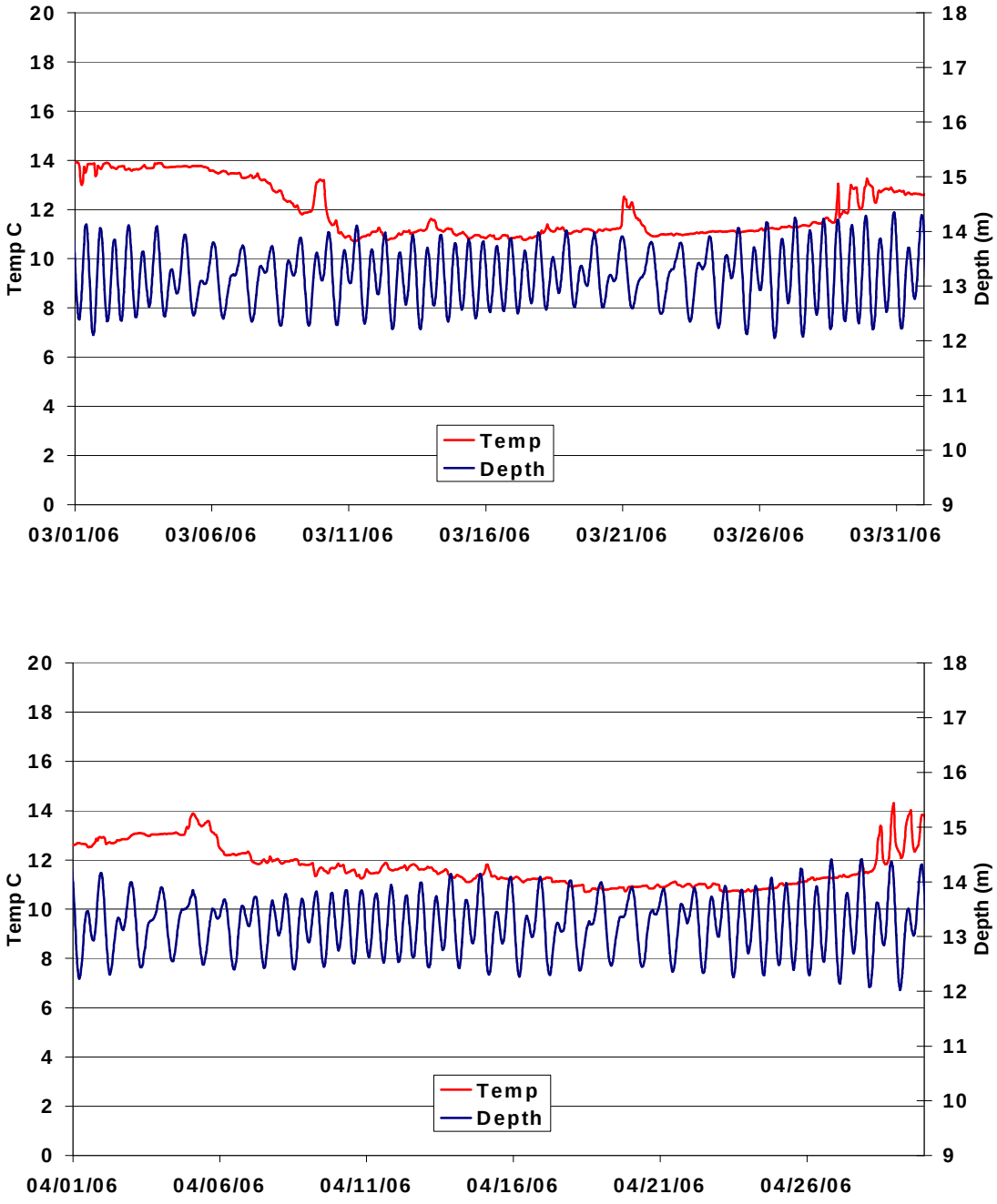


Figure A2-2. Near-bottom temperature and tidal depth from March (top) through April (bottom) 2006 at CM 1.

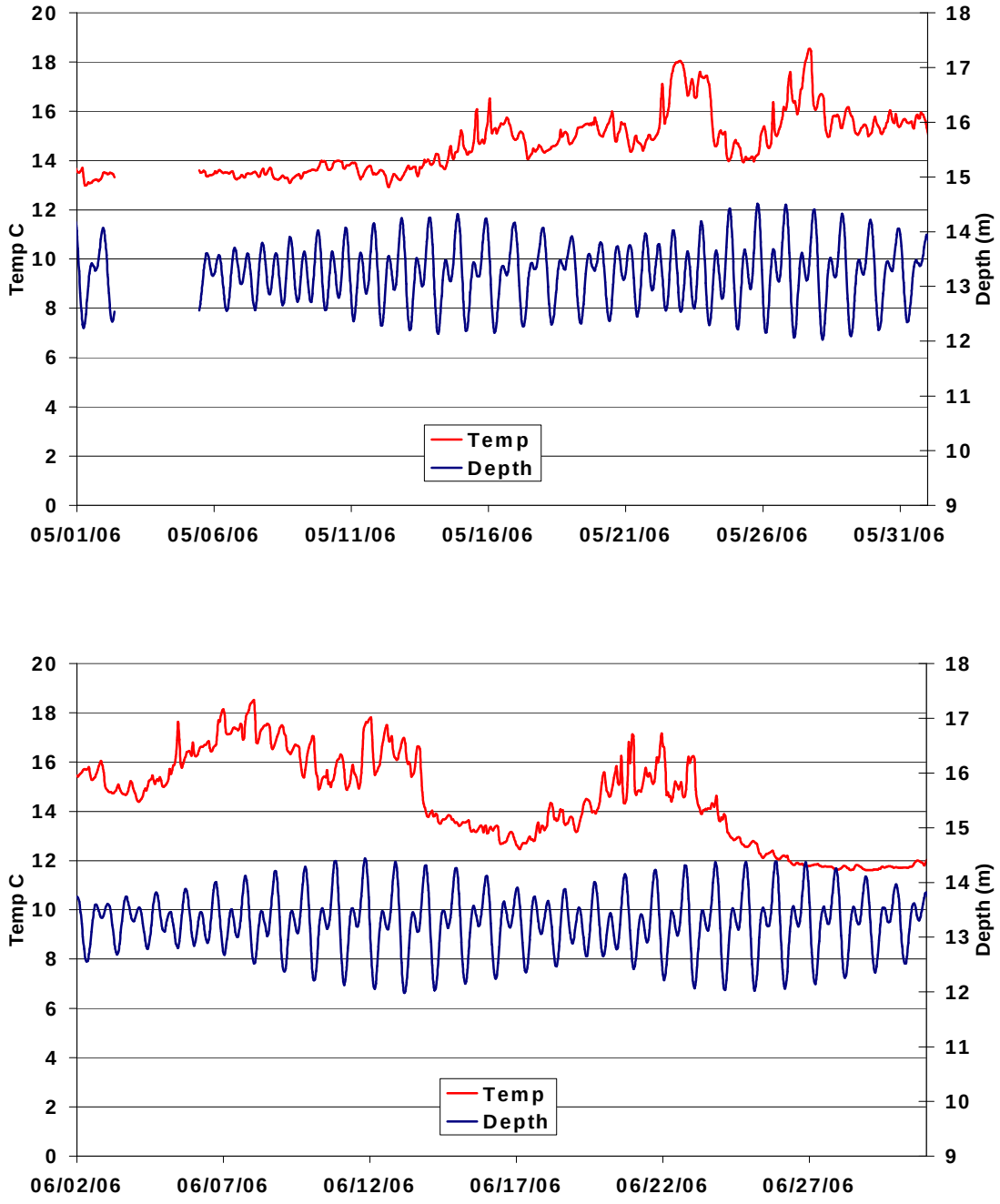


Figure A2-3. Near-bottom temperature and tidal depth from May (top) through June (bottom) 2006 at CM 1.

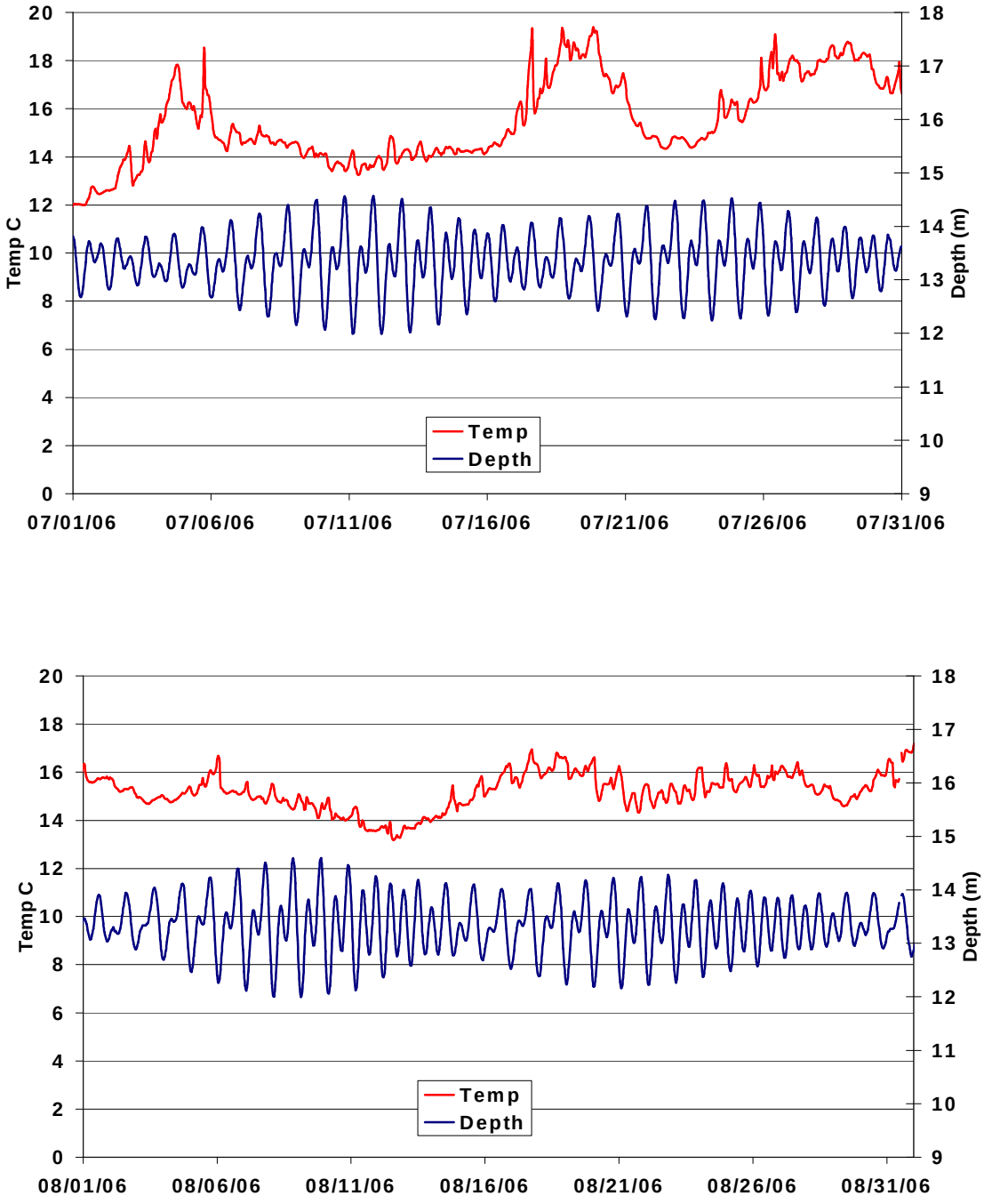


Figure A2-4. Near-bottom temperature and tidal depth from July (top) through August (bottom) 2006 at CM 1.

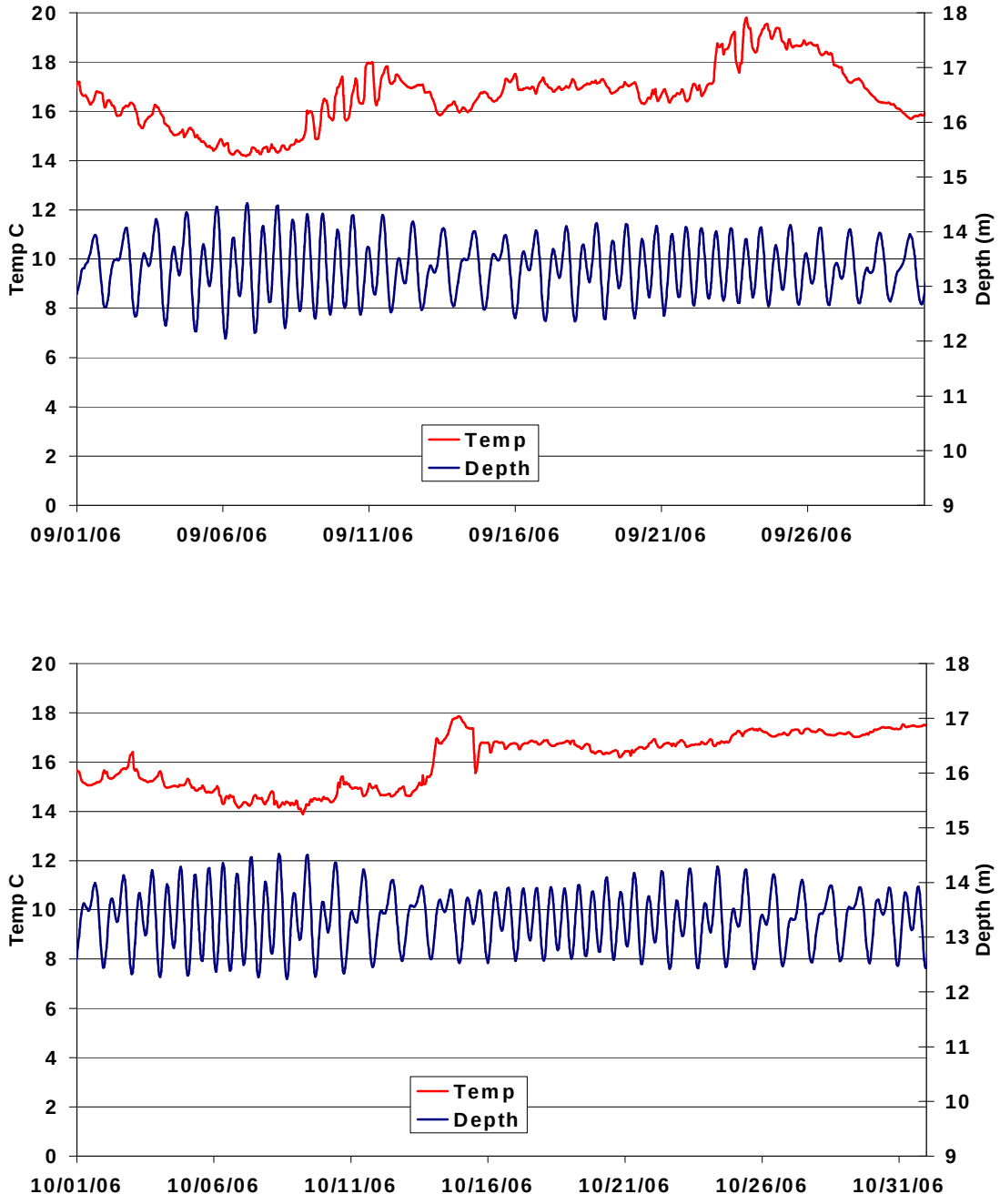


Figure A2-5. Near-bottom temperature and tidal depth from September (top) through October (bottom) 2006 at CM 1.

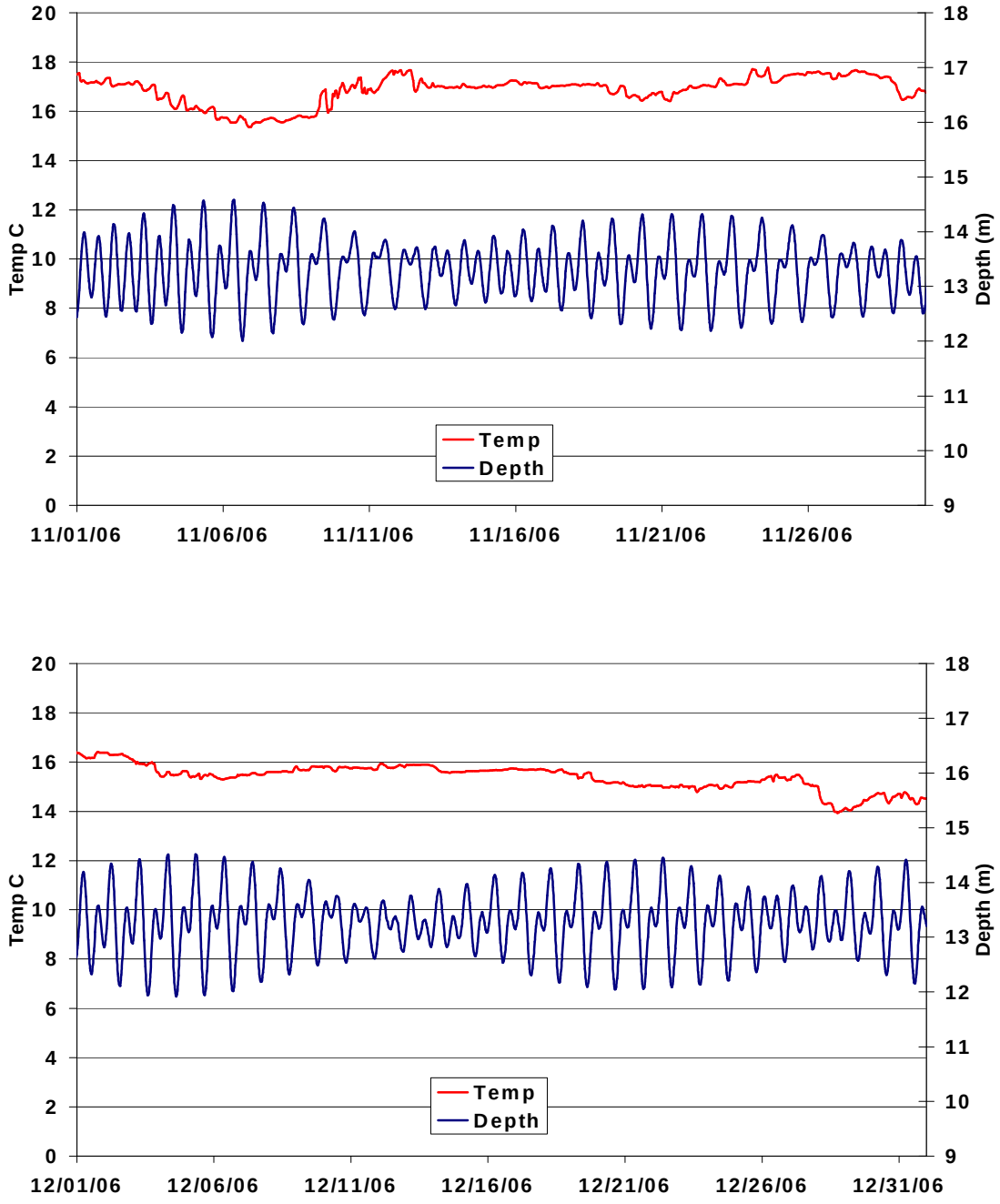


Figure A2-6. Near-bottom temperature and tidal depth from November (top) through December (bottom) 2006 at CM 1.

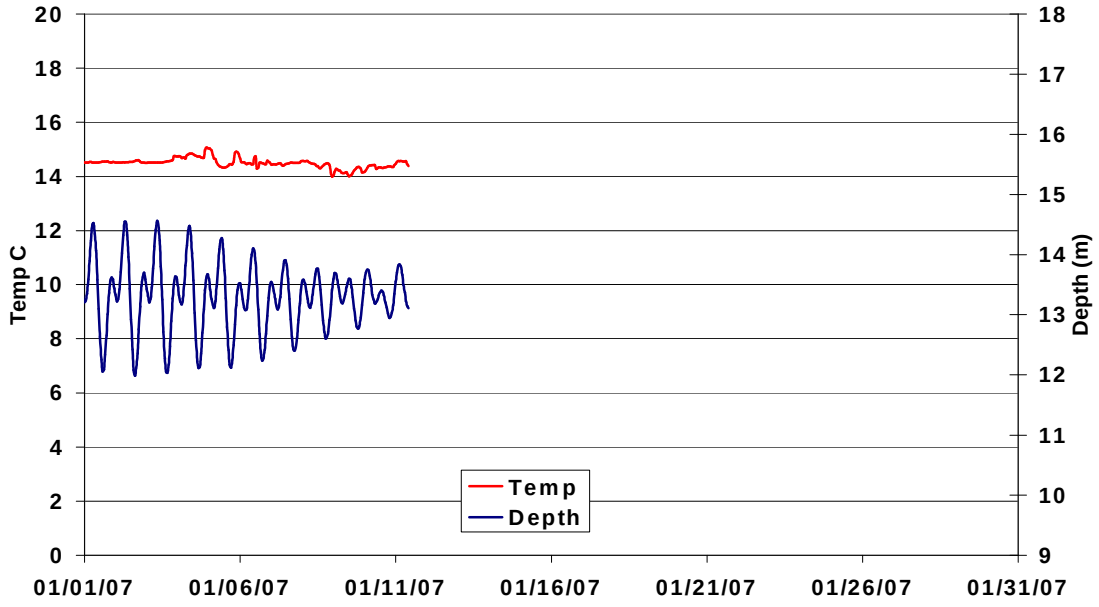


Figure A2-7. Near-bottom temperature and tidal depth from January, 2007 at CM 1.

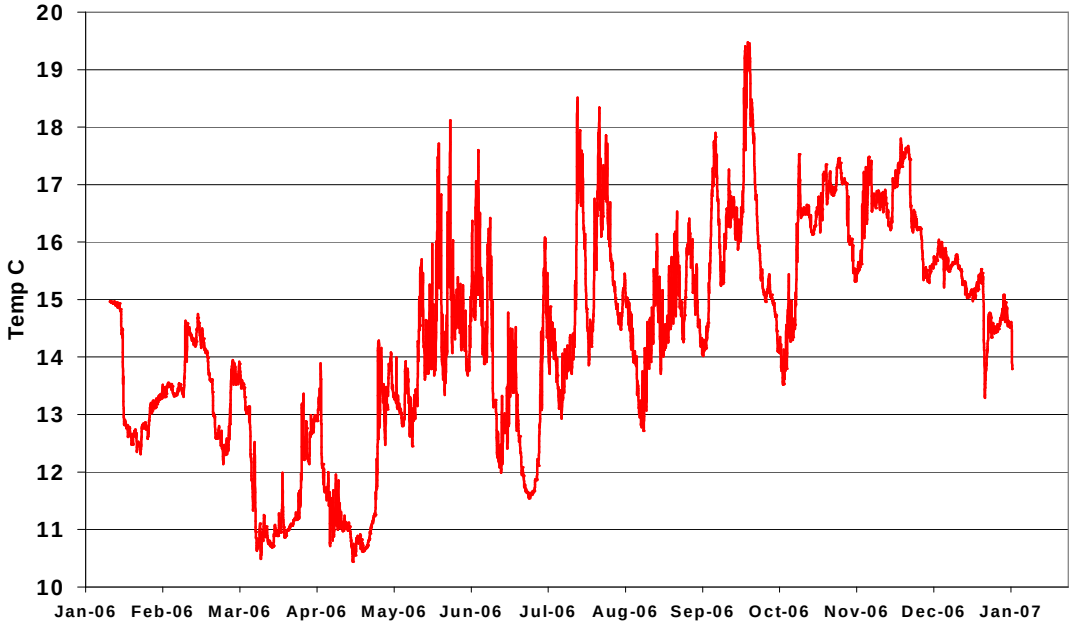


Figure A2-8. Annual temperature January 2006 through January 2007 at CM 2.

Table A2-2. Monthly and yearly mean temperatures recorded from January 2006 through January 2007 at CM2.

Month	Mean	Standard Dev	Max	Min
January	13.36	0.90	14.97	12.31
February	13.54	0.68	14.75	12.14
March	11.79	1.07	13.95	10.49
April	11.62	0.97	14.29	10.44
May	14.13	1.10	18.12	12.45
June	13.54	1.38	17.57	11.54
July	14.97	1.48	18.51	11.86
August	14.61	0.76	16.53	12.72
September	16.22	1.31	19.48	14.02
October	15.84	1.16	17.53	13.52
November	16.67	0.61	17.80	15.31
December	15.38	0.54	16.38	13.29
January 07	14.60	0.22	15.08	13.79
Total Year	**14.34**	**1.86**	**19.48**	**10.44**

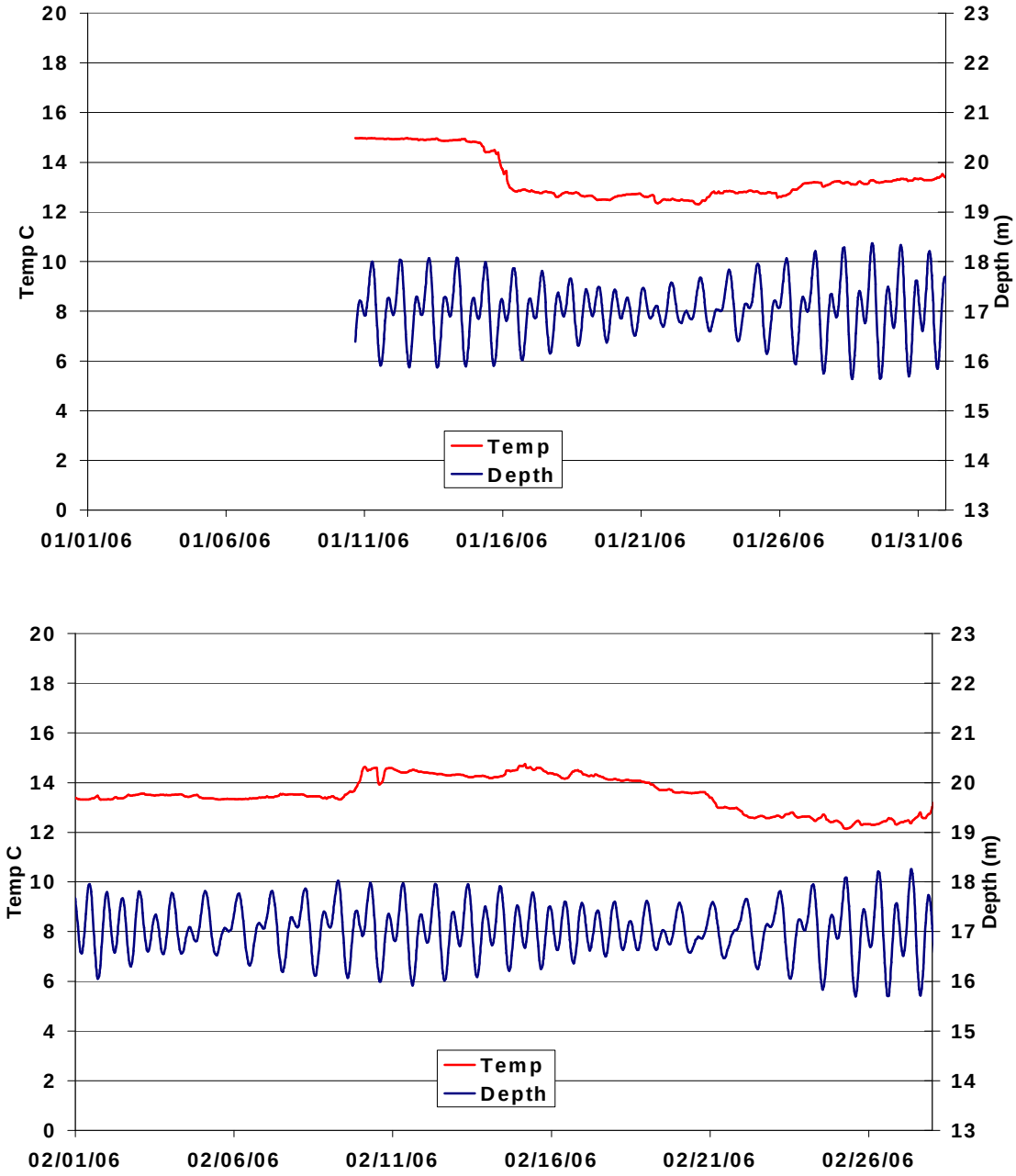


Figure A2-9. Near-bottom temperature and tidal depth from January (top) through February (bottom) 2006 at CM 2.

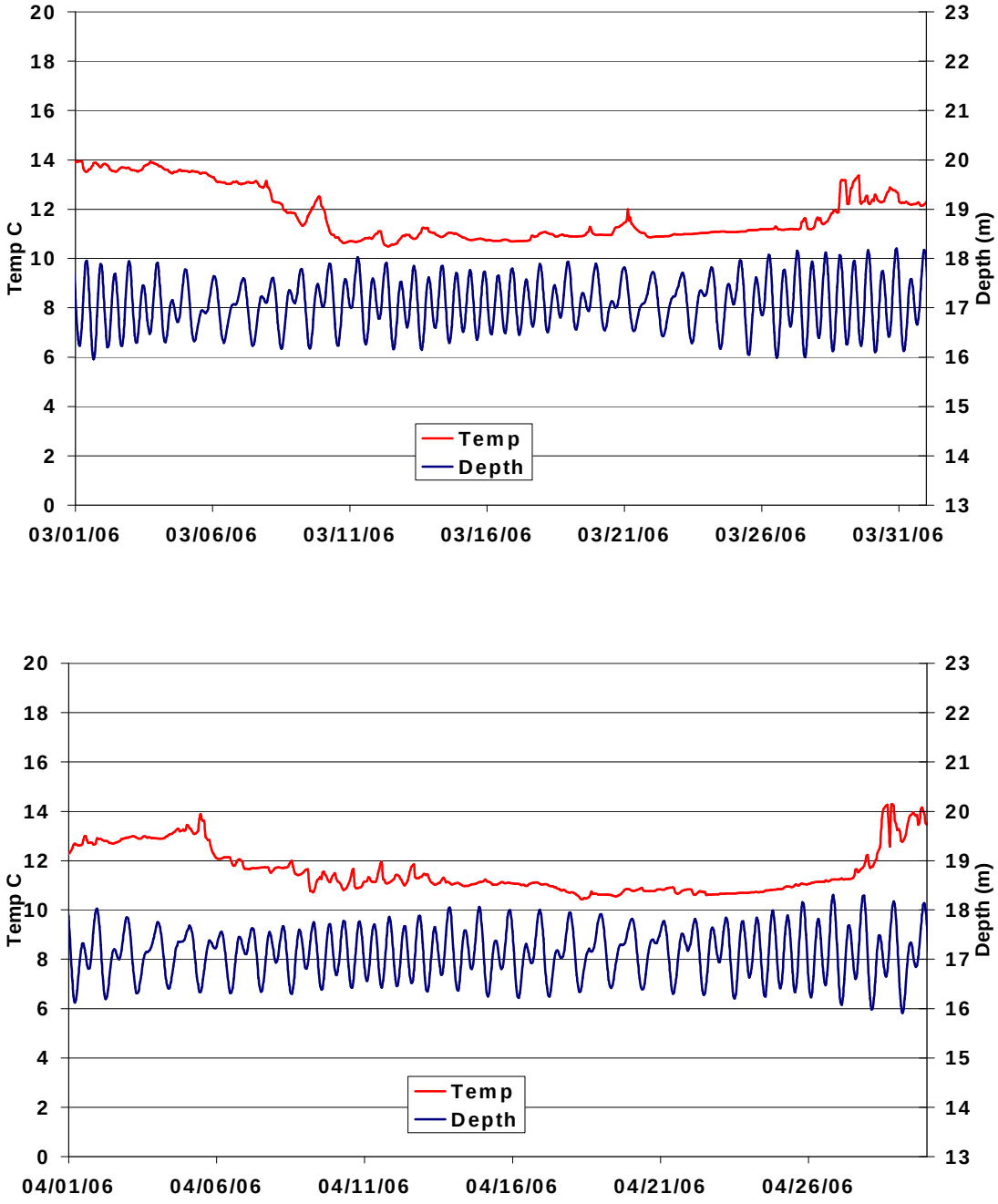


Figure A2-10. Near-bottom temperature and tidal depth from March (top) through April (bottom) 2006 at CM 2.

