Calixto Romias/ The Stockton Record 2020

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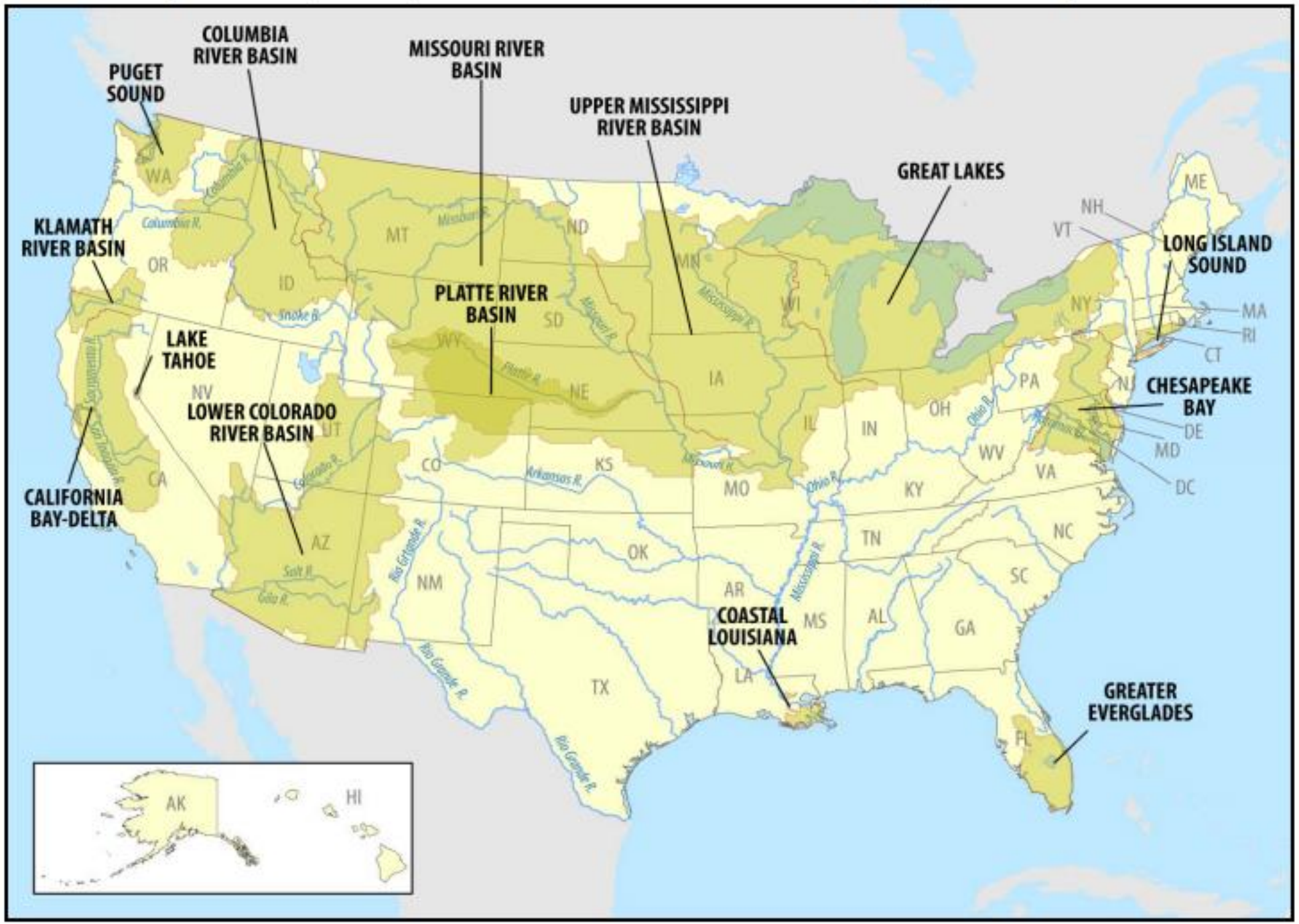
SESSION 31:
MODELING FOR HABS DECISION SUPPORT

