AES Huntington Beach

"Lighting Up California"

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Background

- AES applied for retool of HBGS Units 3 and 4 in 2001 in response to energy crisis.
- The Governor issued an Executive Order that allowed expedited power plant licensing.
- Since it was an existing structure, the retool was the quickest way to bring a unit on line and it was one of the only facilities in the state with this ability.
- AES completed all certification requirements in an extremely compressed time frame.
- Certificate granted and Units 3 and 4 became operational in January 2003 and August 2003.

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Conditions BIO-4 and BIO-5

- The conditions reflect an intent to focus on actual impacts to coastal fish, and it appeared that all of the stakeholders understood that intent.
- Condition BIO-4 required AES to provide $1.5 million to evaluate impacts of impingement and entrainment.
- BIO-5 required mitigation if the study determined that significant impacts to “one or more species of coastal fish” were occurring.

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The Project is Unique

- The project was a retool designed to take into account existing infrastructure in order to expedite operations.
- The certification is only valid through September 2011.
- Mitigation is being evaluated at a point in time when half of the license period has passed.

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Terms of Certification

- The certification was limited to ten years to address stakeholder concerns regarding the expedited process.
- Some stakeholders feel the units should be replaced when the existing license expires.
- The record reflects the view of these stakeholders:

  "The applicant is, of course, free to make a future application to extend operation of the facility beyond the 5 year period. Such a request would be the subject of a new review and analysis. It is the community's clear preference, which the staff shares, that a modern, more efficient, less visually prominent, plant replace this aging facility once California's energy emergency has abated."

  Taken from CEC Staff's post-hearing brief dated March 21, 2001

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Regulatory Developments

Significant events have transpired since certification of the project:

- EPA issued the final 316(b) Phase II Rule requiring HBGS to reduce impingement and entrainment.
- California SWRCB issued a draft scoping document for 316(b) that requires use of technologies and/or operational measures, and limits the use of restoration measures.
- Any additional technology and/or operational measures that are required would substantially reduce or eliminate the need for mitigation through restoration.

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AES Has Consistently Met Its Obligations

- Conducted the surf zone study which confirmed that HBGS is not the source of the ocean bacteria problems.
- Completed the impingement and entrainment study pursuant to BIO-4.
- CEC Compliance Manager has indicated that AES has met all conditions of certification, with BIO-5 still pending.
- AES contracted all of the energy from Units 3&4 to Southern California Edison.