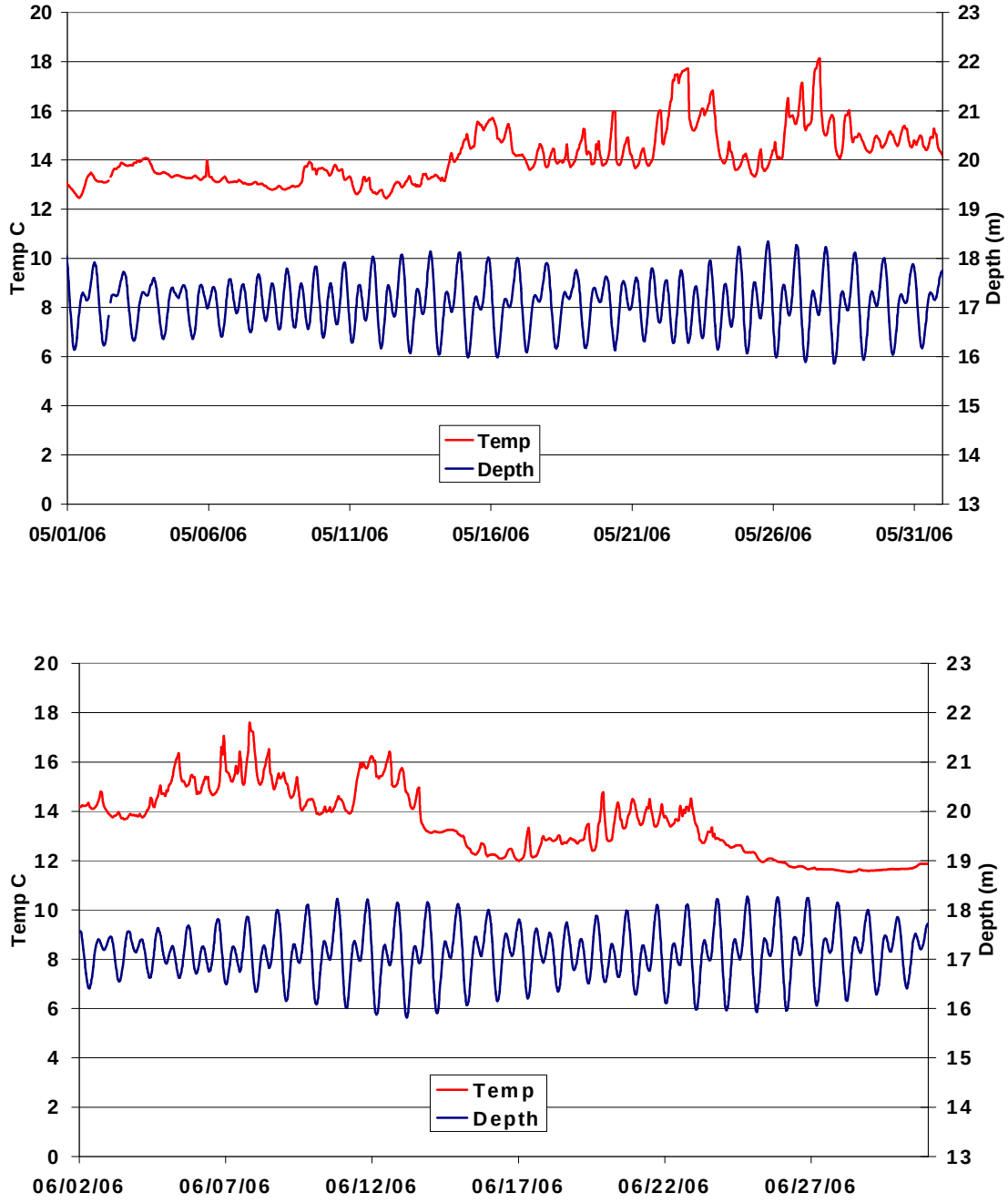


Figure A2-11. Near-bottom temperature and tidal depth from May (top) through June (bottom) 2006 at CM 2.

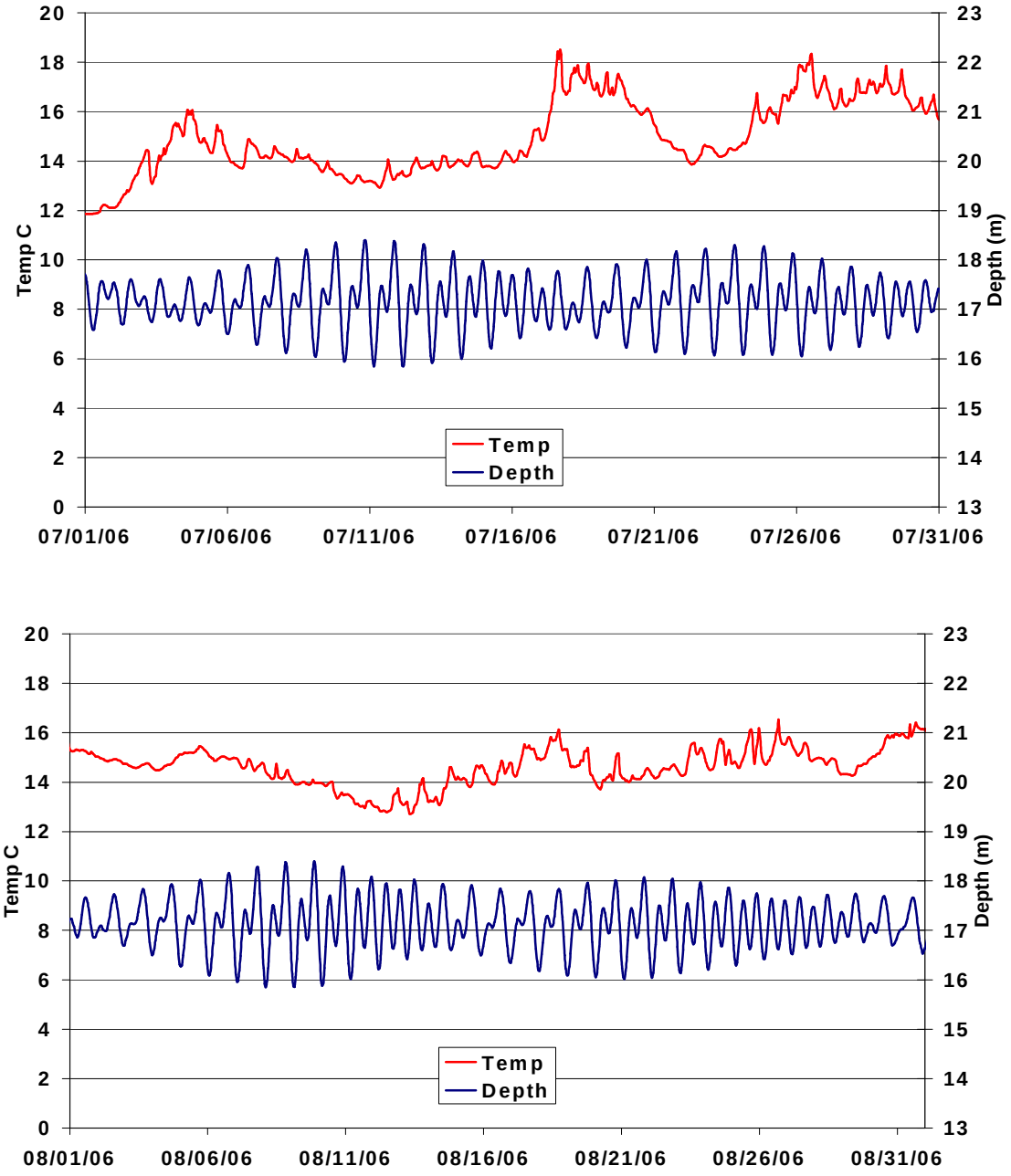


Figure A2-12. Near-bottom temperature and tidal depth from July (top) through August (bottom) 2006 at CM 2.

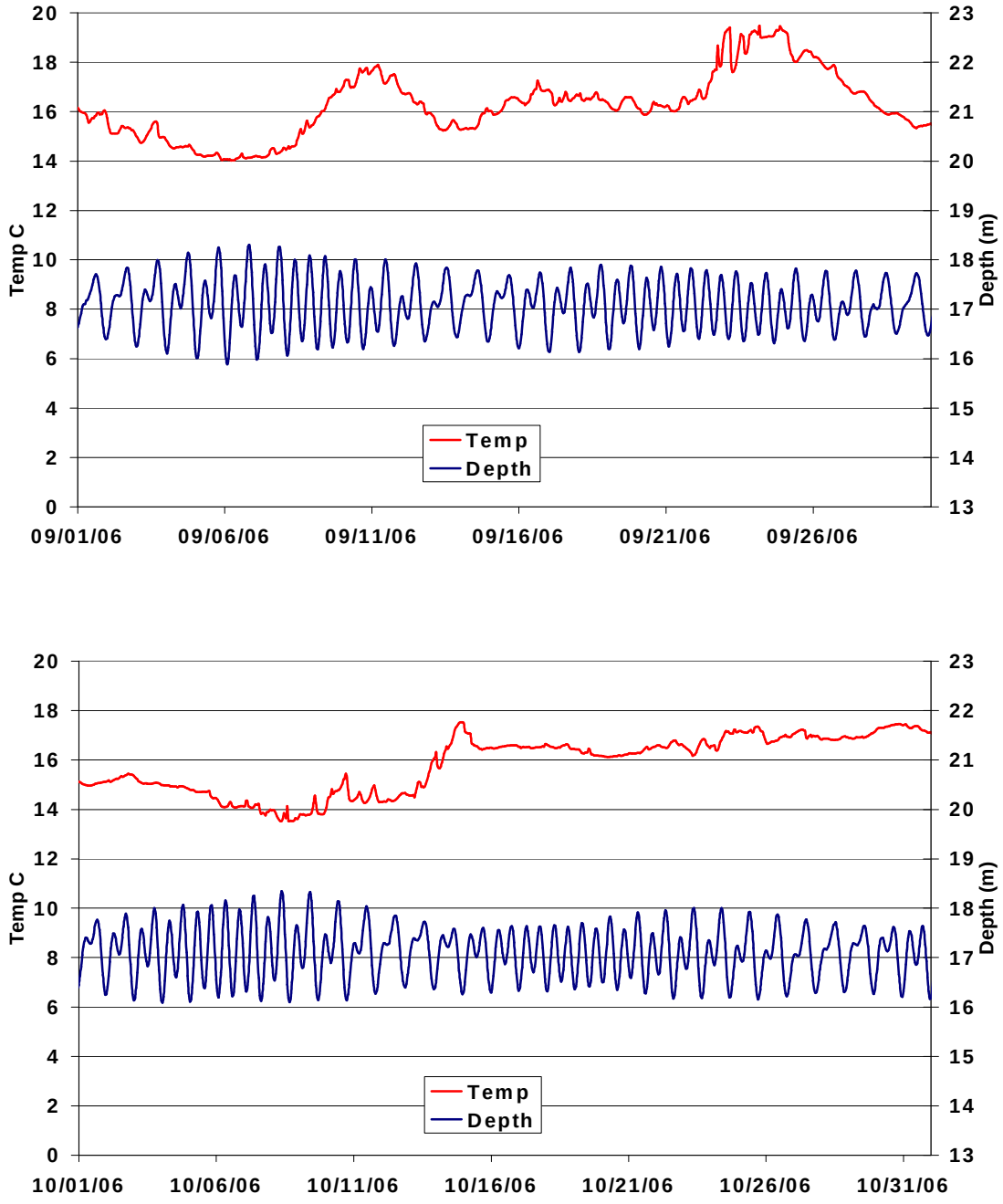


Figure A2-13. Near-bottom temperature and tidal depth from September (top) through October (bottom) 2006 at CM 2.

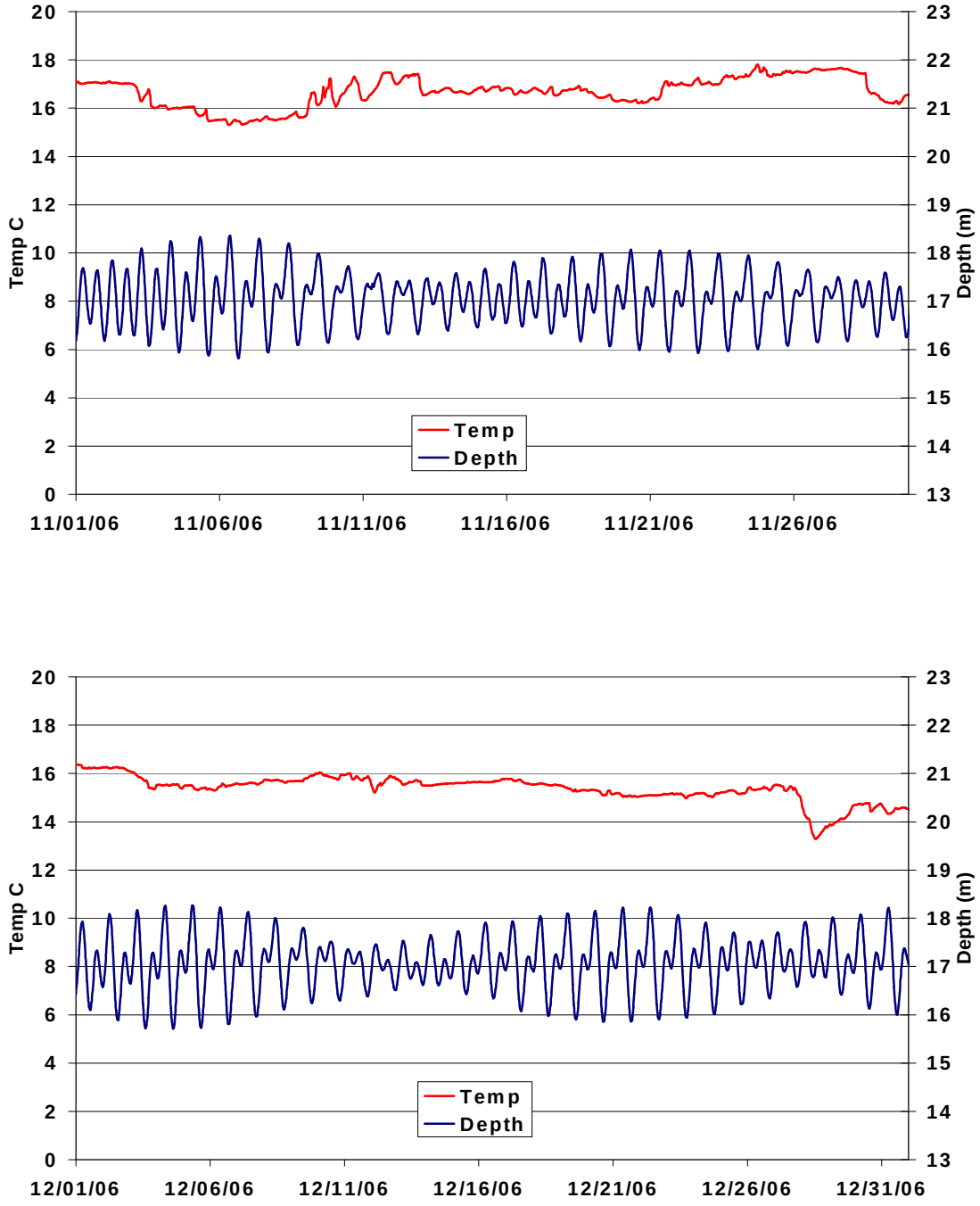


Figure A2-14. Near-bottom temperature and tidal depth from November (top) through December (bottom) 2006 at CM 2.

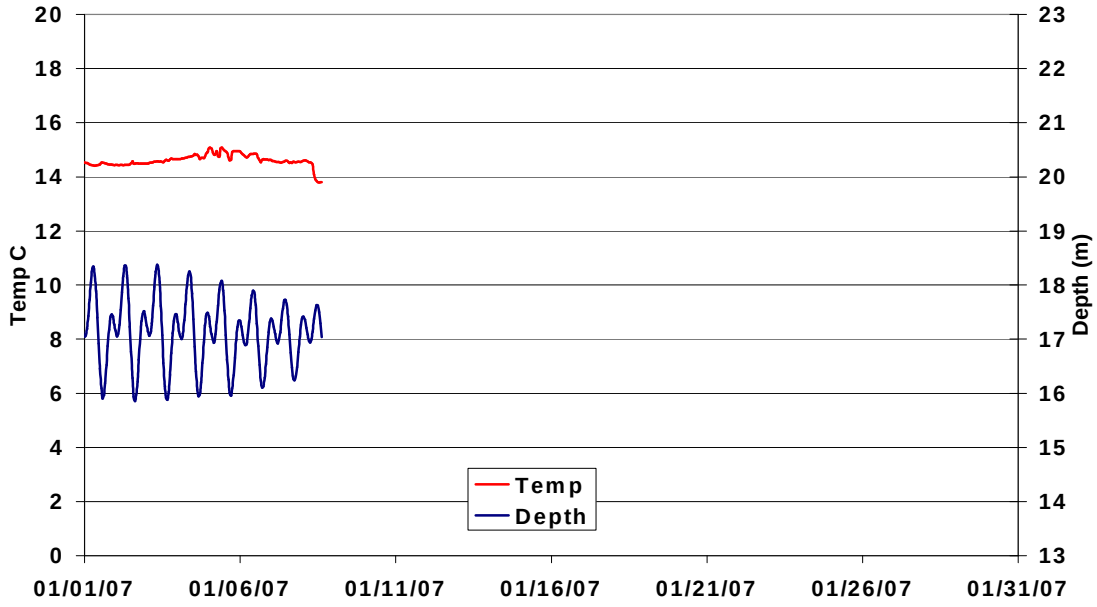


Figure A2-15. Near-bottom temperature and tidal depth from January, 2007 at CM 2.

Haynes 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 Haynes Generating Station (HnGS).

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 HnGS CONTACT INFORMATION

Name	Cell/Outside Line	E-mail Information
Alex Gima	(310) 522-7513	alex.gima@ladwp.com
On-Site Emergency Number	27300	
Operating Supervisor	(310) 52-27507	
Station Control Operator	(310) 52-27510	

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-µm 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 ½ 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 (ABEA##). The first two letters are "AB" refers to Alamitos 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 two Alamitos Bay generating stations (Alamitos and Haynes). The first letter refers to the station being an Outer, 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	1-3
Shore	1-3
Harbor	1-4
Entrainment	1-3

3. Entrainment Stations E1 and E2 are located near AGS intake structures and E3 is at HnGS.

4. The second letter designates the replicate, either "A" or "B". The source water stations only have one sample so will 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

Alamitos Bay Entrainment Abundance Field Data Sheet - Alamitos Generating Station (AGS) and Haynes Generating Station (HnGS)

Sheet #: ______ **Date:** ______ **Mesh:** **0.335** mm **Flowmeter 1:** ______ **Conversion 1:** ______

Survey #: A B E A ______ **Crew:** ______ **Net Dia.:** ______ **Flowmeter 2:** ______ **Conversion 2:** ______

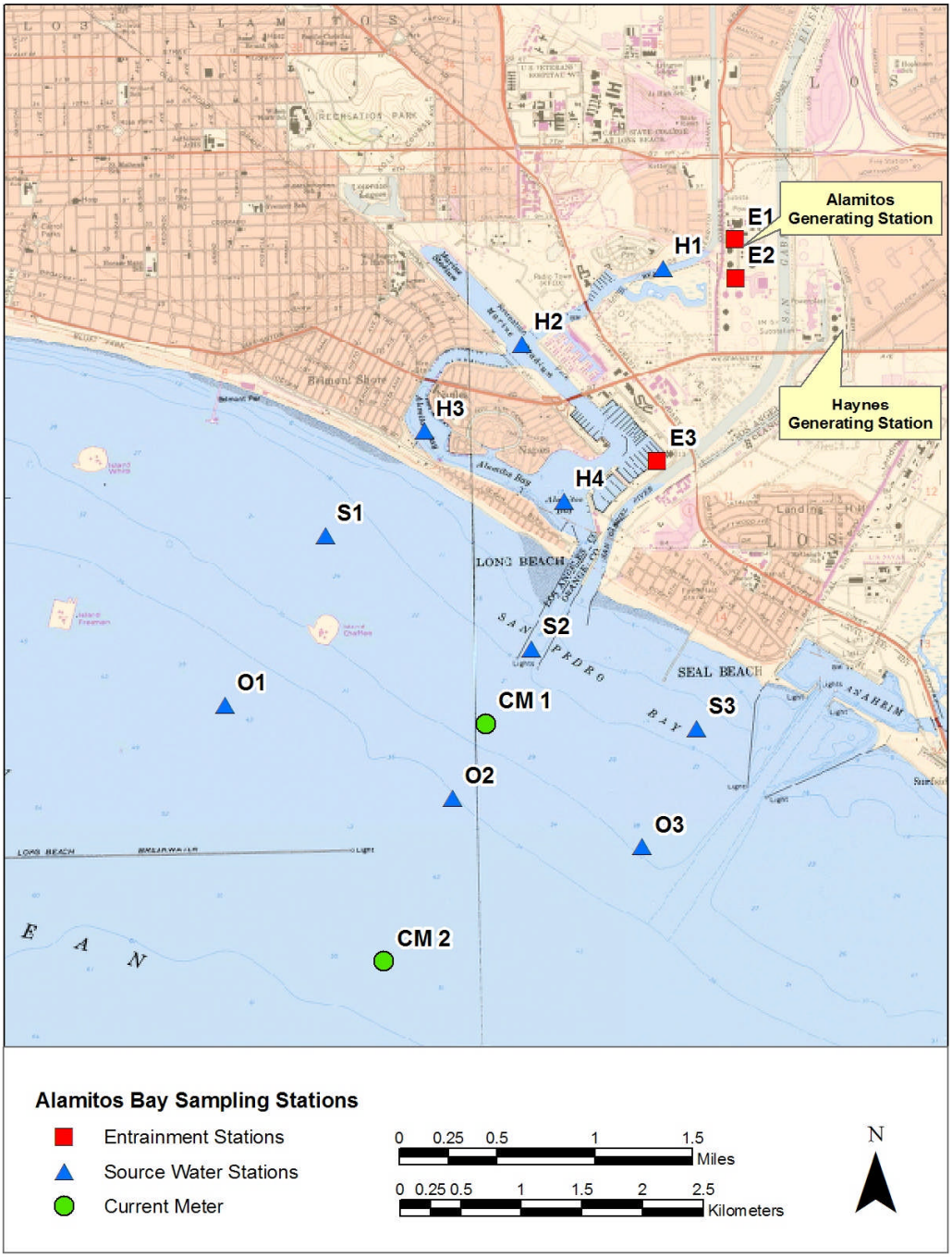
Station (A#A#)	Flowmeter Start	Flowmeter End	Total Flow	Volume (cu. m)	Sample Number	Cycle (1-4)	Temp °C	Salinity (ppt)	Tide (E, F, HS, LS)	Station Depth (ft)	Start Time (PST)	End Time (PST)	Total (min)
1													
2													
1													
2													
1													
2													
1						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

Survey: ABEA## (Alamitos Bay Entrainment Abundance)
Date: MM/DD/YY
Station: A#A#
A#: (Station Designation - Outer 1-3, Harbor 1-4, Shore 1-3 or Entrainment 1-3)
A (Replicate A or B - Only Entrainment samples have two replicates)
#: (Net 1 or 2)
Tide: Ebb, Flood, High Slack (HS), or Low Slack (LS)

NOTES:

Reviewed By / Date: ______ Entered By / Date: ______ Copied By / Date: ______

Attachment B1-1. Example field datasheet for Alamitos Bay station sampling.



Attachment B1-2. Map of HnGS and AGS entrainment and source water sampling stations. E = Entrainment, H = Harbor, S = Shore, O = Offshore, and CM = Current Meter.

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 Haynes 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%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 ¾ 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% 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

ALAMITOS BAY (AGS) AND (HnGS) – Lab Tracking Sheet

Survey: ________________________________

Sample Information						Sort Information							QC Information			
Project #	Sample Date	Station	Cycle	Sample	Start Time # Jars	Sorter	Date Sorted	Time (hrs)	# Fish	Fish Eggs	# Megs	# Lobster/ Squid	QC'd By	QC Date	QC Fish	QC Other *

*specify which (fish eggs(E), megs(M), lobster(L), or squid(S))

Attachment B2-1. Lab Tracking Sheet

Alamitos Bay Power Plants-Sorter's Log

(ABEA)

Name: _____

Sample Information					Sort Information							Quality Control					
						Sort Time											
Survey Number	Station	Cycle	Sample	Collection Time	Date Sorted	AGS	HnGS	# of Fish	# of Fish Eggs	# of Megs	Lobster / Squid	QC'ed By	QC'ed Date	QC Fish	Fish P / F	QC Other *	Other P / F

*specify which (fish eggs(E), megs(M), lobster(L), or squid(S))

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

3.1.2 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.

3.1.3 *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.

3.2 Larval Fish Measuring

3.2.1. Larval Fish Measuring Procedure

a. Turn on the computer, camera, and light source at the measuring station.

b. Consult the lab 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 submerse 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.

4.2 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

HAYNES GENERATING STATION (HnGS) - Lab Data Sheet **Sheet:**

Survey: _____ **Date:** _____ **Start Time:** _____ **Cycle:** _____ **Station:** _____

Species Code	Taxon	Count	QC Resort Additional Count	Total Count	Stage	Entrain-able	Comments

NOTES: **Total:**

	ID'ed By / Date	ID QC By / Date	QC Resort By / Date	Entered By / Date
Fish				
Eggs				
Inverts				

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 Haynes Generating Station (HnGS).

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 HnGS CONTACT INFORMATION

Name	Cell/Outside Line	E-mail Information
Alex Gima	(310) 522-7513	alex.gima@ladwp.com
On-Site Emergency Number	27300	
Operating Supervisor	(310) 52-27507	
Station Control Operator	(310) 52-27510	

4.0 PROCEDURES

Impingement sampling will only be undertaken when there is water passing through the stationary/traveling screens of Units 1-6. If only one pump is in operation, proceed with sample collection using the following procedures. The bar rack area does not require daily cleaning, thus no collections will be conducted from this area. 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 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

Impingement sampling procedures will generally be the same at all units. However, Units 1&2 are equipped with stationary screens (Figure B4-1), which are more difficult to rinse, and will only be rinsed and cleaned prior to, and at the end of, the 24-hour sampling period. Units 3-6, equipped with traveling screens (TS), will be rinsed and cleaned every 6 hours during the 24-hr period (see Table B4-1). Figure B4-2 shows the collection sump area of Units 1&2 and Figure B4-3 shows the collection sump collection area of Units 3&4. The Unit 5&6 collection area is basically the same as the one for Units 3&4. The bar racks are located at the marina and are not cleaned on a regular basis. They will not be cleaned during the weekly sampling.

a. 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.

b. 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.

c. 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.

d. 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.

e. Remove all impinged fish and invertebrates from the impinged debris.

f. Replace the mesh net/vexar basket in the rectangular sump before initiation of the screenwash for the next cycle.

g. 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 preformed 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, re-measured and re-weighed 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 (e.g., 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 (8-10)	Units 5/6
8:00	Rinse and Clean		
8:30	Start Cycle 1		
9:00		Rinse and Clean	
9:30		Start Cycle 1	
10:00			Rinse and Clean
10:30			Start Cycle 1
11:00			
11:30			
12:00			
12:30			
13:00			
13:30			
14:00			
14:30			
15:00		Rinse Cycle 1	
15:30		Start Cycle 2	
16:00		Process Cycle 1	Rinse Cycle 1
16:30			Start Cycle 2
17:00			Process Cycle 1
17:30			
18:00			
18:30			
19:00			
19:30			
20:00			
20:30			
21:00		Rinse Cycle 2	
21:30		Start Cycle 3	
22:00		Process Cycle 2	Rinse Cycle 2
22:30			Start Cycle 3
23:00			Process Cycle 2
23:30			
0:00			
0:30			
1:00			
1:30			
2:00			
2:30			
3:00		Rinse Cycle 3	
3:30		Start Cycle 4	
4:00		Process Cycle 3	Rinse Cycle 3
4:30			Start Cycle 4
5:00			Process Cycle 3
5:30			
6:00			
6:30			
7:00			
7:30			
8:00	Rinse Cycle 1		
8:30	Process Cycle 1		
9:00		Rinse Cycle 4	
9:30		Process Cycle 4	
10:00			Rinse Cycle 4
10:30			Process Cycle 4
11:00			

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. Unit 1 slide screens. Unit 2 screens are identical.

Figure B4-2. Sump basket at Unit 2 (top). Unit 1 is identical. Note the space between the trough and the edge of the sump basket (bottom).

Figure B4-3. Units 3&4 (8-10) traveling screens sump collection area. The Unit 5&6 sumps are similar.

Haynes 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 Haynes Generating Station (HnGS). 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 HnGS entrainment study will sample only one station. While the summation signs over stations are presented in the equations they will be summing over an n of one in the actual calculations and therefore will drop out of the formulas.

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 $(i = 1, \ldots, N)$;

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

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

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

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

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

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

where

ρ_{ijkl} = density of larvae at the lth station within the kth cycle on the jth day in the ith time period;

V_{ijkl} = volume of water passing the at the lth station within the kth cycle on the jth day in the ith 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

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

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

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

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

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

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

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

with estimated variance

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

where

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

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

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

$$PE_i = \frac{\text{abundance of entrained larvae}_i}{\text{abundance of larvae in source population}_i}$$
$$= \text{probability of entrainment in } i\text{th time period } (i = 1, \ldots, N).$$

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

$$PE_i = \frac{\widehat{E_i}}{\widehat{R_i}} \qquad \text{(B1)}$$

where

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

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

Estimating Daily Entrainment

The estimate of total Haynes Generating Station (HnGS) entrainment on day j in period i can be expressed from equation (A4) as

$$\widehat{E_{ij}} = \sum_{k=1}^{4}\sum_{l=1}^{1} V_{ijkl}\,\frac{1}{3}\sum_{m=1}^{3}\rho_{ijklm} = V_{ij}\sum_{k=1}^{4}\sum_{l=1}^{1}\left(\frac{1}{12}\right)\sum_{m=1}^{3}\rho_{ijklm} \tag{B2}$$

with associated variance

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

which can be estimated by

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

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

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

$$\widehat{Var}\left(\widehat{E_i}\right) = V_i^{\,2}\sum_{k=1}^{4}\sum_{l=1}^{1}\left(\frac{1}{12}\right)^2 s^2_{\rho_{ijkl}}\ . \tag{B6}$$

Estimating Numbers of Larvae at Risk

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

$$\widehat{R_{ij}} = V_S\cdot\widehat{\overline{\rho}_{S_{ij}}} \tag{B7}$$

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

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

The individual variances within Formula B8 describe temporal-spatial variance in density within the source population during the day of sampling. Nine source water locations are sampled in Alamitos Bay and San Pedro 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 $\widehat{Var}\left(\widehat{R}_i\right) = Var\left(\widehat{R}_{ij} \mid R_{ij}\right)$.

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

$$\widehat{PE}_i = \frac{\widehat{E}_i}{\widehat{R}_i} \tag{B9}$$

Variance for the Estimate of PE_i

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

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

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

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

where by the Delta method can be approximated by

$$\widehat{Var}\left(\widehat{PE_i}\right) \approx \widehat{Var}\left(\widehat{E_i}\right)\left(\frac{1}{V_S \cdot \widehat{\bar{\rho}_{S_i}}}\right)^2 + \widehat{Var}\left(V_S \cdot \bar{\rho}_{S_i}\right)\left(\frac{-\widehat{E_i}}{V_S \cdot \left(\widehat{\bar{\rho}_{S_i}}\right)^2}\right)^2 \tag{B10}$$

and is equivalent to

$$= PE_i^2\left[CV\left(\widehat{E_i}\right)^2 + CV\left(V_S \cdot \widehat{\bar{\rho}_{S_i}}\right)^2\right]$$

where

$$\widehat{R_i} = V_S \cdot \widehat{\bar{\rho}_{S_{ij}}} \text{ and}$$

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

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

$$\widehat{P_M} = 1 - \sum_{i=1}^{N} \hat{f}_i\left(1 - \widehat{PE_i}\right)^q \tag{B11}$$

where

q = number of days of larval life, and

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

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

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

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

$$\widehat{Var}(\hat{f}_i) = \widehat{Var}\left[\frac{\widehat{E_i}}{\widehat{E_T}}\right]$$

$$= \widehat{Var}\left[\frac{\widehat{E_i}}{\widehat{E_i} + \sum_{j \neq i}^{N} \widehat{E_j}}\right]$$

$$= \hat{f}_i^{\,2}(1-\hat{f}_i)^2\left[\frac{\widehat{Var}(\widehat{E_i})}{\widehat{E_i}^{\,2}} + \frac{\widehat{Var}(\widehat{E_T})}{\widehat{E_T}^{\,2}}\right].$$

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:

$$\widehat{Var}(\widehat{P_M}) = \widehat{Var}\left(1 - \sum_{i=1}^{N} \hat{f}_i(1-\widehat{PE_i})^q\right)$$

$$= \widehat{Var}\left(\sum_{i=1}^{N} \hat{f}_i(1-\widehat{PE_i})^q\right)$$

$$= \sum_{i=1}^{N}\left[Var(\hat{f}_i)(1-\widehat{PE_i})^{2q}\right]$$

$$+ \sum_{i=1}^{N}\left[Var(\widehat{PE}_i)(\hat{f}_i q(1-\widehat{PE_i})^{q-1})^2\right]$$

$$+ 2\sum_{i=1}^{N}\sum_{j>i}^{N}\mathrm{cov}\left(\hat{f}_i, \hat{f}_j\right)(1-\widehat{PE_j})^q(1-\widehat{PE_i})^q \qquad \text{where}$$

$$\mathrm{cov}\left(\hat{f}_i, \hat{f}_j\right) = \left(\frac{1}{\widehat{E_T}}\right)^2 \hat{f}_i\hat{f}_j Var\left(\sum_{g \neq i,j}^{N} \widehat{E_g}\right) + \hat{f}_i\left(1-\hat{f}_j\right)\widehat{E_i} + \hat{f}_j\left(1-\hat{f}_i\right)\widehat{E_j}\Bigg].$$

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:

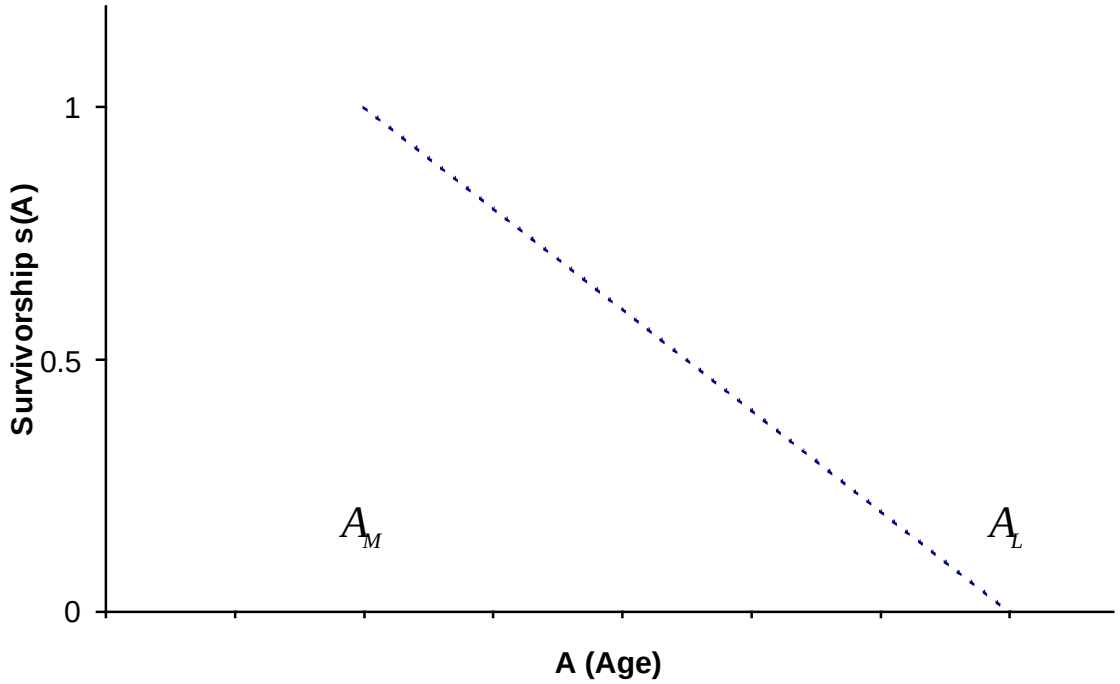
$$\widehat{FH} = \frac{\widehat{E_T}}{\widehat{TLF} \bullet \prod_{i=1}^{n} S_i} \qquad \text{(C1)}$$

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 ith 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

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

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,

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

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):

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

where

$\text{CV}(\hat{E}_T)$ = CV of estimated entrainment (estimated by $\text{CV}(\hat{\text{I}})$ when available),
$\text{CV}(\widehat{S}_j)$ = CV of estimated survival of eggs and larvae up to entrainment,
$\text{CV}(\widehat{\widehat{F}})$ = 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

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

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:

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

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 jth 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 HnGS. 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

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

where

n = number of age classes from entrainment to recruitment and

$\widehat{S}_j$ = survival rate from the beginning to end of the jth age class.

