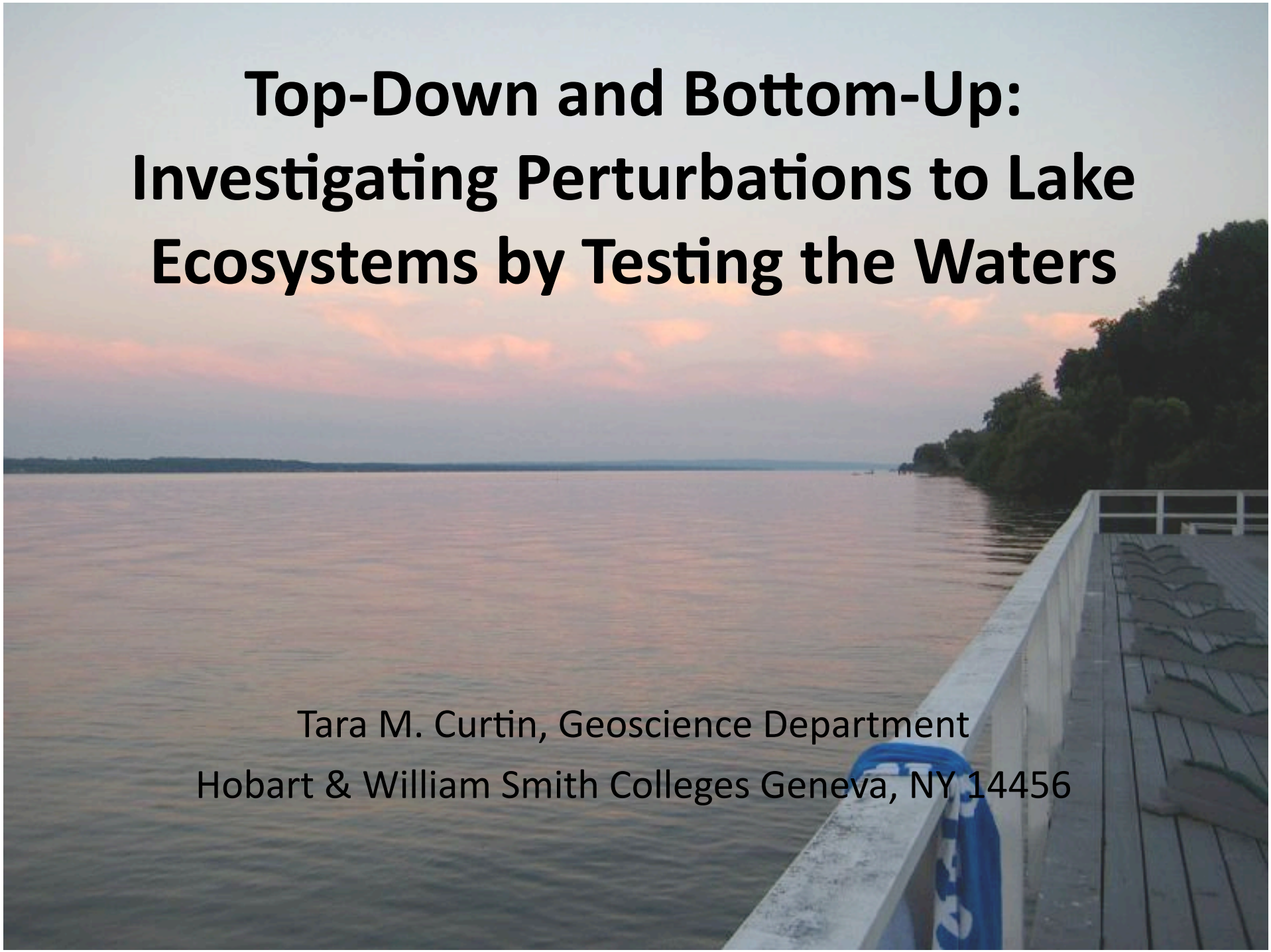


Top-Down and Bottom-Up: Investigating Perturbations to Lake Ecosystems by Testing the Waters

Tara M. Curtin, Geoscience Department

Hobart & William Smith Colleges Geneva, NY 14456

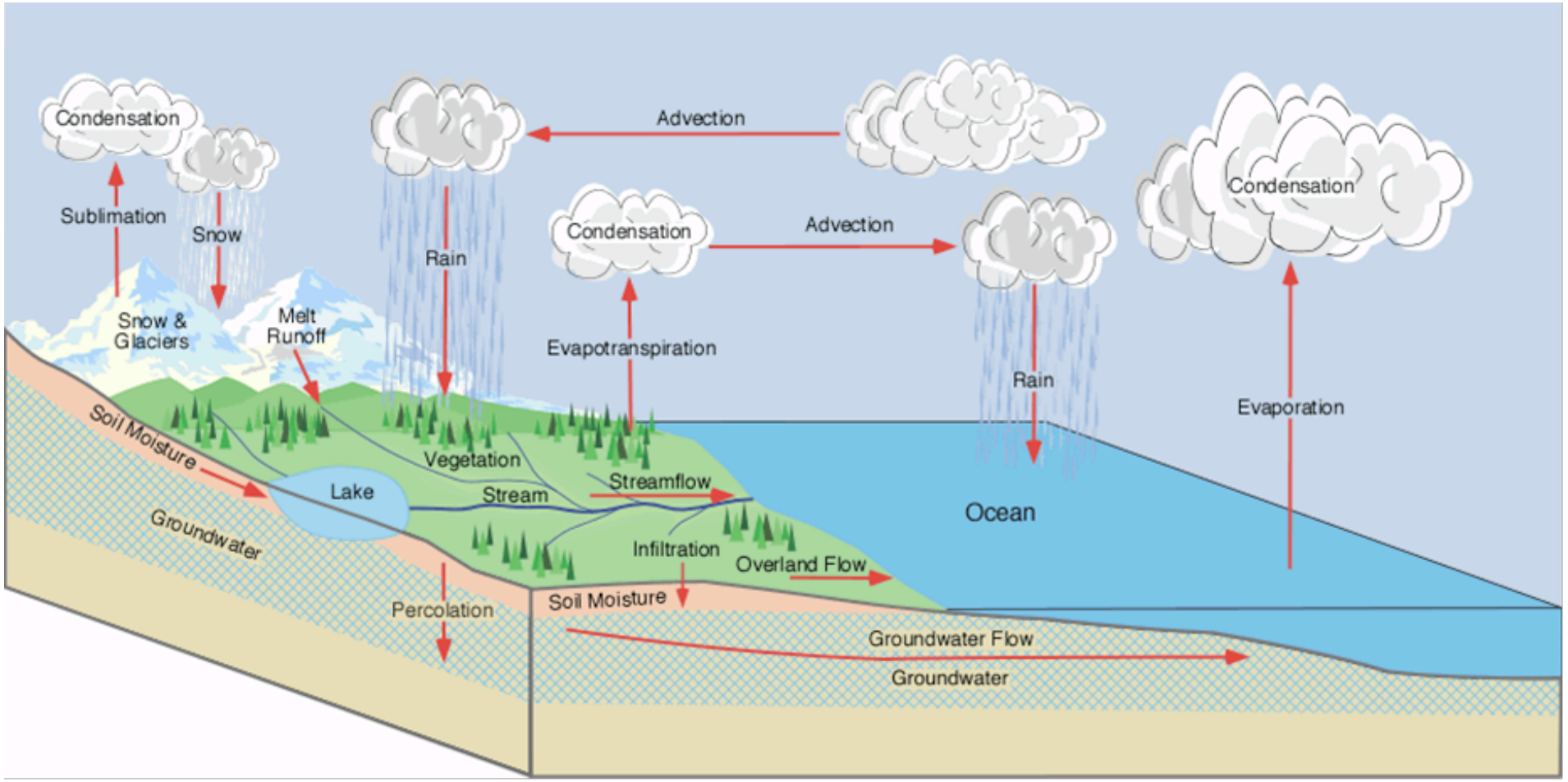
Field-Based Introductory Water Cycle Course

