ITEM 4.B

Interagency Ecological Program (IEP) Pelagic Organisms Decline (POD)

Information Item

Bay-Delta Public Advisory Committee

May 25, 2006
POD Update

Chuck Armor

Interagency Ecological Program
Pelagic Organism Decline ("POD") Management Team

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- **USBR**
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- Consultant
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FACTORS IN THE PELAGIC ORGANISM DECLINE
2005 RESULTS

- TOXIC COMPOUNDS
- PELAGIC ORGANISMS
- WATER PROJECTS
- EXOTIC SPECIES
2005 Abundance Results

Hypothesis: Improved Hydrology in 2005 would have no major effect on the decline.
2005 Fall Abundance Indices

Delta smelt

Threadfin shad

Longfin smelt

Striped bass

- Lowest
- 2nd Lowest
- 10th Lowest
FACTORS IN THE PELAGIC ORGANISM DECLINE

2005 RESULTS
Water Project Operations: Initial Summary

Recent Hydrology and Operations
- Less San Joaquin River flow
- Shift in timing of exports
- Longer duration of barrier operations

Effects?
Trends in Fish Salvage
Winter Salvage of Delta Smelt

Recent higher levels at State and Federal Water Projects
The Winter Salvage Hypothesis

Recent Hydrology and Operations
- Less SJR River flow
- Shift in timing of exports

Entrainment
- Increase in winter salvage.
FACTORS IN THE PELAGIC ORGANISM DECLINE
2005 RESULTS

PELAGIC ORGANISMS

EXOTIC SPECIES
"Bad Suisun Bay" Hypothesis

Recent Trends

Expansion in the range of the clam Corbula

Food web disruption

Consistent with BJ Miller Analyses

Decline in zooplankton (calanoid copepods) in Suisun Bay
FACTORS IN THE PELAGIC ORGANISM DECLINE
2005 RESULTS

TOXIC COMPOUNDS

PELAGIC ORGANISMS
Toxic Effects:
2005 Study Highlights

- Changes in the patterns of use for herbicides and pesticides, but it is unclear if these changes pose serious risks.
- Significant toxicity in some bioassays for 40 percent of sampling sites; however, the cause was not identified.
- Toxic blue-green alga (Microcystis) was present throughout the Delta at substantially higher levels in 2005 than 2004.
FACTORS IN THE PELAGIC ORGANISM DECLINE

May 2006 Update
What factors were correlated with the step changes in abundance?

Bryan Manly and Mike Chotkowski

Analyses of fall fish trawl data.

Gross hydrology (inflow – exports) has a statistically significant but minor effect on the step changes in abundance.
Trends in Fish Habitat

Model of fish habitat “needs” using water quality data

Combine information

Long-term water quality data for estuary

Trends in Environmental Quality (EQ)
Summer “habitat quality” has deteriorated
Fall “habitat quality” has deteriorated too.

Consistent with Contra Costa Water District analyses.
Has there been a recent decrease in Delta residence time?

- Longer residence time is important for food web species
- Trends evaluated by DWR using a particle tracking model.
- No evidence of recent changes for Sacramento or San Joaquin rivers.
Winter Salvage of Delta Smelt (Nov-Mar)

Recent high salvage levels are not unique
showing Old and Middle River Flow monitoring stations

Clifton Court Forebay

Flow monitoring station
Flows at Old and Middle Rivers Predict Winter Salvage Levels of Delta Smelt

Source: Pete Smith and Cathy Ruhl (USGS)
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May 2006 Update

“Bad Suisun Bay” Hypothesis
Changes in the Suisun Bay Food Web

Hypothesis by Wim Kimmerer (SFSU)

Detritus & Bacteria

Ciliates

Small copepods

Clams (Corbula)

Large copepods

Phytoplankton

Recent 1980s 1970s
New Linkages Between Hypotheses?

- **Bad Suisun Bay Hypothesis**
  - Food web disruption
  - Exotic clams and zooplankton

- **Winter Salvage Hypothesis**
  - Reduced habitat for pelagic fishes
  - Exotic weeds

**Changes in operations**

**Adult losses**
FACTORS IN THE PELAGIC ORGANISM DECLINE

- Exotic Species
- Pelagic Organisms
- Toxic Compounds
- Water Projects

?
2006-2007 Studies
CONTAMINANTS

*Is the water toxic?*
Bioassays on water samples (UCD)

*What is the cause of the toxicity?*
Toxicity evaluation – TIE (UCD)

*What are the sources and population level effects of toxicity?*
2006-2007 Studies: Sources and Effects of Toxicity

- **Do wild fish show toxicity problems?**
  - Histopathology & biomarker analysis (UCD)

- **Role of toxic algae?**
  - Microcystis studies (DWR/UCD)

- **Contaminant sources?**
  - Regional monitoring data & modeling (SFEI et al.)

- **Population level effects?**
  - Dose response modeling (UCD)
Additional Highlights of 2006-2007 Work Plan

- Narratives
  - Bad Suisun Bay
  - Winter Salvage
  - Other hypotheses and linkages

- Food web effects
  - Phytoplankton (UCD)
  - Zooplankton (SFSU, BJ Miller)
  - Benthos (DWR, SFSU)

- Fish diseases (USFWS, UCD)

- Power plant effects (Mirant, IEP, SWC)

- Modeling
  - Abundance vs. environmental conditions (Manly, USBR, DWR, CCWD)
  - Fish population models (SFSU, UCD)
  - Particle tracking (DWR)

- Ongoing syntheses (IEP, outside groups)