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

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

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

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

which leads to

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

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

$$\widehat{AEL} = \hat{E}_T \cdot \hat{S}_{adult} \tag{C7}$$

yields

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

where

$$\widehat{AEL} \equiv 2\widehat{FH}\ . \tag{C8}$$

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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Haynes 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

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA01**
Start Date: **1/5/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Atherinopsis californiensis	jacksmelt	322	2,118.23
Gobiidae unid.	gobies	149	986.52
Atherinopsidae unid.	silversides	36	239.94
Hypsoblennius spp.	combtooth blennies	31	208.97
Atherinops affinis	topsmelt	31	202.53
larval/post-larval fish unid.	larval fishes	2	12.98
larval fish fragment	unidentified larval fishes	2	12.89
Acanthogobius flavimanus	yellowfin goby	1	6.49
Genyonemus lineatus	white croaker	1	6.49
	Total Fishes:	**575**	
Eggs			
Paralichthyidae unid. (eggs)	sand flounder eggs	2	13.97
fish eggs unid.	unidentified fish eggs	1	6.53
	Total Eggs:	**3**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA02**
Start Date: **1/17/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	145	987.36
Hypsoblennius spp.	combtooth blennies	8	55.62
Atherinopsis californiensis	jacksmelt	7	47.48
Acanthogobius flavimanus	yellowfin goby	2	13.49
larval fish fragment	unidentified larval fishes	1	6.91
larval/post-larval fish unid.	larval fishes	1	6.91
Pleuronichthys guttulatus	diamond turbot	1	6.87
Atherinops affinis	topsmelt	1	6.62
	Total Fishes:	**166**	
Eggs			
Genyonemus lineatus (eggs)	white croaker eggs	12	82.19
fish eggs unid.	unidentified fish eggs	6	41.53
	Total Eggs:	**18**	

(continued)

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA02**
Start Date: **1/17/2006**
Stations: **E3 (continued)**
Target Invertebrates

No Invertebrates

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA02**
Start Date: **1/17/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	1,453	2,008.23
Hypsoblennius spp.	combtooth blennies	70	98.24
Acanthogobius flavimanus	yellowfin goby	21	29.01
Atherinopsis californiensis	jacksmelt	6	7.97
Gillichthys mirabilis	longjaw mudsucker	4	5.66
Gobiesox spp.	clingfishes	4	5.49
larval fish fragment	unidentified larval fishes	3	4.87
Gibbonsia spp.	clinid kelpfishes	2	3.35
larval/post-larval fish unid.	larval fishes	3	2.84
Clevelandia ios	arrow goby	2	2.83
Heterostichus rostratus	giant kelpfish	1	1.41
Leptocottus armatus	Pacific staghorn sculpin	1	1.41
Atherinops affinis	topsmelt	1	1.32
	Total Fishes:	**1,571**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	5	6.42
	Total Target Invertebrates:	**5**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA02**
Start Date: **1/17/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	167	172.91
Genyonemus lineatus	white croaker	147	131.41
Sciaenidae unid.	croakers	40	37.50
Leptocottus armatus	Pacific staghorn sculpin	22	19.21
Hypsoblennius spp.	combtooth blennies	9	8.36
Pleuronichthys guttulatus	diamond turbot	7	6.47
larval fish fragment	unidentified larval fishes	6	5.88
Acanthogobius flavimanus	yellowfin goby	5	4.37
larvae, unidentified yolksac	unidentified yolksac larvae	5	3.92
Gillichthys mirabilis	longjaw mudsucker	4	3.90
Lepidogobius lepidus	bay goby	4	3.44
Atherinopsis californiensis	jacksmelt	4	3.16
Gobiesox spp.	clingfishes	3	3.12
larval fish - damaged	unidentified larval fishes	2	1.84
Paralichthys californicus	California halibut	2	1.60
Atherinops affinis	topsmelt	1	1.01
Typhlogobius californiensis	blind goby	1	0.95
Scorpaenichthys marmoratus	cabezon	1	0.80
	Total Fishes:	**430**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	19	17.22
Pinnixa spp. (megalops)	pea crabs megalops	3	2.98
Cancer anthonyi (megalops)	yellow crab megalops	1	1.12
unidentified crab (megalops)	unidentified crab megalops	1	0.91
Cancer antennarius (megalops)	brown rock crab megalops	1	0.69
	Total Target Invertebrates:	**25**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA03**
Start Date: **1/31/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	116	812.47
Genyonemus lineatus	white croaker	21	156.96
Hypsoblennius spp.	combtooth blennies	15	108.04
Atherinopsis californiensis	jacksmelt	7	50.48
Gibbonsia spp.	clinid kelpfishes	4	31.20
Leptocottus armatus	Pacific staghorn sculpin	4	27.76
Sciaenidae unid.	croakers	1	7.22
Gobiesox spp.	clingfishes	1	6.94
Gillichthys mirabilis	longjaw mudsucker	1	6.57
Atherinopsidae unid.	silversides	1	6.54
	Total Fishes:	**171**	
Eggs			
Genyonemus lineatus (eggs)	white croaker eggs	103	731.42
fish eggs unid.	unidentified fish eggs	31	218.65
Citharichthys spp. (eggs)	sanddab eggs	14	96.32
Paralichthys californicus (eggs)	California halibut eggs	11	73.97
Pleuronichthys spp. (eggs)	turbot eggs	2	13.19
	Total Eggs:	**161**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA04**
Start Date: **2/14/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	266	1,946.45
Atherinopsis californiensis	jacksmelt	122	873.16
Hypsoblennius spp.	combtooth blennies	39	284.99
Atherinops affinis	topsmelt	11	82.01
Atherinopsidae unid.	silversides	9	63.96
Gobiesox spp.	clingfishes	1	8.12
Typhlogobius californiensis	blind goby	1	7.73
Gillichthys mirabilis	longjaw mudsucker	1	6.90
	Total Fishes:	**450**	
Eggs			
Paralichthyidae unid. (eggs)	sand flounder eggs	86	636.99
Genyonemus lineatus (eggs)	white croaker eggs	20	141.44
fish eggs unid.	unidentified fish eggs	16	101.26
Citharichthys spp. (eggs)	sanddab eggs	7	48.29
Paralichthys californicus (eggs)	California halibut eggs	4	27.59
Pleuronichthys spp. (eggs)	turbot eggs	3	22.10
	Total Eggs:	**136**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA04**
Start Date: **2/14/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	1,658	2,664.33
Hypsoblennius spp.	combtooth blennies	338	540.83
Acanthogobius flavimanus	yellowfin goby	140	228.46
larval/post-larval fish unid.	larval fishes	5	8.69
Gobiesox spp.	clingfishes	6	8.65
Gillichthys mirabilis	longjaw mudsucker	5	7.56
larval fish fragment	unidentified larval fishes	4	6.81
Atherinopsis californiensis	jacksmelt	4	6.42
Pleuronichthys guttulatus	diamond turbot	4	6.19
Typhlogobius californiensis	blind goby	2	3.31
Gibbonsia spp.	clinid kelpfishes	2	3.22
Atherinops affinis	topsmelt	1	1.87
Myctophidae unid.	lanternfishes	1	1.55
Leptocottus armatus	Pacific staghorn sculpin	1	1.53
Atherinopsidae unid.	silversides	1	1.28
	Total Fishes:	**2,172**	
Target Invertebrates			
Majidae unid. (megalops)	spider crab megalops	1	1.55
Pugettia spp. (megalops)	kelp crabs megalops	1	1.28
	Total Target Invertebrates:	**2**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA04**
Start Date: **2/14/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	357	302.83
Hypsoblennius spp.	combtooth blennies	35	35.99
Atherinopsis californiensis	jacksmelt	17	18.97
Pleuronichthys guttulatus	diamond turbot	8	7.64
Genyonemus lineatus	white croaker	7	5.33
Gobiesox spp.	clingfishes	6	4.99
Acanthogobius flavimanus	yellowfin goby	3	3.26
Pleuronectidae unid.	righteye flounders	3	2.79
Typhlogobius californiensis	blind goby	3	2.71
Gillichthys mirabilis	longjaw mudsucker	3	2.21
larval/post-larval fish unid.	larval fishes	2	1.82
Sciaenidae unid.	croakers	1	1.35
Leptocottus armatus	Pacific staghorn sculpin	1	1.15
larval fish fragment	unidentified larval fishes	1	1.09
Atherinopsidae unid.	silversides	1	1.00
Lepidogobius lepidus	bay goby	1	0.91
Zaniolepis frenata	shortspine combfish	1	0.91
Sebastes spp.	rockfishes	1	0.73
	Total Fishes:	**451**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	5	4.77
Pinnixa spp. (megalops)	pea crabs megalops	3	2.93
Majidae unid. (megalops)	spider crab megalops	1	0.82
Cancer gracilis (megalops)	slender crab megalops	1	0.66
	Total Target Invertebrates:	**10**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA05**
Start Date: **2/27/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	175	1,112.61
Hypsoblennius spp.	combtooth blennies	28	188.27
Atherinopsis californiensis	jacksmelt	10	69.25
Genyonemus lineatus	white croaker	7	49.97
Atherinops affinis	topsmelt	5	32.86
Typhlogobius californiensis	blind goby	1	6.99
larval fish - damaged	unidentified larval fishes	1	6.96
Labrisomidae unid.	labrisomid blennies	1	6.12
	Total Fishes:	**228**	
Eggs			
Paralichthyidae unid. (eggs)	sand flounder eggs	160	1,026.57
Genyonemus lineatus (eggs)	white croaker eggs	49	317.48
fish eggs unid.	unidentified fish eggs	32	213.65
Citharichthys spp. (eggs)	sanddab eggs	20	143.65
Paralichthys californicus (eggs)	California halibut eggs	2	13.94
Pleuronichthys spp. (eggs)	turbot eggs	1	6.12
	Total Eggs:	**264**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA06**
Start Date: **3/13/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	211	1,380.51
Genyonemus lineatus	white croaker	87	531.83
Hypsoblennius spp.	combtooth blennies	33	218.12
Atherinopsis californiensis	jacksmelt	10	69.31
Sciaenidae unid.	croakers	5	30.08
Gobiesox spp.	clingfishes	3	17.99
Acanthogobius flavimanus	yellowfin goby	2	13.55
Citharichthys sordidus	Pacific sanddab	1	7.02
Gillichthys mirabilis	longjaw mudsucker	1	6.19
Seriphus politus	queenfish	1	6.19
Stenobrachius leucopsarus	northern lampfish	1	6.19
Citharichthys stigmaeus	speckled sanddab	1	6.02
Parophrys vetulus	English sole	1	6.02
Atherinopsidae unid.	silversides	1	5.62
Clupeiformes unid.	herrings and anchovies	1	5.62
larval fish fragment	unidentified larval fishes	1	5.62
Merluccius productus	Pacific hake	1	5.62
Paralichthys californicus	California halibut	1	5.62
	Total Fishes:	**362**	
Eggs			
fish eggs unid.	unidentified fish eggs	564	3,535.71
Paralichthyidae unid. (eggs)	sand flounder eggs	77	483.04
Genyonemus lineatus (eggs)	white croaker eggs	18	120.99
Pleuronichthys spp. (eggs)	turbot eggs	7	41.09
Citharichthys spp. (eggs)	sanddab eggs	5	31.41
Engraulidae unid. (eggs)	anchovy eggs	1	6.19
	Total Eggs:	**672**	
Target Invertebrates			
Hemigrapsus oregonensis (megs.)	yellow shore crab megalops	1	7.40
	Total Target Invertebrates:	**1**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA06**
Start Date: **3/13/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	1,218	1,799.45
Hypsoblennius spp.	combtooth blennies	205	305.59
Genyonemus lineatus	white croaker	137	188.90
Acanthogobius flavimanus	yellowfin goby	44	86.32
Atherinopsis californiensis	jacksmelt	17	24.88
Gillichthys mirabilis	longjaw mudsucker	8	12.11
larvae, unidentified yolksac	unidentified yolksac larvae	6	8.99
Gobiesox spp.	clingfishes	5	6.96
Pleuronichthys guttulatus	diamond turbot	3	5.21
Engraulis mordax	northern anchovy	3	4.33
larval fish - damaged	unidentified larval fishes	2	3.53
Paralichthys californicus	California halibut	2	3.47
larval fish fragment	unidentified larval fishes	2	3.31
Leptocottus armatus	Pacific staghorn sculpin	2	2.85
Typhlogobius californiensis	blind goby	1	1.96
Stenobrachius leucopsarus	northern lampfish	1	1.81
Gibbonsia spp.	clinid kelpfishes	1	1.65
Atherinops affinis	topsmelt	1	1.43
Clinocottus analis	wooly sculpin	1	1.43
Atherinopsidae unid.	silversides	1	1.30
Pleuronectiformes unid.	flatfishes	1	1.17
	Total Fishes:	**1,661**	
Target Invertebrates			
Hemigrapsus oregonensis (megs.)	yellow shore crab megalops	7	9.57
Pinnixa spp. (megalops)	pea crabs megalops	6	7.89
Pugettia spp. (megalops)	kelp crabs megalops	4	5.52
	Total Target Invertebrates:	**17**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA06**
Start Date: **3/13/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Genyonemus lineatus	white croaker	3,243	3,308.91
Gobiidae unid.	gobies	698	705.03
Sciaenidae unid.	croakers	55	59.31
Hypsoblennius spp.	combtooth blennies	44	44.53
Engraulis mordax	northern anchovy	42	42.65
Paralichthys californicus	California halibut	42	39.85
larval fish fragment	unidentified larval fishes	24	23.16
Parophrys vetulus	English sole	24	21.92
Gobiesox spp.	clingfishes	20	19.05
Atherinopsis californiensis	jacksmelt	14	14.05
Lepidogobius lepidus	bay goby	13	12.93
Pleuronichthys guttulatus	diamond turbot	11	12.54
Stenobrachius leucopsarus	northern lampfish	11	12.19
larvae, unidentified yolksac	unidentified yolksac larvae	13	11.68
Acanthogobius flavimanus	yellowfin goby	10	9.58
Gillichthys mirabilis	longjaw mudsucker	9	9.02
Citharichthys stigmaeus	speckled sanddab	11	9.00
Typhlogobius californiensis	blind goby	8	8.16
Merluccius productus	Pacific hake	6	5.97
Sebastes spp.	rockfishes	4	3.32
larval fish - damaged	unidentified larval fishes	3	3.07
Clinocottus analis	wooly sculpin	2	2.60
Seriphus politus	queenfish	2	2.03
Labrisomidae unid.	labrisomid blennies	2	1.97
Pleuronichthys verticalis	hornyhead turbot	2	1.86
Chaenopsidae unid.	tube blennies	2	1.78
larval/post-larval fish unid.	larval fishes	1	1.30
Neoclinus spp.	fringeheads	1	1.12
Ruscarius creaseri	roughcheek sculpin	1	1.12
Citharichthys spp.	sanddabs	1	1.09
Leptocottus armatus	Pacific staghorn sculpin	1	1.01
Gibbonsia spp.	clinid kelpfishes	1	0.99
Heterostichus rostratus	giant kelpfish	1	0.99
Pleuronichthys spp.	turbots	1	0.84
Sardinops sagax	Pacific sardine	1	0.83
Cottidae unid.	sculpins	1	0.66
	Total Fishes:	**4,325**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	107	101.51
Pinnixa spp. (megalops)	pea crabs megalops	13	14.05
Hemigrapsus oregonensis (megs.)	yellow shore crab megalops	5	4.66
Paguridae unid. (megalops)	hermit crab megalops	3	3.49
Petrolisthes spp. (megalops)	porcelain crab megalops	1	1.35
Pachygrapsus crassipes (megalops)	striped shore crab megalops	1	1.30

(continued)

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA06**
Start Date: **3/13/2006**
Stations: **O1-O3, S1-S3** *(continued)*

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Target Invertebrates *(continued)*			
Cancer gracilis (megalops)	slender crab megalops	1	1.12
unidentified crab (megalops)	unidentified crab megalops	1	1.12
Majidae unid. (megalops)	spider crab megalops	1	0.73
	Total Target Invertebrates:	**133**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA07**
Start Date: **3/26/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	179	1,257.33
Genyonemus lineatus	white croaker	35	242.35
Hypsoblennius spp.	combtooth blennies	28	199.52
Gobiesox spp.	clingfishes	13	91.01
Sciaenidae unid.	croakers	10	73.29
Atherinopsis californiensis	jacksmelt	4	28.05
Gillichthys mirabilis	longjaw mudsucker	3	20.09
Paralichthys californicus	California halibut	2	15.36
larvae, unidentified yolksac	unidentified yolksac larvae	2	15.00
Atherinops affinis	topsmelt	2	13.93
Acanthogobius flavimanus	yellowfin goby	2	13.75
Atherinopsidae unid.	silversides	2	12.77
Engraulis mordax	northern anchovy	1	7.68
Pleuronichthys guttulatus	diamond turbot	1	7.68
Rhinogobiops nicholsii	blackeye goby	1	7.58
Gibbonsia spp.	clinid kelpfishes	1	6.86
larval/post-larval fish unid.	larval fishes	1	6.86
Typhlogobius californiensis	blind goby	1	6.34
Labrisomidae unid.	labrisomid blennies	1	5.96
	Total Fishes:	**289**	
Eggs			
fish eggs unid.	unidentified fish eggs	487	3,448.40
Paralichthyidae unid. (eggs)	sand flounder eggs	117	827.92
Citharichthys spp. (eggs)	sanddab eggs	81	552.19
Pleuronichthys spp. (eggs)	turbot eggs	46	323.36
Atherinopsidae unid. (eggs)	silverside eggs	43	272.76
Genyonemus lineatus (eggs)	white croaker eggs	34	225.83
Engraulidae unid. (eggs)	anchovy eggs	7	45.58
	Total Eggs:	**815**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	8	61.08
Pinnixa spp. (megalops)	pea crabs megalops	4	29.64
Hemigrapsus spp. (megalops)	shore crab megalops	3	19.28
Paguridae unid. (megalops)	hermit crab megalops	1	7.68
unidentified crab (megalops)	unidentified crab megalops	1	6.43
	Total Target Invertebrates:	**17**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA08**
Start Date: **4/10/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	323	2,276.40
Hypsoblennius spp.	combtooth blennies	76	515.24
Engraulis mordax	northern anchovy	38	256.58
Genyonemus lineatus	white croaker	22	151.96
Leuresthes tenuis	California grunion	14	89.56
Atherinopsis californiensis	jacksmelt	14	87.81
Atherinopsidae unid.	silversides	7	45.44
Gibbonsia spp.	clinid kelpfishes	3	21.93
Gobiesox spp.	clingfishes	2	14.92
Sciaenidae unid.	croakers	2	14.60
Pleuronichthys guttulatus	diamond turbot	2	13.52
larval/post-larval fish unid.	larval fishes	1	7.61
larval fish - damaged	unidentified larval fishes	1	7.31
Typhlogobius californiensis	blind goby	1	7.30
Acanthogobius flavimanus	yellowfin goby	1	6.08
Citharichthys stigmaeus	speckled sanddab	1	6.08
	Total Fishes:	**508**	
Eggs			
fish eggs unid.	unidentified fish eggs	499	3,331.35
Sciaenidae unid. (eggs)	croaker eggs	86	608.21
Paralichthyidae unid. (eggs)	sand flounder eggs	35	245.76
Citharichthys spp. (eggs)	sanddab eggs	18	124.12
Atherinops affinis (eggs)	topsmelt eggs	11	74.21
Pleuronichthys spp. (eggs)	turbot eggs	6	42.84
Engraulidae unid. (eggs)	anchovy eggs	2	15.23
	Total Eggs:	**657**	
Target Invertebrates			
unidentified crab (megalops)	unidentified crab megalops	3	21.36
Hemigrapsus spp. (megalops)	shore crab megalops	2	12.29
Pinnixa spp. (megalops)	pea crabs megalops	2	12.29
	Total Target Invertebrates:	**7**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA08**
Start Date: **4/10/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	2,045	2,877.24
Hypsoblennius spp.	combtooth blennies	683	951.10
Engraulis mordax	northern anchovy	189	258.24
Genyonemus lineatus	white croaker	155	205.31
Engraulidae unid.	anchovies	114	153.65
Atherinopsidae unid.	silversides	36	49.70
Gobiesox spp.	clingfishes	31	43.18
Atherinopsis californiensis	jacksmelt	31	41.83
Acanthogobius flavimanus	yellowfin goby	31	39.32
Gillichthys mirabilis	longjaw mudsucker	26	34.69
Gibbonsia spp.	clinid kelpfishes	6	8.08
larval fish - damaged	unidentified larval fishes	5	6.69
larvae, unidentified yolksac	unidentified yolksac larvae	4	5.77
Sciaenidae unid.	croakers	4	4.99
Pleuronichthys verticalis	hornyhead turbot	3	4.88
Pleuronichthys guttulatus	diamond turbot	3	4.23
Typhlogobius californiensis	blind goby	2	3.35
Seriphus politus	queenfish	2	3.17
Heterostichus rostratus	giant kelpfish	2	2.64
Atherinops affinis	topsmelt	2	2.25
Leuresthes tenuis	California grunion	1	1.64
Clevelandia ios	arrow goby	1	1.47
Sebastes spp.	rockfishes	1	1.47
Merluccius productus	Pacific hake	1	1.46
Roncador stearnsii	spotfin croaker	1	1.39
Gobiesocidae unid.	clingfishes	1	1.31
larval fish fragment	unidentified larval fishes	1	1.31
Pleuronichthys ritteri	spotted turbot	1	1.07
	Total Fishes:	**3,382**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	48	69.11
Grapsidae unid. (megalops)	shore crab megalops	47	64.02
Pinnixa spp. (megalops)	pea crabs megalops	24	31.63
unidentified crab (megalops)	unidentified crab megalops	20	27.36
Majidae unid. (megalops)	spider crab megalops	6	8.20
Hemigrapsus spp. (megalops)	shore crab megalops	4	5.71
Pachycheles spp. (megalops)	porcelain crabs megalops	2	3.21
Pinnotheres spp. (megalops)	pea crab megalops	2	2.66
Paguridae unid. (megalops)	hermit crab megalops	2	2.54
Porcellanidae unid. (megalops)	porcelain crab megalops	1	1.39
	Total Target Invertebrates:	**156**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA08**
Start Date: **4/10/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Genyonemus lineatus	white croaker	2,565	2,749.78
Gobiidae unid.	gobies	1,460	1,444.36
Engraulis mordax	northern anchovy	760	832.77
Engraulidae unid.	anchovies	458	475.18
Hypsoblennius spp.	combtooth blennies	144	135.86
Atherinopsidae unid.	silversides	52	49.64
Gobiesox spp.	clingfishes	45	46.08
Atherinopsis californiensis	jacksmelt	36	36.64
Sciaenidae unid.	croakers	30	31.62
Paralichthys californicus	California halibut	25	27.48
Pleuronichthys verticalis	hornyhead turbot	15	16.51
Gillichthys mirabilis	longjaw mudsucker	15	13.53
Pleuronichthys guttulatus	diamond turbot	13	13.40
Seriphus politus	queenfish	13	12.93
larval fish - damaged	unidentified larval fishes	13	12.23
larvae, unidentified yolksac	unidentified yolksac larvae	11	11.46
Parophrys vetulus	English sole	9	9.87
Pleuronichthys ritteri	spotted turbot	9	9.83
Pleuronichthys spp.	turbots	9	9.58
Merluccius productus	Pacific hake	7	7.73
Gibbonsia spp.	clinid kelpfishes	7	7.16
Typhlogobius californiensis	blind goby	6	6.37
Sebastes spp.	rockfishes	6	5.73
Stenobrachius leucopsarus	northern lampfish	5	5.73
Labrisomidae unid.	labrisomid blennies	5	4.97
Citharichthys sordidus	Pacific sanddab	3	3.66
Clinocottus analis	wooly sculpin	3	3.05
Pleuronectiformes unid.	flatfishes	2	2.15
Rhinogobiops nicholsii	blackeye goby	2	2.15
Pleuronectidae unid.	righteye flounders	2	1.81
Icelinus quadriseriatus	yellowchin sculpin	1	1.27
Bathylagus ochotensis	popeye blacksmelt	1	1.15
Ophidiidae unid.	cusk-eels	1	1.13
Ruscarius creaseri	roughcheek sculpin	1	1.11
Haemulidae unid.	grunts	1	0.95
Leptocottus armatus	Pacific staghorn sculpin	1	0.95
Citharichthys stigmaeus	speckled sanddab	1	0.93
Hexagrammidae unid.	greenlings	1	0.87
Heterostichus rostratus	giant kelpfish	1	0.72
	Total Fishes:	**5,739**	

(continued)

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA08**
Start Date: **4/10/2006**
Stations: **O1-O3, S1-S3** *(continued)*

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	739	739.67
Pinnixa spp. (megalops)	pea crabs megalops	163	156.66
unidentified crab (megalops)	unidentified crab megalops	117	118.67
Grapsidae unid. (megalops)	shore crab megalops	51	53.97
Pinnotheres spp. (megalops)	pea crab megalops	36	35.06
Paguridae unid. (megalops)	hermit crab megalops	31	31.02
Majidae unid. (megalops)	spider crab megalops	25	27.17
Cancer antennarius (megalops)	brown rock crab megalops	15	15.22
Porcellanidae unid. (megalops)	porcelain crab megalops	16	14.50
Hemigrapsus spp. (megalops)	shore crab megalops	9	9.61
Petrolisthes spp. (megalops)	porcelain crab megalops	7	6.99
Pachycheles rudis (megalops)	thickclaw porcelain crab	7	6.48
Pachycheles spp. (megalops)	porcelain crabs megalops	6	5.98
Cancer anthonyi (megalops)	yellow crab megalops	3	3.38
Diogenidae (megalops)	left-handed hermit crabs	3	2.80
Loligo opalescens	market squid	2	2.25
Cancer spp. (megalops)	cancer crabs megalops	1	1.12
Lophopanopeus spp. (megalops)	black-clawed crab megalops	1	0.93
	Total Target Invertebrates:	**1,232**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA09**
Start Date: **4/24/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	282	1,751.65
Atherinopsidae unid.	silversides	249	1,410.74
Hypsoblennius spp.	combtooth blennies	125	739.00
Atherinops affinis	topsmelt	38	225.15
Genyonemus lineatus	white croaker	33	202.50
Engraulis mordax	northern anchovy	10	56.95
Gobiesox spp.	clingfishes	3	17.24
Sciaenidae unid.	croakers	1	6.39
Gibbonsia spp.	clinid kelpfishes	1	5.99
Sardinops sagax	Pacific sardine	1	5.94
larvae, unidentified yolksac	unidentified yolksac larvae	1	5.60
Pleuronichthys guttulatus	diamond turbot	1	5.40
Typhlogobius californiensis	blind goby	1	5.40
	Total Fishes:	**746**	
Eggs			
fish eggs unid.	unidentified fish eggs	831	4,885.26
Paralichthyidae unid. (eggs)	sand flounder eggs	99	604.67
Citharichthys spp. (eggs)	sanddab eggs	54	311.94
Engraulidae unid. (eggs)	anchovy eggs	18	105.65
Sciaenidae unid. (eggs)	croaker eggs	4	24.84
Pleuronichthys spp. (eggs)	turbot eggs	4	23.10
Genyonemus lineatus (eggs)	white croaker eggs	3	18.87
Atherinops affinis (eggs)	topsmelt eggs	1	5.46
	Total Eggs:	**1,014**	
Target Invertebrates			
unidentified crab (megalops)	unidentified crab megalops	3	18.08
Grapsidae unid. (megalops)	shore crab megalops	2	11.59
Pugettia spp. (megalops)	kelp crabs megalops	2	11.45
Pinnixa spp. (megalops)	pea crabs megalops	1	5.99
Loligo opalescens	market squid	1	5.40
	Total Target Invertebrates:	**9**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA10**
Start Date: **5/8/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	293	1,934.35
Hypsoblennius spp.	combtooth blennies	263	1,845.25
Atherinopsidae unid.	silversides	160	1,113.14
Genyonemus lineatus	white croaker	35	236.51
Engraulis mordax	northern anchovy	23	160.71
Atherinops affinis	topsmelt	5	34.07
Labrisomidae unid.	labrisomid blennies	2	13.01
Gillichthys mirabilis	longjaw mudsucker	1	7.74
Rhinogobiops nicholsii	blackeye goby	1	7.74
Gobiesox spp.	clingfishes	1	6.78
larval fish fragment	unidentified larval fishes	1	6.50
Syngnathus leptorhynchus	bay pipefish	1	6.23
	Total Fishes:	**786**	
Eggs			
fish eggs unid.	unidentified fish eggs	244	1,725.73
Atherinops affinis (eggs)	topsmelt eggs	3	21.61
Citharichthys spp. (eggs)	sanddab eggs	1	8.12
	Total Eggs:	**248**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	1	7.60
Brachyura unid. (megalops)	unidentified crab megalops	1	6.78
Pugettia spp. (megalops)	kelp crabs megalops	1	6.78
Majidae unid. (megalops)	spider crab megalops	1	6.23
	Total Target Invertebrates:	**4**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA10**
Start Date: **5/8/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	1,548	2,319.10
Hypsoblennius spp.	combtooth blennies	1,281	1,989.61
Engraulis mordax	northern anchovy	549	809.89
Genyonemus lineatus	white croaker	224	337.95
Gobiesox spp.	clingfishes	24	36.96
Atherinopsidae unid.	silversides	20	31.85
Leuresthes tenuis	California grunion	18	28.72
Labrisomidae unid.	labrisomid blennies	11	18.11
larval fish fragment	unidentified larval fishes	12	18.08
larval fish - damaged	unidentified larval fishes	10	15.84
Pleuronichthys spp.	turbots	5	7.94
Pleuronichthys verticalis	hornyhead turbot	4	7.00
Seriphus politus	queenfish	4	5.52
Gillichthys mirabilis	longjaw mudsucker	3	5.13
Engraulidae unid.	anchovies	3	4.50
Acanthogobius flavimanus	yellowfin goby	2	3.33
Typhlogobius californiensis	blind goby	2	3.15
Sciaenidae unid.	croakers	2	3.09
Paraclinus spp.	clinid	2	2.78
Ruscarius creaseri	roughcheek sculpin	1	1.82
Paralichthys californicus	California halibut	1	1.48
Syngnathus spp.	pipefishes	1	1.43
Lepidogobius lepidus	bay goby	1	1.27
Pleuronichthys guttulatus	diamond turbot	1	1.25
	Total Fishes:	**3,729**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	19	28.44
Brachyura unid. (megalops)	unidentified crab megalops	19	27.35
Pugettia spp. (megalops)	kelp crabs megalops	12	18.97
Pinnixa spp. (megalops)	pea crabs megalops	10	14.31
Pinnotheres spp. (megalops)	pea crab megalops	2	2.75
unidentified crab (megalops)	unidentified crab megalops	1	1.25
	Total Target Invertebrates:	**63**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA10**
Start Date: **5/8/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Engraulis mordax	northern anchovy	681	664.18
Gobiidae unid.	gobies	401	396.93
Hypsoblennius spp.	combtooth blennies	392	375.64
Genyonemus lineatus	white croaker	290	258.57
Engraulidae unid.	anchovies	65	63.64
larval fish fragment	unidentified larval fishes	14	14.31
Atherinopsidae unid.	silversides	12	11.54
Gobiesox spp.	clingfishes	13	11.01
Pleuronichthys verticalis	hornyhead turbot	10	10.35
Typhlogobius californiensis	blind goby	9	8.68
larval fish - damaged	unidentified larval fishes	9	7.68
Paralichthys californicus	California halibut	6	5.47
Sciaenidae unid.	croakers	4	4.17
Oxylebius pictus	painted greenling	4	3.90
Pleuronichthys spp.	turbots	4	3.53
Seriphus politus	queenfish	3	3.35
Leuresthes tenuis	California grunion	4	3.25
Ruscarius creaseri	roughcheek sculpin	3	3.05
Stenobrachius leucopsarus	northern lampfish	3	2.85
larvae, unidentified yolksac	unidentified yolksac larvae	2	2.01
Gibbonsia spp.	clinid kelpfishes	2	1.80
Lepidogobius lepidus	bay goby	2	1.76
Citharichthys stigmaeus	speckled sanddab	1	1.14
Ophidiidae unid.	cusk-eels	1	1.14
Parophrys vetulus	English sole	1	1.14
Citharichthys sordidus	Pacific sanddab	1	1.08
Gillichthys mirabilis	longjaw mudsucker	1	0.96
Artedius lateralis	smoothhead sculpin	1	0.90
Rhinogobiops nicholsii	blackeye goby	1	0.90
Oxyjulis californica	senorita	1	0.83
Pleuronectidae unid.	righteye flounders	1	0.83
Sebastes spp.	rockfishes	1	0.80
Zaniolepis frenata	shortspine combfish	1	0.80
Atherinopsis californiensis	jacksmelt	1	0.78
Clinocottus analis	wooly sculpin	1	0.78
Labrisomidae unid.	labrisomid blennies	1	0.72
Paraclinus spp.	clinid	1	0.72
	Total Fishes:	**1,948**	