Institution: Small (~2,050 students), co-ed liberal arts institution

Course Information:

- No pre-requisites
- Meets 3x/wk for 55 min lectures and 1x/wk for 3 hr lab
- Enrollment:
  - ~40 students (20 per lab; 2 labs)
  - First years and sophomores only
  - Required for Geoscience major
  - Elective for Environmental Studies and Public Policy majors
  - Elective for lab science graduation requirement
- Course to attract potential Geoscience majors and meet graduation requirements

Field-Based Introductory Water Cycle Course



http://www.naugawatshed.org/What%20is%20a%20watershed.htm

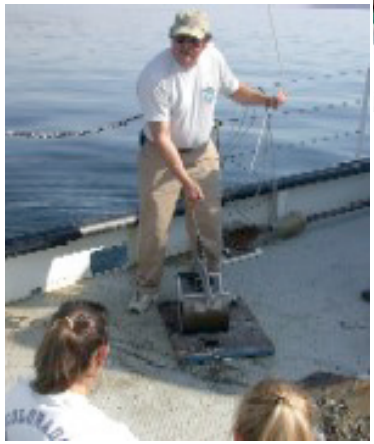
Seneca Lake, NY: Our Natural Laboratory

http://www.usgs.gov

R/V *William Scandling*

Captain John Nichols

Mate John Abbott



Top-Down and Bottom-Up Perturbations

Are zebra and quagga mussels beneficial to Seneca Lake?

