AGENDA
Scientific Advisor Panel Meeting
May 11, 2018
9:00 a.m. – 1:30 pm
San Diego Bay National Wildlife Refuge Complex Headquarters
1080 Gunpowder Point Drive, Chula Vista, California 91910
Gate Code 9658

1. Introductions (9:00 am – 9:15 am)

2. Purpose of the Meeting (Stan Williams/Peter MacLaggan) (9:15 am – 9:30 am)

   a. Completion of the Coastal Development Permit for construction, maintenance, and monitoring of the Otay River Estuary Restoration Project
   b. Topics for Review for the NPDES Permit Renewal

3. Neutral Third-Party Review Topics 9:30 am – 11:00 am (Ben Neill)
   a. Background
   b. Review topics
      i. Removing the Biological Performance Standard for Mitigation
      ii. Mitigating for Mortality to All Forms of Marine Life
      iii. Comparing Intake and Mortality of All Forms of Marine Life Associated with Different Intake Screen Locations

Break: 11:00 am – 11:15 am

   c. Review next steps, assignments, and due dates for Neutral Third-Party Review (SAP and RWQCB) 11:15 am – 11:30 am-Draft SAP Schedule

5. Otay River Estuary Restoration Project Update (Stan Williams, Andy Yuen)

   a. NEPA Update 11:15 am – 11:30 am (Andy Yuen)
   b. CDP Application Update 11:30 am – 12:00 pm (Stan Williams)

Lunch 12:00 pm – 12:30 pm

   c. Restoration Plan 12:30 pm – 12:45 pm (Stan Williams)
   d. Mitigation Monitoring and Report Plan 12:45 pm – 1:15 pm (Kate Huckelbridge)
   e. Next steps, assignments, and due dates for Mitigation Monitoring and Report Plan

6. Close out comments 1:15 pm – 1:30 pm (Stan Williams, Kate Huckelbridge, RWQCB, and SAP)

TOPICS FOR SAP REVIEW IN SUPPORT OF REISSUANCE OF CARLSBAD DESALINATION PLANT INTAKE AND DISCHARGE PERMIT

Meeting Agenda

- Purpose of Science Advisory Panel (SAP) Review
- Intake/Discharge Modifications Under Consideration
- SAP Review Topics
  - **Topic 1:** Removing the biological performance standard for impingement mitigation
  - **Topic 2:** Mitigating for mortality to all forms of marine life
  - **Topic 3:** Comparing intake and mortality of all forms a marine life associated with different intake screen locations

Purpose of SAP Review

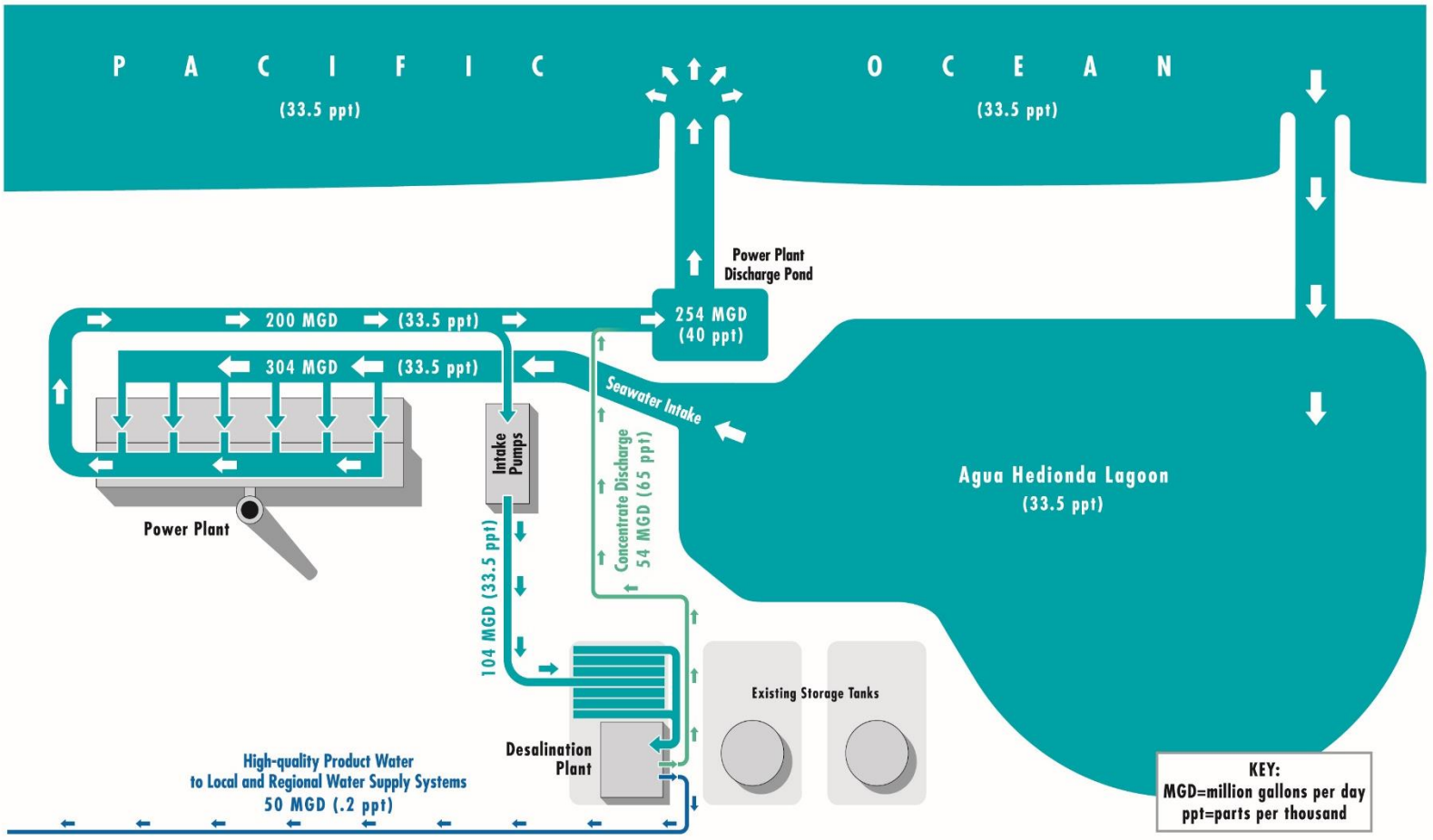
- Regional Water Board (RWB) plans to issue an intake and discharge permit for the Carlsbad Desalination Plant (CDP) to address:
  - Compliance with the Ocean Plan Amendment (OPA)
  - Closure of the Encina Power Station
- The new intake facilities will replace the current CDP configuration that utilizes the Encina Power Station (EPS) once-through cooling system
- The RWB has requested the SAP review information in the permit application to confirm that Poseidon's analyses and conclusions are based on sound science and meet the technical requirements of the OPA

