Technical Memorandum

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Prepared For: Scott Maloni, Poseidon Water
Prepared By: Eric Miller, Miller Marine Science & Consulting, Inc.
Reviewed By: Dr. Larry Allen, Miller Marine Science & Consulting, Inc.
Subject: Multiple Lines of Evidence Summation for Third-Party Review

PURPOSE

Over the last several months Poseidon and regulatory agency staff have jointly worked with Dr. Peter Raimondi as part of a Neutral Third-Party Review (NTPR) to evaluate the best available site for a 1-mm screened ocean intake to minimize the intake and mortality of all forms on marine life for the proposed Huntington Beach Desalination Plant (HBDP). The parties have determined that this analysis will benefit from consideration of Multiple Lines of Evidence (MLE) as the Ocean Plan Amendment (OPA) provides various guidance under section M.2.b and does not prescribe a single analytical approach.

The following is a brief synopsis of the MLE we presented at the August 30, 2018 meeting with agency staff and Poseidon Water and consultants. Five of the six lines of evidence conclude that the proposed intake site (i.e., station E) is the best screened-intake site to minimize intake and mortality of all forms of marine life. This document is intended to provide insights into our analytical approach and the underlying ecological considerations for Dr. Peter Raimondi's NTPR.

MULTIPLE LINES OF EVIDENCE CONSIDERED AND THEIR APPLICABILITY TO OCEAN PLAN AMENDMENT COMPLIANCE

The MLE approach was pursued after the agreement amongst the State and Regional Water Board Staff and California Coastal Commission Staff (Agency Staff), NTPR, and Poseidon Water and its consultants (Poseidon team) that no single metric satisfied the collective goal of identifying the best intake location as described in the OPA Section M.2.b. (biological considerations only):

- *(3) Analyze the feasibility of placing intake, discharge, and other facility infrastructure in a location that avoid impacts to sensitive habitats* and sensitive species.*
- *(4) Analyze the direct and indirect effects on all forms of marine life* resulting from facility construction and operation, individually and in combination with potential anthropogenic effects on all forms of marine life* resulting from other past, present, and reasonably foreseeable future activities within the area affected by the facility.*
- *(5) Analyze oceanographic geologic, hydrogeologic, and seafloor topographic conditions at the site, so that the siting of a facility, including the intakes and discharges, minimizes the intake and mortality of all forms of marine life.**
- (*7) Ensure that the intake and discharge structures are not located within a MPA or SWQPA* with the exception of intake structures that do not have marine life mortality associated with the construction, operation, and maintenance of the intake structures (e.g.*

slant wells). Discharges shall be sited at a sufficient distance from a MPA or SWQPA so that the salinity* within the boundaries of a MPA or SWQPA* does not exceed natural background salinity.* To the extent feasible,* surface intakes shall be sited so as to maximize the distance from a MPA or SWQPA.**

Discussions between the Agency Staff, NTPR, and the Poseidon team identified five quantitative and qualitative lines of evidence:

<u>Quantitative Lines of Evidence</u>

1. ETM/APF using sampling station-specific criteria where available
    a. Addresses Section M.2.b.(4)
2. Mean concentration including all identified and enumerated taxa
    a. Addresses Section M.2.b.(4)
3. Standardized mean concentration including all identified and enumerated taxa
    a. Addresses Section M.2.b.(4)

<u>Qualitative Lines of Evidence</u>

4. Sampling station distance to sensitive habitats
    a. Addresses Sections M.2.b.(3) and M.2.b.(7)
5. Habitat Homogeneity
    a. Addresses Section M.2.b.(5)

In the process of conducting these analyses, the Poseidon team added a sixth line of evidence - mean concentration including all identified and enumerated taxa, except *Emerita*.[1] This line of evidence was added after plotting the data and observing *Emerita* concentrations were dominating the results of the analysis to the exclusion of other taxa that should be factored into the determination of the best available intake location. Therefore, this additional analysis was conducted to examine if the distribution of all taxa (except *Emerita*) combined displayed the same spatial mean concentration pattern as the mean concentration of all taxa (including *Emerita*) combined. This additional line of evidence addressed Section M.2.b.(4).