Application of APF

John Steinbeck
Principal Scientist
Tenera Environmental

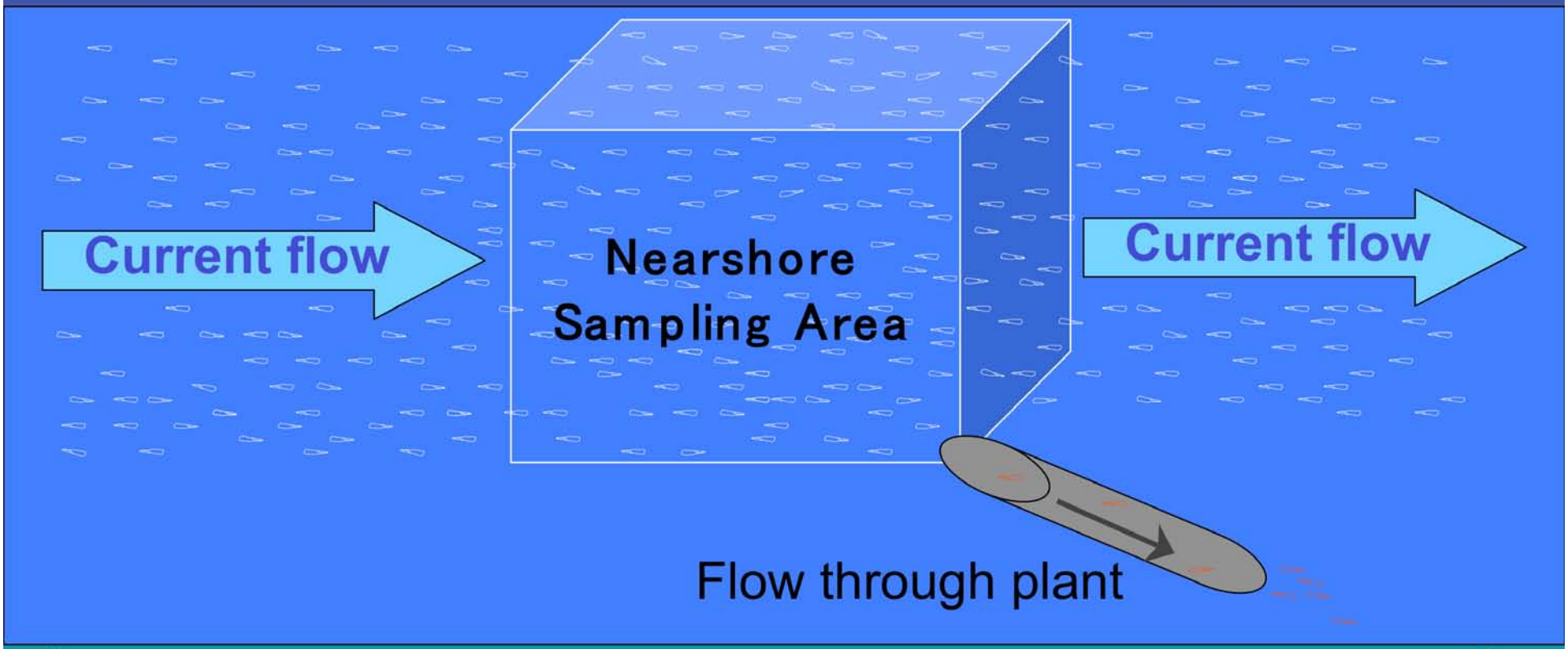
Application of APF

- What is APF?
- How it was applied in CEC staff proposal.
- How APF for gobies was calculated by BRRT but not used in mitigation calculations.

What is APF?

- Percentage of source water population lost due to entrainment estimated using Empirical Transport Model – ETM.
- Area of Production Foregone (APF) uses mortality estimates from ETM to estimate the area that would need to be replaced to compensate for entrainment losses:
  - Doesn't estimate or imply that habitat is lost or degraded due to entrainment.

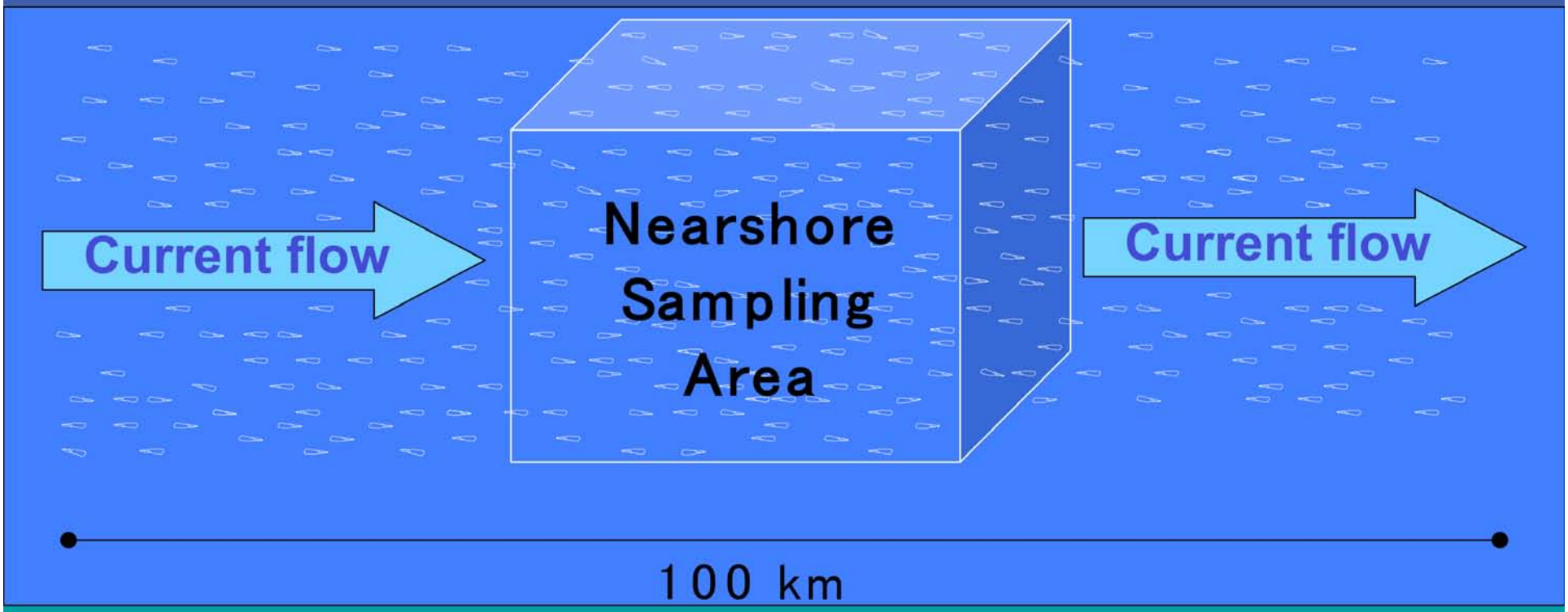
Conceptualization of *ETM*



Total population subject to entrainment = source water population:

1. Mortality due to entrainment = Number Entrained / Number in Sampling Area.
2. Extrapolate to entire SW population estimated using currents and age of larvae.