(continued)

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA10**
Start Date: **5/8/2006**
Stations: **O1-O3, S1-S3** *(continued)*

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	72	71.00
Pinnixa spp. (megalops)	pea crabs megalops	28	26.29
Grapsidae unid. (megalops)	shore crab megalops	20	18.93
Brachyura unid. (megalops)	unidentified crab megalops	14	11.59
Majidae unid. (megalops)	spider crab megalops	5	4.65
unidentified crab (megalops)	unidentified crab megalops	4	3.88
Cancer antennarius (megalops)	brown rock crab megalops	4	3.54
Pinnotheres spp. (megalops)	pea crab megalops	3	2.58
Diogenidae (megalops)	left-handed hermit crabs	2	1.67
Lophopanopeus spp. (megalops)	black-clawed crab megalops	2	1.59
Cancer spp. (megalops)	cancer crabs megalops	1	0.97
	Total Target Invertebrates:	**155**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA11**
Start Date: **5/22/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Atherinopsidae unid.	silversides	1,739	10,350.00
Gobiidae unid.	gobies	425	2,594.85
Hypsoblennius spp.	combtooth blennies	305	2,067.50
Leuresthes tenuis	California grunion	256	1,520.06
Atherinops affinis	topsmelt	19	125.89
Atherinopsis californiensis	jacksmelt	4	27.85
Gobiesox spp.	clingfishes	3	19.13
larval fish - damaged	unidentified larval fishes	2	14.70
Labrisomidae unid.	labrisomid blennies	2	13.49
Genyonemus lineatus	white croaker	2	11.66
Pleuronectidae unid.	righteye flounders	1	7.72
Sciaenidae unid.	croakers	1	6.18
Engraulis mordax	northern anchovy	1	5.77
	Total Fishes:	**2,760**	
Eggs			
fish eggs unid.	unidentified fish eggs	325	2,050.13
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	73	481.01
Paralichthyidae unid. (eggs)	sand flounder eggs	29	176.65
Sciaenidae unid. (eggs)	croaker eggs	28	166.36
Citharichthys spp. (eggs)	sanddab eggs	20	127.51
Engraulidae unid. (eggs)	anchovy eggs	4	24.18
Pleuronichthys spp. (eggs)	turbot eggs	1	5.91
	Total Eggs:	**480**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	1	5.77
	Total Target Invertebrates:	**1**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA12**
Start Date: **6/5/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	544	3,813.26
Hypsoblennius spp.	combtooth blennies	433	3,076.48
Leuresthes tenuis	California grunion	25	173.71
Labrisomidae unid.	labrisomid blennies	7	48.65
Seriphus politus	queenfish	3	20.49
larvae, unidentified yolksac	unidentified yolksac larvae	1	7.45
Atherinopsidae unid.	silversides	1	7.32
larval fish - damaged	unidentified larval fishes	1	7.32
Atherinops affinis	topsmelt	1	7.22
Engraulidae unid.	anchovies	1	7.22
Syngnathus spp.	pipefishes	1	7.22
	Total Fishes:	**1,018**	
Eggs			
fish eggs unid.	unidentified fish eggs	104	728.37
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	30	211.90
Citharichthys spp. (eggs)	sanddab eggs	1	7.45
Pleuronichthys spp. (eggs)	turbot eggs	1	7.22
	Total Eggs:	**136**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA12**
Start Date: **6/5/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	2,294	3,589.62
Hypsoblennius spp.	combtooth blennies	1,076	1,735.02
Genyonemus lineatus	white croaker	37	65.44
larvae, unidentified yolksac	unidentified yolksac larvae	21	35.46
Sciaenidae unid.	croakers	20	34.13
Labrisomidae unid.	labrisomid blennies	20	28.11
larval fish - damaged	unidentified larval fishes	14	23.25
Gobiesox spp.	clingfishes	13	21.99
larval fish fragment	unidentified larval fishes	13	20.97
Typhlogobius californiensis	blind goby	11	18.40
Syngnathus spp.	pipefishes	7	12.01
Engraulidae unid.	anchovies	7	11.08
Seriphus politus	queenfish	7	10.83
Gibbonsia spp.	clinid kelpfishes	4	6.96
Hypsypops rubicundus	garibaldi	3	5.18
Cheilotrema saturnum	black croaker	2	3.33
Roncador stearnsii	spotfin croaker	2	2.98
Atherinops affinis	topsmelt	1	1.95
Clinocottus spp.	sculpins	1	1.82
Paralabrax spp.	sand bass	1	1.79
Peprilus simillimus	Pacific butterfish	1	1.68
Paralichthys californicus	California halibut	1	1.49
Engraulis mordax	northern anchovy	1	1.29
	Total Fishes:	**3,557**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	5	8.40
Brachyura unid. (megalops)	unidentified crab megalops	4	6.34
Pugettia spp. (megalops)	kelp crabs megalops	2	2.97
Lophopanopeus spp. (megalops)	black-clawed crab megalops	1	1.68
Paguridae unid. (megalops)	hermit crab megalops	1	1.29
	Total Target Invertebrates:	**13**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA12**
Start Date: **6/5/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Hypsoblennius spp.	combtooth blennies	860	870.72
Gobiidae unid.	gobies	760	716.56
larvae, unidentified yolksac	unidentified yolksac larvae	374	368.04
Sciaenidae unid.	croakers	292	270.34
larval fish fragment	unidentified larval fishes	116	113.51
Seriphus politus	queenfish	91	87.90
Engraulis mordax	northern anchovy	72	69.42
Genyonemus lineatus	white croaker	51	50.84
Paralichthys californicus	California halibut	58	50.46
Atherinopsidae unid.	silversides	51	49.78
Engraulidae unid.	anchovies	38	37.94
Labrisomidae unid.	labrisomid blennies	29	29.23
Hypsypops rubicundus	garibaldi	27	24.69
larval fish - damaged	unidentified larval fishes	21	19.71
Leuresthes tenuis	California grunion	16	16.58
Cheilotrema saturnum	black croaker	12	11.74
Typhlogobius californiensis	blind goby	11	11.67
Roncador stearnsii	spotfin croaker	12	10.97
Gobiesox spp.	clingfishes	8	8.11
Pleuronichthys ritteri	spotted turbot	5	4.77
Paralabrax spp.	sand bass	5	4.60
larval/post-larval fish unid.	larval fishes	4	4.21
Peprilus simillimus	Pacific butterfish	4	3.88
Syngnathus spp.	pipefishes	3	3.54
Pleuronichthys spp.	turbots	4	3.53
Scorpaenidae unid.	scorpionfishes	2	2.18
Menticirrhus undulatus	California corbina	2	2.08
Atherinops affinis	topsmelt	2	1.99
Sphyraena argentea	Pacific barracuda	2	1.88
Citharichthys stigmaeus	speckled sanddab	2	1.65
Clinocottus spp.	sculpins	1	1.08
Gibbonsia spp.	clinid kelpfishes	1	1.05
Girella nigricans	opaleye	1	1.03
Semicossyphus pulcher	California sheephead	1	1.03
Cynoglossidae unid.	tongue soles	1	0.94
Pleuronectiformes unid.	flatfishes	1	0.91
Pleuronichthys verticalis	hornyhead turbot	1	0.91
Oxyjulis californica	senorita	1	0.85
Paralichthyidae unid.	sand flounders	1	0.85
Gillichthys mirabilis	longjaw mudsucker	1	0.81
	Total Fishes:	**2,944**	

(continued)

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA12**
Start Date: **6/5/2006**
Stations: **O1-O3, S1-S3** *(continued)*

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	27	28.16
Grapsidae unid. (megalops)	shore crab megalops	16	16.34
Brachyura unid. (megalops)	unidentified crab megalops	8	8.09
Petrolisthes spp. (megalops)	porcelain crab megalops	7	7.69
Lophopanopeus spp. (megalops)	black-clawed crab megalops	6	6.30
Pachycheles spp. (megalops)	porcelain crabs megalops	6	6.00
Paguridae unid. (megalops)	hermit crab megalops	5	5.54
Pinnixa spp. (megalops)	pea crabs megalops	3	3.35
Porcellanidae unid. (megalops)	porcelain crab megalops	3	3.21
unidentified crab (megalops)	unidentified crab megalops	3	3.18
Majidae unid. (megalops)	spider crab megalops	2	2.29
Cancer antennarius (megalops)	brown rock crab megalops	1	1.05
Pinnotheres spp. (megalops)	pea crab megalops	1	0.91
	Total Target Invertebrates:	**88**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA13**
Start Date: **6/19/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	335	2,256.06
Hypsoblennius spp.	combtooth blennies	187	1,285.60
Atherinopsidae unid.	silversides	17	115.98
larval fish fragment	unidentified larval fishes	7	47.47
Labrisomidae unid.	labrisomid blennies	6	41.77
Atherinops affinis	topsmelt	5	32.40
larval fish - damaged	unidentified larval fishes	3	21.26
Gobiesox spp.	clingfishes	3	20.70
Sciaenidae unid.	croakers	1	7.30
Cheilotrema saturnum	black croaker	1	7.18
Syngnathus spp.	pipefishes	1	6.48
	Total Fishes:	**566**	
Eggs			
fish eggs unid.	unidentified fish eggs	72	528.53
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	50	361.77
Engraulidae unid. (eggs)	anchovy eggs	1	6.34
	Total Eggs:	**123**	

(continued)

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA13**
Start Date: **6/19/2006**
Stations: **E3 continued**

Target Invertebrates
No Invertebrates

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA14**
Start Date: **7/5/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	345	2,300.65
Hypsoblennius spp.	combtooth blennies	167	1,144.53
Labrisomidae unid.	labrisomid blennies	10	65.66
Gobiesox spp.	clingfishes	2	13.69
Gibbonsia spp.	clinid kelpfishes	1	6.85
Hypsypops rubicundus	garibaldi	1	6.53
Sciaenidae unid.	croakers	1	6.32
	Total Fishes:	**527**	
Eggs			
fish eggs unid.	unidentified fish eggs	96	640.29
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	12	83.19
Pleuronichthys spp. (eggs)	turbot eggs	1	6.94
Paralichthyidae unid. (eggs)	sand flounder eggs	1	6.32
	Total Eggs:	**110**	

Target Invertebrates
No Invertebrates

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA14**
Start Date: **7/5/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	1,290	1,646.15
Hypsoblennius spp.	combtooth blennies	942	1,178.24
Labrisomidae unid.	labrisomid blennies	48	73.04
larval fish fragment	unidentified larval fishes	32	43.33
Syngnathus spp.	pipefishes	12	14.56
larval fish - damaged	unidentified larval fishes	11	13.74
Gobiesox spp.	clingfishes	8	11.09
Sciaenidae unid.	croakers	8	10.66
Engraulis mordax	northern anchovy	6	7.17
larvae, unidentified yolksac	unidentified yolksac larvae	5	6.25
Ilypnus gilberti	cheekspot goby	3	4.15
larval/post-larval fish unid.	larval fishes	3	4.15
Atherinopsidae unid.	silversides	2	2.57
Engraulidae unid.	anchovies	1	1.34
Leuresthes tenuis	California grunion	1	1.16
	Total Fishes:	**2,372**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	5	6.39
Brachyura unid. (megalops)	unidentified crab megalops	4	4.74
Pinnixa spp. (megalops)	pea crabs megalops	3	3.75
Pugettia spp. (megalops)	kelp crabs megalops	2	2.37
Lophopanopeus spp. (megalops)	black-clawed crab megalops	1	1.19
	Total Target Invertebrates:	**15**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA14**
Start Date: **7/5/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Hypsoblennius spp.	combtooth blennies	520	536.32
Gobiidae unid.	gobies	365	378.48
larvae, unidentified yolksac	unidentified yolksac larvae	140	151.45
Sciaenidae unid.	croakers	86	89.81
larval fish fragment	unidentified larval fishes	34	36.93
Hypsypops rubicundus	garibaldi	25	24.46
Engraulis mordax	northern anchovy	15	16.95
larval fish - damaged	unidentified larval fishes	11	10.63
Labrisomidae unid.	labrisomid blennies	11	8.99
Engraulidae unid.	anchovies	8	8.53
Atherinopsidae unid.	silversides	8	7.94
Paralichthys californicus	California halibut	7	7.27
Gobiesox spp.	clingfishes	5	4.58
Cheilotrema saturnum	black croaker	2	2.46
Paralabrax spp.	sand bass	2	2.46
Syngnathus spp.	pipefishes	2	1.93
Pomacentridae unid.	damselfishes	1	1.21
Oxyjulis californica	senorita	1	1.15
Pleuronichthys ritteri	spotted turbot	1	0.98
Scorpaenidae unid.	scorpionfishes	1	0.96
Gibbonsia spp.	clinid kelpfishes	1	0.72
Roncador stearnsii	spotfin croaker	1	0.72
	Total Fishes:	**1,247**	
Target Invertebrates			
Pinnixa spp. (megalops)	pea crabs megalops	10	8.95
Lophopanopeus spp. (megalops)	black-clawed crab megalops	10	7.73
Pachycheles spp. (megalops)	porcelain crabs megalops	4	4.58
Petrolisthes spp. (megalops)	porcelain crab megalops	3	2.97
Pugettia spp. (megalops)	kelp crabs megalops	2	1.81
Grapsidae unid. (megalops)	shore crab megalops	2	1.79
Brachyura unid. (megalops)	unidentified crab megalops	2	1.78
Hippoidea (megalops)	mole crab megalops	1	1.21
Paguridae unid. (megalops)	hermit crab megalops	1	1.21
Diogenidae (megalops)	left-handed hermit crabs	1	1.00
Porcellanidae unid. (megalops)	porcelain crab megalops	1	1.00
Majidae unid. (megalops)	spider crab megalops	1	0.96
Pinnotheres spp. (megalops)	pea crab megalops	1	0.94
	Total Target Invertebrates:	**39**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA15**
Start Date: **7/17/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	212	1,391.18
Hypsoblennius spp.	combtooth blennies	58	382.07
Labrisomidae unid.	labrisomid blennies	12	93.55
larval fish fragment	unidentified larval fishes	2	14.29
Atherinopsidae unid.	silversides	1	6.68
Hypsypops rubicundus	garibaldi	1	6.68
Syngnathus spp.	pipefishes	1	6.46
Sciaenidae unid.	croakers	1	6.19
	Total Fishes:	**288**	
Eggs			
fish eggs unid.	unidentified fish eggs	65	426.18
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	45	323.98
Paralichthyidae unid. (eggs)	sand flounder eggs	4	25.57
	Total Eggs:	**114**	
Target Invertebrates			
Brachyura unid. (megalops)	unidentified crab megalops	1	6.46
	Total Target Invertebrates:	**1**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA16**
Start Date: **7/31/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	294	1,887.04
Hypsoblennius spp.	combtooth blennies	100	657.86
Typhlogobius californiensis	blind goby	2	12.41
Syngnathus spp.	pipefishes	2	11.83
Syngnathus leptorhynchus	bay pipefish	1	7.83
Genyonemus lineatus	white croaker	1	6.73
Atherinopsidae unid.	silversides	1	6.50
Labrisomidae unid.	labrisomid blennies	1	5.63
	Total Fishes:	**402**	
Eggs			
fish eggs unid.	unidentified fish eggs	96	598.37
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	28	200.87
Paralichthyidae unid. (eggs)	sand flounder eggs	1	7.83
	Total Eggs:	**125**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA17**
Start Date: **8/14/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	592	4,185.14
Hypsoblennius spp.	combtooth blennies	89	638.68
Atherinopsidae unid.	silversides	3	23.86
Hypsypops rubicundus	garibaldi	2	12.98
larvae, unidentified yolksac	unidentified yolksac larvae	1	8.23
Syngnathus spp.	pipefishes	1	7.95
larval fish fragment	unidentified larval fishes	1	7.41
Umbrina roncador	yellowfin croaker	1	7.37
Leuresthes tenuis	California grunion	1	6.45
	Total Fishes:	**691**	
Eggs			
fish eggs unid.	unidentified fish eggs	293	2,072.63
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	17	133.86
Paralichthyidae unid. (eggs)	sand flounder eggs	3	20.31
Pleuronichthys spp. (eggs)	turbot eggs	1	8.06
Citharichthys spp. (eggs)	sanddab eggs	1	6.53
Engraulidae unid. (eggs)	anchovy eggs	1	6.30
	Total Eggs:	**316**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA17**
Start Date: **8/14/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	3,748	5,638.47
Hypsoblennius spp.	combtooth blennies	546	801.37
Labrisomidae unid.	labrisomid blennies	25	38.80
larval fish fragment	unidentified larval fishes	13	19.16
Syngnathus spp.	pipefishes	6	8.85
Hypsypops rubicundus	garibaldi	2	2.94
Umbrina roncador	yellowfin croaker	1	1.93
larvae, unidentified yolksac	unidentified yolksac larvae	1	1.83
Seriphus politus	queenfish	1	1.67
unidentified fish, damaged	unidentified damaged fish	1	1.39
	Total Fishes:	**4,344**	
Target Invertebrates			
Pinnixa spp. (megalops)	pea crabs megalops	1	1.78
Brachyura unid. (megalops)	unidentified crab megalops	1	1.21
	Total Target Invertebrates:	**2**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA17**
Start Date: **8/14/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	746	622.44
Hypsoblennius spp.	combtooth blennies	291	275.73
Hypsypops rubicundus	garibaldi	34	31.46
Sciaenidae unid.	croakers	7	7.21
larvae, unidentified yolksac	unidentified yolksac larvae	7	7.11
Paralichthys californicus	California halibut	7	6.19
Cheilotrema saturnum	black croaker	5	4.84
unidentified fish, damaged	unidentified damaged fish	5	4.49
larval fish fragment	unidentified larval fishes	4	3.93
Menticirrhus undulatus	California corbina	3	2.55
Gobiesox spp.	clingfishes	2	1.99
Oxyjulis californica	senorita	2	1.95
Paralichthyidae unid.	sand flounders	2	1.66
Pleuronectidae unid.	righteye flounders	1	1.14
Sphyraena argentea	Pacific barracuda	1	1.12
Peprilus simillimus	Pacific butterfish	1	1.11
larval fish - damaged	unidentified larval fishes	1	1.05
Paralabrax spp.	sand bass	1	0.93
Hypsoblennius jenkinsi	mussel blenny	1	0.89
Typhlogobius californiensis	blind goby	1	0.89
Lepidogobius lepidus	bay goby	1	0.84
Syngnathus spp.	pipefishes	1	0.84
Engraulis mordax	northern anchovy	1	0.72
Pleuronichthys guttulatus	diamond turbot	1	0.71
Labrisomidae unid.	labrisomid blennies	1	0.69
	Total Fishes:	**1,127**	
Target Invertebrates			
Pinnixa spp. (megalops)	pea crabs megalops	23	17.44
Grapsidae unid. (megalops)	shore crab megalops	6	4.56
Panulirus interruptus (phyllosome)	California spiny lobster	3	2.99
Pugettia spp. (megalops)	kelp crabs megalops	3	2.86
Majidae unid. (megalops)	spider crab megalops	3	2.57
Petrolisthes spp. (megalops)	porcelain crab megalops	2	1.77
Porcellanidae unid. (megalops)	porcelain crab megalops	1	0.76
Lophopanopeus spp. (megalops)	black-clawed crab megalops	1	0.72
Panulirus interruptus	California spiny lobster	1	0.71
Brachyura unid. (megalops)	unidentified crab megalops	1	0.69
	Total Target Invertebrates:	**44**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA18**
Start Date: **8/28/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	364	2,766.09
Hypsoblennius spp.	combtooth blennies	91	698.81
Leuresthes tenuis	California grunion	8	56.93
Labrisomidae unid.	labrisomid blennies	3	22.07
Genyonemus lineatus	white croaker	1	7.87
Atherinopsidae unid.	silversides	1	7.67
Haemulidae unid.	grunts	1	7.38
Xenistius californiensis	salema	1	7.38
Cheilotrema saturnum	black croaker	1	6.54
Roncador stearnsii	spotfin croaker	1	6.54
Syngnathus spp.	pipefishes	1	6.54
	Total Fishes:	**473**	
Eggs			
fish eggs unid.	unidentified fish eggs	163	1,217.32
Paralichthyidae unid. (eggs)	sand flounder eggs	30	229.02
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	27	200.37
Pleuronichthys spp. (eggs)	turbot eggs	9	68.93
Citharichthys spp. (eggs)	sanddab eggs	3	22.20
Engraulidae unid. (eggs)	anchovy eggs	1	7.38
Sciaenidae unid. (eggs)	croaker eggs	1	7.38
	Total Eggs:	**234**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	1	8.03
	Total Target Invertebrates:	**1**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA19**
Start Date: **9/11/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	240	1,669.33
Hypsoblennius spp.	combtooth blennies	59	420.52
Seriphus politus	queenfish	3	21.06
larvae, unidentified yolksac	unidentified yolksac larvae	2	13.18
Paralabrax spp.	sand bass	1	7.23
Engraulidae unid.	anchovies	1	6.59
	Total Fishes:	**306**	
Eggs			
fish eggs unid.	unidentified fish eggs	94	665.67
Paralichthyidae unid. (eggs)	sand flounder eggs	9	64.77
Sciaen. / Paralich. / Labridae (eggs)	fish eggs	6	39.55
Citharichthys spp. (eggs)	sanddab eggs	4	26.80
Pleuronichthys spp. (eggs)	turbot eggs	4	26.80
Engraulidae unid. (eggs)	anchovy eggs	1	7.23
	Total Eggs:	**118**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	1	7.82
Brachyura unid. (megalops)	unidentified crab megalops	1	5.71
	Total Target Invertebrates:	**2**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA19**
Start Date: **9/11/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	902	1,466.82
Hypsoblennius spp.	combtooth blennies	262	426.93
Labrisomidae unid.	labrisomid blennies	8	12.77
Seriphus politus	queenfish	6	10.38
Syngnathus spp.	pipefishes	4	6.76
Engraulidae unid.	anchovies	3	5.56
Gibbonsia spp.	clinid kelpfishes	3	5.24
larval fish - damaged	unidentified larval fishes	3	5.19
Sciaenidae unid.	croakers	1	1.34
Cheilotrema saturnum	black croaker	1	1.33
	Total Fishes:	**1,193**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	5	8.01
Brachyura unid. (megalops)	unidentified crab megalops	4	7.12
	Total Target Invertebrates:	**9**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA19**
Start Date: **9/11/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	200	226.65
Hypsoblennius spp.	combtooth blennies	173	188.92
larvae, unidentified yolksac	unidentified yolksac larvae	61	69.80
Paralabrax spp.	sand bass	47	52.97
Engraulidae unid.	anchovies	44	50.60
Paralichthys californicus	California halibut	23	26.94
Sciaenidae unid.	croakers	11	12.65
Seriphus politus	queenfish	10	12.08
Pleuronichthys guttulatus	diamond turbot	9	9.50
Genyonemus lineatus	white croaker	8	9.24
Symphurus atricaudus	California tonguefish	4	4.51
Citharichthys stigmaeus	speckled sanddab	3	3.61
Labrisomidae unid.	labrisomid blennies	3	3.46
Ophidion scrippsae	basketweave cusk-eel	3	3.12
Blennioidei unid.	blennies	2	2.50
Citharichthys sordidus	Pacific sanddab	2	2.46
Pleuronichthys verticalis	hornyhead turbot	2	2.41
Gobiesox spp.	clingfishes	2	2.30
Gillichthys mirabilis	longjaw mudsucker	2	2.07
Pleuronichthys ritteri	spotted turbot	2	2.07
Menticirrhus undulatus	California corbina	2	1.90
Umbrina roncador	yellowfin croaker	2	1.87
Roncador stearnsii	spotfin croaker	1	1.34
Sardinops sagax	Pacific sardine	1	1.34
Halichoeres semicinctus	rock wrasse	1	1.25
larval fish fragment	unidentified larval fishes	1	1.23
Semicossyphus pulcher	California sheephead	1	1.22
Girella nigricans	opaleye	1	1.18
Pleuronectidae unid.	righteye flounders	1	1.18
larval fish - damaged	unidentified larval fishes	1	1.13
Pleuronectiformes unid.	flatfishes	1	1.13
Heterostichus rostratus	giant kelpfish	1	1.03
Ophidiidae unid.	cusk-eels	1	1.03
Syngnathus spp.	pipefishes	1	1.03
Cheilotrema saturnum	black croaker	1	1.02
Paralichthyidae unid.	sand flounders	1	0.88
	Total Fishes:	**629**	

(continued)

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA19**
Start Date: **9/11/2006**
Stations: **O1-O3, S1-S3** *(continued)*

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	8	9.92
Brachyura unid. (megalops)	unidentified crab megalops	4	5.01
Pugettia spp. (megalops)	kelp crabs megalops	3	3.54
Pinnixa spp. (megalops)	pea crabs megalops	2	2.40
Cancer antennarius (megalops)	brown rock crab megalops	1	1.34
Majidae unid. (megalops)	spider crab megalops	1	1.25
Porcellanidae unid. (megalops)	porcelain crab megalops	1	1.25
Pachycheles spp. (megalops)	porcelain crabs megalops	1	1.18
	Total Target Invertebrates:	**21**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA20**
Start Date: **9/25/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	237	1,687.51
Hypsoblennius spp.	combtooth blennies	97	716.27
Labrisomidae unid.	labrisomid blennies	3	24.24
Pleuronichthys guttulatus	diamond turbot	2	13.43
larval fish - damaged	unidentified larval fishes	1	8.04
Leuresthes tenuis	California grunion	1	8.04
Atherinops affinis	topsmelt	1	6.95
Atherinopsidae unid.	silversides	1	6.95
Seriphus politus	queenfish	1	6.95
	Total Fishes:	**344**	
Eggs			
fish eggs unid.	unidentified fish eggs	8	56.30
Pleuronichthys spp. (eggs)	turbot eggs	1	6.95
	Total Eggs:	**9**	
Target Invertebrates			
Brachyura unid. (megalops)	unidentified crab megalops	1	7.44
	Total Target Invertebrates:	**1**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA21**
Start Date: **10/9/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	146	1,022.66
Hypsoblennius spp.	combtooth blennies	54	379.21
Labrisomidae unid.	labrisomid blennies	3	19.14
Leuresthes tenuis	California grunion	1	6.93
	Total Fishes:	**204**	
Eggs			
fish eggs unid.	unidentified fish eggs	26	187.65
Paralichthyidae unid. (eggs)	sand flounder eggs	5	36.08
Labridae unid. (eggs)	wrasse eggs	1	6.71
	Total Eggs:	**32**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA21**
Start Date: **10/9/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	548	742.16
Hypsoblennius spp.	combtooth blennies	104	156.22
Gillichthys mirabilis	longjaw mudsucker	7	10.00
larval fish fragment	unidentified larval fishes	8	9.82
Genyonemus lineatus	white croaker	6	8.10
larval fish - damaged	unidentified larval fishes	4	6.59
Engraulidae unid.	anchovies	3	3.81
Labrisomidae unid.	labrisomid blennies	2	2.87
Atherinopsis californiensis	jacksmelt	1	1.72
Gobiesocidae unid.	clingfishes	1	1.72
Gobiesox spp.	clingfishes	1	1.37
Pleuronichthys guttulatus	diamond turbot	1	1.36
Syngnathus spp.	pipefishes	1	1.36
	Total Fishes:	**687**	
Target Invertebrates			
Brachyura unid. (megalops)	unidentified crab megalops	2	2.93
Pugettia spp. (megalops)	kelp crabs megalops	1	1.36
Grapsidae unid. (megalops)	shore crab megalops	1	1.15
	Total Target Invertebrates:	**4**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA21**
Start Date: **10/9/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	115	124.26
Genyonemus lineatus	white croaker	89	97.46
Hypsoblennius spp.	combtooth blennies	48	52.42
larvae, unidentified yolksac	unidentified yolksac larvae	9	9.54
Triphoturus mexicanus	Mexican lampfish	4	4.35
Atherinopsidae unid.	silversides	4	4.26
Engraulidae unid.	anchovies	3	3.54
larval fish fragment	unidentified larval fishes	3	3.07
Engraulis mordax	northern anchovy	2	2.56
Sciaenidae unid.	croakers	1	1.22
Pleuronichthys guttulatus	diamond turbot	1	1.04
Paralichthys californicus	California halibut	1	1.03
Blennioidei unid.	blennies	1	1.02
	Total Fishes:	**281**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	4	4.97
Pinnixa spp. (megalops)	pea crabs megalops	1	1.22
	Total Target Invertebrates:	**5**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA22**
Start Date: **10/23/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	71	494.43
Hypsoblennius spp.	combtooth blennies	67	490.42
Atherinops affinis	topsmelt	2	13.79
Labrisomidae unid.	labrisomid blennies	1	7.67
Atherinopsidae unid.	silversides	1	6.89
larval fish fragment	unidentified larval fishes	1	6.59
	Total Fishes:	**143**	
Eggs			
fish eggs unid.	unidentified fish eggs	7	51.00
Paralichthyidae unid. (eggs)	sand flounder eggs	2	14.31
Pleuronichthys spp. (eggs)	turbot eggs	2	13.48
	Total Eggs:	**11**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA23**
Start Date: **11/6/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	74	480.70
Hypsoblennius spp.	combtooth blennies	14	91.18
larval fish - damaged	unidentified larval fishes	1	6.74
Engraulidae unid.	anchovies	1	6.67
Atherinopsis californiensis	jacksmelt	1	6.36
Sciaenidae unid.	croakers	1	6.15
larval fish fragment	unidentified larval fishes	1	6.11
	Total Fishes:	**93**	
Eggs			
fish eggs unid.	unidentified fish eggs	5	31.87
Pleuronichthys spp. (eggs)	turbot eggs	2	13.10
	Total Eggs:	**7**	
Target Invertebrates			
Loxorhynchus spp.	spider crabs	2	14.71
	Total Target Invertebrates:	**2**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA23**
Start Date: **11/6/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	456	718.18
Hypsoblennius spp.	combtooth blennies	62	104.02
Genyonemus lineatus	white croaker	7	10.65
larval fish fragment	unidentified larval fishes	6	8.69
Gillichthys mirabilis	longjaw mudsucker	4	7.10
Engraulis mordax	northern anchovy	4	7.03
larval fish - damaged	unidentified larval fishes	2	3.65
Leuresthes tenuis	California grunion	2	3.55
Gibbonsia spp.	clinid kelpfishes	2	3.40
Pleuronichthys guttulatus	diamond turbot	2	2.73
larval/post-larval fish unid.	larval fishes	1	1.87
Gobiesox spp.	clingfishes	1	1.78
Syngnathus spp.	pipefishes	1	1.66
Pleuronectidae unid.	righteye flounders	1	1.55
Sciaenidae unid.	croakers	1	1.16
	Total Fishes:	**552**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	3	5.45
Majidae unid. (megalops)	spider crab megalops	2	3.40
Grapsidae unid. (megalops)	shore crab megalops	1	1.81
Brachyura unid. (megalops)	unidentified crab megalops	1	1.80
	Total Target Invertebrates:	**7**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA23**
Start Date: **11/6/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	312	332.57
Genyonemus lineatus	white croaker	244	273.07
larvae, unidentified yolksac	unidentified yolksac larvae	32	36.47
Hypsoblennius spp.	combtooth blennies	23	26.23
Engraulis mordax	northern anchovy	18	18.89
Pleuronichthys guttulatus	diamond turbot	8	8.81
larval fish - damaged	unidentified larval fishes	6	6.69
Paralichthys californicus	California halibut	5	5.76
larval fish fragment	unidentified larval fishes	5	5.25
Sciaenidae unid.	croakers	3	3.85
Pleuronichthys ritteri	spotted turbot	2	2.67
Atherinopsis californiensis	jacksmelt	2	2.56
Engraulidae unid.	anchovies	2	2.32
Pleuronichthys verticalis	hornyhead turbot	1	1.06
	Total Fishes:	**663**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	34	36.76
Pinnixa spp. (megalops)	pea crabs megalops	4	4.21
Majidae unid. (megalops)	spider crab megalops	2	2.00
Grapsidae unid. (megalops)	shore crab megalops	1	1.06
Paguridae unid. (megalops)	hermit crab megalops	1	1.06
	Total Target Invertebrates:	**42**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA24**
Start Date: **11/20/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	109	731.74
Hypsoblennius spp.	combtooth blennies	30	200.82
Atherinopsis californiensis	jacksmelt	15	101.83
Atherinopsidae unid.	silversides	6	39.59
Gibbonsia spp.	clinid kelpfishes	3	20.23
Chaenopsidae unid.	tube blennies	1	6.60
	Total Fishes:	**164**	
Eggs			
Paralichthyidae unid. (eggs)	sand flounder eggs	7	47.46
fish eggs unid.	unidentified fish eggs	5	33.08
Blenniidae (eggs)	blenny eggs	3	20.42
	Total Eggs:	**15**	
Target Invertebrates			
No Invertebrates			