During recent meetings, the NTPR stressed the importance of examining environmental risk rather than a simple numerical difference, which is consistent with OPA guidance to use ETM/APF which focuses on an evaluation of the broader ecosystem risk rather than abundance of the species at risk. The APF, per the NTPR, was developed to calculate and express risk in a readily understood metric (area of habitat). Nevertheless, the value of the ETM/APF in its original use was to evaluate the risk to the local marine ecology posed by entrainment at a designated facility's water intake structure. Risk, as we understand the NTPR comments, captures not only numerical abundance but also accounts more for community structure in recognizing that not all taxa are

[1] Emerita is a small-bodied detritivore that reclaims energy deposited in the sandy intertidal zone. Nearly all of the Emerita collected during the 2003-04 sampling were Stage 1 zoea likely recently spawned off the beach affronting Stations U4 through E. Smaller, lower-trophic level taxa frequently commonly dominate species-abundance distribution curves. As species-specific size and trophic level increase, abundances decline in recognition of the biological resources needed to develop and support larger animals that consume larger quantities of prey (McGill et al. 2007, Lercari et al. 2010).

equally abundant in their undisturbed state. In other words, taxa are naturally plentiful at various levels based on their body size, trophic level, fecundity, density-dependent habitat requirements, and predator/prey dynamics (who do they eat and who eats them).

The ETM incorporates this risk by standardizing the entrainment estimate as a function of the overall source population abundance susceptible to entrainment. Data concerns limited the utility of the ETM at all stations under consideration for the HBDP and therefore provided the genesis for examining the larval concentration data that was uniformly collected at all sampling stations. To incorporate risk into the larval concentration analysis, the NTPR recommended using standardized concentrations. Using standardized concentrations places the concentrations of each taxon on an equal plane with all the others. While not quite the same as standardizing to the source population abundance as would occur with the ETM, it does provide a more accurate assessment of the relative ecological risk of the intake location than simply counting the total number of marine organisms potentially susceptible to entrainment.

Absent consideration of the proportion of the total population of each taxa that is potentially at risk, those taxa that are naturally more abundant will invariably have a more significant influence on the spatial pattern of raw concentration than those taxa that are naturally less abundant. Such an approach would protect one species to the detriment of the rest of the taxa that are potentially at risk, which conflicts with the broader ecosystem protection goals of the OPA.

At the meeting on Aug 30, 2018, the NTPR used a hypothetical example to explain why the ecosystem risk analysis is a better metric for intake siting determinations than the total concentrations of species potentially at risk. In this example, the species at risk are the CIQ Goby and Tidewater Goby (*Eucyclogobius newberryi*). Tidewater Goby is a Federally-listed Endangered Species, while the three species in the CIQ Goby complex are relatively abundant. Hypothetical entrainment of 1000 CIQ goby and 100 Tidewater Goby (combined entrainment of 1100 fish) would be environmentally superior than hypothetical entrainment of 500 CIQ Goby and 200 Tidewater Goby (combined entrainment of 700 fish) because a fewer number of the endangered Tidewater Goby are at risk of entrainment. The risk to the environment resulting from the entrainment of a greater number of CIQ Goby is less of a concern because of the healthy populations of this species group. The standardized concentration and, to a lesser extent, mean concentration excluding *Emerita* provide a way to evaluate the available data in a way that appropriately weighs the ecological risk across the entrained community, rather than simply adding up total entrained organisms without any consideration of loss of those organisms to the communities they represent.

METHODS AND MAPPING OF SUPPORTING EXCEL FILE

All of the data and analyses used in deriving the MLE are provided in the accompanying MS-Excel file (Review-MLE APF All Stations Analysis) that includes 23 tabs. Significance testing was used to compare the station-specific concentrations and test for significant differences using the floating alpha method described in Reed et al. (2018). The floating alpha method uses the effect size calculated between two stations as the critical p-value. A one-sample, one-sided t-test is used to compare the same two stations as the effect size was calculated. The p-value resulting from the t-test is compared against the effect size. A p-value less than the effect size indicates a significant difference.

Tab MLE Summary – Summarizes the results from the evaluation of the six lines of evidence described above. The column headers (1-7) represent the ascending rank of lowest value to the highest value for each line of evidence analyzed. Each line of evidence is developed through the following tabs.