INTAKE/DISCHARGE MODIFICATIONS UNDER CONSIDERATION

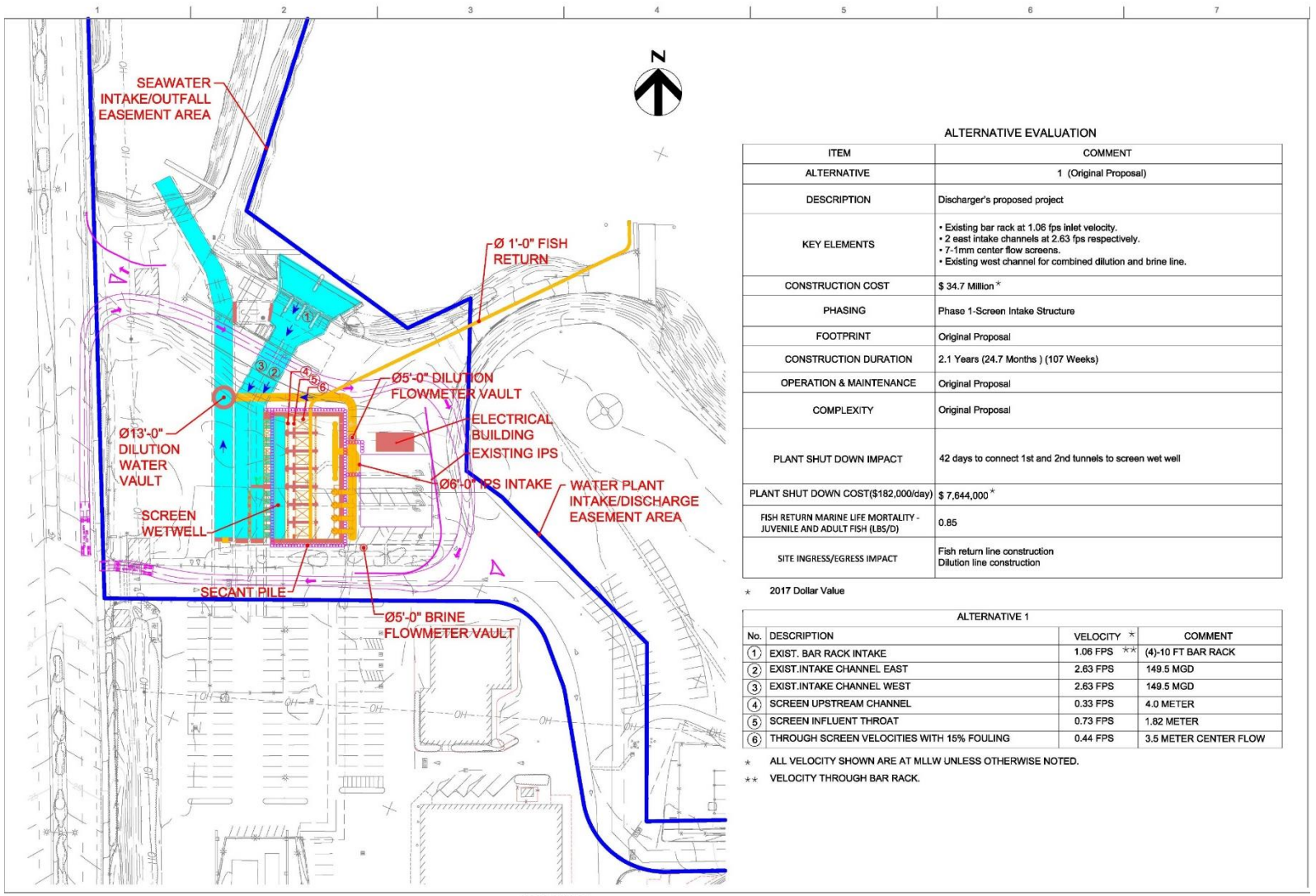
Intake/Discharge Modifications Under Consideration

- The RWB has reviewed 21 intake/discharge alternatives for CDP stand-alone operations
- Three alternatives are still under review
- The SAP's review will help advise the RWB on the merits of these alternatives

Existing Intake Configuration



Alternative 1 Intake Configuration



ALTERNATIVE EVALUATION

ITEM	COMMENT
ALTERNATIVE	1 (Original Proposal)
DESCRIPTION	Discharger's proposed project
KEY ELEMENTS	• Existing bar rack at 1.06 fps inlet velocity. • 2 east intake channels at 2.63 fps respectively. • 7-1mm center flow screens. • Existing west channel for combined dilution and brine line.
CONSTRUCTION COST	$ 34.7 Million *
PHASING	Phase 1-Screen Intake Structure
FOOTPRINT	Original Proposal
CONSTRUCTION DURATION	2.1 Years (24.7 Months) (107 Weeks)
OPERATION & MAINTENANCE	Original Proposal
COMPLEXITY	Original Proposal
PLANT SHUT DOWN IMPACT	42 days to connect 1st and 2nd tunnels to screen wet well
PLANT SHUT DOWN COST($182,000/day)	$ 7,644,000 *
FISH RETURN MARINE LIFE MORTALITY - JUVENILE AND ADULT FISH (LBS/D)	0.85
SITE INGRESS/EGRESS IMPACT	Fish return line construction Dilution line construction

* 2017 Dollar Value

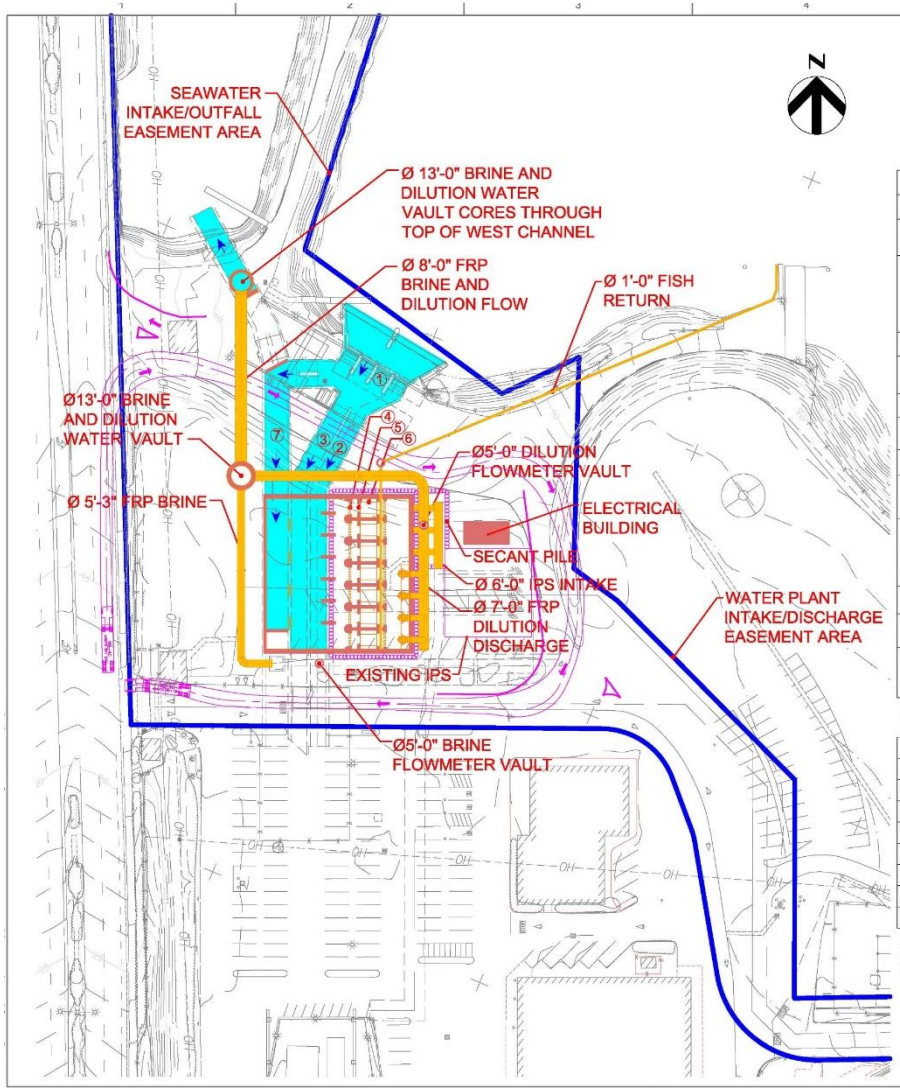
ALTERNATIVE 1

No.	DESCRIPTION	VELOCITY *	COMMENT
1	EXIST. BAR RACK INTAKE	1.06 FPS **	(4)-10 FT BAR RACK
2	EXIST.INTAKE CHANNEL EAST	2.63 FPS	149.5 MGD
3	EXIST.INTAKE CHANNEL WEST	2.63 FPS	149.5 MGD
4	SCREEN UPSTREAM CHANNEL	0.33 FPS	4.0 METER
5	SCREEN INFLUENT THROAT	0.73 FPS	1.82 METER
6	THROUGH SCREEN VELOCITIES WITH 15% FOULING	0.44 FPS	3.5 METER CENTER FLOW

* ALL VELOCITY SHOWN ARE AT MLLW UNLESS OTHERWISE NOTED.