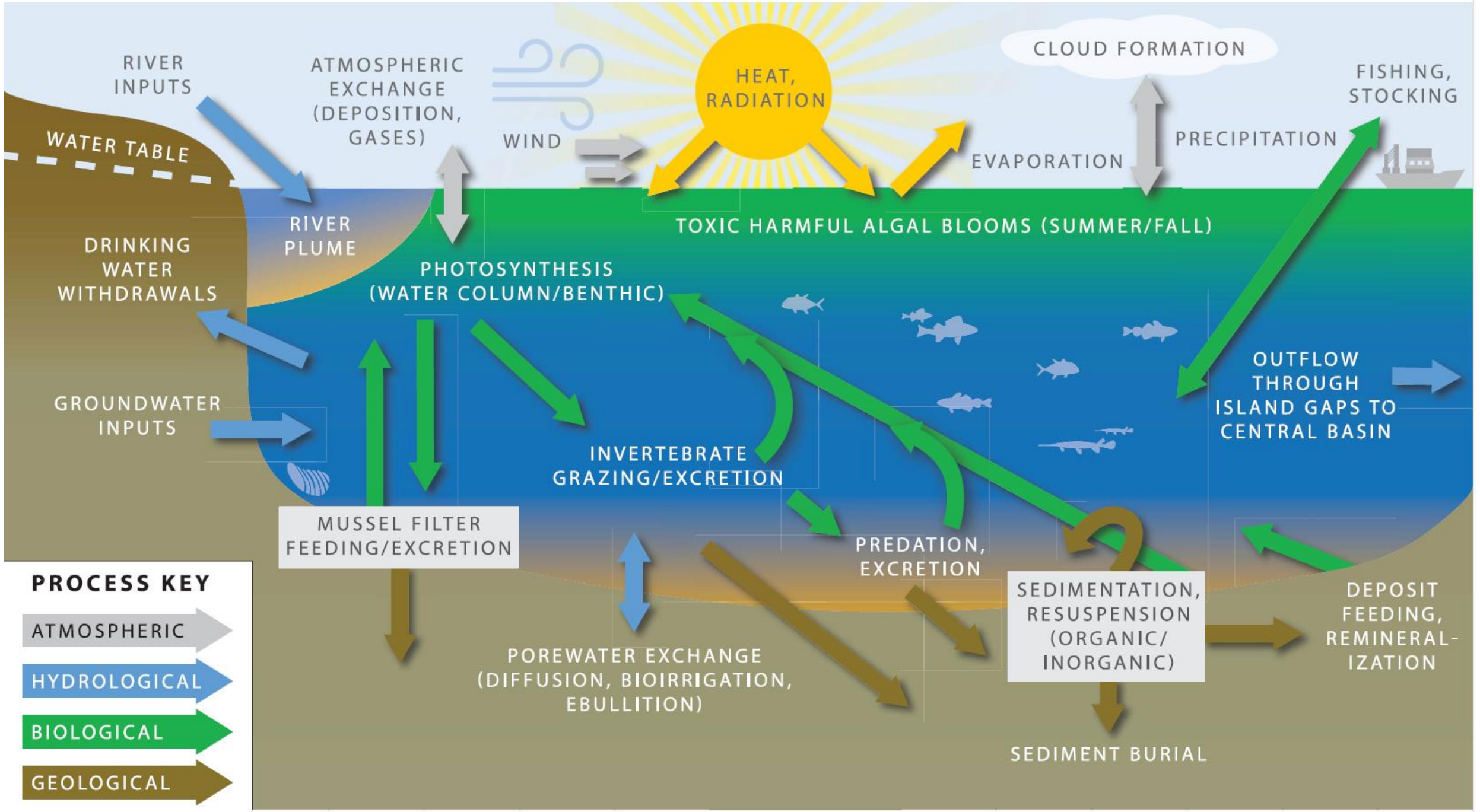
JOHN BRATTON, PHD, PG

CWEMF
California Water & Environmental Modeling Forum
2023 Annual Meeting

Figure A-5. Major Ecosystem Restoration Initiatives Utilizing Adaptive Management



SOURCE: CONGRESSIONAL RESEARCH SERVICE, 2011 (n = 14)


RIVER INPUTS
ATMOSPHERIC EXCHANGE (DEPOSITION, GASES)
HEAT, RADIATION
CLOUD FORMATION
FISHING, STOCKING
WATER TABLE
WIND
EVAPORATION
PRECIPITATION
RIVER PLUME
TOXIC HARMFUL ALGAL BLOOMS (SUMMER/FALL)
DRINKING WATER WITHDRAWALS
PHOTOSYNTHESIS (WATER COLUMN/BENTHIC)
OUTFLOW THROUGH ISLAND GAPS TO CENTRAL BASIN
GROUNDWATER INPUTS
INVERTEBRATE GRAZING/EXCRETION
MUSSEL FILTER FEEDING/EXCRETION
PREDATION, EXCRETION
SEDIMENTATION, RESUSPENSION (ORGANIC/ INORGANIC)
DEPOSIT FEEDING, REMINERAL-IZATION
POREWATER EXCHANGE (DIFFUSION, BIOIRRIGATION, EBULLITION)
SEDIMENT BURIAL
PROCESS KEY
ATMOSPHERIC
HYDROLOGICAL
BIOLOGICAL
GEOLOGICAL

FULL LAKE ERIE ECOSYSTEM MODEL

- Funded by USACE
- LEEM expanded from Western Basin model (WLEEM)
- Simulates HABs, hypoxia, and macroalgae
- Used for scenario assessment by USEPA and others (nutrient load reduction goals, etc.)

