

Status of Lake Erie's Western Basin Fish Populations: *Trends and Environmental Conditions*

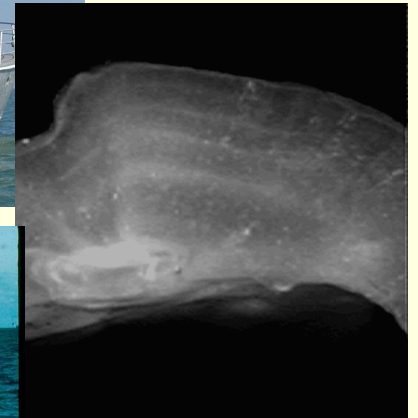
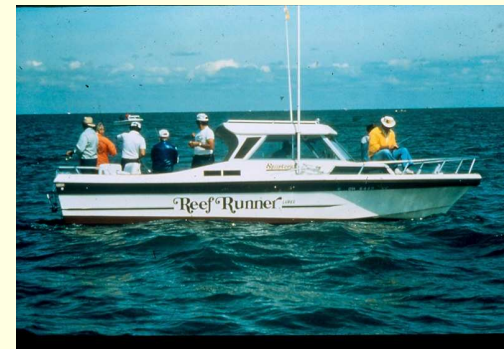
Chris Vandergoot

Ohio Department of Natural Resources
Division of Wildlife



Status of the Lake Erie's Western Basin Fish Populations *Sampling Programs*

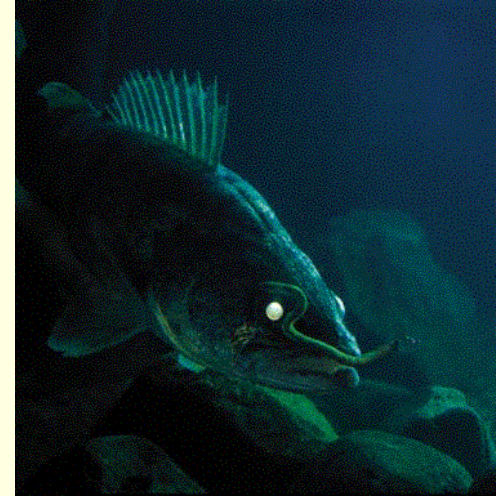
- Ohio harvest assessment programs
- Ohio gillnet sampling
- Ohio trawling programs
- Acoustic sampling program
- Other programs
 - Lower trophic level
 - Diet assessment





Status of the Lake Erie's Western Basin Fish Populations *Outline*

- Status of Predators
- Status of Forage
- Status of Lower Trophic Levels
- Environmental Conditions



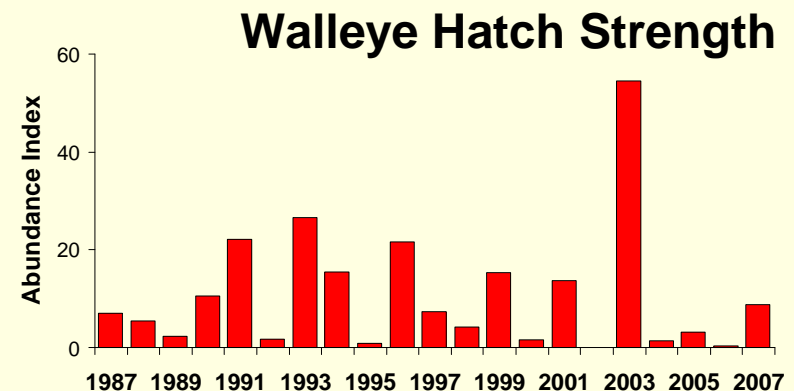
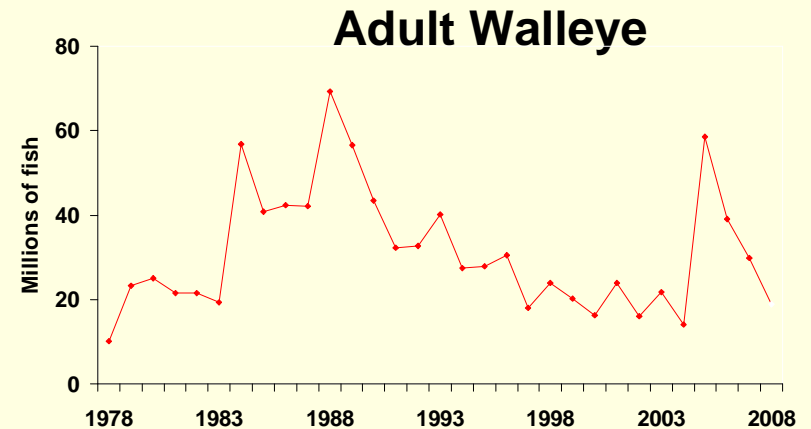


