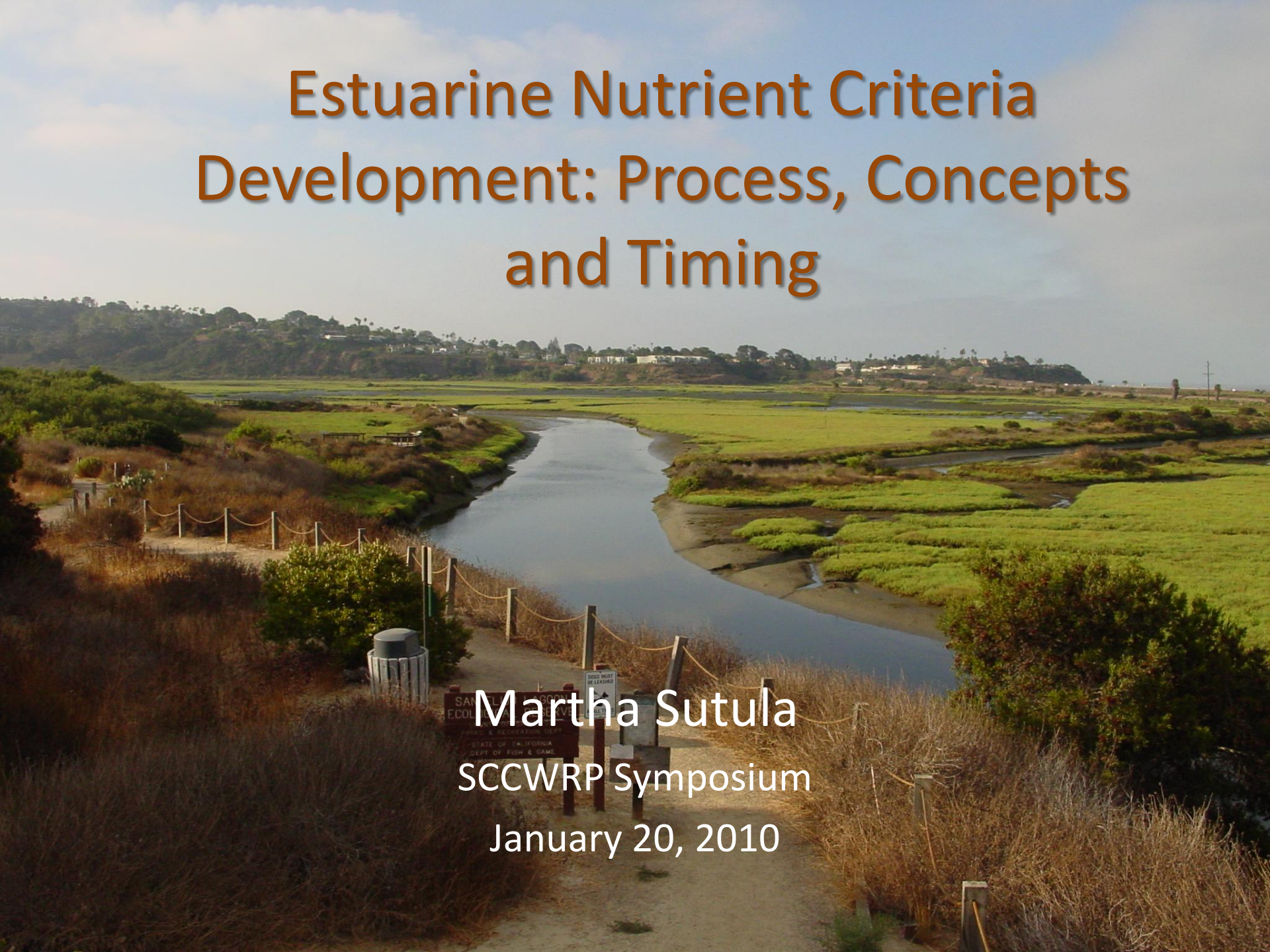


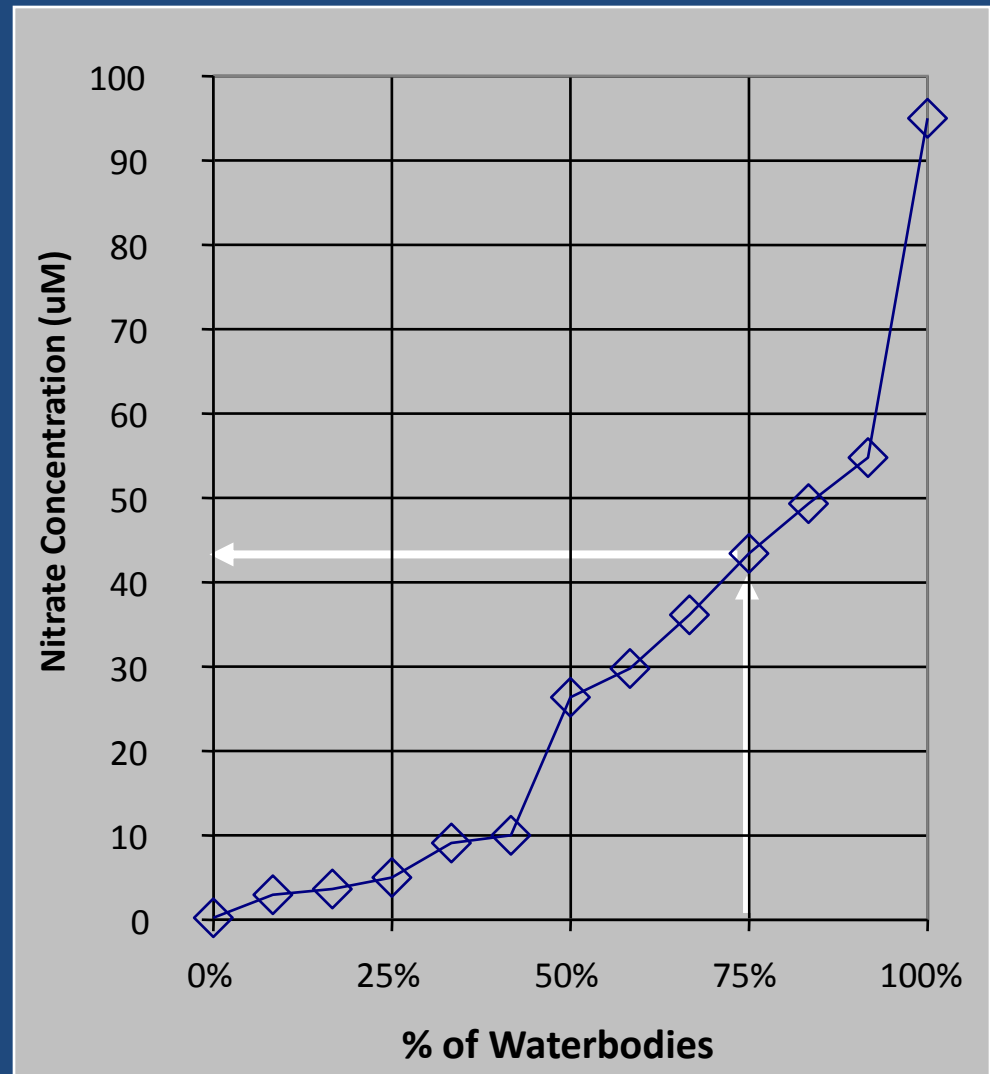
Estuarine Nutrient Criteria Development: Process, Concepts and Timing



Martha Sutula
SCCWRP Symposium
January 20, 2010

Past Efforts to Develop Criteria

