4.10 OCEAN WATER QUALITY AND MARINE BIOLOGICAL RESOURCES

This section analyzes potential sources of contamination of ocean water in the vicinity of the Huntington Beach Generating Station (HBGS) intake to determine the quality of water that will enter the desalination facility. In addition, impacts to the local marine biology caused by the discharge of concentrated seawater, impingement, and entrainment are assessed. Impacts are analyzed for both the co-located and stand-alone scenarios of the desalination facility operation. Impacts to water quality from local contaminant sources would be the same for both operation scenarios.

Information in this section was compiled from the *Hydrodynamic Modeling of Source Water Make-Up and Concentrated Seawater Dilution for the Ocean Desalination Project at the AES Huntington Beach Generating Station* (Appendix K, Hydrodynamic Modeling Report), prepared in 2004 and supplemented in 2010 by Dr. Scott A. Jenkins Consulting; *Salinity Tolerance Investigation: a Supplemental Report Prepared for the Huntington Beach, CA Desalination Project*, prepared by Steven D. Le Page (2004); *Watershed Sanitary Survey Report* (Appendix L, Watershed Sanitary Survey), prepared by Archibald & Wallberg Consultants in 2002; the California Ocean Plan (2005) prepared by the State Water Resources Control Board (2001); *Huntington Beach Desalination Facility Intake Effects Assessment* (2004) and *Poseidon Resources Huntington Beach Desalination Facility Entrainment and Impingement Effects from Operation of the Huntington Beach Desalination Facility in Standalone Mode* (2010) prepared by Tenera Environmental (Appendix M, Intake Effects Assessment); *Evaluation of a Report on Receiving Water Chemistry and Quality Issues Related to the Operation of a Reverse Osmosis Desalination Facility at the Huntington Beach Power Generating Station* (Appendix N, Receiving Water Chemistry and Quality Report) prepared in 2004 and supplemented in 2010 by Jeffrey B. Graham, Ph.D.; *Marine Biological Considerations Related to the Reverse Osmosis Desalination Project at the Applied Energy Sources Huntington Beach Generating Station* and *Biological Implications of a "Stand Alone" Operational Mode for the Desalination Plant at Huntington Beach, CA* (Appendix O, Marine Biological Considerations), prepared in 2004 and 2010 by Jeffrey B. Graham, Ph.D.; Existing Conditions for the Proposed Poseidon Desalination Project at Huntington Beach, California and the Effects of a Concentrated Seawater Discharge on the Marine Environment of Huntington Beach, California letter reports prepared by MBC Applied Environmental Services in 2001 and 2002 (Appendix P, Marine Biological Analysis). It should be noted that some of the studies documenting existing conditions in the marine environment span several years and even decades, in part to record multiple years of data for specific analyses. In most cases, data from older studies are still relevant and are therefore referenced in this analysis.

EXISTING CONDITIONS

OCEAN WATER QUALITY

The Pacific Ocean is located approximately 2,000 feet south of the project site, along Huntington State and Huntington City beaches. Source water for the proposed desalination facility will be taken from the existing condenser cooling water circulation system from the Huntington Beach Generating Station facility (HBGS). Up to 514 million gallons per day (MGD) of cooling seawater presently flows to the HBGS through an existing ocean water intake structure located approximately 1,840 feet offshore. The Santa Ana River flows into the Pacific Ocean approximately 8,300 feet from the HBGS intake, while the Talbert Channel discharges into the ocean approximately 1,300 feet upcoast (northwest) from the mouth of the Santa Ana River. The Orange County Sanitation District (OCSD) deep ocean sewage outfall is located five miles offshore of the Santa Ana River at a depth of 195 feet (refer to Figure 4.10-1, *LOCATION MAP OF LOCAL SURFACE AND WASTEWATER DISCHARGES*). Bacteria levels are the primary Pacific Ocean water quality concern in the project vicinity.

Natural water temperatures in the Pacific Ocean fluctuate throughout the year in response to seasonal and diurnal variations in currents as well as meteorological factors such as wind, air temperature, relative humidity, cloud cover, ocean waves, and turbulence. Diurnally, natural surface water temperatures generally vary one to two degrees celsius in the summer and 0.3 to one degree celsius in the winter. Reasonably sharp thermoclines (differences between surface and bottom water temperatures) are known to occur in the nearshore waters of Huntington Beach at a depth of 12 to 15 meters during the summer, and are typically absent during the winter. Salinities in the area are fairly uniform and normally range from 33.0 to 34.0 parts per thousand (ppt), while levels of dissolved oxygen range from approximately five to 13 milligrams per liter (mg/L).

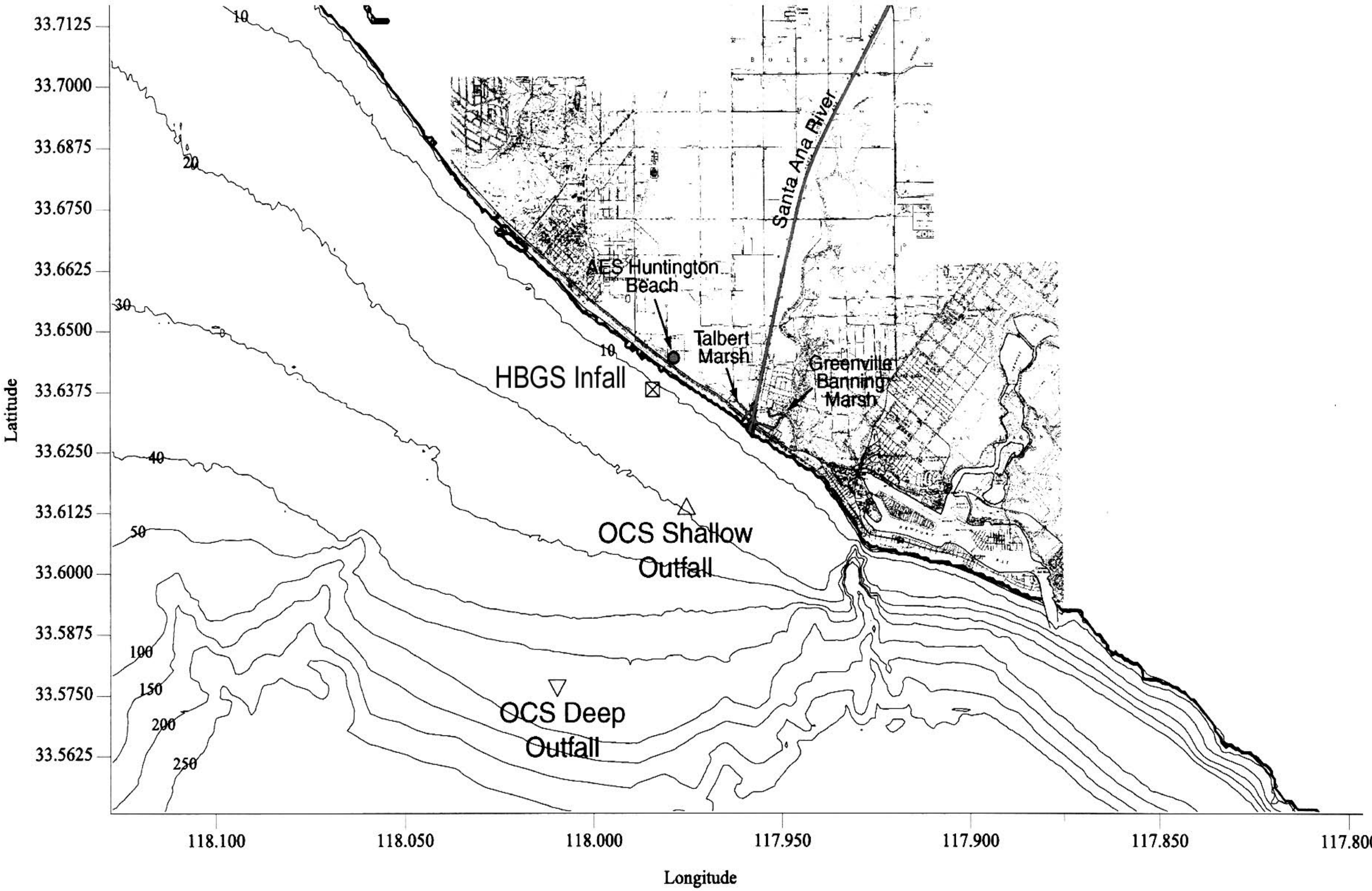
There have been three reported beach closures in Huntington Beach since 2005. The closures have been due to levels of bacteria in the surf zone that have exceeded the State standard. Earlier closures prompted a series of studies in order to find the source of contamination that is causing bacteria levels in the surf zone to exceed State standards. A review of multiple studies conducted finds HBGS is not the source of bacteria in the surf zone. A discussion of bacteria in the ocean surrounding the subject site is discussed in APPENDIX Q, Huntington Beach Surf Zone Studies.

POTENTIAL SOURCES OF CONTAMINATION IN PROXIMITY TO THE HBGS INTAKE

There are a number of discharges and potential sources of contaminants in the vicinity of the HBGS intake (which will be the source of water for the proposed desalination facility). These potential contaminant sources were investigated to determine the quality of water that will enter the desalination facility. A hydrodynamic modeling study was conducted by oceanographers at the Scripps Institution of Oceanography in 2005, and subsequently updated in 2010. That study, in conjunction with a study that considered potential sources of contaminants in the vicinity of the HBGS intake, is referenced in this discussion to determine if existing contaminant sources could affect the quality of water at the generating station intake. Appendix L, Watershed Sanitary Survey contains a more thorough discussion of each of the potential contaminant sources, and Appendix K, Hydrodynamic Modeling Report, contains a detailed discussion of the modeling results.

<u>OCSD Wastewater Discharge</u>

Although disinfection of the OCSD effluent reduces bacteria in the discharge to the level of beach standards in the zone of initial dilution established for the OCSD outfall, the potential for the OCSD discharge to impact water quality for other constituents at the intake of the HBGS was investigated. OCSD discharges a mix of primary and secondary treated wastewater at an outfall that is located 4.5 miles offshore at a depth of 195 feet. The OCSD outfall is located southeast of the HBGS intake (refer to Figure 4.10-1, Location Map of Local Surface and Wastewater Discharges).



SOURCE: Archibald and Wallberg 2002

FIGURE 4.10-1

Location Map of Local Surface and Wastewater Discharges

6483-01

MAY 2010

Seawater Desalination Project At Huntington Beach

Z:\Projects\j648301\MAPDOC\MAPS\SEIR

INTENTIONALLY LEFT BLANK

Under normal oceanographic conditions, the HBGS intake and OCSD discharge are segregated in two different water masses by ocean thermal stratification, with no appreciable exchange between those water masses. Currents generally flow downcoast (i.e. southeast) from the OCSD outfall. The OCSD wastewater discharge would have the greatest potential to impact water quality at the HBGS intake with summer El Nino conditions when net transport by waves and currents is upcoast toward the HBGS intake. A modeling study was conducted to determine if OCSD discharge could potentially affect water quality at the intake of the generating station (the results of the modeling study are discussed below, under Impacts).

Urban Stormwater Runoff

The Santa Ana River and Talbert Marsh (located southeast of the HBGS intake) are known sources of fecal indicator bacteria to the surf zone during storm events. A modeling study was conducted to determine if these two sources could potentially affect water quality at the intake of the generating station (the results of the modeling study are discussed below, under Impacts).

Storm water discharges from the Santa Ana River and Talbert Marsh would have the greatest potential to impact water quality at the HBGS intake if an extreme storm event coincided with an El Nino winter and maximum pumping of cooling water into the generating station. Although it is unlikely that all of these events would coincide with one another, this was considered to be the "worst-case" scenario for determining if the Santa Ana River and Talbert Marsh contribute contaminants to the HBGS intake.

Dry Weather Runoff

Several studies have shown that the Talbert Marsh is a significant source of fecal indicator bacteria in the surf zone. A modeling study was conducted to determine if dry weather runoff from the Talbert Marsh could affect water quality at the intake of the generating station (the results of the modeling study are discussed below, under *IMPACTS*). Most of the dry weather runoff is now diverted to OCSD for treatment and discharge at the deep water outfall. However, fecal indicator bacteria levels at the outlet of the marsh remain high and these bacteria are flushed out of the marsh, particularly during spring tides.

Recirculation of HBGS Discharge

The HBGS outfall is located 340 feet from the intake. The National Pollution Discharge Elimination System (NPDES) permit for the HBGS allows the facility to discharge up to 514 million gallons per day (MGD). The discharge consists largely of cooling water but up to 1.66 MGD of generating station process wastewater and storm water can be mixed with the cooling water and discharged at the outfall. In addition, upon project implementation, there is a potential for the desalination facility's discharge to be recirculated, as the concentrated seawater would be discharged through the HBGS outfall.

Recirculation of the HBGS discharge would have the greatest potential to impact water quality at the intake during wet weather conditions when the maximum amount of storm water is being discharged through the outfall. The storm water flow that may be recirculated ranges from 0.0004% to 0.007% of the total intake flow. Therefore the storm water flow that may be recirculated is negligible.

Los Angeles and San Gabriel Rivers

The Los Angeles River discharges to the ocean approximately 16 miles upcoast (i.e. northwest) from HBGS, while the San Gabriel River discharges approximately 11 miles upcoast. The United States Geological Survey (USGS) conducted an intensive ocean water quality monitoring program in the summer of 2001 and found a mass of lower-salinity water near the shore in Huntington Beach. The source of the nearshore low-salinity water was not identified in their study but the authors of the report speculated that it may be coming from the San Gabriel and Los Angeles rivers (USGS, 2003). There have been no further studies on the potential impact of these two rivers.

Cruise Ships and Fishing Boats

Cruise ship and fishing boat operations in the vicinity of the HBGS intake have the potential to impact water quality in regards to sewage discharge and leaks or spills of oil/fuel. The nearest major port for cruise ships to the HBGS intake is the Long Beach Harbor, situated approximately 16 miles upcoast. Another major port for cruise ship operations is the Los Angeles Harbor, located approximately 18 miles upcoast of the HBGS intake.

Sportfishing in Orange County is done mostly from piers and boats. A commercial passenger and private fishing vessel fleet, based in Newport Bay, operates in the vicinity of Newport and Huntington Beach. Charter boats operating off Newport and Huntington Beach fish the artificial reefs and sandy bottom, or the rocky areas and kelp beds to the south offshore of Corona Del Mar and Laguna Beach, typically in water depths of 14 to 18 meters deep (OCSD, 2002a).

Recreation

It is estimated that over five million people visit Huntington State Beach each year for recreational purposes. Such users have the potential to affect water quality at the HBGS intake due to sewage and spills of contaminants such as lighter fluid used for bonfires.

Oil and Gas Production Facilities

There are two offshore oil platforms approximately 1.5 miles west of the HBGS intake and four platforms approximately 10 miles west of the intake. Oil and gas pipelines connect the platforms to coastal oil/gas facilities upcoast from the intake. There are no oil tanker shipping lanes in the vicinity of the intake. The closest shipping lanes are six to seven miles offshore. There has been only one reported incidence of oil spill in the vicinity of Huntington Beach, which occurred in 1990 [1]. A catastrophic event at one of the offshore platforms that is near the coast could affect water quality at the HBGS intake.

Red Tides and Algal Toxins

Refer to Section 4.11, *PRODUCT WATER QUALITY* for a discussion of existing conditions in regards to red tides and algal toxins.

Operations at HBGS

Source water quality for the proposed desalination facility has the potential to be affected by HBGS operations. Activities or conditions occurring along the HBGS cooling water system between the

1 CDFG, Office of Spill Prevention and Response website, accessed 1/28/10.

HBGS intake and the point at which water is diverted toward the desalination facility could impact water quality (particularly in regards to metals). The diversion point would occur after cooling water has traveled through the HBGS condensers. Other potential sources of contamination at HBGS include cycle water discharges (the discharge of HBGS process byproduct water at various points into the cooling water system), urban runoff discharges, wastewater discharges, hazardous materials, and heat treatments (the periodic diversion of water from the discharge vault back into the cooling water system to be reheated to prevent biological growth). These potential contaminant sources are further analyzed below, under *IMPACTS.*

Elevated Bacteria Levels in the Huntington Beach Surf Zone

Extensive bacterial studies have shown that the Santa Ana River and Talbert Marsh appear to be the primary sources of fecal indicator bacteria to the near shore ocean. In addition, bird droppings and a reservoir of bacteria stored in the sediment and on marine vegetation may continue to be the source of bacteria at the mouths of the river and marsh. However, three separate studies conducted between 2001 and 2002 have demonstrated that HBGS is not the source of bacteria in the surf zone. Additional information in regards to existing conditions for the elevated bacteria levels in the Huntington Beach surf zone is provided in Appendix Q, Huntington Beach Surf Zone Studies.

MARINE BIOLOGY

All of the marine species living near the HBGS commonly occur over geographic ranges extending well beyond the coastal waters of Southern California. They are part of a biologically and climatologically unique region called the Southern California Bight (SCB). Geographically, the SCB is an open embayment extending from Point Conception, California into Baja California, Mexico and 125 miles offshore. Biologically, the SCB is a transition-zone species assemblage positioned between two larger and diverse assemblages: one in the cooler waters to the north, and the other in the warmer waters to the south. SCB organisms comprise a mix of species (some from the cooler northern waters and some from the warmer southern waters). [2]

Physical, biological, and oceanographic factors affect the total SCB biomass and cause year-to-year variation in the number of species occurring within the SCB and in areas such as Huntington Beach. While ocean temperature, current patterns, and upwelling affect nutrient and food supplies, biological variables such as the arrival of planktonic animals to coastal areas, the recruitment of new organisms (addition of young-of-the-year to the population) and habitat availability and quality all influence ecosystem-species composition, diversity, and biomass (Jackson 1986). The young stages of most marine invertebrates and fishes living at and near Huntington Beach and throughout the SCB begin life as drifting plankton. Their survival into the next life stage requires that the appropriate and vacant habitat be found. Thus, evaluation of either local or regional habitats with respect to their biodiversity, the abundance of different species, and the ages, body size, and growth rates of specific organisms must always be made in the context of the large-scale factors influencing these, whether in the area around Huntington Beach or across the entire SCB.

Since 1975 National Pollutant Discharge Elimination System (NPDES) requirements for HBGS receiving water monitoring have been carried out by Marine Biological Consultants (MBC) Applied Environmental Sciences (Costa Mesa, CA). Annual reports by MBC (a complete list of these annual

[2] Marine Biological Considerations Related to the Reverse Osmosis Desalination Project at the AES Huntington Beach Generating Station, J.B. Graham, Ph.D., August 3, 2004, Supplemented in February, 2010 (refer to Appendix S, *MARINE BIOLOGICAL CONSIDERATIONS).*

reports is contained the bibliography of Appendix K, Hydrodynamic Modeling Report) have monitored the abundance, diversity, and health status of marine organisms inhabiting the waters and substrata surrounding the HBGS. In addition to recording environmental conditions and censusing the organisms living near the HBGS heated discharge, MBC sampling has been done at locations 3,000 feet north and south of the discharge. The sampling methods have included diver surveys along bottom transects, trawling for the census of fishes and macroinvertebrates, and bottom-core samples to assess the number and diversity of animals living within the substrate.Over the years, as monitoring results consistently indicated the absence of discharge effects, the number of surveys required by NPDES was reduced. The MBC report for 1993 contains the most recent analysis of the benthic infauna (i.e., organisms living in the substrate). The 2001 report has the most recent findings of the trawling and diving surveys of benthic macroinvertebrates.

The sea floor (benthic habitat) surrounding the HBGS discharge is relatively smooth and gently sloping, and contains medium to fine-grain sands. It extends for a considerable distance, both up and down the coast from the discharge site. Littoral currents sweep the waters overlying the coastal sea floor in a generally downcoast direction, although net movement is affected by tides, winds, and storms. These factors and sand grain size play a major role in determining the distribution, abundance, and diversity of benthic animals.

The marine organisms living in the vicinity of the HBGS discharge occur in one of three habitat classifications: (1) substrate (termed infauna); (2) on the bottom seafloor (termed benthic - macroinvertebrates, including worms, crabs, sand dollars, starfish and some fishes); or (3) in the water column itself (termed pelagic - consisting of squid, fish, plankton, etc.).

- **Infauna:** Huntington Beach infauna surveys were carried out from 1975 to 1993 by MBC Applied Environmental Sciences (MBC 1993). The habitat surrounding the HBGS outfall is dynamic and there are many species that can potentially occur in the infauna. However, many of these are rare or appear episodically. Most of these animals have very short lives and it is reasonable to assume that many of them arrive each year in the plankton. Thus, the infaunal species diversity of the extended habitat varies from year to year as does organism age, size, and abundance.

Table 4.10-1, *ORDER OF ABUNDANCE OF INFAUNAL ANIMALS AT HUNTINGTON BEACH, 1975-1993,* lists the infaunal species in order of their mean abundance from 1975 to 1993 (a summary of major groups of infaunal animals is provided in Table 1 of Appendix O, Marine Biological Considerations, and Figure 2 of Appendix O also shows the numbers of species and numbers of individuals found in samples over time). Average animal density was about 43 per unit volume, but this varied from year to year and by a factor of five over 18 years. In terms of both numbers and species, the most dominant animals each year were polychaete worms and crustaceans. Mollusks were the third most abundant group and showed marked variation from year to year.

- **Benthic macrofauna:** Macrofaunal surveys, conducted from 1975 to 2000, show the repeated occurrence of the same core group of species in the area (MBC, 2001). The macrofaunal species occurring at Huntington Beach are typical of those expected to occur at other comparable open, sandy bottom habitats throughout the SCB.