ELSEVIER

Journal of Great Lakes Research

Volume 42, Issue 6, December 2016, Pages 1193-1205

Development of the Western Lake Erie Ecosystem Model (WLEEM): Application to connect phosphorus loads to cyanobacteria biomass

Edward M. Verhamme, Todd M. Redder, Derek A. Schlea, Jeremy Grush, John F. Bratton, Joseph V. DePinto

Drinking water intake crib, City of Toledo

THREE BASINS

- HABs in Western Basin
- Hypoxia in Central Basin
- Excess Macroalgae in Eastern Basin

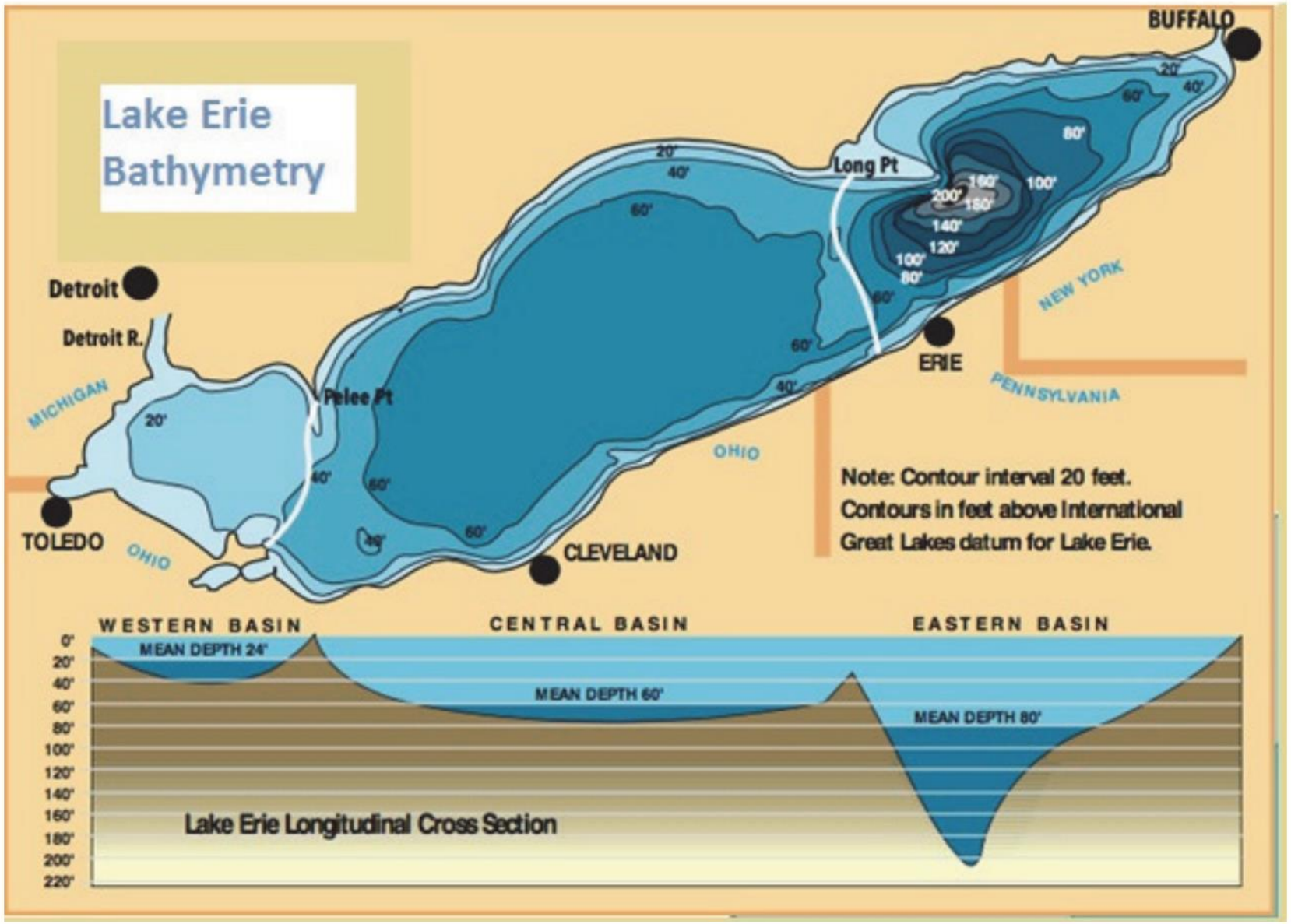
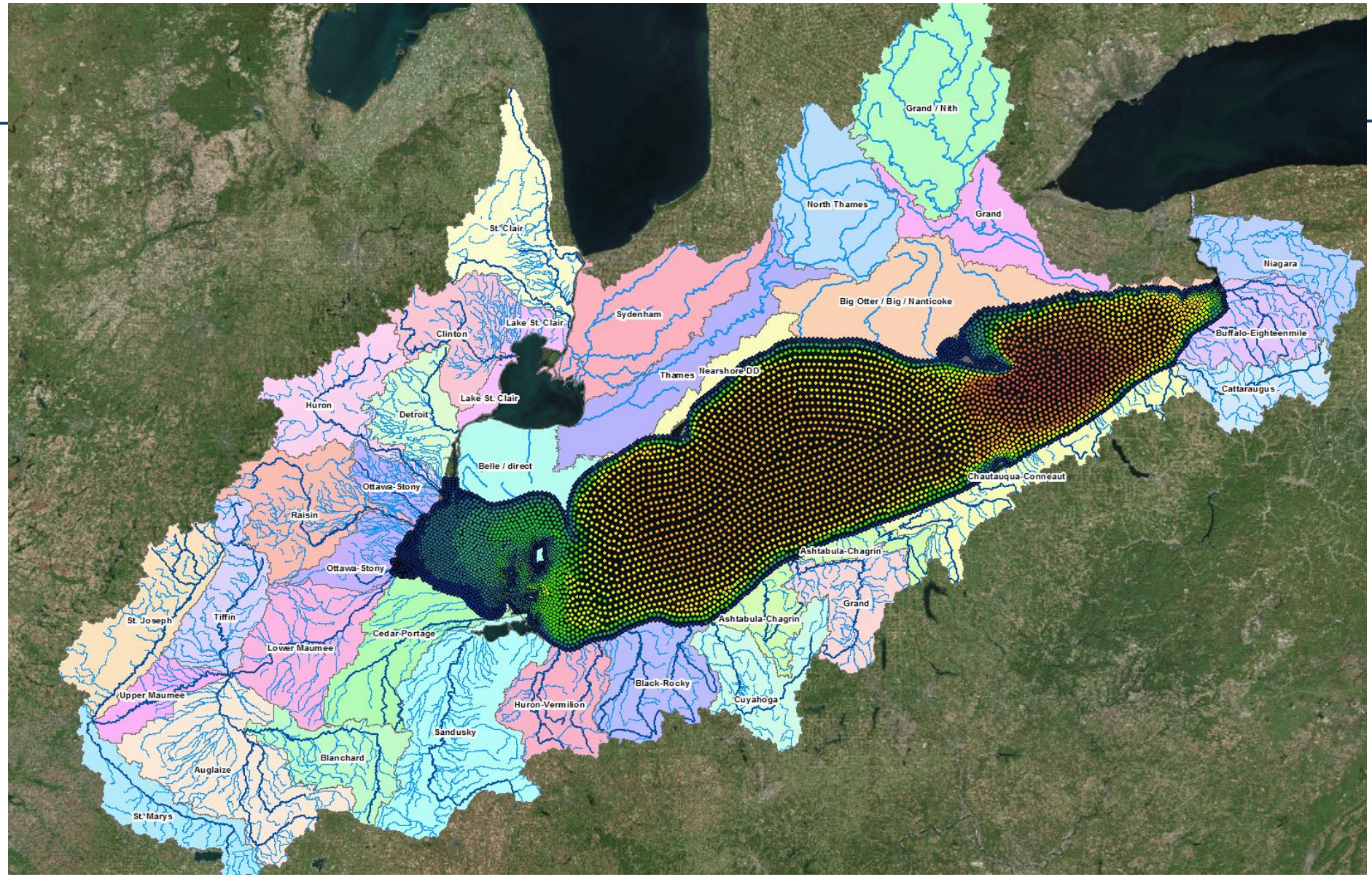
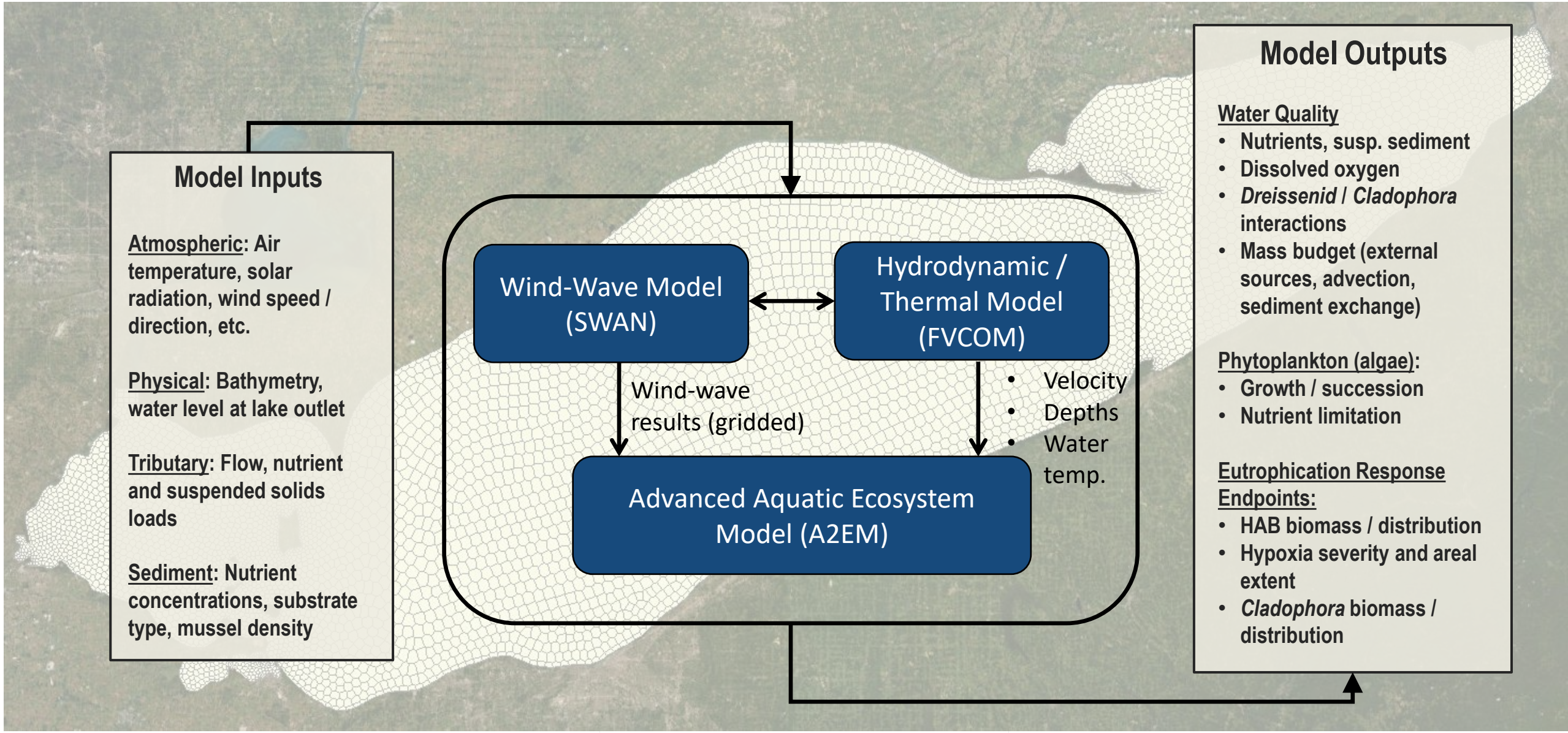