- ◆ National Nutrient Criteria Strategy (1998) based on distribution of ambient nutrient concentration data
- ◆ Many factors affect nutrients, so not necessarily linked to beneficial use impairment.



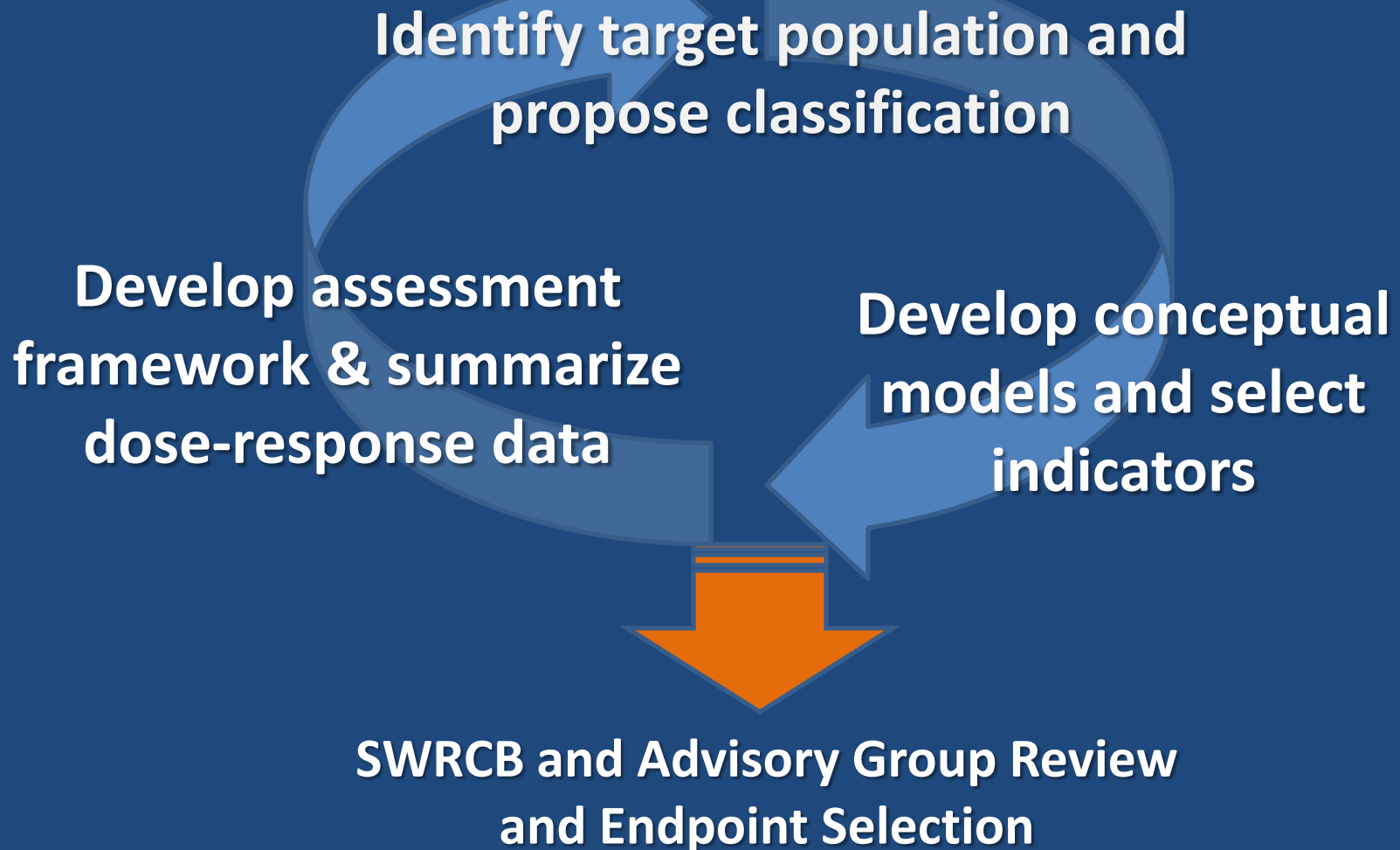
California's Approach: Nutrient Numeric Endpoint (NNE) Framework