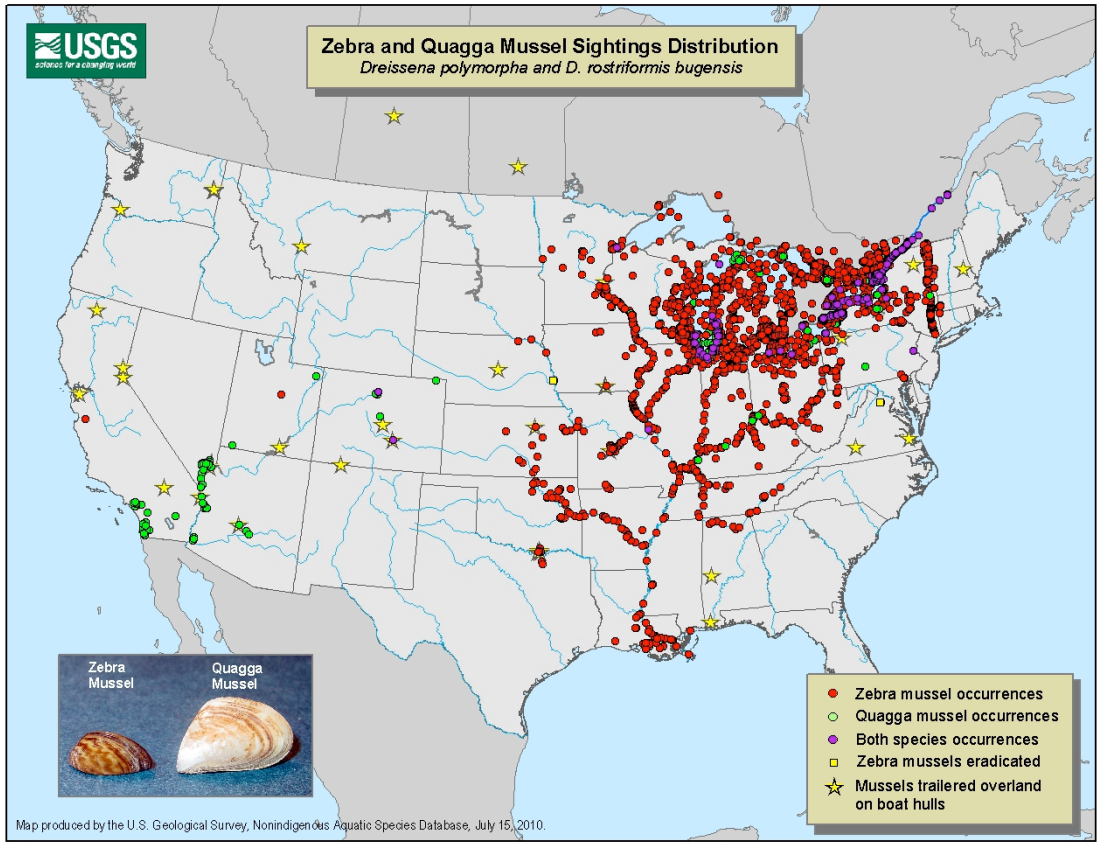
Zebra Mussel Quagga Mussel

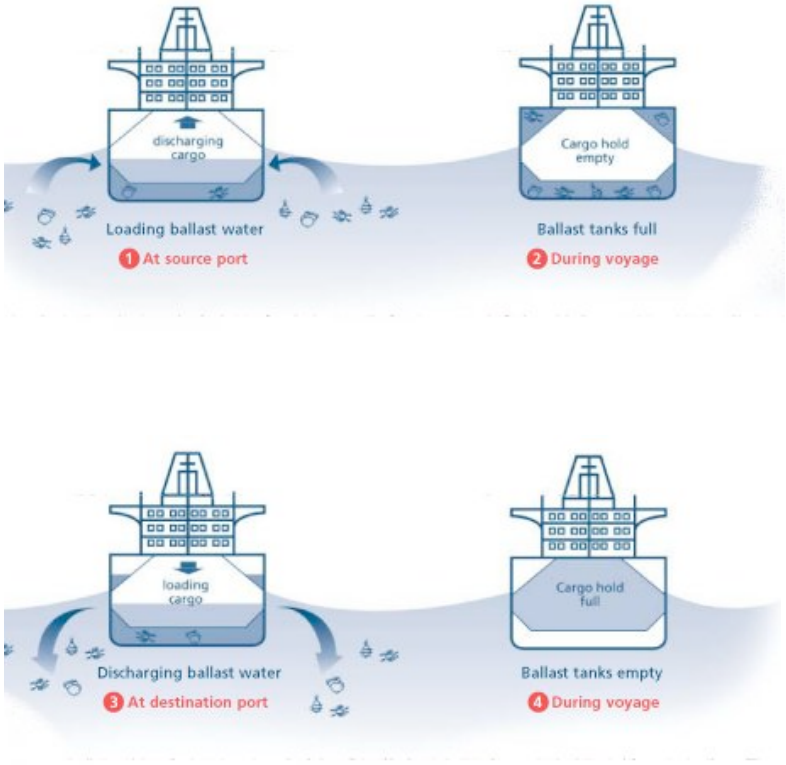
Image from: www.usgs.gov

Top-Down Perturbations

Zebra and quagga mussels

Top-Down Perturbations

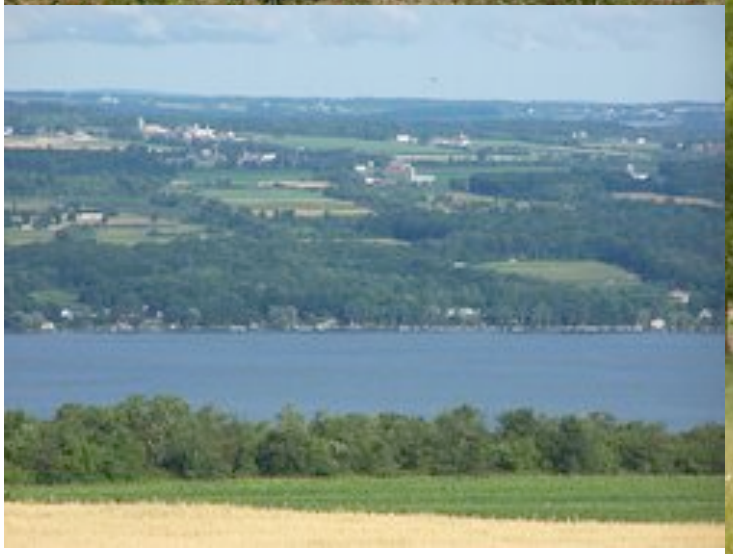




http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/maps/current_zm_quag_map.jpg