TABLE 4.10-1
ORDER OF ABUNDANCE OF INFAUNAL ANIMALS AT HUNTINGTON BEACH, 1975–1993

SPECIES	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	MEAN	SD
Apoprionospio pygmaea	680	430	360	360	44	100	300	50	720	440	21	167	42	133	96	88	1513	29	79	297.4	376.5
Rhepoxynius menziesi	—	—	28	150	290	280	150	180	160	340	675	194	212	975	229	413	496	142	73	262.4	250.0
Diastylopsis tenuis	380	120	270	180	540	530	330	160	160	50	25	794	183	438	83	125	54	96	94	242.8	213.7
Goniada littorea	450	370	380	350	290	240	380	220	210	90	192	389	175	171	213	204	13	233	25	241.8	117.8
Olivella baetica	130	90	44	140	110	25	110	110	4	60	1950	11	29	33	21	33	25	8	1	154.4	460.3
Owenia collaris	—	—	—	180	240	180	800	—	150	40	88	—	—	8	750	54	400	—	4	152.3	253.5
Polydora nuchalis	—	—	—	—	—	—	340	—	30	1470	167	72	—	—	—	—	—	—	—	109.4	358.5
Crepidula naticarum	—	—	—	20	—	20	70	50	—	1670	104	28	—	25	—	—	—	—	—	104.6	401.3
Chaetozone cf. Setosa	60	120	210	20	17	60	10	250	40	20	292	11	200	13	183	121	42	92	14	93.4	94.4
Tharyx sp.	690	280	170	30	17	30	70	80	40	40	—	161	38	—	—	—	—	—	36	88.5	171.0
Mediomastus spp.	—	—	—	100	250	230	80	80	10	30	13	122	233	38	42	100	4	250	48	85.8	85.7
Leitoscoloplos pugettensi	40	210	180	50	39	150	80	300	80	40	92	122	71	—	13	—	4	83	—	81.8	83.0
Tellina modesta	10	—	10	50	90	680	110	50	10	120	8	28	79	17	29	8	—	—	10	68.9	160.3
Dendraster excentricus	—	120	—	—	6	—	130	150	20	310	21	6	12	46	117	21	63	142	—	61.2	82.8
Eohaustorius washingtonianus	—	—	—	190	90	4	10	13	—	90	50	56	100	108	200	83	50	50	—	60.8	63.7
*Prionospio lighti**	70	50	40	50	17	200	4	70	30	30	21	6	—	271	58	79	8	63	5	56.5	71.9
Amaeana occidentalis	5	50	50	40	56	10	60	20	10	180	104	—	33	13	4	4	—	258	96	52.3	46.4
*Pectinaria californiensis***	40	20	20	70	17	20	10	40	20	320	88	—	8	179	21	8	13	—	4	47.2	81.4
Spiophanes bombyx	50	20	20	30	22	50	20	—	90	170	100	17	21	71	63	33	33	58	24	47.0	41.7
Magelona sacculata	—	—	—	30	33	190	30	80	10	10	150	—	12	46	67	63	75	33	—	43.6	54.3
Photis spp.	60	—	20	—	—	10	17	30	—	410	46	44	4	25	4	4	25	—	—	36.8	96.8

TABLE 4.10-1 (CONTINUED)

SPECIES	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	MEAN	SD
Paraprionospio pinnata	—	40	10	—	6	20	140	100	20	180	17	61	33	8	4	—	—	46	8	36.5	53.4
Ampharete labrops	—	—	10	10	16	30	4	10	10	440	42	22	—	4	38	8	25	8	4	35.8	104.1
Amastigos acutus	—	—	—	—	250	260	80	4	50	—	4	—	—	—	—	—	—	—	—	34.1	84.5
Typosyllis spp.	120	170	—	80	—	—	30	30	40	—	—	—	42	33	29	38	13	—	—	32.9	47.1
Leptocuma forsmanni	20	10	20	20	60	30	20	—	4	11	8	33	29	88	121	42	33	63	10	32.7	31.4
Isocheles pilosus	—	4	10	—	—	330	—	20	10	—	—	6	—	100	96	—	8	—	—	30.7	82.4
Leptopecten latiauratus	5	—	40	—	—	30	40	20	10	290	29	6	—	—	—	—	—	—	—	24.7	69.2
*Thalenessa spinosa****	20	50	30	4	17	20	21	20	20	110	59	—	17	8	—	17	—	—	—	21.7	27.3
Rhepoxynius spp.	5	10	10	120	—	20	10	—	—	—	50	17	29	55	—	4	17	8	—	18.7	30.6
Neverita recluziana	—	—	—	—	6	4	10	20	10	130	42	6	8	13	8	—	—	—	—	13.5	31.4

Notes:
* previously Prionospio cirrifera
** previously Cistena californiensis
** previously Eusigalion spinosum
Source: MBC 1975-1992

Table 4.10-2, MACROFAUNAL INVERTEBRATES AT HUNTINGTON BEACH, 1975-2007 lists key macrofaunal invertebrate species surveyed at Huntington Beach. Graphs showing animal abundance and species number for the area reflect the range of annual differences that commonly occur in shallow water habitats (refer to Figure 3, INTERANNUAL VARIATION IN HUNTINGTON BEACH MACROFAUNA ABUNDANCES AND SPECIES RICHNESS, 1975-2001, in Appendix O, Marine Biological Considerations). Average abundances of these and other organisms and total species number varied from year to year. In 2004 only 20 species were recorded. In 1984 just after the 1982-1983 El Niño, there were 54 species. Animal densities also vary considerably, from less than 12 per square meter in 1976 and 1977 to over 160 per square meter in 1989.

From 1975 to 2007, five animal groups (three annelid [polychaete] worms [Diopatra, Owenia, Maldanidae], hermit crabs [Paguridae] and Pacific sand dollars [Dendraster excentricus]) account for about 88% of the marcrofaunal abundance. The relative numbers of these organisms vary from year to year and in different localities and they could be especially abundant, with as many as 3,600-9,000 individuals of various species (sand dollars, polychaete worms, hermit crabs) being taken in one otter trawl net at one sampling site. Pacific sand dollars, for example, were found in great abundance near the discharge and at the upcoast sampling area in 1997, but had not been found in these areas in the preceding five years and have appeared variably at all stations over the survey and are not consistently found in the waters around the HBGS.

- **Fishes:** Since the fish surveys began, 61 species have been collected, all of which can be considered as typical residents of open, sandy bottom coastal habitats in southern California (Horn and Allen, 1978; Mearns, 1979; Allen and DeMartini, 1983). The numbers of fish species taken in Huntington Beach trawl surveys ranged from 11 in 1991 to 23 in 1998 and averages 16 species/year. The fifteen most abundant fish species living in the area between 1976 and 2000 are: white croaker, queenfish, northern anchovy, California halibut, Pacific sardine, speckled sanddab, curflin turbot, kelp pipefish, white seaperch, walleye surfperch, C-O turbot, Pacific butterfish, California lizard fish, salema, and barred surfperch (refer to Table 4.10-3, YEARLY ABUNDANCE OF DEMERSAL FISH SPECIES COLLECTED BY OTTER TRAWL AT HUNTINGTON BEACH, 1976-2001). The persistent representation of the same species indicates that the fish fauna is relatively stable.

<u>**Conclusions of the MBC Monitoring**</u>

The overall findings of MBC in its NPDES monitoring program are as follows (MBC 2001):

Operation of the HBGS had no detectable adverse effects on the marine biota or the beneficial uses of the receiving waters:

- There are strong indications that a relatively stable assemblage of organisms occur in the marine habitats near the discharge and, although the numbers and relative abundance rankings of species shift from year to year, no species has either been recruited to or eliminated from the area

- All of the organisms occurring in waters adjacent to the HBGS have much broader geographic distributions, extending in most instances to beyond the range of the Southern California Bight

- Both the sea floor and littoral water habitats occurring near the HBGS discharge site are not home to any threatened or endangered marine species

- The area does not have any "environmentally sensitive" habitats such as eel grass beds, surf grass, rocky shores, or kelp beds

- The movement, abundance, and diversity of invertebrate and fish populations along the Huntington Beach coast appear all to be in response to natural ecological factors and not in any way influenced or affected by the HBGS discharge.

Piscivorous Bird Species

Many species of seabirds are found in the SCB, the most numerous of which include shearwaters, phalaropes, gulls, terns, and auklets. Seabirds can be found in the SCB year-round with some species breeding, some overwintering and others migrating through the area. These include listed species such as the western snowy plover and the California least tern. Western snowy plover, a beach-nesting species, is a Federally-listed Threatened Species. Although snowy plover nesting does not occur on the beach near the Project area, Critical Habitat for the species has been designated within the City in the Bolsa Chica Ecological Reserve, and within a protected breeding area of Huntington State Beach. California least tern (Sterna antillarum browni; State- and Federally-listed as endangered), another beach-nesting species, may feed in nearshore waters in the Project area. Critical Habitat has not been designated for the California least tern. Seabirds most frequently eat fish, squid and crustaceans, although scavenging is common in gulls.

Breeding colonies of Least Terns in the vicinity of the project area include the Bolsa Chica Ecological Reserve, Huntington State Beach, Upper Newport Bay and Seal Beach National Wildlife Refuge. The Snowy Plovers are breeding in only one location in Orange County, at Bolsa Chica Ecological Reserve. [3]

[3] http://www.seaandsageaudubon.org/Conservation/SnowyPlovers/ (accessed April 14, 2010).

TABLE 4.10-2
MACROFAUNAL INVERTEBRATES AT HUNTINGTON BEACH, 1975-2007

	Year																													Mean	Percent Total
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2004	2007		
Total Number of Species	21	38	23	27	48	21	39	24	25	54	43	36	43	32	46	29	37	32	40	29	26	29	26	31	24	27	25	20	21	31.6	—
Mean Number of Individuals (per m²)	13.6	11.8	11.8	19.3	93.3	107.3	50.2	119.4	78.0	73.7	61.8	49.9	139.1	63.1	160.7	22.0	56.1	40.5	58.1	53.6	36.2	51.0	66.4	53.9	49.4	54.5	51.3	37.3	94.8	61.3	—
Mean Densities of Key Species (per m²)																															
Diopatra spp	10.2	5.1	7.7	10.2	10.9	17.8	19.1	23.2	28.6	28.1	43.9	39.1	26.2	10.2	7.9	11.1	40.0	19.6	42.4	43.8	29.0	40.0	23.3	45.5	42.1	44.7	38.2	32.9	89.1	28.6	48.6
Paguridea, unid. (includes *Isocheles* sp.)	0.0	1.8	1.1	0.2	2.0	0.2	1.6	90.4	0.7	0.5	3.7	0.7	101.9	13.6	128.3	0.5	0.3	10.7	0.3	0.4	0.1	0.5	0.4	0.1	0.2	0.1	0.7	0.2	0.1	12.4	21.1
Owenia collaris	—	—	—	2.1	67.5	85.9	16.2	—	6.6	1.8	0.1	—	0.0	1.8	1.1	0.6	7.4	0.0	0.0	0.1	0.0	0.0	—	0.2	—	—	—	0.0	0.3	6.6	11.2
Dendraster excentricus	—	—	—	—	—	—	—	—	35.0	20.2	0.0	—	—	2.5	11.8	1.1	0.4	—	—	—	—	—	36.9	—	—	—	—	—	—	3.9	6.5
Maldanidae, unid.	0.1	0.2	1.3	1.2	2.7	0.0	1.0	0.3	0.3	0.6	2.3	0.2	1.1	1.0	3.0	2.8	3.1	7.1	3.6	0.2	0.8	1.2	1.7	0.6	0.5	0.8	1.6	0.9	0.5	1.4	2.4
Ophiuroidea, unid.	—	0.1	0.0	0.0	0.1	—	0.2	0.0	0.3	1.2	2.1	0.7	1.9	0.4	0.6	2.9	1.5	0.4	3.7	1.2	1.5	1.4	1.4	2.6	1.6	3.3	1.0	1.3	0.5	1.1	1.9
Leptopecten latiauratus	—	—	—	—	0.1	—	0.1	—	—	0.3	1.5	—	0.0	14.0	0.0	—	0.0	0.1	0.0	0.9	0.1	0.1	0.0	0.0	0.0	0.2	0.2	—	—	0.6	1.0
Balanus spp	0.0	0.3	—	—	0.3	0.4	2.6	2.1	—	0.0	0.1	0.2	0.3	—	2.3	0.1	0.1	0.3	1.7	0.9	0.4	2.1	0.1	—	0.1	1.8	1.5	0.1	0.1	0.6	1.0
Crepidula spp	—	0.1	—	—	—	—	0.1	1.7	0.1	0.6	0.7	0.7	0.5	0.9	0.9	0.9	0.3	0.3	0.5	1.9	—	—	0.0	0.5	0.1	0.1	1.8	0.1	—	0.4	0.7
Majidae, unid.	—	—	—	—	—	—	—	—	—	—	—	—	0.1	0.1	0.0	0.1	0.0	0.1	0.7	1.5	0.1	2.5	0.5	0.5	0.7	0.8	4.5	0.2	1.8	0.5	0.8
Zaolutus actius	—	0.0	0.0	—	0.4	0.0	1.0	0.0	0.6	0.6	0.0	0.2	0.1	—	—	—	0.0	0.1	0.9	0.2	0.7	0.5	0.2	0.8	2.2	0.5	0.2	0.1	0.2	0.3	0.6
Olivella spp	1.9	0.2	—	0.0	0.2	—	0.1	0.0	—	0.7	0.4	0.0	0.1	2.2	0.3	0.1	0.0	—	0.0	0.3	—	0.0	0.1	0.2	—	0.1	0.1	—	—	0.3	0.4
Spiochaetopterus costarum	0.1	0.1	0.0	0.1	0.2	—	0.1	0.2	0.1	0.1	0.1	0.7	0.1	0.6	—	0.5	1.0	0.7	0.1	0.0	0.1	0.0	0.9	0.5	—	—	—	—	—	0.2	0.4
Astropecten armatus	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.9	0.3	0.4	0.5	0.4	0.6	0.1	0.1	0.2	0.2	0.4	0.6	0.2	0.2	0.4
Dendronotus frondosus	—	—	—	—	4.0	—	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.1	0.2
Nassarius spp	—	0.0	—	0.0	0.1	0.0	0.1	—	—	0.6	0.1	0.1	0.3	1.6	0.1	0.1	0.1	0.0	0.1	—	—	0.0	0.2	0.0	0.2	0.1	0.1	0.0	—	0.1	0.2
Pista spp	—	0.1	0.1	0.0	0.1	0.1	0.2	—	0.2	—	0.6	0.1	1.2	—	—	0.2	0.3	0.2	0.1	0.1	—	—	—	0.0	—	0.0	0.0	—	0.1	0.1	0.2
Hiatella arctica	—	—	—	—	—	—	—	—	3.3	0.2	—	0.0	—	—	0.0	—	—	—	—	0.0	—	—	—	—	—	—	—	—	—	0.1	0.2
Phyllochaetopterus spp	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.4	—	—	0.0	—	—	1.3	0.8	0.6	—	—	—	—	0.2	—	0.1	0.2
Stylatula elongata	0.0	0.0	—	—	—	—	0.0	—	0.0	0.2	0.2	—	0.0	—	—	—	—	0.1	0.6	0.4	0.3	0.1	0.4	0.3	0.1	0.2	0.2	0.4	0.1	0.1	0.2
Renilla kollikeri	—	—	—	—	0.0	—	0.0	0.0	—	0.0	0.1	0.1	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.2
Solen spp	—	—	—	—	—	—	—	—	—	1.1	0.0	—	—	—	—	—	—	—	1.2	0.3	0.2	0.0	—	—	—	—	—	—	—	0.1	0.2
Pyromaia tuberculata	0.0	0.0	—	—	0.2	—	0.7	0.0	0.0	0.4	0.2	0.0	0.0	—	0.0	0.0	0.0	0.0	—	—	—	0.1	0.3	0.2	0.4	0.0	—	—	0.4	0.1	0.2
Chaetopterus variopedatus Cmplx	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.6	0.1	0.0	0.1	0.1	0.3	0.2	0.1	0.2	0.2	0.4	0.1	0.1	—	1.2	0.1	0.2
Harenactis attenuata	0.1	—	—	—	—	—	—	—	—	—	—	—	0.1	0.0	0.1	0.3	0.2	—	—	—	—	—	—	0.4	0.35	0.8	—	0.4	0.6	0.1	0.2
Polygireulima rutila (Balcis rutila)	—	0.0	0.0	—	0.0	—	0.1	0.0	0.0	0.3	—	0.5	0.4	0.5	0.1	—	—	—	—	—	—	—	—	0.1	0.02	—	—	—	—	0.1	0.1
Thalamorporella spp	—	0.1	0.1	—	0.2	—	0.2	0.4	—	0.1	0.1	0.1	—	—	0.0	0.1	0.0	—	0.2	—	—	—	—	—	—	—	—	—	—	0.1	0.1
Neverita reclusiana	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	—	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Ophiodermella spp	—	—	0.0	0.0	—	0.1	0.3	0.0	—	0.1	0.0	—	0.0	—	—	0.0	0.0	0.1	0.1	—	—	0.0	0.0	0.1	0.2	0.2	0.1	—	—	0.0	0.1
Anthozoa, unid.	—	—	—	—	—	0.1	—	—	—	0.4	0.4	—	—	—	—	—	—	—	—	—	—	—	—	0.3	0.1	—	—	—	—	0.0	0.1
Argopecten circularis	—	—	—	—	—	—	—	—	—	—	0.3	0.0	0.1	—	—	—	—	0.0	0.7	—	—	—	—	—	—	—	—	—	—	0.0	0.1

For 1975 and 1978 data were taken from the same 5 stations sampled to 1993; since 1994, only 4 stations have been sampled.
Note: 0.0 = <0.05

TABLE 4.10-3
YEARLY ABUNDANCE OF DEMERSAL FISH SPECIES COLLECTED BY OTTER TRAWL AT HUNTINGTON BEACH, 1978-2008

Species	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2004	2007	2008	Total	% Total	F.O.
Engraulis mordax	601	2921	165	1916	1	3209	903	—	27	—	80	2	7518	92	1990	9905	509	321	826	35	1409	—	628	9	2	—	5	33074	47	23
Genyonemus lineatus	4029	100	2035	378	211	779	259	652	626	625	304	1	167	6	2479	3618	913	780	24	473	103	1	128	390	—	—	2	19083	27	25
Seriphus politus	724	65	1249	1209	85	2221	1309	723	380	195	47	—	385	22	1875	1963	579	654	91	430	199	—	495	125	—	—	—	15025	21	22
Phanerodon furcatus	77	147	15	297	10	40	3	17	5	1	—	—	1	—	—	7	6	5	—	1	1	—	—	—	15	—	2	650	1	18
Citharichthys stigmaeus	2	1	2	—	5	—	—	7	5	38	21	6	21	5	3	5	20	5	21	2	9	18	22	11	64	45	103	441	1	24
Paralichthys californicus	35	3	19	25	47	15	10	24	8	23	25	9	12	14	27	5	11	6	4	13	5	6	1	11	17	12	16	403	1	27
Amphistichus argenteus	24	161	22	31	—	2	—	—	—	—	—	—	—	—	—	8	—	2	4	1	—	—	6	8	2	—	—	271	<1	12
Cymatogaster aggregata	33	93	7	9	5	31	—	1	1	—	—	—	1	—	1	3	6	1	2	—	16	—	4	13	20	—	3	250	<1	19
Synodus lucioceps	2	—	—	5	115	—	—	—	—	1	1	13	9	1	5	—	—	1	—	—	9	29	—	21	12	16	6	246	<1	16
Hyperprosopon argenteum	70	6	55	—	—	23	—	3	—	—	5	—	—	—	1	—	—	—	—	12	1	—	2	20	—	—	—	198	<1	11
Peprilus simillimus	38	1	5	—	2	66	9	4	9	—	1	—	1	—	3	—	—	5	1	—	38	—	—	—	—	—	—	183	<1	14
Anchoa compressa	—	—	—	—	1	1	—	—	—	—	4	—	—	—	1	5	—	—	—	30	68	—	—	—	—	—	—	110	<1	7
Sardinops sagax	—	—	—	—	—	—	—	—	—	—	—	—	36	—	6	—	12	—	8	—	46	—	—	—	—	—	1	109	<1	6
Xystreurys liolepis	—	—	2	1	13	2	—	7	2	6	7	2	2	7	3	3	1	4	—	—	1	8	1	3	1	11	12	99	<1	22
Leptocottus armatus	1	—	1	—	—	1	—	17	3	4	20	—	1	—	3	3	2	—	—	1	—	3	6	2	9	9	13	99	<1	18
Menticirrhus undulatus	4	10	1	1	6	6	2	12	6	—	—	—	2	—	3	2	1	—	1	10	14	1	4	—	—	—	—	86	<1	18
Pleuronichthys ritteri	—	—	1	—	4	—	1	2	4	15	13	6	2	8	3	2	2	—	1	—	—	—	—	1	—	—	—	65	<1	15
Myliobatis californica	8	1	1	1	1	1	—	9	1	—	—	—	—	1	1	2	—	6	—	5	2	—	18	—	—	1	—	59	<1	16
Pleuronichthys verticalis	6	—	—	1	4	1	—	7	—	4	—	1	—	—	—	—	—	—	—	—	—	9	—	1	9	3	11	57	<1	12
Platyrhinoidis triseriata	—	2	—	—	—	2	—	10	2	8	2	2	—	2	—	1	1	—	1	—	2	—	—	—	—	2	6	43	<1	14
Cheilotrema saturnum	—	—	—	2	—	13	1	2	2	—	—	—	—	—	—	—	3	1	—	—	—	—	—	—	—	3	—	27	<1	8
Pleuronichthys guttulatus	1	—	2	1	1	6	—	—	1	1	—	1	—	1	—	—	1	—	—	1	—	—	—	2	—	3	—	22	<1	13
Paralabrax nebulifer	1	—	—	—	1	1	1	—	4	1	2	1	1	—	—	1	1	2	—	—	1	1	—	—	1	—	—	20	<1	15
Symphurus atricaudus	2	—	—	1	1	—	1	4	—	6	3	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	19	<1	8
Parophrys vetulus	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	14	17	<1	4
Embiotoca jacksoni	1	—	—	10	—	—	—	1	—	—	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	16	<1	4
Syngnathus exilis	4	—	—	—	—	—	—	—	—	—	5	—	2	—	3	—	1	—	1	—	—	—	—	—	—	—	—	16	<1	6
Paralabrax clathratus	1	—	—	—	—	1	2	—	6	—	3	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	15	<1	7
Citharichthys xanthostigma	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	12	—	—	14	<1	2
Syngnathus californiensis	—	2	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	4	—	—	—	2	12	<1	5
Mustelus henlei	—	—	—	—	—	—	—	—	—	—	1	1	—	—	1	1	—	—	—	5	—	—	1	—	—	—	—	10	<1	6
Rhinobatos productus	—	1	—	—	—	—	1	—	—	—	1	2	—	—	—	—	—	—	—	—	—	1	1	—	—	2	—	9	<1	7
Ophidion scrippsae	1	—	—	—	—	—	—	1	4	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	8	<1	5
Heterostichus rostratus	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	1	2	—	—	—	1	—	—	—	—	1	—	7	<1	6
Syngnathus sp	—	—	1	2	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	7	<1	5
Chromis punctipinnis	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	2	1	—	—	—	6	<1	4
Atractoscion nobilis	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	5	<1	3
Porichthys myriaster	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2	1	—	—	—	—	—	5	<1	4
Sphyraena argentea	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	1	—	—	—	—	—	—	—	5	<1	2