** VELOCITY THROUGH BAR RACK.

Alternative 15 Intake Configuration



ALTERNATIVE EVALUATION

ITEM	COMMENT
ALTERNATIVE	15
DESCRIPTION	Discharger's proposed project with discharge channel repurposed as an intake.
KEY ELEMENTS	• Existing bar rack at 1.06 fps inlet velocity. • 3 intake channels at 1.54, 1.54 and 1.60 fps inlet velocity respectively. • 7-1mm center flow screens. • Additional brine discharge and combined dilution and brine line.
CONSTRUCTION COST	$ 38.3 Million* (Incremental increase from Alt 1 is $ 3.6 Million)
PHASING	Phase 1A-Screen intake structure Phase 1B-Dilution and brine line
FOOTPRINT	Same as original proposal
CONSTRUCTION DURATION	2.2 Years (26.1 Months) (113 weeks) (Incremental increase from Alt 1 is 6 weeks)
OPERATION & MAINTENANCE	Same as original proposal
COMPLEXITY	3rd inlet tunnel New combined dilution and brine discharge
PLANT SHUT DOWN IMPACT	42 days to connect 1st and 2nd tunnels to screen wet well 28 days for blocking existing channel and cutting roof and connect to 3rd tunnel 14 days for pipeline connection. Total of 84 days
PLANT SHUT DOWN COST($182,000/day)	$ 15,288,000* (INCREMENTAL INCREASE FROM ALT 1 is $ 7,644,000)
FISH RETURN MARINE LIFE MORTALITY - JUVENILE AND ADULT FISH (LBS/D)	0.78
SITE INGRESS/EGRESS IMPACT	Fish return line construction Dilution line construction Combined dilution and brine line construction

* 2017 Dollar Value

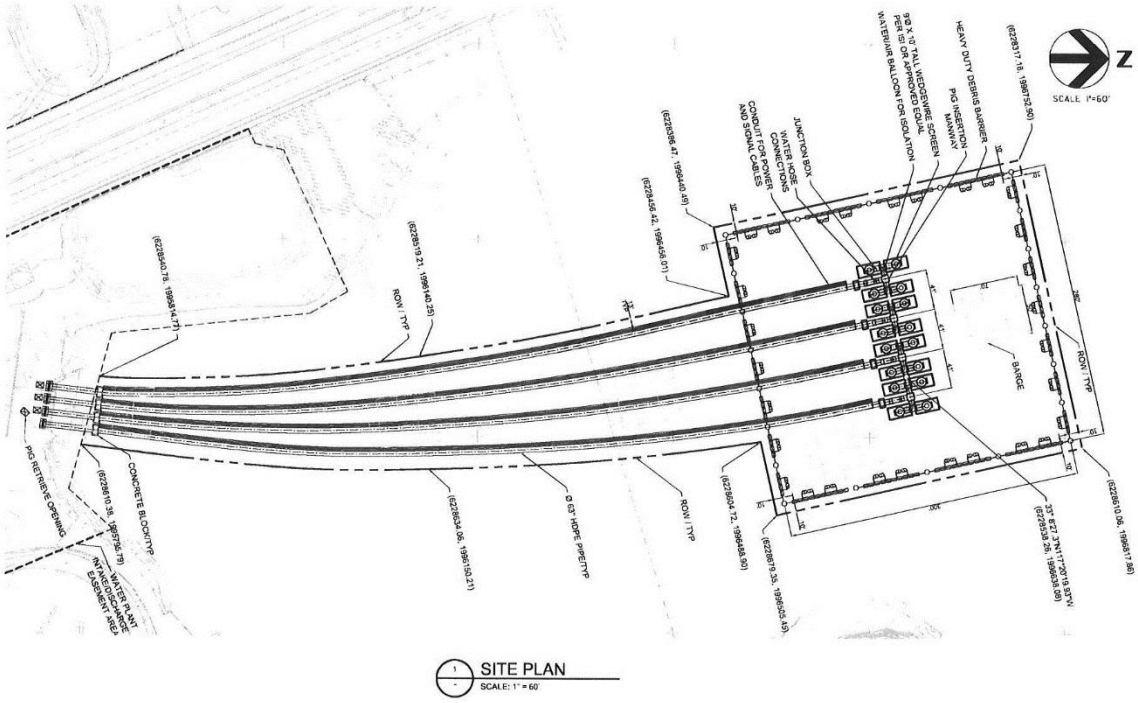
ALTERNATIVE 15

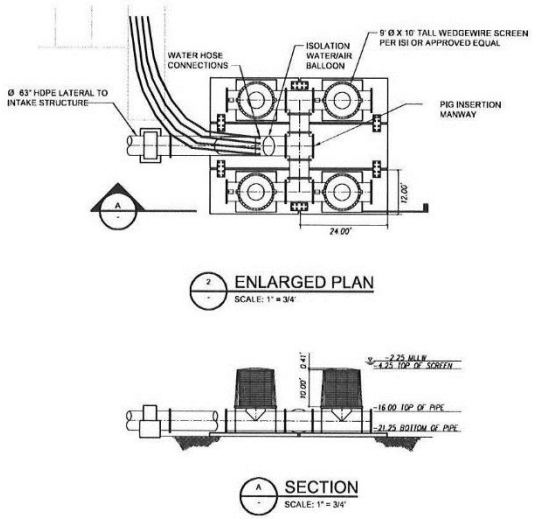
No.	DESCRIPTION	VELOCITY *	COMMENT
1	EXIST. BAR RACK INTAKE	1.06 FPS **	(4)-10 FT BAR RACK
2	EXIST.INTAKE CHANNEL EAST	1.54 FPS	87.5 MGD
3	EXIST.INTAKE CHANNEL WEST	1.54 FPS	87.5 MGD
4	SCREEN UPSTREAM CHANNEL	0.33 FPS	4.0 METER
5	SCREEN INFLUENT THROAT	0.73 FPS	1.82 METER
6	THROUGH SCREEN VELOCITIES WITH 15% FOULING	0.44 FPS	3.5 METER CENTER FLOW
7	EXIST.DISCH. CHANNEL REPURPOSED	1.60 FPS	124 MGD

* ALL VELOCITY SHOWN ARE AT MLLW UNLESS OTHERWISE NOTED.

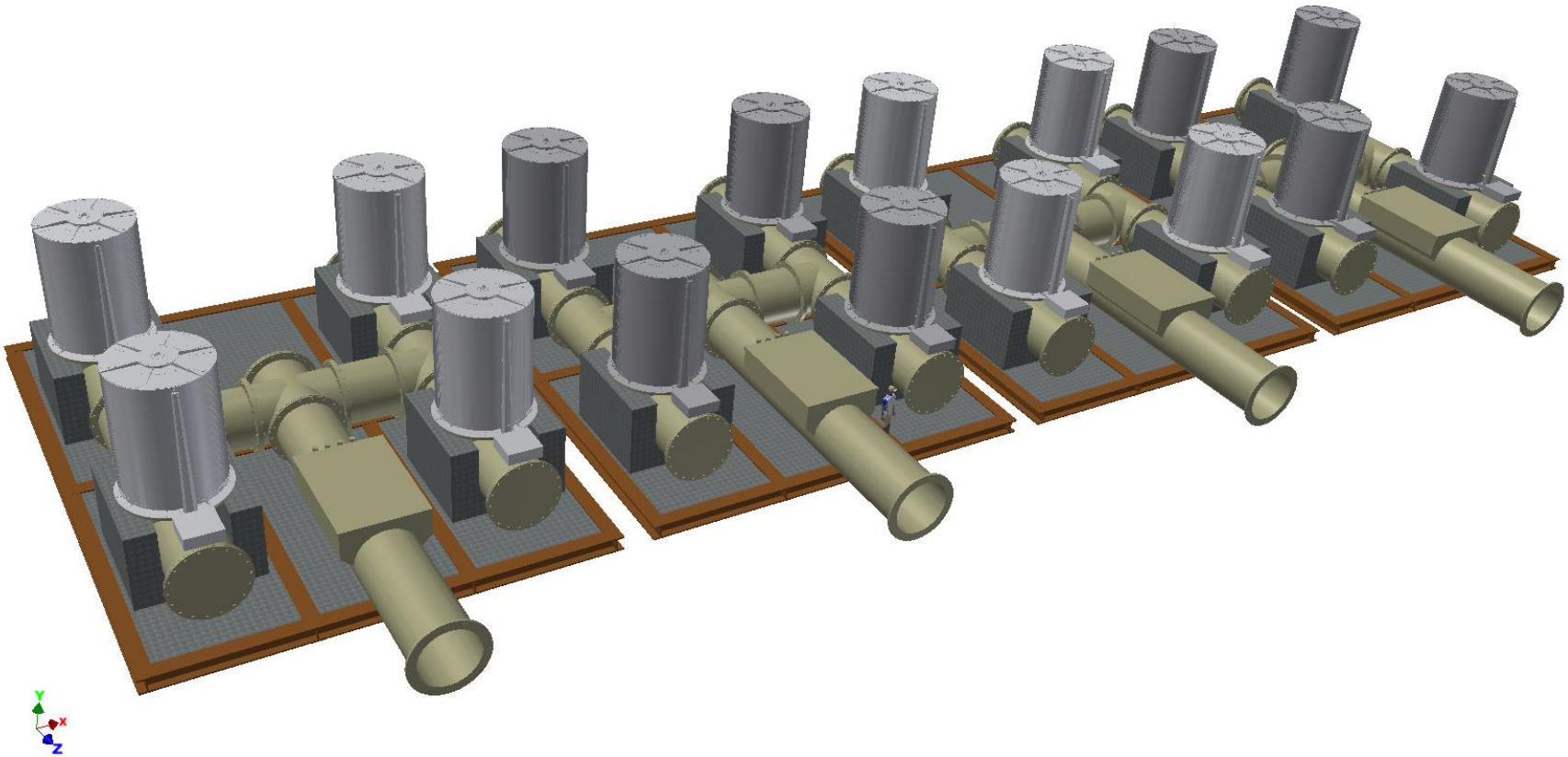
** VELOCITY THROUGH BAR RACK.