http://globallast.imo.org

Bottom-Up Perturbations

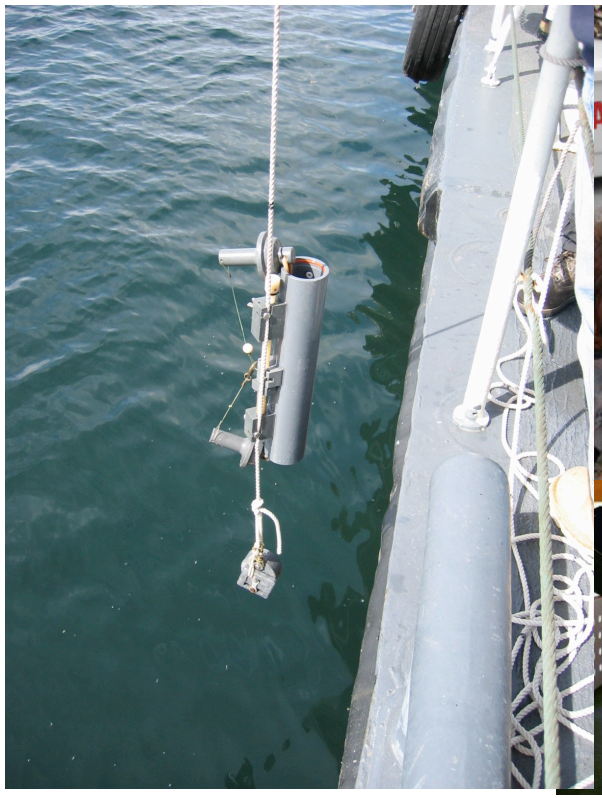


Top-Down and Bottom-Up Perturbations

Field Work

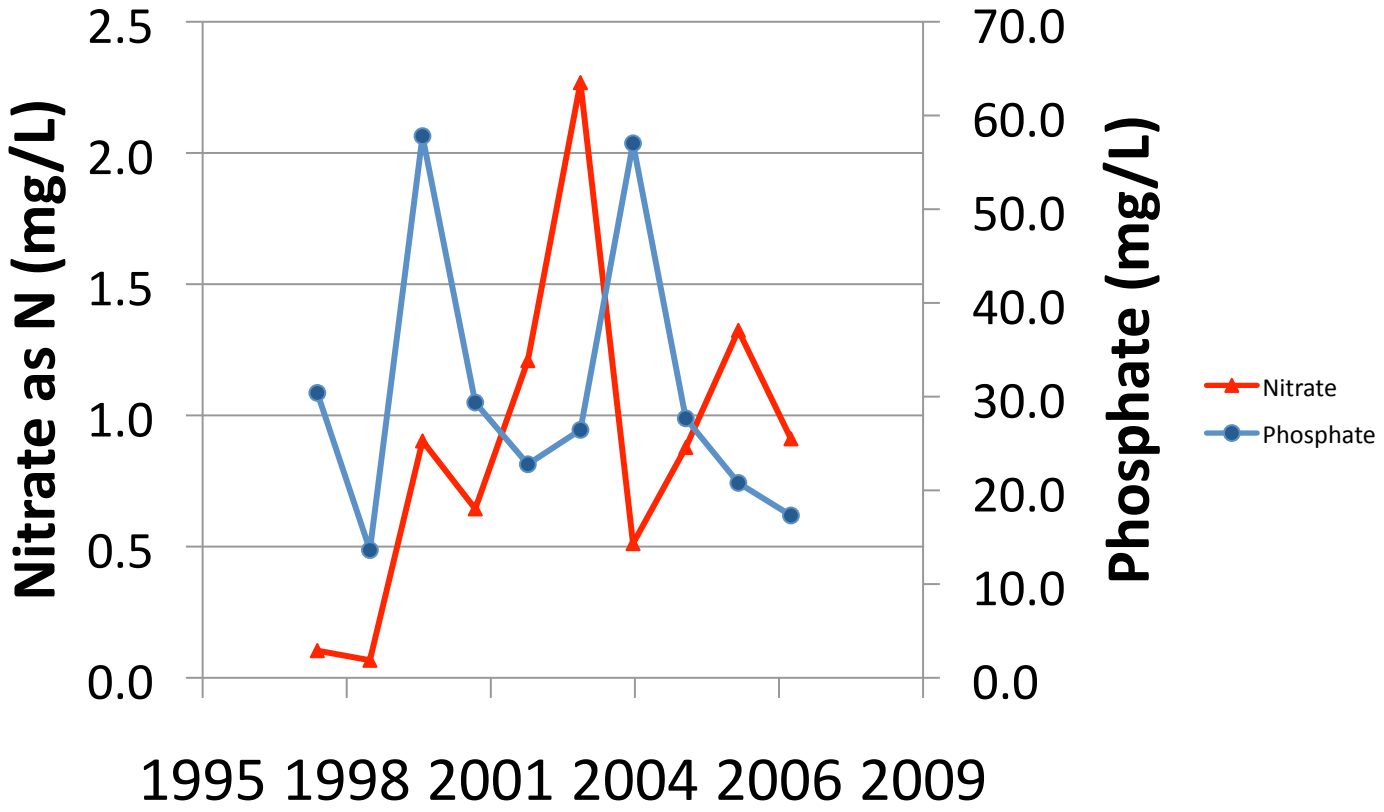
Week 1: Tributary stream chemistry

Weeks 2, 3: Seneca Lake- chemistry & invasives



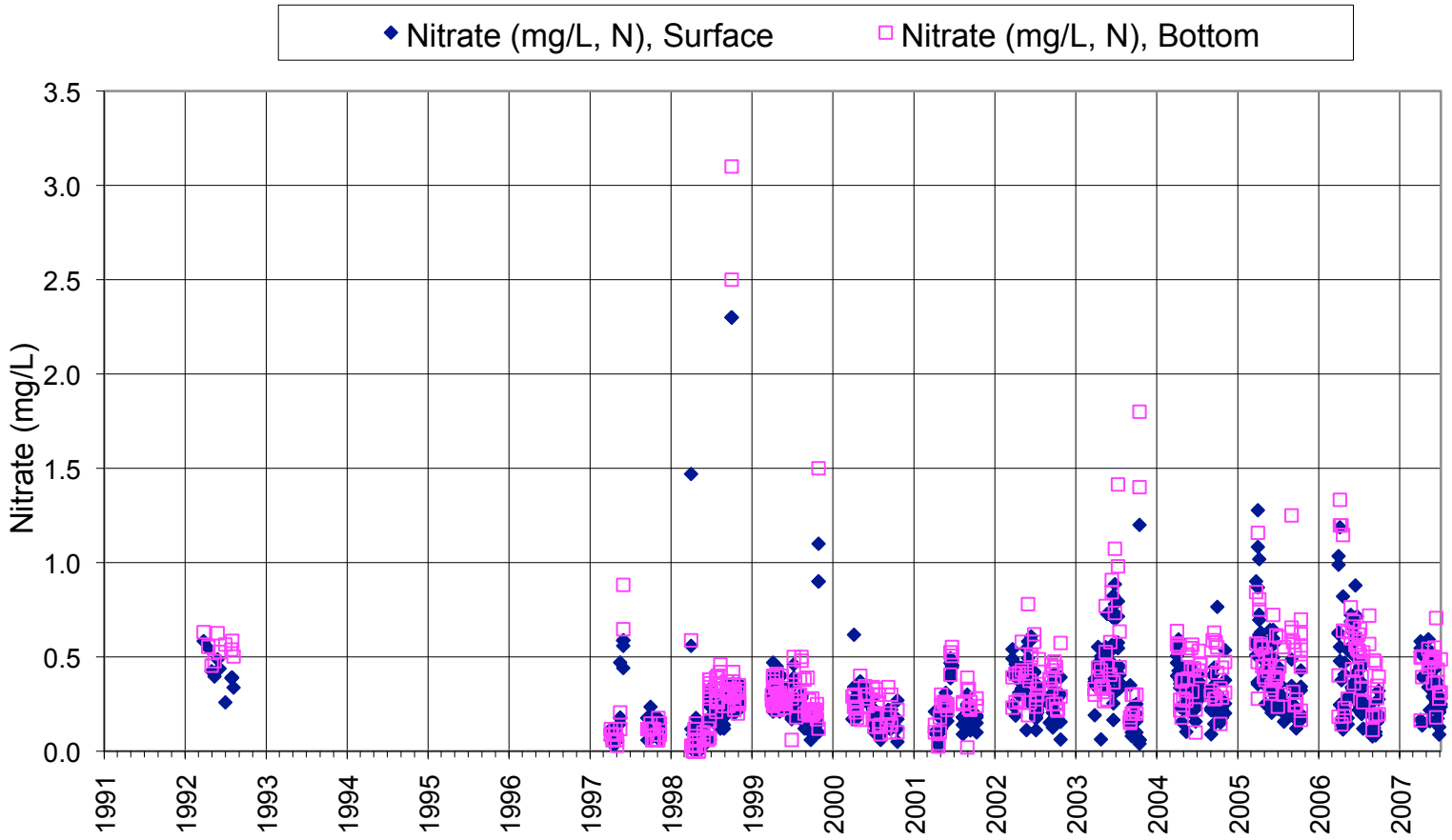
Top-Down and Bottom-Up Perturbations

Wilson Creek, a small tributary of Seneca Lake



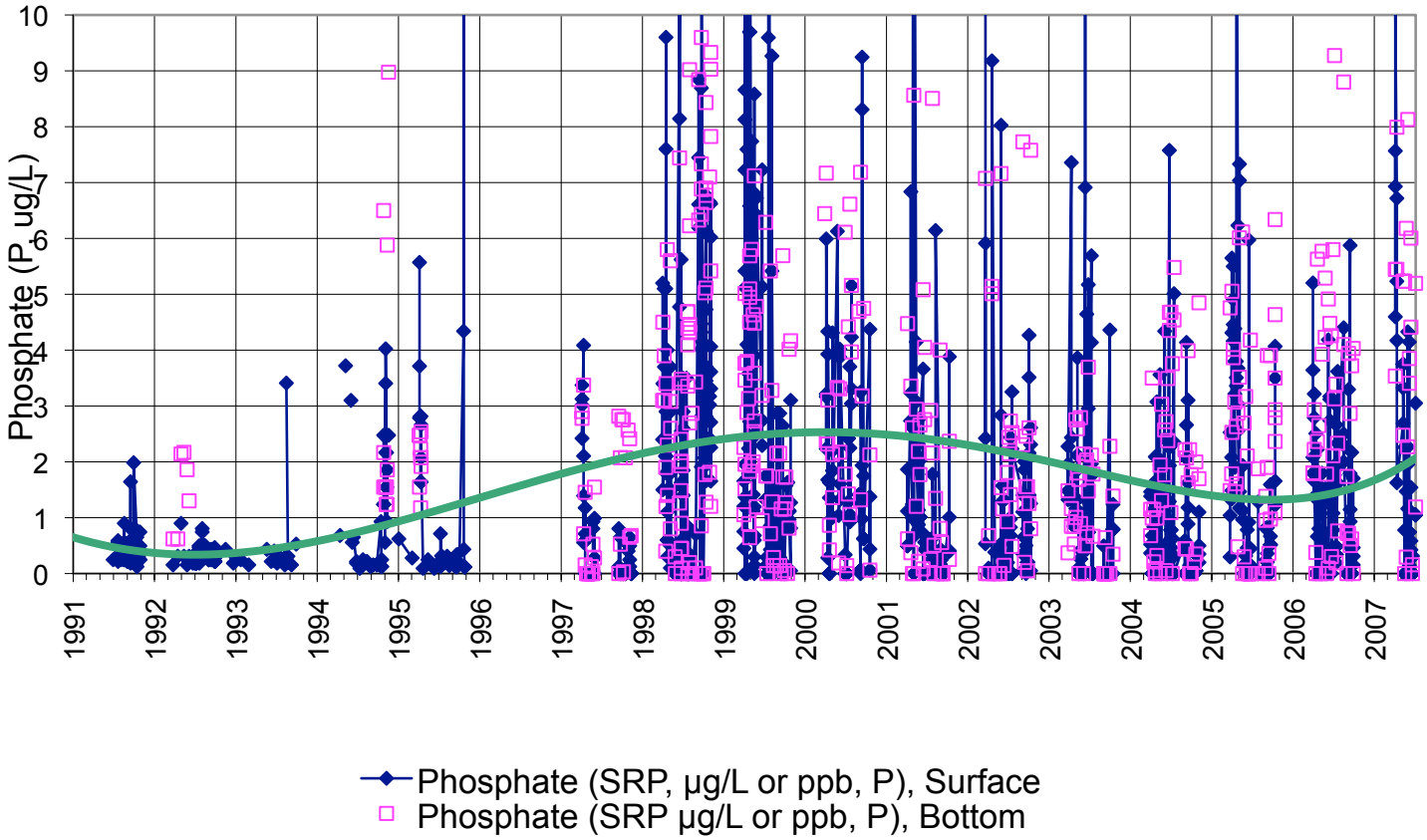