APF Tabs – The next 11 tabs with labels beginning with APF document the development of the ETM/APF analyses. Where applicable, additional instructions or notes are inserted to identify the tables' calculation methods and mechanics.

Concentration Tabs – The next three tabs beginning with Conc represent the three analyses based on concentration. These include just mole crab (*Emerita*), no mole crab (*Emerita* removed from the data set before analysis), and all sp (all taxa included in the analysis). Mean concentrations at each station other than Station E were compared to Station E using the floating alpha method described above to determine if significant differences existed between the station-specific sampling results.

Standardized Density Tabs – The std density analysis is presented on the five tabs beginning with Std Den. All steps of the analysis are shown from the raw density through the final data set to highlight the analytical mechanics used to derive the final values. Mean concentrations at each station other than Station E were compared to Station E using the floating alpha method described above to determine if significant differences existed between the station-specific sampling results.

Taxon Tabs – The final three tabs focus on annual raw mean concentration, and the degree to which this parameter would result in the protection of *Emerita* to the detriment of the remaining taxa.

QUANTITATIVE ANALYTICAL RESULTS

ETM/APF. The ETM/APF did not substantially differ based on the estuarine larval concentration data source (Table 1). Differences did result when station-specific current speeds (ROMS) were used and when a uniform ocean current speed (99-00 current) for all stations was used. The station-specific current speed analysis indicated the APF at Station E (using 12 taxa in the analysis) was the lowest at 130 acres followed by the Station D4 APF at 139 acres. Using only the four taxa common to nearly all stations increased the Station E APF, but with substantially higher standard error (indicating less precise and less reliable results) than in the 12-taxa analysis. The imprecision of the four-taxa ETM/APF analysis was a concern raised by the NTPR, raising considerable doubt as to the validity and utility of those estimates. The imprecision of the four taxa ETM/APF is what prompted the parties to consider additional lines of evidence. Using the single current speed analysis indicated the APF at Station U4 was lowest at approximately 76 acres followed by Station E (12-taxa) at approximately 98 acres. Averaging across the four independent APFs calculated, the Station E (12-taxa) APF was the lowest at 114 acres.

Mean Concentration. As previously noted, one line of evidence under consideration is the annual raw mean concentration of all taxa combined at each station. This line of evidence is in conflict with the broader ecosystem protection goals of Section M.2.b.(4). of the OPA, which states:

> *(4) Analyze the direct and indirect effects on all forms of marine life* resulting from facility construction and operation, individually and in combination with potential anthropogenic*

effects on all forms of marine life resulting from other past, present, and reasonably foreseeable future activities within the area affected by the facility.*

We interpret this provision of the OPA to mean the best intake site is one that will minimize the overall ecological impact risk to the marine community, not just the lowest raw concentration of plankton identified and counted during sampling.

Comprehensive ecosystem protection goals provided the basis for the 2003-04 entrainment study used in this analysis. The sampling and analysis plan required the identification and counting of all larval fishes and a select group of invertebrates. This list of taxa, developed in consultation with a technical working group comprised of regulatory agency staff, project consultants, and third-party scientific experts, was specifically designed to appropriately weigh the ecological risk across the broader marine community potentially at risk of entrainment.

In the 2003-04 entrainment study, the stations where *Emerita* concentrations were at their peak corresponded with minimum concentrations of all the other taxa (Table 2). In fact, for most other taxa, their concentrations were at or near their peak levels at stations where *Emerita* was least common. This was especially true for taxa stressed by other anthropogenic effects, such as fishing. *Emerita* concentrations were least at Stations O4 and O2 (Table 2). At these two stations, stressed taxa such as White Croaker (*Genyonemus lineatus*), California Halibut, sea basses (*Paralabrax* spp.), Kelp Bass (*P. clathratus*), Pacific Sardine (*Sardinops sagax*), and others were most common.

Standardized Mean Concentration. The standardized mean concentration analysis evaluates ecological risk differences between the stations by standardizing the concentrations for each taxon's station-specific concentration across all the nets processed during that sampling event. In essence, this places the station-specific concentration in the context of the overall concentration across the area minimizing the differences in natural abundance patterns between sampled taxa.