Status of the Lake Erie's Western Basin Fish Populations

Predators



- Walleye abundance has declined
- Highly variable recruitment
- Large 2003 year-class
- Extremely poor year-classes in more recent years
- Changes in distribution
- Growth stable

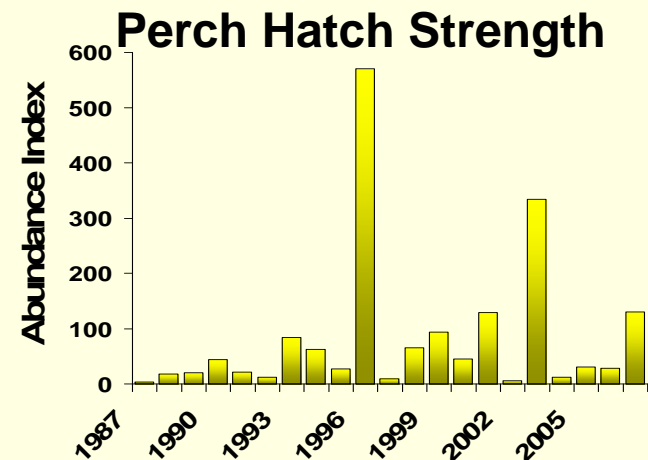
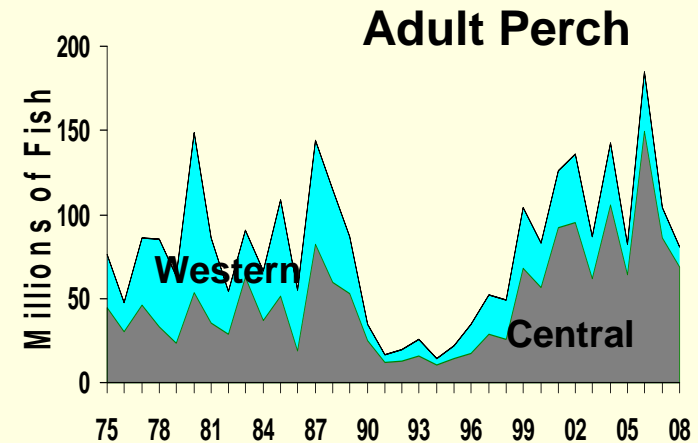




Status of the Lake Erie's Western Basin Fish Populations *Predators*



- Yellow perch abundance has increased
- Year-class strength highly variable
- Large 1996 and 2003 year-classes, average 2007 year-class
- Increased growth (due to increased benthos)



Great Lakes Fishery Commission

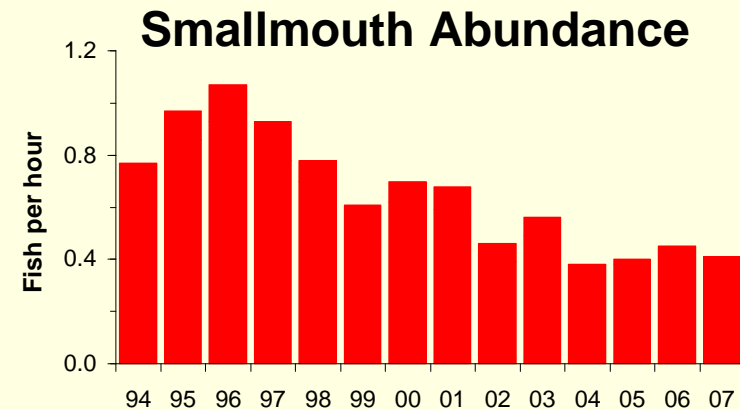
Lake Erie Committee



Status of the Lake Erie's Western Basin Fish Populations *Predators*



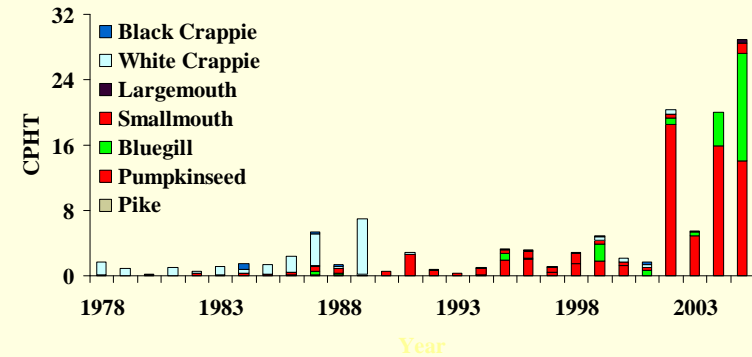
- Declining smallmouth bass abundance in west
- Round goby effect on spawning success
- Potential cormorant depredation
- Increasing in abundance in other systems (due to warming)