J. Halfman, unpublished data

Top-Down and Bottom-Up Perturbations



J. Halfman, unpublished data

Top-Down and Bottom-Up Perturbations

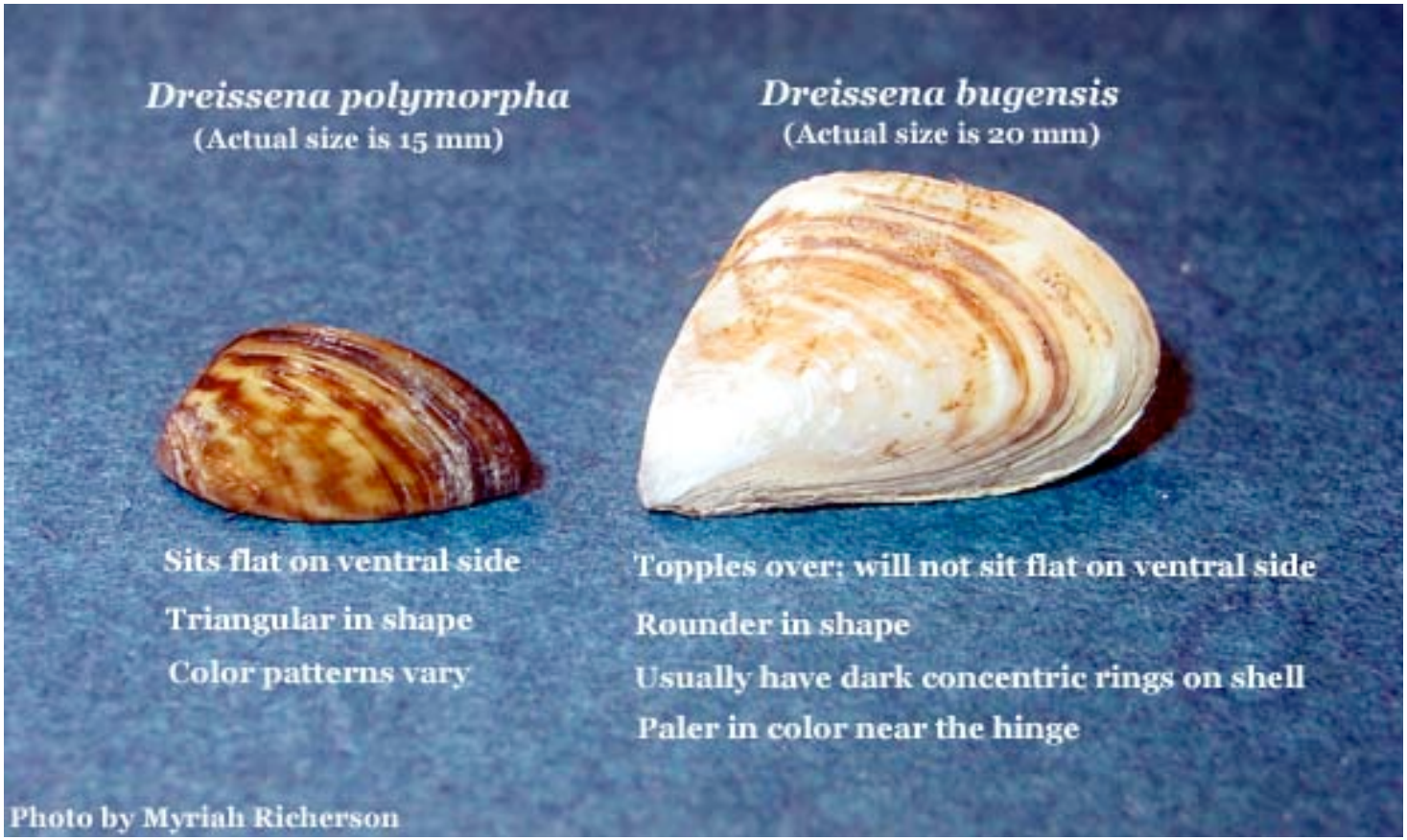


J. Halfman, unpublished data

Top-Down and Bottom-Up Perturbations

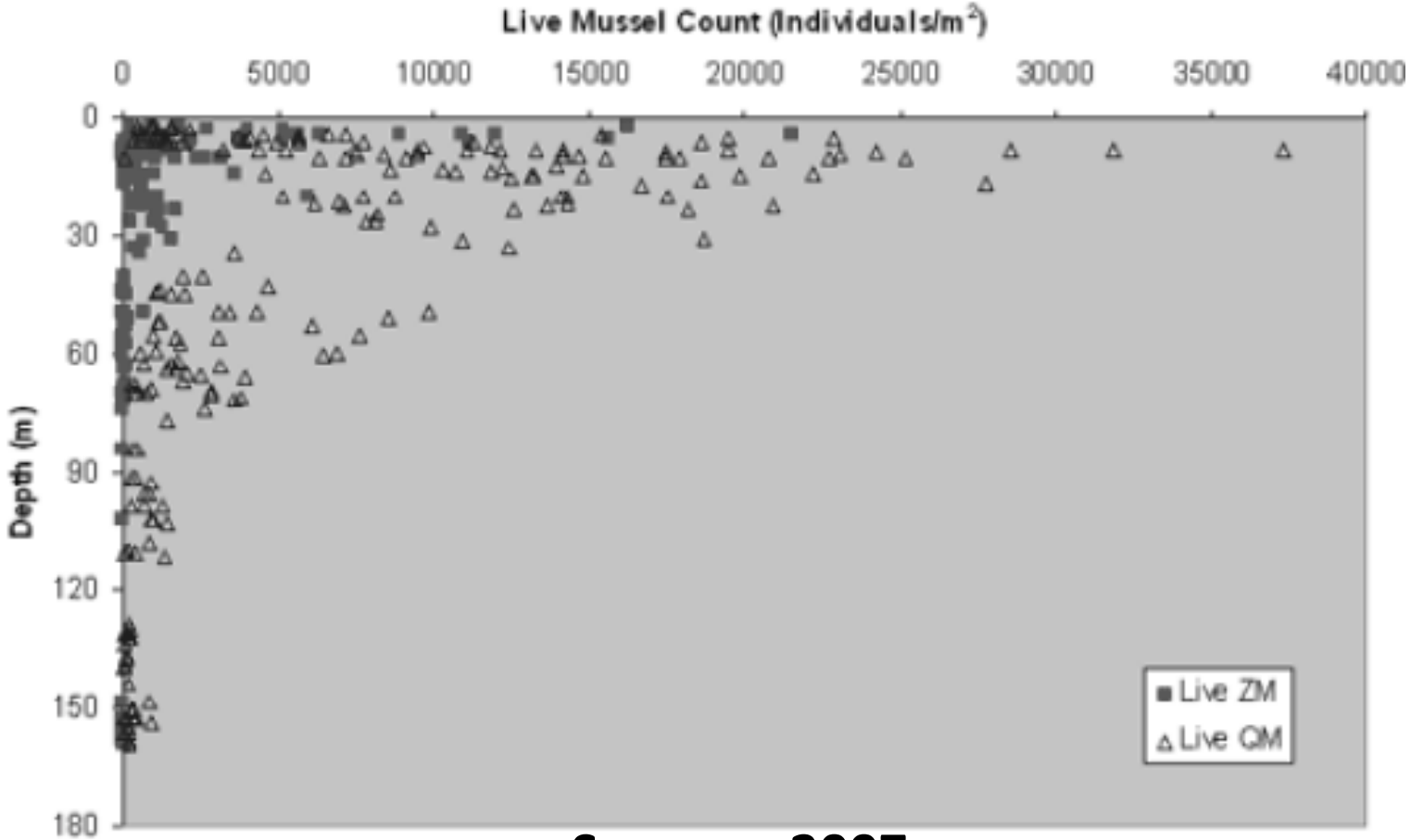
Ponar Dredge Sampling

Top-Down and Bottom-Up Perturbations



http://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=5

Top-Down and Bottom-Up Perturbations