SWRCB Staff Strategy: Narrative objectives (criteria) with numeric guidance (NNE)

Conceptual Approach:

1. Response indicators (rather than nutrients) provide a direct link to BU impairment
2. Use multiple indicators in a “weight of evidence” approach
3. Create tools to simulate ecological response to nutrient loads et al. co-factors (e.g. hydromod)

Technical Basis for Estuarine NNE Development— The Process



Preliminary Classification

Geoform

Tidal Regime

Enclosed Bay

Perennial

Lagoon

Perennial

Intermittent

Ephemeral

Permanently closed

River mouth

Perennial

Intermittent



Perennially Tidal Enclosed Bay



Intermittently Tidal Lagoon

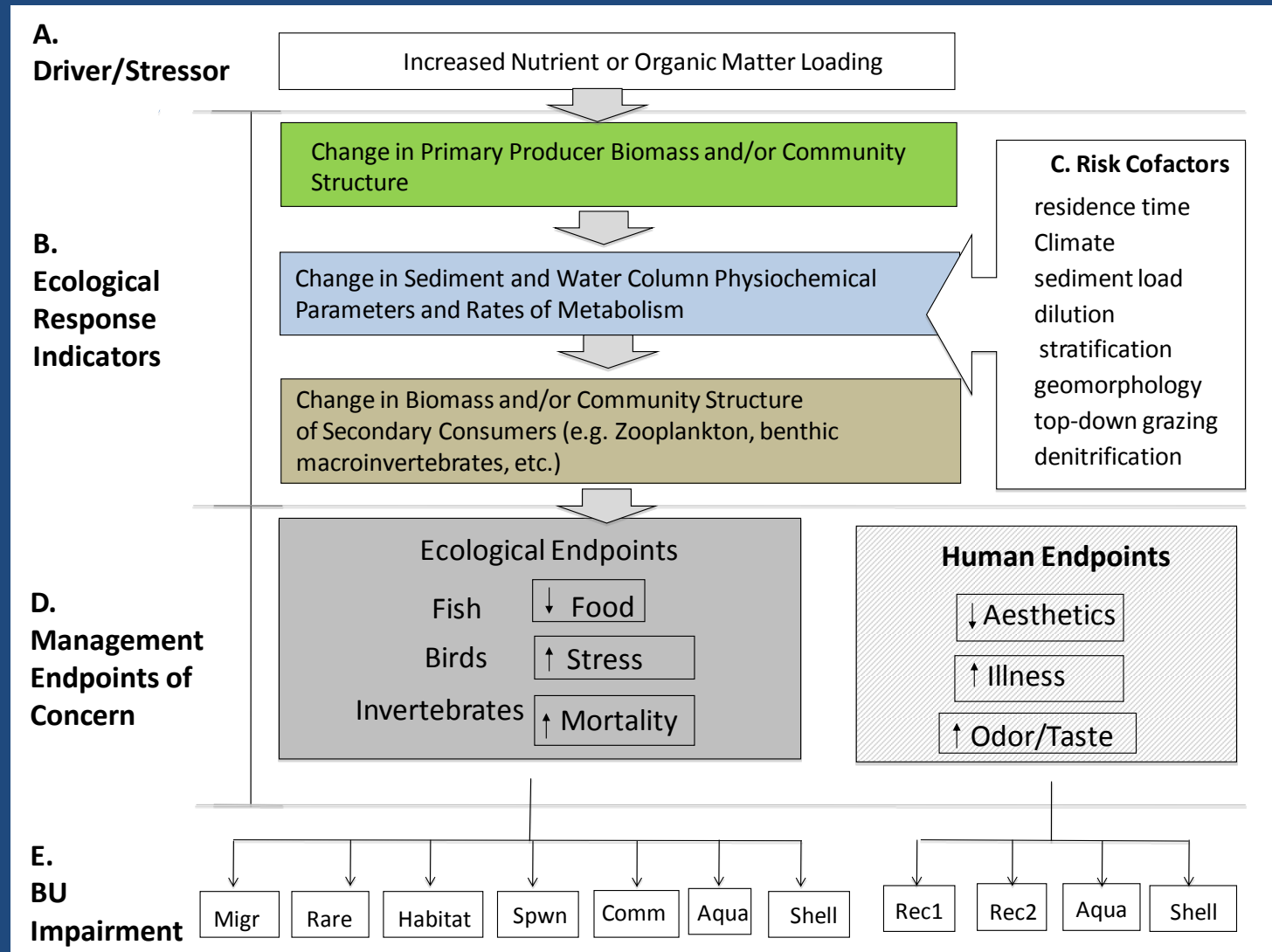


Permanently closed Lagoon



Intermittently Tidal River Mouth

Conceptual Model Development and Initial Indicator Selection



Estuarine NNE Framework: Candidate Indicators

Primary Producers Indicators

- Phytoplankton biomass and/or community composition
- Macroalgal biomass
- Submerged aquatic vegetation
- Microphytobenthos (MPB) biomass and/or comm. composition