Conceptualization of *ETM* and *APF*



If total annual mortality = 1%, then 1% of 100 km or 1 km of coastal habitat would need to be created to compensate for the entrainment losses.

Correct Application of APF

- It is appropriate when you can determine adult habitat that are producing the larvae:
  - Gobies occupy mudflats – use APF to estimate area of wetland that would need to be added to SW area to compensate for losses of goby larvae.
  - Rockfish occupy reefs – use APF to estimate area of artificial reef that would need to be added to SW area to compensate for losses of rockfish larvae.

Correct Application of APF

- Not applicable to all habitats and species.
- Specifically, species occupying open water coastal habitat:
  - 3-dimensional environment – not an area.
  - Changes in adult populations on multiple spatial and temporal scales.
  - Adults may not even be present in SW area – larval transport.

CEC Application of APF

- As CEC staff response states, the APF calculations for HBGS were "..not a difficult estimation."
- The apparent simplicity of the calculations do not make them correct.
- Assumptions critical to the concept are ignored or dismissed.

CEC Application of APF

- The application of APF in CEC staff proposal produces an estimate of soft bottom habitat.

  This habitat has no connection to the production of the larvae being entrained.

  Contrasting example - Moss Landing Power Plant restoration based on wetlands - habitat for adult gobies that produced the larvae entrained.

CEC Application of APF

- Assumes the entire source water area estimated for the entrainable larvae is adult habitat.
- Will always result in the largest possible estimate of APF.

CEC Application of APF
Alternative Calculation for Gobies

- The APF approach used in CEC staff proposal was unnecessary since an alternative supported by the BRTT was calculated.
- The detailed analysis used in the APF estimate for gobies provides a stark contrast with the approach used in CEC staff proposal.

CEC Application of APF
Alternative Calculation for Gobies

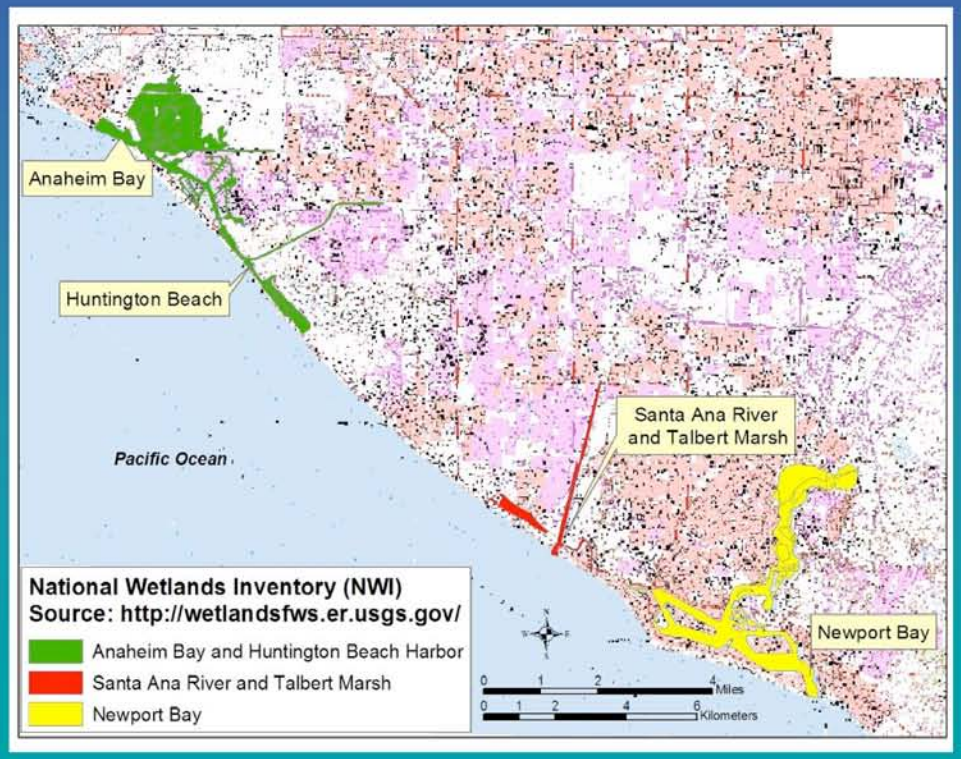
1. ETM calculations were used to estimate entrainment mortality on goby larvae with addition of estimate of goby larvae in coastal wetland areas where larvae are produced.