Alternative 21 Intake Configuration

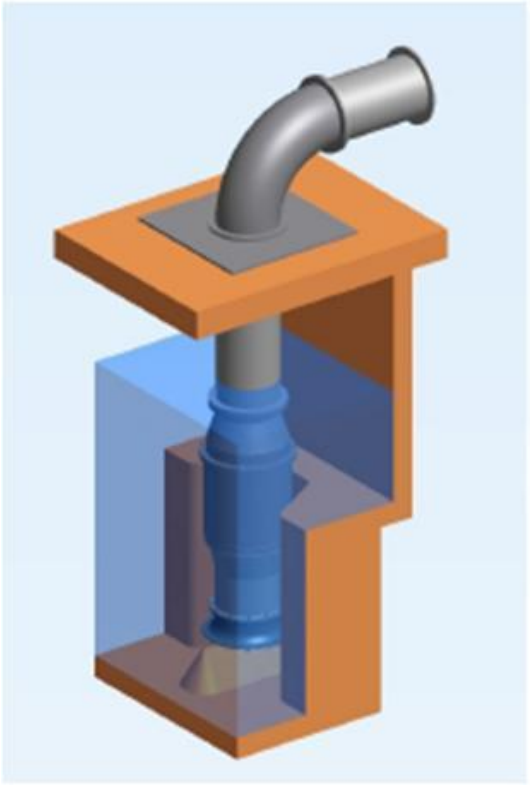


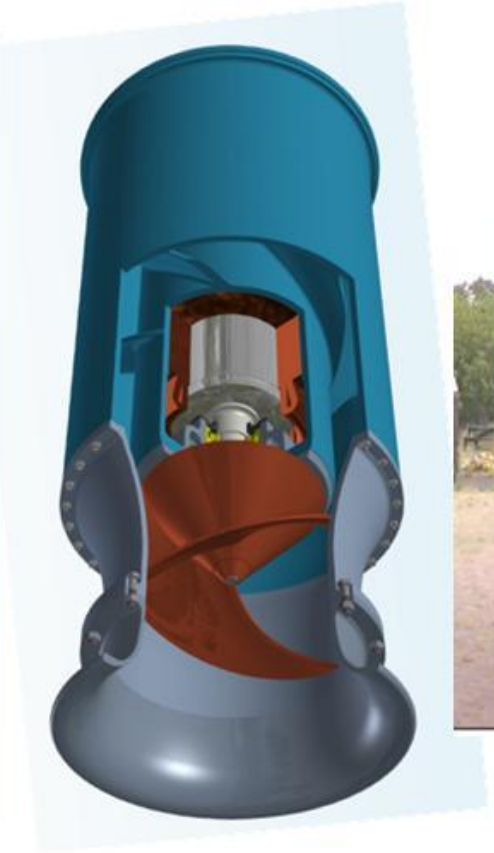


Self Cleaning Intake Screen Layout

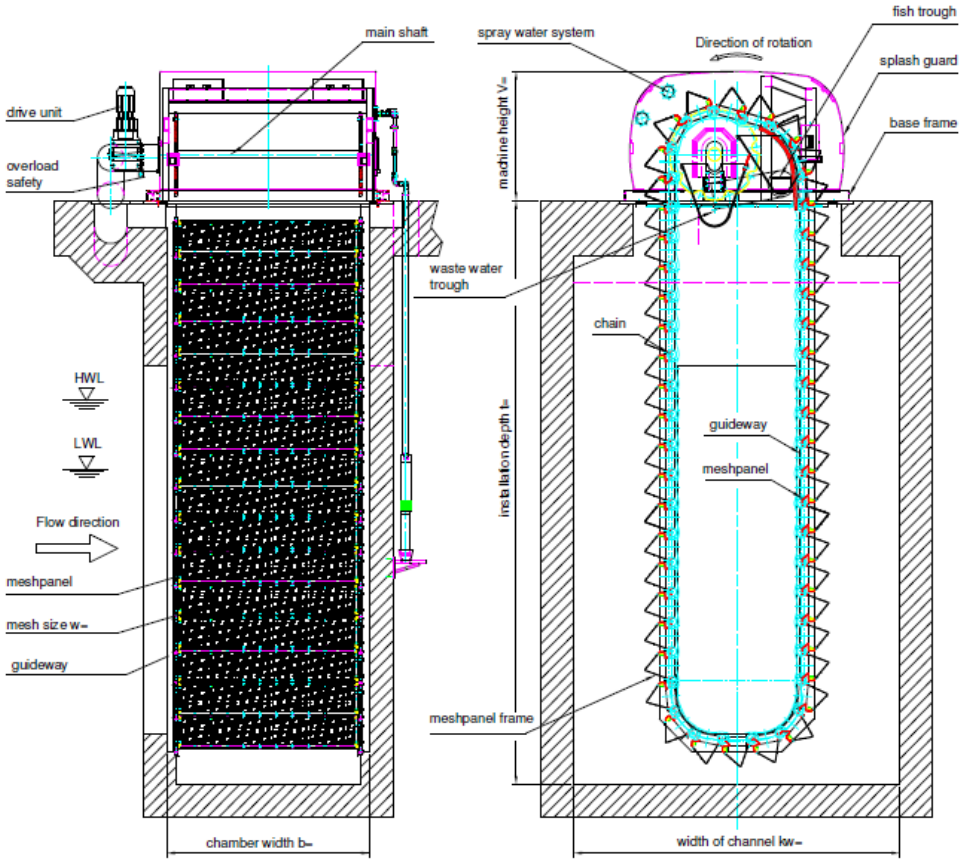


Fish-friendly Brine Dilution Pumps

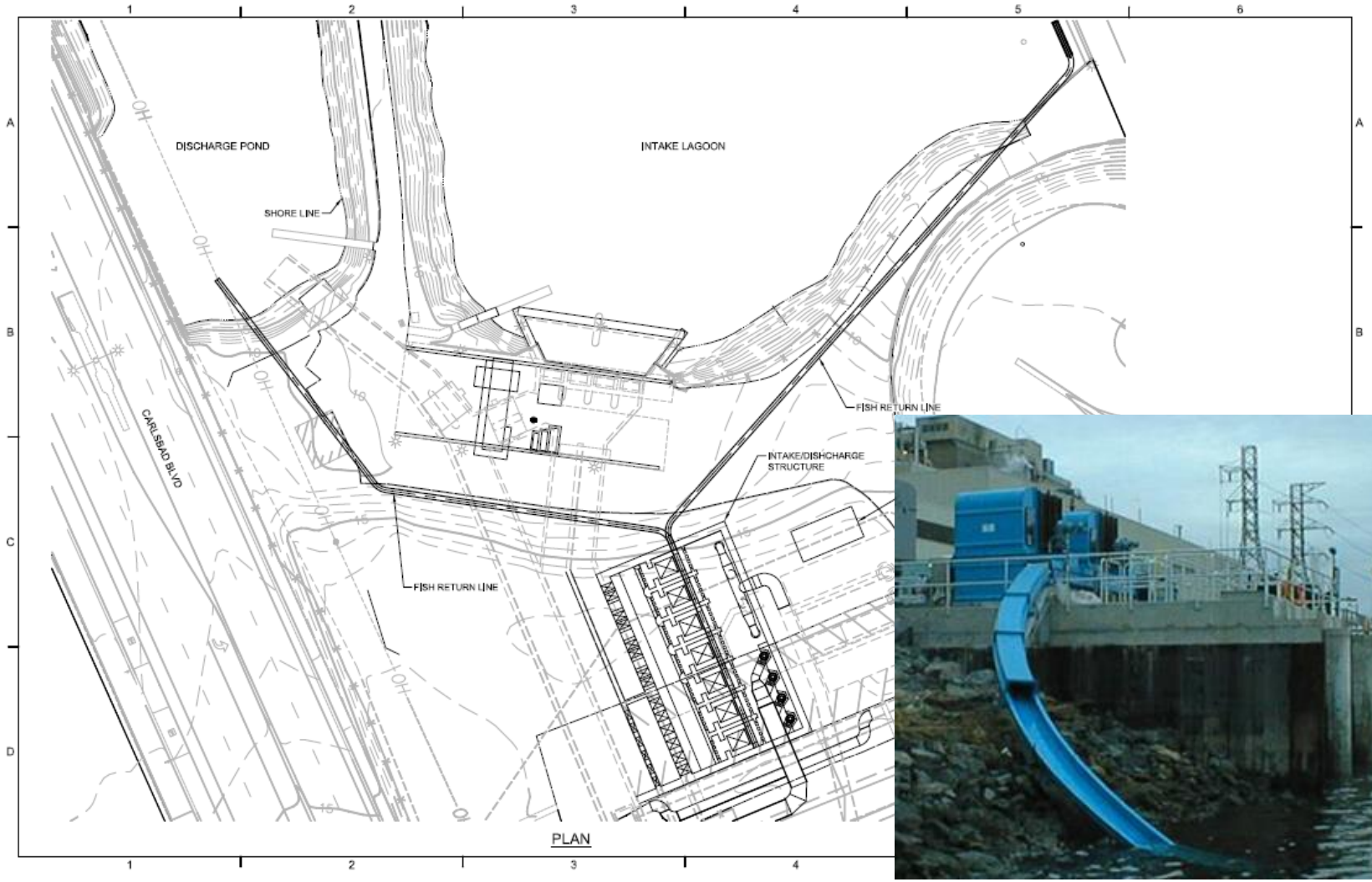




Centerflow 1-mm Traveling Water Screen



Fish Return System



TOPIC 1 - REMOVING THE BIOLOGICAL PERFORMANCE STANDARD FOR MITIGATION

Proposed Conclusion Topic 1

- Proposed Conclusion 1.1
  - Because Poseidon proposes to provide an additional 11 acres of mitigation habitat for a total of 66.4 acres, the biological performance standard and associated fish productivity monitoring are no longer necessary to compensate for impingement from the Facility during collocated operations with EPS.

Topic 1 – Elimination of Biological Performance Standard

- In 2009 the RWB approved the Water Code determination for the CDP which required;
  - 55.4 acres of mitigation for entrainment and impingement
  - Biological performance standard for impingement mitigation (1,715.5 kg/yr)
  - Productivity monitoring to ensure biological performance standard is met
- Poseidon subsequently agreed to provide 66.4 acres of mitigation (increase of 11 acres to address impingement impacts independent of the 55.4 acres required for entrainment mitigation)
- The biological performance standard and productivity monitoring are no longer needed
  - The additional 11 acres of mitigation ensures that the potential impingement impacts associated with temporary stand-alone operation are fully mitigated
  - Remaining 55.4 acres available for mitigation entrainment impacts
- The biological performance tests would adversely impact fish populations and the salt march habitat in the restoration site, which is contrary to the goals of the MLMP

TOPIC 2 - MITIGATING FOR MORTALITY TO ALL FORMS OF MARINE LIFE

Proposed Conclusions Topic 2

- Proposed Conclusion 2.1
  - Intake-related ETM/APF analysis was done adequately for assessing impacts to all forms under stand-alone operation
  - APF used upper 95% CI
  - Accounted for 1% mitigation credit for use of 1-mm screens
- Proposed Conclusion 2.2