Estuarine NNE Framework:

Candidate Indicators

Primary Producers Indicators

- Phytoplankton biomass and/or community composition
- Macroalgal biomass
- Submerged aquatic vegetation
- Microphytobenthos (MPB) biomass and/or comm. composition

Physiochemical Indicators

- Dissolved oxygen
- Water clarity
- Harmful algal bloom toxins
- Sediment organic matter accumulation
- Benthic metabolism

Secondary Consumer Indicators

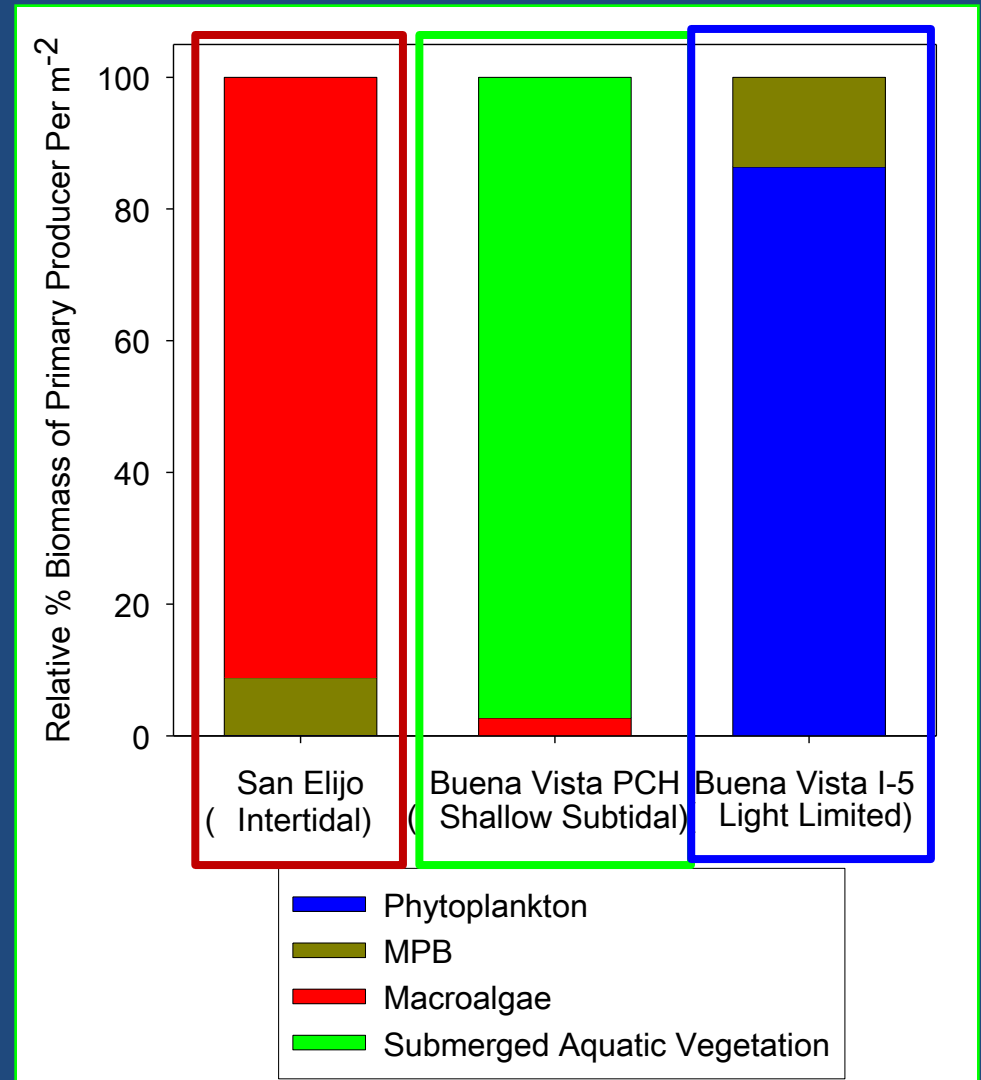
- Benthic macro-invertebrates

Indicators Selection Criteria:

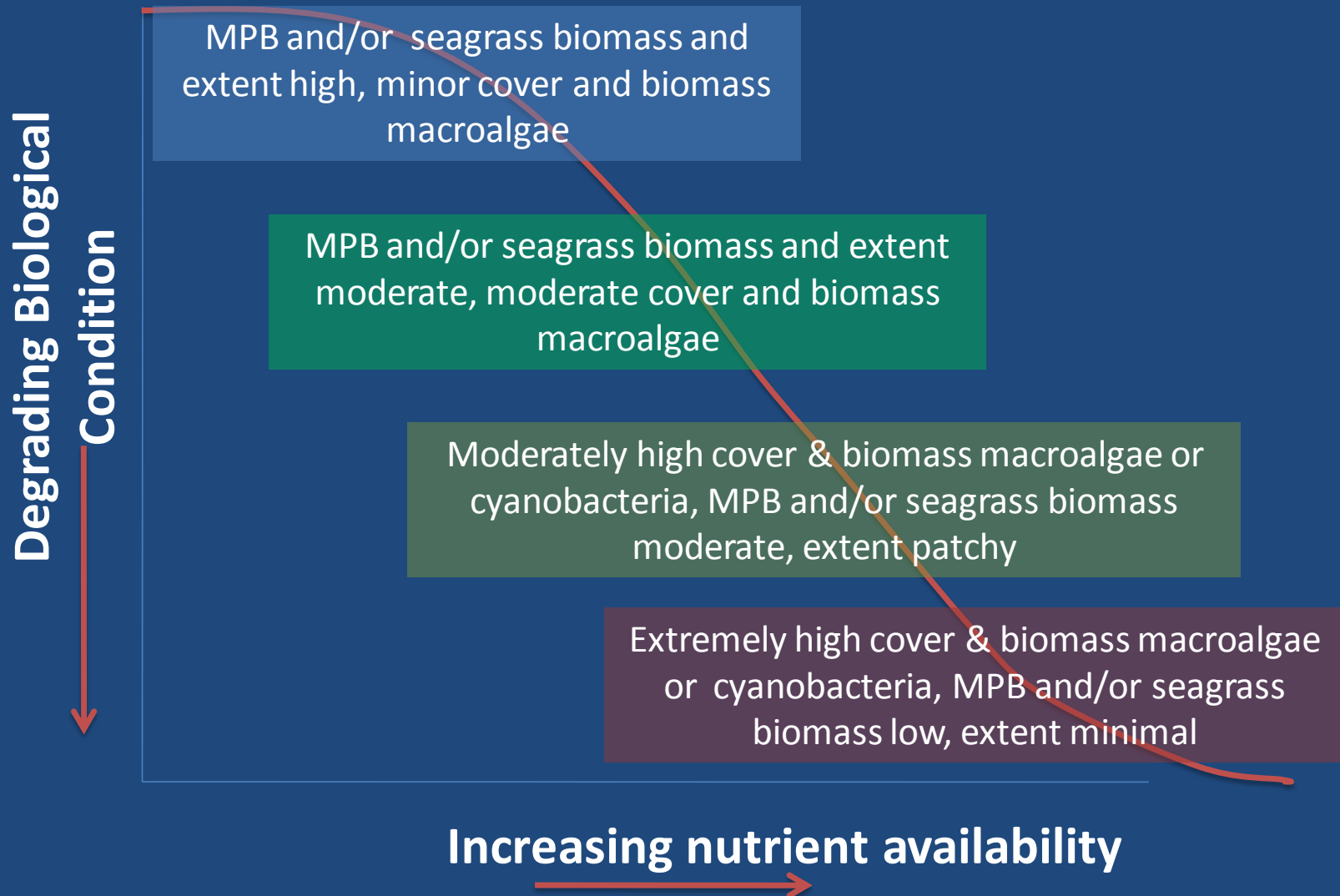
- Clear link to beneficial uses
- Predictive relationships with causal factors (nutrients, hydrology etc)
- Scientifically sound and practical measurement process
- Show a trend either towards increasing or/and decreasing eutrophication (signal: noise good)

Dominant Indicators of Eutrophication Change as a Function of Habitat Type (ie. Class)

