

# Data (and Science) Gap Analysis (DaSGA) for Determining the Potential Influence of Ammonia/ium on the POD

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# Outline

- What is the DaSGA?
- Why do it?
- How is it developed?
- Examples
- Prioritization criteria
- Summary



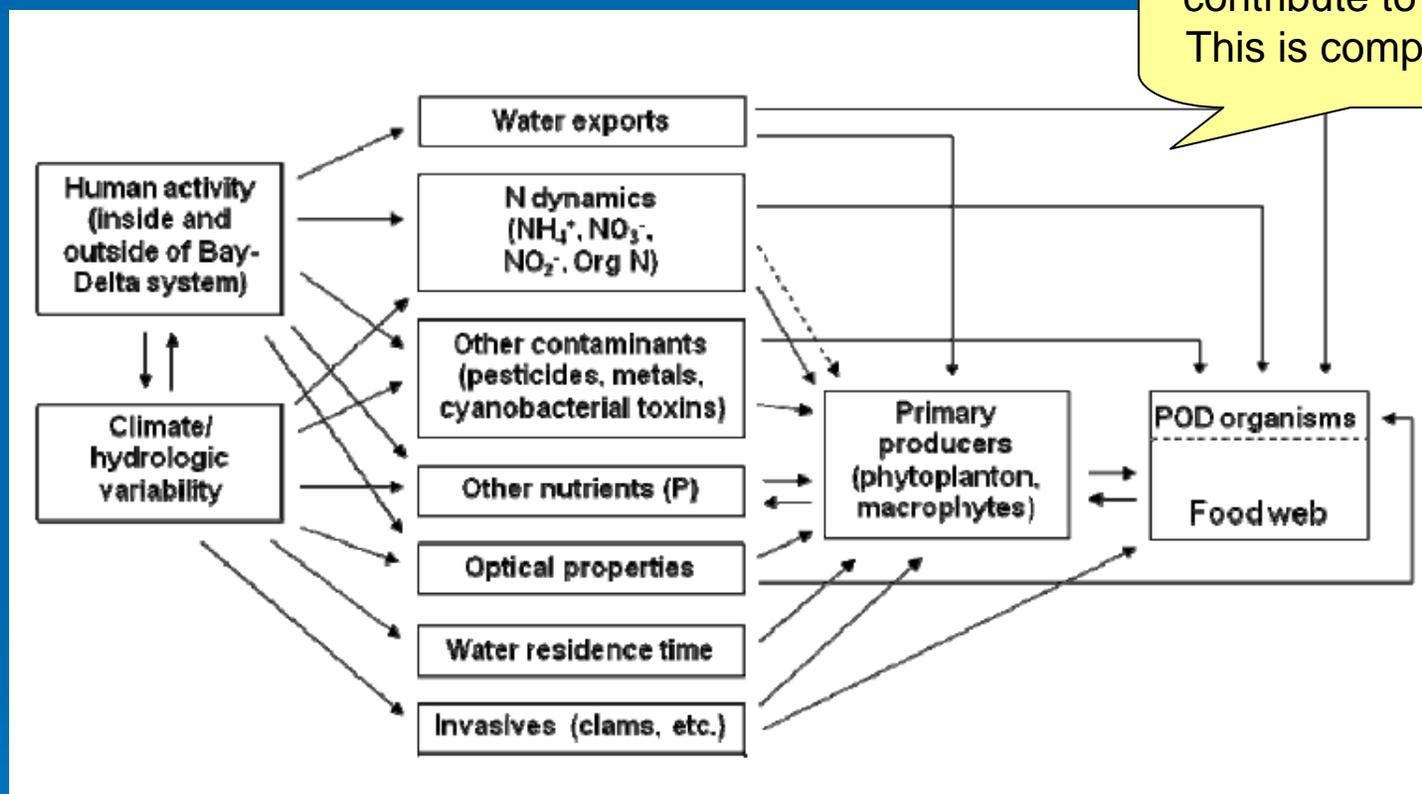
# What is the DaSGA?