Status of the Lake Erie's Western Basin Fish Populations *Predators*

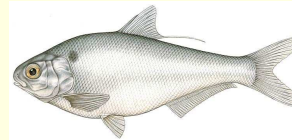
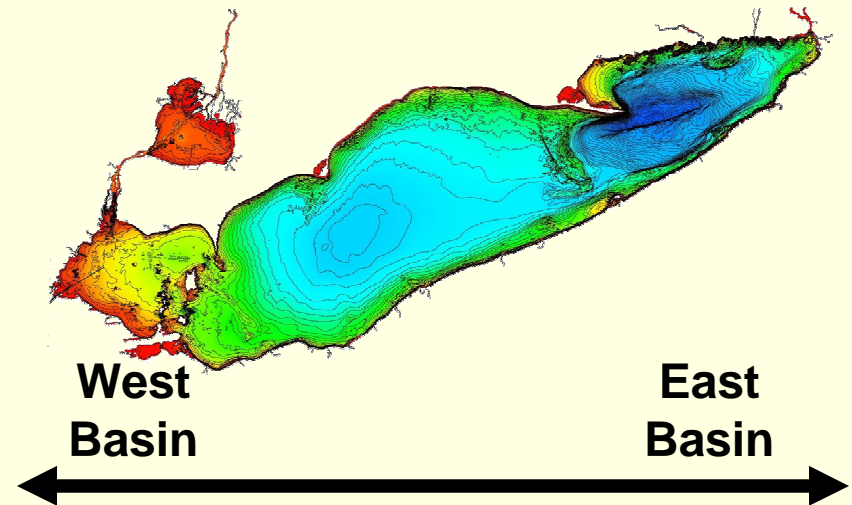
- Increases in number of phytophilic species
- Associated with more extensive submerged aquatic beds
- Increased number of lake sturgeon, particularly in survey gear





Status of the Lake Erie's Western Basin Fish Populations *Forage*

- Gradient in prey fish community west to east
 - Higher diversity west
 - Lower diversity east
- Clupeids, shiners dominate in west
- Rainbow smelt dominate in east



Great Lakes Fishery Commission

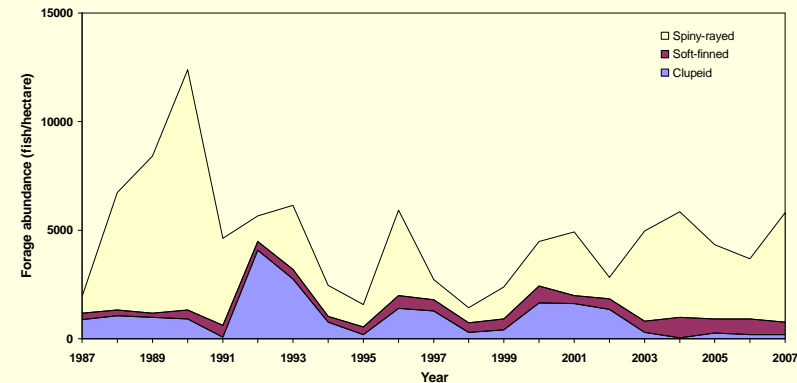
Lake Erie Committee



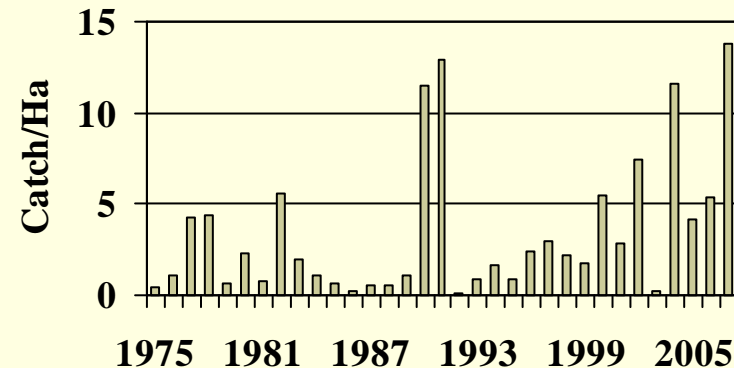
Status of the Lake Erie's Western Basin Fish Populations *Forage*