  - 67.83 acres mitigates for mortality of all forms of marine life resulting from construction and operation of stand-alone facility

Marine Life Mortality Report

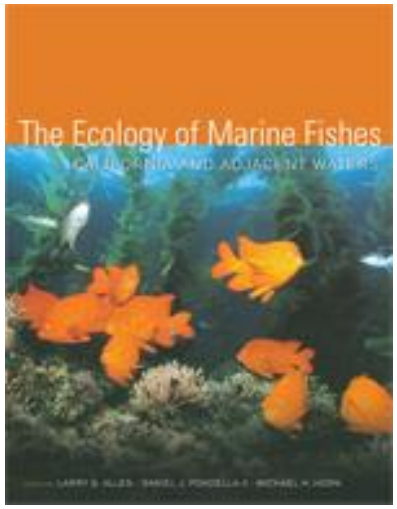
- The SAP has been asked to confirm that Poseidon is mitigating for mortality to all forms of marine life
- Poseidon's Marine Life Mortality Report and Mitigation Calculation (Appendix ZZ) addresses the following:
  - Intake Mortality
    - CDP Process Water
      - Entrainment
  - Discharge Mortality
    - Flow Augmentation
      - Entrainment
      - Osmotic Stress
  - Fish Return Mortality
  - Permanent Construction Impacts
  - Mitigation Calculation

Calculation of Entrainment Impacts (APF)

- The Empirical Transport Model (ETM) was used to calculate entrainment impacts in accordance with the Ocean Plan.
  - Entrainment data collected by EPS to assess its intake impacts (Tenera 2008)
    - Same data used in Dr. Raimondi's 2008 presentation to California Coastal Commission staff
  - Relied on the ETM parameters presented in Tenera (2008) scaled to Carlsbad Desalination Plant intake volumes
  - Used same taxa, habitat classification, and source water areas as Dr. Raimondi's 2008 presentation

Calculation of Entrainment Impact (APF)

- Habitats in the EPS/CDP area
  - Highly productive habitats: estuary, kelp, rocky reef
  - Low productive habitats: pelagic open water, open coast soft-bottom
- Classifications per Allen and Pondella (2006)



Calculation of Entrainment Impact (APF)

Taxa	Habitat	Area Habitat Represented
CIQ Goby	Southern Bay Estuary/Southern Nearshore Soft Bottom	Estuary
Combtooth blennies	Southern Cryptic Reef/Southern Nearshore & Bay Estuary	Estuary and Reef
Garibaldi	Southern Kelp Reef	Kelp and Reef
Northern Anchovy	California Coastal Pelagic	Pelagic Open Water
White Croaker	Southern Nearshore Soft Bottom & Inner Shelf	Soft Bottom
California Halibut	Southern Nearshore Soft Bottom	Soft Bottom
Queenfish	Southern Nearshore Soft Bottom	Soft Bottom
Spotfin Croaker	Southern Surf Zone & Nearshore Soft Bottom	Soft Bottom

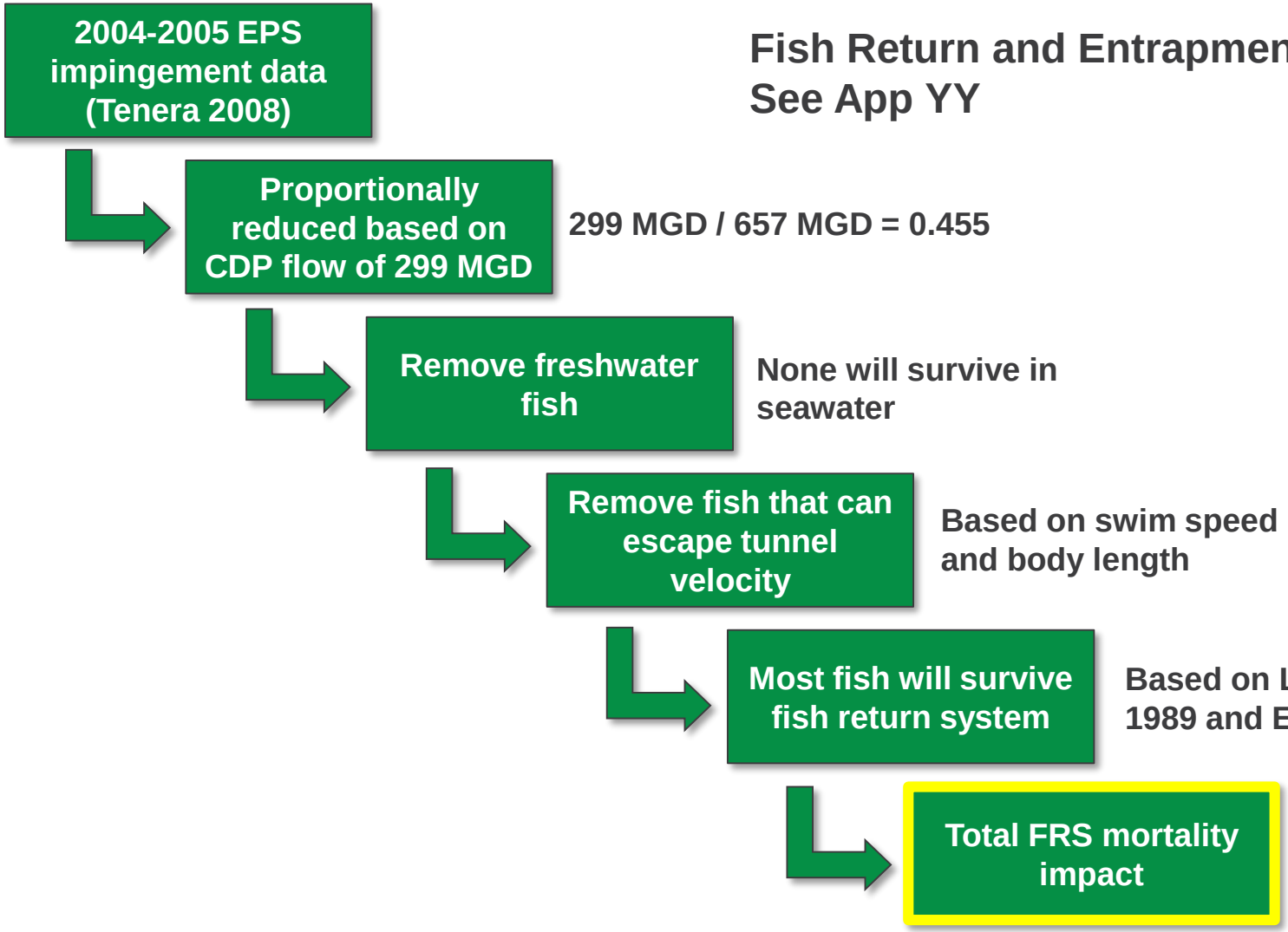
CDP Process Water – Entrainment Mortality