Table 3 provides additional evidence as to the likelihood that raw concentration mainly reflects *Emerita* concentrations at the expense of the rest of the community sampled. In Table 3, the Stations are listed from left to right in order of increasing *Emerita* concentration. The rank concentration for each taxon of the 25 most common taxa is indexed based on the station-specific annual mean raw concentrations. The ranks across all taxa are summed at the bottom of Table 3 and show that those stations with the lowest *Emerita* concentration are otherwise highly populated (in comparison to other stations in the area) by the rest of the community. These same Stations O2 and O4 that have low *Emerita* concentrations are also the most taxonomically rich. While moving the intake to one of these stations would potentially result in lower raw annual mean concentration, the ecological risk would be more severe across a wide range of non-*Emerita* taxa. The annual raw mean concentration should be given minimal weight as a line of evidence.

QUALITATIVE ANALYSIS

Spatial considerations such as distance to sensitive habitats, including nursery grounds for protected species, are included in Table 4 and presented in Figure 1. These considerations are germane to addressing Section M.2.b. of the OPA. Table 2 notes which taxa support a fishery (commercial and/or recreational) and if the Marine Protected Area South Coast Region Science

Advisory Team considered the taxon likely to benefit from Marine Protected Area (MPA) protection. Taxa that both support a fishery and were considered likely to benefit from MPA protections are highlighted in red.

In addition to the distance to sensitive habitats or fishery/MPA status, the location of Giant Sea Bass (*Stereolepis gigas*) nursery grounds are noted in Figure 1. Benseman and Allen (2018) and Allen et al. (in press) surveyed the Southern California Bight, including offshore Huntington Beach and Newport, for the presence of recently settled Giant Sea Bass. No individuals were found offshore of Huntington Beach, but significantly higher densities were observed along the Newport coast. This was especially true near the Newport Pier located approximately 1.2 miles downcoast of Station D4. Their study throughout the Southern California Bight found that beaches inshore of the heads of submarine canyons were preferred nursery grounds for Giant Sea Bass. Densities of these individuals declined sharply with distance along the coast from the canyon head. As noted in Appendix F1 of SLC (2017), Giant Sea Bass is protected in California and is illegal to take except for limited incidental take by commercial gill net.

CONCLUSION

The results and conclusions in this report are summarized in Table 5. When significance is considered, no ecological benefit could be achieved by moving the intake to another location based on the APF line of evidence, no-*Emerita* concentration, and standardized concentration. The only line of evidence suggesting relocating the intake is the annual raw mean concentration including all taxa, but such a relocation would reduce impacts to only *Emerita* while increasing risks to nearly all other taxa. This seems contrary to the intent of the OPA to protect all forms of marine life as well as directly contradicting OPA Section M.2.b.(4).

REFERENCES

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Table 1. Area of Production Forgone (APF) estimates for each sampling station based on number of taxa included in the analysis, ocean current data source (ROMS model or 99-00 S4 current meter), estuarine data source (Agua Hedionda Lagoon [AHL] or Alamitos Bay), and APF (acres) standard error station. The grand mean is the average of all four APF estimates on that row.

Station	Number of Taxa In Analysis	ROMS				99-00 Current				Grand Mean
		AHL		Alamitos Bay		AHL		Alamitos Bay		
		APF	Std Err	APF	Std Err	APF	Std Err	APF	Std Err	
E	12	130	29.45	130	29.44	99	22.61	97	23.01	114
U4	4	161	45.87	161	45.98	76	16.87	75	17	118
D4	4	139	30.82	139	31.17	153	35.82	153	36.12	146
D2	4	148	39.65	147	40.09	145	44.46	145	44.51	146
E	4	213	67.36	213	67.32	126	37.17	126	64.84	170
O4	3	272	78.67	272	78.67	113	32.56	113	32.57	193
U2	4	213	58.21	213	58.22	232	59.83	241	61.37	225
O2	4	286	83.14	286	83.29	288	83.49	288	83.64	287

Table 2. Sampling station-specific annual mean raw concentration (and standard error) by taxon collected during the 2003-04 plankton sampling program offshore Huntington Beach, California. The 25 most common taxa are presented with the remaining 85 taxa-specific concentrations summed for each station. The number of taxa identified at each station is also given.