- Functional forage groups
- Large decreases in age-0 white perch
- Decreases in clupeids
- Increases in shiners

West Basin Forage



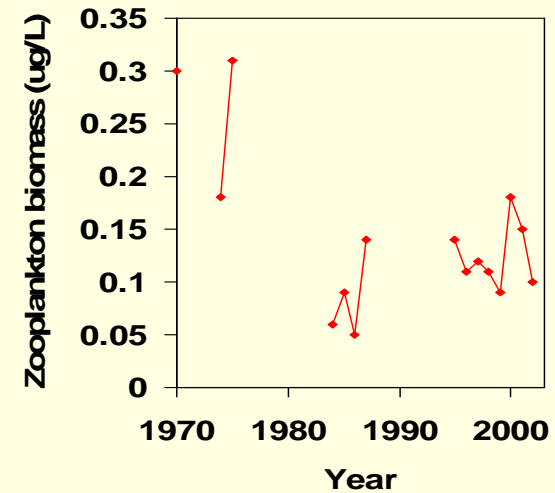
Emerald Shiners





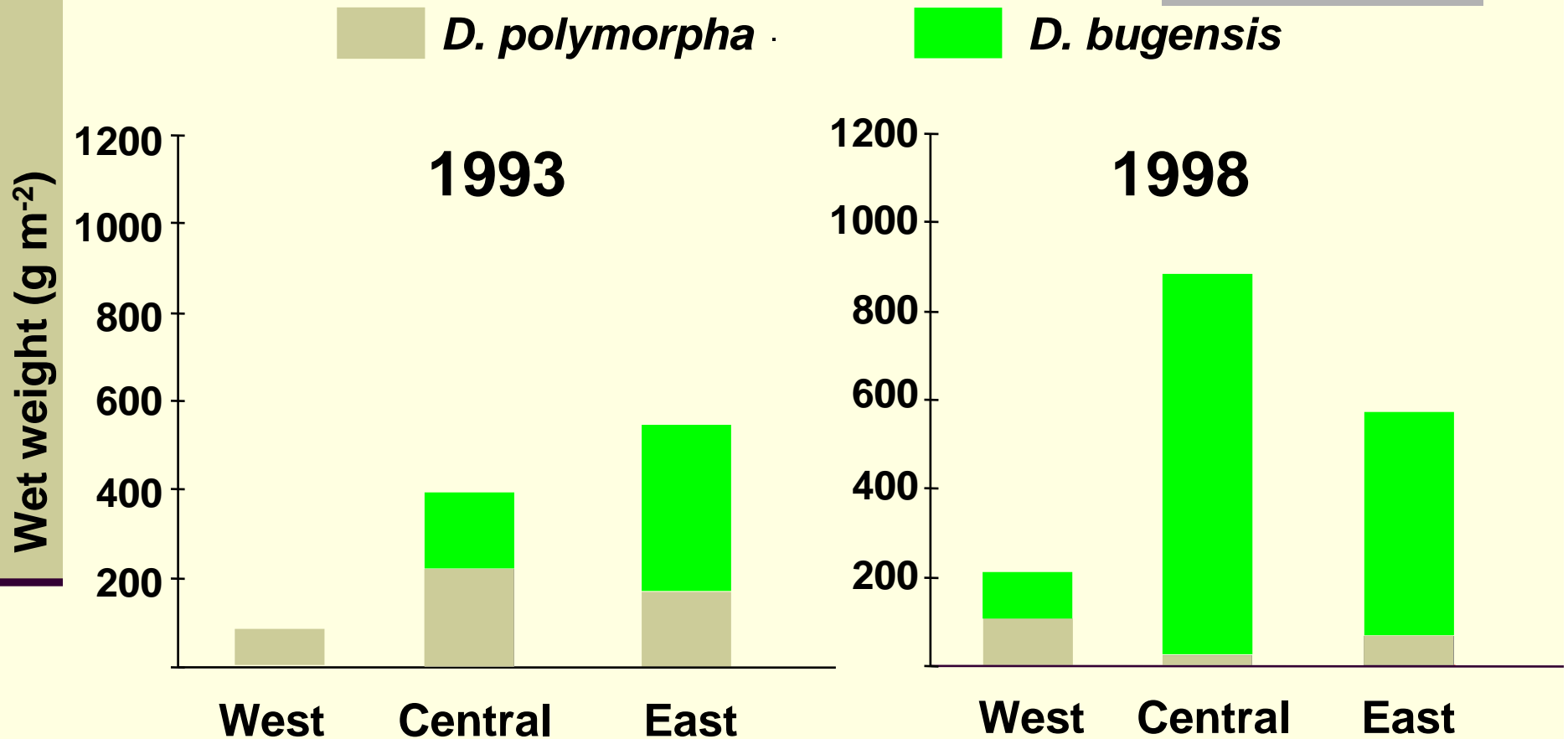
Status of the Lake Erie's Western Basin Fish Populations *Lower Trophic Levels*

