

Lab 6: Analysis of Plant Control in “Clear Lake CA”

- Run control for 3 years
- Add *Hydrilla*
- Run perturbed
- Use difference graph to assess impacts of *Hydrilla*
 - animals
 - nutrients
- Interpret nutrients
 - *Technical Documentation*
 - mass balance plots
- Interpret blue-green algal response

Objective: analyze impacts of invasive plant species

Assuming that we have a calibrated study, we can use it to answer “what if” questions about the site being modeled.

This lab is intended to introduce you to an analysis of the impacts of the invasive aquatic weed *Hydrilla*. Load **Lab6_Clear Lake CA.aps**. This is based on, but not intended to faithfully represent, Clear Lake CA. The macrophyte *Hydrilla* was first found in the lake in 1994 and has been spreading rapidly since then. Eradication efforts have been underway since 1996.

Add the Macrophyte *Hydrilla* to your simulation at an initial condition of 10 g/m² dry wt

The purpose of this exercise is to analyze the impacts of this invasive aquatic weed. If *Hydrilla* were to spread to all of the lake what would be the impacts on the invertebrates, fish, and nutrients? How might it affect the widespread blue-green algal blooms? Why?

Run Control

- Check Setup to make sure 3-year simulation (to go beyond transient conditions)
- Check Rate Specifications
 - considering objectives, are variables suitable?
- Run and inspect Control graph

Add *Hydrilla*

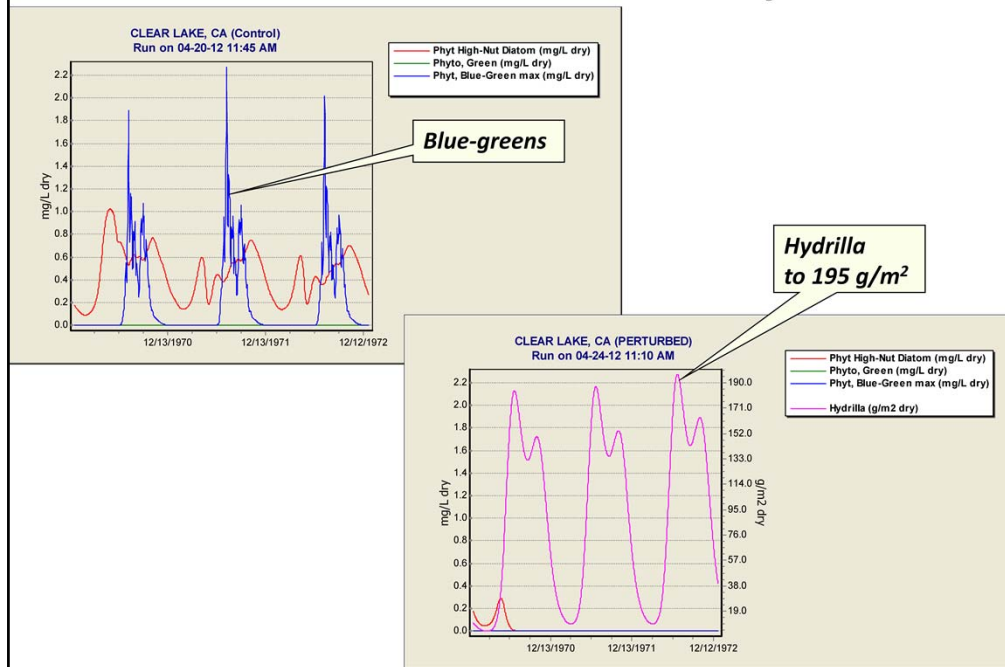
- Add Macrophyte2
- Choose *Hydrilla*
- Set initial biomass to 10 g/m² and loading to 1e-5
- (Check Trophic Interactions)
- Run and inspect Perturbed graph

It's always a good idea to check trophic interactions after adding a new state variable to make sure that the feeding matrix is set up properly.

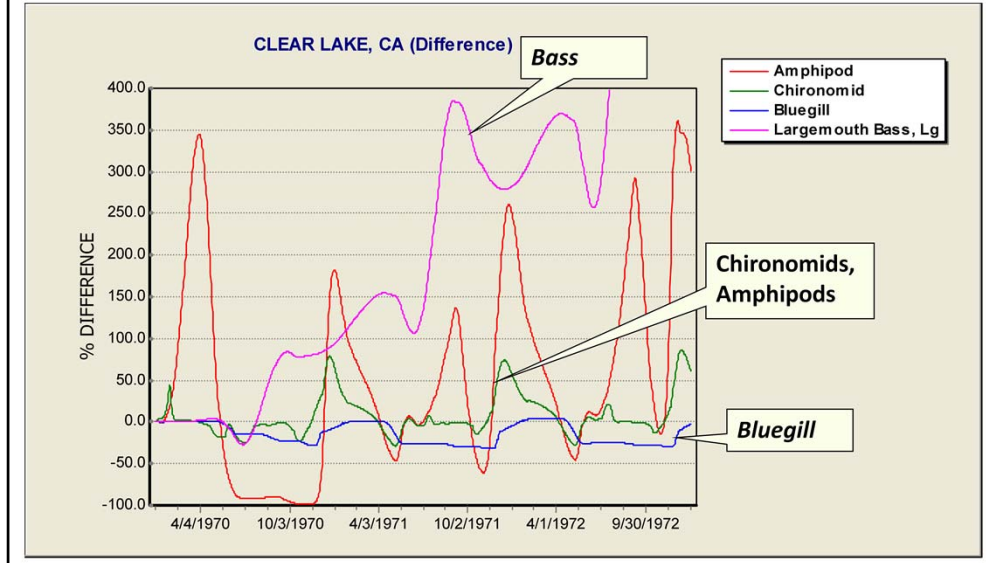
Does the trophic matrix give any clue as to why *Hydrilla* is invasive?

Note: if you think you may wish to examine *Hydrilla* rates, you will need to re-specify this in the Setup screen.

Clear Lake CA with and without *Hydrilla*



Clear Lake CA with and without *Hydrilla* shown in difference graph



The difference graph summarizes the effects of *Hydrilla*.

Bass are predicted to increase due to detrital food chain based on sloughed *Hydrilla*. Sediment-dwelling detritivores (chironomids and amphipods) are predicted to increase, and their predators—bluegill, silversides (not shown), and bass increase accordingly.

Analyze *Hydrilla* Impacts

- Does *Hydrilla* affect the dissolved oxygen?
- How does *Hydrilla* affect the nutrient levels?
Why?
 - hint: see *Tech Doc.* p. 90
 - confirm by looking at mass balance plots
- How does *Hydrilla* affect blue-green algae?
 - hint: plot control & perturbed blue-green limitations