TABLE 4.10-3 (CONTINUED)

Species	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2004	2007	2008	Total	% Total	F.O.
Girella nigricans	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	4	<1	2
Rhacochilus vacca	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	4	<1	3
Atherinopsis californiensis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1	—	—	—	—	—	—	3	<1	3
Scorpaena guttata	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	3	<1	3
Squalus acanthias	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	<1	2
Trachurus symmetricus	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	3	<1	3
Xenistius californiensis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	3	<1	1
Leuresthes tenuis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	2	<1	1
Anchoa delicatissima	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Citharichthys sordidus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	<1	1
Dorosoma petenense	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Gibbonsia elegans	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Halichoeres semicinctus	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Hypsoblennius sp	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	<1	1
Pleuronichthys coenosus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	<1	1
Pleuronichthys decurrens	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	<1	1
Porichthys notatus	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Scomber japonicus	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Sebastes paucispinis	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Sebastes serranoides	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Semicossyphus pulcher	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	<1	1
Triakis semifasciata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	<1	1
Total Abundance	5667	3514	3584	3893	514	6426	2504	1505	1102	931	550	48	8162	159	6413	15536	2080	1796	986	1031	1933	82	1324	621	165	108	196	70830	—	27
Number of Species	24	15	18	20	19	23	15	20	24	17	23	14	17	11	20	19	23	17	14	22	23	14	17	17	13	12	14	61	—	—
Number of Trawls	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	—	—	—

INTENTIONALLY LEFT BLANK

Sea Turtles

All six species of sea turtles occurring in the U.S. are listed as either endangered or threatened and are protected under the Endangered Species Act of 1973. NOAA Fisheries and the USFWS share jurisdiction for sea turtles, with NOAA Fisheries having lead responsibility for the conservation and recovery of sea turtles in the marine environment and USFWS on turtles on nesting beaches[4].

REGULATORY FRAMEWORK

As evidenced by the list in Section 3.7, there are a number of agreements, permits and approvals anticipated to be necessary for construction and operation of the Seawater Desalination Project at Huntington Beach, and there are several governmental agencies with regulatory authority over various aspects of the Project. Many of those agreements, permits and approvals relate to ocean water quality and marine biological resources. Consequently, the potential ocean water quality and marine biological resource impacts of the Project must be considered in the context of existing plans and laws that describe the authority of these governmental agencies. In addition, because the HBGS is currently operating pursuant to a NPDES permit issued by the Santa Ana Regional Water Quality Control Board and an emergency certification issued by the California Energy Commission with provisions relating to ocean water quality and marine biological resources, the action taken by those regulatory authorities is also summarized in this section. (Appendix A provides a summary of the background and history of the HBGS and its operations.)

California Ocean Plan

Since 1973, the California State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCB) have been delegated the responsibility for administering permitted discharge into the coastal marine waters in California. The SWRCB prepares and adopts the Quality Control Plan for Waters of California (Ocean Plan), which establishes water quality standards that apply to ocean waters within the State of California's jurisdiction. RWQCBs adopt Water Quality Control Plans in their respective regions and regulate individual wastewater discharges through issuance of NPDES (National Pollutant Discharge Elimination System) permits. NPDES permits must implement all applicable Water Quality Control Plan water quality standards, including those in the Ocean Plan when applicable.

The SWRCB adopted the Ocean Plan on July 6, 1972. Since 1972, the Ocean Plan has been amended a number of times, most recently in 2005. Additional non-substantive amendments were adopted on September 15, 2009.\ The Ocean Plan establishes beneficial uses to be protected, water quality objectives and a program for implementation needed for achieving the water quality objectives. The beneficial uses of the ocean protected by the Ocean Plan include: preservation and enhancement of designated Areas of Special Biological Significance (ASBS); rare and endangered species; marine habitat; fish migration; fish spawning; shellfish harvesting; recreation; commercial and sport fishing; mariculture; industrial water supply; aesthetic enjoyment; and navigation.

To protect these beneficial uses, the Ocean Plan establishes both narrative objectives and numerical water quality concentration objectives. Ocean Plan water quality concentration objectives are established for the protection of marine aquatic life and for the protection of human health. The

4 http://www.nmfs.noaa.gov/pr/species/turtles/ (accessed April 14, 2010).

substantive provisions in the current version of the Ocean Plan were adopted in 2005. Table B of the 2005 Ocean Plan establishes water quality concentration objectives for 21 parameters for the protection of marine aquatic life. To protect human health, Table B of the Ocean Plan establishes water quality concentration objectives for 20 non-carcinogenic compounds, and for 42 carcinogenic compounds.

The Ocean Plan requires that Table B water quality concentration objectives be achieved upon completion of initial dilution. The Ocean Plan defines "initial dilution" as the irreversible rapid and turbulent mixing that occurs as a result of the momentum and buoyancy of discharged wastewater. The Ocean Plan requires that the assigned initial dilution be based on the lowest average initial dilution that occurs within any month of the year (minimum month initial dilution). The Ocean Plan also requires that initial dilution be based on observed wastewater flow characteristics, observed receiving water density, and the assumption of zero ocean currents.

Ocean Plan narrative objectives and numerical water quality concentration objectives must be implemented within NPDES permits issued by the RWQCBs. On the basis of available oceanographic and hydrodynamic data and computer modeling, each NPDES permit identifies the minimum month initial dilution applicable to the regulated discharge. The NPDES permit then assigns effluent concentration limits to implement applicable Ocean Plan water quality concentration standards.

Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan)

The State Water Resources Control Board's Thermal Plan regulates the discharges of elevated temperature wastes (thermal discharges) into coastal waters of California. The main purpose of this plan is to assure protection of the beneficial uses and ASBS from excessive thermal discharges. A key plan objective is to reduce the overall amount of thermal load discharged in State waters, including coastal waters.

The Thermal Plan limits the maximum temperature of thermal discharge to Coastal Waters to 20 degrees Fahrenheit over the ambient ocean water temperature. This plan also requires the discharge of elevated wastes to the ocean not to cause a temperature increase in the natural water by more than 4 degrees Fahrenheit at: (a) the shoreline, (b) the surface of any ocean substrate, or (c) the ocean surface beyond 1,000 feet from the discharge system. The surface temperature limitation is to be maintained at least 50 percent of the duration of any tidal cycle.

SARWQCB Water Quality Control Plan (Basin Plan)

The California Ocean Plan, the Thermal Plan and other plans and policies adopted by the SWRCB are incorporated into the Water Quality Control Plan for the Santa Ana River Basin (the "Basin Plan") adopted by the Santa Ana RWQCB. A revised Basin Plan became effective on January 24, 1995. In 2008, the Basin Plan was amended. The Basin Plan specifies beneficial uses and water quality objectives for waters in the "Nearshore Zone" and "Offshore Zone" of the Pacific Ocean in the Santa Ana region.

The "Nearshore Zone" is defined by the Ocean Plan, Chapter II, A.1 as "a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline". The "Offshore Zone" is the area bounded between by the "Nearshore Zone" and the limit of the State waters.

Use of Pacific Ocean for Municipal Supply

As explained in the Basin Plan, the Pacific Ocean′s nearshore waters in the project site vicinity serve multiple beneficial uses. Existing beneficial uses within the coastal vicinity include: industrial service supply, navigation, contact water recreation (swimming, diving), non-contact water recreation (sailing, tide pool studies, aesthetic enjoyment, etc.), commercial and sport fishing, wildlife habitat support, rare/threatened/endangered species habitat support, spawning/reproduction/development habitat support, marine habitat, and shellfish harvesting. No potential uses within the project vicinity (as categorized within the WQMP) have been recorded.

The Seawater Desalination Project at Huntington Beach does not require that the Pacific Ocean in the vicinity of the intake be designated as supporting the beneficial use of drinking water (MUN). The Sources of Drinking Water Policy, adopted by the State Water Resources Control Board in 1988, requires that all waters of the state, with certain exceptions, be protected as existing or potential sources of municipal and domestic supply. One of the exceptions is water with a total dissolved solids (TDS) concentration exceeding 3,000 mg/L, which is applicable to the Pacific Ocean. The MUN designation affords some additional chemical protection of a waterway because maximum contaminant levels (MCLs) are to be achieved in ambient waters. There is no additional protection provided for microbial contaminants because MCLs have not been established for pathogens or coliforms.

The Pacific Ocean in the vicinity of the intake is high quality and, in fact, has concentrations of some chemicals that are far below the drinking water MCLs prior to any treatment. An MUN designation would not provide any additional protection because the intake water quality is not influenced by storm water discharges, the Santa Ana River, the Talbert Marsh, or the Orange County Sanitation District (OCSD) wastewater discharge, as described in the hydrologic modeling studies included in Appendix K, Hydrodynamic Modeling Report. Requiring these discharges to meet MCLs in ambient waters would provide no improvement in water quality at the intake to the desalination facility.

NPDES Permits

The Santa Ana RWQCB (SARWQCB) is the RWQCB with jurisdiction over the Seawater Desalination Project at Huntington Beach. The SARWQCB also has jurisdiction over the existing operation of the HBGS. Santa Ana RWQCB Order No. R8-2006-0011 (NPDES CA0001163) regulates the discharge of cooling water and wastewater from the HBGS. The Seawater Desalination Project at Huntington Beach (specifically the co-located operating condition of the project) also maintains an approved NPDES Permit. Order No. R8-2006-0034 (NPDES CA8000403) regulates the discharge of saline wastewater from the approved co-located seawater desalination facility. Both NPDES permits implement applicable water quality standards established within the Ocean Plan. Effluent limitations established within each NPDES permit are based on a SARWQCB-assigned minimum month initial dilution of 7.5 to 1. Both permits implement effluent and receiving water quality monitoring programs to assess compliance with Ocean Plan standards.

Order No. R8-2006-0034 (NPDES CA8000403), which was issued by the SARWQCB[5] on August 25, 2006, was subsequently upheld by the State Water Resources Control Board. Order No. R8-2006-0034 includes discharge prohibitions, effluent limitations and discharge specifications, and receiving water limitations. Effluent standards and requirements established in that permit implement receiving water standards and provisions established within the California Ocean Plan[6] ("Ocean Plan"). The Ocean Plan prohibits waste discharges to the ocean from degrading marine or benthic communities, and designates that these receiving water quality standards are to be achieved after completion of initial dilution, which is defined as the rapid and irreversible turbulent mixing that occurs as a result of the momentum and buoyancy of the discharge.[7] Order No. R8-2006-0034 defines the area within which initial dilution is complete (the Zone of Initial Dilution or "ZID") as the area extending 1,000 feet from the base of the discharge tower.[8] Therefore, Ocean Plan receiving water standards apply to all waters outside of the ZID.

Based on the established 7.5:1 dilution factor, the area affected by the salinity concentration of 40 ppt would not extend beyond the ZID under any circumstances, and is confined to a small area around the base of the discharge tower. Order No. R8-2006-0034 found that acute toxicity effects are not likely to occur at or below 40 ppt. The flow volumes associated with a 7.5:1 dilution factor identified in Order No. R8-2006-0034 achieves the objectives of the Ocean Plan, which designates the acute toxicity mixing zone as extending from the point of discharge outward to a point 10 percent of the distance to the designated Zone of Initial Dilution (ZID), which in this case is 100 feet. Therefore, under the co-located operating condition, compliance with the requirements of Order No. R8-2006-0034 would ensure that no significant impacts related to elevated salinity would occur.

Since the issuance of Order No. R8-2006-0034, the applicant is now considering both co-located and stand-alone operational scenarios. While the total volume of product water and discharge from the desalination facility would not change under stand-alone scenario, the power plant discharge would change, in that discharge volumes would be less variable and the discharge would no longer contain elevated temperatures resulting from HBGS cooling under average operating conditions. This affects the mixing characteristics of the concentrated seawater discharge from the desalination facility, because the heated discharge is more buoyant, resulting in more effective dispersal. Therefore, modification to Order No. R8-2006-0034 will be needed for stand-alone operating conditions. A modified NPDES permit (like the existing NPDES permit) would implement applicable Ocean Plan water quality standards.

The California Energy Commission's Emergency Certification Action for HBGS Units 3 and 4

While the California Energy Commission (CEC) does not have jurisdiction over the Seawater Desalination Project at Huntington Beach, the CEC does have jurisdiction over certain aspects of the HBGS. In May 2001, the CEC granted an emergency certification for the retooling and restarting of HBGS Units 3 and 4, which had been retired in 1995. As part of that emergency process, the CEC conditions of approval included a requirement that AES pay for a study to determine the actual impingement and entrainment losses resulting from the operation of the HBGS once-through

[5] Order No. R8-2006-0034 (NPDES CA8000403), Waste Discharge Requirements for the Poseidon Resources LLC Seawater Desalination Facility Discharge to the Pacific Ocean. August 25, 2006.
[6] Water Quality Control Plan, Ocean Waters of California. State Water Resources Control Board. 2005.
[7] California Ocean Plan. Page 26.
[8] Page 10 of "Response in Opposition to Petition of Surfrider Foundation and Orange County Coastkeeper (Waste Discharge Requirements Order No. R8-2006-0034 [NPDES CA8000403] for Poseidon Desalination Facility, Santa Ana Water Board, SRWCB/OCBB File A-1776". February 23, 2007.

cooling water system. This study (the "AES Huntington Beach LLC Generating Station Entrainment and Impingement Study") was completed in April 2005. Data from this study were used to evaluate impingement and entrainment effects of the Seawater Desalination Project at Huntington Beach.

The CEC also required that AES provide mitigation/compensation funds to be used for such things as tidal wetlands restoration, creation of artificial reefs, or some other form of habitat compensation that is sufficient to fully address the species impacts identified, if studies determined that the operations would result in significant impacts to one or more species of coastal fish. This requirement was to be determined by the CEC in consultation with AES, state, federal, and local resource agencies. Working together with the California Department of Fish and Game, the California Coastal Commission, the SARWQCB, and National Marine Fisheries Service, the CEC determined that impacts to marine species resulting from operation of HBGS Units 3 and 4 would be mitigated by AES's funding of the purchase, restoration, and maintenance of 66.8 acres of tidal wetlands, at a cost of $5,511,000. AES agreed to this mitigation and upon payment of the mitigation funding to the Huntington Beach Wetlands Conservatory, the CEC extended the HGBS Retool license for Units 3 and 4 until September 30, 2011.

Pursuant to an application filed with the CEC on March 1, 2010, AES has requested an extension of the certification expiration date until December 31, 2020 (AES 2010). The request for an extension references the pending policy changes being considered by the SWRCB relating to the regulation of once-through cooling under Clean Water Act section 316(b).

Clean Water Act Section 316(b); Proposed Power Plant Once-Through Cooling Regulation

The SWRCB has scheduled a public hearing for May 4, 2010, to consider adopting a proposed Water Quality Control Policy on the use of coastal and estuarine water for power plant cooling. The proposed policy establishes technology-based standards to implement the federal Clean Water Act section 316(b). Section 316(b) applies specifically to cooling water intake structures used by power plants (and does not apply to the operation of seawater desalination facilities). The latest draft of the proposed policy is dated March 22, 2010.

Section 316(b) is implemented through NPDES permits. Because there currently are no federal or state standards for implementing section 316(b) for existing power plants, RWQCBs implement section 316(b) on a case-by-case basis, using their independent judgment. If it is adopted, the proposed SWRCB policy for implementing Clean Water Act section 316(b) would apply to 19 existing power plants, including the HBGS. The intent of the proposed policy is to protect marine and estuarine life from the impacts of once-through cooling.

According to the milestones set in the March 22, 2010 draft of the proposed policy, the HBGS would be required to be in compliance with the new policy by December 31, 2020.

Porter Cologne Water Quality Control Act, California Water Code Section 13142.5(b)

The Porter Cologne Water Quality Control Act, California Water Code 13142.5(b) states as policy that new industrial facilities using seawater for processing must use the best available site, design, technology and mitigation feasible to minimize intake and mortality of marine life. The SARWQCB will evaluate the site, design, technology and mitigation associated with the project in their analysis and permitting of the facility.

California Coastal Act, California Public Resources Code, Division 20, Sections 30230 and 30231

Sections 30230 and 30231 of the California Coastal Act (Coastal Act) require generally that marine resources be maintained, enhanced, and where feasible, restored. They also require that the marine environment be used in a manner that sustains biological productivity and maintains healthy populations of all marine species. Coastal Act Section 30231 requires that biological productivity be maintained, and where feasible, restored, including by minimizing the adverse effects of entrainment.

Magnuson-Stevens Fishery Conservation and Management Act, as amended 1996

The Magnuson-Stevens Act requires fishery management plans to identify as essential fish habitat (EFH) those areas that are necessary to fish for their basic life functions. EFH is defined as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish. "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities. "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle. The Act charges NOAA Fisheries (the National Marine Fisheries Service) with developing conservation measures to protect and enhance these habitats. While state agencies are not required to consult with NOAA Fisheries or respond to any EFH Conservation Recommendations, NOAA Fisheries is required by the Magnuson-Stevens Act to make EFH Conservation Recommendations to state agencies if their actions would adversely impact EFH [9]

Federal Endangered Species Act

The federal Endangered Species Act (ESA) extends legal protection to plants and animals listed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS) and the National Oceanographic Atmospheric Administration Fisheries Service (NOAA Fisheries), and authorizes the agencies to review proposed federal actions to assess potential impacts to listed species. Listed species are those that are threatened or endangered (in danger of extinction throughout all or a significant portion of their range) and have been the subject of final regulation and listing in the Federal Register. Those species officially proposed for listing in a Federal Register notice are also represented.

Section 9 of the ESA and federal regulations promulgated pursuant to Section 4(d) of the ESA prohibit the "take" of endangered and threatened species, respectively, without special exemption (16 U.S.C 1531 et seq.). "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is further defined as intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out of an otherwise lawful activity,

[9] http://www.nmfs.noaa.gov/habitat/habitatprotection/efh/index.htm, accessed February 5, 2010.

provided that such taking is in compliance with the terms and conditions of the incidental take statement.

Sections 7 and 10 of the ESA allow “incidental take” of a listed species via a federal or private action, respectively, through formal consultation with the USFWS and/or NOAA Fisheries.

Marine Mammal Protection Act

Marine mammals are protected by the Marine Mammal Protection Act of 1972 and, for those species listed as endangered or threatened, by the Endangered Species Act of 1973. National Marine Fisheries Service is the federal agency charged with the responsibility of enforcing the provisions of the Act. The Marine Mammal Protection Act prohibits the take (including harassment, disturbance, capture, and death) of any marine mammals except as set forth in the act[10].

California Endangered Species Act

The California Endangered Species Act (CESA) provides protection and prohibits the take of plant, fish, and wildlife species listed as rare, threatened, or endangered by the State of California. Unlike the federal ESA, state-listed plants have the same degree of protection as wildlife. Take authorization may be obtained by the project applicant from the California Department of Fish and Game (CDFG) under CESA Sections 2091 and 2081. Section 2091, like FESA Section 7, provides for consultation between a state lead agency under the California Environmental Quality Act (CEQA) and CDFG, with issuance of take authorization if the project does not jeopardize the listed species. Section 2081 allows take of a listed species for educational, scientific, or population management purposes. In this case, private developers consult with CDFG to develop a set of measures and standards for managing the listed species, including full mitigation for impacts and funding of implementation and monitoring of mitigation measures.

California Fish and Game Code

The California Fish and Game Code provides protection from take for a variety of species, referred to as “fully protected” species. Section 5050 lists protected amphibians and reptiles. Section 3515 prohibits take of fully protected fish species. Eggs and nests of all birds are protected under Section 3503, nesting birds (including raptors and passerines) under Sections 3503.5 and 3513, birds of prey under Section 3503.5, and fully protected birds under Section 3511. Migratory non-game birds are protected under Section 3800. Section 86 of the California Fish and Game Code defines take as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” Except for take related to scientific research, all take of fully protected species is prohibited.