	CDP Process Water	Fish Return	Total	1 mm Screen Credit (1%)	Net Total	Supporting Documentation
Flow (MGD)	127	0.42	127.42			
Area of Production Foregone Total (Acres)	36.00	0.12	36.12	-0.36	35.76	Appendix K Appendix P

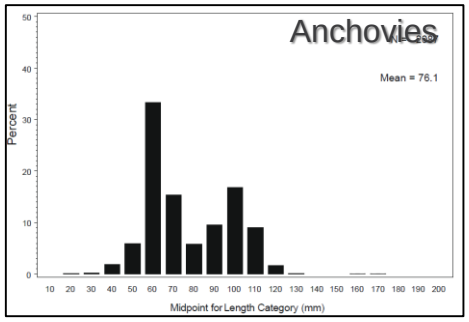
Flow Augmentation – Entrainment Mortality

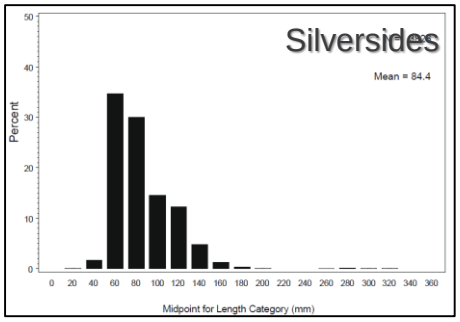
	Flow Augmentation System	Fish Return	Total	1 mm Screen Credit (1%)	Net Total	ROWD Supporting Documentation
Flow (MGD)	171	0.58	171.58			
Entrainment Mortality APF (Acres)	48.00	0.16	48.16	-0.48	47.68	Appendix K Appendix P

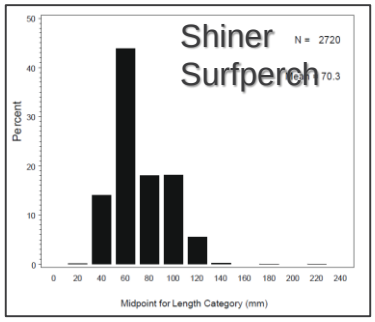
Calculation of Fish Return Impacts



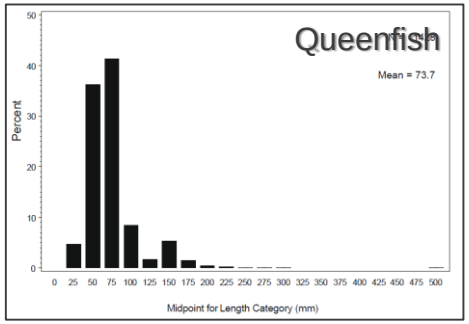
Calculation of Fish Return Impacts

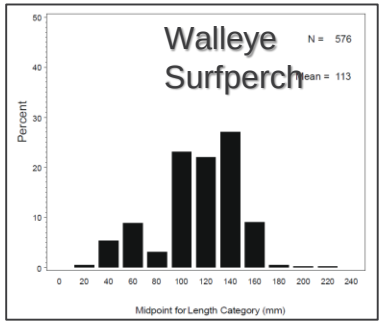


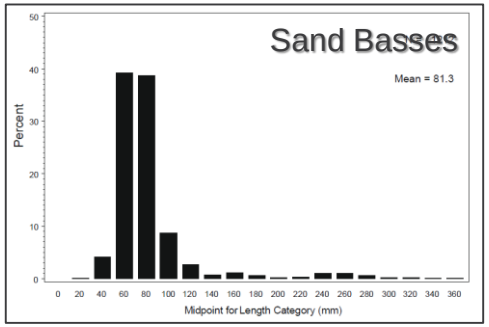


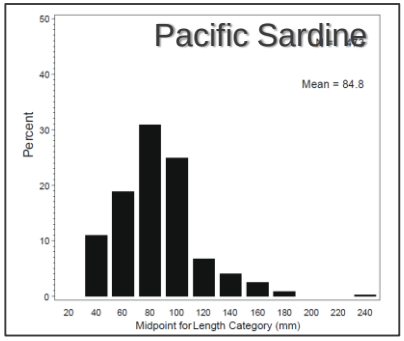


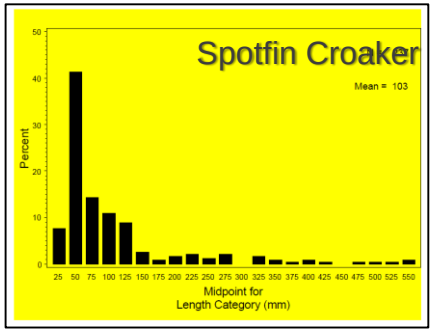
Length frequency distribution for dominant taxa