Figure 1. Map depicting Lake Erie bathymetry (feet) including longitudinal cross section. Modified from figure by Ted Walke of Pennsylvania Angler and Boater Fact Sheet.

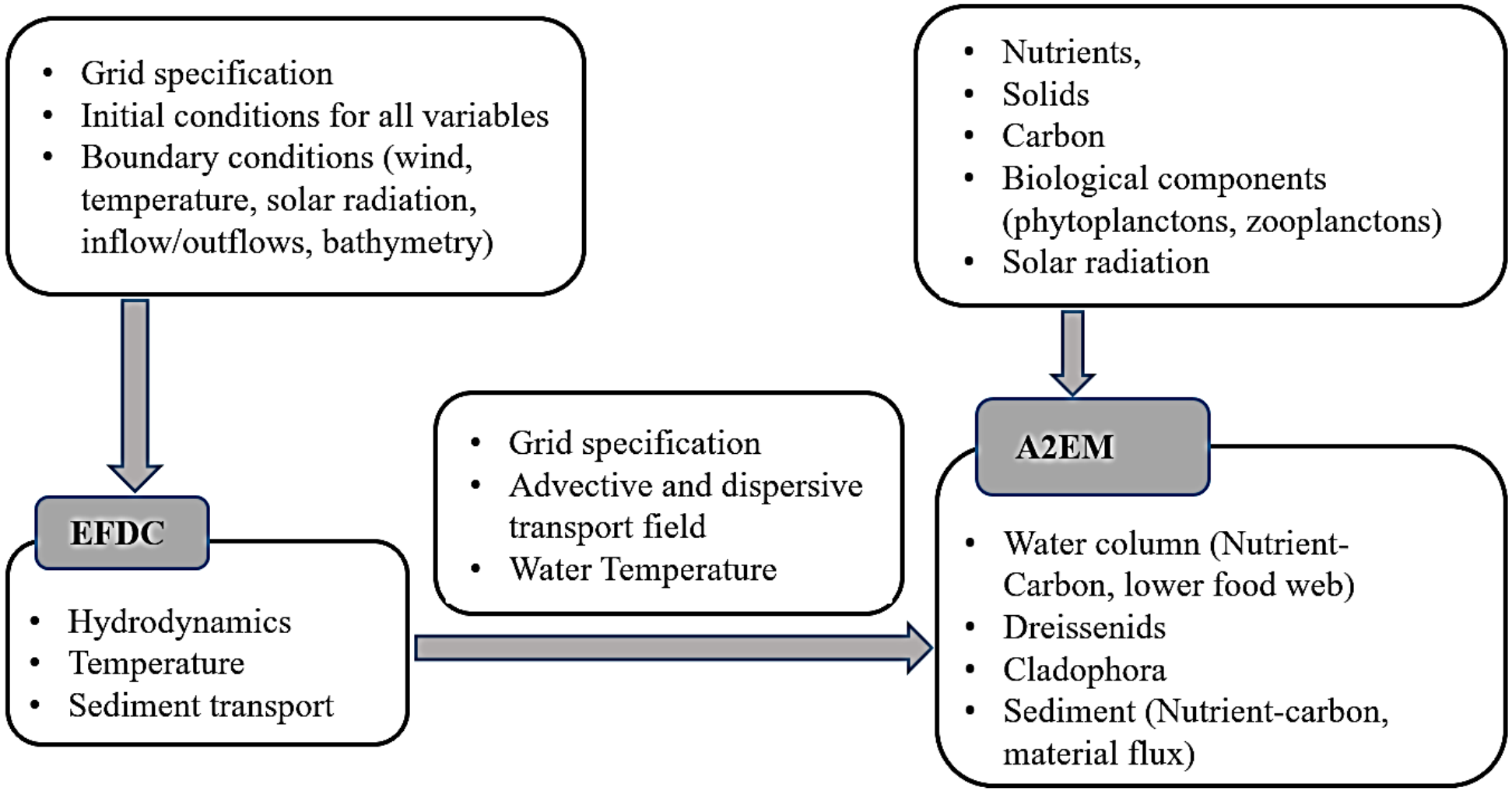
