Presentation Overview

- Our perception of the major concerns

- Our conceptual framework of the potential drivers

- Our opinion and major recommendations
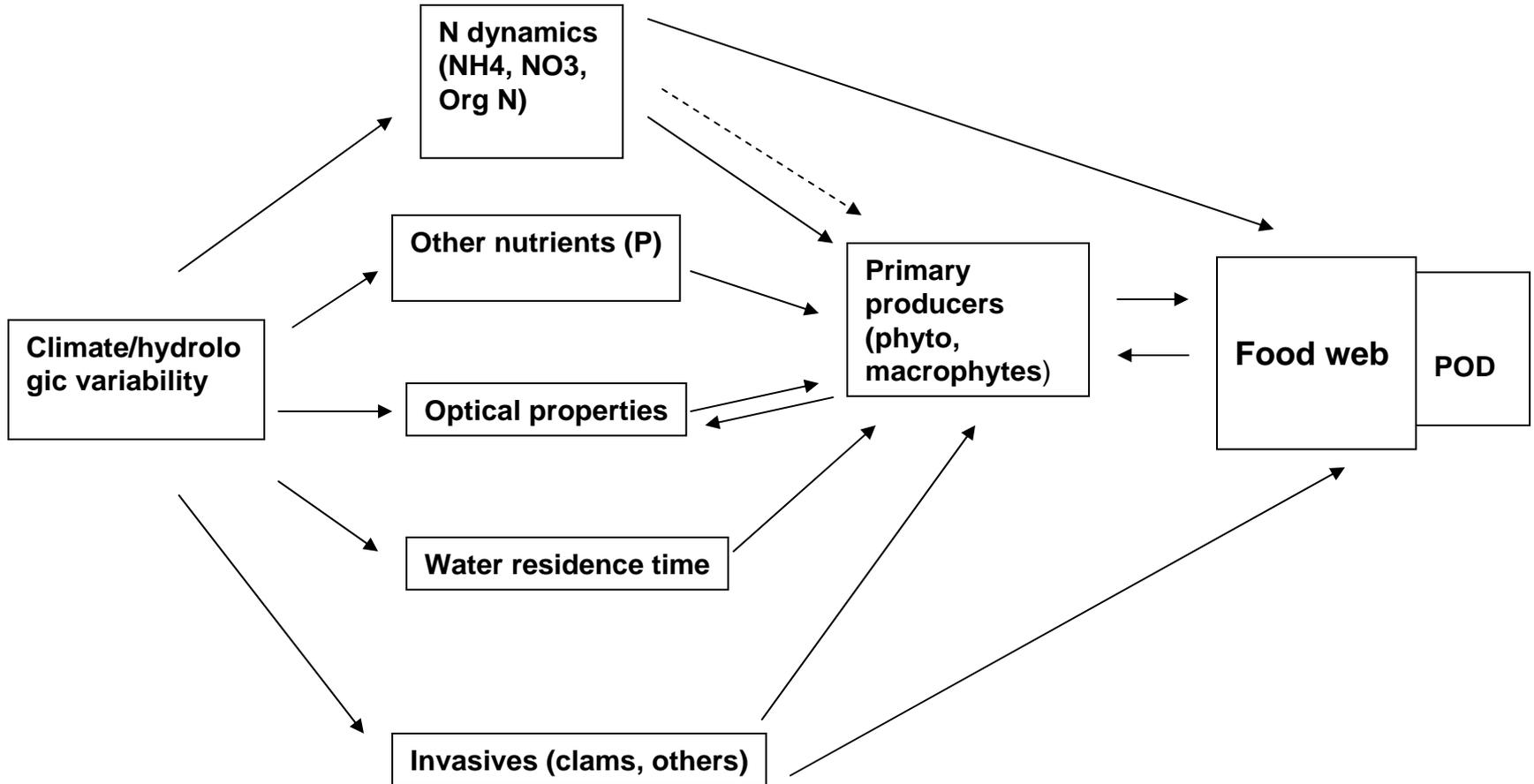
Major Concerns

- POD species

- Undesirable changes in community structure and productivity of phytoplankton (Delta different from Suisun Bay)

  $\Rightarrow$ habitat and nutrient-cycling changes in Delta, with downstream ramifications

Note: Different but perhaps inter-related issues in different parts of the system

Potential Drivers

- Hydrologic changes
- Nutrient loading and types (N & P)
- Food-web effects
- Climate change (temperature and hydrology)
- Toxins (incl. NH_3 & NO_2^-)
- Light

Conceptual framework: drivers & responses

Initial Assessment

- Much extensive and impressive research is being conducted

- Many of the important topics are being addressed

- However, an over-arching, integrative model is lacking to guide research, synthesize knowledge, and predict outcomes

Always begin a project audaciously, but end it conservatively.

- Dominic Di Toro

Integrative Model

- **Spatial and temporal dimensions**

- **Major aspects**
  - Hydrology
  - Biogeochemistry of N
  - Trophic structure and function

  Note: Jassby (2008) provides a rationale for   this over-arching model.

Crucial Gaps

1. Integration of understanding of the roles of hydrology, nutrients and herbivory in the temporal dynamics of phytoplankton production and community composition. This includes understanding of positive and negative feedbacks between the Delta and Upper Bay.

Note: Jassby (2008) is a good start on this integration.

Crucial Gaps

2. Analysis of sources (exogenous and endogenous), sinks and transformations of N along Delta-to-Bay continuum, and controls on them.

3. Understanding of controls on POD populations.
   - N
   - Combination of other stressors, including chemicals, food availability and hydrology

Crucial Gaps

4. Field observations of POD species and other potentially interacting and/or sensitive taxonomic groups.

- POD: toxicological responses
  ($\Rightarrow$ methods development needed)
- Others: presence/absence