   Estimated annual mortality due to entrainment using CW volume of 203.5 mgd = 0.45% .

CEC Application of APF
Alternative Calculation for Gobies

2. Data from National Wetlands Inventory used to estimate mudflat habitat in coastal wetlands near HBGS.

   This is the habitat critical to adult gobies – increasing this habitat results in increased larval production.



CEC Application of APF
Alternative Calculation for Gobies

3. Wetlands area from GIS analysis and ETM used to estimate an APF estimate of 15 acres of wetlands. Conservative - includes wetland areas not occupied by adult gobies.

   This is same approach that was used at Moss Landing Power Plant for the Elkhorn Slough restoration.

Description	Area(m^2)	Hectares	Acres
Anaheim Bay / Huntington Beach Wetlands			
Estuarine - Intertidal Emergent - Flooded Subtidal	163,429	16.34	40.38
Estuarine - Intertidal Emergent - nonpersistant	2,789,164	278.92	689.21
Estuarine - Intertidal Emergent - persistant	574,191	57.42	141.89
Estuarine - Intertidal Flooded - subtidal	536,095	53.61	132.47
Estuarine - Open water - Subtidal	2,207,754	220.78	545.54
Totals	**6,270,633**	**627.06**	**1549.50**
Santa Ana River / Talbert Marsh			
Estuarine - Intertidal Emergent - nonpersistant	463,348	46.33	114.50
Estuarine - Intertidal Flooded - subtidal	39,957	4.00	9.87
Estuarine - Open water - Subtidal	485,630	48.56	120.00
Totals	**988,935**	**98.89**	**244.37**
Newport Bay			
Estuarine - Intertidal Emergent - Flooded Subtidal	1,234,755	123.48	305.11
Estuarine - Intertidal Emergent - nonpersistant	477,057	47.71	117.88
Estuarine - Intertidal Emergent - persistant	61,794	6.18	15.27
Estuarine - Intertidal Flooded - subtidal	280,950	28.10	69.42
Estuarine - Open water - Subtidal	4,436,274	443.63	1096.22
Totals	**6,490,831**	**649.08**	**1603.91**

CEC Application of APF
Alternative Calculation for Gobies

- Appropriate application of APF.
- Provides direct benefits to many of the other entrained fishes that are associated with wetland/estuarine habitats during some phase of their life.
- Provides indirect benefits to other coastal fishes.
- Provides many other environmental benefits.

Comparison with SONGS Mitigation

- The CEC staff propose restoration of 104 acres for HBGS based on cooling water flow of 203.5 mgd.
- Wetland mitigation for SONGS with cooling water flow of 2500 mgd was 150 acres.
- Calculated value for gobies is close to 10% of SONGS mitigation – about right based on flow.

AES Huntington Beach Entrainment and Impingement Study

Shane Beck
Senior Scientist
MBC *Applied Environmental Sciences*

Major Points

- Study designed for determining significance under Condition BIO-5.
- Significance criteria used in CEC staff proposal were never discussed with MBC, Tenera, or AES members of the BRRT.
- The use of *APF* to scale restoration was not proposed by CEC staff until March 2006.

Major Points

- Condition BIO-5 and the IM&E Study focused on coastal fish species.
- The Area of Production Foregone (*APF*) approach has been misapplied.
- Commission Staff arbitrarily omitted APF estimates that can be supported with data collected during the study.
- Calculation of impacts should be based on actual flows.
- Restoration should account for the limited license period.