MODEL DOMAIN



LEEM MODEL FRAMEWORK



LAKE ONTARIO ECOSYSTEM MODEL (LOEM) FRAMEWORK



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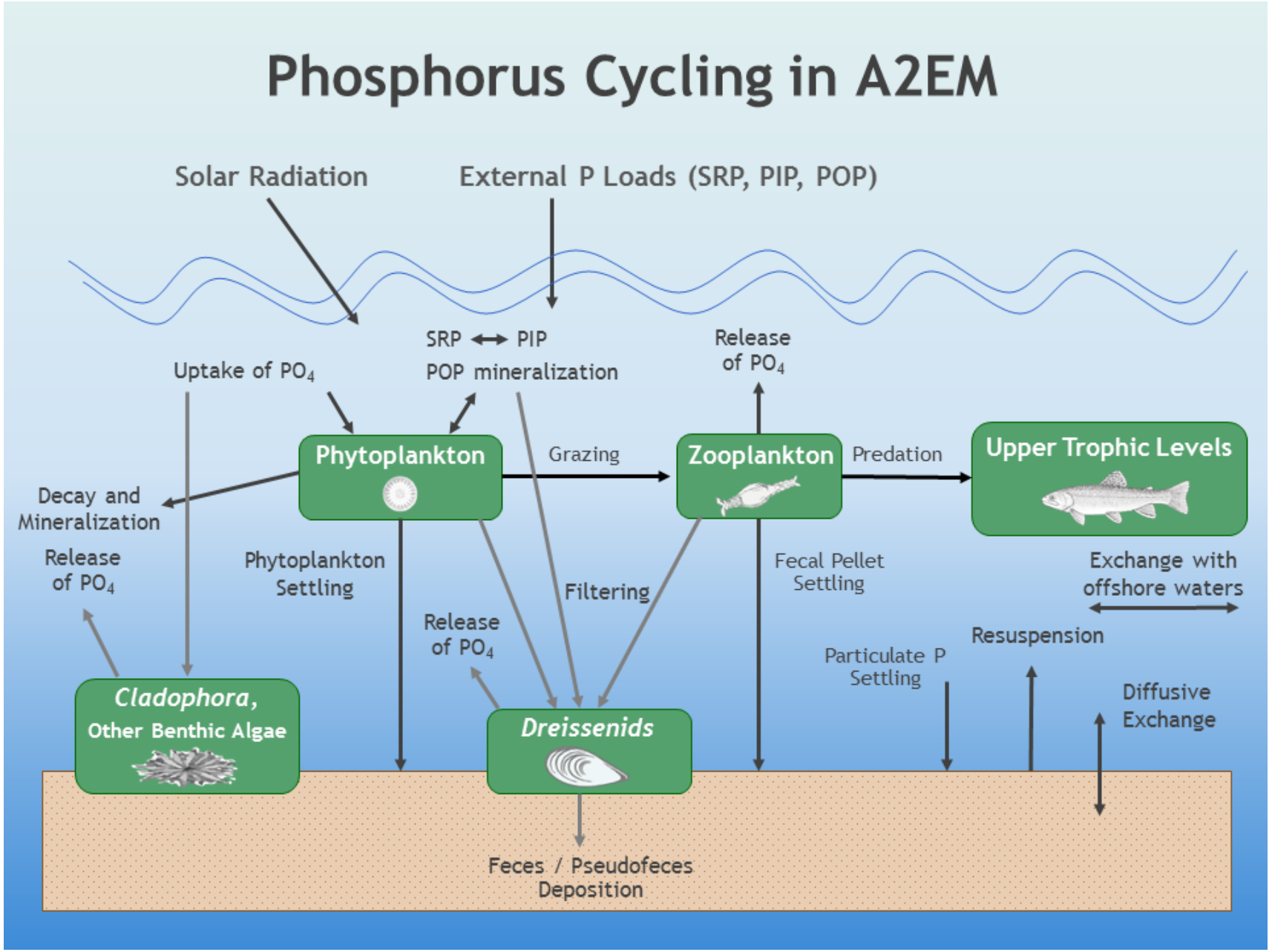
Phosphorus Cycling in A2EM