- This is a simple data gap analysis.
  - what are the questions we're trying to answer
  - what do we know
  - what do we not know
  - what are the priorities for continued research
- A peer (POD-CWT) reviewed/supported data evaluation and planning tool.
- Currently in draft for ammonia/ammonium.
- Ammonia/ium Workshop and Summit discussions will be incorporated.
- Builds on the Expert Panel Research Framework (Mar-09)

# Research Framework

(March 2009 Expert Panel)

Many factors contribute to the POD. This is complex issue.



- *"...it does not currently appear possible to conclusively reject any of the proposed explanations for the POD and the food web changes. In fact, the multiplicity of diverse potential drivers in this ecosystem needs to be placed into a conceptual framework that could help guide research in the Bay-Delta ecosystem and eventually lead to well-grounded management decisions about ammonia/um."*

# Data Gap (DaSGA) Purpose

- The POD-CWT Strategy (2009) states that conducting environmental investigations with limited resources can be an inefficient process without an agreed upon set of criteria on which to base funding decisions.

*“Once studies, monitoring and research needs are identified through conceptual modeling, the CWT could apply the following criteria to determine which would be most useful to understanding the effects of contaminants on the POD, and provide that information to the IEP managers [and other potential funding agents].” – Data Gaps Prioritization*

- Unanswered research questions are provided in Appendix C of the POD-CWT Strategy.

# Data Gap (DaSGA) Uses

The DaSGA is a process that will help us work through research questions in a thoughtful manner.

## ➤ This DaSGA will

- Help fulfill this POD-CWT objective by identifying research/data needs and their relative priority.
- Focus research to answer the most important questions.
- Assist funding agencies in resource allocation.
- Helps ensure decisions are made with adequate information and are supported by the parties involved.

## ➤ Similar efforts for other stressors (e.g., invasive species, water exports, pesticides already started through the POD-CWT) could support comparisons to determine the relative contribution of each to the POD.

The holistic question of “So what?” Are resources being spent at a level proportional to the problem?

# Data Gap (DaSGA) Approach

- Conceptual Approach: USEPA Data Quality Objective (DQO) Process (USEPA 2000, 2006)
  - Assess what decisions must be made
  - What information is available to make those decisions
    - What data do we need to answer our questions?
    - Do we have those data?
    - What level of confidence do we have with available data?
  - What additional information is needed
    - What are the relative priorities for collecting additional data?
  - How the information will be used in decision making?

DQO steps  
1-3 are  
addressed  
by the  
DaSGA

# Overarching Problem Statement

- Are ambient concentrations of ammonia/ium causing or contributing to toxicity or food web-effects in the Delta that affect the POD?
  - if so, some of the general questions are:
    - which species are adversely affected?
    - where are adverse effects occurring?
    - how does this fit in the conceptual model?
    - what is the fate and transport?
    - what is the relative contribution of any potential effects to the POD?

But we shouldn't get lost in the minute details unless they address the big questions. Are POD fish starving? or dying from toxicity?

# Example DQO Table

Problem Statement	Decision Statement	Input to the Decision	Study Boundaries	Decision Rules
Are ambient concentrations of ammonia/ium causing or contributing to toxicity or food web-effects in the Delta that affect the POD?	1. Sources (including fate and transport) of ammonia/ium are contributing to ammonia/ium in areas where there are effects.	Ambient ammonia concentrations, loads discharged from sources, modeled fate and transport.	Delta (decision statements may be area specific within the broader Delta area).	If physico-chemical modeling determines that a source contributes significantly to ammonia/ium in areas where there are effects, then it may be considered for appropriate action.
	2. Ambient concentrations of ammonia/ium are contributing to acute or chronic toxicity.	Ambient ammonia concentrations and acute effect levels. Ambient ammonia concentrations and chronic effect levels.	Delta (decision statements may be area specific within the broader Delta area and vary by species).	If ambient concentrations exceed acute or chronic criteria, they may be mitigated by appropriate action.