Summary of Entrainment Results

- No threatened or endangered fish/invertebrate species collected.
- Estimates of annual mortality due to entrainment at Units 3&4 at maximum flow averaged:

  0.28 % for nearshore taxa

  0.45 % for CIQ gobies

Condition of Certification BIO-5

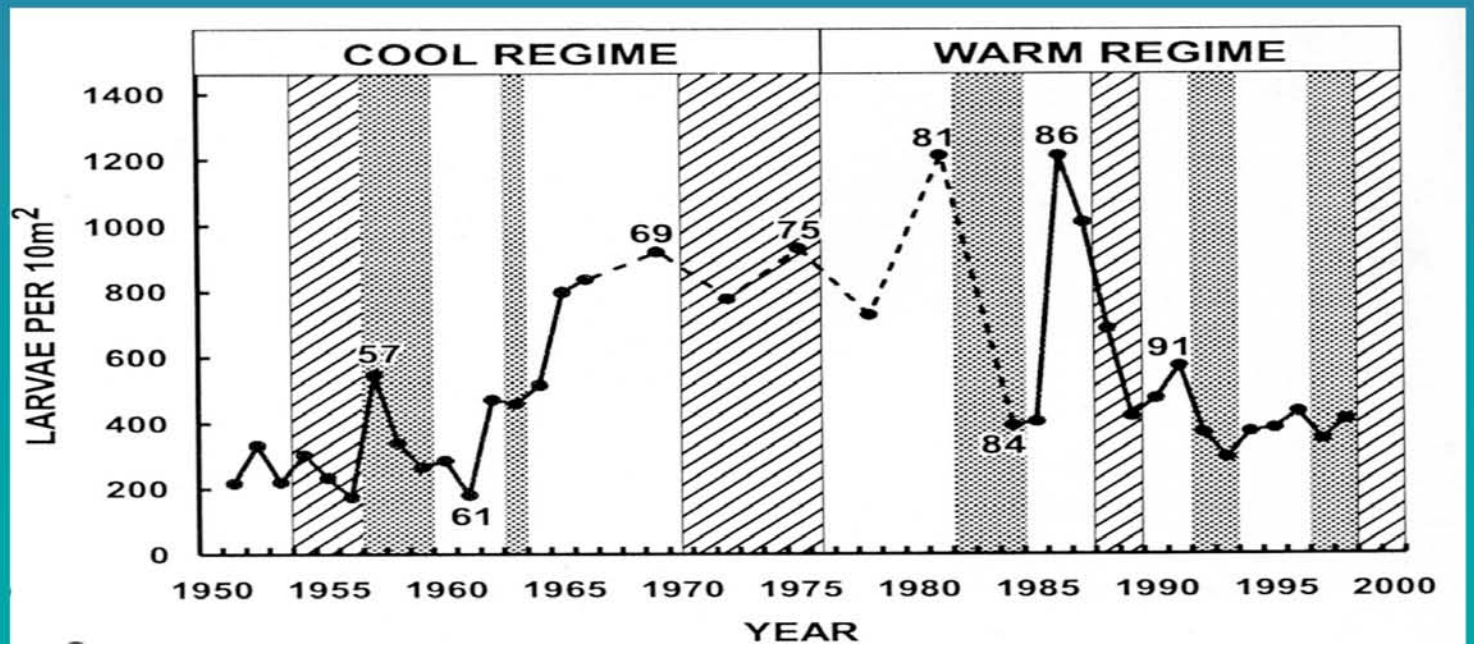
"*If the entrainment and impingement study determines that significant impacts to one or more species of coastal fish is occurring, the project owner will provide funds for mitigation/compensation for impacts to Southern California Bight fish populations.*"

Findings of Significance are Not Supported

- Entrainment effects to larvae were low such that staff used potential indirect effects to bird species to justify a mandatory finding of significance.
- Staff equates the existence of once-through cooling to “substantial degradation” of habitat.
- Both of these are inconsistent with Condition BIO-5 and the scientific efforts performed consistent with the certification requirements.

Findings of Significance are Not Supported (cont)

- Entrainment losses due to Units 3&4 are so small (<0.5%) it is unlikely any relative increase in densities due to non-operation of the facility could be measured since natural population fluctuations are much higher.



Findings of Significance are Not Supported (cont.)

- While the absolute numbers of larvae entrained may seem large (millions), many of the species studied have high fecundity and mortality rates:
  - A single queenfish can produce >2,000,000 eggs per year.
  - Natural mortality rates for most fish species exceed 99%.

Summary

- Application of the science is wrong.
- Restoration should be based on the appropriate and supportable data.

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AES Concerns

- AES is extremely disappointed with the position that Staff has taken with respect to BIO-5.
- Though we were members of the working group, the process limited any meaningful input and many of the specific issues of this license were ignored, including:
  - The limited duration of the permit.
  - The actual operating profile of the units.
  - The significant technical flaws in their scientific conclusions.
  - The actual words and intent of BIO-5.
  - The pending 316b regulation.
- As our experts have discussed, the data does not support the interpretations made by staff. As a result, the process appears to have been conducted to generate an unsupportable amount of mitigation.
- Absent a significant modification to Staff's position, AES will be left with no other option but to pursue all appropriate remedies.