Section 3503 of the California Fish and Game Code prohibits the killing of birds or the destruction of bird nests. Section 3503.5 prohibits the killing of raptor species and the destruction of raptor nests. CDFG has jurisdictional authority over streambed and wetland resources associated with rivers, streams, and lakes under Sections 1600–1607. CDFG has the authority to regulate all work under the jurisdiction of the State of California that would substantially divert, obstruct, or change the natural flow of a river, stream, or lake; substantially change the bed, channel, or bank of a river, stream, or lake; or use material from a streambed.

[10] http://www.nmfs.noaa.gov/pr/laws/mmpa.htm (accessed April 14, 2010).

California Marine Life Protection Act

The Marine Life Protection Act (MLPA) directs the state to reevaluate and redesign California's system of marine protected areas (MPAs) to: increase coherence and effectiveness in protecting the state's marine life and habitats, marine ecosystems, and marine natural heritage, as well as to improve recreational, educational and study opportunities provided by marine ecosystems subject to minimal human disturbance. The MLPA also requires that the best readily available science be used in the redesign process, as well as the advice and assistance of scientists, resource managers, experts, stakeholders and members of the public.

California is taking a regional approach to redesigning MPAs, and has divided the state into five study regions. Three types of MPA designation types are used in the MLPA process: state marine reserves (SMR), state marine parks (SMP) and state marine conservation areas (SMCA). There are currently six draft MPA proposals for the south coast study region. The project site is not within any of the proposed MPAs, with the nearest proposed MPAs being the Bolsa Chica SMCA, Bolsa Chica SMR, and Upper Newport Bay SMCA.

IMPACTS

SIGNIFICANCE CRITERIA

Significant impacts would occur if:

- Existing or potential sources of ocean water contamination would substantially degrade ocean water quality at the HBGS intake resulting in adverse effects on source water for the Seawater Desalination Project at Huntington Beach

- The discharge from the Seawater Desalination Project at Huntington Beach would result in a substantial degradation in ocean water quality because:

    - Increased salinity levels would cause State of California Ocean Plan applicable numeric and/or narrative objectives to be exceeded relative to water quality concentration, and acute or chronic toxicity and/or concentration standards for receiving waters established in the California Ocean Plan for protection of aquatic habitat and human heath would be exceeded by:

        1. Under Co-located conditions, the project operating in a manner that is inconsistent with or in violation of NPDES Order No. R8-2006-0034

        2. Under Stand-alone conditions, project operations resulting in a sustained salinity level of 40 ppt beyond 100 feet from the base of the discharge tower (10% of the ZID) would

    - Discharge would exceed regulatory limits

    - Project-related impingement and entrainment impacts would substantially reduce populations of affected species such that the sustainability of those populations could not be maintained.

DISCUSSION OF SIGNIFICANCE THRESHOLDS RELATIVE TO SALINITY

Salinity Thresholds used in the 2005 REIR:

Because there were no universally accepted standards for thresholds of significance for elevated salinity at the time that the previous REIR was certified, it defined the threshold for elevated salinity to be:

- Significant impacts related to elevated salinity would occur if the project would discharge salinity levels that result in substantial ecological losses to source populations of marine organisms; and/or
- Permanent elevation of salinity levels to 37.5 ppt or greater outside of a reasonable distance from the discharge core would be significant.

Since the time that the REIR was certified, specifically relevant guidance has been provided through NPDES Order No. R8-2006-0034. Considerations that the SARWQCB applied in establishing effluent standards in Order No. R8-2006-0034 are based on receiving water standards and provisions established within the Ocean Plan, and therefore represent appropriate thresholds of significance for the project.

Revised Salinity Thresholds Based on NPDES Permit Provisions:

As noted above, the Seawater Desalination Project at Huntington Beach (specifically the co-located operating condition of the project) maintains an approved NPDES Order No. R8-2006-0034 (NPDES CA8000403), which was issued by the SARWQCB[11] on August 25, 2006, and subsequently upheld by the State Water Resources Control Board. Order No. R8-2006-0034 establishes the following[12]:

- The Zone of Initial Dilution (“ZID”) is defined as the area extending 1,000 feet from the base of the discharge tower[13]
- In issuing Order No. R8-2006-0034, the SARWQCB determined that there was not a reasonable potential for acute toxicity effects to occur below a concentration of 40 ppt[14], and therefore did not establish a numeric acute toxicity limit, and instead relied on the narrative objectives of the Ocean Plan in achieving acute toxicity requirements. Based on these actions, an appropriate numeric concentration limit for acute toxicity is established as 40 ppt

[11] Order No. R8-2006-0034 (NPDES CA8000403), Waste Discharge Requirements for the Poseidon Resources LLC Seawater Desalination Facility Discharge to the Pacific Ocean. August 25, 2006.
[12] Ibid.
[13] Page 10 of "Response in Opposition to Petition of Surfrider Foundation and Orange County Coastkeeper (Waste Discharge Requirements Order No. R8-2006-0034 [NPDES CA8000403] for Poseidon Desalination Facility, Santa Ana Water Board, SRWCB/OCBB File A-1776". February 23, 2007.
[14] Page 11 of "Response in Opposition to Petition of Surfrider Foundation and Orange County Coastkeeper (Waste Discharge Requirements Order No. R8-2006-0034 [NPDES CA8000403] for Poseidon Desalination Facility, Santa Ana Water Board, SRWCB/OCBB File A-1776". February 23, 2007.

- Water quality based effluent limitations (WQBELs) were established that correspond to an "initial dilution" of 7.5:1 for the combined desalination/HBGS discharge.[15] Initial dilution is the proportion of dilution water volume to effluent volume at the edge of the ZID.

The approved project under co-located operating conditions, achieves compliance with the standards established in Order No. R8-2006-0034 and the water quality objectives established within the Ocean Plan.

As noted above, because the applicant is pursuing approvals for the stand-alone operating condition as well, the characteristics of the discharge change for the following reasons:

- Because the temperature of HBGS discharge is elevated, it is more buoyant than seawater at ambient temperature and the discharge plume will rise.

- With the stand-alone operating condition, the discharge would be "unheated", and with the elevated salinity levels, would be denser than ambient seawater resulting in accelerated downward movement that results in a larger area of the sea floor affected by the elevated salinity levels (i.e., a larger ZID).

- With the stand-alone operation conditions, discharge volumes would be less variable than HBGS discharge volumes. Under stand-alone conditions, discharge flows will be maintained at a near-constant 152 MGD when the desalination facility is operating at its 50 MGD potable water production capacity. Under the approved co-located operations, discharge flows vary, as power production at HBGS (and thus discharge flows) vary depending on grid-based electrical supply and demand.

- In order to maintain the standards established in Order No. R8-2006-0034, a minimum stand-alone intake volume of 152 MGD is required. Therefore, based on guidance from Order No. R8-2006-0034 on establishment of the ZID boundaries, as well as on acute toxicity concentration levels, the appropriate significance threshold for a stand-alone operating condition would be the following:

  1. Maintain a salinity level of 40 ppt at 100 feet or less from the base of the discharge tower (10% of the ZID) under worst case ocean mixing conditions

  2. Maintain a dilution factor of 7.5:1 or greater at the edge of the ZID.

DISCUSSION OF SIGNIFICANCE THRESHOLDS RELATIVE TO MARINE BIOLOGY

- CEQA Guidelines section 15065 addresses the beginning of the CEQA process and provides direction as to the findings of significance that must be made by a lead agency when it determines whether or not to prepare an environmental impact report. CEQA Guidelines section 15065(a)(1) provides that "[a] lead agency shall find that a project may have a significant effect on the environment and thereby require an EIR to be prepared for the project where there is substantial evidence, in light of the whole record, that . . . [t]he project has the potential to: substantially reduce the habitat of a fish or

15 Finding II.J of Order No. R8-2006-0034.

wildlife species; cause a fish or wildlife population to drop below self-sustaining levels; [or] . . . substantially reduce the number or restrict the range of an endangered, rare or threatened species." CEQA Guidelines section 15065 clarifies that findings of significance are not required if a project results in *any* reduction in habitat or population of a species, but only when habitat would be "substantially reduced" by a project or when a project would cause population levels of a species to "drop below self-sustaining levels."

- The guidance for developing significance thresholds for biological resources contained in Appendix G of the CEQA Guidelines also emphasizes the concept of "substantial adverse effect." It follows, therefore, that when considering potential impacts to marine biological resources under CEQA, the concepts of "substantially reduce" and "drop below self-sustaining levels" are important to the determination of significance under CEQA Guidelines section 15065.

- With respect to marine biological resources, the primary issue of concern for the project relates to effects from impingement and entrainment of marine organisms caused by the seawater intake system. There is no specific regulatory guidance for determining the significance of these impacts for seawater desalination facilities, and regulatory actions taken with respect to once-through cooling for power plants are not specifically applicable or controlling.

- In the March 22, 2010, Draft Final Substitute Environmental Document prepared by the SWRCB for its proposed Water Control Policy on the use of Coastal and Estuarine Waters for Power Plant Cooling, the SWRCB questioned whether its proposed policy (see discussion of Clean Water Act section 316(b) above) should be expanded to address seawater desalination facilities. Although the policy is exempt from CEQA, the SWRCB prepares Substitute Environmental Documents in lieu of EIRs or other environmental documents when proposing statewide water quality objectives and programs of implementation. In this document, SWRCB recommended that desalination facilities be addressed "in a separate plan or policy" and noted that seawater desalination facilities are subject to the existing NPDES permit process as well as California Water Code Section 13142.5(b).

- The Substitute Environmental Document reports impingement and entrainment from power plants along the California coast on a cumulative basis, but does not reach a conclusion under CEQA as to the significance of the effects. Moreover, the analysis does not address specific marine ecosystems, or species affected by the withdrawals. While the analysis acknowledges once-through-cooling as an overall State-wide issue, it does not identify specific effects in the SCB or in the vicinity of the HBGS. As recognized by SWRCB staff in the substitute environmental document, seawater desalination facilities and power plants that use once-through cooling technology have different operational characteristics (e.g., water intake volumes and velocities and thermal impacts). In addition, power plants are viewed differently from seawater desalination in terms of the application of "Best Technology Available" for minimization of environmental effects, because the use of seawater is secondary to the primary purpose of power production whereas it is the primary purpose of desalinated water production. But because the type of impacts, although not on the same scale, are similar to those experienced with power plants that utilize cooling water intake structures, guidance provided for those facilities can be helpful in formulating appropriate significance thresholds for the project.

- Applicable guidance is found in the U.S. EPA's draft "Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500." This document generally defines "adverse environmental impact" as entrainment or impingement effects of a magnitude that would jeopardize the protection and propagation of a balanced population of shellfish and fish in and on the body of water from which the cooling water is withdrawn (USEPA 1977).

- Relying therefore on the CEQA Guidelines and Appendix G and recognizing the guidance for evaluating adverse impacts of cooling water intake structures in the power plant industry,

- the standard applied to the Seawater Desalination Project at Huntington Beach is whether the project-related impingement and entrainment impacts would substantially reduce populations of affected species such that the sustainability of those populations could not be maintained.

OCEAN WATER QUALITY IMPACTS

Oceanographers from the Scripps Institution of Oceanography conducted modeling studies using a computer model that simulates ocean conditions near the HBGS intake and outfall (refer to Appendix K, Hydrodynamic Modeling Report). The model calculates the degree of mixing of various potential contaminant sources with the Pacific Ocean. The Santa Ana River, Talbert Marsh, OCSD wastewater discharge outfall, HBGS discharge and proposed desalination facility discharge were all investigated. Seawater contamination resulting from any of the above sources could potentially impact the quality of desalinated product water and, to some degree, the quality of byproduct concentrated seawater water to be discharged from the HBGS outfall. The model results show the amount of dilution of each of these sources of pollutants under different oceanographic conditions.

The modelers from Scripps used their many years of experience working along the Southern California coast to determine the "worst case" conditions that would be modeled. The "worst case" conditions were chosen to determine if any adverse water quality or environmental impacts occurred under extreme ocean and weather conditions that were most likely to show an effect. For example, the effect of the Santa Ana River and Talbert Marsh storm water on water quality at the HBGS intake was modeled assuming a very large, prolonged storm event and ocean currents flowing from the mouth of the river towards the HBGS facility. Normally, ocean currents flow in the opposite direction, down the coast (southeast) away from the HBGS.

It should be noted that the hydrodynamic modeling of potential source water impacts included effects related to operation of the HBGS, and therefore addresses the co-located operational scenario. However, discontinuation of HBGS operation as contemplated in the stand-alone operational scenario would not result in any adverse changes in source water quality. Therefore, the following analysis of source water quality applies to both the co-located and stand-alone operational scenarios.

Degradation of Source Water Quality

The following discussion addresses the significance threshold identified for potential source water quality impacts on the desalination facility from existing sources of potential contamination.

OCSD Wastewater Discharge

As stated above, the OCSD sewage treatment facility discharges a mix of primary and secondary treated wastewater at an outfall located 4.5 miles offshore at a depth of 195 feet. The OCSD conducted extensive ocean monitoring to evaluate potential environmental and public health effects from the discharge of treated wastewater off of Huntington Beach and Newport Beach, California. The data were used to determine compliance with receiving water conditions as specified in the District's National Pollution Discharge Elimination System (NPDES) permit. The monitoring program was designed to determine compliance with permit criteria and to maintain the District's long-term data collection used for trend analyses. Minor changes to receiving waters and sediment quality were identified, predominantly near the outfall. These changes were typically small and not suggestive of potential for adverse effects on biota. Biological communities outside the zone of initial dilution (ZID) were generally healthy, diverse, and comparable to those occurring at similar depths and bottom types throughout the Southern California Bight. A trend of decreasing diversity has occurred for the infaunal (small invertebrates) communities within the ZID, but not in other parts of the monitoring area. Low concentrations of bacteria in water contact zones, in concert with the limited distributions of ammonia and absence of associations of the wastewater plume with phytoplankton blooms, suggest that the present discharge has no discernable impact on environmental or human health. The limited nature of these impacts was reflected in the healthy and diverse infauna, fish, and macroinvertebrate communities seen in the monitoring area outside the ZID. Invertebrate communities outside the ZID are normal similar to reference areas in the SCB.[16]

The OCSD wastewater discharge would have the greatest potential to impact water quality at the HBGS intake with summer El Nino conditions when currents are flowing northwest towards the HBGS. In addition, for worst case conditions, the model assumed that:

- OCSD was discharging at its maximum allowable rate of 480 MGD;
- The temperature conditions in the ocean would allow the wastewater plume to be near the depth of the HBGS intake;
- A current would travel upcoast (northwest);
- End of pipe total coliform counts would be at the mid- to high end of operational ranges prior to OCSD disinfection resolution; and
- HBGS would operate at a maxium flow rate and intake velocity (507 MGD and two feet per second, respectively).

It should be noted that these conditions are atypical and the likelihood of them occurring simultaneously is extremely low.

16 Ocean Monitoring Program 2007-08 Annual Report, Orange County Sanitation District, 2008.

The worst case model results show that the OCSD discharge is diluted 30 million to one at the HBGS intake. Any contaminants discharged at the OCSD outfall would be diluted to background levels at the intake to the HBGS. Therefore, the OCSD discharge was not found to be a significant source of contamination at the HBGS intake, and would not result in any significant effects on source water quality.

Furthermore, the proposed desalination project discharge is not expected to have a measurable impact on the OCSD's wastewater treatment plant effluent water quality, and therefore will not require changes to OCSD's monitoring program or additional monitoring in the currently monitored area. The OCSD discharge outfall is more than five miles (26,400 feet) away from the power plant outfall. By the time the desalination facility discharge reaches the OCSD monitoring area, the salinity change contributed to the desalination facility discharge will be within the range of natural variability, and therefore, will be non-detectible. Refer to Appendix K, Hydrodynamic Modeling Report, for additional information.

Urban Stormwater Runoff

The Santa Ana River drains a highly urbanized watershed of 1,700 square miles and flows into the ocean approximately 8,300 feet southeast from the intake to the AES facility. The Talbert Marsh, which receives urban runoff from the City of Huntington Beach and several other communities, discharges to the ocean about 7,000 feet southeast from the AES intake. Under typical conditions, the discharges from the Santa Ana River and Talbert Marsh flow away (southeast) from the AES intake. However, there are times when the currents flow northwest and carry river and marsh water towards the AES facility. Since freshwater is less dense than seawater, the river and marsh discharges normally float on the surface of the sea and are slowly mixed into deeper waters. During storms, winds and waves can mix the river and marsh plumes into deeper water more rapidly.

Storm water discharges from the Santa Ana River and Talbert Marsh would have the greatest potential to impact water quality at the HBGS intake if an extreme storm event coincided with an El Nino winter and maximum pumping of cooling water into the generating station. Although it is unlikely that all of these events would coincide with one another, this was considered to be the "worst-case" scenario for determining if the Santa Ana River and Talbert Marsh contribute contaminants to the HBGS intake.

The model results show that during a 24-hour extreme runoff period only 0.0003 percent of the water at the HBGS intake would come from the Santa Ana River and Talbert Marsh and the remaining 99.9997 percent would be seawater. These results show that contaminants are not transported to the HBGS intake from the Santa Ana River and Talbert Marsh during extreme storm conditions. More detailed modeling results are presented in Appendix K, Hydrodynamic Modeling Report. Therefore, urban storm water runoff does not present any significant impacts on source water quality.

Dry Weather Runoff

The mouth of the Talbert Marsh is closed by sand spits for short periods of time during the dry season. This can trap urban runoff and seawater in the Marsh and lower channel system. When very high tides rise over the sand spit, the mouth of the Talbert Marsh opens and water in the marsh can be released into near shore ocean waters in a single tidal flush. Because Talbert Marsh waters are similar to seawater salinity in the dry season, the discharge does not float on the sea surface and may quickly mix into deeper ocean waters where the HBGS intake is located.

Tidal flushing of the Talbert Marsh would have the greatest potential to impact water quality at the HBGS intake during high spring tides combined with summer El Nino conditions when currents are flowing northwest from the marsh towards the intake. The model showed that under these worst case conditions, the marsh water is diluted 20,000 to one and essentially does not reach the intake. This is due to the fact that the marsh water is released into the surf zone and the onshore waves keep the marsh water in the shallow nearshore waters, whereas the HBGS intake is located 1,840 feet offshore at a depth of approximately 33 feet. Therefore, urban dry weather runoff does not present any significant impacts on source water quality.

Recirculation of HBGS Discharge

The HBGS outfall is located approximately 1,500 feet offshore and 340 feet from the HBGS intake. The potential for recirculation of the discharge into the intake was examined. The discharge consists primarily of cooling water, but a small amount of power plant process wastewater and storm water can be mixed with the cooling water. The concentrated seawater from the proposed desalination facility will also be mixed with the power plant cooling water.

Recirculation of the HBGS discharge would have the greatest potential to impact water quality at the intake during El Nino storm conditions when the maximum amount of storm water is being discharged through the outfall. The hydrodynamic model for recirculation of the HBGS discharge was run using the El Nino conditions of February 1998 and the maximum allowable discharge of 1.66 MGD of generating station process wastewater and storm water. In addition, the proposed desalination facility was assumed to be running at full capacity so that 50 MGD of concentrated seawater discharge was mixed with the cooling water discharge. The model results for a 7-day extreme runoff period show that only 0.1 to 0.3 percent of the HBGS discharge would be recirculated to the intake. It should be noted that in the stand-alone operating condition, the discharge recirculation would be slightly less that the 0.3 percent modeled for the co-located condition. Based on these results, the recirculation of the HBGS discharge during storm events does not present any significant impacts on source water quality.

Los Angeles and San Gabriel Rivers

As stated above, the Los Angeles River discharges to the ocean approximately 16 miles upcoast (i.e. northwest) from HBGS, while the San Gabriel River discharges approximately 11 miles upcoast. The amount of dilution that occurs and the fact that the generating station intake is at a depth of approximately 33 feet indicates that contaminants entering the ocean from these two rivers would not likely affect the water quality at the HBGS intake, and would not present any significant impacts on source water quality.

Cruise Ships and Fishing Boats

The nearest major port for cruise ships is located approximately 16 miles northwest of the HBGS intake. Ingress/egress routes for cruise ships for Long Beach Harbor and Los Angeles Harbor do not come in close proximity to the HBGS. In addition, given the limited nature of sportfishing that occurs in the project site vicinity, it is not anticipated that fishing boats would have a significant impact on source water quality.

Recreation

Any contaminants released into the ocean due to recreational use are likely to be small in quantity greatly diluted due to tidal action. It would be difficult for such contaminants to reach the HBGS intake due to its depth of approximately 33 feet below the ocean surface. Therefore, recreational uses would not present any significant impacts on source water quality.

Oil and Gas Production Facilities

As stated above, there are two offshore oil platforms approximately 1.5 miles west of the HBGS intake and four platforms approximately 10 miles west of the intake. There have not been any reportable spills or leaks from the offshore oil platforms or the pipelines. A catastrophic event at one of the offshore platforms that is near the coast could affect water quality at the HBGS intake. However, given the relatively low probability based on operational history, oil and gas productions would not present any significant impacts on source water quality.

Red Tides and Algal Toxins

Refer to Section 4.11, *PRODUCT WATER QUALITY* for a discussion of potential impacts in regards to red tides and algal toxins.

Operations at HBGS

Activities or conditions occurring along the HBGS cooling water system between the HBGS intake and the point at which water is diverted toward the desalination facility could impact water quality (particularly in regards to metals). The diversion point would occur after cooling water has traveled through the HBGS condensers.

