State Board Desalination Workshop
Moss Landing, CA
January 30, 2013

Rich Nagel
West Basin Municipal Water District
Topics for the Expert Panel

1. Intake Entrainment
2. Diffuser Entrainment
3. Mitigation Fee Assessment
4. Brine Discharge Considerations
1. Intake Entrainment

- Continue to endorse the “Adult Equivalent Life” approach for Entrainment Mortality
- Safeguard marine populations by protecting adults, juveniles and mature larvae
2. Diffuser Entrainment

• Assess the mortality due to diffuser entrainment

• Evaluate the diffuser entrainment mortality using the “Adult Equivalent Life” approach
3. Mitigation Fee Assessment

- Standardized approach to the mitigation fee structure
- Seek consensus from regulatory bodies
- Fee should be based on the Area of Production Foregone
- Mitigation fee should have a direct nexus for a specific project
4. Brine Discharge Considerations

- All projects should be assessed from a site specific perspective
- Impact assessments should be placed on benthic organisms while organisms in the water-column are unaffected by the hyper-saline plume
West Basin’s Intake Effects Assessment Study
## Intake Effects Assessment Study

### Timeline

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2011</td>
<td>Sampling and implementation plan finalized</td>
</tr>
<tr>
<td>March 2011</td>
<td>Start of biweekly intake and monthly source water sampling</td>
</tr>
<tr>
<td>March 2011</td>
<td>Final monthly source water survey</td>
</tr>
<tr>
<td>July 2012</td>
<td>Attempt at special study – postponed due to low larvae abundance</td>
</tr>
<tr>
<td>August - September 2012</td>
<td>Tracking larvae abundances for the special study</td>
</tr>
<tr>
<td>December 2012 - Present</td>
<td>Tracking larvae abundances</td>
</tr>
<tr>
<td>Present – March 2013</td>
<td>High larvae abundance sampling to occur</td>
</tr>
<tr>
<td>June 2013</td>
<td>Final Report</td>
</tr>
</tbody>
</table>
Intake Piping Installation
Intake Piping Installation
Intake Piping Installation
Intake Piping Installation
Intake Piping Installation
Intake Piping Installation
Intake Effects Assessment Study

Lessons Learned to Date

1. No impingement

2. Life stages of larvae dictate entrainment efficiency

3. Be scientific with metallurgy

4. Consider unique marine environment in structural design

5. Wedge wire does NOT foul
Initial Sampling Procedures

- Reasons to Modify Procedure
  - Verify clean intake lines for no predation
  - Sampling height in the water column
  - Drifting “open intake”
  - Lack of larvae abundance
West Basin’s Initial Sampling Procedures

2 mm

1 mm

2000’ of Pipe to On-Shore Sampling Nets

~30’

~10’
West Basin’s Modified Sampling Procedures

~240 GPM

2000’ of Intake Piping Not Being Utilized
Modified Sampling Procedures

- No predation
- Same depth
- Same intake location
- All samples will be processed on the boat
- Weekly larvae abundance sampling
- 72 hour sampling event
  - Drawing samples every 2 hours
  - Sampling throughout the night
Conclusions
Thank You

Rich Nagel
West Basin Municipal Water District
RichN@WestBasin.org
310-660-6210