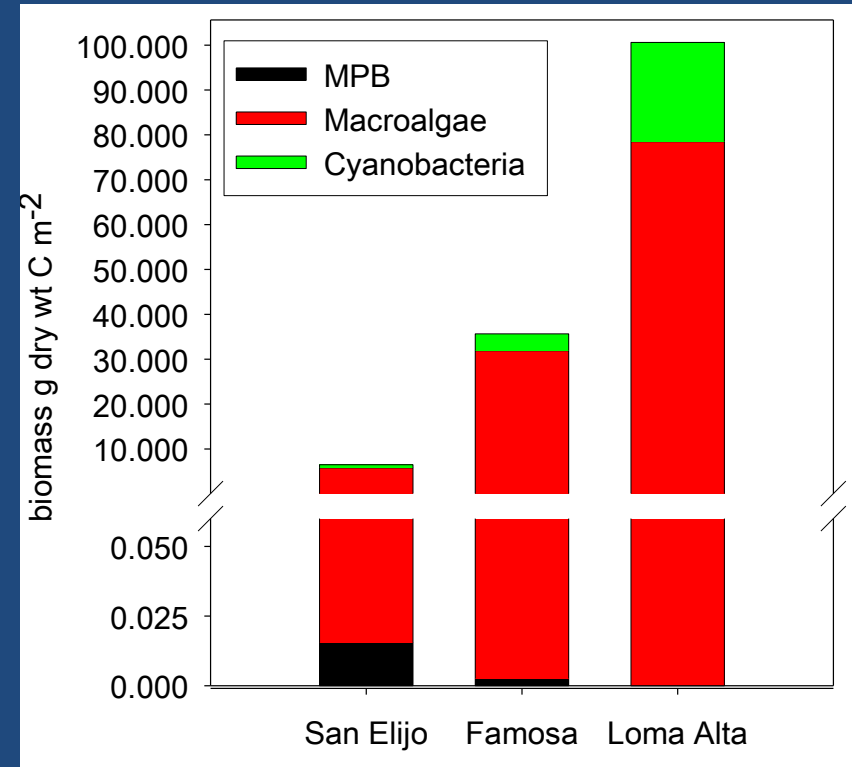
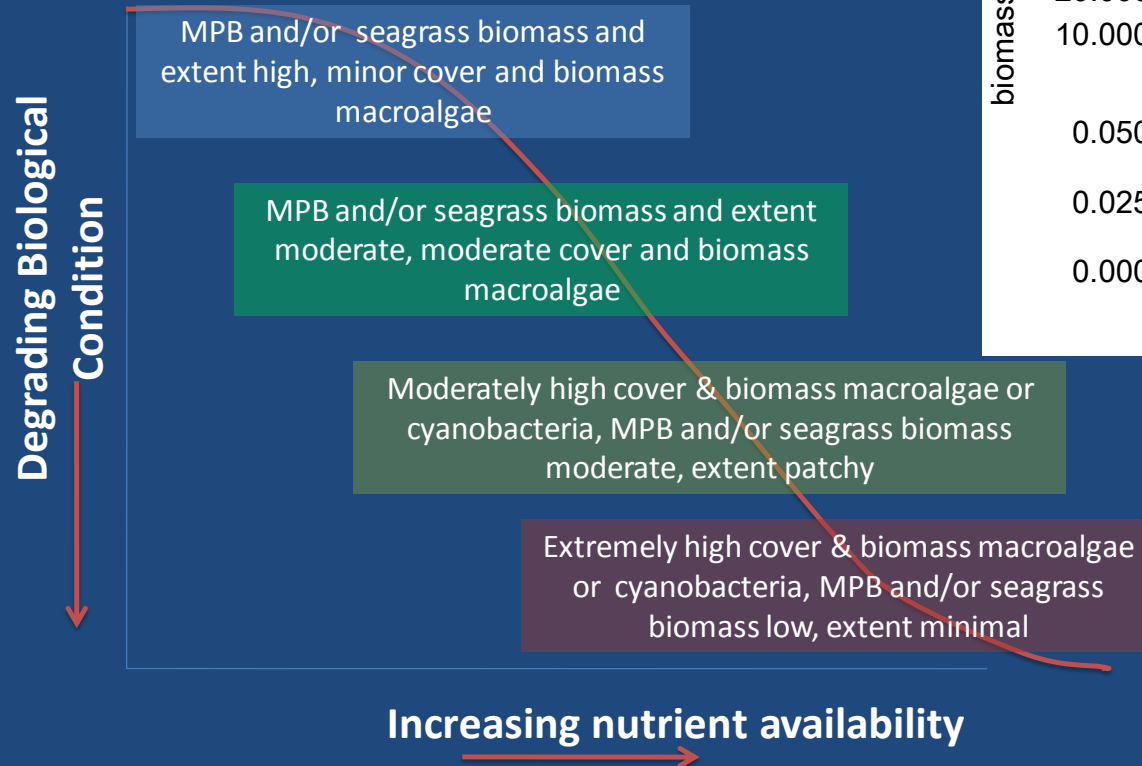
| Depth | Dominant Primary Producers |
|--------------------------------|---|
| Intertidal | MPB Macroalgae |
| Shallow Subtidal | MPB Phytoplankton Macroalgae SAV |
| Deep Subtidal or Light Limited | MPB Phytoplankton |