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AES Proposals

- In spite of disagreement with the Report's conclusions, AES is committed to providing appropriate mitigation to fully address its entrainment and impingement losses.
- The AES proposals are based on providing full mitigation for the actual impacts of operating Units 3 and 4 over the life of the certification.

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AES Proposal Fundamentals

Both proposals are based on the following four points with respect to appropriate mitigation:

- Point 1 – Use of actual calculated impacts during the first 5 years of operations.
- Point 2 – Application of a conservative estimate of future operations to calculate impacts during the second 5 years of operations.
- Point 3 - Mitigate based on losses over the 10 year term of the license.
- Point 4 – In the unlikely event that the plant operations are underestimated, provide additional mitigation funds at the end of the license period at a 2 to 1 ratio.

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Point 1

During the first 5 years of the permit, base entrainment mitigation on actual flows and impacts rather than maximums.

- There is no rational reason why impacts over the first 5 years of the permit should be calculated assuming maximum permitted operations when we know with certainty that the facility only operated at approximately 1/3 of these maximums.

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Actual Operating Data

Units 3&4 Operating Factors							
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**Avg.**
1st Qtr	N/A	0.0%	3.1%	20.6%	12.7%	12.8%	9.8%
2nd Qtr	N/A	0.0%	12.8%	28.6%	33.0%	45.0%	23.9%
3rd Qtr	N/A	0.0%	53.4%	51.6%	75.0%	60.0%	48.0%
4th Qtr	0.0%	0.0%	48.7%	39.1%	10.1%	N/A	19.6%
Total	**N/A%**	**0.0%**	**29.7%**	**35.1%**	**32.8%**	**N/A**	**25.3%**

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Point 2

Use a conservative forecast of operations to estimate impacts over the second 5 years of the permit.

- As opposed to new projects, we have 3 ½ years of actual operating data to assist us in forecasting.
- The relatively short forecast period minimizes the probability of the estimate being off significantly.
- The unit characteristics and electricity market fundamentals drive the units operating profile. Neither of these are expected to change much over the remaining life of the permit.

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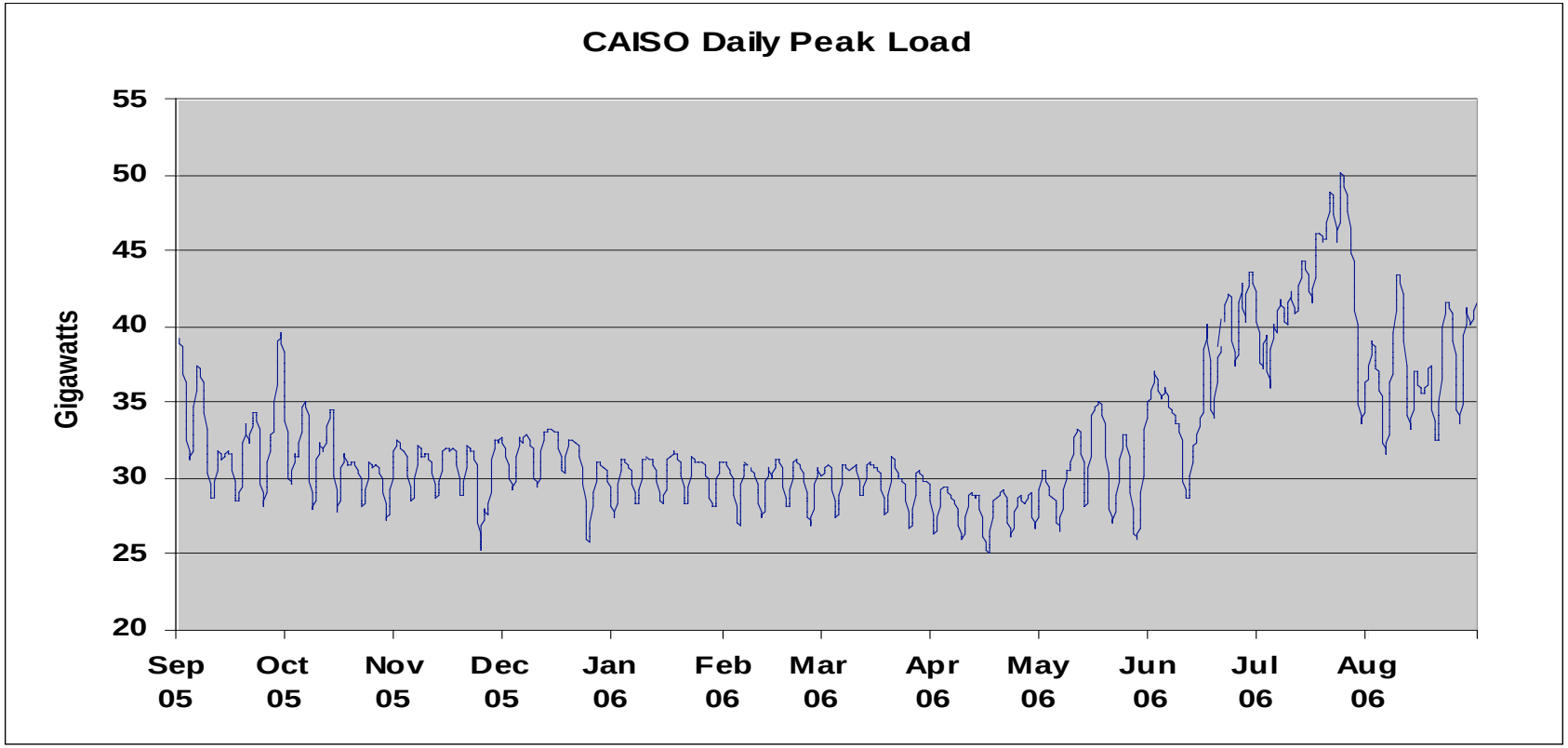
Operational Profile