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA25**
Start Date: **12/4/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	100	704.27
Hypsoblennius spp.	combtooth blennies	18	119.71
Genyonemus lineatus	white croaker	12	82.23
Atherinopsidae unid.	silversides	7	47.57
Atherinopsis californiensis	jacksmelt	3	20.04
larval fish fragment	unidentified larval fishes	1	8.07
larvae, unidentified yolksac	unidentified yolksac larvae	1	7.32
Paralichthys californicus	California halibut	1	7.32
Atherinops affinis	topsmelt	1	6.60
Pleuronichthys guttulatus	diamond turbot	1	6.60
Umbrina roncador	yellowfin croaker	1	6.07
	Total Fishes:	**146**	
Eggs			
fish eggs unid.	unidentified fish eggs	76	522.12
Sciaenidae unid. (eggs)	croaker eggs	21	146.91
Engraulidae unid. (eggs)	anchovy eggs	5	36.61
Pleuronichthys spp. (eggs)	turbot eggs	3	19.66
Paralichthyidae unid. (eggs)	sand flounder eggs	1	7.32
	Total Eggs:	**106**	
Target Invertebrates			
Brachyura unid. (megalops)	unidentified crab megalops	1	8.07
Grapsidae unid. (megalops)	shore crab megalops	1	6.34
Pugettia spp. (megalops)	kelp crabs megalops	1	6.07
	Total Target Invertebrates:	**3**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA25**
Start Date: **12/4/2006**
Stations: **H1-H4**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	446	670.76
Hypsoblennius spp.	combtooth blennies	52	73.77
Genyonemus lineatus	white croaker	31	50.80
Engraulis mordax	northern anchovy	11	15.59
Atherinopsis californiensis	jacksmelt	4	6.49
Atherinopsidae unid.	silversides	4	5.79
larval fish fragment	unidentified larval fishes	3	3.83
Gibbonsia spp.	clinid kelpfishes	2	3.28
Heterostichus rostratus	giant kelpfish	2	3.10
Gillichthys mirabilis	longjaw mudsucker	2	2.79
Atherinops affinis	topsmelt	1	1.71
larval fish - damaged	unidentified larval fishes	1	1.69
larval/post-larval fish unid.	larval fishes	1	1.68
Leptocottus armatus	Pacific staghorn sculpin	1	1.49
Pleuronichthys guttulatus	diamond turbot	1	1.17
	Total Fishes:	**562**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	15	20.55
Pugettia spp. (megalops)	kelp crabs megalops	11	17.55
Majidae unid. (megalops)	spider crab megalops	4	5.63
Paguridae unid. (megalops)	hermit crab megalops	2	3.46
Pinnixa spp. (megalops)	pea crabs megalops	2	3.21
Brachyura unid. (megalops)	unidentified crab megalops	2	2.65
Cancer anthonyi (megalops)	yellow crab megalops	1	1.73
	Total Target Invertebrates:	**37**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA25**
Start Date: **12/4/2006**
Stations: **O1-O3, S1-S3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Genyonemus lineatus	white croaker	650	668.08
Gobiidae unid.	gobies	315	313.16
Engraulis mordax	northern anchovy	34	35.03
Pleuronichthys guttulatus	diamond turbot	25	26.73
Hypsoblennius spp.	combtooth blennies	18	17.89
Lepidogobius lepidus	bay goby	11	10.34
larval fish fragment	unidentified larval fishes	9	9.69
Gillichthys mirabilis	longjaw mudsucker	9	8.97
Paralichthys californicus	California halibut	8	8.67
Pleuronichthys ritteri	spotted turbot	7	7.08
larvae, unidentified yolksac	unidentified yolksac larvae	7	6.98
Atherinopsidae unid.	silversides	6	6.16
Citharichthys stigmaeus	speckled sanddab	5	5.11
larval fish - damaged	unidentified larval fishes	4	4.05
Citharichthys sordidus	Pacific sanddab	3	3.20
Gibbonsia spp.	clinid kelpfishes	3	3.15
Clinocottus analis	wooly sculpin	2	2.30
Atherinopsis californiensis	jacksmelt	2	2.00
Pleuronectidae unid.	righteye flounders	1	1.08
Leptocottus armatus	Pacific staghorn sculpin	1	1.06
Cottidae unid.	sculpins	1	1.02
	Total Fishes:	**1,121**	
Target Invertebrates			
Pugettia spp. (megalops)	kelp crabs megalops	168	175.34
Majidae unid. (megalops)	spider crab megalops	27	27.13
Pinnixa spp. (megalops)	pea crabs megalops	12	12.50
Paguridae unid. (megalops)	hermit crab megalops	5	5.10
Grapsidae unid. (megalops)	shore crab megalops	3	2.99
Diogenidae (megalops)	left-handed hermit crabs	1	1.02
Cancer antennarius (megalops)	brown rock crab megalops	1	0.98
Brachyura unid. (megalops)	unidentified crab megalops	1	0.97
	Total Target Invertebrates:	**218**	

Haynes Generating Station
Entrainment Study - Fish and Invertebrate Abundances

Survey: **ABEA26**
Start Date: **12/18/2006**
Stations: **E3**

Taxon	Common Name	Count	Mean Concentration (#/1,000m^3)
Fishes			
Gobiidae unid.	gobies	127	924.73
Atherinopsidae unid.	silversides	65	502.54
Hypsoblennius spp.	combtooth blennies	29	211.29
Genyonemus lineatus	white croaker	10	72.50
Atherinops affinis	topsmelt	4	31.50
Atherinopsis californiensis	jacksmelt	4	30.30
larval fish - damaged	unidentified larval fishes	2	14.75
Gibbonsia spp.	clinid kelpfishes	1	7.32
Pleuronichthys guttulatus	diamond turbot	1	6.96
Sciaenidae unid.	croakers	1	6.37
Syngnathus spp.	pipefishes	1	6.37
	Total Fishes:	**245**	
Eggs			
fish eggs unid.	unidentified fish eggs	13	98.97
Pleuronichthys spp. (eggs)	turbot eggs	2	15.11
Labridae unid. (eggs)	wrasse eggs	1	7.32
Paralichthyidae unid. (eggs)	sand flounder eggs	1	6.96
	Total Eggs:	**17**	
Target Invertebrates			
Grapsidae unid. (megalops)	shore crab megalops	1	7.32
	Total Target Invertebrates:	**1**	

Appendix D2. Calculated Annual Entrainment and Standard Error Data

Table D2-1. Calculated total annual entrainment and standard error of larval fish and eggs at HnGS in 2006 based on actual and design cooling water intake flow volumes.

Taxon	Common Name	Calculated Annual Entrainment (Actual Flows)	Standard Error	Calculated Annual Entrainment (Design Flows)	Standard Error
Larval Fish					
Gobiidae unid.	gobies	1,828,364,516	71,589,462	2,334,220,376	87,312,721
Atherinopsidae unid.	silversides	920,323,104	132,981,650	1,062,818,072	143,372,928
Hypsoblennius spp.	combtooth blennies	732,022,349	25,578,857	915,313,887	31,887,073
Genyonemus lineatus	white croaker	75,425,299	4,341,458	96,188,344	5,330,046
Engraulidae unid.	anchovies	22,673,541	1,037,682	27,301,289	1,252,501
Labrisomidae unid.	labrisomid blennies	15,068,186	1,010,349	19,493,190	1,334,399
Gobiesocidae unid.	clingfishes	9,088,713	621,893	11,712,226	798,276
unidentified fish, damaged	unidentified damaged fish	8,705,487	474,547	11,578,027	632,124
Sciaenidae unid.	croakers	7,187,066	851,266	9,313,532	1,072,359
Gibbonsia spp.	clinid kelpfishes	3,583,074	351,045	5,590,130	561,815
Syngnathus spp.	pipefishes	3,111,275	262,278	3,765,987	314,935
Pleuronichthys guttulatus	diamond turbot	2,664,083	261,515	3,409,219	317,971
Seriphus politus	queenfish	2,490,643	336,755	2,937,768	382,131
larvae, unidentified yolksac	unidentified yolksac larvae	2,415,796	288,351	3,051,218	353,785
Acanthogobius flavimanus	yellowfin goby	2,024,413	170,918	2,715,310	226,266
Gillichthys mirabilis	longjaw mudsucker	1,977,286	209,589	2,550,861	265,538
Typhlogobius californiensis	blind goby	1,961,918	232,165	2,453,304	280,529
larval/post-larval fish unid.	larval fishes	1,184,545	173,545	1,620,620	235,840
Paralichthys californicus	California halibut	1,153,745	199,518	1,520,648	257,327
Hypsypops rubicundus	garibaldi	985,374	122,987	1,381,248	170,008
Leptocottus armatus	Pacific staghorn sculpin	876,157	234,166	1,491,536	398,630
Citharichthys spp.	sanddabs	821,712	112,551	1,026,911	139,405
Rhinogobiops nicholsii	blackeye goby	703,083	133,859	823,133	155,565
Cheilotrema saturnum	black croaker	626,312	116,889	764,490	142,115
Umbrina roncador	yellowfin croaker	506,822	97,391	721,836	137,049

(table continued)

Table D2-1 (continued). Calculated total annual entrainment and standard error of larval fish and eggs at HnGS in 2006 based on actual and design cooling water intake flow volumes.

Taxon	Common Name	Calculated Annual Entrainment (Actual Flows)	Standard Error	Calculated Annual Entrainment (Design Flows)	Standard Error
Pleuronectidae unid.	righteye flounders	385,901	103,238	414,783	110,856
Haemulidae unid.	grunts	375,837	100,448	396,576	105,989
Xenistius californiensis	salema	375,837	100,448	396,576	105,989
Paralabrax spp.	sand bass	359,420	96,164	388,533	103,840
Roncador stearnsii	spotfin croaker	332,942	88,984	351,314	93,893
Stenobrachius leucopsarus	northern lampfish	268,400	72,325	332,364	88,828
Parophrys vetulus	English sole	260,975	70,324	323,169	86,371
Sardinops sagax	Pacific sardine	255,242	68,264	319,095	85,282
Clupeiformes unid.	herrings and anchovies	243,832	65,705	301,941	80,697
Merluccius productus	Pacific hake	243,832	65,705	301,941	80,697
Chaenopsidae unid.	tube blennies	161,673	43,735	354,629	94,779
		3,649,208,392		**4,527,644,084**	
Fish Eggs					
fish eggs unid.	unidentified fish eggs	1,191,101,773	50,804,750	1,474,924,676	63,156,902
Paralichthyidae unid.)	sand flounder eggs	183,531,130	8,312,029	236,704,432	10,688,292
Sciaenidae / Paralichthyidae / Labridae	SPL fish eggs	90,493,059	5,266,737	109,555,973	5,913,154
Citharichthys spp.	sanddab eggs	63,124,903	3,948,597	80,387,665	4,943,657
Genyonemus lineatus	white croaker eggs	57,836,910	2,103,521	86,480,192	3,219,014
Sciaenidae unid.	croaker eggs	40,580,902	3,589,670	51,237,429	4,429,581
Pleuronichthys spp.	turbot eggs	28,681,415	2,146,415	36,053,832	2,642,169
Atherinopsidae unid.	silverside eggs	11,560,935	3,111,232	14,653,846	3,916,405
Engraulidae unid.	anchovy eggs	11,128,912	846,961	14,029,527	1,092,083
Atherinops affinis	topsmelt eggs	4,427,698	679,702	5,441,190	844,679
Paralichthys californicus	California halibut eggs	3,894,210	483,333	6,151,903	757,002
Labridae unid.	wrasse eggs	733,860	124,571	950,979	160,889
Blenniidae	blenny eggs	500,220	135,318	1,097,230	293,247
		1,687,595,926		**2,117,668,875**	

Table D2-2. Calculated total annual entrainment and standard error of target shellfishes at HnGS in 2006 based on actual and design cooling water intake flow volumes.

Taxon	Common Name	Calculated Annual Entrainment (Actual Flows)	Standard Error	Calculated Annual Entrainment (Design Flows)	Standard Error
Target Invertebrates					
Grapsidae unid. (megalops)	shore crab megalops	4,264,792	379,948	5,217,248	465,125
Pugettia spp. (megalops)	kelp crabs megalops	3,629,771	708,905	4,586,866	891,821
Pinnixa spp. (megalops)	pea crabs megalops	2,031,387	372,519	2,574,200	468,622
unidentified crab (megalops)	unidentified crab megalops	1,949,343	219,836	2,464,009	275,528
Brachyura unid. (megalops)	unidentified crab megalops	1,549,133	188,218	1,826,174	221,370
Loxorhynchus spp.	spider crabs	565,680	151,222	790,366	211,234
Paguridae unid. (megalops)	hermit crab megalops	325,547	87,610	412,641	110,283
Majidae unid. (megalops)	spider crab megalops	307,149	82,213	334,557	89,414
Loligo opalescens	market squid	231,898	62,021	289,912	77,482
	Total	**14,854,700**		**18,495,973**	

Haynes Generating Station

Appendix E

Impingement Data

E1. Normal Operation Impingement Data - Fish
E2. Heat Treatment Impingement Data – Fish
E3. Normal Operation Impingement Data – Invertebrate
E4. Heat Treatment Impingement Data – Invertebrate

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI1
Start Date: January 4, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Engraulis mordax	northern anchovy	1	0.008
			1	0.008
2				
	None			
3				
	Atherinops affinis	topsmelt	1	0.004
			1	0.004
4				
	Engraulis mordax	northern anchovy	1	0.003
			1	0.003
5				
	Atherinopsidae	silverside, unid.	1	0.009
	Porichthys myriaster	specklefin midshipman	1	0.001
			2	0.010

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI2

Start Date: January 11, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
2				
	None			
3				
	None			
4				
	None			
5				
	Porichthys myriaster	specklefin midshipman	1	0.526
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.527
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI3

Start Date: January 18, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
2				
	None			
3				
	None			
4				
	None			
5				
	Atherinopsidae	silverside, unid.	1	0.034
	Odontopyxis trispinosa	pygmy poacher	1	0.002
	Symphurus atricaudus	California tonguefish	1	0.011
			3	0.047
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI4

Start Date: January 25, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Ophidion scrippsae	basketweave cusk-eel	1	0.107
			1	0.107
2				
	None			
3				
	Syngnathus californiensis	kelp pipefish	1	0.001
			1	0.001
4				
	None			
5				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI5

Start Date: February 1, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Pleuronichthys guttulatus	diamond turbot	1	0.001
	Syngnathus leptorhynchus	bay pipefish	2	0.002
			3	0.003
2				
	None			
3				
	None			
4				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
5				
	Engraulis mordax	northern anchovy	1	0.003
	Pleuronichthys ritteri	spotted turbot	1	0.001
	Porichthys myriaster	specklefin midshipman	1	0.414
	Syngnathus leptorhynchus	bay pipefish	2	0.002
			5	0.420
6				
	None	NO FISH		

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI6

Start Date: February 8, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Survey Totals Biomass (kg)
1				
	Pleuronichthys ritteri	spotted turbot	2	0.002
			2	0.002
2				
	None			
3				
	None			
4				
	None			
5				
	Atherinops affinis	topsmelt	1	0.006
	Syngnathus californiensis	kelp pipefish	2	0.002
	Syngnathus sp	pipefish, unid.	1	0.001
			4	0.009
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI7

Start Date: February 15, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
2				
	None			
3				
	None			
4				
	None			
5				
	Ilypnus gilberti	cheekspot goby	1	0.001
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.002
6				
	Atherinops affinis	topsmelt	1	0.007
	Leptocottus armatus	Pacific staghorn sculpin	1	0.003
	Pleuronichthys ritteri	spotted turbot	1	0.131
	Seriphus politus	queenfish	1	0.035
	Syngnathus leptorhynchus	bay pipefish	11	0.004
	Syngnathus sp	pipefish, unid.	2	0.003
			17	0.183

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI8

Start Date: February 22, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Porichthys myriaster	specklefin midshipman	1	0.665
			1	0.665
2				
	None			
3				
	None			
4				
	None			
5				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
6				
	Anchoa compressa	deepbody anchovy	1	0.008
	Anchoa delicatissima	slough anchovy	1	0.003
	Atherinopsidae	silverside, unid.	1	0.006
	Clinidae	kelp blenny, unid.	1	0.001
	Porichthys myriaster	specklefin midshipman	2	0.407
	Syngnathus leptorhynchus	bay pipefish	2	0.001
			8	0.426

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI9
Start Date: March 1, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	2	0.007
	Pleuronichthys ritteri	spotted turbot	2	0.003
	Syngnathus leptorhynchus	bay pipefish	3	0.001
			7	0.011
2				
	None			
3				
	Atherinops affinis	topsmelt	1	0.006
			1	0.006
4				
	Atherinops affinis	topsmelt	1	0.008
			1	0.008
5				
	Pleuronichthys ritteri	spotted turbot	1	0.001
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.002
6				
	Atherinops affinis	topsmelt	11	0.164
	Atherinopsis californiensis	jacksmelt	1	0.111
	Engraulis mordax	northern anchovy	1	0.001
	Pleuronichthys ritteri	spotted turbot	1	0.001
	Porichthys myriaster	specklefin midshipman	2	0.006
	Sardinops sagax	Pacific sardine	1	0.015
	Symphurus atricaudus	California tonguefish	1	0.010
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			19	0.309

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI10

Start Date: March 8, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Cheilotrema saturnum	black croaker	1	0.001
	Porichthys myriaster	specklefin midshipman	1	0.003
	Syngnathus leptorhynchus	bay pipefish	2	0.001
			4	0.005
2				
	None			
3				
	Syngnathus sp	pipefish, unid.	1	0.001
			1	0.001
4				
	None			
5				
	None			
6				
	Atherinops affinis	topsmelt	3	0.080
	Engraulis mordax	northern anchovy	1	0.001
	Syngnathus leptorhynchus	bay pipefish	6	0.002
	Syngnathus sp	pipefish, unid.	2	0.001
			12	0.084

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI11
Start Date: March 15, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Symphurus atricaudus	California tonguefish	1	0.014
	Syngnathus leptorhynchus	bay pipefish	3	0.001
	Urobatis halleri	round stingray	1	0.044
			5	0.059
2				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
3				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
4				
	None			
5				
	None			
6				
	Atherinops affinis	topsmelt	1	0.038
	Engraulis mordax	northern anchovy	3	0.006
	Heterostichus rostratus	giant kelpfish	1	0.001
	Leptocottus armatus	Pacific staghorn sculpin	1	0.002
	Pleuronichthys ritteri	spotted turbot	1	0.002
	Rhinobatos productus	shovelnose guitarfish	1	0.700
	Seriphus politus	queenfish	1	0.001
	Syngnathus leptorhynchus	bay pipefish	13	0.007
	Syngnathus sp	pipefish, unid.	4	0.002
	Urobatis halleri	round stingray	1	0.139
			27	0.898

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI12

Start Date: March 22, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
	Urobatis halleri	round stingray	1	0.054
			2	0.055
2				
	Atherinops affinis	topsmelt	1	0.033
	Syngnathus leptorhynchus	bay pipefish	4	0.003
			5	0.036
3				
	None			
4				
	None			
5				
	None			
6				
	Atherinops affinis	topsmelt	2	0.077
	Citharichthys stigmaeus	speckled sanddab	1	0.010
	Leptocottus armatus	Pacific staghorn sculpin	1	0.004
	Syngnathus leptorhynchus	bay pipefish	16	0.005
	Syngnathus sp	pipefish, unid.	1	0.001
	Urobatis halleri	round stingray	1	0.186
			22	0.283

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI13
Start Date: March 29, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Engraulis mordax	northern anchovy	1	0.005
	Syngnathus leptorhynchus	bay pipefish	16	0.004
	Synodus lucioceps	California lizardfish	1	0.003
	Urobatis halleri	round stingray	1	0.044
			19	0.056
2				
	Engraulis mordax	northern anchovy	28	0.001
	Seriphus politus	queenfish	2	0.002
	Syngnathus leptorhynchus	bay pipefish	4	0.002
			34	0.005
3				
	Anchoa delicatissima	slough anchovy	1	0.002
	Pleuronichthys guttulatus	diamond turbot	1	0.003
			2	0.005
6				
	Atherinops affinis	topsmelt	3	0.073
	Engraulis mordax	northern anchovy	1	0.004
	Myliobatis californica	bat ray	4	1.228
	Pleuronichthys ritteri	spotted turbot	1	0.002
	Pleuronichthys verticalis	hornyhead turbot	1	0.045
	Porichthys myriaster	specklefin midshipman	1	0.018
	Sebastes miniatus	vermillion rockfish	1	0.002
	Seriphus politus	queenfish	3	0.003
	Symphurus atricaudus	California tonguefish	1	0.021
	Syngnathus leptorhynchus	bay pipefish	13	0.006
	Syngnathus sp	pipefish, unid.	2	0.002
			31	1.404

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI14
Start Date: April 5, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	1	0.005
	Atherinops affinis	topsmelt	2	0.047
	Engraulis mordax larvae	northern anchovy larvae	16	0.001
	Leptocottus armatus	Pacific staghorn sculpin	1	0.001
	Porichthys notatus	plainfin midshipman	1	0.186
	Syngnathus leptorhynchus	bay pipefish	10	0.002
			31	0.242
2				
	Atherinops affinis	topsmelt	1	0.049
			1	0.049
3				
	None			
4				
	None			
5				
	Pleuronichthys ritteri	spotted turbot	1	0.002
	Porichthys notatus	plainfin midshipman	1	0.010
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			3	0.013
6				
	Anchoa delicatissima	slough anchovy	1	0.003
	Atherinops affinis	topsmelt	13	0.358
	Atherinopsis californiensis	jacksmelt	1	0.358
	Leptocottus armatus	Pacific staghorn sculpin	2	0.006
	Myliobatis californica	bat ray	2	0.498
	Porichthys myriaster	specklefin midshipman	9	5.244
	Porichthys notatus	plainfin midshipman	3	0.280
	Syngnathus leptorhynchus	bay pipefish	10	0.019
	Syngnathus sp	pipefish, unid.	3	0.003
	Torpedo californica	Pacific electric ray	1	13.700
	Urobatis halleri	round stingray	7	4.216
			52	24.685

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI15
Start Date: April 12, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	None			
2				
	Anchoa delicatissima	slough anchovy	1	0.003
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.004
3				
	None			
4				
	Atherinops affinis	topsmelt	1	0.045
			1	0.045
5				
	Atherinops affinis	topsmelt	1	0.057
	Cymatogaster aggregata	shiner perch	1	0.034
	Myliobatis californica	bat ray	1	0.243
	Syngnathus leptorhynchus	bay pipefish	1	0.003
	Urobatis halleri	round stingray	1	0.553
			5	0.890
6				
	Atherinops affinis	topsmelt	11	0.273
	Atherinopsidae	silverside, unid.	1	0.001
	Atherinopsis californiensis	jacksmelt	1	0.159
	Cymatogaster aggregata	shiner perch	2	0.037
	Genyonemus lineatus	white croaker	1	0.001
	Myliobatis californica	bat ray	1	0.226
	Pleuronichthys guttulatus	diamond turbot	1	0.003
	Porichthys myriaster	specklefin midshipman	6	0.883
	Syngnathus leptorhynchus	bay pipefish	2	0.001
	Syngnathus sp	pipefish, unid.	1	0.001
	Urobatis halleri	round stingray	4	1.706
			31	3.291

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI16

Start Date: April 19, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	None			
2				
	Atherinops affinis	topsmelt	1	0.040
	Engraulis mordax larvae	northern anchovy larvae	2	0.001
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			4	0.042
3				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
4				
	Atherinops affinis	topsmelt	1	0.010
			1	0.010
5				
	None			
6				
	Atherinops affinis	topsmelt	5	0.170
	Cymatogaster aggregata	shiner perch	2	0.046
	Engraulis mordax	northern anchovy	1	0.005
	Leptocottus armatus	Pacific staghorn sculpin	1	0.003
	Pleuronichthys guttulatus	diamond turbot	1	0.003
	Porichthys myriaster	specklefin midshipman	5	1.580
	Syngnathus leptorhynchus	bay pipefish	2	0.002
	Syngnathus sp	pipefish, unid.	1	0.002
			18	1.811

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI17
Start Date: April 26, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	None			
2				
	Engraulis mordax larvae	northern anchovy larvae	13	0.001
			13	0.001
3				
	None			
4				
	Engraulis mordax larvae	northern anchovy larvae	1	0.001
			1	0.001
5				
	Cymatogaster aggregata	shiner perch	1	0.015
	Trachurus symmetricus	jack mackerel	1	0.067
	Urobatis halleri	round stingray	2	0.936
			4	1.018
6				
	Anchoa delicatissima	slough anchovy	1	0.001
	Atherinops affinis	topsmelt	4	0.148
	Cymatogaster aggregata	shiner perch	2	0.072
	Engraulis mordax larvae	northern anchovy larvae	6	0.001
	Pleuronichthys guttulatus	diamond turbot	2	0.003
	Syngnathus leptorhynchus	bay pipefish	31	0.061
	Urobatis halleri	round stingray	1	0.141
			47	0.427

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI18
Start Date: May 3, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
2				
	Atherinopsis californiensis	jacksmelt	1	0.159
	Cymatogaster aggregata	shiner perch	1	0.001
	Engraulis mordax larvae	northern anchovy larvae	30	0.001
	Porichthys myriaster	specklefin midshipman	1	0.035
	Syngnathus leptorhynchus	bay pipefish	4	0.005
			37	0.201
3				
	Pleuronichthys guttulatus	diamond turbot	1	0.001
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.002
4				
	None			
5				
	Cymatogaster aggregata	shiner perch	1	0.027
	Porichthys myriaster	specklefin midshipman	1	0.005
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			3	0.033
6				
	Anchoa delicatissima	slough anchovy	1	0.004
	Atherinops affinis	topsmelt	1	0.026
	Atherinopsis californiensis	jacksmelt	2	0.391
	Cymatogaster aggregata	shiner perch	3	0.100
	Myliobatis californica	bat ray	1	0.277
	Paralichthys californicus	California halibut	1	0.003
	Pleuronichthys guttulatus	diamond turbot	2	0.903
	Pleuronichthys ritteri	spotted turbot	5	0.023
	Syngnathus leptorhynchus	bay pipefish	13	0.024
	Urobatis halleri	round stingray	2	0.883
			31	2.634

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI19
Start Date: May 10, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	2	0.006
	Cymatogaster aggregata	shiner perch	1	0.002
	Engraulis mordax larvae	northern anchovy larvae	81	0.001
	Porichthys myriaster	specklefin midshipman	1	0.262
	Syngnathus leptorhynchus	bay pipefish	16	0.008
	Urobatis halleri	round stingray	1	0.046
			102	0.325
2				
	Engraulis mordax larvae	northern anchovy larvae	5	0.001
	Seriphus politus	queenfish	1	0.001
	Syngnathus leptorhynchus	bay pipefish	4	0.001
			10	0.003
3				
	None			
4				
	None			
5				
	Cymatogaster aggregata	shiner perch	2	0.023
	Hypsoblennius jenkinsi	mussel blenny	1	0.004
	Porichthys myriaster	specklefin midshipman	1	0.302
	Syngnathus leptorhynchus	bay pipefish	7	0.008
			11	0.337
6				
	Anchoa delicatissima	slough anchovy	2	0.006
	Atherinops affinis	topsmelt	4	0.081
	Cymatogaster aggregata	shiner perch	1	0.003
	Engraulis mordax larvae	northern anchovy larvae	2	0.001
	Heterostichus rostratus	giant kelpfish	2	0.002
	Pleuronichthys guttulatus	diamond turbot	2	0.004
	Syngnathus leptorhynchus	bay pipefish	26	0.051
			39	0.148

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI20
Start Date: May 17, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	1	0.001
	Cymatogaster aggregata	shiner perch	2	0.003
	Engraulis mordax larvae	northern anchovy larvae	15	0.001
	Paraclinus integripinnis	reef finspot	1	0.005
	Pleuronichthys guttulatus	diamond turbot	1	0.001
	Porichthys myriaster	specklefin midshipman	1	0.136
	Syngnathus leptorhynchus	bay pipefish	9	0.007
	Urobatis halleri	round stingray	1	0.343
			31	0.497
2				
	Cymatogaster aggregata	shiner perch	1	0.001
	Engraulis mordax larvae	northern anchovy larvae	22	0.001
	Syngnathus leptorhynchus	bay pipefish	5	0.006
			28	0.008
3				
	Cymatogaster aggregata	shiner perch	1	0.019
			1	0.019
4				
	Cymatogaster aggregata	shiner perch	1	0.026
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.027
5				
	Engraulis mordax larvae	northern anchovy larvae	5	0.001
	Syngnathus leptorhynchus	bay pipefish	3	0.007
			8	0.008
6				
	Cymatogaster aggregata	shiner perch	1	0.029
	Engraulis mordax larvae	northern anchovy larvae	3	0.002
	Hyperprosopon argenteum	walleye surfperch	1	0.004
	Myliobatis californica	bat ray	1	0.268
	Syngnathus leptorhynchus	bay pipefish	7	0.015
			13	0.318

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI21
Start Date: May 24, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	5	0.017
	Atherinops affinis	topsmelt	1	0.001
	Cymatogaster aggregata	shiner perch	2	0.030
	Engraulis mordax	northern anchovy	3	0.004
	Engraulis mordax larvae	northern anchovy larvae	103	0.006
	Hyperprosopon argenteum	walleye surfperch	1	0.002
	Leptocottus armatus	Pacific staghorn sculpin	1	0.008
	Phanerodon furcatus	white seaperch	1	0.004
	Porichthys myriaster	specklefin midshipman	1	1.106
	Porichthys notatus	plainfin midshipman	1	0.089
	Syngnathus leptorhynchus	bay pipefish	5	0.007
	Urobatis halleri	round stingray	1	0.331
			125	1.605
3				
	None			
4				
	Atherinopsis californiensis	jacksmelt	1	0.198
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.199
5				
	Atherinops affinis	topsmelt	1	0.015
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
	Porichthys myriaster	specklefin midshipman	1	0.332
	Syngnathus leptorhynchus	bay pipefish	1	0.002
	Syngnathus sp	pipefish, unid.	2	0.001
			6	0.351
6				
	Anchoa delicatissima	slough anchovy	4	0.008
	Atherinops affinis	topsmelt	2	0.001
	Engraulis mordax larvae	northern anchovy larvae	10	0.010
	Myliobatis californica	bat ray	1	0.199
	Phanerodon furcatus	white seaperch	1	0.005
	Porichthys myriaster	specklefin midshipman	5	1.399
	Seriphus politus	queenfish	4	0.045
	Syngnathus leptorhynchus	bay pipefish	12	0.041
			39	1.708

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI22

Start Date: May 31, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Odontopyxis trispinosa	pygmy poacher	1	0.004
	Seriphus politus	queenfish	3	0.002
	Syngnathus leptorhynchus	bay pipefish	6	0.011
			10	0.017
2				
	Hyperprosopon argenteum	walleye surfperch	1	0.002
	Porichthys myriaster	specklefin midshipman	1	0.089
	Syngnathus leptorhynchus	bay pipefish	2	0.001
			4	0.092
3				
	Embiotoca jacksoni	black perch	1	0.002
	Peprilus simillimus	Pacific pompano	1	0.037
			2	0.039
4				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
5				
	Atherinopsis californiensis	jacksmelt	1	0.228
			1	0.228
6				
	Anchoa delicatissima	slough anchovy	2	0.006
	Atherinops affinis	topsmelt	1	0.034
	Cymatogaster aggregata	shiner perch	1	0.003
	Heterostichus rostratus	giant kelpfish	1	0.001
	Hypsoblennius gilberti	rockpool blenny	1	0.028
	Mustelus californicus	grey smoothhound	1	0.047
	Porichthys myriaster	specklefin midshipman	5	3.015
	Syngnathus leptorhynchus	bay pipefish	3	0.005
	Urobatis halleri	round stingray	2	0.754
			17	3.893

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI23
Start Date: June 7, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Embiotoca jacksoni	black perch	1	0.005
	Engraulis mordax	northern anchovy	1	0.002
	Porichthys myriaster	specklefin midshipman	1	0.488
	Syngnathus leptorhynchus	bay pipefish	1	0.002
			4	0.497
2				
	Atherinopsidae	silverside, unid.	2	0.001
	Seriphus politus	queenfish	3	0.001
	Syngnathus leptorhynchus	bay pipefish	6	0.008
	Urobatis halleri	round stingray	1	0.318
			12	0.328
3				
	Phanerodon furcatus	white seaperch	1	0.008
			1	0.008
4				
	Cymatogaster aggregata	shiner perch	1	0.025
	Engraulis mordax	northern anchovy	1	0.001
	Phanerodon furcatus	white seaperch	1	0.005
			3	0.031
5				
	None			
6				
	Anchoa delicatissima	slough anchovy	2	0.005
	Atherinops affinis	topsmelt	1	0.001
	Engraulis mordax	northern anchovy	1	0.002
	Syngnathus leptorhynchus	bay pipefish	4	0.008
			8	0.016