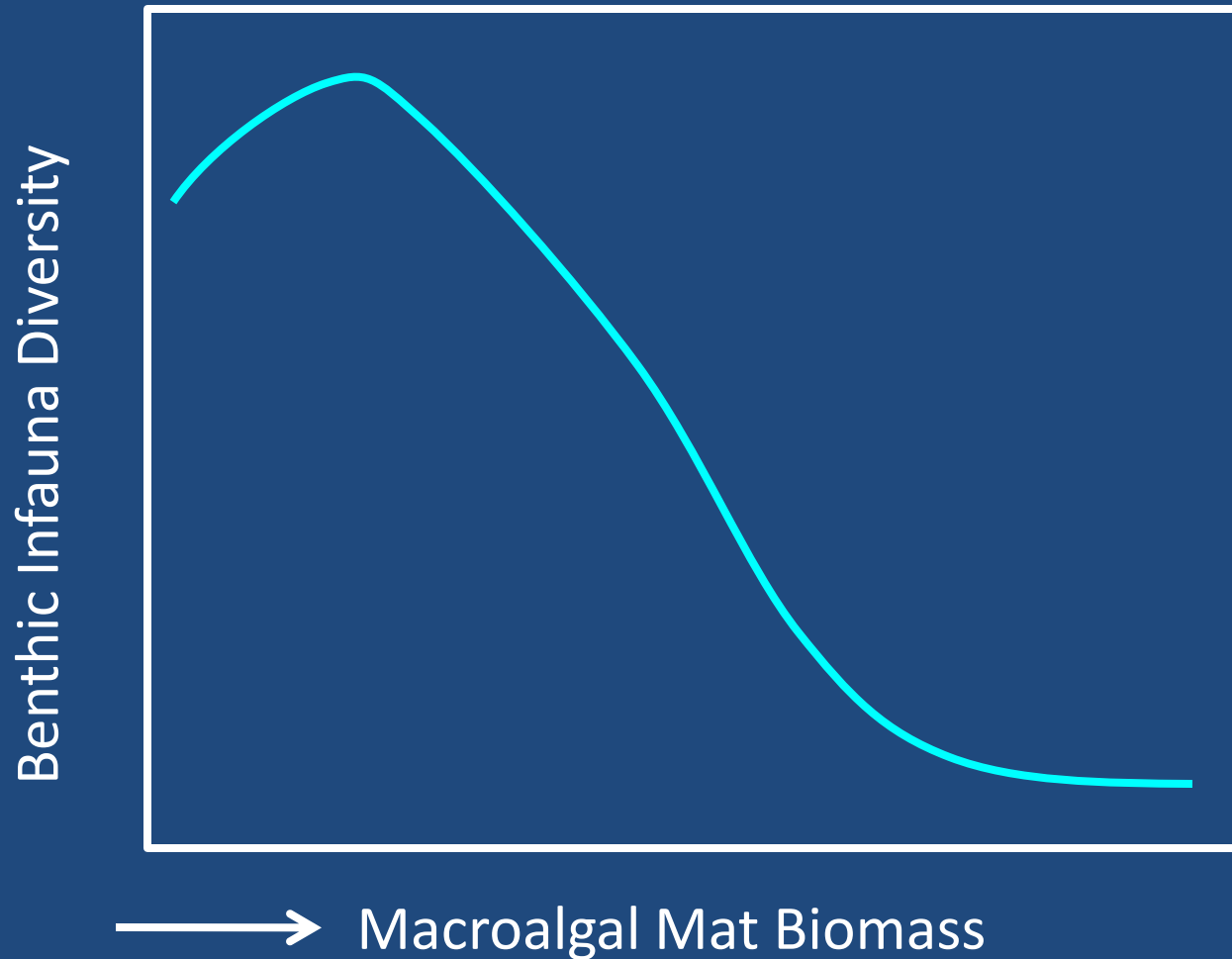
Eutrophication Disturbance Gradient Model (Lower Intertidal and Shallow Subtidal Habitat)



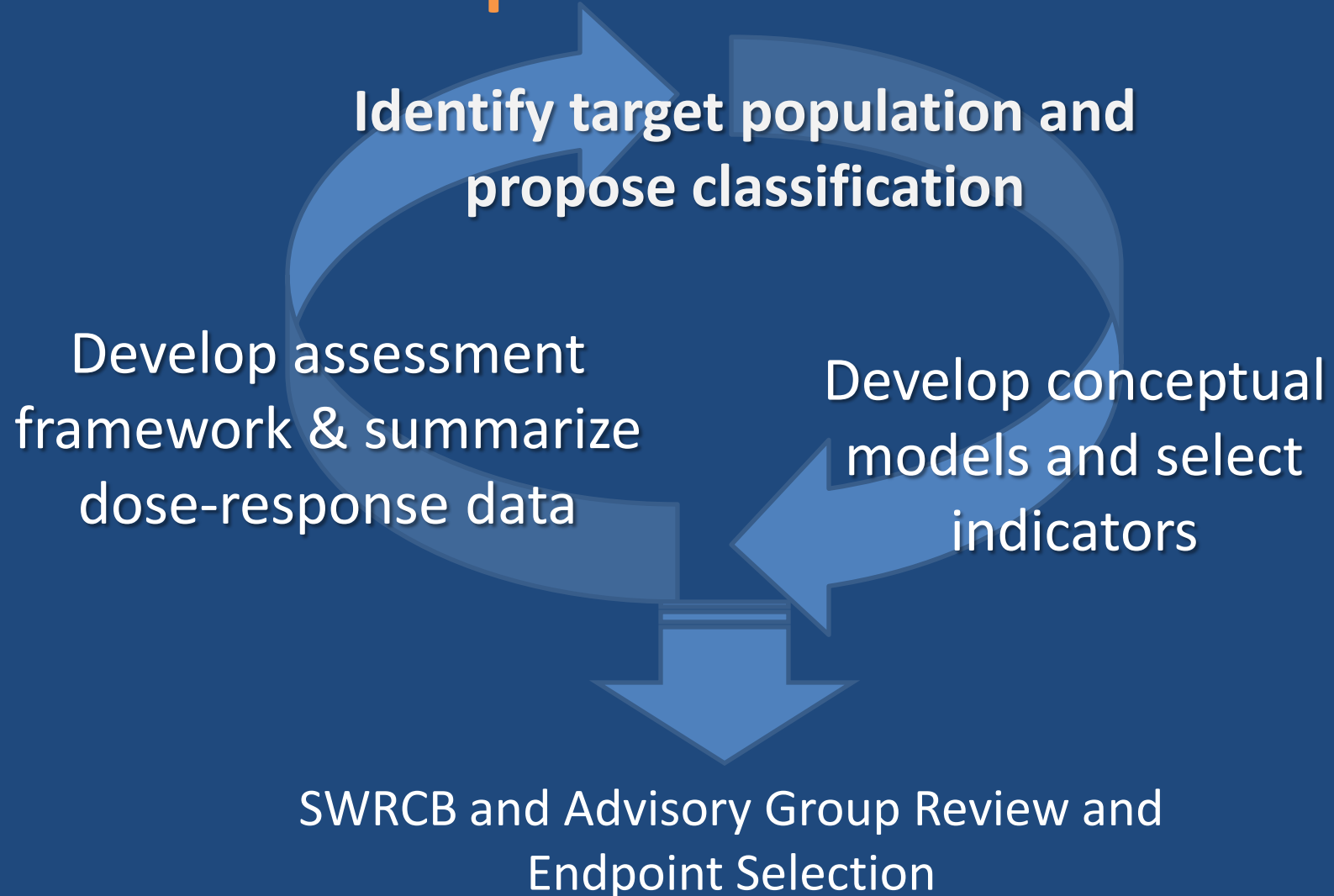
Eutrophication Disturbance Gradient Model (Lower Intertidal Habitat)