Proposed Operating Estimates	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
	15%	30%	80%	25%	39%

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Point 3

Mitigate based on losses over the 10 year term of the license.

- AESHB is not Moss Landing, Morro Bay or El Segundo. Our certification expires in 2011.
- There is no justification for calculating mitigation beyond 2011.
- This approach preserves options to install technology to reduce impacts or replace the units when the license expires.
- It also minimizes the potential of over mitigation through restoration, when 316b may require the installation of technology or the units may be retired.

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Point 4

If forecasted operations are underestimated, any uncompensated losses at the end of the license period will be mitigated at a ratio of 2 to 1.

- Ensures that the environment is more than protected, even if unforeseen events occur.
- Is entirely feasible due to the wetlands restoration schedule.
- A reasonable approach since there is the potential for a technology installation before the certification expires.

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AES Proposal – Option #1

Based on the scientifically supported use of the goby APF as adjusted for actual operations and certification term.

1. Average the actual goby APF from the 1st five years of operations and a conservative estimate of the APF over the remaining five years.

   Avg. APF = (5.7 acres + 8.2 acres) / 2 = 7 wetland acres

2. Factor in the limited permit life based on the assumption that a typical power plant has a minimum 30 year life.

   Adjusted APF = 7 acres * 10 yrs / 30 yrs = 2.33 wetland acres

3. Scale the adjusted APF using a ratio of 3 to 1 based on a comparison of wetland to wetland, and that the existing wetland has some current functional value.

   Option #1 APF = 2.33 acres * 3 = 7 wetland acres

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AES Proposal – Option #2

Based on the ETM and APF methodology applied by Staff as adjusted for actual operations and certification term.

1. Average the actual calculated APF from the 1st five years of operations and a conservative estimate of the APF over the remaining five years.

Avg. APF = (41.8 acres + 59.3 acres) / 2 = 50.6 open ocean acres

2. Factor in the limited permit life based on the assumption that a typical power plant has a minimum 30 year life.

Adjusted APF = 50.6 acres * 10 yrs / 30 yrs = 16.9 open ocean acres

3. The adjusted APF is applied at a 1 to 1 ratio given the increased productivity of a wetland vs. sandy bottom, ocean habitat.

Option #2 APF = 16.9 acres * 1 = 16.9 wetland acres

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The Bottom Line

Based on the revised restoration plan provided by the Wetland Conservancy, the cost of restoration is $58k per acre.

- The funding required for Option #1 is:

  7 acres x $58,000/acre = $406,000

- The funding required for Option #2 is:

  16.9 acres x $58,000/acre = $980,200

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Why the AES Proposals Make Sense

- Option #1 is scientifically defensible and based on a direct relationship between the species sampled and habitat restored.
- Option #2 is based on the same ETM and APF methodology applied by Staff.
- Both options balance environmental protection with the unique nature of this license.
- The alternatives do not distort the analysis that will be done prior to the expiration of the license by giving an distinct advantage to the permit extension option.