Summer 2007

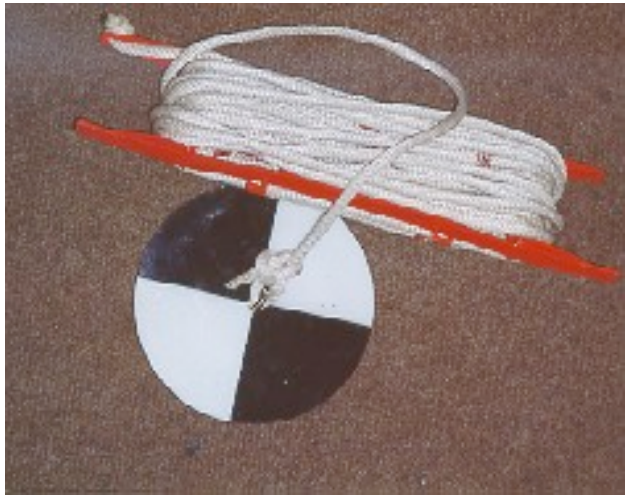
Data: Dr. Bin Zhu, Finger Lakes Institute, Hobart & William Smith Colleges

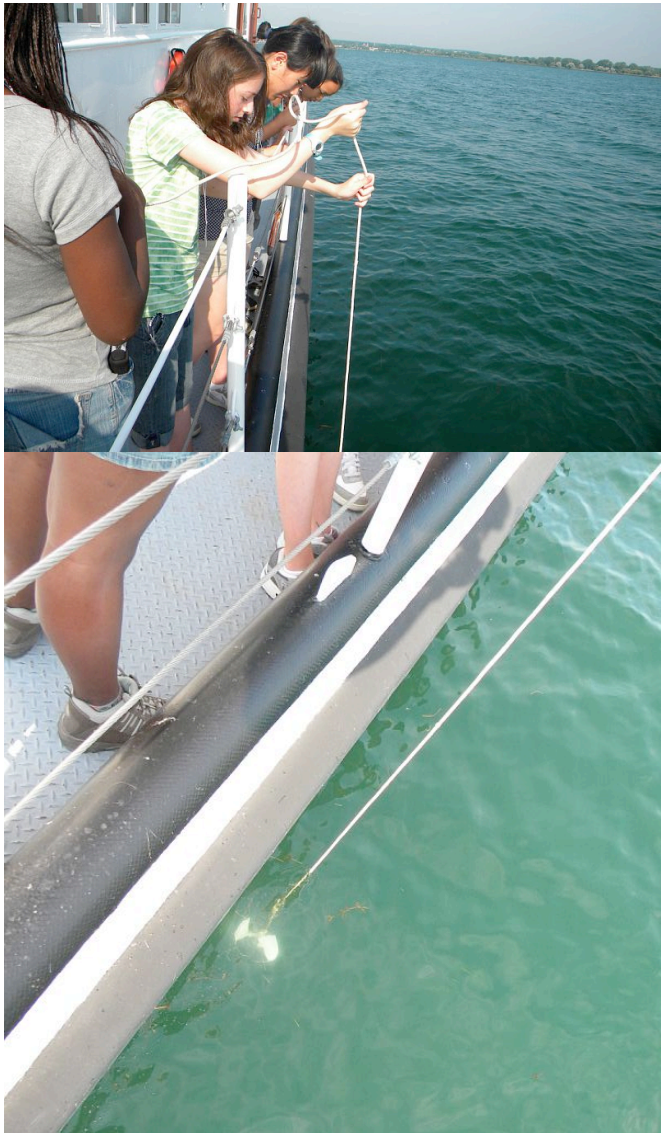
Top-Down and Bottom-Up Perturbations

1. Estimate how many mussels are in Seneca Lake.
2. How much water can these mussels filter feed in one day if they each can filter ~1L?
3. How long would it take these mussels to completely filter all the water in Seneca Lake?