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI24
Start Date: June 14, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	1	0.001
	Atherinopsidae	silverside, unid.	1	0.001
	Engraulis mordax	northern anchovy	2	0.001
	Seriphus politus	queenfish	4	0.001
	Syngnathus leptorhynchus	bay pipefish	2	0.002
			10	0.006
2				
	Atherinops affinis	topsmelt	3	0.006
	Heterostichus rostratus	giant kelpfish	1	0.010
	Seriphus politus	queenfish	5	0.003
	Syngnathus leptorhynchus	bay pipefish	2	0.004
			11	0.023
3				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001
4				
	Atherinopsis californiensis	jacksmelt	1	0.005
			1	0.005
5				
	None			
6				
	Engraulis mordax	northern anchovy	4	0.009
	Gibbonsia elegans	spotted kelpfish	1	0.004
	Gobiesox rhessodon	California clingfish	1	0.001
	Leptocottus armatus	Pacific staghorn sculpin	2	0.048
	Phanerodon furcatus	white seaperch	2	0.012
	Syngnathus leptorhynchus	bay pipefish	6	0.013
	Urobatis halleri	round stingray	1	0.205
			17	0.292

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI25
Start Date: June 21, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	3	0.006
	Atherinops affinis	topsmelt	6	0.006
	Engraulis mordax	northern anchovy	2	0.002
	Hypsoblennius gilberti	rockpool blenny	1	0.006
	Seriphus politus	queenfish	139	0.156
	Syngnathus leptorhynchus	bay pipefish	5	0.011
			156	0.187
3				
	Phanerodon furcatus	white seaperch	1	0.006
			1	0.006
4				
	Phanerodon furcatus	white seaperch	1	0.005
			1	0.005
6				
	Atherinops affinis	topsmelt	6	0.017
	Cymatogaster aggregata	shiner perch	1	0.050
	Engraulis mordax	northern anchovy	1	0.001
	Leptocottus armatus	Pacific staghorn sculpin	1	0.020
	Porichthys myriaster	specklefin midshipman	1	0.270
	Seriphus politus	queenfish	1	0.001
	Symphurus atricaudus	California tonguefish	1	0.016
	Syngnathus leptorhynchus	bay pipefish	6	0.016
			18	0.391

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI26

Start Date: June 28, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	None			
2				
	Seriphus politus	queenfish	1	0.001
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			2	0.002
3				
	None			
4				
	Cymatogaster aggregata	shiner perch	1	0.001
	Engraulis mordax	northern anchovy	1	0.001
			2	0.002
5				
	None			
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI27

Start Date: July 3, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	5	0.017
	Cymatogaster aggregata	shiner perch	1	0.045
	Engraulis mordax	northern anchovy	1	0.011
	Seriphus politus	queenfish	9	0.010
	Syngnathus leptorhynchus	bay pipefish	3	0.006
			19	0.089
2				
	Anchoa delicatissima	slough anchovy	2	0.007
	Atherinops affinis	topsmelt	4	0.007
	Cymatogaster aggregata	shiner perch	7	0.286
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
	Hyperprosopon argenteum	walleye surfperch	1	0.010
	Seriphus politus	queenfish	3	0.007
	Syngnathus leptorhynchus	bay pipefish	2	0.002
			20	0.320
3				
	Atherinops affinis	topsmelt	2	0.004
	Cymatogaster aggregata	shiner perch	5	0.200
	Seriphus politus	queenfish	1	0.001
			8	0.205
4				
	Anchoa delicatissima	slough anchovy	3	0.012
	Atherinops affinis	topsmelt	2	0.056
	Cymatogaster aggregata	shiner perch	11	0.433
	Seriphus politus	queenfish	1	0.001
			17	0.502
5				
	None			
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI28
Start Date: July 12, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Anchoa sp	deepbody/slough anchovy, unid.	2	0.005
	Atherinops affinis	topsmelt	11	0.034
	Engraulis mordax	northern anchovy	4	0.018
	Seriphus politus	queenfish	27	0.021
	Syngnathus leptorhynchus	bay pipefish	4	0.003
			48	0.081
2				
	Atherinops affinis	topsmelt	2	0.005
	Seriphus politus	queenfish	1	0.001
	Syngnathus leptorhynchus	bay pipefish	3	0.004
			6	0.010
3				
	Seriphus politus	queenfish	1	0.001
			1	0.001
4				
	Atherinops affinis	topsmelt	1	0.023
	Engraulis mordax	northern anchovy	1	0.001
			2	0.024
5				
	None			
6				
	Atherinops affinis	topsmelt	4	0.004
	Engraulis mordax	northern anchovy	4	0.012
	Genyonemus lineatus	white croaker	1	0.001
	Heterostichus rostratus	giant kelpfish	1	0.008
	Leptocottus armatus	Pacific staghorn sculpin	1	0.020
	Porichthys sp	midshipman, unid.	2	0.955
	Seriphus politus	queenfish	2	0.002
			15	1.002

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI29
Start Date: July 19, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	8	0.008
	Atherinops affinis	topsmelt	66	0.034
	Embiotoca jacksoni	black perch	2	0.040
	Engraulis mordax	northern anchovy	6	0.008
	Genyonemus lineatus	white croaker	42	0.042
	Porichthys myriaster	specklefin midshipman	6	0.002
	Seriphus politus	queenfish	408	0.118
	Syngnathus leptorhynchus	bay pipefish	22	0.014
	Xenistius californiensis	salema	2	0.002
			562	0.268
2				
	Atherinops affinis	topsmelt	14	0.032
	Engraulis mordax	northern anchovy	2	0.006
	Genyonemus lineatus	white croaker	5	0.004
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
	Heterostichus rostratus	giant kelpfish	1	0.006
	Seriphus politus	queenfish	126	0.038
	Syngnathus leptorhynchus	bay pipefish	4	0.002
			153	0.089
3				
	Atherinops affinis	topsmelt	1	0.004
	Engraulis mordax	northern anchovy	1	0.002
	Seriphus politus	queenfish	2	0.001
			4	0.007
4				
	Atherinops affinis	topsmelt	1	0.002
	Seriphus politus	queenfish	2	0.002
			3	0.004
5				
	Atherinops affinis	topsmelt	8	0.036
	Engraulis mordax	northern anchovy	4	0.014
	Seriphus politus	queenfish	1	0.001
			13	0.051

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Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI29 (Continued)

Start Date: July 19, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
6				
	Atherinops affinis	topsmelt	45	0.113
	Engraulis mordax	northern anchovy	39	0.057
	Genyonemus lineatus	white croaker	5	0.010
	Heterostichus rostratus	giant kelpfish	6	0.033
	Porichthys myriaster	specklefin midshipman	2	0.350
	Seriphus politus	queenfish	607	0.229
	Syngnathus leptorhynchus	bay pipefish	24	0.018
	Syngnathus sp	pipefish, unid.	1	0.001
			729	0.811

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI30
Start Date: July 26, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
2				
	Atherinops affinis	topsmelt	16	0.042
	Embiotoca jacksoni	black perch	2	0.042
	Engraulis mordax	northern anchovy	10	0.002
	Seriphus politus	queenfish	214	0.072
	Syngnathus leptorhynchus	bay pipefish	4	0.002
			246	0.160
3				
	Engraulis mordax	northern anchovy	3	0.006
	Seriphus politus	queenfish	2	0.001
			5	0.007
4				
	Atherinops affinis	topsmelt	1	0.004
	Engraulis mordax	northern anchovy	1	0.003
	Leptocottus armatus	Pacific staghorn sculpin	1	0.032
	Seriphus politus	queenfish	3	0.001
			6	0.040
5				
	Atherinops affinis	topsmelt	11	0.043
	Engraulis mordax	northern anchovy	34	0.025
	Leptocottus armatus	Pacific staghorn sculpin	5	0.060
	Seriphus politus	queenfish	22	0.012
			72	0.140
6				
	Atherinops affinis	topsmelt	21	0.043
	Cymatogaster aggregata	shiner perch	1	0.004
	Engraulis mordax	northern anchovy	9	0.035
	Genyonemus lineatus	white croaker	13	0.016
	Gobiesox rhessodon	California clingfish	1	0.001
	Heterostichus rostratus	giant kelpfish	6	0.052
	Seriphus politus	queenfish	348	0.188
	Sphyraena argentea	Pacific barracuda	3	0.011
	Syngnathus leptorhynchus	bay pipefish	8	0.016
			410	0.366

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI31
Start Date: August 2, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
2				
	Atherinops affinis	topsmelt	2	0.007
	Cymatogaster aggregata	shiner perch	1	0.002
	Engraulis mordax	northern anchovy	3	0.007
	Seriphus politus	queenfish	168	0.061
	Syngnathus sp	pipefish, unid.	2	0.001
			176	0.078
3				
	Engraulis mordax	northern anchovy	1	0.001
			1	0.001
4				
	Seriphus politus	queenfish	1	0.001
			1	0.001
5				
	Atherinops affinis	topsmelt	13	0.090
	Atherinopsis californiensis	jacksmelt	1	0.001
	Cymatogaster aggregata	shiner perch	2	0.044
	Engraulis mordax	northern anchovy	23	0.067
	Genyonemus lineatus	white croaker	2	0.002
	Leptocottus armatus	Pacific staghorn sculpin	1	0.031
	Porichthys myriaster	specklefin midshipman	1	0.595
	Seriphus politus	queenfish	59	0.033
			102	0.863
6				
	Atherinops affinis	topsmelt	26	0.131
	Atherinopsidae	silverside unid	2	0.003
	Engraulis mordax	northern anchovy	35	0.104
	Fundulus parvipinnis	California killifish	2	0.005
	Gillichthys mirabilis	longjaw mudsucker	1	0.002
	Heterostichus rostratus	giant kelpfish	1	0.023
	Seriphus politus	queenfish	193	0.106
	Sphyraena argentea	Pacific barracuda	1	0.001
	Syngnathus sp	pipefish, unid.	2	0.012
	Urobatis halleri	round stingray	11	1.822
			274	2.209

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI32

Start Date: August 9, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	4	0.010
	Engraulis mordax	northern anchovy	30	0.050
	Seriphus politus	queenfish	18	0.008
	Syngnathus sp	pipefish, unid.	6	0.004
			58	0.072
2				
	Atherinops affinis	topsmelt	6	0.010
	Engraulis mordax	northern anchovy	4	0.007
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
	Seriphus politus	queenfish	11	0.007
	Syngnathus sp	pipefish, unid.	4	0.006
			26	0.031
3				
	Atherinops affinis	topsmelt	1	0.003
	Engraulis mordax	northern anchovy	1	0.001
			2	0.004
4				
	Anchoa delicatissima	slough anchovy	1	0.005
	Atherinops affinis	topsmelt	1	0.004
	Cottidae	sculpin, unid.	1	0.003
	Engraulis mordax	northern anchovy	1	0.001
	Seriphus politus	queenfish	1	0.001
			5	0.014
5				
	Anchoa delicatissima	slough anchovy	5	0.012
	Atherinops affinis	topsmelt	5	0.015
	Cymatogaster aggregata	shiner perch	1	0.002
	Engraulis mordax	northern anchovy	5	0.014
	Heterostichus rostratus	giant kelpfish	1	0.007
	Seriphus politus	queenfish	1	0.001
			18	0.051
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI33
Start Date: August 15, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	1	0.004
	Atherinops affinis	topsmelt	6	0.009
	Engraulis mordax	northern anchovy	10	0.027
	Leptocottus armatus	Pacific staghorn sculpin	2	0.082
	Seriphus politus	queenfish	69	0.044
	Syngnathus sp	pipefish, unid.	9	0.015
			97	0.181
2				
	Atherinops affinis	topsmelt	3	0.005
	Engraulis mordax	northern anchovy	4	0.005
	Seriphus politus	queenfish	36	0.019
	Syngnathus sp	pipefish, unid.	3	0.009
			46	0.038
3				
	None			
4				
	None			
5				
	Atherinops affinis	topsmelt	9	0.052
	Atherinopsis californiensis	jacksmelt	1	0.025
	Engraulis mordax	northern anchovy	11	0.026
	Phanerodon furcatus	white seaperch	1	0.038
	Seriphus politus	queenfish	11	0.008
	Syngnathus leptorhynchus	bay pipefish	1	0.001
	Syngnathus sp	pipefish, unid.	6	0.043
			40	0.193
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI34
Start Date: August 23, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	40	0.045
	Engraulis mordax	northern anchovy	15	0.015
	Leptocottus armatus	Pacific staghorn sculpin	5	0.110
	Pleuronichthys guttulatus	diamond turbot	5	0.080
	Seriphus politus	queenfish	75	0.045
	Syngnathus sp	pipefish, unid.	5	0.005
			145	0.300
2				
	Atherinops affinis	topsmelt	4	0.008
	Engraulis mordax	northern anchovy	1	0.004
	Gibbonsia elegans	spotted kelpfish	1	0.012
	Leptocottus armatus	Pacific staghorn sculpin	1	0.027
	Seriphus politus	queenfish	25	0.017
	Syngnathus sp	pipefish, unid.	1	0.001
			33	0.069
3				
	Atherinops affinis	topsmelt	1	0.003
	Seriphus politus	queenfish	1	0.001
			2	0.004
4				
	Seriphus politus	queenfish	1	0.001
			1	0.001
5				
	Atherinops affinis	topsmelt	3	0.010
	Engraulis mordax	northern anchovy	22	0.007
	Seriphus politus	queenfish	22	0.015
	Syngnathus sp	pipefish, unid.	1	0.002
			48	0.034
6				
	Atherinops affinis	topsmelt	15	0.106
	Cymatogaster aggregata	shiner perch	1	0.003
	Engraulis mordax	northern anchovy	4	0.014
	Genyonemus lineatus	white croaker	1	0.587
	Heterostichus rostratus	giant kelpfish	14	0.190
	Leuresthes tenuis	California grunion	3	0.004
	Seriphus politus	queenfish	26	0.022
	Syngnathus sp	pipefish, unid.	3	0.007
			67	0.933

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI35
Start Date: August 30, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	14	0.014
	Cheilotrema saturnum	black croaker	2	0.006
	Engraulis mordax	northern anchovy	8	0.008
	Seriphus politus	queenfish	80	0.052
	Syngnathus sp	pipefish, unid.	6	0.010
			110	0.090
2				
	Atherinops affinis	topsmelt	7	0.033
	Engraulis mordax	northern anchovy	1	0.001
	Genyonemus lineatus	white croaker	1	0.002
	Seriphus politus	queenfish	17	0.013
			26	0.049
3				
	Atherinops affinis	topsmelt	1	0.002
	Heterostichus rostratus	giant kelpfish	1	0.014
	Syngnathus sp	pipefish, unid.	1	0.001
			3	0.017
4				
	Atherinops affinis	topsmelt	1	0.021
			1	0.021
5				
	Atherinops affinis	topsmelt	3	0.005
	Cymatogaster aggregata	shiner perch	1	0.040
	Seriphus politus	queenfish	14	0.017
			18	0.062
6				
	Atherinops affinis	topsmelt	24	0.122
	Cymatogaster aggregata	shiner perch	1	0.006
	Engraulis mordax	northern anchovy	5	0.012
	Heterostichus rostratus	giant kelpfish	3	0.021
	Seriphus politus	queenfish	24	0.022
	Syngnathus sp	pipefish, unid.	4	0.003
			61	0.186

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI36
Start Date: September 6, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	30	0.040
	Cymatogaster aggregata	shiner perch	10	0.040
	Engraulis mordax	northern anchovy	10	0.030
	Leptocottus armatus	Pacific staghorn sculpin	10	0.200
	Seriphus politus	queenfish	90	0.120
	Syngnathus sp	pipefish, unid.	20	0.010
			170	0.440
2				
	Atherinops affinis	topsmelt	4	0.004
	Gibbonsia elegans	spotted kelpfish	2	0.014
	Seriphus politus	queenfish	8	0.008
	Syngnathus sp	pipefish, unid.	4	0.006
			18	0.032
3				
	Atherinops affinis	topsmelt	2	0.007
	Seriphus politus	queenfish	1	0.001
			3	0.008
4				
	Engraulis mordax	northern anchovy	2	0.004
	Leptocottus armatus	Pacific staghorn sculpin	2	0.094
	Seriphus politus	queenfish	1	0.009
			5	0.107
5				
	Atherinops affinis	topsmelt	22	0.054
	Engraulis mordax	northern anchovy	3	0.003
	Sardinops sagax	Pacific sardine	10	0.060
			35	0.117
6				
	Atherinops affinis	topsmelt	16	0.033
	Engraulis mordax	northern anchovy	1	0.003
	Gobiesocidae	clingfish unid	1	0.001
	Heterostichus rostratus	giant kelpfish	6	0.065
	Leptocottus armatus	Pacific staghorn sculpin	1	0.032
	Seriphus politus	queenfish	18	0.017
	Syngnathus sp	pipefish, unid.	3	0.002
			46	0.153

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI37
Start Date: September 13, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Leptocottus armatus	Pacific staghorn sculpin	4	0.092
	Leuresthes tenuis	California grunion	4	0.008
	Seriphus politus	queenfish	40	0.040
			48	0.140
2				
	Atherinops affinis	topsmelt	1	0.011
	Leptocottus armatus	Pacific staghorn sculpin	2	0.019
	Leuresthes tenuis	California grunion	1	0.001
	Seriphus politus	queenfish	8	0.018
	Syngnathus sp	pipefish, unid.	2	0.001
	Urobatis halleri	round stingray	1	0.180
			15	0.230
3				
	Atherinops affinis	topsmelt	2	0.006
	Seriphus politus	queenfish	1	0.001
			3	0.007
4				
	Porichthys myriaster	specklefin midshipman	1	0.599
	Seriphus politus	queenfish	2	0.002
			3	0.601
5				
	Atherinops affinis	topsmelt	1	0.004
	Genyonemus lineatus	white croaker	1	0.003
	Seriphus politus	queenfish	19	0.020
	Syngnathus sp	pipefish, unid.	2	0.003
			23	0.030
6				
	Atherinops affinis	topsmelt	11	0.044
	Engraulis mordax	northern anchovy	2	0.003
	Leuresthes tenuis	California grunion	4	0.006
	Sardinops sagax	Pacific sardine	1	0.007
	Seriphus politus	queenfish	11	0.017
	Syngnathus sp	pipefish, unid.	5	0.005
	Umbrina roncador	yellowfin croaker	2	0.671
			36	0.753

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI38
Start Date: September 20, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	20	0.025
	Fundulus parvipinnis	California killifish	5	0.010
	Seriphus politus	queenfish	25	0.030
			50	0.065
2				
	Cheilotrema saturnum	black croaker	1	0.001
	Engraulis mordax	northern anchovy	1	0.001
	Leptocottus armatus	Pacific staghorn sculpin	1	0.014
	Seriphus politus	queenfish	7	0.011
			10	0.027
3				
	Porichthys myriaster	specklefin midshipman	1	0.223
			1	0.223
4				
	None			
5				
	Myliobatis californica	bat ray	1	0.370
	Seriphus politus	queenfish	1	0.004
	Syngnathus sp	pipefish, unid.	1	0.001
			3	0.375
6				
	Atherinops affinis	topsmelt	19	0.046
	Cymatogaster aggregata	shiner perch	1	0.007
	Engraulis mordax	northern anchovy	2	0.007
	Gobiesox rhessodon	California clingfish	1	0.001
	Heterostichus rostratus	giant kelpfish	1	0.018
	Leptocottus armatus	Pacific staghorn sculpin	1	0.016
	Leuresthes tenuis	California grunion	2	0.005
	Pleuronichthys guttulatus	diamond turbot	1	0.343
	Seriphus politus	queenfish	12	0.015
	Syngnathus sp	pipefish, unid.	3	0.006
			43	0.464

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI39

Start Date: September 27, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	20	0.050
	Cymatogaster aggregata	shiner perch	5	0.045
	Engraulis mordax	northern anchovy	5	0.005
	Seriphus politus	queenfish	145	0.155
			175	0.255
2				
	Atherinops affinis	topsmelt	2	0.002
	Seriphus politus	queenfish	9	0.010
	Syngnathus sp	pipefish, unid.	1	0.001
	Urobatis halleri	round stingray	1	0.080
			13	0.093
3				
	Cymatogaster aggregata	shiner perch	1	0.021
	Seriphus politus	queenfish	1	0.002
			2	0.023
4				
	None			
5				
	Atherinops affinis	topsmelt	4	0.027
	Heterostichus rostratus	giant kelpfish	3	0.048
	Leuresthes tenuis	California grunion	2	0.010
	Seriphus politus	queenfish	6	0.005
			15	0.090
6				
	Anchoa delicatissima	slough anchovy	1	0.002
	Atherinops affinis	topsmelt	9	0.026
	Porichthys myriaster	specklefin midshipman	1	0.490
	Seriphus politus	queenfish	8	0.010
	Syngnathus sp	pipefish, unid.	1	0.002
			20	0.530

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI40

Start Date: October 4, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	10	0.020
	Engraulis mordax	northern anchovy	10	0.020
	Gibbonsia elegans	spotted kelpfish	10	0.100
	Gibbonsia metzi	striped kelpfish	10	0.110
	Leptocottus armatus	Pacific staghorn sculpin	10	0.090
	Seriphus politus	queenfish	30	0.040
			80	0.380
2				
	Fundulus parvipinnis	California killifish	1	0.003
	Leuresthes tenuis	California grunion	5	0.007
	Seriphus politus	queenfish	14	0.017
			20	0.027
3				
	Seriphus politus	queenfish	1	0.001
			1	0.001
4				
	None			
5				
	Atherinops affinis	topsmelt	3	0.010
	Cymatogaster aggregata	shiner perch	1	0.008
	Seriphus politus	queenfish	3	0.004
			7	0.022

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI41

Start Date: October 11, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	4	0.011
	Atherinops affinis	topsmelt	14	0.022
	Cymatogaster aggregata	shiner perch	1	0.002
	Engraulis mordax	northern anchovy	4	0.004
	Gobiesox rhessodon	California clingfish	1	0.002
	Heterostichus rostratus	giant kelpfish	1	0.018
	Leptocottus armatus	Pacific staghorn sculpin	3	0.084
	Leuresthes tenuis	California grunion	9	0.009
	Seriphus politus	queenfish	62	0.073
	Syngnathus sp	pipefish, unid.	4	0.004
	Urobatis halleri	round stingray	1	0.070
			104	0.299
2				
	Atherinops affinis	topsmelt	2	0.021
	Syngnathus sp	pipefish, unid.	2	0.001
			4	0.022
3				
	None			
4				
	Syngnathus sp	pipefish, unid.	1	0.001
			1	0.001
5				
	None			
6				
	Atherinops affinis	topsmelt	8	0.023
	Cymatogaster aggregata	shiner perch	1	0.020
	Engraulis mordax	northern anchovy	2	0.004
	Hyperprosopon argenteum	walleye surfperch	1	0.005
	Leuresthes tenuis	California grunion	5	0.007
	Porichthys myriaster	specklefin midshipman	2	0.636
	Seriphus politus	queenfish	13	0.016
	Syngnathus sp	pipefish, unid.	2	0.002
			34	0.713

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI42

Start Date: October 18, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	2	0.006
	Atherinops affinis	topsmelt	2	0.004
	Engraulis mordax	northern anchovy	1	0.002
	Seriphus politus	queenfish	15	0.015
			20	0.027
2				
	Engraulis mordax	northern anchovy	1	0.001
	Seriphus politus	queenfish	4	0.003
			5	0.004
3				
	Atherinops affinis	topsmelt	1	0.004
	Seriphus politus	queenfish	1	0.001
	Urobatis halleri	round stingray	1	0.301
			3	0.306
4				
	None			
5				
	None			
6				
	Atherinops affinis	topsmelt	4	0.056
	Engraulis mordax	northern anchovy	1	0.001
	Seriphus politus	queenfish	9	0.008
	Syngnathus sp	pipefish, unid.	4	0.006
			18	0.071

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI43

Start Date: October 25, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	1	0.002
	Atherinops affinis	topsmelt	3	0.007
	Cheilotrema saturnum	black croaker	1	0.001
	Engraulis mordax	northern anchovy	2	0.001
	Leptocottus armatus	Pacific staghorn sculpin	1	0.018
	Leuresthes tenuis	California grunion	5	0.005
	Seriphus politus	queenfish	42	0.044
	Syngnathus sp	pipefish, unid.	3	0.001
	Xenistius californiensis	salema	1	0.001
			59	0.080
2				
	Engraulis mordax	northern anchovy	1	0.001
	Seriphus politus	queenfish	1	0.005
	Syngnathus sp	pipefish, unid.	3	0.002
			5	0.008
3				
	Atherinops affinis	topsmelt	1	0.003
	Heterostichus rostratus	giant kelpfish	1	0.011
	Syngnathus sp	pipefish, unid.	1	0.002
			3	0.016
4				
	None			
5				
	None			
6				
	Atherinops affinis	topsmelt	12	0.077
	Engraulis mordax	northern anchovy	1	0.002
	Heterostichus rostratus	giant kelpfish	1	0.010
	Porichthys myriaster	specklefin midshipman	3	0.312
	Seriphus politus	queenfish	7	0.005
	Syngnathus sp	pipefish, unid.	3	0.002
			27	0.408

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI44

Start Date: November 1, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	3	0.007
	Leptocottus armatus	Pacific staghorn sculpin	1	0.036
	Leuresthes tenuis	California grunion	2	0.004
	Seriphus politus	queenfish	13	0.015
	Syngnathus sp	pipefish, unid.	1	0.001
			20	0.063
2				
	Atherinops affinis	topsmelt	1	0.004
	Seriphus politus	queenfish	1	0.001
	Syngnathus sp	pipefish, unid.	2	0.001
			4	0.006
3				
	Porichthys myriaster	specklefin midshipman	1	0.452
	Seriphus politus	queenfish	1	0.001
			2	0.453
4				
	Anisotremus davidsonii	sargo	1	0.001
	Syngnathus sp	pipefish, unid.	1	0.001
			2	0.002
5				
	None			
6				
	Atherinops affinis	topsmelt	6	0.039
	Heterostichus rostratus	giant kelpfish	1	0.005
	Porichthys myriaster	specklefin midshipman	1	0.001
	Seriphus politus	queenfish	4	0.008
	Syngnathus sp	pipefish, unid.	1	0.001
			13	0.054

Haynes Generating Station - Normal Operation Impingement Data - Fish
Survey: HnGSFI45
Start Date: November 8, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	1	0.003
	Atherinops affinis	topsmelt	3	0.005
	Engraulis mordax	northern anchovy	6	0.001
	Leuresthes tenuis	California grunion	3	0.003
	Seriphus politus	queenfish	66	0.067
	Syngnathus sp	pipefish, unid.	1	0.001
			80	0.080
2				
	Atherinops affinis	topsmelt	1	0.002
	Leptocottus armatus	Pacific staghorn sculpin	1	0.032
			2	0.034
3				
	Leuresthes tenuis	California grunion	1	0.001
	Seriphus politus	queenfish	1	0.001
			2	0.002
4				
	Cymatogaster aggregata	shiner perch	1	0.008
	Engraulis mordax	northern anchovy	1	0.001
	Seriphus politus	queenfish	1	0.001
			3	0.010
5				
	None			
6				
	Atherinops affinis	topsmelt	6	0.029
	Leptocottus armatus	Pacific staghorn sculpin	1	0.032
	Leuresthes tenuis	California grunion	1	0.001
	Seriphus politus	queenfish	10	0.006
			18	0.068

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI46

Start Date: November 15, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Engraulis mordax	northern anchovy	1	0.001
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
	Seriphus politus	queenfish	2	0.001
			4	0.003
2				
	Atherinops affinis	topsmelt	2	0.005
	Porichthys myriaster	specklefin midshipman	2	0.004
	Seriphus politus	queenfish	26	0.017
	Syngnathus sp	pipefish, unid.	5	0.013
			35	0.039
3	None			
4	None			
5	None			
6				
	Atherinops affinis	topsmelt	3	0.010
	Heterostichus rostratus	giant kelpfish	1	0.039
	Leuresthes tenuis	California grunion	1	0.001
	Myliobatis californica	bat ray	1	0.131
	Porichthys myriaster	specklefin midshipman	2	0.002
	Seriphus politus	queenfish	14	0.008
	Syngnathus sp	pipefish, unid.	3	0.003
			25	0.194

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI47

Start Date: November 20, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Survey Totals Biomass (kg)
1				
	None			
2				
	Seriphus politus	queenfish	4	0.002
	Syngnathus sp	pipefish, unid.	2	0.001
			6	0.003
3				
	None			
4				
	None			
5				
	None			
6				
	Atherinops affinis	topsmelt	2	0.008
	Leptocottus armatus	Pacific staghorn sculpin	1	0.031
	Porichthys myriaster	specklefin midshipman	1	0.001
	Seriphus politus	queenfish	3	0.002
	Syngnathus sp	pipefish, unid.	3	0.002
			10	0.044

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI48

Start Date: November 29, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Atherinops affinis	topsmelt	3	0.009
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
			4	0.010
2				
	Atherinops affinis	topsmelt	6	0.017
	Seriphus politus	queenfish	5	0.004
			11	0.021
3				
	Atherinops affinis	topsmelt	1	0.004
	Seriphus politus	queenfish	1	0.001
			2	0.005
4				
	Seriphus politus	queenfish	1	0.004
			1	0.004
5				
	None			
6				
	Atherinops affinis	topsmelt	9	0.026
	Engraulis mordax	northern anchovy	1	0.001
	Heterostichus rostratus	giant kelpfish	1	0.012
	Leuresthes tenuis	California grunion	2	0.003
	Porichthys myriaster	specklefin midshipman	1	0.126
	Seriphus politus	queenfish	8	0.006
	Syngnathus sp	pipefish, unid.	2	0.005
			24	0.179

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI49

Start Date: December 6, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Gibbonsia elegans	spotted kelpfish	1	0.014
	Syngnathus sp	pipefish, unid.	2	0.001
			3	0.015
2				
	Anisotremus davidsonii	sargo	1	0.001
	Engraulis mordax	northern anchovy	1	0.001
	Seriphus politus	queenfish	4	0.004
	Syngnathus sp	pipefish, unid.	1	0.002
	Xenistius californiensis	salema	1	0.001
			8	0.009
3				
	Cymatogaster aggregata	shiner perch	1	0.016
			1	0.016
4				
	Seriphus politus	queenfish	5	0.004
	Syngnathus sp	pipefish, unid.	1	0.001
			6	0.005
5				
	Atherinops affinis	topsmelt	3	0.014
	Gillichthys mirabilis	longjaw mudsucker	1	0.004
	Gobiesox rhessodon	California clingfish	1	0.002
	Porichthys myriaster	specklefin midshipman	1	0.279
	Raja inornata	California skate	1	0.133
	Seriphus politus	queenfish	6	0.004
	Syngnathus sp	pipefish, unid.	1	0.002
			14	0.438
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI50

Start Date: December 13, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
	Seriphus politus	queenfish	2	0.002
	Syngnathus sp	pipefish, unid.	3	0.003
	Urobatis halleri	round stingray	1	0.059
			7	0.065
2				
	Seriphus politus	queenfish	1	0.001
			1	0.001
3				
	None			
4				
	None			
5				
	Atherinops affinis	topsmelt	2	0.037
	Heterostichus rostratus	giant kelpfish	2	0.025
	Leuresthes tenuis	California grunion	1	0.002
	Seriphus politus	queenfish	2	0.002
	Syngnathus sp	pipefish, unid.	2	0.002
	Urobatis halleri	round stingray	1	0.035
			10	0.103
6				
	None			

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI51

Start Date: December 20, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Anchoa delicatissima	slough anchovy	2	0.004
	Anisotremus davidsonii	sargo	1	0.005
	Atherinops affinis	topsmelt	2	0.005
	Engraulis mordax	northern anchovy	3	0.001
	Gobiesox rhessodon	California clingfish	1	0.001
	Leptocottus armatus	Pacific staghorn sculpin	1	0.025
	Seriphus politus	queenfish	80	0.090
	Syngnathus sp	pipefish, unid.	3	0.003
	Urobatis halleri	round stingray	4	0.170
	Xenistius californiensis	salema	4	0.006
			101	0.310
2				
	Seriphus politus	queenfish	3	0.005
			3	0.005
3				
	Urobatis halleri	round stingray	1	0.029
			1	0.029
4				
	Engraulis mordax	northern anchovy	1	0.001
	Seriphus politus	queenfish	2	0.002
			3	0.003
5				
	Atherinops affinis	topsmelt	4	0.027
	Embiotoca jacksoni	black perch	2	0.157
	Heterostichus rostratus	giant kelpfish	1	0.010
	Ophichthus zophochir	yellow snake eel	1	0.030
	Porichthys myriaster	specklefin midshipman	2	0.003
	Seriphus politus	queenfish	13	0.020
	Syngnathus sp	pipefish, unid.	4	0.005
	Urobatis halleri	round stingray	1	0.044
	Xenistius californiensis	salema	1	0.001
			29	0.297
6				
	None	NO FISH		

Haynes Generating Station - Normal Operation Impingement Data - Fish

Survey: HnGSFI52

Start Date: December 27, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
1				
	Engraulis mordax	northern anchovy	1	0.001
	Gillichthys mirabilis	longjaw mudsucker	1	0.001
	Gobiesox rhessodon	California clingfish	1	0.001
	Seriphus politus	queenfish	3	0.003
	Syngnathus sp	pipefish, unid.	3	0.002
	Urobatis halleri	round stingray	1	0.043
	Xenistius californiensis	salema	1	0.002
			11	0.053
2				
	Atherinops affinis	topsmelt	1	0.005
	Syngnathus sp	pipefish, unid.	3	0.003
			4	0.008
3				
	Syngnathus sp	pipefish, unid.	1	0.001
			1	0.001
4				
	None			
5				
	Heterostichus rostratus	giant kelpfish	1	0.015
	Hypsoblennius gilberti	rockpool blenny	1	0.007
	Seriphus politus	queenfish	1	0.001
	Syngnathus leptorhynchus	bay pipefish	1	0.011
			4	0.034
6				
	None			