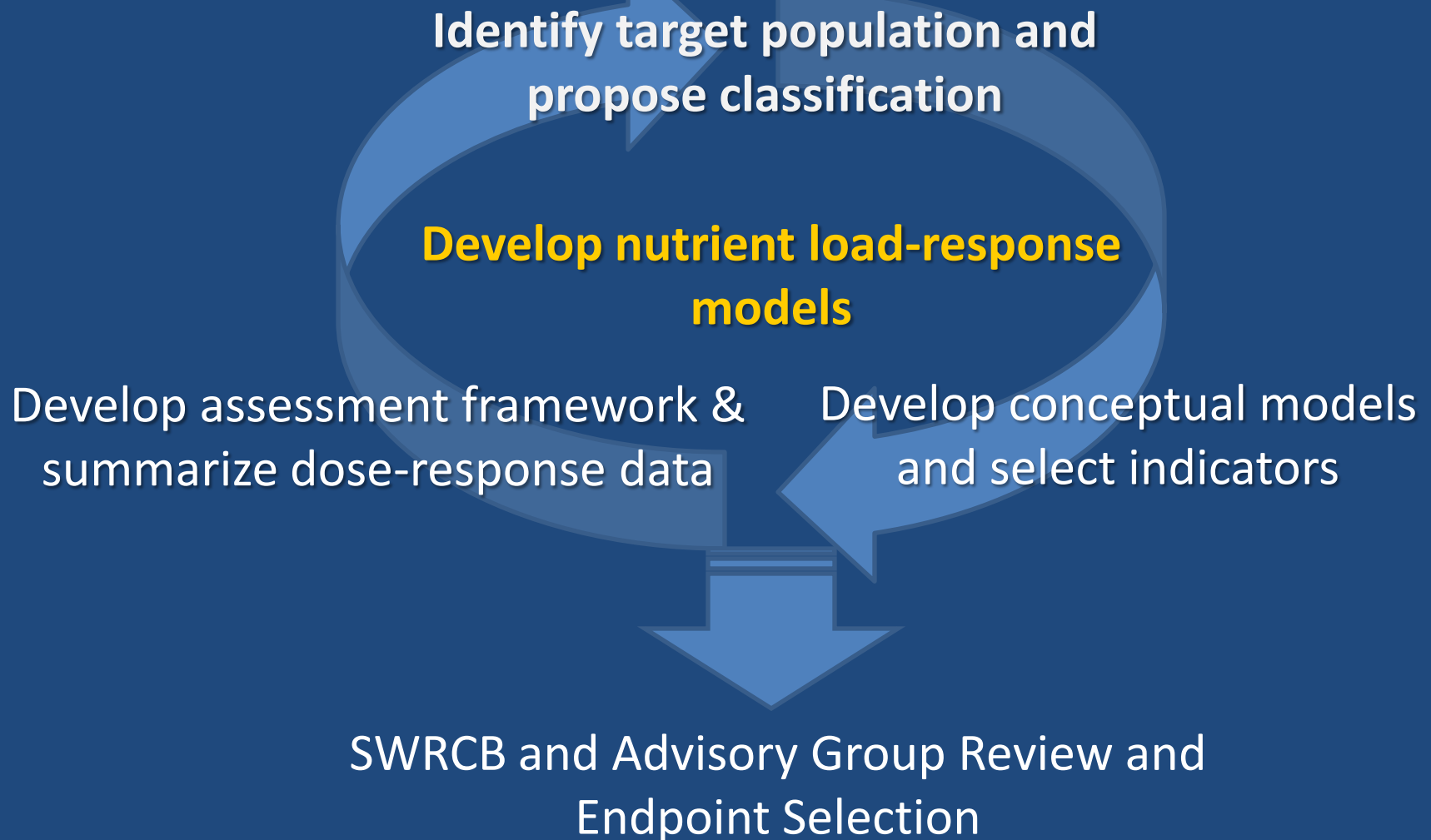
Conceptual Figure of Dose Response Relationship



Technical Basis for Estuarine NNE Development— The Process



Technical Basis for Estuarine NNE Development— The Process



Timing and Benefits

- Technical framework will provide
 - Clear links between criteria and beneficial uses
 - Basis for consistent statewide standards
- Initial technical framework for Estuarine NNE by March 2012
 - Bight '08 Eutrophication Assessment and SD Lagoon TMDL data will help shape and test framework
 - Additional work anticipated to address identified data gaps and load-response models

E-NNE Technical Team

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