There are numerous water quality constituents regulated in drinking water supplies. Samples were collected from the HBGS intake vault and from the outlet of the condensers (where the desalination facility intake will be located). Tables 4.10-4A and 4.10-4B, *COMPARISON OF HBGS INTAKE WELL MONITORING DATA TO PRIMARY MAXIMUM CONTAMINANT LEVELS* compares the intake data to the California Department of Health Services (DHS) primary MCLs. Table 4.10-5A and 4.10-5B, *COMPARISON OF INTAKE WELL MONITORING DATA TO SECONDARY MAXIMUM CONTAMINANT LEVELS* compares the data to the secondary MCLs. Although MCLs apply to treated drinking water, raw water concentrations that exceed MCLs provide an indication of potential contaminants of concern. None of the primary MCLs are exceeded in the intake water and the only secondary MCLs that are exceeded are salts (TDS, chloride, sulfate) that would be removed by the reverse osmosis process. Therefore, existing contaminant levels in the HBGS discharge are not anticipated to present any significant impacts on source water quality.

Potential sources of contaminants at the HBGS site also include cycle water, storm water, and wastewater that are mixed with the cooling water, and on-site spills of hazardous materials of sufficient magnitude to enter the floor drainage system or yard storm drainage system. These potential contaminants are discussed in more detail in Appendix L, Watershed Sanitary Survey.

<u>**Cycle Water Discharges**</u>

Cycle water is discharged to the cooling water system at various locations as the cooling water flows through the generating station. The cycle water is under vacuum so the cooling water leaks into the cycle water but the cycle water does not leak into the cooling water. There are several locations where cycle water is discharged into the cooling water system. Table 4.10-6, CYCLE WATER DISCHARGES TO THE HBGS COOLING WATER SYSTEM presents a summary of the discharges to the cooling water system that will be upstream of the intake to the desalination facility. The contaminants in these discharges will be greatly diluted by the large volume of cooling water compared to the small volume of the discharges. The only chemical of concern in a drinking water source is nitrite. The other chemicals in the discharges are not toxic to humans and drinking water standards have not been established. Because the volume of cooling water represents a maximum of 0.002 percent of the cooling water flowing through one unit at the HBGS, the nitrite concentration of 800 mg/L will be diluted to about 0.02 mg/L in the cooling water that would reach the desalination facility. This level of nitrite is well below the drinking water MCL of one mg/L. Nitrite and the other chemicals present in the cycle water discharges will easily be removed by the reverse osmosis membranes, and would not present any significant impacts on source water quality.

TABLE 4.10-4A
COMPARISON OF HBGS INTAKE WELL MONITORING DATA TO PRIMARY MAXIMUM CONTAMINANT LEVELS

CONSTITUENT	PRIMARY MAXIMUM CONTAMINANT LEVEL	MONITORING DATA		
		NUMBER OF SAMPLES	MEAN CONCENTRATION	MAXIMUM CONCENTRATION
INORGANIC CHEMICALS				
Aluminum, mg/L	1	3	0.063	0.073
Antimony, mg/L	0.006	3	0.00009	0.00013
Arsenic, mg/L	0.05	3	0.002	0.003
Asbestos, MFL	7			
Barium, mg/L	1	14	<0.000001	<0.000001
Beryllium, mg/L	0.004	3	<0.000005	<0.000005
Cadmium, mg/L	0.005	4	0.00003	0.0001
Chromium, mg/L	0.05	4	0.002	0.003
Copper, mg/L	1.3	4	0.0005	0.0008
Cyanide, mg/L	0.2	2	<0.001	<0.001
Fluoride, mg/L	2	14	0.724	0.9
Lead, mg/L	0.015	4	0.0001	0.0002
Mercury, mg/L	0.002	4	<0.0001	<0.0001
Nickel, mg/L	0.1	5	0.001	0.002
Nitrate, mg/L as N	10	14	<0.1	<0.1
Nitrate + Nitrite, mg/L as N	10			
Nitrite, mg/L as N	1			
Selenium, mg/L	0.05	3	0.005	0.008

TABLE 4.10-4A (CONTINUED)

CONSTITUENT	PRIMARY MAXIMUM CONTAMINANT LEVEL	MONITORING DATA		
		NUMBER OF SAMPLES	MEAN CONCENTRATION	MAXIMUM CONCENTRATION
Thallium, mg/L	0.002	3	0.00004	0.00006
Radioactivity				
Gross alpha particle, pCi/L	15	3	3.62	6.62
Gross beta particle, pCi/L	50	2	14.15	23.4
Radium 226 & 228, pCi/L	5	1	0.226	
Radium 226, pCi/L				
Radium 228, pCi/L				
Strontium-90, pCi/L	8			
Tritium, pCi/L	20,000			
Uranium, pCi/L	20			
ORGANIC CHEMICALS				
Atrazine, mg/L	0.003	1		<0.010
Benzo(a)pyrene, mg/L	0.0002	1		<0.001
Carbofuran, mg/L	0.018	1		<0.050
Di(2-ethylhexyl)pthlate, mg/L	0.004	1		<0.030
Endothall, mg/L	0.100	1		<0.400
Simazine,mg/L	0.004	1		<0.010
2,3,7,8 – TCDD, pg/L	0.003	1		<1.69

Note: August 2001 – November 2001 data as per sanitary survey approved by DHS August 2002.

TABLE 4.10-4B
COMPARISON OF HBGS INTAKE WELL MONITORING DATA TO PRIMARY MAXIMUM CONTAMINANT LEVELS

CONSTITUENT	PRIMARY MAXIMUM CONTAMINANT LEVEL	MONITORING DATA		
		NUMBER OF SAMPLES	MEAN CONCENTRATION	MAXIMUM CONCENTRATION
INORGANIC CHEMICALS				
Aluminum, mg/L	1	8	0.204	0.496
Antimony, mg/L	0.006	8	0.00011	0.00014
Arsenic, mg/L	0.05	8	0.0016	0.0025
Barium, mg/L	1	14	<0.000001	<0.000001
Beryllium, mg/L	0.004	8	<0.000004	<0.00002
Cadmium, mg/L	0.005	8	0.00004	0.0003
Chromium, mg/L	0.05	8	0.0013	0.0048
Copper, mg/L	1.3	8	0.0011	0.002
Cyanide, mg/L	0.2	4	<0.001	<0.001
Fluoride, mg/L	2	4	1.6	1.9
Lead, mg/L	0.015	8	0.0002	0.0004
Mercury, mg/L	0.002	8	0.00002	0.00005

TABLE 4.10-4B (CONTINUED)

CONSTITUENT	PRIMARY MAXIMUM CONTAMINANT LEVEL	MONITORING DATA		
		NUMBER OF SAMPLES	MEAN CONCENTRATION	MAXIMUM CONCENTRATION
Nickel, mg/L	0.1	8	0.0029	0.0085
Nitrate, mg/L as N	10	14	<0.1	<0.1
Nitrite, mg/L as N	1	1	<0.6	<0.6
Nitrite + Nitrate, mg/L as N	10	1	<0.6	<0.6
Selenium, mg/L	0.05	8	0.00003	0.00005
Thallium, mg/L	0.002	8	0.000011	0.000025
RADIOACTIVITY				
Gross alpha particle, pCi/L	15	3	3.62	6.62
Gross beta particle, pCi/L	50	2	14.15	23.4
Radium 226 & 228, pCi/L	5	1	0.226	0.226
Strontium-90, pCi/L	8	1	< 2	< 2
Tritium, pCi/L	20,000	1	24.6	24.6
Uranium, pCi/L	20	1	1.64	1.64
Organic Chemicals				
Atrazine, mg/L	0.003	1	<0.010	<0.010
Benzo(a)pyrene, mg/L	0.0002	4	<0.000001	<0.000001
Carbofuran, mg/L	0.018	1	<0.050	<0.050
Di(2-ethylhexyl)pthlate, mg/L	0.004	1	<0.030	<0.030
Endothall, mg/L	0.100	1	<0.400	<0.400
Simazine,mg/L	0.004	1	<0.010	<0.010
2,3,7,8 – TCDD, pg/L	0.003	1	<1.69	<1.69

Note: Nov. 2001-Dec 2002 water quality data collected for the desalination facility design and operation criteria.

Urban Runoff Discharges

Storm runoff from the HBGS site and a limited amount of off-site urban runoff is currently discharged to the cooling water system downstream of the intake to the desalination facility, and not affect water quality at the desalination intake.

TABLE 4.10-5A
COMPARISON OF HBGS INTAKE WELL MONITORING DATA TO SECONDARY MAXIMUM CONTAMINANT LEVELS

CONSTITUENT	SECONDARY MAXIMUM CONTAMINANT LEVEL	MONITORING DATA		
		NUMBER OF SAMPLES	MEAN CONCENTRATION	MAXIMUM CONCENTRATION
Aluminum, mg/L	0.2	3	0.063	0.073
Color, units	15			
Copper, mg/L	1.0	4	0.0005	0.0008
Corrosivity	Non corrosive			
MBAS, mg/L	0.5			
Iron, mg/L	0.3	3	0.051	0.081
Manganese, mg/L	0.05	3	0.006	0.009
MTBE, mg/L	0.005	2	<0.002	<0.003
Threshold Odor Number, units	3			
Silver, mg/L	0.1	4	0.0003	0.0006
Thiobencarb, mg/L	0.001	1		<0.010
Turbidity, units	5	27	3.9	16
Zinc, mg/L	5.0	3	0.006	0.008
Total dissolved solids, mg/L	500	26	33,100	39,100
Conductance, umhos/cm	900	24	48,400	49,200
Chloride, mg/L	250	14	19,600	20,200
Sulfate, mg/L	250	14	2,300	2,700

Note: August 2001 – November 2001 data as per sanitary survey approved by DHS August 2002.

TABLE 4.10-5B
COMPARISON OF HBGS INTAKE WELL MONITORING DATA TO SECONDARY MAXIMUM CONTAMINANT LEVELS

CONSTITUENT	SECONDARY MAXIMUM CONTAMINANT LEVEL	POSEIDON MONITORING DATA		
		NUMBER OF SAMPLES	MEAN CONCENTRATION	MAXIMUM CONCENTRATION
Aluminum, mg/L	0.2	3	0.063	0.073
Color, units	15	1	3	3
Copper, mg/L	1.0	4	0.0005	0.0008
Corrosivity	Non corrosive	NA	NA	NA
MBAS, mg/L	0.5	1	0.065	0.065
Iron, mg/L	0.3	3	0.051	0.081
Manganese, mg/L	0.05	3	0.006	0.009
MTBE, mg/L	0.005	2	<0.002	<0.003
Threshold Odor Number, units	3	4	1	1
Silver, mg/L	0.1	4	0.0003	0.0006
Thiobencarb, mg/L	0.001	1		<0.010

TABLE 4.10-5B (CONTINUED)

CONSTITUENT	SECONDARY MAXIMUM CONTAMINANT LEVEL	POSEIDON MONITORING DATA		
		NUMBER OF SAMPLES	MEAN CONCENTRATION	MAXIMUM CONCENTRATION
Turbidity, units	5	27	3.9	16
Zinc, mg/L	5.0	8	0.0029	0.0058
Total dissolved solids, mg/L	500	26	33,500	34,340
Conductance, umhos/cm	900	24	48,400	49,200
Chloride, mg/L	250	14	19,600	20,200
Sulfate, mg/L	250	14	2,300	2,700

NA – Not Applicable
Note: Nov 2001 – Dec 2002 water quality data collected for desalination facility design and operation criteria.

TABLE 4.10-6
CYCLE WATER DISCHARGES TO THE HBGS COOLING WATER SYSTEM

DISCHARGE	VOLUME	CONTAMINANTS
Condensate Overboard	25,000 gallons per unit at start-up, generally once per month.	Chloride – 1-5 mg/L Ammonia – 0.15-0.5 mg/L Silica – 1 mg/L Iron – 1-5 mg/L Copper – 1 mg/L pH – 7.0-8.5
Boiler Blowdown	25,000 gallons per day from each unit.	Chloride – 1-9 mg/L Phosphate – 0.5-10 mg/L Silica – 0.135-0.25 mg/L Iron – 1 mg/L Copper – 1 mg/L pH – 9.15-11 EC – 10-300 umhos/cm Sodium hydroxide – 1-40 mg/L
Bearing Cooling Water Exchanges	Several 1,000 gallons per day from each unit.	Nitrite – 600-800 mg/L EC – 6,000 umhos/cm pH – 8.5 Hardness – 10 mg/L as CaCO3 Sodium fluorescein dye – 1-10 mg/L Polyoxyethylene-polyoxypropylene copolymer Ethoxylated nonylphenol Polydimethysiloxane Isothiazolin Uranine dye – 2-10 mg/L

Wastewater Discharges

Low volume wastes, metal cleaning wastes, and pipeline hydrostatic test water are diverted to the HBGS retention basin and then to the outfall, where the wastewater is mixed with cooling water. Currently this waste is discharged downstream of the intake to the desalination facility and would not be included in the source water for the proposed desalination facility and therefore, they would not present any significant effects on source water quality.

Hazardous Materials Spills

A number of petroleum products and other hazardous materials are stored and used at the generating station. Although unlikely due to spill prevention measures and clean-up procedures in place at the HBGS, there is the potential for a spill to reach the floor drain or the storm drainage system and enter the cooling water system. The floor and yard drainage system currently enters the outfall line downstream of the point where the desalination facility will be located and would not be included in the desalination facility's source water and therefore, the discharge would not present any significant effects on source water quality.

Heat Treatments

Periodically water from the discharge vault is diverted back into the facility and reheated. This reheated water is then used to clean the onsite intake and discharge lines of biological growths ("bio-film"). This recirculated water contains wastes that have been discharged to the discharge vault prior to the flow being reversed in the facility. The proposed desalination facility would not intake water from the HBGS cooling water system during heat treatments and therefore, heat treatment discharges would not present any significant effects on source water quality.

Elevated Bacteria Levels in the Huntington Beach Surf Zone

As stated above, extensive bacterial studies have shown that the Santa Ana River and Talbert Marsh appear to be the primary sources of fecal indicator bacteria to the near shore ocean. In addition, bird droppings and a reservoir of bacteria stored in the sediment and on marine vegetation may continue to be the source of bacteria at the mouths of the river and marsh. Modeling studies and monitoring data indicate that there is likely another unidentified source of bacteria in the vicinity of Stations 6N and 9N. However, three separate studies conducted between 2001 and 2002 have demonstrated that HBGS is not the source of bacteria in the surf zone.

As discussed previously, the results of hydrodynamic modeling performed for the EIR show that contaminants are not transported to the HBGS intake from the Santa Ana River and Talbert Marsh during extreme storm event conditions. In addition, dry weather urban runoff at Talbert Marsh during tidal flushing essentially does not reach the HBGS intake. Although the cause of the elevated bacteria levels in the Huntington Beach surf zone has not been determined, the seawater desalination process would have the ability to remove bacteria and produce potable water meeting all State Title 22 standards. The treatment process and product water quality impacts are further discussed in Section 5.11, *PRODUCT WATER QUALITY.* Therefore, elevated bacteria levels would not present any significant effects on source water quality.

MARINE BIOLOGY

Concentrated Seawater Discharge

As discussed in Section 3.3, this SEIR analyzes effects of the project under two scenarios; 1) the existing baseline conditions that include operation of the HBGS and the project's withdrawal of source water from the HBGS cooling water discharge, which is referred to the co-located operating condition; and 2) where the HBGS were to permanently discontinue or reduce its existing power plant's historic long term cooling water circulation operations, resulting in direct intake of seawater by the project, which is referred to as the stand-alone operating condition. Each of the following discussions of effects on the marine environment are discussed in terms of both the co-located and stand-alone operating conditions. Modeled salinity dispersions for both conditions is provided in Appendix K, Hydrodynamic Modeling Report.

Co-Located Operation – Elevated Salinity

Hydrodynamic modeling of water mass dilution and dispersion (included as Appendix K, Hydrodynamic Modeling Report) utilized the SEDXPORT model, developed at Scripps Institution of Oceanography for the U.S. Navy's Coastal Water Clarity Program. It has been thoroughly peer reviewed (including peer review by Dr. Stanley Grant, Professor at University of California, Irvine), and has been extensively calibrated and validated in numerous applications throughout the Southern California Bight. The model studied the ocean response to the proposed 50 MGD desalination facility using continuous long term simulations of the historical sequence ocean and HBGS operating variables. This approach was applied to two distinct historical periods: 1) resulting in 7,523 modeled solutions between 1980 and mid 2000; and 2) involving 578 modeled solutions that characterized the post re-powering period using data collected between January 1, 2002 and July 30, 2003.

The hydrodynamic modeling studies conducted for the co-located operating condition demonstrate that the initial dilution ratio at the edge of the ZID under the monthly worst case condition is 10:1, and when HBGS is in standby mode the monthly worst case dilution ratio is 8:1. Order No. R8-2006-0034 established water quality based effluent limitations (WQBELs) that correspond to an initial dilution ratio of 7.5:1 for the combined desalination/HBGS discharge.[17] Based on the established 7.5:1 dilution factor, the previously permitted co-located desalination discharge complies with the discharge limitations of Order No. R8-2006-0034 under the entire range of possible HBGS/desalination facility combined discharge flows (e.g., low flow, average flow, and peak flow conditions—see Figures 4.10-2 through 4.10-5).

As a result, the proposed discharge under the co-located operation condition will comply with Ocean Plan acute and chronic toxicity limits. Therefore, impacts would be less than significant.

Compliance with Order No. R8-2006-0034 would result in elevated salinities within the water column in the immediate vicinity of the discharge jet. Mobile species have the ability to avoid areas that they cannot tolerate and, since sharp salinity gradients may act as barriers to the movements of fish, would likely avoid higher salinity areas (Holliday 1971: "Salinity: Fishes." Marine Ecology. F. Holliday, 1971.). Due to the mobility of the fish, commercial fishing would not be impacted. In addition, fish have been observed feeding in the discharge streams of southern California

[17] Finding II.J of Order No. R8-2006-0034.

generating stations including the HBGS discharge. This opportunistic behavior is likely to be reduced or completely discontinued following the addition of the concentrated seawater discharge. However, given that the HBGS discharge stream is not the sole food source for fish in the region, and that only a relatively small area would be affected, the elevated salinity is not anticipated to substantially affect foraging opportunities and impacts in this regard would not be significant.

Planktonic species have limited mobility and these species tend to occur in great numbers within the subject site vicinity. Marine planktonic organisms have similar salinity tolerances as local fish species. No significant increase in plankton loss is expected from the elevated salinity in the discharge stream.

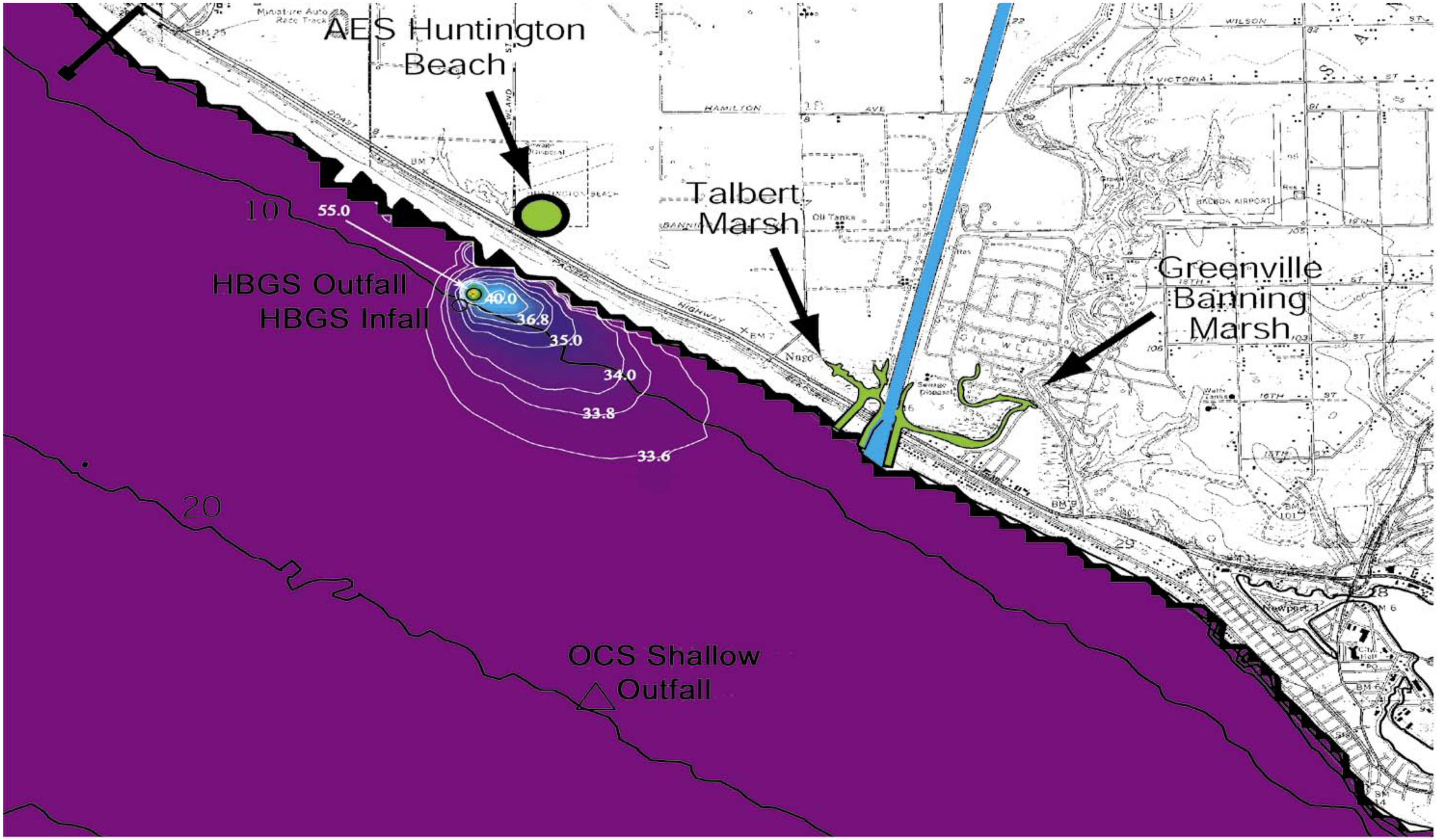
The benthic area potentially exposed to a 40 ppt salinity concentration as a result of the proposed desalination facility discharge is relatively small in relation to the soft-bottom habitat offshore of Huntington Beach. Conditions of elevated salinity which are potentially inimical for benthic organisms occur in a small area under standby conditions, which occur very infrequently and would not exist under average HBGS flow conditions. There are no areas of biological significance in the habitat area where elevated salinity conditions occur and the sandy, soft bottom habitat. The benthic community near the discharge structure is dominated by soft-bottom infaunal invertebrate species with limited mobility. Macrofaunal species are the larger members of the benthic community more easily identified in the field and are commonly used to assess the benthic community. Infaunal and other benthic species common offshore of Huntington Beach will have salinity tolerances similar to those of other marine species in the area and should be able to endure salinity increases of up to 40 ppt. For most marine organisms, lower salinities are more detrimental than higher salinities, as long as the upper limit does not exceed 40 ppt.[18]

In times of stress infaunal species can withdraw into the sediments, where the interstitial water is only gradually exchanged with overlaying water. Still, the benthic species at the base of the intake tower will probably be replaced by species which are more tolerant of high salinities. There is also likely to be a general trend of replacement of infaunal species in the area of the 40 ppt salinity footprint with species which are common to areas of fluctuating salinity such as bays, estuaries and river mouths. While species common to the open coast can tolerate salinity fluctuations to some degree, in the open coast these fluctuations are gradual, while operations of either the proposed desalination facility or HBGS may cause rapid changes in local salinity which estuarine species are better adapted to tolerate. Local benthic community diversity is likely to be depressed as a result of desalination facility operations. However, these estuarine species will be functionally similar to the existing community and would be the ecological equivalents of the native benthic infauna. Thus, while the species composition might be changed in the area of the discharge, it would not be devoid of life and would remain an effective feeding resource within the EFH. Temporal fluctuations in abundance and diversity of benthic species are the norm for the shallow water communities on the mainland shelf of southern California.[19] Replacement species are most likely to be infaunal species common to local estuaries and bays. The area of this replacement will be relatively small and localized.