Decision statements are phrased as research questions in the DaSGA

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# Example Questions/Data Gaps:

- Are there food web effects from ammonia?
  - The data show a complicated picture.
  - Phytoplankton community data needed.
  - Benthic grazing data needed.
  - Are POD fish are starving?
- What are the sources/fate & transport of ammonia/ammonium in the Delta?
  - Models were recommended to address this data gap.
  - Non-point sources poorly characterized.
  - Transformation rates uncertain.
  - Benthic organism interactions uncertain.
  - Ambient data limited in critical spawning habitats.



# Example: Toxicity Data Gaps

AMMONIA RELATED DATA AND SCIENCE GAPS IN THE SACRAMENTO-SANJOAQUIN DELTA AND SUISUN BAY ESTUARY			
Research Question	Available Information / Workshop Discussion	Data Gap / Objective	Ranking and Rationale
<b>C. AMMONIA TOXICITY</b>			
Framework Research Topic 10 – Sensitivity of POD organisms to ammonia/um (not considered a high priority by the Panel)			
<p>What concentrations of ammonia are acutely toxic to POD fishes?</p> <p>(Do ambient concentrations exceed those levels?)</p>	<p>Werner et al. (2009) report ambient acute toxicity testing with juvenile delta smelt and laboratory LC50s for ammonia.</p> <p>Limited testing has been completed in areas of Delta smelt spawning. Striped bass toxicity testing with ammonia are also reported (Hazel et al. 1971).</p> <p>There are no toxicity studies with other POD species tested with ammonia/um.</p>	<p>Acute toxicity data should be generated (i.e., 96-h ammonia/um LC50s) for all four POD fish species, using standard methods (e.g., USEPA 2002); and help select species for additional toxicity testing.</p> <p>Ammonia concentrations in areas of sensitive species spawning should be thoroughly evaluated.</p>	<p>? – Toxicity data derived with standard methods will allow a comparison of the sensitivities of POD species to the sensitivities of other fish and aquatic invertebrates.</p> <p>- limited or no availability of POD species for testing is a big obstacle.</p>
<p>What concentrations of ammonia are chronically toxic to POD fishes?</p> <p>(Do ambient concentrations exceed those levels?)</p>	<p>Ambient concentrations around the delta (IEP monitoring station data) &lt; chronic EPA criteria and are unlikely to be chronically toxic to delta fish or invertebrates that are protected by the criteria.</p> <p>But the protectiveness of EPA criteria to POD fishes and other sensitive Delta species is not known.</p>	<p>Chronic toxicity data should be generated for at least some of the POD fish species, under standard “unstressed” conditions and “stressed” conditions.</p>	<p>? - Chronic toxicity data will allow a comparison to EPA criteria to determine if these criteria are adequately protective, and to Delta concentrations to determine if ambient concentration may be affecting POD species.</p> <p>- standardized chronic testing is not available for direct assessment of POD species.</p>

# Suggested Criteria for Prioritization

(modified from the POD-CWT Strategy Document (Jan, 2009))

➤ An *a priori* procedure for prioritizing research is needed.

- Are research tools currently available to answer the question in species of interest?
- Is the research time-critical?
- Are tools cost-effective?
- Can the research be completed/reported in a timely manner?
- Does this address a direct, indirect, or potential link to the POD?
- Is this a new issue, follow-up, or repeat study?
- Does the study serve multiple information needs / aid other IEP work teams?



# Summary

- Data gap analyses help us understand the confidence we have in the data/decisions, if more data needed, and what are the questions we are trying to answer.
- Collaboration/documentation allows all involved parties to buy-in to the research/decision making process, of which the DaSGA is one part.
- Ammonia Workshop Expert Panel identified several significant research needs before the question of ammonia/ium effects can be answered.
- Additional data needed to answer questions about potential ammonia effects in the Delta will be described.
- Criteria for prioritization under development.
- You can help by joining the POD-CWT.
  - PIs may increase their chance of funding when proposing high priority research!