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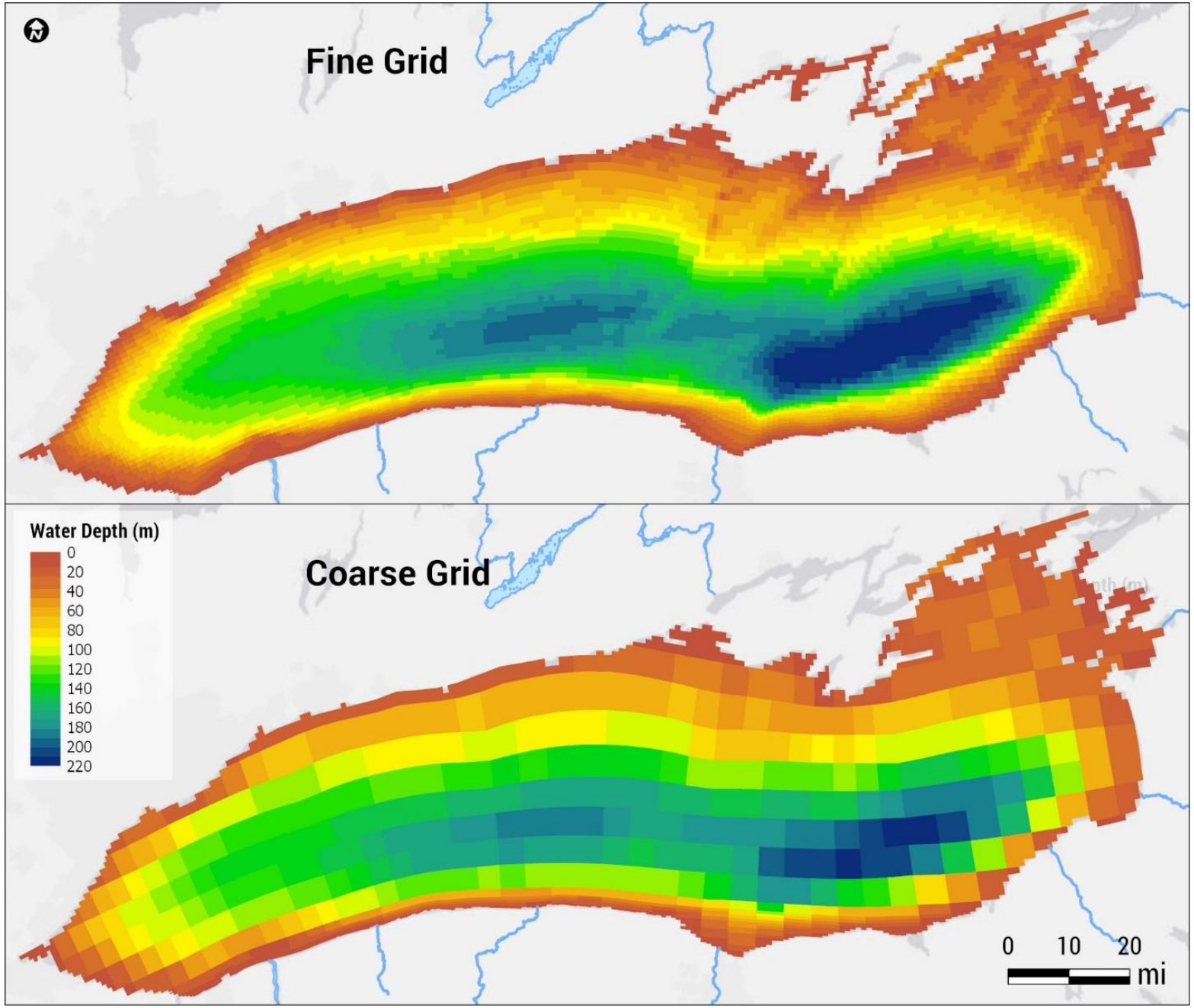
Lake Ontario Ecosystem Model