Top-Down and Bottom-Up Perturbations

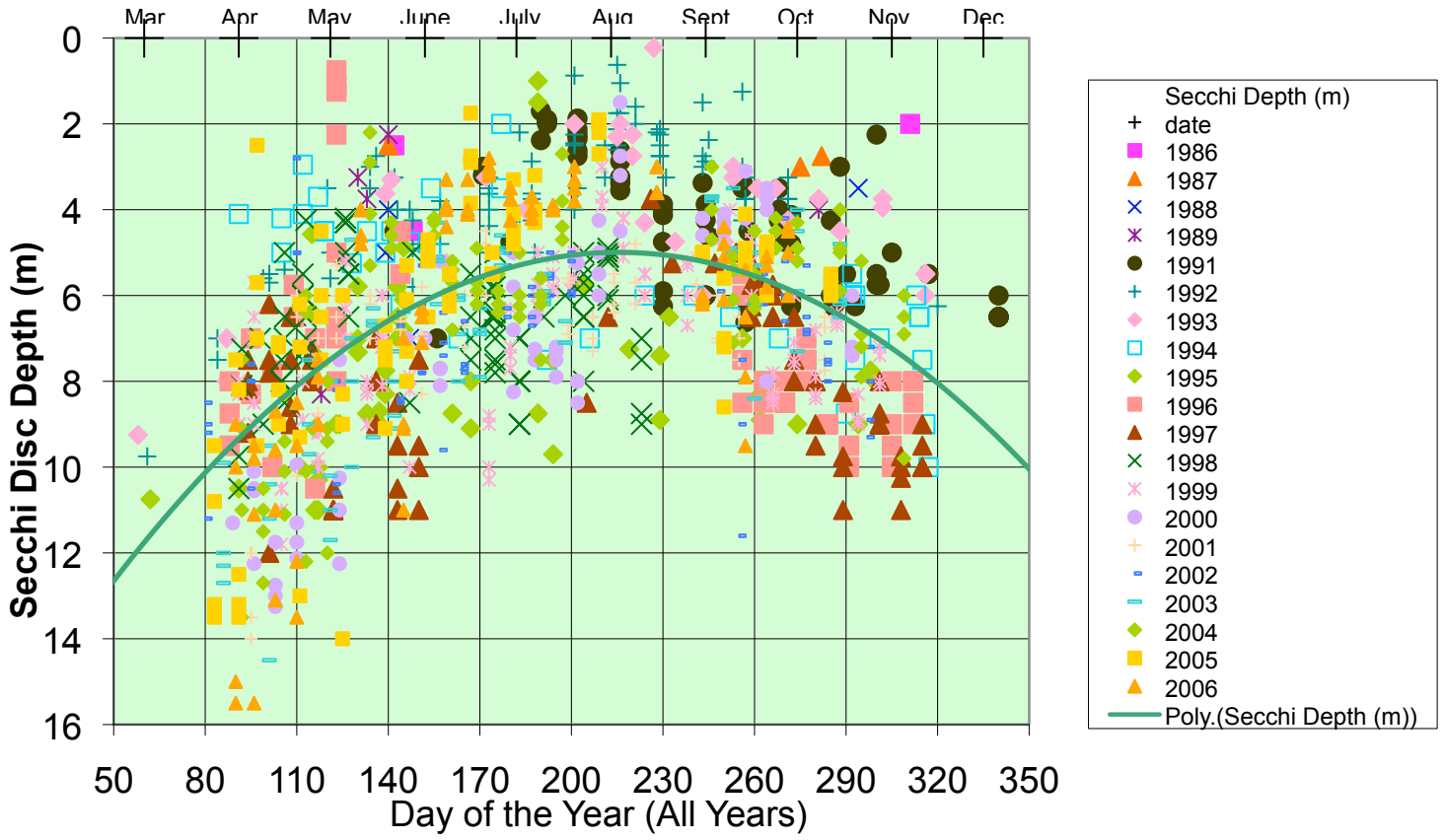
Secchi Disk





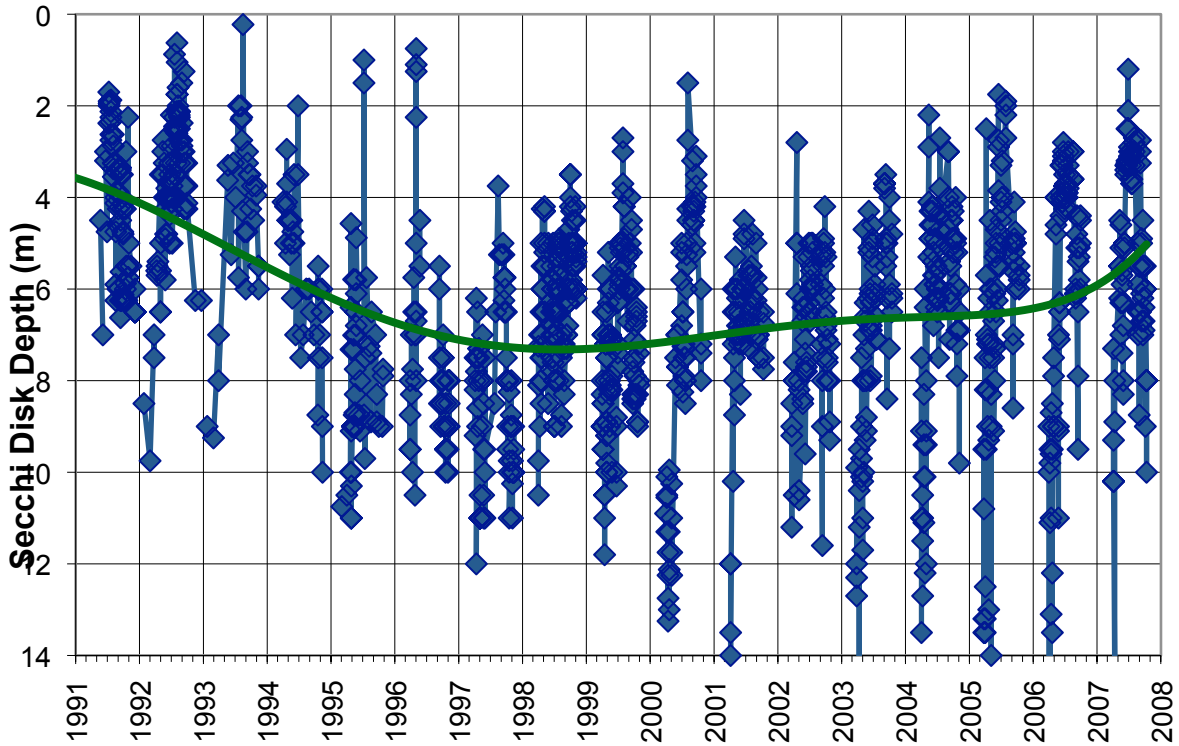
http://earthobservatory.nasa.gov

Top-Down and Bottom-Up Perturbations



J. Halfman, unpublished data

Top-Down and Bottom-Up Perturbations

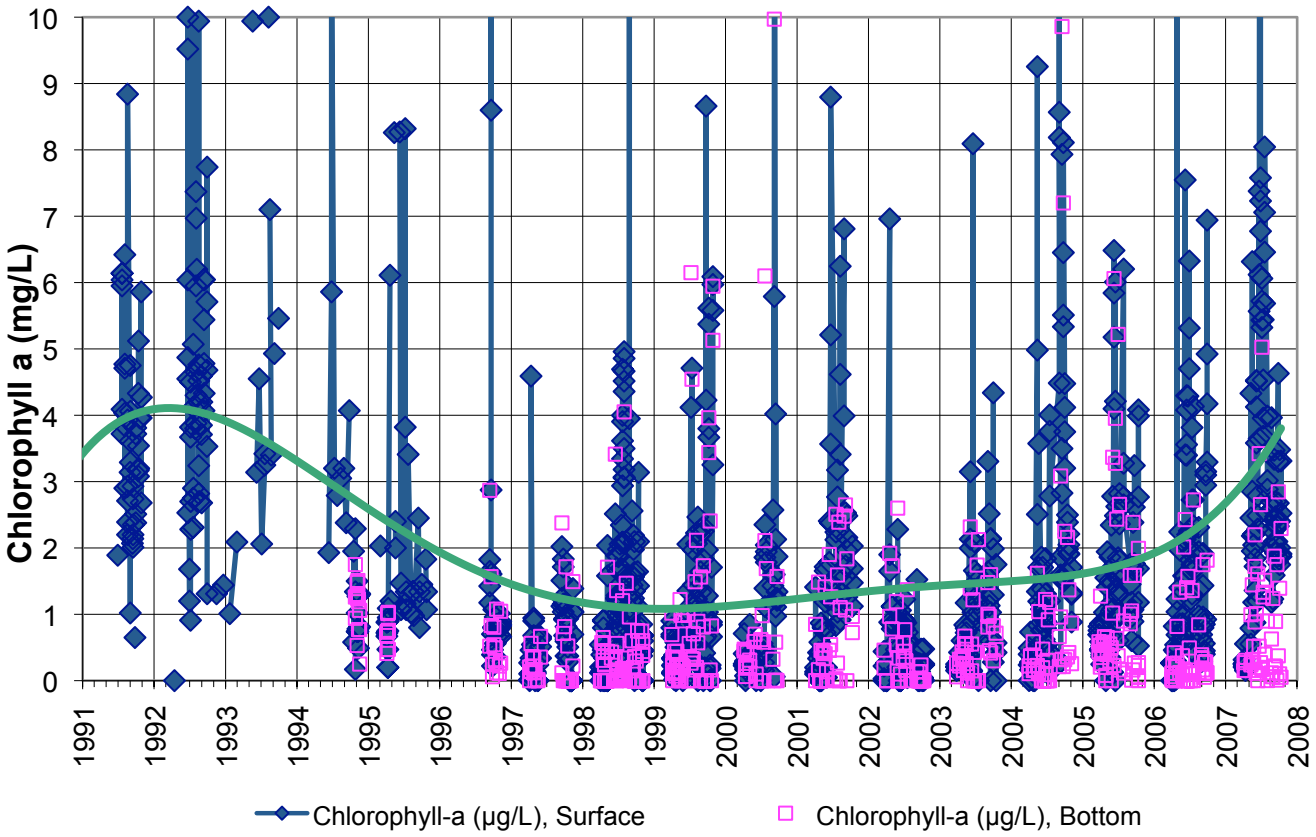


1992: Zebra mussel 2000: Quagga mussel