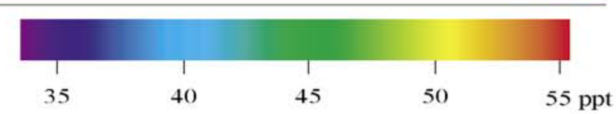
---

18 Benthic Impact of the Discharge from Desalination Plant. C. Pomory, 2000.

19 The Benthic Macrofauna of the Mainland Shelf of Southern California. G.F. Jones, 1969.



30-day average of salinity at mid water column depth for concentrated sea water from: R.O. = 50 mgd, Plant Flow Rate = 126.7 mgd, low flow conditions.



SOURCE: Jenkins and Wasyl 2010

FIGURE 4.10-2

Projected Mid-Depth Salinity Over the HBGS Outfall - "Low Flow" Scenario

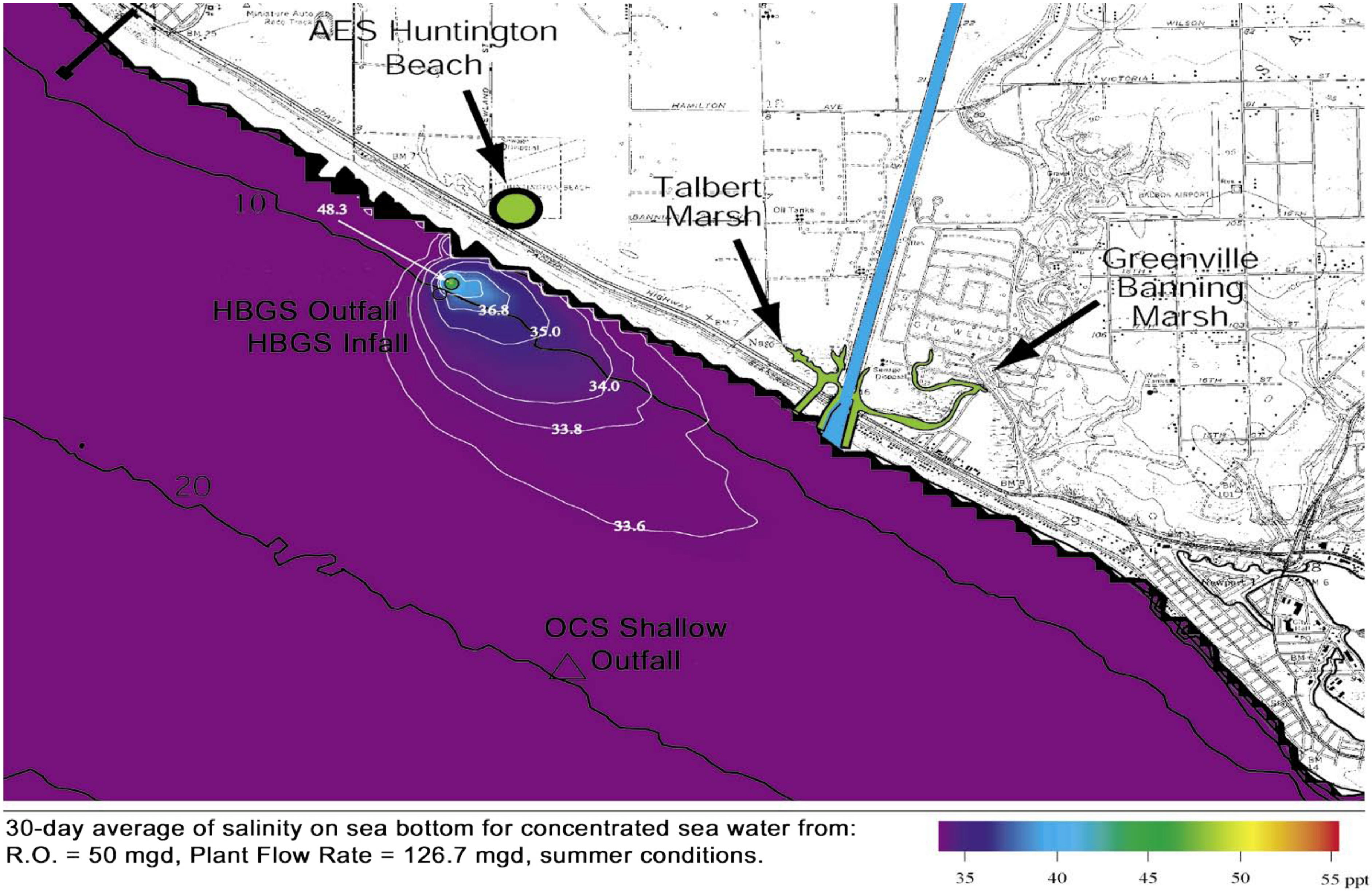
6483-01

MAY 2010

Seawater Desalination Project At Huntington Beach

Z:\Projects\j648301\MAPDOC\MAPS\SEIR

INTENTIONALLY LEFT BLANK



SOURCE: Jenkins and Wasyl 2010

FIGURE 4.10-3

Projected Seafloor Salinity at the HBGS Outfall - "Low Flow" Scenario

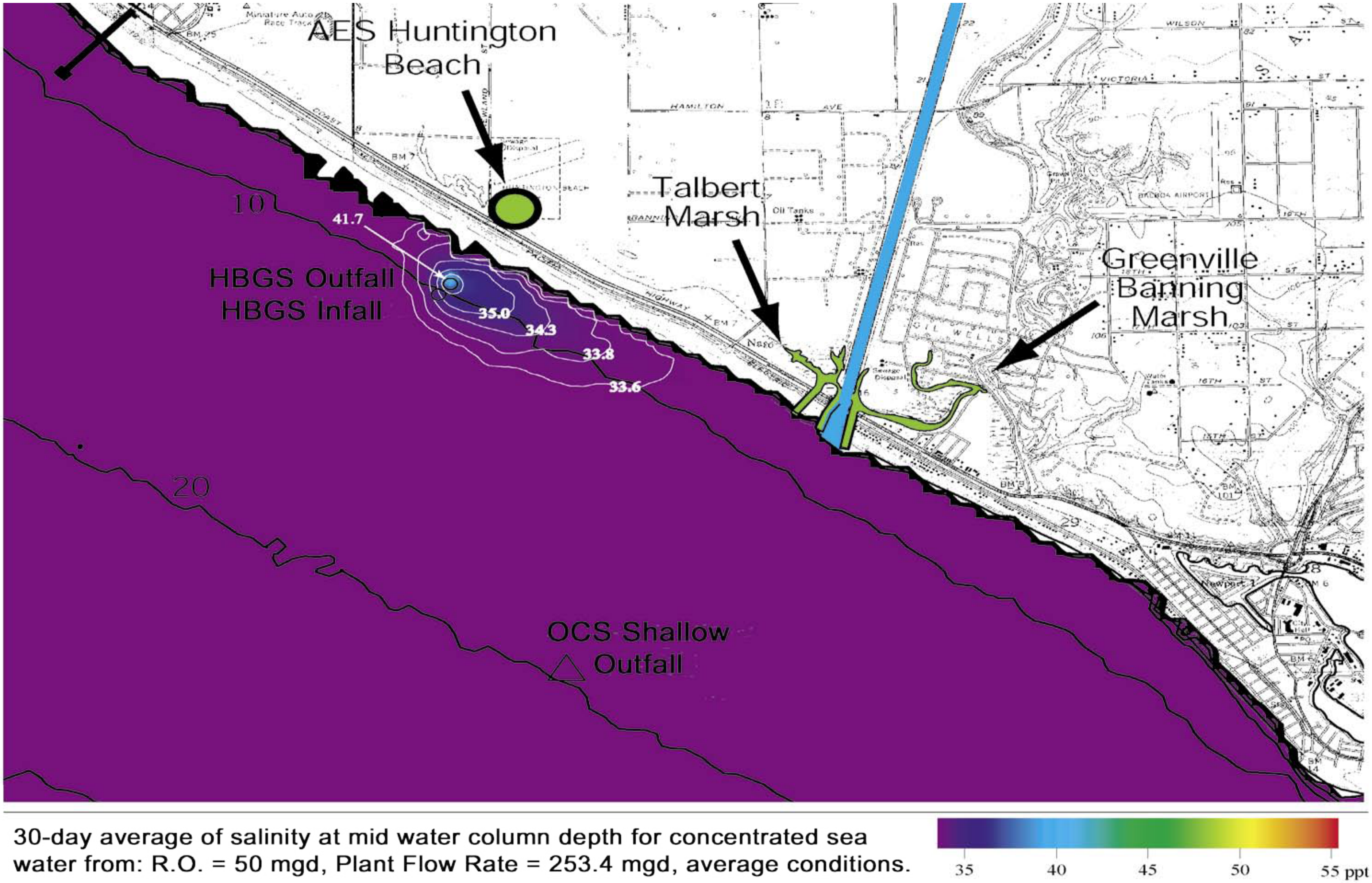
6483-01

MAY 2010

Seawater Desalination Project At Huntington Beach

Z:\Projects\j648301\MAPDOC\MAPS\SEIR

INTENTIONALLY LEFT BLANK



30-day average of salinity at mid water column depth for concentrated sea water from: R.O. = 50 mgd, Plant Flow Rate = 253.4 mgd, average conditions.

SOURCE: Jenkins and Wasyl 2010

FIGURE 4.10-4

Projected Mid-Depth Salinity Over the HBGS Outfall - "Average Flow" Scenario

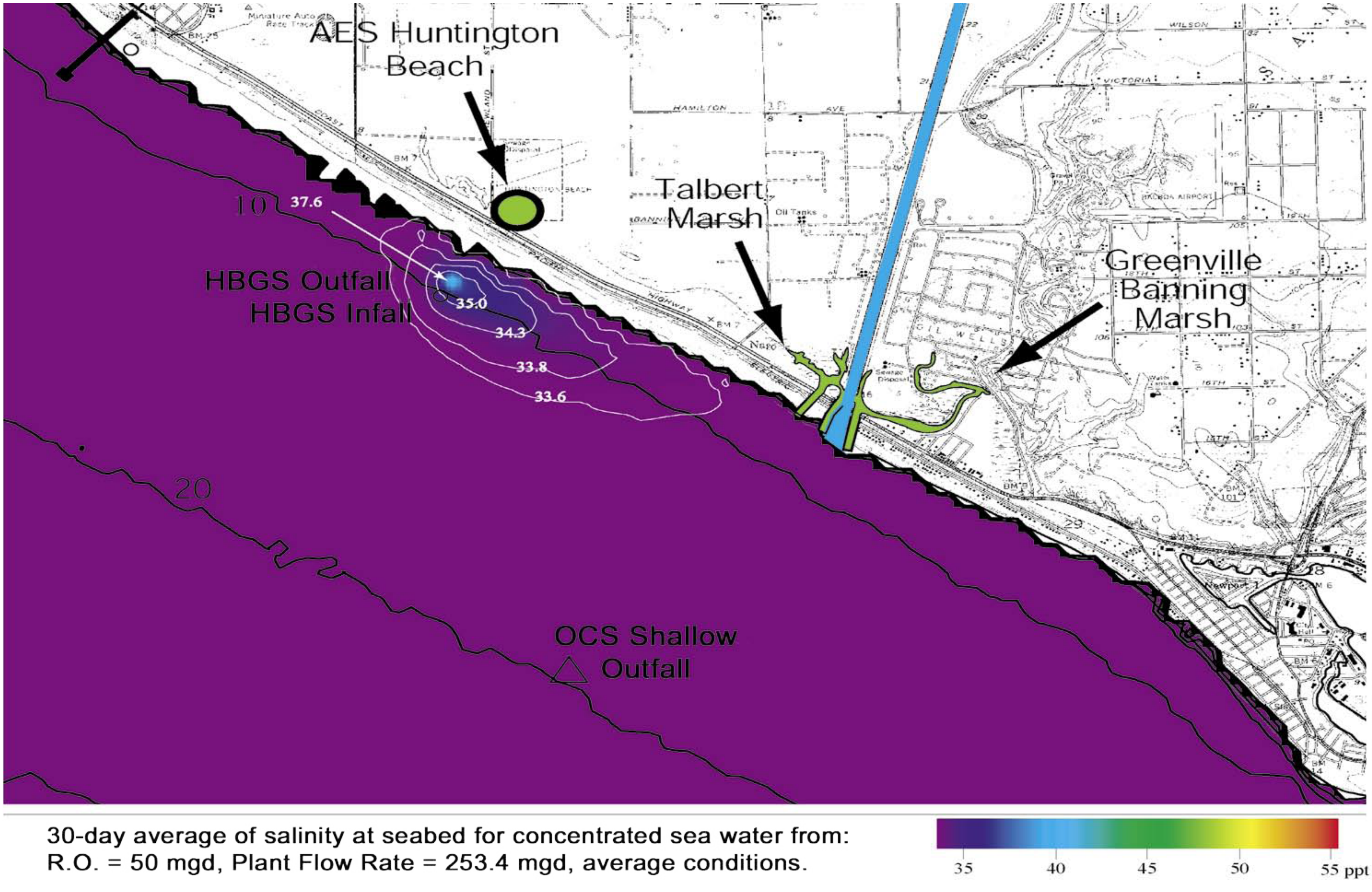
6483-01

MAY 2010

Seawater Desalination Project At Huntington Beach

Z:\Projects\j648301\MAPDOC\MAPS\SEIR

INTENTIONALLY LEFT BLANK



SOURCE: Jenkins and Wasyl 2010

FIGURE 4.10-5

Projected Seafloor Salinity at the HBGS Outfall - "Average Flow" Scenario

6483-01

MAY 2010

Seawater Desalination Project At Huntington Beach

Z:\Projects\j648301\MAPDOC\MAPS\SEIR

INTENTIONALLY LEFT BLANK

In summary, a suite of biological facts indicates that the combined thermal and reverse osmosis discharge would not be large enough to have a significant biological impact on the marine species or communities living near the HBGS (as the reverse osmosis process would not involve the heating or cooling of circulated ocean water, thermal impacts would not occur). Most of the marine organisms living near the HBGS also occur in areas of the SCB and beyond it where salinities can be greater than those that would occur in the combined reverse osmosis and HBGS discharge field. For example, the natural geographic distributions of most of the species living at Huntington Beach extend south to near the tip of Baja California where both coastal temperatures and salinities are as high or higher than those predicted for most areas in the combined discharge field. In addition, some of these species or ones very closely related to them live in the upper part of the Gulf of California where salinities are 36–38 ppt and can be as high as 40 ppt. Thus, many of the species present in water around Huntington Beach naturally experience a salinity range comparable to or greater than what is predicted of the combined discharge area. Increased salinities of the HBGS flow will not cause a potential impairment of EFH functions, and the project will not result in a significant impact or adverse affect on EFH.

Hydrodynamic modeling for the project also finds that an elevated salinity zone would occur around the discharge core and that all organisms living within these areas would encounter it. For the animals swimming in the water (some macroinvertebrates, fishes, turtles, mammals), the duration of their elevated salinity exposure would depend on their location and their residence time in the zone. Such a brief exposure time would have no effect on marine mammals, turtles, or most fishes which are good osmoregulators and while most fishes are unlikely to prefer salinities this high, comparative data showing fish easily tolerate high salinities for short periods suggest these salinities could be tolerated for a short time. Also, fishes would have the ability to “sense” such a marked salinity change in the water and could thus alter their swimming direction to avoid it.

In the case of organisms that drift across the elevated salinity area, models developed for the discharge flow field show that planktonic animals drifting though the discharge area would experience elevated salinity for variable times. These times would depend upon both the area of the zone and the organism’s rate of drift and its position relative to the discharge core.

Under low flow worst case scenario, exposure to the inner discharge core would be less than one hour and exposure to the core’s periphery would be two to three hours. Short-term exposures to higher salinity levels can be tolerated with no impact to marine organisms. While plankton, fishes and other water-column residents would have relatively brief exposures to the highest salinities within the elevated salinity zone, this would not be the case for the benthic organisms occurring in the discharge area. Bottom-dwelling organisms living near the core would experience an increased salinity. One likely biological result of this elevated benthic salinity zone would be some reduction in the total diversity of species living within the zone and the likely increase in the concentration of species having a greater tolerance to the elevated salinity. Such species may already exist in the Huntington Beach bottom community or species from other nearby coastal habitats (tide pool, bays) where salinity is more variable may be recruited to this zone.

Summary of Significance for Elevated Salinity Exposure Effects – Co-located Scenario

The elevated salinity levels anticipated under the co-located operation scenario would conform to the discharge limitations established in Order No. R8-2006-0034, and would be less than significant. As further addressed in this analysis, the areas affected by salinities higher than 40 ppt would not represent substantial ecological effects due to the following factors:

- Benthic areas do not contain natural hard bottom habitats that support sensitive species
- Fishes, plankton, and other pelagic animals that encounter elevated salinity in the discharge region will have very low exposure times (on the order of several hours)
- Foraging areas affected by elevated salinity are limited in size, and would not represent a substantial displacement in foraging areas, or otherwise substantially affect foraging behavior
- No threatened or endangered species or kelp beds exist within the vicinity of the HBGS outfall
- No significant effects on EFH functions would occur

Co-located Operation – Concentration Standards

The Ocean Plan establishes receiving water concentration standards for the protection of aquatic habitat and human health for toxic metals, cyanide, chlorine residual, phenolic compounds, and several chlorinated organic compounds. The project (see above) is also not projected to result in any change in the Regional Board-assigned initial dilution value used for computing compliance with California Ocean Plan (COP) receiving water standards.

Chemical comparisons show that all of the trace elements considered in the discharge analysis already occur in the source water and they have the same concentration off Huntington Beach coast as they do in coastal oceans throughout the world. Chemical and physical factor comparisons between the source water and the RO facility discharge stream demonstrate the "concentrating effect" of RO on the source seawater but also show that the RO operation will not significantly affect water turbidity, suspended solids, pH, and oxygen levels.

Mass balance tests results were based on the assumption of a low HBGS flow rate and thus conservatively overestimate the concentration that would be expected under normal operation conditions. Nevertheless, the results show that while these trace elements will become slightly concentrated by RO, their discharge concentrations remain far below the numerical water quality standards established to protect aquatic marine life by the Environmental Protection Agency and by the State of California. The only change in discharge water chemistry resulting from the RO facility will be an elevation in dissolved iron. However, this concentration is low and, like the salinity difference between the discharge and receiving waters, the iron concentration will be rapidly diluted to ambient levels. There are no numerical water quality standards governing the discharge of iron, which is usually present in low concentrations in seawater. Moreover, iron is an important ocean nutrient (essential for the growth of phytoplankton) and is likely to be biologically assimilated by primary produce organisms (mainly phytoplankton) in the discharge plume. As noted in Tables 4.10-7 through 4.10-9, discharge of the concentrated seawater would not exceed receiving water concentration standards related to aquatic habitat or human health, and therefore no significant impacts would result. Additional information is provided in Appendix N, Receiving Water Chemistry and Quality Report.