Haynes Generating Station - Heat Treatment Impingement Data - Fish

Survey: HnGSHT1

Start Date: March 7, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
1				
	Syngnathus sp	pipefish, unid.	2	0.002
			2	0.002

Haynes Generating Station - Heat Treatment Impingement Data - Fish

Survey: HnGSHT2

Start Date: May 10, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
2				
	Syngnathus leptorhynchus	bay pipefish	1	0.001
			1	0.001

Haynes Generating Station - Heat Treatment Impingement Data - Fish

Survey: HnGSHT3

Start Date: August 21, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
5				
	Anchoa compressa	deepbody anchovy	1	0.002
	Atherinops affinis	topsmelt	3	0.024
	Engraulis mordax	northern anchovy	4	0.010
	Gibbonsia elegans	spotted kelpfish	1	0.020
	Myliobatis californica	bat ray	1	0.248
	Seriphus politus	queenfish	6	0.007
			16	0.311

Haynes Generating Station - Heat Treatment Impingement Data - Fish

Survey: HnGSHT4

Start Date: August 22, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
2				
	Engraulis mordax	northern anchovy	6	0.008
	Seriphus politus	queenfish	3	0.003
			9	0.011

Haynes Generating Station - Heat Treatment Impingement Data - Fish

Survey: HnGSHT5

Start Date: November 14, 2006

			Survey Totals	
Unit	Taxon	Common Name	Abundance	Biomass (kg)
2				
	Atherinops affinis	topsmelt	5	0.020
			5	0.020

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI1
Start Date: January 4, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	3				
		Neotrypaea gigas	giant ghost shrimp	1	0.006
				1	0.006
	5				
		Portunus xantusii	Xantus swimming crab	1	0.027
		Crangon nigromaculata	blackspotted bay shrimp	1	0.002
				2	0.029
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	4	0.003
		Navanax inermis	California aglaja	1	0.034
		Cnidaria	sea jelly, unid.	1	0.005
				6	0.042
	2				
		None			
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	4	0.213
		Cnidaria	sea jelly, unid.	1	0.011
				6	0.225
	4				
		Navanax inermis	California aglaja	2	0.064
		Cnidaria	sea jelly, unid.	1	0.006
		Chrysaora colorata	purple-striped jellyfish	1	0.004
		Aurelia aurita	moon jelly	1	0.260
				5	0.334
	5				
		Hermissenda crassicornis	hermissenda	5	0.002
		Navanax inermis	California aglaja	3	0.068
		Cnidaria	sea jelly, unid.	1	0.003
		Nudibranchia	Nudibranch, unid.	1	0.001
				10	0.074
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI2
Start Date: January 11, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	5				
		Portunus xantusii	Xantus swimming crab	2	0.029
		Pachygrapsus crassipes	striped shore crab	1	0.008
				3	0.037
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	2	0.001
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
		Protothaca staminea	Pacific littleneck	2	0.008
				5	0.010
	2				
		None			
	3				
		Hermissenda crassicornis	hermissenda	2	0.001
		Navanax inermis	California aglaja	4	0.072
				6	0.073
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
				1	0.001
	5				
		Hermissenda crassicornis	hermissenda	31	0.012
		Navanax inermis	California aglaja	4	0.128
		Bulla gouldiana	California bubble	1	0.010
		Aeolidia papillosa	shag-rug aeolis	1	0.001
		Dendronotus iris	giant-frond-aeolis	1	0.009
				38	0.160
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI3
Start Date: January 18, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	28	0.001
		Navanax inermis	California aglaja	5	0.312
		Protothaca staminea	Pacific littleneck	6	0.020
		Polyorchis penicillatus	red jellyfish	3	0.006
		Polycera atra	orange-spike polycera	2	0.001
		Gastropoda	gastropod, unid.	1	0.004
				45	0.344
	2				
		None			
	3				
		Navanax inermis	California aglaja	3	0.058
		Polyorchis penicillatus	red jellyfish	1	0.002
				4	0.060
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	2	0.075
		Polyorchis penicillatus	red jellyfish	1	0.001
				4	0.077
	5				
		Hermissenda crassicornis	hermissenda	6	0.004
		Navanax inermis	California aglaja	4	0.065
		Polyorchis penicillatus	red jellyfish	5	0.004
		Ceratostoma nuttalli	Nuttall's thornmouth	1	0.001
				16	0.074
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI4
Start Date: January 25, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	7	0.001
		Navanax inermis	California aglaja	8	0.213
		Protothaca staminea	Pacific littleneck	2	0.003
		Polyorchis penicillatus	red jellyfish	4	0.029
		Polycera atra	orange-spike polycera	1	0.001
		Ceratostoma nuttalli	Nuttall's thornmouth	1	0.003
		Dendronotus subramosus	stubby dendronotus	1	0.001
				24	0.251
	2				
		None			
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	2	0.047
		Cnidaria	sea jelly, unid.	2	0.011
		Polyorchis penicillatus	red jellyfish	1	0.008
		Polyorchis haplus	polyorchid jellyfish, unnamed	1	0.002
				7	0.069
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	3	0.128
		Polyorchis penicillatus	red jellyfish	1	0.005
		Phyllaplysia taylori	zebra leafslug	1	0.001
				6	0.135
	5				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	7	0.095
		Polyorchis penicillatus	red jellyfish	8	0.057
		Leptopecten sp	scallop, unid.	1	0.001
				17	0.154
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI5
Start Date: February 1, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
				1	0.001
	5				
		Pachygrapsus crassipes	striped shore crab	1	0.003
				1	0.003
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	1	0.002
		Navanax inermis	California aglaja	21	0.544
		Aurelia aurita	moon jelly	1	0.009
		Polyorchis penicillatus	red jellyfish	1	0.001
		Gastropoda	gastropod, unid.	2	0.001
		Crepidula onyx	onyx slippersnail	2	0.001
				28	0.558
	2				
		None			
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	8	0.213
		Polyorchis penicillatus	red jellyfish	1	0.005
				10	0.219
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	4	0.102
				5	0.103
	5				
		Hermissenda crassicornis	hermissenda	13	0.010
		Polyorchis penicillatus	red jellyfish	1	0.007
				14	0.017
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI6
Start Date: February 8, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	5				
		Hemigrapsus sp	shore crab, unid.	3	0.004
				3	0.004
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	6	0.147
		Polyorchis penicillatus	red jellyfish	2	0.002
		Kelletia kelletii	Kellet's whelk	1	0.002
				10	0.152
	2				
		None			
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	1	0.017
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
				3	0.019
	4				
		Navanax inermis	California aglaja	1	0.029
				1	0.029
	5				
		Hermissenda crassicornis	hermissenda	5	0.002
		Aurelia aurita	moon jelly	5	0.032
		Polyorchis penicillatus	red jellyfish	1	0.003
		Acanthodoris rhodoceras	black-tipped spiny doris	1	0.001
				12	0.038
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI7
Start Date: February 15, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Crangon nigromaculata	blackspotted bay shrimp	11	0.001
				11	0.001
	5				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	6				
		Portunus xantusii	Xantus swimming crab	1	0.017
		Hemigrapsus oregonensis	yellow shore crab	4	0.005
				5	0.022
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	2	0.001
		Navanax inermis	California aglaja	3	0.035
		Polycera atra	orange-spike polycera	1	0.001
		Flabellina trilineata	threeline aeolis	4	0.001
				10	0.038
	2				
		None			
	3				
		None			
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
		Leptopecten sp	scallop, unid.	1	0.001
				2	0.002
	5				
		Chrysaora colorata	purple-striped jellyfish	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
				2	0.002
	6				
		Hermissenda crassicornis	hermissenda	5	0.003
		Navanax inermis	California aglaja	1	0.003
		Bulla gouldiana	California bubble	2	0.042
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
		Polyorchis penicillatus	red jellyfish	1	0.008
		Haminoea virescens	green glassy bubble	1	0.001
				11	0.058

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI8
Start Date: February 22, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	6				
		Pachygrapsus crassipes	striped shore crab	1	0.008
		Hemigrapsus oregonensis	yellow shore crab	3	0.003
				4	0.011
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	1	0.001
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
		Polyorchis penicillatus	red jellyfish	2	0.010
				4	0.012
	2				
		None			
	3				
		None			
	4				
		None			
	5				
		Hermissenda crassicornis	hermissenda	3	0.003
		Bulla gouldiana	California bubble	1	0.017
		Polyorchis penicillatus	red jellyfish	2	0.014
				6	0.034
	6				
		Navanax inermis	California aglaja	1	0.031
		Bulla gouldiana	California bubble	4	0.044
		Polyorchis penicillatus	red jellyfish	3	0.023
				8	0.098

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI9
Start Date: March 1, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Pachygrapsus crassipes	striped shore crab	1	0.043
				1	0.043
	4				
		Crangon nigromaculata	blackspotted bay shrimp	2	0.002
				2	0.002
	5				
		Neotrypaea gigas	giant ghost shrimp	1	0.004
				1	0.004
	6				
		Neotrypaea gigas	giant ghost shrimp	1	0.008
		Portunus xantusii	Xantus swimming crab	1	0.020
		Hemigrapsus oregonensis	yellow shore crab	4	0.004
		Pyromaia tuberculata	tuberculate pear crab	3	0.005
				9	0.037
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	1	0.001
		Aurelia aurita	moon jelly	8	0.254
		Polyorchis penicillatus	red jellyfish	1	0.012
				10	0.267
	2				
		None			
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Aurelia aurita	moon jelly	10	0.086
				11	0.087
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
		Cnidaria	sea jelly, unid.	1	0.004
		Aurelia aurita	moon jelly	1	0.021
				3	0.026
	5				
		Navanax inermis	California aglaja	2	0.073
		Aurelia aurita	moon jelly	3	0.074
		Polyorchis penicillatus	red jellyfish	4	0.025
				9	0.172

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Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI9 (Continued)
Start Date: March 1, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Survey Totals Biomass (kg)
Non-Shellfish	6			
	Hermissenda crassicornis	hermissenda	4	0.002
	Navanax inermis	California aglaja	4	0.150
	Aurelia aurita	moon jelly	12	0.225
	Bulla gouldiana	California bubble	5	0.053
	Polyorchis penicillatus	red jellyfish	5	0.024
	Leptopecten sp	scallop, unid.	1	0.001
	Aplysia californica	California seahare	1	0.521
			32	0.976

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI10
Start Date: March 8, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Crangon nigromaculata	blackspotted bay shrimp	1	0.002
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.316
				2	0.318
	5				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	6				
		Hemigrapsus oregonensis	yellow shore crab	3	0.003
				3	0.003
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	5	0.001
		Navanax inermis	California aglaja	1	0.008
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Flabellina trilineata	threeline aeolis	3	0.001
		Dendronotus frondosus	leafy dendronotid	1	0.001
				11	0.012
	2				
		None			
	3				
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
				1	0.001
	4				
		None			
	5				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	2	0.059
				3	0.060
	6				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	6	0.179
		Bulla gouldiana	California bubble	9	0.108
		Polyorchis penicillatus	red jellyfish	1	0.014
		Dirona picta	spotted dirona	1	0.001
				18	0.303

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI11
Start Date: March 15, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Crangon nigromaculata	blackspotted bay shrimp	1	0.002
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.002
				3	0.005
	6				
		Portunus xantusii	Xantus swimming crab	1	0.015
		Crangon nigromaculata	blackspotted bay shrimp	1	0.002
		Loligo opalescens	California market squid	3	0.063
				5	0.080
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	4	0.001
				4	0.001
	2				
		Hermissenda crassicornis	hermissenda	1	0.001
		Polyorchis penicillatus	red jellyfish	1	0.001
				2	0.002
	3				
		None			
	4				
		None			
	5				
		None			
	6				
		Hermissenda crassicornis	hermissenda	4	0.003
		Nudibranchia	nudibranch, unid.	1	0.001
		Polyorchis penicillatus	red jellyfish	1	0.005
				6	0.009

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI12
Start Date: March 22, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Crangon nigromaculata	blackspotted bay shrimp	2	0.003
				2	0.003
	6				
		Portunus xantusii	Xantus swimming crab	7	0.116
				7	0.116
Non-Shellfish	1				
		Polyorchis penicillatus	red jellyfish	1	0.001
		Molpadia intermedia	unnamed sea cucumber	1	0.024
				2	0.025
	2				
		Aurelia aurita	moon jelly	1	0.024
		Polyorchis penicillatus	red jellyfish	2	0.010
				3	0.034
	3				
		Navanax inermis	California aglaja	1	0.012
		Aurelia aurita	moon jelly	3	0.070
				4	0.082
	4				
		None			
	5				
		None			
	6				
		Navanax inermis	California aglaja	1	0.012
		Cnidaria	sea jelly, unid.	1	0.006
		Aurelia aurita	moon jelly	3	0.150
		Dendronotus iris	giant-frond-aeolis	1	0.001
		Polyorchis penicillatus	red jellyfish	15	0.038
				21	0.207

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI13
Start Date: March 29, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Crangon nigromaculata	blackspotted bay shrimp	8	0.012
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.163
				9	0.175
	2				
		Crangon nigromaculata	blackspotted bay shrimp	1	0.002
		Pyromaia tuberculata	tuberculate pear crab	2	0.003
				3	0.005
	3				
		Pyromaia tuberculata	tuberculate pear crab	2	0.001
				2	0.001
	6				
		Pachygrapsus crassipes	striped shore crab	1	0.032
				1	0.032
Non-Shellfish	1				
		Aurelia aurita	moon jelly	32	0.928
				32	0.928
	2				
		Hermissenda crassicornis	hermissenda	2	0.001
		Aurelia aurita	moon jelly	14	0.312
		Polyorchis penicillatus	red jellyfish	2	0.001
		Phyllaplysia taylori	zebra leafslug	2	0.001
				20	0.315
	3				
		Hermissenda crassicornis	hermissenda	2	0.003
		Navanax inermis	California aglaja	1	0.008
		Aurelia aurita	moon jelly	3	0.050
		Polyorchis penicillatus	red jellyfish	2	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Philine auriformis	New Zealand snail	1	0.002
				10	0.065
	6				
		Hermissenda crassicornis	hermissenda	3	0.002
		Navanax inermis	California aglaja	1	0.013
		Aurelia aurita	moon jelly	14	0.732
		Bulla gouldiana	California bubble	1	0.006
		Polyorchis penicillatus	red jellyfish	2	0.012
				21	0.765

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI14
Start Date: April 5, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Crangon nigromaculata	blackspotted bay shrimp	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.003
				2	0.004
	2				
		Crangon nigromaculata	blackspotted bay shrimp	1	0.002
				1	0.002
	5				
		Crangon nigromaculata	blackspotted bay shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	1	0.002
		Pyromaia tuberculata	tuberculate pear crab	1	0.004
				3	0.007
	6				
		Portunus xantusii	Xantus swimming crab	5	0.091
		Loligo opalescens	California market squid	6	0.104
				11	0.195
Non-Shellfish	1				
		Navanax inermis	California aglaja	3	0.127
		Polyorchis penicillatus	red jellyfish	8	0.017
				11	0.144
	2				
		Polyorchis penicillatus	red jellyfish	2	0.003
				2	0.003
	3				
		Polyorchis penicillatus	red jellyfish	2	0.002
		Argopecten ventricosus	Pacific calico scallop	1	0.001
				3	0.003
	4				
		Polyorchis penicillatus	red jellyfish	6	0.008
				6	0.008
	5				
		Navanax inermis	California aglaja	1	0.035
		Polyorchis penicillatus	red jellyfish	33	0.098
				34	0.133
	6				
		Bulla gouldiana	California bubble	4	0.111
		Polyorchis penicillatus	red jellyfish	37	0.143
		Leptopecten sp	scallop, unid.	37	0.100
				78	0.354

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI15
Start Date: April 12, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	5				
		Neotrypaea gigas	giant ghost shrimp	1	0.005
		Portunus xantusii	Xantus swimming crab	1	0.017
				2	0.022
	6				
		Crangon nigromaculata	blackspotted bay shrimp	4	0.005
		Loligo opalescens	California market squid	1	0.022
				5	0.027
Non-Shellfish	1				
		None			
	2				
		Navanax inermis	California aglaja	1	0.058
		Polyorchis penicillatus	red jellyfish	16	0.047
				17	0.105
	3				
		None			
	4				
		Navanax inermis	California aglaja	1	0.008
		Polyorchis penicillatus	red jellyfish	2	0.010
				3	0.018
	5				
		Hermissenda crassicornis	hermissenda	1	0.001
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
		Polyorchis penicillatus	red jellyfish	16	0.044
				18	0.046
	6				
		Hermissenda crassicornis	hermissenda	10	0.006
		Navanax inermis	California aglaja	1	0.046
		Polyorchis penicillatus	red jellyfish	76	0.304
				87	0.356

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI16
Start Date: April 19, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	3				
		Neotrypaea gigas	giant ghost shrimp	1	0.008
				1	0.008
	5				
		Neotrypaea gigas	giant ghost shrimp	1	0.005
		Hemigrapsus oregonensis	yellow shore crab	1	0.005
				2	0.010
	6				
		Neotrypaea gigas	giant ghost shrimp	1	0.006
		Crangon nigromaculata	blackspotted bay shrimp	1	0.002
		Hemigrapsus nudus	purple shore crab	1	0.002
				3	0.010
Non-Shellfish	1				
		None			
	2				
		Hermissenda crassicornis	hermissenda	4	0.001
		Navanax inermis	California aglaja	1	0.023
		Polyorchis penicillatus	red jellyfish	5	0.006
		Flabellina iodinea	Spanish shawl	1	0.001
				11	0.031
	3				
		Hermissenda crassicornis	hermissenda	3	0.002
		Navanax inermis	California aglaja	1	0.017
		Polyorchis penicillatus	red jellyfish	3	0.005
				7	0.024
	4				
		Navanax inermis	California aglaja	2	0.034
		Polyorchis penicillatus	red jellyfish	16	0.039
				18	0.073
	5				
		Navanax inermis	California aglaja	1	0.016
		Aurelia aurita	moon jelly	1	0.016
		Polyorchis penicillatus	red jellyfish	66	0.151
				68	0.183
	6				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	1	0.011
		Nudibranchia	nudibranch unid	1	0.001
		Polyorchis penicillatus	red jellyfish	87	0.310
		Leptopecten sp	scallop, unid.	1	0.001
				91	0.324

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI17
Start Date: April 26, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	2				
		Portunus xantusii	Xantus swimming crab	1	0.015
				1	0.015
	5				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus nudus	purple shore crab	1	0.003
				2	0.004
	6				
		Neotrypaea gigas	giant ghost shrimp	1	0.005
		Portunus xantusii	Xantus swimming crab	4	0.076
		Hemigrapsus nudus	purple shore crab	1	0.001
				6	0.082
Non-Shellfish	1				
		None			
	2				
		Navanax inermis	California aglaja	1	0.023
		Polyorchis penicillatus	red jellyfish	2	0.001
		Dendronotus subramosus	stubby dendronotus	2	0.001
		Flabellina trilineata	threeline aeolis	4	0.001
				9	0.026
	3				
		None			
	4				
		None			
	5				
		Aurelia aurita	moon jelly	22	1.839
		Polyorchis penicillatus	red jellyfish	68	0.313
		Flabellina trilineata	threeline aeolis	1	0.001
		Flabellina iodinea	Spanish shawl	21	0.063
				112	2.216
	6				
		Hermissenda crassicornis	hermissenda	6	0.003
		Navanax inermis	California aglaja	2	0.031
		Polyorchis penicillatus	red jellyfish	57	0.199
		Dendronotus subramosus	stubby dendronotus	1	0.001
		Flabellina trilineata	threeline aeolis	1	0.001
				67	0.235

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI18
Start Date: May 3, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	2				
		Neotrypaea gigas	giant ghost shrimp	1	0.003
		Portunus xantusii	Xantus swimming crab	1	0.013
				2	0.016
	6				
		Crangon nigromaculata	blackspotted bay shrimp	2	0.002
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				4	0.004
Non-Shellfish	2				
		Hermissenda crassicornis	hermissenda	2	0.001
		Polyorchis penicillatus	red jellyfish	1	0.003
		Flabellina trilineata	threeline aeolis	2	0.001
		Dendronotus frondosus	leafy dendronotid	2	0.001
				7	0.006
	3				
		None			
	4				
		Polyorchis penicillatus	red jellyfish	3	0.003
				3	0.003
	5				
		Hermissenda crassicornis	hermissenda	1	0.001
		Polyorchis penicillatus	red jellyfish	5	0.020
		Flabellina trilineata	threeline aeolis	2	0.001
				8	0.022
	6				
		Hermissenda crassicornis	hermissenda	2	0.002
		Bulla gouldiana	California bubble	1	0.012
		Polyorchis penicillatus	red jellyfish	9	0.039
		Flabellina trilineata	threeline aeolis	1	0.001
		Flabellina iodinea	Spanish shawl	3	0.004
				16	0.058

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI19
Start Date: May 10, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	2	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				3	0.002
	2				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	2	0.001
				3	0.002
	5				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	6				
		Portunus xantusii	Xantus swimming crab	1	0.019
		Hemigrapsus oregonensis	yellow shore crab	2	0.002
				3	0.021
Non-Shellfish	2				
		Hermissenda crassicornis	hermissenda	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Flabellina trilineata	threeline aeolis	3	0.001
				5	0.003
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Flabellina trilineata	threeline aeolis	1	0.001
		Dendronotus frondosus	leafy dendronotid	1	0.001
				3	0.003
	4				
		Gastropoda	gastropod, unid.	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
				2	0.002
	5				
		Hermissenda crassicornis	hermissenda	2	0.001
		Navanax inermis	California aglaja	2	0.063
		Bulla gouldiana	California bubble	1	0.016
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
		Polyorchis penicillatus	red jellyfish	4	0.030
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Leptopecten sp	scallop, unid.	1	0.001
		Flabellina trilineata	threeline aeolis	3	0.001
				15	0.114

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Haynes Generating Station - Normal Operation Impingement Data - Invertebrate

Survey: HnGSFI19 (Continued)
Start Date: May 10, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Non-Shellfish	6			
	Hermissenda crassicornis	hermissenda	6	0.002
	Polyorchis penicillatus	red jellyfish	9	0.047
	Flabellina iodinea	Spanish shawl	1	0.001
			16	0.050

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI20
Start Date: May 17, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	2	0.001
		Pyromaia tuberculata	tuberculate pear crab	7	0.009
				9	0.010
	4				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	5				
		Pyromaia tuberculata	tuberculate pear crab	2	0.002
				2	0.002
	6				
		Neotrypaea gigas	giant ghost shrimp	2	0.007
		Portunus xantusii	Xantus swimming crab	1	0.019
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.003
				5	0.030
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	32	0.005
				32	0.005
	2				
		Hermissenda crassicornis	hermissenda	11	0.001
		Polycera atra	orange-spike polycera	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Flabellina trilineata	threeline aeolis	1	0.001
				14	0.004
	3				
		Hermissenda crassicornis	hermissenda	2	0.001
		Flabellina trilineata	threeline aeolis	3	0.001
				5	0.002
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
				2	0.002
	5				
		Hermissenda crassicornis	hermissenda	8	0.002
		Aurelia aurita	moon jelly	1	0.221
		Phyllaplysia taylori	zebra leafslug	3	0.002
		Flabellina trilineata	threeline aeolis	1	0.001
		Dendronotus frondosus	leafy dendronotid	1	0.001
				14	0.227

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Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI20 (Continued)
Start Date: May 17, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Non-Shellfish	6			
	Hermissenda crassicornis	hermissenda	9	0.004
	Phyllaplysia taylori	zebra leafslug	1	0.001
	Dendronotus frondosus	leafy dendronotid	2	0.001
	Aplysia sp	seahare, unid.	1	0.001
			13	0.007

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate

Survey: HnGSFI21
Start Date: May 24, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	3				
		Portunus xantusii	Xantus swimming crab	1	0.018
		Pyromaia tuberculata	tuberculate pear crab	2	0.002
				3	0.020
	6				
		Portunus xantusii	Xantus swimming crab	2	0.029
		Hemigrapsus nudus	purple shore crab	1	0.001
				3	0.030
Non-Shellfish	1				
		Navanax inermis	California aglaja	1	0.026
		Polycera atra	orange-spike polycera	25	0.012
				26	0.038
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Aurelia aurita	moon jelly	1	0.026
				2	0.027
	4				
		Aurelia aurita	moon jelly	1	0.056
				1	0.056
	5				
		Hermissenda crassicornis	hermissenda	2	0.002
		Navanax inermis	California aglaja	1	0.055
		Aurelia aurita	moon jelly	1	0.062
		Phyllaplysia taylori	zebra leafslug	1	0.001
				5	0.120
	6				
		Hermissenda crassicornis	hermissenda	10	0.003
		Aurelia aurita	moon jelly	2	0.104
		Bulla gouldiana	California bubble	2	0.027
		Polyorchis penicillatus	red jellyfish	1	0.001
		Phyllaplysia taylori	zebra leafslug	10	0.010
				25	0.145

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI22
Start Date: May 31, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Pyromaia tuberculata	tuberculate pear crab	2	0.004
		Loligo opalescens	California market squid	1	0.004
		Cancer anthonyi	yellow crab	1	0.002
				4	0.010
	3				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	4				
		Pachygrapsus crassipes	striped shore crab	1	0.001
				1	0.001
	5				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	6				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	1	0.001
				1	0.001
	2				
		Hermissenda crassicornis	hermissenda	3	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
				4	0.002
	3				
		None			
	4				
		None			
	5				
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Aplysia californica	California seahare	1	0.888
				2	0.889
	6				
		Hermissenda crassicornis	hermissenda	10	0.004
		Aurelia aurita	moon jelly	1	0.070
				11	0.074

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI23
Start Date: June 7, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	8	0.001
				9	0.002
	2				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.002
	3				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	4				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	3	0.002
				4	0.003
	6				
		Portunus xantusii	Xantus swimming crab	2	0.021
		Pachygrapsus crassipes	striped shore crab	1	0.039
		Hemigrapsus oregonensis	yellow shore crab	4	0.002
		Pyromaia tuberculata	tuberculate pear crab	9	0.018
				16	0.080
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	2	0.001
		Polycera atra	orange-spike polycera	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Leptopecten sp	scallop, unid.	1	0.001
		Triopha maculata	spotted triopha	1	0.001
				6	0.005
	2				
		Hermissenda crassicornis	hermissenda	5	0.001
		Phyllaplysia taylori	zebra leafslug	2	0.001
				7	0.002
	3				
		None			

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Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI23 (Continued)
Start Date: June 7, 2006

				Survey Totals	
	Unit	Taxon	Common Name	Abundance	Biomass (kg)
Non-Shellfish	4				
		Bulla gouldiana	California bubble	2	0.027
		Leptopecten sp	scallop, unid.	2	0.004
				4	0.031
	5				
		None			
	6				
		Hermissenda crassicornis	hermissenda	17	0.010
		Phyllaplysia taylori	zebra leafslug	2	0.001
		Leptopecten sp	scallop, unid.	1	0.001
				20	0.012

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI24
Start Date: June 14, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	5	0.003
				6	0.004
	2				
		Portunus xantusii	Xantus swimming crab	1	0.011
		Hemigrapsus oregonensis	yellow shore crab	2	0.001
		Pyromaia tuberculata	tuberculate pear crab	13	0.010
				16	0.022
	3				
		Hemigrapsus oregonensis	yellow shore crab	3	0.002
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				4	0.003
	4				
		Pachygrapsus crassipes	striped shore crab	1	0.023
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	2	0.002
				4	0.026
	6				
		Neotrypaea gigas	giant ghost shrimp	1	0.004
		Pachygrapsus crassipes	striped shore crab	1	0.013
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	12	0.006
		Pyromaia tuberculata	tuberculate pear crab	3	0.002
				18	0.026
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	2	0.001
				2	0.001
	2				
		Hermissenda crassicornis	hermissenda	3	0.001
		Phyllaplysia taylori	zebra leafslug	4	0.001
				7	0.002
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Aurelia aurita	moon jelly	1	0.006
		Aplysia californica	California seahare	1	0.100
				3	0.107

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Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI24 (Continued)
Start Date: June 14, 2006

Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
4				
	Hermissenda crassicornis	hermissenda	3	0.002
	Triopha maculata	spotted triopha	1	0.001
			4	0.003
5				
	None			
6				
	Hermissenda crassicornis	hermissenda	21	0.009
	Aurelia aurita	moon jelly	1	0.156
	Leptopecten sp	scallop, unid.	2	0.003
	Diaulula sandiegensis	ring-spotted dorid	2	0.007
			26	0.175

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI25
Start Date: June 21, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	2	0.001
		Hemigrapsus oregonensis	yellow shore crab	10	0.008
		Pyromaia tuberculata	tuberculate pear crab	19	0.013
				31	0.022
	3				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	4				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.002
	6				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	11	0.004
		Pyromaia tuberculata	tuberculate pear crab	4	0.005
		Hemigrapsus nudus	purple shore crab	4	0.001
				20	0.011
Non-Shellfish	1				
		Hermissenda crassicornis	hermissenda	7	0.001
		Polycera hedgpethi	Hedgpeth's polycera	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
				9	0.003
	2				
		None			
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Leptopecten sp	scallop, unid.	1	0.001
				2	0.002
	4				
		Hermissenda crassicornis	hermissenda	2	0.001
				2	0.001
	5				
		None			
	6				
		Hermissenda crassicornis	hermissenda	11	0.007
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Leptopecten sp	scallop, unid.	2	0.001
		Diaulula sandiegensis	ring-spotted dorid	10	0.075
				24	0.084

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate

Survey: HnGSFI26
Start Date: June 28, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	2				
		Pyromaia tuberculata	tuberculate pear crab	2	0.001
		Heptacarpus paludicola	California coastal shrimp	1	0.001
				3	0.002
	3				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.002
Non-Shellfish	1				
		None			
	3				
		Diaulula sandiegensis	ring-spotted dorid	4	0.015
				4	0.015
	4				
		Phyllaplysia taylori	zebra leafslug	1	0.001
				1	0.001
	5				
		None			
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI27
Start Date: July 3, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	4	0.003
				5	0.004
	2				
		Pyromaia tuberculata	tuberculate pear crab	3	0.003
				3	0.003
	4				
		Neotrypaea gigas	giant ghost shrimp	1	0.003
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.004
Non-Shellfish	1				
		Aplysia californica	California seahare	1	0.281
		Diaulula sandiegensis	ring-spotted dorid	1	0.004
				2	0.285
	2				
		Hermissenda crassicornis	hermissenda	1	0.001
		Leptopecten sp	scallop, unid.	1	0.001
		Aplysia californica	California seahare	2	0.878
		Haminoea sp	glassy bubble, unid.	1	0.001
				5	0.881
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
		Leptopecten sp	scallop, unid.	1	0.001
		Diaulula sandiegensis	ring-spotted dorid	1	0.002
				3	0.004
	4				
		None			
	5				
		None			
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI28
Start Date: July 12, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	4	0.004
		Pyromaia tuberculata	tuberculate pear crab	39	0.020
				43	0.024
	2				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	2	0.001
				3	0.002
	4				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.002
	6				
		Hemigrapsus oregonensis	yellow shore crab	5	0.009
		Octopus bimaculatus/bimaculoides	California two-spot octopus	3	0.564
				8	0.573
Non-Shellfish	2				
		Navanax inermis	California aglaja	1	0.001
		Leptopecten sp	scallop, unid.	1	0.001
		Aplysia californica	California seahare	1	0.093
		Haminoea sp	glassy bubble, unid.	1	0.001
				4	0.096
	3				
		None			
	4				
		None			
	5				
		None			
	6				
		Hermissenda crassicornis	hermissenda	2	0.001
				2	0.001

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI29
Start Date: July 19, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	2	0.002
		Hemigrapsus oregonensis	yellow shore crab	6	0.004
		Pyromaia tuberculata	tuberculate pear crab	26	0.014
				34	0.020
	2				
		Hemigrapsus oregonensis	yellow shore crab	2	0.001
		Pyromaia tuberculata	tuberculate pear crab	2	0.001
				4	0.002
	4				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	5				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	4	0.005
				5	0.006
	6				
		Hemigrapsus oregonensis	yellow shore crab	8	0.007
				8	0.007
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.008
		Phyllaplysia taylori	zebra leafslug	2	0.002
				4	0.010
	2				
		Diaulula sandiegensis	ring-spotted dorid	2	0.026
				2	0.026
	3				
		Navanax inermis	California aglaja	1	0.039
				1	0.039
	4				
		Hermissenda crassicornis	hermissenda	1	0.001
				1	0.001
	5				
		Navanax inermis	California aglaja	1	0.023
		Aplysia californica	California seahare	1	0.787
				2	0.810
	6				
		Hermissenda crassicornis	hermissenda	1	0.001
		Bulla gouldiana	California bubble	1	0.028
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Leptopecten sp	scallop, unid.	2	0.002
				5	0.032