	O4		O2		D2		D4		U2		E		U4		Grand
Taxa	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean
Emerita analoga (zoea)	0.044	0.012	0.045	0.014	0.074	0.032	0.074	0.025	0.200	0.065	0.300	0.173	0.476	0.219	0.173
Gobiidae unid.	0.006	0.001	0.024	0.004	0.273	0.036	0.495	0.078	0.089	0.013	0.171	0.025	0.117	0.031	0.168
Engraulis mordax	0.077	0.012	0.072	0.017	0.067	0.013	0.049	0.008	0.098	0.020	0.089	0.020	0.088	0.020	0.077
Seriphus politus	0.024	0.010	0.025	0.010	0.042	0.015	0.117	0.042	0.024	0.010	0.033	0.015	0.055	0.027	0.046
Genyonemus lineatus	0.066	0.015	0.087	0.016	0.016	0.004	0.026	0.006	0.024	0.005	0.023	0.005	0.034	0.009	0.039
Sciaenidae unid.	0.038	0.014	0.029	0.010	0.011	0.004	0.004	0.001	0.014	0.004	0.004	0.002	0.025	0.012	0.018
Hypsoblennius spp.	0.024	0.007	0.018	0.005	0.008	0.002	0.005	0.001	0.010	0.002	0.005	0.002	0.018	0.004	0.013
Paralichthys californicus	0.051	0.014	0.017	0.005	0.004	0.001	0.002	0.001	0.007	0.002	0.003	0.001	0.006	0.002	0.013
Paralabrax spp.	0.028	0.010	0.013	0.005	0.003	0.002	0.001	0.000	0.002	0.001	0.001	0.000	0.005	0.002	0.008
Paralabrax clathratus	0.027	0.013	0.009	0.004	0.001	0.001	0.000	0.000	0.002	0.001	0.001	0.001	0.002	0.001	0.006
Atherinopsis californiensis	0.001	0.001	0.002	0.001	0.004	0.002	0.009	0.002	0.015	0.006	0.005	0.003	0.005	0.001	0.006
larvae, unidentified yolksac	0.009	0.003	0.010	0.004	0.002	0.001	0.001	0.001	0.003	0.001	0.002	0.001	0.008	0.003	0.005
Sardinops sagax	0.020	0.010	0.008	0.004	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.001	0.003	0.001	0.005
Sphyraena argentea	0.021	0.008	0.008	0.004	0.002	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.005
Chromis punctipinnis	0.030	0.018	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Engraulidae	0.007	0.002	0.002	0.001	0.012	0.007	0.003	0.001	0.000	0.000	0.003	0.002	0.002	0.001	0.004
Hypsopsetta guttulata	0.002	0.001	0.003	0.001	0.006	0.001	0.002	0.001	0.007	0.002	0.001	0.001	0.006	0.001	0.004
Citharichthys stigmaeus	0.018	0.005	0.004	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.001	0.004
Cancer gracilis (megalops)	0.003	0.001	0.006	0.002	0.001	0.000	0.003	0.002	0.005	0.002	0.003	0.002	0.003	0.001	0.003
Cancer anthonyi (megalops)	0.002	0.001	0.003	0.001	0.003	0.003	0.002	0.001	0.006	0.002	0.005	0.003	0.002	0.001	0.003
Cancer antennarius (megalops)	0.003	0.001	0.005	0.002	0.002	0.001	0.002	0.001	0.005	0.002	0.002	0.001	0.002	0.001	0.003
Lepidogobius lepidus	0.006	0.002	0.008	0.003	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.003
larval fish fragment	0.005	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.004	0.001	0.002	0.001	0.002	0.001	0.003
Leuresthes tenuis	0.000	0.000	0.000	0.000	0.012	0.008	0.000	0.000	0.001	0.001	0.001	0.000	0.003	0.002	0.002
Pleuronichthys ritteri	0.008	0.002	0.004	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.002
Remaining Taxa - Sum	0.082		0.039		0.023		0.024		0.021		0.020		0.038		
Number of Taxa Identified	77		74		51		52		58		54		55		110

Table 3. Rank of the 25 most common taxa's annual mean raw concentration among the seven sampling stations. Sum of ranks is the sum of all ranks presented in the table for each station. Fished designations represent whether or not the taxon is fished (recreationally or commercially) and whether a taxon is expected to benefit from MPA protection. Ranks in red indicate those taxa that are both fished and expected to benefit from MPA protection. Fished and MPA designations based on Appendices C-1 and D in http://www.dfg.ca.gov/marine/pdfs/rpsc/body_part2.pdf.