J. Halfman, unpublished data

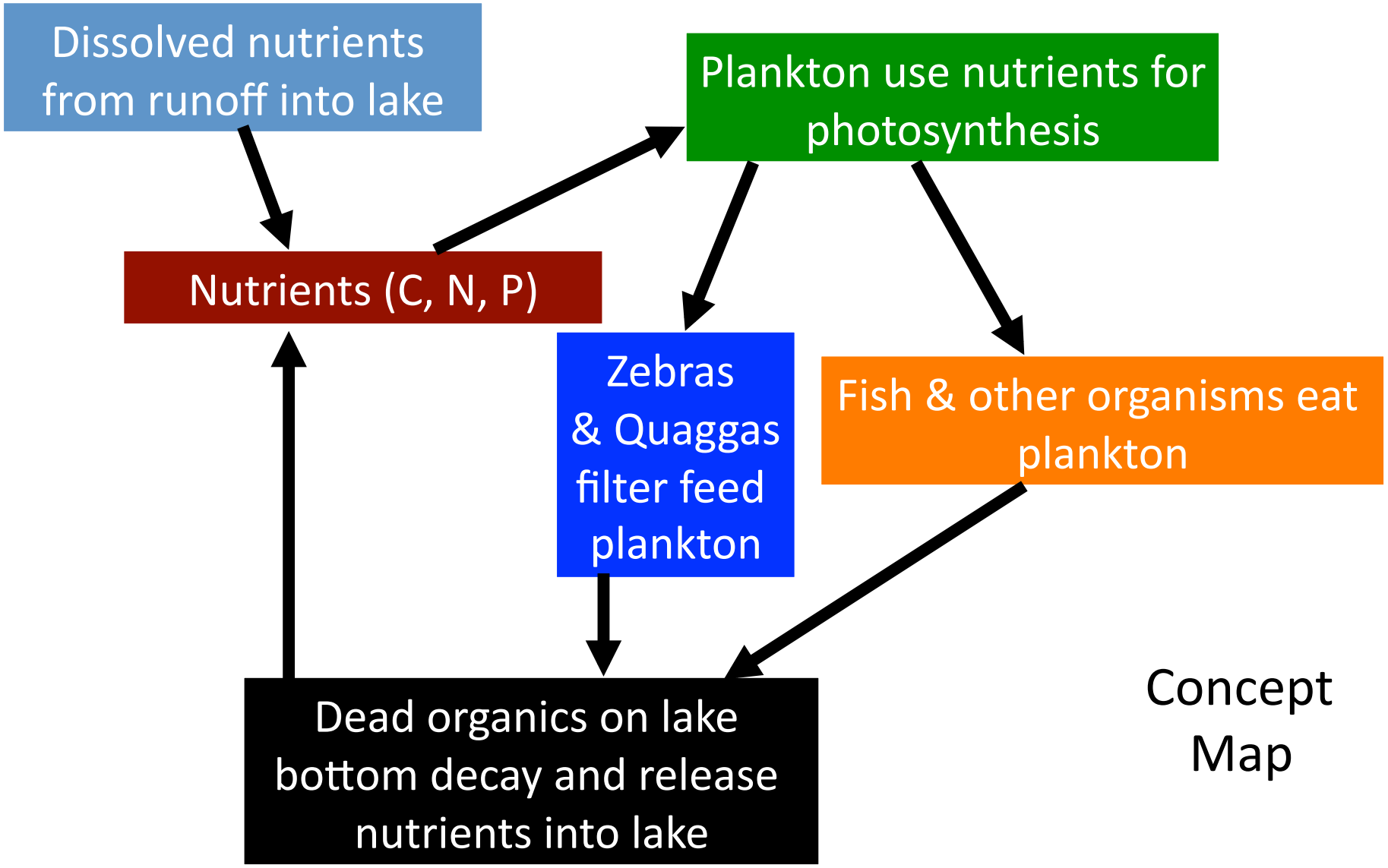
Top-Down and Bottom-Up Perturbations

Top-Down and Bottom-Up Perturbations



J. Halfman, unpublished data

Top-Down and Bottom-Up Perturbations



Concept Map

Top-Down and Bottom-Up Perturbations

Are zebra and quagga mussels beneficial to Seneca Lake?

Zebra Mussel Quagga Mussel

Image from: www.usgs.gov