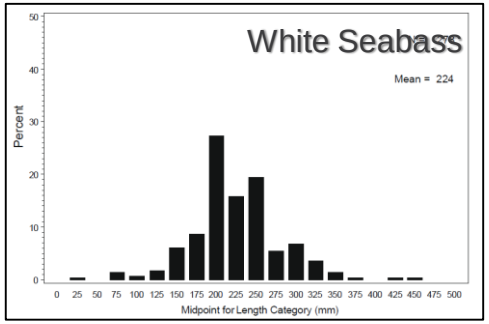




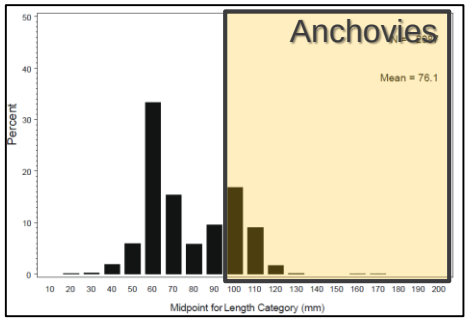


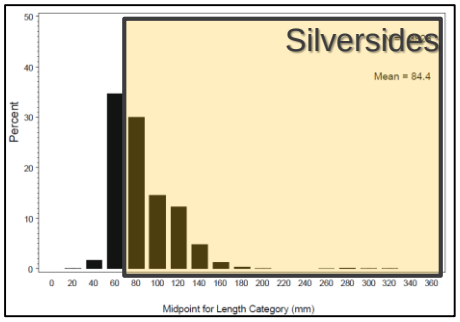


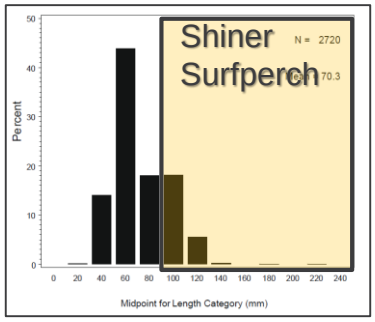




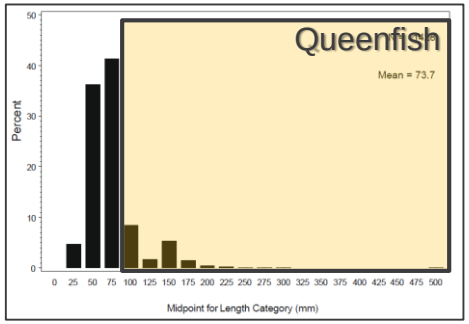
Calculation of Fish Return Impacts

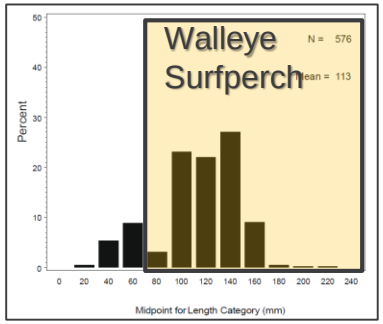


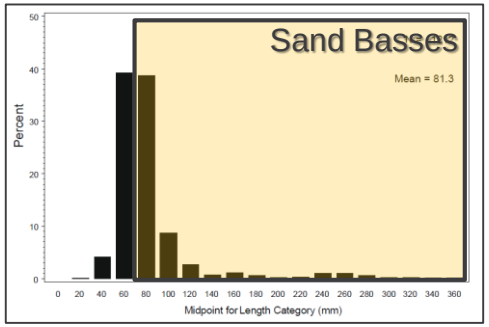


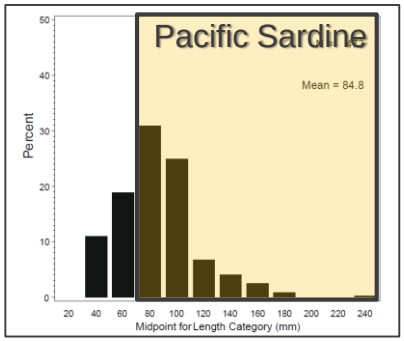


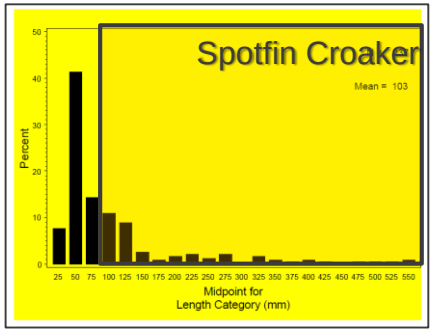
Fish that could escape <u>2.6 ft/sec</u>

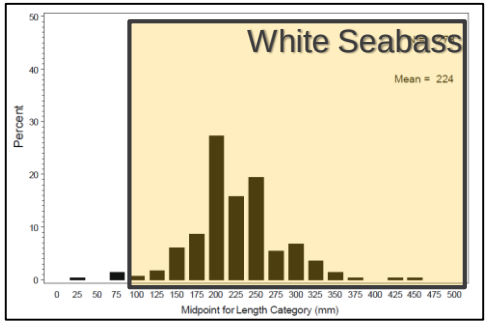












Fish Return Impacts Conclusions

- Entrapment unlikely due to the following:
  - Presence of FRS with fish-friendly features
  - Tunnel velocity below swimming ability of some fish
  - Distance required to sustain swimming is approximately 200 ft
- Estimated survival through FRS is based on best available data:
  - Species-specific FRS data from Love et al. (1989) (understanding the difference between the systems)
  - Lab data from EPRI 2010 documenting 70-100% survival for fish >11 mm

Mitigation Calculation – Fish Return

Fish Return Mortality

- The fish return system mortality is estimated to be 0.85 lbs/day for Alternative 1 and 0.78 for Alternative 15.
- Order R9-2009-0038 estimated the CDP stand-alone operations would result in 10.36 lbs/day of impingement mortality, which would be offset by 11.3 acres of estuarine habitat restoration.
- A proportional reduction of the 11.3 acres yields the impacted area associated with the fish return system:

Alternative 1 - 0.85 lbs/d/10.36 lbs/d x 11.3 acres = 0.93 acres

Alternative 15 - 0.78 lbs/d/10.36 lbs/d x 11.3 acres = 0.85 acres

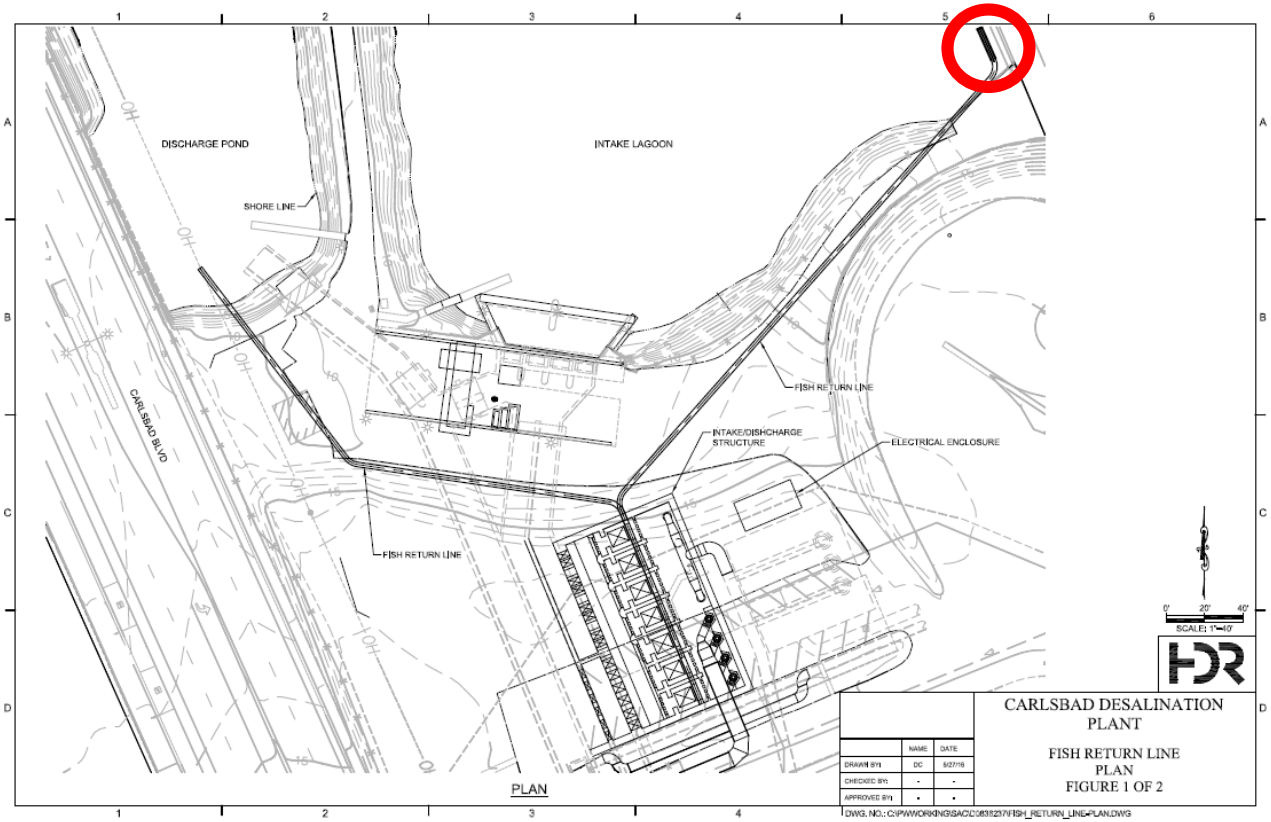
Permanent Construction Impacts

- The entire area within Agua Hedionda Lagoon that would be permanently impacted by the fish return system is less than 0.1 acres.