Taxa	O4 Mean	O2 Mean	D2 Mean	D4 Mean	U2 Mean	E Mean	U4 Mean	Fished (App D.)	MPA (Table C-1)
Emerita analoga (zoea)	1	2	3	3	5	6	7	NO	YES
Gobiidae unid.	1	2	6	7	3	5	4	NO	NO
Engraulis mordax	4	3	2	1	7	6	5	YES	NO
Seriphus politus	2	3	5	7	1	4	6	YES[1]	NO
Genyonemus lineatus	6	7	1	4	3	2	5	YES	NO
Sciaenidae unid.	7	6	3	2	4	1	5	YES	NA
Hypsoblennius spp.	7	5	3	1	4	2	6	NO	NO
Paralichthys californicus	7	6	3	1	5	2	4	YES	NO
Paralabrax spp.	7	6	4	1	3	2	5	YES	YES
Paralabrax clathratus	7	6	3	1	5	2	4	YES	YES
Atherinopsis californiensis	1	2	3	6	7	5	4	YES	NO
larvae, unidentified yolksac	6	7	3	1	4	2	5	NA	NA
Sardinops sagax	7	6	1	1	4	3	5	YES	NO
Sphyraena argentea	7	6	5	2	4	1	3	YES	NO
Chromis punctipinnis	7	6	1	1	1	1	5	YES	YES
Engraulidae	6	2	7	4	1	5	3	NA	NA
Hypsopsetta guttulata	3	4	5	2	7	1	6	YES	NO
Citharichthys stigmaeus	7	6	3	1	2	4	5	YES	NO
Cancer gracilis (megalops)	4	7	1	2	6	5	3	YES	NO
Cancer anthonyi (megalops)	3	4	5	2	7	6	1	YES	YES
Cancer antennarius (megalops)	5	7	1	3	6	2	4	YES	YES
Lepidogobius lepidus	6	7	4	5	3	2	1	NO	NO
larval fish fragment	7	4	2	1	6	5	3	NA	NA
Leuresthes tenuis	1	3	7	2	5	4	6	NO	YES
Pleuronichthys ritteri	7	6	3	2	4	1	5	YES	NO
Remaining Taxa - Sum	7	6	3	4	2	1	5		
Number of Taxa ID'd	77	74	51	52	58	54	55		
Sum of Ranks	133	129	88	67	109	80	115		
Rank of Sum of Ranks	7	6	3	1	4	2	5		
Sum of ranks = lowest sum is the station where each taxon is least abundant									
[1] = Commonly co-occurring with White Croaker in landings									

Table 4. Distance from each sampling station to each of the two wetland complex mouths in the area.

Station	Distance to BC Wetland (mi)	Distance to HB Wetland (mi)
U4	1.8	4
U2	3.1	2.5
E	4.4	1.4
D2	5.5	0
D4	6.8	1.2
O2	4.6	1.8
O4	5	2.5

Table 5. Summary of lines of evidence where each station is listed in its rank from the lowest to the highest value. Additional ecological parameters derived in this memo are included to highlight the contradiction of protecting marine life and community by using the annual mean raw concentration. The station-specific order of values for the concentration-allsp is substantially different from the station-specific order of values for ecological parameters.

	Lowest		Values				Highest
Line of Evidence	1	2	3	4	5	6	7
APF	E	U4	D4	D2	O4	U2	O2
Concentration-AllSp	O2*	U2	D2	O4	E	D4	U4
Concentration-No Emerita	U2	E	O2	U4	D2**	O4**	D4**
Standardized Concentration	E	U2**	U4**	D4**	D2**	O2**	O4**
Ecological Parameters							
# of Taxa	D2	D4	E	U4	U2	O2	O4
Sum of Taxa Ranks	D4	E	D2	U2	U4	O2	O4
* = Station's value was significantly lower than the Station E value							
**= Station's value was significantly higher than the Station E value							