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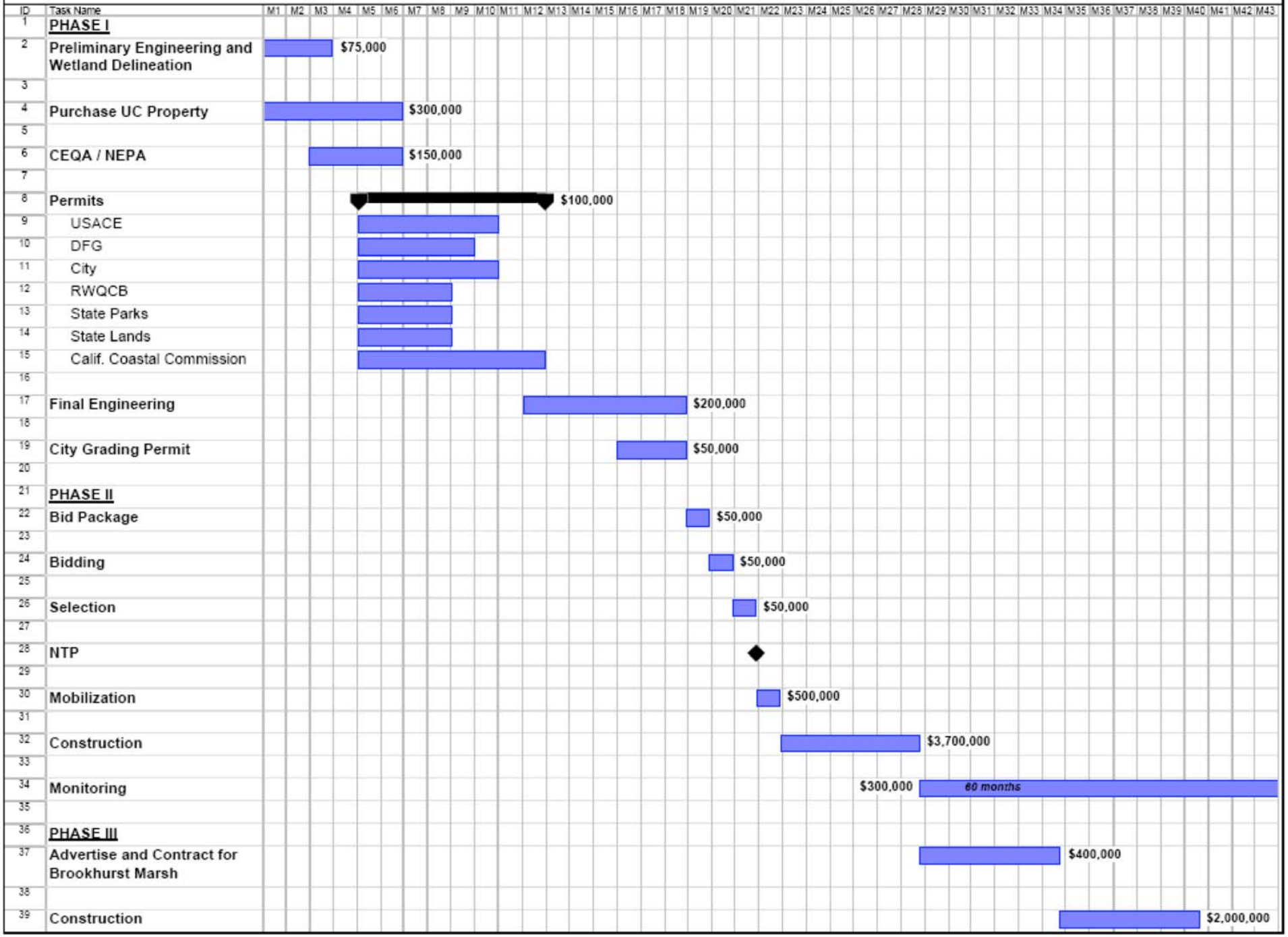
Why the AES Proposals Make Sense (cont.)

- The proposals consider the fact that 316b may require additional mitigation measures in the near future.
- The 2011 decision point fits well with the timeline of the restoration project. Units 1&2 will most likely be a source of funding between now and 2011 as well.
- The options do not unfairly penalize AES for doing the right thing and responding to a crisis.
- Reaching a compromise resolution avoids expensive and disruptive additional proceedings and the potential that Unit 3 & 4 may not be available going forward.

HUNTINGTON BEACH WETLANDS RESTORATION