TABLE 4.10-7
COMPLIANCE WITH COP STANDARDS FOR PROTECTION OF MARINE AQUATIC LIFE 6-MONTH MEDIAN CONCENTRATIONS

CONSTITUENT	COP 6-MONTH MEDIAN WATER QUALITY OBJECTIVE1 (µG/L)	COP 6-MONTH MEDIAN LIMIT FOR 7.5:1 DILLUTION2 (µG/L)	PROJECTED CONCENTRATION OF END-OF-PIPE EFFLUENT (DILUTED W/ COOLING WATER3) (µG/L)	PROJECTED CONCENTRATION OF UNDILUTED SEAWATER DESALINATION EFFLUENT4 (µG/L)
Arsenic	8	45.5	1.1	1.2
Cadmium	1	8.5	0.33	0.34
Chromium VI	2	17	0	0
Copper	3	10.5	1.5	1.7
Lead	2	17	0.31	0.35
Mercury	0.04	0.34	0.044	0.050
Nickel	5	42.5	3.3	3.3
Selenium	15	127.5	0.44	0.5
Silver	0.7	4.75	0.0	0.0
Zinc	20	110	27.4	30.7
Cyanide	1	8.5	0	0
Chlorine Residual	2	17	1.4	2
Ammonia (as N)	600	5,100	90	80
Non-chlorinated Phenolics	30	255	0	0
Chlorinated Phenolics	1	8.5	0	0
Endosulfan	0.009	0.0765	0	0
Endrin	0.002	0.017	0	0
Hexachlohexanses (HCH)	0.004	0.034	0	0

Note 1: Source – 2009 California Ocean Plan (COP), Table B, Water Quality Objectives; Note 2: Discharge limits calculated for 7.5:1 initial dilution in accordance with COP Requirement C.3.a.; Note 3: Discharge concentration at the point of entrance to the ocean after dilution (127 MGD of intake) – see Table 1. Note 4: Concentration of desalination plant effluent before it is blended with seawater.

TABLE 4.10-8
COMPLIANCE WITH COP STANDARDS FOR PROTECTION OF MARINE AQUATIC LIFE DAILY MAXIMUM CONCENTRATIONS

CONSTITUENT	COP DAILY MAXIMUM WATER QUALITY OBJECTIVE1 (μG/L)	COP DAILY MAXIMUM LIMIT FOR 7.5:1 DILLUTION2 (μG/L)	PROJECTED CONCENTRATION OF END-OF-PIPE EFFLUENT (DILUTED W/ COOLING WATER3) (μG/L)	PROJECTED CONCENTRATION OF UNDILUTED SEAWATER DESALINATION EFFLUENT4 (μG/L)
Arsenic	32	249.5	1.9	1.9
Cadmium	4	34	0.17	0.18
Chromium VI	8	68	0	0
Copper	12	87	2.4	2.6
Lead	8	68	0.5	0.6
Mercury	0.16	1.36	0.07	0.08
Nickel	20	170	8	8
Selenium	60	510	0.73	0.83
Silver	2.8	22.6	0.1	0.1
Zinc	80	620	76	85
Cyanide	4	34	0	0
Chlorine Residual	8	68	4	6
Ammonia (as N)	2,400	5,100	1,270	1,830
Non-chlorinated Phenolics	120	255	0	0
Chlorinated Phenolics	4	8.5	0	0
Endosulfan	0.018	0.0765	0	0
Endrin	0.004	0.017	0	0
Hexachlohexanses (HCH)	0.008	0.034	0	0

Note 1: Source – 2009 California Ocean Plan (COP), Table B, Water Quality Objectives; Note 2: Discharge limits calculated for 7.5:1 initial dilution in accordance with COP Requirement C.3.a.; Note 3: Discharge concentration at the point of entrance to the ocean after dilution (127 MGD of intake) – see Table 1. Note 4: Concentration of desalination plant effluent before it is blended with seawater.

TABLE 4.10-9
COMPLIANCE WITH COP STANDARDS FOR PROTECTION OF MARINE AQUATIC LIFE INSTANTANEOUS MAXIMUM CONCENTRATIONS

CONSTITUENT	COP INSTANTANEOUS MAXIMUM WATER QUALITY OBJECTIVE[1] (µG/L)	COP INSTANTANEOUS MAXIMUM LIMIT FOR 7.5:1 DILLUTION[2] (µG/L)	PROJECTED CONCENTRATION OF END-OF-PIPE EFFLUENT (DILUTED W/ COOLING WATER[3]) (µG/L)	PROJECTED CONCENTRATION OF UNDILUTED SEAWATER DESALINATION EFFLUENT[4] (µG/L)
Arsenic	80	**657.5**	1.9	1.9
Cadmium	10	**85**	0.33	0.34
Chromium VI	20	**170**	0	0
Copper	30	**240**	2.4	2.6
Lead	20	**170**	0.5	0.6
Mercury	0.4	**3.4**	0.07	0.08
Nickel	50	**425**	8	8
Selenium	150	**1,275**	0.73	0.83
Silver	7	**58.3**	0.1	0.1
Zinc	200	**1,640**	80	90
Cyanide	10	**85**	0	0
Chlorine Residual	60	**510**	35	50
Ammonia (as N)	6,000	**51,000**	1,270	1,830
Non-chlorinated Phenolics	300	**2,550**	0	0
Chlorinated Phenolics	10	**85**	0	0
Endosulfan	0.027	**0.229**	0	0
Endrin	0.006	**0.051**	0	0
Hexachlohexanses (HCH)	0.012	**0.102**	0	0

Note 1: Source – 2009 California Ocean Plan (COP), Table B, Water Quality Objectives; Note 2: Discharge limits calculated for 7.5:1 initial dilution in accordance with COP Requirement C.3.a.; Note 3: Discharge concentration at the point of entrance to the ocean after dilution (127 MGD of intake). Note 4: Concentration of desalination plant effluent before it is blended with seawater.

Co-located Operation – Reverse Osmosis Membrane Cleaning Solution

As stated previously in Section 3.0, *PROJECT DESCRIPTION*, the reverse osmosis system trains will be cleaned using a combination of cleaning chemicals such as industrial soaps (e.g. sodium dodecylbenzene, which is frequently used in commercially available soaps and toothpaste) and weak solutions of acids and sodium hydroxide. Approximate total discharge volumes per reverse osmosis membrane cleaning are shown below in Table 4.10-10, *REVERSE OSMOSIS MEMBRANE SOLUTION DISCHARGE VOLUMES*. Chemicals typically used for cleaning include (it should be noted that the actual cleaning chemicals used will be based on the observed operation and performance of the system once it is placed in operation):

- Citric Acid – (two percent solution)
- Sodium Hydroxide B - (0.1 percent solution)

- Sodium Tripolyphosphate B - (two percent solution)
- Sodium Dodecylbenzene B- (0.25 percent solution)
- Sulfuric Acid B - (0.1 percent solution)

The "first rinse" treated waste cleaning solution from the washwater tank will be discharged into the local sanitary sewer for further treatment at the OCSD regional wastewater treatment facility. The cleaning rinse water following the "first rinse" will be mixed with the RO facility concentrated seawater, treated waste filter backwash, and the AES facility discharge and sent to the ocean. This "second rinse" water stream will contain trace amounts of cleaning compounds and would be below detection limits for hazardous waste. An Industrial Source Control Permit from the OCSD for discharge of waste cleaning solution into the sanitary sewer system will be required for the project. In addition, the discharge must comply with the limits and requirements contained in the OCSD's Wastewater Discharge Regulations.

TABLE 4.10-10
REVERSE OSMOSIS MEMBRANE SOLUTION DISCHARGE VOLUMES

TYPE OF DISCHARGE	GALLONS	PERCENTAGE
Concentrated Waste Cleaning Solution	4,000	4.4
Rinse Water – Residual Cleaning Solution	11,000	12.0
Rinse Water – Permeate	45,600	50.2
Rinse Water – Concentrate Removed During Rinsing	30,400	33.4
Total Discharge	**91,000**	**100**

An alternative to discharging the "first rinse" of the RO membrane cleaning solution into the OCSD system is to discharge the solution ("first rinse" and all subsequent rinses) into the Pacific Ocean via the HBGS outfall. On a typical day, this alternative would blend 200,000 to 300,000 gallons of cleaning solution at a rate of 150 to 200 GPM (0.2 to 0.3 MGD) with 50 MGD of concentrated seawater by-product discharge, 10-15 MGD of treated filter backwash, and 400 MGD of HBGS cooling water discharge. Under a low flow scenario (high membrane cleaning solution concentration and low concentrations of concentrated seawater discharge, filter backwash, and HBGS cooling water discharge), the membrane cleaning solution would be diluted at a ratio of 260:1. The majority of the chemicals within the membrane cleaning solution would be either below detection levels or regulatory limits, even before dilution with other desalination facility and HBGS discharges. Dilution at a 260:1 ratio would further minimize impacts to the marine environment and would assure NPDES compliance. Modeling for this discharge under various concentrations was performed, and is included in Appendix R, RO Membrane Cleaning Solution Discharge Test Stream Data. Because the project's reverse osmosis cleaning solution first rinse discharge would not exceed regulatory limits of contaminants, no significant impacts would result.

Stand-alone Operation – Elevated Salinity

As noted above, under the stand-alone operation scenario, the total volume of product water and discharge from the desalination facility would not change. However, due to the lack of power plant operation, all mixing conditions modeled for the stand-alone scenario include unheated discharge, even under average mixing conditions.

The same hydrodynamic modeling used in the co-located operation condition analysis was applied to the stand-alone condition (see Appendix K, Hydrodynamic Modeling Report). The modeling utilized boundary conditions (discharge flow, discharge temperature, ocean water temperature, ocean water salinity, ocean water levels, and local bathymetry) and forcing functions (waves, currents, wind) to simulate discharge plume movement and salinity. A 20.5-year-long record of these variables was constructed (7,523 consecutive days) to assess the probable range of oceanographic conditions.

While the hydrodynamic modeling suggests the potential for increased initial dilution area as a result of unheated stand-alone discharge operations, this analysis assumes that the 7.5:1 initial dilution ratio and 1,000 ft ZID established in Order No. R8-02006-0034 will remain constant and be applied to the stand-alone condition. Further, it is anticipated that the more restrictive chronic and acute toxicity salinity concentrations standards established in Order No. R8-02006-0034 will also be applicable. To meet all of these conditions, based on the hydrodynamic modeling, the intake flow volume should be no less than 152 MGD.

The Ocean Plan designates the acute toxicity mixing zone as extending from the point of discharge outward to a point 10 percent of the distance to the designated Zone of Initial Dilution (ZID). Assuming a 1,000 ft ZID, the Ocean Plan designated acute toxicity mixing zone would extend 10 percent (100 feet) of this 1000 foot distance.

Under all conditions associated with the stand-alone operation, including worst case ocean mixing conditions, daily maximum receiving water salinity concentrations of 40 ppt would not occur beyond 100 feet from the discharge tower, and therefore, the Ocean Plan standards for acute toxicity are met. The Ocean Plan daily maximum chronic toxicity standards are also met, because salinity concentrations will never exceed 40 ppt outside of the ZID. It should be noted that under average conditions, the seafloor concentrations of 40 ppt would not occur beyond 54 feet from the discharge tower.

As discussed under the co-located condition, higher salinities predicted for the limited area in the immediate vicinity of the discharge outfall under stand-alone conditions are potentially toxic to fish species. Mobile species have the ability to avoid areas that they cannot tolerate and, since sharp salinity gradients may act as barriers to the movements of fish, would likely avoid higher salinity areas.[20] Due to the mobility of the fish, commercial fishing would not be impacted. In addition, fish have been observed feeding in the discharge streams of southern California generating stations including the HBGS discharge. This opportunistic behavior is likely to be reduced or completely discontinued following the addition of the concentrated seawater discharge. However, given that the HBGS discharge stream is not the sole food source for fish in the region, and that only a relatively small area would be affected, the elevated salinity is not anticipated to substantially affect foraging opportunities and impacts in this regard would not be significant.

Planktonic species have limited mobility and these species tend to occur in great numbers within the subject site vicinity. Marine planktonic organisms have similar salinity tolerances as local fish

---

20 "Salinity: Fishes." Marine Ecology. F. Holliday, 1971.

species. No significant increase in plankton loss is expected from the elevated salinity in the discharge stream.

The benthic area potentially exposed to a 40 ppt salinity concentration as a result of the proposed desalination facility discharge is relatively small in relation to the soft-bottom habitat offshore of Huntington Beach. Conditions of elevated salinity above 40 ppt which are potentially inimical for benthic organisms occur in a small area under worst case stand-alone conditions. There are no areas of biological significance in the habitat area where elevated salinity conditions occur and the sandy, soft bottom habitat. The benthic community near the discharge structure is dominated by soft-bottom infaunal invertebrate species with limited mobility. Macrofaunal species are the larger members of the benthic community more easily identified in the field and are commonly used to assess the benthic community. Infaunal and other benthic species common offshore of Huntington Beach will have salinity tolerances similar to those of other marine species in the area and should be able to endure salinity increases of up to 40 ppt. For most marine organisms, lower salinities are more detrimental than higher salinities, as long as the upper limit does not exceed 40 ppt.[21] Under stand-alone operation salinities will be at or below 40 ppt within 100 feet from the discharge tower.

In times of stress infaunal species can withdraw into the sediments, where the interstitial water is only gradually exchanged with overlaying water. Still, the benthic species at the base of the intake tower will probably be replaced by species which are more tolerant of high salinities. There is also likely to be a general trend of replacement of infaunal species in the area of the 40 ppt salinity footprint with species which are common to areas of fluctuating salinity such as bays, estuaries and river mouths. While species common to the open coast can tolerate salinity fluctuations to some degree, in the open coast these fluctuations are gradual, while operation of the project in the stand-alone condition may cause rapid changes in local salinity which estuarine species are better adapted to tolerate. Local benthic community diversity is likely to be depressed as a result of desalination facility operations. However, these estuarine species will be functionally similar to the existing community and would be the ecological equivalents of the native benthic infauna. Thus, while the species composition might be changed in the area of the discharge, it would not be devoid of life and would remain an effective feeding resource within the EFH. Temporal fluctuations in abundance and diversity of benthic species are the norm for the shallow water communities on the mainland shelf of southern California.[22] Replacement species are most likely to be infaunal species common to local estuaries and bays. The area of this replacement will be relatively small and localized.

In summary, a suite of biological facts indicates that the stand-alone scenario discharge would not be large enough to have a significant biological impact on the marine species or communities living near the discharge. Most of the marine organisms living near the HBGS also occur in areas of the SCB and beyond it where salinities can be greater than those that would occur in the stand alone scenario discharge field. For example, the natural geographic distributions of most of the species living at Huntington Beach extend south to near the tip of Baja California where both coastal temperatures and salinities are as high, or higher than those predicted for most areas in the combined discharge field. In addition, some of these species or ones very closely related to them live in the upper part of the Gulf of California where salinities are 36-38 ppt and can be as high as 40 ppt. Thus, many of the species present in water around Huntington Beach naturally experience a

[21] Benthic Impact of the Discharge from Desalination Plant. C. Pomory, 2000.

[22] The Benthic Macrofauna of the Mainland Shelf of Southern California. G.F. Jones, 1969.

salinity range comparable to or greater than what is predicted of the combined discharge area. Increased salinities of the HBGS flow will not cause a potential impairment of EFH functions, and the project will not result in a significant impact or adverse affect on EFH.

Hydrodynamic modeling for the project in the stand-alone condition also finds that an elevated salinity zone would occur around the discharge core and that all organisms living within these areas would encounter it. For the animals swimming in the water (some macroinvertebrates, fishes, turtles, mammals), the duration of their elevated salinity exposure would depend on their location and their residence time in the zone. Such a brief exposure time would have no effect on marine mammals, turtles, or most fishes which are good osmoregulators and while most fishes are unlikely to prefer salinities this high, comparative data showing fish easily tolerate high salinities for short periods suggest these salinities could be tolerated for a short time. Also, fishes would have the ability to "sense" such a marked salinity change in the water and could thus alter their swimming direction to avoid it.

In the case of organisms that drift across the elevated salinity area, models developed for the discharge flow field show that planktonic animals drifting though the discharge area would experience elevated salinity for variable times. These times would depend upon both the area of the zone and the organism's rate of drift and its position relative to the discharge core.

Under stand-alone operating condition, exposure to the inner discharge core would be less than one hour and exposure to the core's periphery would be less than two hours. Short-term exposures to higher salinity levels can be tolerated with no impact to marine organisms. While plankton, fishes and other water-column residents would have relatively brief exposures to the highest salinities within the elevated salinity zone, this would not be the case for the benthic organisms occurring in the discharge area. Bottom-dwelling organisms living near the core would experience an increased salinity. One likely biological result of this permanently elevated benthic salinity zone would be some reduction in the total diversity of species living within the zone and the likely increase in the concentration of species having a greater tolerance to the elevated salinity. Such species may already exist in the Huntington Beach bottom community or species from other nearby coastal habitats (tide pool, bays) where salinity is more variable may be recruited to this zone.

Summary of Significance for Elevated Salinity Exposure Effects – Stand-alone Scenario

The elevated salinity levels anticipated for the desalination facility in the stand-alone operation scenario would maintain a salinity level of 40 ppt or less at 100 feet from the base of the discharge tower (10% of the ZID), and will thereby comply with the Ocean Plan standards. Similar to the co-located condition, the areas affected by salinities higher than 40 ppt would not represent substantial ecological effects due to the following factors:

- Benthic areas do not contain natural hard bottom habitats that support sensitive species
- Fishes, plankton, and other pelagic animals that encounter elevated salinity in the discharge region will have very low exposure times (on the order of several hours)
- Foraging areas affected by elevated salinity are limited in size, and would not represent a substantial displacement in foraging areas, or otherwise substantially affect foraging behavior

- No threatened or endangered species or kelp beds exist within the vicinity of the HBGS outfall

- No significant effects on EFH functions would occur

Stand-alone Operation – Concentration Standards

Because the stand-alone operating condition involves a larger flow volume than was assumed for the worst case co-located condition, and because the desalination facility discharges would contain the same concentrations of the same constituents, the stand-alone operating condition would have lower concentrations of seawater constituents than identified for the co-located condition. Discharge of the concentrated seawater would not exceed receiving water concentration standards related to aquatic habitat or human health, and therefore no significant impacts would result.

Stand-alone Operation – Reverse Osmosis Membrane Cleaning Solution

Because the stand-alone operating condition involves a larger flow volume than was assumed for the worst case co-located condition, and because the volume of membrane cleaning solution would be the same as with the co-located condition, the stand-alone operating condition would have a higher mixing ratio, and lower concentrations of cleaning solution constituents than identified for the co-located condition. Because the project's reverse osmosis cleaning solution discharge would not exceed regulatory limits of contaminants, no significant impacts would result.

Impingement and Entrainment

Potential impacts on marine biological resources in regards to impingement and entrainment effects of the proposed source water withdrawal of the desalination facility from the cooling water system discharge of the HBGS are analyzed within Appendix M, Intake Effects Assessment (Tenera 2004) as supplemented by additional studies addressing stand-alone operating conditions (Tenera 2010). Impingement occurs when larger fishes and invertebrates are trapped against the generating station's cooling water intake screens, while entrainment occurs when small planktonic organisms are drawn through the intake screens and through the generating station's cooling water system. Figure 4.10-6, *HBGS INTAKE SCREENING PROCESS,* depicts the HBGS facility's intake screening process.

Recent studies on the effects of the HBGS cooling water intake system on the ocean environment were conducted in connection with a re-powering project certified by the California Energy Commission (CEC). An Impingement Mortality and Entrainment (IM&E) Characterization Study (MBC and Tenera Environmental 2005) was submitted to the Santa Ana Regional Water Quality Control Board as part of the HBGS NPDES permit application that required compliance with provisions of the 316(b) Phase II regulations of the Clean Water Act. The sampling data collected in this 2003–2004 IM&E study were included as part of the desalination facility impingement and entrainment study conducted for the project (Tenera Environmental 2004 and 2010).