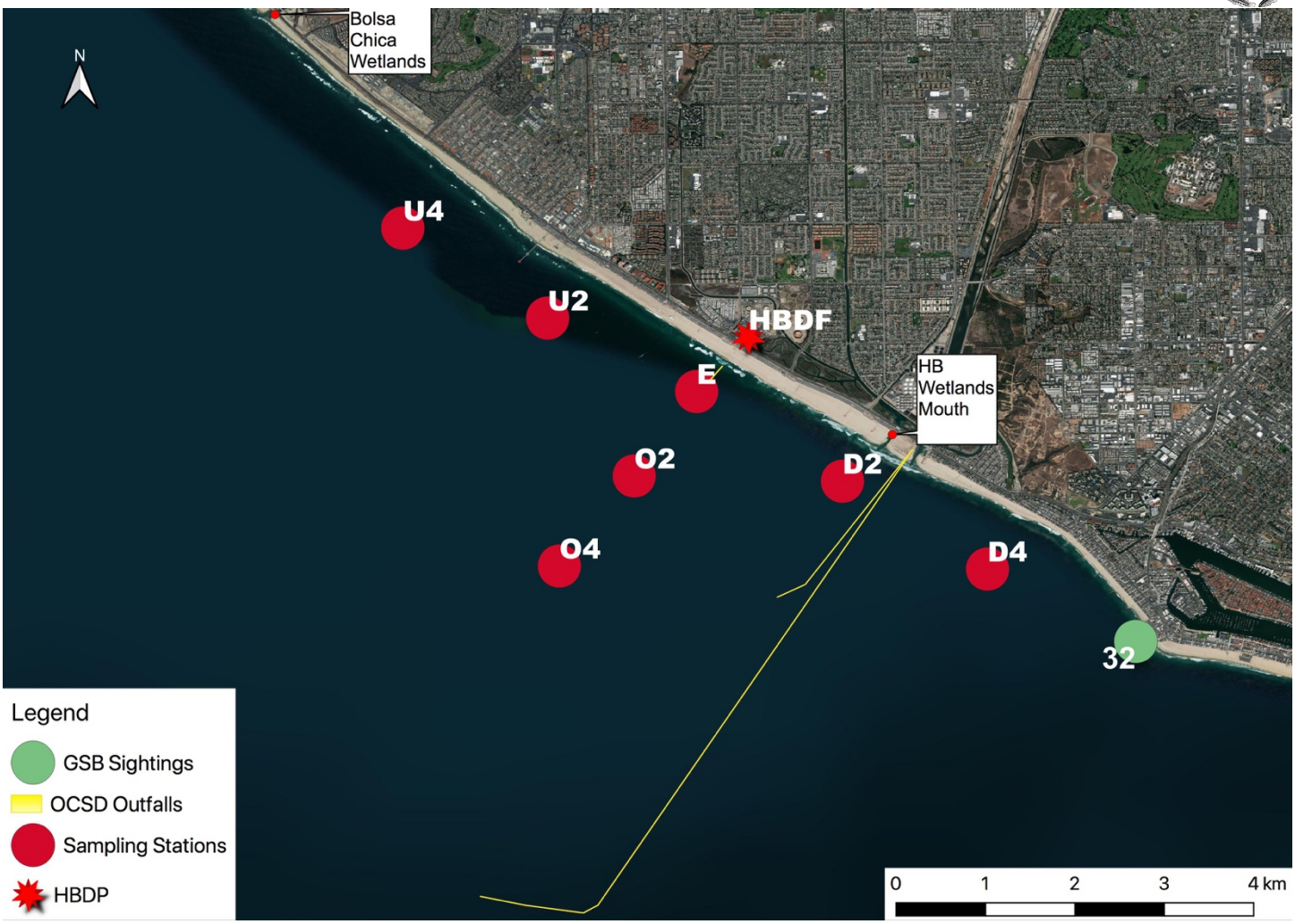

Figure 1. Location of the seven sampling stations evaluated, the two mouths of wetland complexes, the Orange County Sanitation District (OCSD) ocean outfalls, and the location of Giant Sea Bass observations in the Huntington Beach and Newport area. The "32" showing on the Giant Sea Bass Sightings symbol reflect their density at the site, or 32 Giant Sea Bass young-of-the-year/hectare reported in Benseman and Allen (2018).