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI30
Start Date: July 26, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Survey Totals Biomass (kg)
Shellfish	2				
		Hemigrapsus oregonensis	yellow shore crab	4	0.002
				4	0.002
	3				
		Hemigrapsus oregonensis	yellow shore crab	3	0.002
				3	0.002
	4				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.002
	5				
		Heptacarpus palpator	intertidal coastal shrimp	5	0.005
		Hemigrapsus oregonensis	yellow shore crab	18	0.018
		Octopus bimaculatus/bimaculoides	California two-spot octopus	2	0.259
				25	0.282
	6				
		Neotrypaea gigas	giant ghost shrimp	1	0.004
		Portunus xantusii	Xantus swimming crab	1	0.015
		Hemigrapsus oregonensis	yellow shore crab	1	0.002
		Pyromaia tuberculata	tuberculate pear crab	3	0.003
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.086
				7	0.110
Non-Shellfish	2				
		Aplysia californica	California seahare	2	0.856
		Haminoea sp	glassy bubble, unid.	2	0.002
				4	0.858
	3				
		None			
	4				
		Leptopecten sp	scallop, unid.	1	0.001
				1	0.001
	5				
		Phyllaplysia taylori	zebra leafslug	5	0.005
		Aplysia californica	California seahare	1	0.711
				6	0.716
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI31
Start Date: August 2, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	2				
		Hemigrapsus oregonensis	yellow shore crab	3	0.002
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				4	0.003
	3				
		Pyromaia tuberculata	tuberculate pear crab	2	0.002
				2	0.002
	5				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	7	0.004
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				9	0.006
	6				
		Hemigrapsus oregonensis	yellow shore crab	3	0.003
				3	0.003
Non-Shellfish	2				
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Aplysia californica	California seahare	1	0.972
				2	0.973
	3				
		Navanax inermis	California aglaja	1	0.021
				1	0.021
	4				
		None			
	5				
		Aplysia californica	California seahare	4	1.966
				4	1.966
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI32
Start Date: August 9, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	8	0.006
		Pyromaia tuberculata	tuberculate pear crab	8	0.006
				16	0.012
	2				
		Pachygrapsus crassipes	striped shore crab	1	0.018
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	5	0.005
		Pyromaia tuberculata	tuberculate pear crab	2	0.003
				9	0.027
	3				
		Hemigrapsus oregonensis	yellow shore crab	2	0.003
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				3	0.004
	4				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	5				
		Hemigrapsus oregonensis	yellow shore crab	5	0.006
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
		Octopus sp	octopus, unid.	1	0.001
				7	0.008
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.034
		Phyllaplysia taylori	zebra leafslug	2	0.002
				4	0.036
	2				
		Navanax inermis	California aglaja	1	0.012
				1	0.012
	3				
		Navanax inermis	California aglaja	1	0.052
		Aplysia californica	California seahare	3	0.291
				4	0.343
	4				
		None			
	5				
		None			
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate

Survey: HnGSFI33
Start Date: August 15, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	2	0.001
		Pyromaia tuberculata	tuberculate pear crab	6	0.003
				8	0.004
	2				
		Heptacarpus palpator	intertidal coastal shrimp	2	0.001
		Pyromaia tuberculata	tuberculate pear crab	2	0.001
		Octopus sp	octopus, unid.	2	0.001
				6	0.003
Non-Shellfish	1				
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Aplysia californica	California seahare	4	1.150
				5	1.151
	3				
		None			
	4				
		Haminoea virescens	green glassy bubble	1	0.001
				1	0.001
	5				
		None			
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI34
Start Date: August 23, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	5	0.005
		Pyromaia tuberculata	tuberculate pear crab	15	0.010
				20	0.015
	2				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.002
	3				
		Pyromaia tuberculata	tuberculate pear crab	2	0.002
				2	0.002
	5				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				2	0.002
	6				
		Portunus xantusii	Xantus swimming crab	1	0.002
		Hemigrapsus oregonensis	yellow shore crab	6	0.007
		Pyromaia tuberculata	tuberculate pear crab	10	0.001
				17	0.010
Non-Shellfish	1				
		Navanax inermis	California aglaja	5	0.010
				5	0.010
	2				
		Berthella californica	California sidegill slug	1	0.001
				1	0.001
	3				
		None			
	4				
		Polycera atra	orange-spike polycera	1	0.001
				1	0.001
	5				
		None			
	6				
		Aplysia californica	California seahare	1	0.423
				1	0.423

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI35
Start Date: August 30, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	2	0.002
		Pyromaia tuberculata	tuberculate pear crab	2	0.002
		Octopus bimaculatus/bimaculoides	California two-spot octopus	2	0.030
				6	0.034
	2				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	3				
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.223
				1	0.223
	5				
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.404
				1	0.404
	6				
		Neotrypaea gigas	giant ghost shrimp	1	0.002
				1	0.002
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.002
				2	0.002
	2				
		Polyorchis penicillatus	red jellyfish	1	0.002
		Phyllaplysia taylori	zebra leafslug	1	0.001
		Diaulula sandiegensis	ring-spotted dorid	1	0.011
				3	0.014
	3				
		Navanax inermis	California aglaja	1	0.001
				1	0.001
	4				
		None			
	5				
		None			
	6				
		Navanax inermis	California aglaja	1	0.001
				1	0.001

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI36
Start Date: September 6, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	10	0.010
		Pyromaia tuberculata	tuberculate pear crab	30	0.020
		Octopus bimaculatus/bimaculoides	California two-spot octopus	10	0.050
				50	0.080
	2				
		Portunus xantusii	Xantus swimming crab	2	0.002
		Pyromaia tuberculata	tuberculate pear crab	6	0.004
				8	0.006
	3				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	6				
		Portunus xantusii	Xantus swimming crab	1	0.002
		Hemigrapsus oregonensis	yellow shore crab	2	0.004
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.319
		Pugettia producta	northern kelp crab	1	0.002
				5	0.327
Non-Shellfish	3				
		None			
	4				
		None			
	5				
		Aplysia californica	California seahare	1	0.464
				1	0.464
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI37
Start Date: September 13, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	8	0.008
				8	0.008
	2				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	3				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	5				
		Hemigrapsus oregonensis	yellow shore crab	1	0.002
				1	0.002
	6				
		Portunus xantusii	Xantus swimming crab	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				2	0.002
Non-Shellfish	3				
		Haminoea virescens	green glassy bubble	1	0.003
				1	0.003
	4				
		Diaulula sandiegensis	ring-spotted dorid	1	0.006
				1	0.006
	5				
		Navanax inermis	California aglaja	1	0.012
		Haminoea virescens	green glassy bubble	1	0.004
				2	0.016
	6				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	1	0.001
		Phyllaplysia taylori	zebra leafslug	1	0.001
				3	0.003

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI38
Start Date: September 20, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	5	0.005
				5	0.005
	5				
		Portunus xantusii	Xantus swimming crab	2	0.002
		Hemigrapsus oregonensis	yellow shore crab	1	0.002
				3	0.004
	6				
		Portunus xantusii	Xantus swimming crab	3	0.012
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.657
				4	0.669
Non-Shellfish	2				
		Hermissenda crassicornis	hermissenda	3	0.001
				3	0.001
	3				
		None			
	4				
		None			
	5				
		None			
	6				
		Diaulula sandiegensis	ring-spotted dorid	1	0.009
				1	0.009

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI39
Start Date: September 27, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	5	0.005
		Pyromaia tuberculata	tuberculate pear crab	10	0.005
		Octopus bimaculatus/bimaculoides	California two-spot octopus	5	0.015
				20	0.025
	2				
		Hemigrapsus oregonensis	yellow shore crab	2	0.002
				2	0.002
	6				
		Portunus xantusii	Xantus swimming crab	5	0.022
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.183
				6	0.205
Non-Shellfish	2				
		Hermissenda crassicornis	hermissenda	14	0.001
		Navanax inermis	California aglaja	1	0.001
		Aurelia aurita	moon jelly	1	0.097
				16	0.099
	3				
		Hermissenda crassicornis	hermissenda	1	0.001
				1	0.001
	4				
		None			
	5				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	1	0.002
		Aurelia aurita	moon jelly	1	0.066
		Leptopecten sp	scallop, unid.	1	0.001
		Haminoea virescens	green glassy bubble	2	0.005
				6	0.075
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate

Survey: HnGSFI40
Start Date: October 4, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	10	0.010
				10	0.010
	5				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pugettia producta	northern kelp crab	1	0.001
				2	0.002
Non-Shellfish	2				
		Hermissenda crassicornis	hermissenda	3	0.001
		Navanax inermis	California aglaja	16	0.052
				19	0.053
	3				
		Aurelia aurita	moon jelly	1	0.086
		Kelletia kelletii	Kellet's whelk	1	0.004
				2	0.090
	4				
		None	None		
	5				
		Navanax inermis	California aglaja	3	0.031
		Aurelia aurita	moon jelly	2	0.508
		Leptopecten sp	scallop, unid.	2	0.002
				7	0.541

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI41
Start Date: October 11, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Pyromaia tuberculata	tuberculate pear crab	3	0.001
		Octopus bimaculatus/bimaculoides	California two-spot octopus	2	0.014
				6	0.016
	3				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	6				
		Portunus xantusii	Xantus swimming crab	1	0.007
		Hemigrapsus oregonensis	yellow shore crab	4	0.002
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.642
				6	0.651
Non-Shellfish	1				
		Navanax inermis	California aglaja	9	0.025
		Aurelia aurita	moon jelly	1	0.046
				10	0.071
	2				
		Hermissenda crassicornis	hermissenda	1	0.001
		Polyorchis penicillatus	red jellyfish	2	0.013
		Polycera atra	orange-spike polycera	1	0.001
				4	0.015
	3				
		Navanax inermis	California aglaja	2	0.009
		Leptopecten sp	scallop, unid.	1	0.001
				3	0.010
	4				
		None			
	5				
		None			
	6				
		Navanax inermis	California aglaja	2	0.022
		Polyorchis penicillatus	red jellyfish	3	0.040
		Leptopecten sp	scallop, unid.	1	0.001
				6	0.063

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate

Survey: HnGSFI42
Start Date: October 18, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				1	0.001
	3				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	6				
		Portunus xantusii	Xantus swimming crab	1	0.005
		Hemigrapsus oregonensis	yellow shore crab	2	0.002
				3	0.007
Non-Shellfish	1				
		Navanax inermis	California aglaja	1	0.002
				1	0.002
	2				
		None			
	3				
		None			
	4				
		None			
	5				
		None			
	6				
		Navanax inermis	California aglaja	2	0.019
		Aurelia aurita	moon jelly	1	0.257
		Polyorchis penicillatus	red jellyfish	1	0.005
		Aplysia californica	California seahare	1	0.064
				5	0.345

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI43
Start Date: October 25, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	2	0.001
		Octopus bimaculatus/bimaculoides	California two-spot octopus	2	0.227
		Pugettia producta	northern kelp crab	1	0.002
				5	0.230
	6				
		Portunus xantusii	Xantus swimming crab	4	0.050
		Hemigrapsus oregonensis	yellow shore crab	3	0.003
				7	0.053
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.024
		Leptopecten sp	scallop, unid.	2	0.001
		Aplysia californica	California seahare	1	0.116
				5	0.141
	2				
		Aurelia aurita	moon jelly	1	0.266
				1	0.266
	3				
		Navanax inermis	California aglaja	1	0.024
				1	0.024
	4				
		None			
	5				
		None			
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI44
Start Date: November 1, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Pyromaia tuberculata	tuberculate pear crab	1	0.001
				1	0.001
	2				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
				1	0.001
	6				
		Portunus xantusii	Xantus swimming crab	3	0.034
		Hemigrapsus oregonensis	yellow shore crab	7	0.006
		Lysmata californica	red rock shrimp	1	0.001
				11	0.041
Non-Shellfish	1				
		Navanax inermis	California aglaja	3	0.004
		Leptopecten sp	scallop, unid.	1	0.001
		Strongylocentrotus purpuratus	purple sea urchin	1	0.021
				5	0.026
	2				
		Navanax inermis	California aglaja	1	0.018
		Aurelia aurita	moon jelly	5	0.616
				6	0.634
	3				
		Navanax inermis	California aglaja	1	0.004
		Diaulula sandiegensis	ring-spotted dorid	1	0.023
				2	0.027
	4				
		Polyorchis penicillatus	red jellyfish	1	0.013
				1	0.013
	5				
		None			
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI45
Start Date: November 8, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Portunus xantusii	Xantus swimming crab	2	0.025
		Hemigrapsus oregonensis	yellow shore crab	3	0.002
				5	0.027
	3				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				2	0.002
	6				
		Portunus xantusii	Xantus swimming crab	3	0.030
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	4	0.002
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.323
				9	0.356
Non-Shellfish	1				
		Navanax inermis	California aglaja	4	0.016
				4	0.016
	2				
		Leptopecten sp	scallop, unid.	1	0.001
				1	0.001
	3				
		Navanax inermis	California aglaja	2	0.003
				2	0.003
	4				
		Leptopecten sp	scallop, unid.	1	0.001
				1	0.001
	5				
		None			
	6				
		Navanax inermis	California aglaja	1	0.005
		Diaulula sandiegensis	ring-spotted dorid	1	0.017
				2	0.022

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI46
Start Date: November 15, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.002
				3	0.004
	2				
		Heptacarpus palpator	intertidal coastal shrimp	2	0.001
				2	0.001
	6				
		Portunus xantusii	Xantus swimming crab	3	0.045
		Hemigrapsus oregonensis	yellow shore crab	2	0.001
				5	0.046
Non-Shellfish	1				
		Aurelia aurita	moon jelly	1	0.014
		Pisaster sp	sea star, unid.	1	0.002
				2	0.016
	2				
		Navanax inermis	California aglaja	1	0.003
		Polyorchis penicillatus	red jellyfish	1	0.002
		Leptopecten sp	scallop, unid.	2	0.001
				4	0.006
	3	None			
	4	None			
	5	None			
	6	None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI47
Start Date: November 20, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	2				
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.004
				1	0.004
	6				
		Portunus xantusii	Xantus swimming crab	7	0.103
		Hemigrapsus oregonensis	yellow shore crab	9	0.007
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.730
		Pugettia producta	northern kelp crab	2	0.026
				19	0.866
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.026
		Leptopecten sp	scallop, unid.	1	0.001
				3	0.027
	2				
		Polyorchis penicillatus	red jellyfish	1	0.001
		Leptopecten sp	scallop, unid.	2	0.001
				3	0.002
	3				
		None			
	4				
		None			
	5				
		None			
	6				
		Leptopecten sp	scallop, unid.	3	0.003
				3	0.003

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI48
Start Date: November 29, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	6				
		Portunus xantusii	Xantus swimming crab	3	0.029
		Hemigrapsus oregonensis	yellow shore crab	6	0.004
				9	0.033
Non-Shellfish	1				
		Leptopecten sp	scallop, unid.	1	0.001
				1	0.001
	2				
		Leptopecten sp	scallop, unid.	1	0.001
				1	0.001
	3				
		Diaulula sandiegensis	ring-spotted dorid	1	0.022
				1	0.022
	4				
		None			
	5				
		None			
	6				
		Diaulula sandiegensis	ring-spotted dorid	1	0.027
				1	0.027

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI49
Start Date: December 6, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	2				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
				1	0.001
	5				
		Portunus xantusii	Xantus swimming crab	2	0.051
		Heptacarpus palpator	intertidal coastal shrimp	2	0.001
		Hemigrapsus oregonensis	yellow shore crab	2	0.001
				6	0.053
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.001
		Leptopecten sp	scallop, unid.	3	0.003
		Dendrodoris fulva	yellow prorostome	1	0.001
				6	0.005
	2				
		Hermissenda crassicornis	hermissenda	1	0.001
		Navanax inermis	California aglaja	1	0.012
				2	0.013
	3				
		Navanax inermis	California aglaja	2	0.049
				2	0.049
	4				
		None			
	5				
		Navanax inermis	California aglaja	2	0.025
		Aurelia aurita	moon jelly	1	0.267
				3	0.292
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI50
Start Date: December 13, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Portunus xantusii	Xantus swimming crab	2	0.047
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.281
				3	0.328
	2				
		Heptacarpus palpator	intertidal coastal shrimp	3	0.001
				3	0.001
	3				
		Portunus xantusii	Xantus swimming crab	1	0.014
				1	0.014
	5				
		Portunus xantusii	Xantus swimming crab	2	0.064
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.289
				3	0.353
Non-Shellfish	1				
		Diaulula sandiegensis	ring-spotted dorid	1	0.010
				1	0.010
	2				
		Navanax inermis	California aglaja	2	0.026
		Diaulula sandiegensis	ring-spotted dorid	1	0.016
				3	0.042
	3				
		None			
	4				
		Navanax inermis	California aglaja	1	0.031
				1	0.031
	5				
		Navanax inermis	California aglaja	1	0.009
		Leptopecten sp	scallop, unid.	2	0.002
				3	0.011
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI51
Start Date: December 20, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Heptacarpus palpator	intertidal coastal shrimp	18	0.003
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
		Octopus bimaculatus/bimaculoides	California two-spot octopus	2	0.624
		Pugettia producta	northern kelp crab	1	0.001
		Neotrypaea californiensis	bay ghost shrimp	1	0.001
				23	0.630
	2				
		Portunus xantusii	Xantus swimming crab	1	0.008
				1	0.008
	3				
		Octopus bimaculatus/bimaculoides	California two-spot octopus	1	0.323
				1	0.323
	4				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
				1	0.001
	5				
		Portunus xantusii	Xantus swimming crab	3	0.067
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				4	0.068
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.006
				2	0.006
	3				
		None			
	4				
		None			
	5				
		Navanax inermis	California aglaja	4	0.064
		Polyorchis penicillatus	red jellyfish	1	0.019
				5	0.083
	6				
		None			

Haynes Generating Station - Normal Operation Impingement Data - Invertebrate
Survey: HnGSFI52
Start Date: December 27, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Portunus xantusii	Xantus swimming crab	2	0.042
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
				3	0.043
	2				
		Portunus xantusii	Xantus swimming crab	1	0.012
		Heptacarpus palpator	intertidal coastal shrimp	2	0.001
				3	0.013
	5				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Pugettia producta	northern kelp crab	1	0.003
				2	0.004
Non-Shellfish	1				
		Navanax inermis	California aglaja	2	0.008
		Polyorchis penicillatus	red jellyfish	1	0.007
		Aplysia californica	California seahare	1	0.950
				4	0.965
	2				
		Navanax inermis	California aglaja	1	0.021
		Leptopecten sp	scallop, unid.	1	0.001
				2	0.022
	3				
		None			
	4				
		None			
	5				
		Navanax inermis	California aglaja	1	0.026
				1	0.026
	6				
		None			

Haynes Generating Station - Heat Treatment Impingement Data - Invertebrate
Survey: HnGSHT1
Start Date: March 7, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	1				
		Pachygrapsus crassipes	striped shore crab	1	0.007
				1	0.007

Haynes Generating Station - Heat Treatment Impingement Data - Invertebrate

Survey: HnGSHT2
Start Date: May 10, 2006

				Survey Totals	
	Unit	Taxon	Common Name	Abundance	Biomass (kg)
Shellfish	2				
		None			

Haynes Generating Station - Heat Treatment Impingement Data - Invertebrate
Survey: HnGSHT3
Start Date: August 21, 2006

				Survey Totals	
	Unit	Taxon	Common Name	Abundance	Biomass (kg)
Shellfish	5				
		Heptacarpus palpator	intertidal coastal shrimp	1	0.001
		Hemigrapsus oregonensis	yellow shore crab	1	0.001
				2	0.002
Non-Shellfish	5				
		Navanax inermis	California aglaja	1	0.004
				1	0.004

Haynes Generating Station - Heat Treatment Impingement Data - Invertebrate

Survey: HnGSHT4
Start Date: August 22, 2006

				Survey Totals	
	Unit	Taxon	Common Name	Abundance	Biomass (kg)
Shellfish	2				
		None			

Haynes Generating Station - Heat Treatment Impingement Data - Invertebrate
Survey: HnGSHT5
Start Date: November 14, 2006

	Unit	Taxon	Common Name	Survey Totals Abundance	Biomass (kg)
Shellfish	2				
		Octopus bimaculatus/bimaculoides	California two-spot octopus	2	0.075
				2	0.075

Haynes Generating Station

Appendix F

Master Species Lists

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.

Taxa Name	Taxon	Common Name
Cephalopoda	*Loligo opalescens*	market squid
Decapoda	unidentified crab (megalops)	unid. crab megalops
Palinuridae	*Panulirus interruptus*	California spiny lobster
	Panulirus interruptus (phyllosome)	California spiny lobster (larval)
Paguridae	Paguridae unid. (megalops)	hermit crab megalops
Porcellanidae	*Pachycheles rudis* (megalops)	thickclaw porcelain crab megalops
	Pachycheles spp. (megalops)	porcelain crabs megalops
	Petrolisthes spp. (megalops)	porcelain crab megalops
	Porcellanidae unid. (megalops)	porcelain crab megalops
Hippoidea	Hippoidea (megalops)	mole crab megalops
Diogenidae	Diogenidae (megalops)	left-handed hermit crabs megalops
Brachyura	Brachyura unid. (megalops)	unidentified crab megalops
Majidae	*Loxorhynchus* spp.	spider crabs
	Pugettia spp. (megalops)	kelp crabs megalops
Cancridae	*Cancer antennarius* (megalops)	brown rock crab megalops
	Cancer anthonyi (megalops)	yellow crab megalops
	Cancer gracilis (megalops)	slender crab megalops
	Cancer spp. (megalops)	cancer crabs megalops
Xanthidae	*Lophopanopeus* spp. (megalops)	black-clawed crab megalops
Pinnotheridae	*Pinnixa* spp. (megalops)	pea crabs megalops
	Pinnotheres spp. (megalops)	pea crab megalops
Grapsidae	Grapsidae unid. (megalops)	shore crab megalops
	Hemigrapsus oregonensis (megalops)	yellow shore crab megalops
	Hemigrapsus spp. (megalops)	shore crab megalops
	Pachygrapsus crassipes (megalops)	striped shore crab megalops
Actinopterygii	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
	unidentified fish, damaged	unidentified damaged fish
Acanthopterygii	Sciaenidae / Paralichthyidae / Labridae (eggs)	fish eggs
Clupeiformes	Clupeiformes unid.	herrings and anchovies
Clupeidae	*Sardinops sagax*	Pacific sardine
Engraulidae	Engraulidae unid.	anchovies
	Engraulidae unid. (eggs)	anchovy eggs

(table continued)

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

Taxa Name	Taxon	Common Name
Engraulidae	*Engraulis mordax*	northern anchovy
Bathylagidae	*Bathylagus ochotensis*	popeye blacksmelt
Myctophidae	Myctophidae unid.	lanternfishes
	Stenobrachius leucopsarus	northern lampfish
	Triphoturus mexicanus	Mexican lampfish
Gobiesocidae	Gobiesocidae unid.	clingfishes
	Gobiesox spp.	clingfishes
Merlucciidae	*Merluccius productus*	Pacific hake
Ophidiidae	Ophidiidae unid.	cusk-eels
	Ophidion scrippsae	basketweave cusk-eel
Atherinopsidae	*Atherinops affinis*	topsmelt
	Atherinops affinis (eggs)	topsmelt eggs
	Atherinopsidae unid.	silversides
	Atherinopsidae unid. (eggs)	silverside eggs
	Atherinopsis californiensis	jacksmelt
	Leuresthes tenuis	California grunion
Syngnathidae	*Syngnathus leptorhynchus*	bay pipefish
	Syngnathus spp.	pipefishes
Scorpaenidae	Scorpaenidae unid.	scorpionfishes
	Sebastes spp.	rockfishes
Hexagrammidae	Hexagrammidae unid.	greenlings
	Oxylebius pictus	painted greenling
	Zaniolepis frenata	shortspine combfish
Cottidae	*Artedius lateralis*	smoothhead sculpin
	Clinocottus analis	wooly sculpin
	Clinocottus spp.	sculpins
	Cottidae unid.	sculpins
	Icelinus quadriseriatus	yellowchin sculpin
	Leptocottus armatus	Pacific staghorn sculpin
	Ruscarius creaseri	roughcheek sculpin
	Scorpaenichthys marmoratus	cabezon
Serranidae	*Paralabrax* spp.	sand bass
Haemulidae	Haemulidae unid.	grunts
	Xenistius californiensis	salema
Sciaenidae	*Cheilotrema saturnum*	black croaker
	Genyonemus lineatus	white croaker
	Genyonemus lineatus (eggs)	white croaker eggs
	Menticirrhus undulatus	California corbina
	Roncador stearnsii	spotfin croaker
	Sciaenidae unid.	croakers
	Sciaenidae unid. (eggs)	croaker eggs
	Seriphus politus	queenfish

(table continued)

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

Taxa Name	Taxon	Common Name
Sciaenidae	*Umbrina roncador*	yellowfin croaker
Kyphosidae	*Girella nigricans*	opaleye
Pomacentridae	*Hypsypops rubicundus*	garibaldi
	Pomacentridae unid.	damselfishes
Sphyraenidae	*Sphyraena argentea*	Pacific barracuda
Labridae	*Halichoeres semicinctus*	rock wrasse
	Labridae unid. (eggs)	wrasse eggs
	Oxyjulis californica	senorita
	Semicossyphus pulcher	California sheephead
Blenniidae	Blenniidae (eggs)	blenny eggs
	Hypsoblennius jenkinsi	mussel blenny
	Hypsoblennius spp.	combtooth blennies
Clinidae	Blennioidei unid.	blennies
	Gibbonsia spp.	clinid kelpfishes
	Heterostichus rostratus	giant kelpfish
	Paraclinus spp.	clinid
Chaenopsidae	Chaenopsidae unid.	tube blennies
	Neoclinus spp.	fringeheads
Labrisomidae	Labrisomidae unid.	labrisomid blennies
Gobiidae	*Acanthogobius flavimanus*	yellowfin goby
	Clevelandia ios	arrow goby
	Gillichthys mirabilis	longjaw mudsucker
	Gobiidae unid.	gobies
	Ilypnus gilberti	cheekspot goby
	Lepidogobius lepidus	bay goby
	Rhinogobiops nicholsii	blackeye goby
	Typhlogobius californiensis	blind goby
Stromateidae	*Peprilus simillimus*	Pacific butterfish
Pleuronectiformes	Pleuronectiformes unid.	flatfishes
Pleuronectidae	*Parophrys vetulus*	English sole
	Pleuronectidae unid.	righteye flounders
	Pleuronichthys guttulatus	diamond turbot
	Pleuronichthys ritteri	spotted turbot
	Pleuronichthys spp.	turbots
	Pleuronichthys spp. (eggs)	turbot eggs
	Pleuronichthys verticalis	hornyhead turbot
Paralichthyidae	*Citharichthys sordidus*	Pacific sanddab
	Citharichthys spp.	sanddabs
	Citharichthys spp. (eggs)	sanddab eggs
	Citharichthys stigmaeus	speckled sanddab
	Paralichthyidae unid.	sand flounders
	Paralichthyidae unid. (eggs)	sand flounder eggs

(table continued)

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

Taxa Name	Taxon	Common Name
Paralichthyidae	*Paralichthys californicus*	California halibut
	Paralichthys californicus (eggs)	California halibut eggs
Cynoglossidae	Cynoglossidae unid.	tongue soles
	Symphurus atricaudus	California tonguefish

Appendix F2

Master Species List of Invertebrates Identified in Impingement Samples

Family	Taxon	Common Name
Cnidaria	Cnidaria	sea jelly, unid.
Polyorchidae	*Polyorchis haplus*	polyorchid jellyfish, unnamed
	Polyorchis penicillatus	red jellyfish
Pelagiidae	*Chrysaora colorata*	purple-striped jellyfish
Ulmaridae	*Aurelia aurita*	moon jelly
Gastropoda	Gastropoda	gastropod, unid.
	Nudibranchia	nudibranch, unid.
Calyptraeidae	*Crepidula onyx*	onyx slippersnail
Muricidae	*Ceratostoma nuttalli*	Nuttall's thornmouth
Buccinidae	*Kelletia kelletii*	Kellet's whelk
Aplysiidae	*Aplysia californica*	California seahare
	Aplysia spp.	seahare, unid.
	Phyllaplysia taylori	zebra leafslug
Bullidae	*Bulla gouldiana*	California bubble
Haminoeidae	*Haminoea* spp.	glassy bubble, unid.
	Haminoea virescens	green glassy bubble
Aglajidae	*Navanax inermis*	California aglaja
Philinidae	*Philine auriformis*	New Zealand snail
Pleurobranchidae	*Berthella californica*	California sidegill slug
Discodorididae	*Diaulula sandiegensis*	ring-spotted dorid
Onchidorididae	*Acanthodoris rhodoceras*	black-tipped spiny doris
Polyceratidae	*Triopha maculata*	spotted triopha
Polyceridae	*Polycera atra*	orange-spike polycera
	Polycera hedgpethi	Hedgpeth's polycera
Dendrodorididae	*Dendrodoris fulva*	yellow prorostome
Dendronotidae	*Dendronotus frondosus*	leafy dendronotid
	Dendronotus iris	giant-frond-aeolis
	Dendronotus subramosus	stubby dendronotus
Dironidae	*Dirona picta*	spotted dirona
Flabellinidae	*Flabellina iodinea*	Spanish shawl
	Flabellina trilineata	threeline aeolis
Facelinidae	*Hermissenda crassicornis*	hermissenda
Aeolidiidae	*Aeolidia papillosa*	shag-rug aeolis
Pectindae	*Argopecten ventricosus*	Pacific calico scallop
	Leptopecten spp.	scallop, unid.

(table continued)

Family	Taxon	Common Name
Loliginidae	*Loligo opalescens*	California market squid
Octopodidae	*Octopus bimaculatus/bimaculoides*	California two-spot octopus
	Octopus spp.	octopus, unid.
Hippolytidae	*Heptacarpus palpator*	intertidal coastal shrimp
	Heptacarpus paludicola	California coastal shrimp
	Lysmata californica	red rock shrimp
Crangonidae	*Crangon nigromaculata*	blackspotted bay shrimp
Callianassidae	*Neotrypaea californiensis*	bay ghost shrimp
	Neotrypaea gigas	giant ghost shrimp
Majidae	*Pyromaia tuberculata*	tuberculate pear crab
Epialtidae	*Pugettia producta*	northern kelp crab
Cancridae	*Cancer anthonyi*	yellow crab
Portunidae	*Portunus xantusii*	Xantus swimming crab
Grapsidae	*Hemigrapsus nudus*	purple shore crab
	Hemigrapsus oregonensis	yellow shore crab
	Hemigrapsus spp.	shore crab, unid.
	Pachygrapsus crassipes	striped shore crab
Asterinidae	*Pisaster* spp.	sea star, unid.
Strongylocentrotidae	*Strongylocentrotus purpuratus*	purple sea urchin
Molpadiidae	*Molpadia intermedia*	unnamed sea cucumber

Appendix F3

Master Species List of fishes identified in the impingement samples.

Family	Taxon	Common Name
(Chondrichthyes)		cartilaginous fishes
Triakidae	*Mustelus californicus*	gray smoothhound
Torpedinidae	*Torpedo californica*	Pacific electric ray
Rhinobatidae	*Rhinobatos productus*	shovelnose guitarfish
Rajidae	*Raja inornata*	California skate
Urolophidae	*Urobatis halleri*	round stingray
Myliobatidae	*Myliobatis californica*	bat ray
(Actinopeterygii)		ray-finned fishes
Ophichthidae	*Ophichthus zophochir*	yellow snake eel
Engraulidae	*Anchoa compressa*	deepbody anchovy
	Anchoa delicatissima	slough anchovy
	Anchoa spp.	deepbody/slough anchovy, unid.
	Engraulis mordax	northern anchovy
	Engraulis mordax larvae	northern anchovy larvae
Clupeidae	*Sardinops sagax*	Pacific sardine
Synodontidae	*Synodus lucioceps*	California lizardfish
Ophididae	*Ophidion scrippsae*	basketweave cusk-eel
Batrachoididae	*Porichthys myriaster*	specklefin midshipman
	Porichthys notatus	plainfin midshipman
	Porichthys spp.	midshipman, unid.
Atherinopsidae	*Atherinops affinis*	topsmelt
	Atherinopsidae	silverside, unid.
	Atherinopsis californiensis	jacksmelt
	Leuresthes tenuis	California grunion
Fundulidae	*Fundulus parvipinnis*	California killifish
Syngnathidae	*Syngnathus californiensis*	kelp pipefish
	Syngnathus leptorhynchus	bay pipefish
	Syngnathus spp.	pipefish, unid.
Scorpaenidae	*Sebastes miniatus*	vermilion rockfish
Cottidae	Cottidae	sculpin, unid.
	Leptocottus armatus	Pacific staghorn sculpin
Agonidae	*Odontopyxis trispinosa*	pygmy poacher
Carangidae	*Trachurus symmetricus*	jack mackerel
Haemulidae	*Anisotremus davidsonii*	sargo
	Xenistius californiensis	salema

(table continued)

Family	Taxon	Common Name
Sciaenidae	*Cheilotrema saturnum*	black croaker
	Genyonemus lineatus	white croaker
	Seriphus politus	queenfish
	Umbrina roncador	yellowfin croaker
Embiotocidae	*Cymatogaster aggregata*	shiner perch
	Embiotoca jacksoni	black perch
	Hyperprosopon argenteum	walleye surfperch
	Phanerodon furcatus	white seaperch
Labrisomidae	*Paraclinus integripinnis*	reef finspot
Clinidae	Clinidae	kelp blenny, unid.
	Gibbonsia elegans	spotted kelpfish
	Gibbonsia metzi	striped kelpfish
	Heterostichus rostratus	giant kelpfish
Blennidae	*Hypsoblennius gilberti*	rockpool blenny
	Hypsoblennius jenkinsi	mussel blenny
Gobiesocidae	Gobiesocidae	clingfish, unid.
	Gobiesox rhessodon	California clingfish
Gobiidae	*Gillichthys mirabilis*	longjaw mudsucker
	Ilypnus gilberti	cheekspot goby
Sphyraenidae	*Sphyraena argentea*	Pacific barracuda
Stromateidae	*Peprilus simillimus*	Pacific pompano
Paralichthyidae	*Citharichthys stigmaeus*	speckled sanddab
	Paralichthys californicus	California halibut
Pleuronectidae	*Pleuronichthys guttulatus*	diamond turbot
	Pleuronichthys ritteri	spotted turbot
	Pleuronichthys verticalis	hornyhead turbot
Cynoglossidae	*Symphurus atricaudus*	California tonguefish