

# New technologies

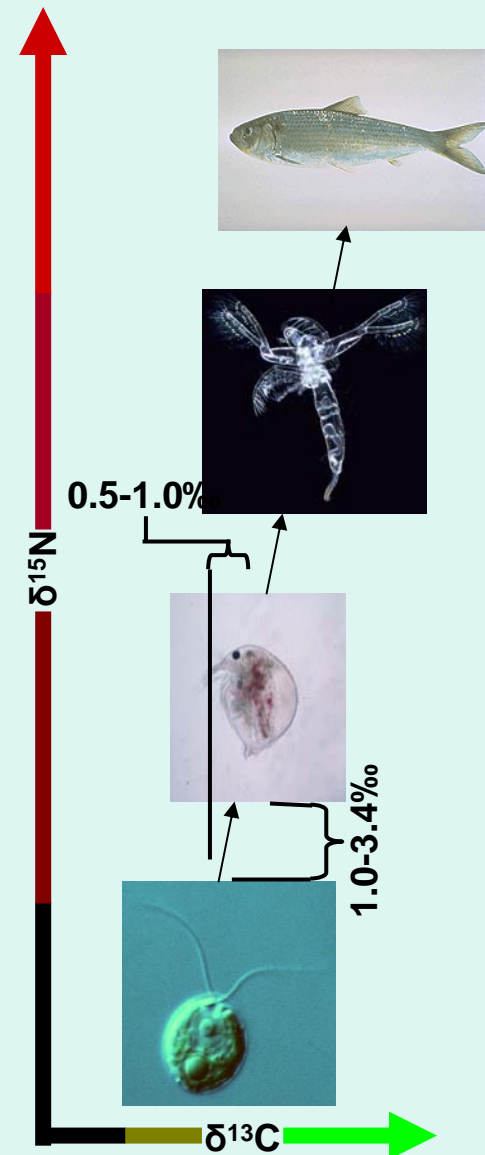
Use of stable isotopes and essential fatty acids to assess predator-prey linkages



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# Stable Isotopes

- Carbon
  - Source data
- Nitrogen
  - Trophic position data



# Stable Isotopes – Uses

- Nearshore-offshore coupling
- Benthic-pelagic coupling
- Basic food web links – source, trophic position (correlated with contaminant load, etc.)
- Coupled with examination of past data:
  - Diet shifts (due to invasives, changes in productivity...)
  - Changes in trophic position

# Stable Isotopes - Caveats

- Lipid content of consumer affects the stable carbon isotope composition
  - Lipid extraction essential (or mathematical correction)
- Tissue turnover and seasonal variation
  - Sample lower food web seasonally
  - Co-ordinate annual fish sampling with the lower food web sampling dates/sites
  - Standard organism – dreissenids (benthic – nearshore/offshore; on buoys?)

# Essential Fatty Acids

- Synthesized by primary producers (phytoplankton oils, not fish oils!)
- Can be broad indicator of diet
- Important for larval fish growth and fish condition (e.g., over-winter survival)

$\omega$ 3 fatty acids (EPA, DHA, linolenic)

$\omega$ 6 fatty acids (ARA)



# Essential Fatty Acids - Uses

- Changes in phytoplankton community that affect the higher food web (e.g., chrysophyte to cyanobacterial shift)
- Potentially nearshore-offshore coupling
- Potentially benthic-pelagic coupling
- Coupled with examination of past data:
  - Diet shifts (due to invasives, changes in productivity...)
  - Changes in fish condition

# Essential Fatty Acids - Caveats

- Cost
- Level of diet analysis – coarse
- *But* known effects on fish make them important components of fish condition or 'health'

# Potential Approaches

- Seasonal sampling of lower foodweb (as in LOLA 2003) to include SI/FA of key components
  - seston, dreissenids, *Diporeia*, *Mysis*, cyclopoids, daphnids, (*Cercopagis* and *Bythotrephes*?)
- Co-ordination with fish sampling at standard time of year to correspond to historic samples/overlap of other sampling sites
  - Alewife, smelt, lake trout
  - Goby, Chinook, lake whitefish...

# Overall Questions

- What are the objectives? S.I. and F.A. are tools that may inform many questions in this cooperative monitoring year effort – need to be incorporated in such a way that:
  - Can link lower food web and fish
  - Can link nearshore-offshore
  - Provide useful information to many subgroups
- Archiving samples
- Data management