To inform excess macroalgae reduction



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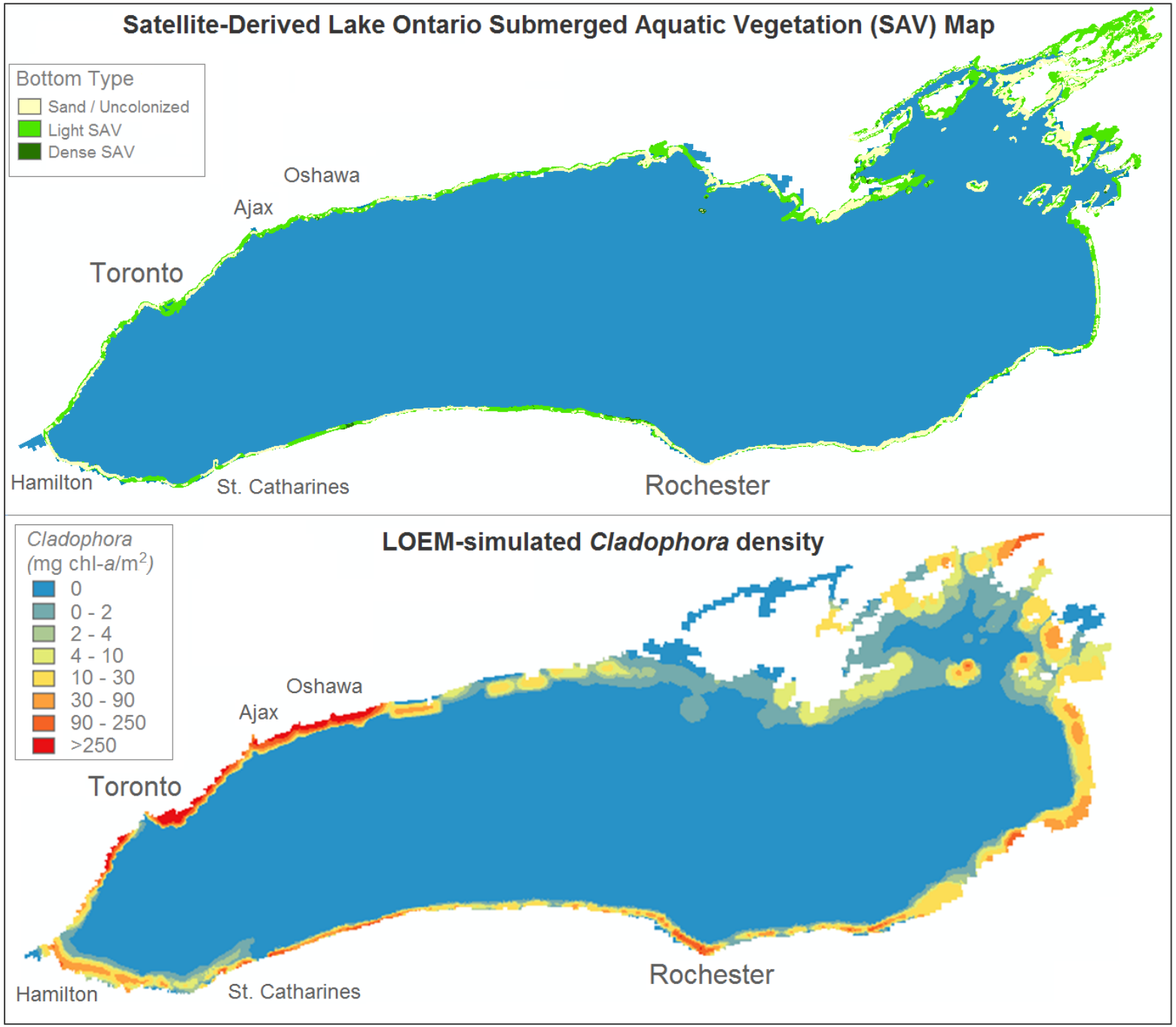
Sept. 2013



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SPEAKERS

1. The Emergency Drought Barrier and Harmful Algal Blooms in the Central Sacramento-San Joaquin Delta – **Keith Bouma-Gregson**, Tamara Kraus, & Brian Bergamaschi (USGS)
2. Tracer-based Phytoplankton Modeling in the Northern San Francisco Estuary – **Rusty Holleman** (UC Davis, RMA)
3. Modeling HABs with CE-QUAL-W2: Approaches and Future Challenges – **Mike Deas** (Watercourse Engineering)

Discussion to identify needs, gaps, and opportunities for improvement of modeling for HABs decision support.

DISCUSSION

Identify:

- needs
- gaps
- opportunities

for improvement of modeling for HABs decision support.

THANK YOU

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