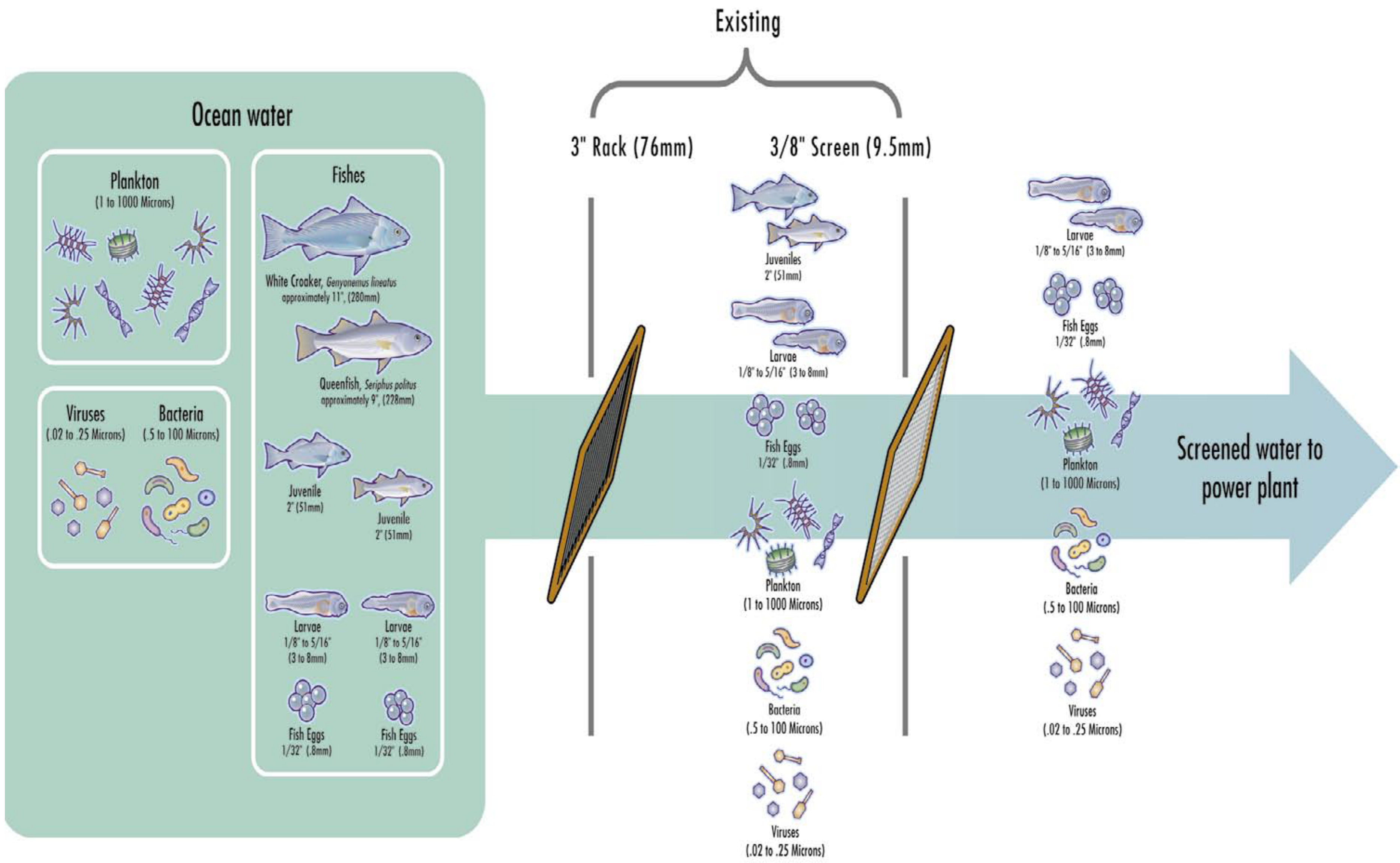


FIGURE 4.10-6

HBGS Intake Screening Process

6483-01

MAY 2010

Seawater Desalination Project At Huntington Beach

Z:\Projects\j648301\MAPDOC\MAPS\SEIR

INTENTIONALLY LEFT BLANK

It should be noted that the project's feedwater withdrawal is not subject to intake regulation under the Federal Clean Water Act (CWA) Section 316(b). As confirmed by the SARWQCB, State and federal Clean Water Act 316(b) policy, law and regulations do not apply to the desalination facility under either of these operating conditions.[23] The project does not include a cooling water intake structure (CWIS). The CWIS is part of the HBGS existing operations and is presently regulated under Section 316(b). The following analysis includes a discussion of environmental effects that are anticipated under both the co-located and stand-alone operating conditions.

Co-located Operation

The desalination facility's feedwater would be withdrawn from the HBGS discharge and not directly from the open ocean, and its withdrawal does not affect HBGS intake requirements. The project does not require the HBGS to increase the quantity of water withdrawn nor does it increase the velocity of the water withdrawn. The desalination intake study is designed to investigate the potential for desalination facility feedwater intake withdrawn from the HBGS cooling water system to increase HBGS entrainment mortality and assess the significance of this potential entrainment effect on the source water.

Co-located Operation - Impingement

The project source water intake would not increase the volume, or the velocity of the HBGS cooling water intake nor would it increase the number of organisms entrained or impinged by the HBGS cooling water intake system. The proposed desalination facility would not cause any additional impingement losses to the marine organisms impinged by the HBGS, as these organisms would not be exposed to further screening prior to entering the desalination facility's pretreatment system.

The proposed desalination facility would not have a separate direct ocean water intake and screening facilities, and would only use cooling water that is already screened by HBGS's intake. Co-location of the desalination facility with the HBGS reduces the amount of source water required to be withdrawn directly from the ocean and avoids impingement impacts that would otherwise result from the siting and implementation of a new intake structure.

Co-located Operation - Entrainment

Entrainment sampling for the desalination feedwater was conducted at an onshore point in the HBGS discharge line just before it is returned in conduits to an offshore discharge location. Bi-weekly samples were collected since the beginning of March 2004 by pumping measured volumes of cooling water discharges through small-mesh nets. The preserved samples were sorted in the laboratory and the fishes and target invertebrates were identified to the lowest taxon practicable.

In general, entrainment effects are assessed using the Empirical Transport Model (ETM), as recommended and approved by the California Energy Commission (CEC), California Coastal Commission (CCC) and other regulatory and resources agencies. This model, used for HBGS intake studies and many other California intake effects studies, compares entrainment larval concentrations to source water larval concentrations to calculate the effects of larval removal on the

[23] Page 7 of "Response in Opposition to Petition of Surfrider Foundation and Orange County Coastkeeper (Waste Discharge Requirements Order No. R8-2006-0034 [NPDES CA8000403] for Poseidon Desalination Facility, Santa Ana Water Board, SRWCB/OCBB File A-1776". February 23, 2007.

standing stock of larvae in the defined source water. Tidal exchange ratios, source water volumes, cooling water volumes, larval concentrations, and larval durations were variables used in the ETM calculations. Conservative assumptions of HBGS volumes of 127 MGD were used for developing the estimates of potential larvae losses due to desalination facility operations.

The study for the desalination project was also compared with the preliminary results from the 2004 six-month report submitted to the CEC (which is part of the ongoing HBGS intake entrainment and impingement study).

Six taxa (gobies, blennies, croakers, northern anchovy, garibaldi, and silversides) and a group of larvae that could not be identified were found to comprise 97 percent of all the fish larvae present in the HBGS cooling water system from which the project would withdraw its source water supply. Species with high commercial and recreational importance, such as California halibut and rockfishes, were shown to be very uncommon in the HBGS intake flows.

Under HBGS minimum intake cooling water flow of 127 MGD, and assuming 100 percent through-HBGS larval mortality (based on USEPA 2004), the estimated larval fish entrainment loss is 0.33 percent of the total population of larvae in the local area surrounding the HBGS intake.

Based on in-facility testing, the observed mortality of HBGS is 94.1 percent and the combined estimated mortality (utilizing the ETM) of the project and HBGS at flows of 507 MGD would be 95.3 percent (an increase in mortality of 1.2 percent due to the proposed desalination facility) and 98.7 percent at HBGS flows of 127 MGD (an increase in mortality of 4.6 percent due to the proposed desalination facility). This assessment assumes 100 percent mortality of all organisms upon withdrawal into the desalination facility.

Estimated larval fish loss attributed to the proposed desalination facility would be 0.02 percent (based on HBGS entrainment mortality of 94.1 percent) of the total population of larvae in the local area surrounding the HBGS intake. This would be an order of magnitude less than the HBGS larval population entrainment loss of 0.33 percent. The 0.02 percent figure accounts for the incremental amount of larval fish loss resulting from the proposed desalination facility, aside from that of the HBGS.

From a regional perspective, model results for larval gobies, northern anchovy, and white croaker showed that approximately 0.33 percent of the larvae in the HBGS source water could be affected by HBGS operations at 127 MGD; this represents a de minimis fraction of the total numbers of larval fishes in the Southern California Bight. Results were modeled on encounter rates for the most abundant species entrained from the source water. The loss of marine organisms due to the potential entrainment of the project has no effect on the species' ability to sustain their populations. The loss will not have a measurable effect on the source populations of the species in the Southern California Bight and is an order of magnitude lower than the entrainment loss typically caused by HBGS operations. In addition:

- The most frequently entrained species are very abundant in the area of HBGS intake and the Southern California Bight, and therefore, the actual ecological effects due to any additional entrainment from the desalination facility are insignificant.

- Species of direct recreational and commercial value constitute a very small fraction of the entrained organisms in the HBGS offshore intake and therefore, the operation of the desalination facility does not result in significant ecological impact in NEPA/CEQA context.

- The California Department of Fish and Game (DFG) (2001), in their Nearshore Fishery Management Plan, provides for sustainable populations with harvests of up to 60 percent of unfished adult stocks. The maximum "harvest" effect of HBGS operations at 127 MGD is 0.33 percent, significantly below the accepted (DFG) thresholds of 60 percent. The maximum "harvest" effect of the project is 0.02 percent, an order of magnitude less than 0.33 percent, based on HBGS entrainment mortality of 94.1 percent.

Impacts on marine organisms due to the potential entrainment resulting from the co-located project would not substantially reduce populations of affected species, and would not affect the ability of the affected species to sustain their populations. Therefore, impacts would be less than significant.

Stand-alone Operation

As noted in the discussion of elevated salinity effects, in order to achieve the anticipated required dilution of concentrated seawater, the desalination facility operating in the stand-alone condition would require a higher intake flow volume than was analyzed for the worst-case/low flow circumstances in the co-located condition. To further determine the potential effects of the project under stand-alone conditions on larval fishes and shellfishes, data from the 2003–2004 study were re-analyzed using a proposed intake volume of 152 MGD (Tenera 2010). The daily intake flow of 507 MGD used in impact assessment for the co-located condition was reduced to the proposed 152 MGD flow to model impacts from the desalination facility in a stand-alone operating condition. It should be noted that unlike the generating station's once through cooling water system, which is regulated under section 316(b), the desalination project is regulated under the Porter Cologne Water Act. The Porter Cologne Water Quality Control Act, California Water Code 13142.5(b) states as policy that new industrial facilities using seawater for processing must use the best available site, design, technology and mitigation feasible to minimize intake and mortality of marine life.

Stand-alone operation – Impingement

The total numbers of fishes collected during each survey in the 2003-2004 study were used to estimate losses based on a proportional relationship between survey flow rate and an intake volume of 152 MGD. The impingement measurements for each sampling date were proportioned using 152 MGD and corresponding flow to estimate daily entrainment for the survey date and days between surveys. These daily estimates were then summed to calculate an estimate of the total annual impingement. It should be noted that the HBGS intake is fitted with a velocity cap and bar racks which serve to substantially reduce impingement effects, as noted in the discussion of project design features in Section 3.4. These features serve to avoid impingement of larger fishes and organisms such as marine mammals and sea turtles, and would remain in place. Therefore it is not anticipated that impingement of marine mammals or sea turtles would result from operation of the desalination facility under the stand-alone operating scenario.

The most abundant species impinged were queenfish (81%), northern anchovy (6%), white croaker (3%), and shiner perch (2%) (*Table 4.10-11, Estimated annual fish impingement abundance and biomass adjusted proportionally for stand-alone flow*). No threatened or endangered species were collected during the sampling. It should also be noted that the project is not within an Area of

Special Biological Significance (ASBS). All of the other species comprised 1% or less of the total estimated impingement. The existing data and results from previous studies on the effectiveness of the intake velocity cap indicate that impingement may be even lower at the low flows projected for the stand-alone operating condition than would be predicted based on the proportional relationship of impingement to flow. The proposed operation of the HBGS intake system under stand-alone operation for the desalination facility would result in an estimated average daily impingement of 13 fishes weighing 0.3 kg (0.7 lb).

The estimated average daily impingement rate for shellfish was approximately 7 individuals weighing 0.1 kg (0.2 lb). The most abundant species were yellow crab (41%), graceful crab (19%), and Pacific rock crab (13%). Other shellfishes in impingement samples included shrimps, octopus, spiny lobster, and market squid. It was determined that most of the impingement of shellfishes probably occurs from organisms living within the CWIS. As a result there is little potential for impingement of shellfishes and other invertebrates to affect source water populations of these species.

Impingement would not result in substantial reductions in fish or shellfish populations under stand-alone operating conditions. It is not anticipated that the small amount of impingement losses would have any effects on the ability of impinged species to sustain their populations, and therefore impacts would be less than significant.

TABLE 4.10-11
ESTIMATED ANNUAL FISH IMPINGEMENT ABUNDANCE AND BIOMASS ADJUSTED PROPORTIONALLY FOR STAND-ALONE FLOW (152 MGD)

SPECIES	COMMON NAME	ESTIMATED ABUNDANCE	ESTIMATED BIOMASS (KG)	PERCENT OF TOTAL ABUND.	PERCENT OF TOTAL BIOMASS
Seriphus politus	queenfish	3,939	22.271	81.2	18.9
Engraulis mordax	northern anchovy	298	1.944	6.1	1.7
Genyonemus lineatus	white croaker	127	1.497	2.6	1.3
Cymatogaster aggregata	shiner perch	85	0.808	1.7	0.7
Peprilus simillimus	Pacific pompano	53	0.848	1.1	0.7
Porichthys myriaster	specklefin midshipman	52	5.643	1.1	4.8
Phanerodon furcatus	white seaperch	36	0.196	0.7	0.2
Sardinops sagax	Pacific sardine	33	1.705	0.7	1.5
Urobatis halleri	round stingray	26	8.538	0.5	7.3
Leuresthes tenuis	California grunion	17	0.074	0.3	<0.1
26 other species		187	74.055	4.0	62.8
	Total	**4,853**	**117.579**	**100**	**100**
	Number of Species	**36**			

Considering the impingement losses in economic terms, catch data from Los Angeles ports for 2004–2008 were used to estimate the ex-vessel commercial fishery value of entrainment losses for northern anchovy, white croaker, California halibut, and rock crabs. The projected revenue losses amounted to less than $500 annually for these species combined. When the total impingement biomass from all species was assigned a very conservative value for one of the most highly prized fishery species, California halibut, it was estimated that equivalent commercial fishery losses due to impingement would be less than $600 annually. Potential losses to recreational fisheries could not be readily converted to a dollar value, but the small fractions of fishery species in the source water that would be affected by impingement and entrainment of the project suggest that such losses would be commercially insignificant.

Stand-alone Operation – Entrainment

The assessment of potential impacts to fish and invertebrate populations caused by the entrainment of planktonic larvae included modeling for the most abundant fish taxa (target taxa) that together comprised 90% of the total estimated larvae entrained. Entrainment impacts were assessed using the Empirical Transport Model (*ETM*), which compares the numbers of larvae entrained with the numbers of larvae at risk of entrainment in the source waters to obtain an estimate of the proportional mortality caused by entrainment. Summarized results from the modeling estimates are presented in *Table 4.10-12, Summary of Entrainment Modeling Estimates on Target Taxa*. Entrainment impacts were additive with the direct losses identified from the impingement sampling.

The total estimated number of fish larvae entrained annually, based on a pumping rate of 152 MGD, was 103,303,290. Ten taxa comprised approximately 91% of the total larvae collected: unidentified gobies (mainly of the genera *Clevelandia, Ilypnus*, and *Quietula* [CIQ complex]), spotfin croaker, anchovies (>95% northern anchovy), queenfish, white croaker, salema, unidentified croakers (newly hatched larvae of several species), combtooth blennies, black croaker, and diamond turbot. The life histories and potential impacts from entrainment on the local populations of these taxa and California halibut, which is an important recreational and commercial species that ranked 11th in total estimated annual entrainment, are analyzed in greater detail in Appendix M, Intake Effects Assessment (see Section 4.3.4–*Results by Species*). Of the five target invertebrate taxa included in the study (cancrid crab megalops, market squid postlarvae, Pacific sand crab, California spiny lobster, and ridgeback rock shrimp) only Pacific sand crab and cancrid crabs were found in the entrainment samples. Pacific sand crab zoeae comprised almost 98% of the entrained target invertebrates. Almost all of the Pacific sand crab larvae collected were in the earliest stages of their larval development (zoea Stage I); only two megalopal stage larvae were collected from entrainment samples and none were collected from source water samples. Sampling results are presented for cancrid and Pacific sand crabs, but no assessments of potential entrainment impacts were conducted for Pacific sand crab because of the low numbers collected and absence of megalops in the source water samples.

The most abundant taxon of larval fish entrained (33%) was CIQ gobies, comprised of three species of small, bottom-dwelling types of fish that are common in bays and lagoons. Nearby adult populations are concentrated in localized habitats, such as Alamitos Bay, Anaheim Bay, and Talbert Marsh, and their larvae are dispersed in these environs and transported out into coastal waters by tidal flushing and prevailing currents. These larvae would experience high rates of natural mortality at the intake location, because the intake is located in an area that does not provide suitable habitat to sustain resident adult populations, and there is a low likelihood that larvae that have been flushed into the area of the intake would be able to return to the shallow bay habitats that meet the species life history requirements.

Although the study focused on species that produce planktonic larvae and are therefore potentially affected by entrainment, it is important to note that many common species have early life stages that are not susceptible. For example, live-bearers, such as the several species of surfperches, sharks, and rays common to the area, produce young that are fully developed juveniles too large to be affected by entrainment.

The proportion of larvae potentially entrained through the HBDF ranged from 0.02–0.33% of the source water populations of approximately 115,000,000,000 (billion) larvae, based on the ETM model results. Because of larval transport in ocean currents, larvae could potentially occur over a coastline distance of up to 100 km (60 mi). However, it should be noted that the populations of these species extend over a much larger geographic range than the extrapolated source water bodies, and therefore the estimated mortality levels overstate the actual impact on the species throughout their ranges.

TABLE 4.10-12
SUMMARY OF ENTRAINMENT MODELING ESTIMATES ON TARGET TAXA FOR STAND-ALONE FLOW (152 MGD)

TAXON	ESTIMATED ANNUAL LARVAL ENTRAINMENT	ESTIMATED ANNUAL SOURCE WATER POPULATION AT RISK	P_M ALONGSHORE EXTRAPOLATION	P_M OFFSHORE EXTRAPOLATION
CIQ goby complex	33,927,750	15,749,000,000	0.21% (76.7 km)	*
spotfin croaker	20,896,741	58,199,000,000	0.04% (33.9 km)	0.04%
northern anchovy	16,293,995	6,807,000,000	0.24% (94.8 km)	0.12%
queenfish	5,339,449	7,435,000,000	0.08% (91.5 km)	0.05%
white croaker	5,284,106	5,519,000,000	0.10 % (75.4 km)	0.04%
salema	3,506,783	–	–	–
combtooth blennies	2,148,242	2,992,000,000	0.07% (18.3 km)	*
black croaker	2,137,034	8,928,000,000	0.02% (55.1 km)	0.02%
diamond turbot	1,631,863	1,948,000,000	0.08% (49.4 km)	0.06%
California halibut	1,505,361	6,289,000,000	0.03% (76.2 km)	<0.01%
rock crab megalops	2,324,020	693,000,000	0.33% (100.3 km)	0.22%
Total	**94,995,344**	**114,559,000,000**		

* No extrapolation to offshore areas because the taxon has an exclusively alongshore distribution.
— ETM values could not be calculated because there were no surveys during which salema larvae were present in both entrainment and source water samples.

Larval entrainment losses due to operation of the project in the stand alone operating condition are projected to affect only a small fraction of the larvae (0.02–0.33%) of the source water populations of approximately 115,000,000,000 (billion) individual larval fish at risk to entrainment, that occur within the project's source water. The IM&E studies at HBGS demonstrate estimated levels of proportional mortality that are much less than the estimates from other coastal power plants in California. This is attributed to the location of the facility along a fairly homogeneous stretch of coastline dominated by sandy habitat that provides less diverse habitat for fishes than rocky coastal or estuarine areas where some of the other facilities are located. In addition, the coastal currents in the vicinity of the HBGS spread any effects of the entrainment losses over tens of kilometers of coastline limiting any effects to the populations. There were no state or federal threatened or endangered species collected during the entrainment sampling. It should also be noted that the project is not within an Area of Special Biological Significance (ASBS)

Impacts on marine organisms due to the potential entrainment resulting from the project are relatively small, and would not substantially reduce populations of affected species, or affect the ability of the affected species to sustain their populations. Therefore, impacts would be less than significant.

Indirect Effects of Impingement and Entrainment

In regard to the potential indirect impacts on prey species of the California least tern, under either the co-located or stand-alone operating scenario, a study by Atwood and Kelly (1984) indicates that northern anchovy, topsmelt, jacksmelt, and deepbody or slough anchovies were the primary food sources for least terns in California. Based on the species' mobility, diversity of diet and lack of significant impacts on fish species (as discussed in relation to impingement and entrainment effects), California least terns (as well as other birds that utilize this area for foraging of fish species) are not expected to be impacted by implementation of the project. Moreover, population dynamics of the California least tern have been primarily affected by reductions in nesting habitat. The substantial increases in the breeding populations for the species (from 600 pairs in 1973, to over 7,000 pairs in 2005), has been attributed to protection of nesting sites.[24] It should be further noted that these population increases have occurred in light of the continued operation of the HBGS and other coastal power plants that have utilized once-through cooling. There does not appear to be a substantial adverse effect on the species resulting from any reduction in prey species that could be attributable to the HBGS. Therefore, such effects would similarly not be anticipated with operation of the desalination facility operating in a stand-alone condition.

California Coastal Act, California Public Resources Code, Division 20, Sections 30230 and 30231

Sections 30230 and 30231 of the California Coastal Act (Coastal Act) require generally that marine resources be maintained, enhanced, and where feasible, restored. They also require that the marine environment be used in a manner that sustains biological productivity and maintains healthy populations of all marine species.

Based on the analysis contained in this section, it is not anticipated that the project would conflict with these policies.

Porter Cologne Water Quality Control Act, California Water Code Section 13142.5(b)

The Porter Cologne Water Quality Control Act, California Water Code 13142.5(b) states as policy that new industrial facilities using seawater for processing must use the best available site, design, technology and mitigation feasible to minimize intake and mortality of marine life. Based on the analysis contained in this section, it is not anticipated that the project would conflict with these provisions of the Water Code.

SUMMARY OF IMPACTS

No significant impacts related to ocean water quality and marine biological resources were identified.

[24] California least tern 5-Year Review Summary and Evaluation (p. 22), U.S. Fish and Wildlife Service, September, 2006.

MITIGATION MEASURES

As no significant impacts have been identified, no mitigation is required under CEQA.

UNAVOIDABLE SIGNIFICANT IMPACTS

None have been identified.