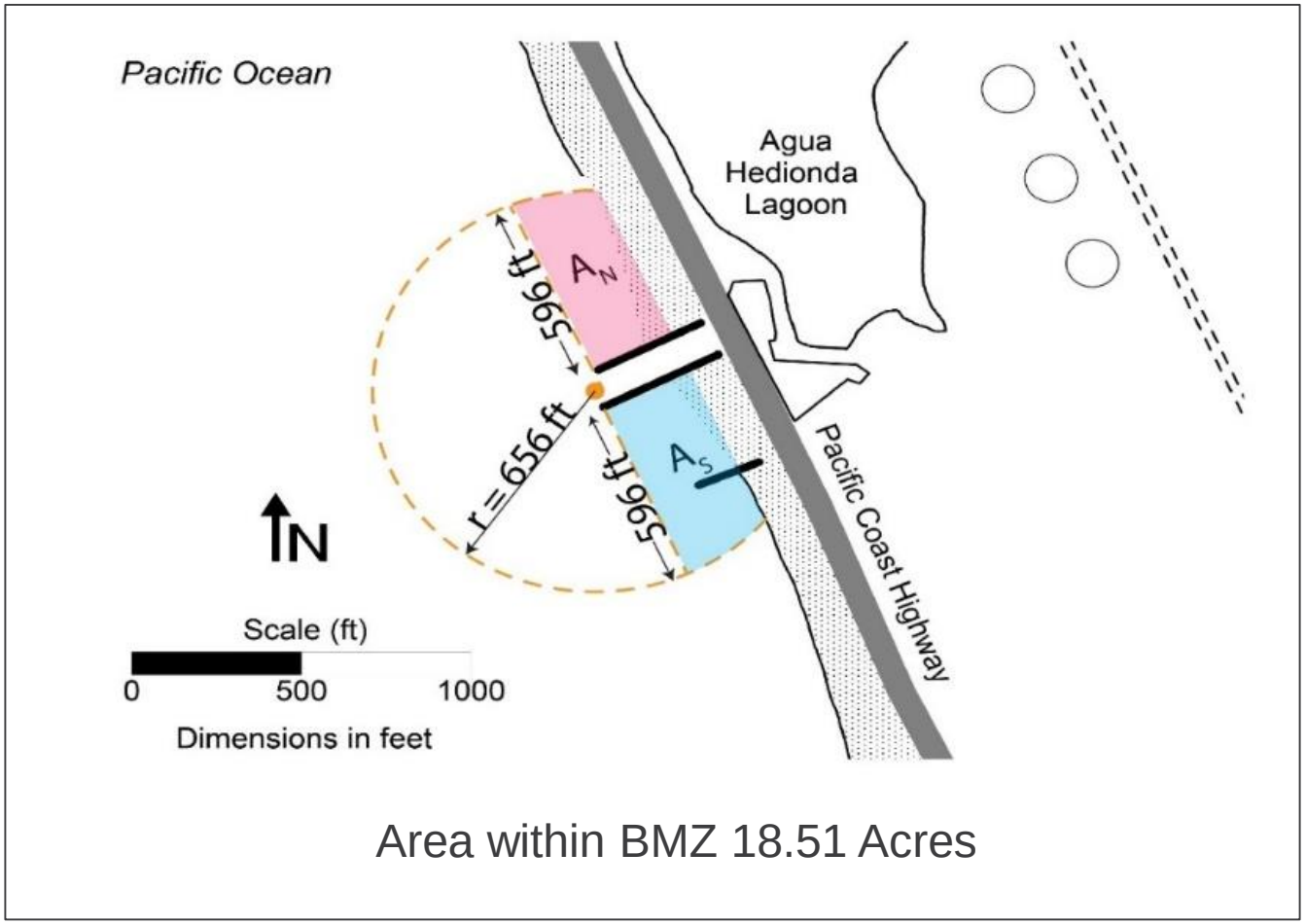
Mitigation Calculation – Fish Return

Mitigation Calculation – Construction Impact

- The entire area within Agua Hedionda Lagoon that would be permanently impacted by the fish return system is less than 0.1 acres.



Mitigation Calculation – Brine Mixing Zone



Area within BMZ 18.51 Acres

Combined Marine Life Mortality Proposed Project (Alternative 1 and Alternative 15)

Impact	Impact Assessment Method	Impacted Area (Acres)	
		Alternative 1	Alternative 15
Intake	APF calculated per Appendix E of the Staff Report/SED to the Ocean Plan Amendment using a 95% confidence bound for an assumed 100% mortality of all forms of marine life entrained by 127 MGD CDP process water with an APF of 35.76 acres and 171 MGD flow augmentation with an APF of 47.68 acres after accounting for a 1% credit for 1 mm screening technology.	83.44	83.44
	Potential mortality associated with the operation of the fish return system.	0.93	0.85
Discharge	Area within the BMZ potentially exposed to a salinity in excess of 2 ppt over natural background salinity.	18.51	18.51
Construction	Permanent footprint of the fish return within lagoon	0.10	0.10
	Total Impacted Area	102.98	102.90

Proposed Mitigation Ratio

- Consistent with the 2009 Water Code determination for the CDP, Poseidon is proposing one acre of high productivity estuarine habitat mitigation for every 10 acres of low productivity habitat impacted by project operations

Basis for Proposed Mitigation Ratio

- The impacted area identified in the CDP Marine Life Mortality Report for the proposed project is 102.98 acres for Alternative 1.
- There are four types of habitats impacted by the CDP:
  - Estuarine habitat
  - Open water habitat
  - Soft bottom habitat
  - Rock jetty habitat
- Poseidon is proposing to restore estuarine habitat to satisfy all of the CDP mitigation requirements.
- There are three key factors for measuring habitat productivity (vegetation production, fish count, and fish productivity)
- The productivity of the estuarine habitat contemplated under the restoration project is significantly greater than that of the soft bottom offshore of the CDP
- The mitigation calculation contemplates 1:1 in-kind mitigation for estuarine species and the rocky jetty habitat, and 10:1 mitigation for open ocean species and soft bottom habitat potentially impacted by the CDP.

Basis for Proposed Mitigation Ratio

Natural Resource	Mitigation Ratio[b]
Vegetation (Net prod. g C/m^2/y)	>10:1[a]
Fish (count/m^2)	650:1 to 9,750:1
Fish Productivity	6:1 to 12:1

a. Since there is no aquatic vegetation present in the BMZ, a true ratio cannot be calculated. However, given the high productivity of the estuarine habitat (1,680 g C/m^2/y) compared to no aquatic vegetation in the BMZ, a ratio of 10:1 is extremely conservative.

b. (ROWD Appendix UU)

Mitigation Calculation

Table 13 Mitigation Calculation Alternative 1						
Type of Impact Measured	**Impacted Area (Acres)**	**Impacted Habitat**	**Impacted Area By Habitat Type (Acres)**	**Mitigation Ratio**	**Required Mitigation (Acres)**	**Mitigation Area Habitat Type**
Intake	83.44	Estuarine	62.58	1:1	62.58	Estuarine
		Open Water	20.86	10:1	2.09	Estuarine
Fish Return	0.93	Estuarine	0.93	1:1	0.93	Estuarine
Discharge	18.51	Soft Bottom	18.20	10:1	1.82	Estuarine
		Rock Jetties	0.31	1:1	0.31	Estuarine
Construction	0.10	Estuarine	0.10	1:1	0.10	Estuarine
Total	**102.98**		**102.98**		**67.83**	

* Fish Return mitigation for Alt 15 is 0.85 acres, no fish return mitigation required for Alt 21

** Construction mitigation for Alt 15 is 0.10 acre, construction mitigation for Alt 21 is 0.20 acre

TOPIC 3 - COMPARING INTAKE AND MORTALITY OF ALL FORMS A MARINE LIFE ASSOCIATED WITH DIFFERENT INTAKE SCREEN LOCATIONS

Topic 3 – Proposed Conclusion 3.1

- Proposed screen location for Alt 1 results in 0.497 kg/day (0.85 lbs/day) mortality

Topic 3 – Fish Return Mortality Calculation

- The calculations presented under Topic 2 resulted in 0.497 kg/day (0.85 lbs/day) mortality for Alternative 1
- Alt 15 reduces tunnel velocity from 2.6 to 1.6 ft/sec by repurposing the discharge tunnel for intake use
- As a result of the lower velocity, the fish return mortality for Alternative 15 is reduced to 0.456 kg/day (0.78 lbs/day)
- Alternative 21 (wedge wire screens located in the lagoon) does not have a fish return, so the fish return mortality for this alternative is zero

Topic 3 – Proposed Conclusion 3.2

- Tunnel velocity of 2.6 ft/sec with 1-mm screens and fish return system precludes entrapment

Topic 3 – Fish Return Mortality Calculation

Entrapment unlikely due to the following:

- Tunnel velocity below swimming ability of some fish
- Presence of fish return system with fish-friendly features
- Distance required to sustain swimming is approximately 200 ft
- Use of fish-friendly screens has been recognized by EPA 316(b) standards for addressing entrapment:

  Entrapment includes but is not limited to: Organisms caught in the bucket of a traveling screen and unable to reach a fish return

Topic 3 – Proposed Conclusion 3.3

- Operational impacts of fish return system can be adequately assessed with SONGS data

Topic 3 – Fish Return Mortality Calculation

- Fish return system survival data are sparse
- Fish return system survival data for Southern California taxa are very sparse
- In light of this, two data sources were used:
  - SONGS (Love et al. 1989) – where species-specific data were available
  - Lab data (EPRI 2010) – where species-specific data were not available

Topic 3 – Proposed Conclusion 3.4

- Kg/day is appropriate metric for assessing impacts of intake screen locations

Topic 3 – Fish Return Mortality Calculation

- Organisms that would be collected by screens are larger; smaller organisms are accounted for in entrainment estimates
- Tenera 2008 enumerated and weighed collected organisms
- Weight is a valid measure of intake-related mortality
- Impact assessments (e.g., Port of Los Angeles, San Onofre Kelp Impacts) typically rely on biomass per unit area to convert biomass lost to mitigation area

Questions and Documents for SAP Review

- **Topic 1:** Removing the biological performance standard for impingement mitigation
- **Topic 2:** Mitigating for mortality to all forms of marine life
- **Topic 3:** Comparing intake and mortality of all forms a marine life associated with different intake screen locations