- Trends in Dreissenids
- Zooplankton Biomass
- Total Phosphorus



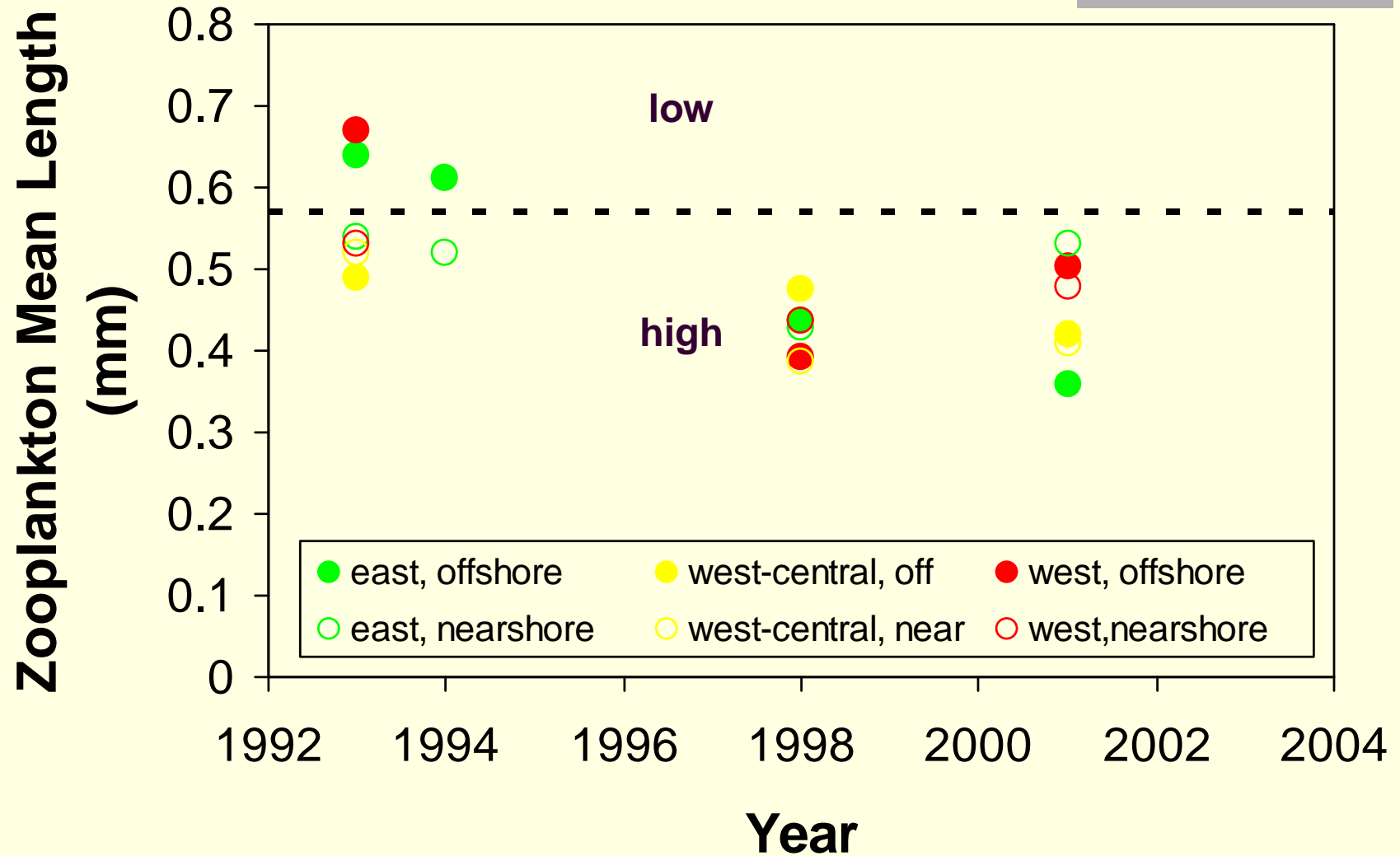


Status of the Lake Erie's Western Basin Fish Populations *Dreissena* Biomass





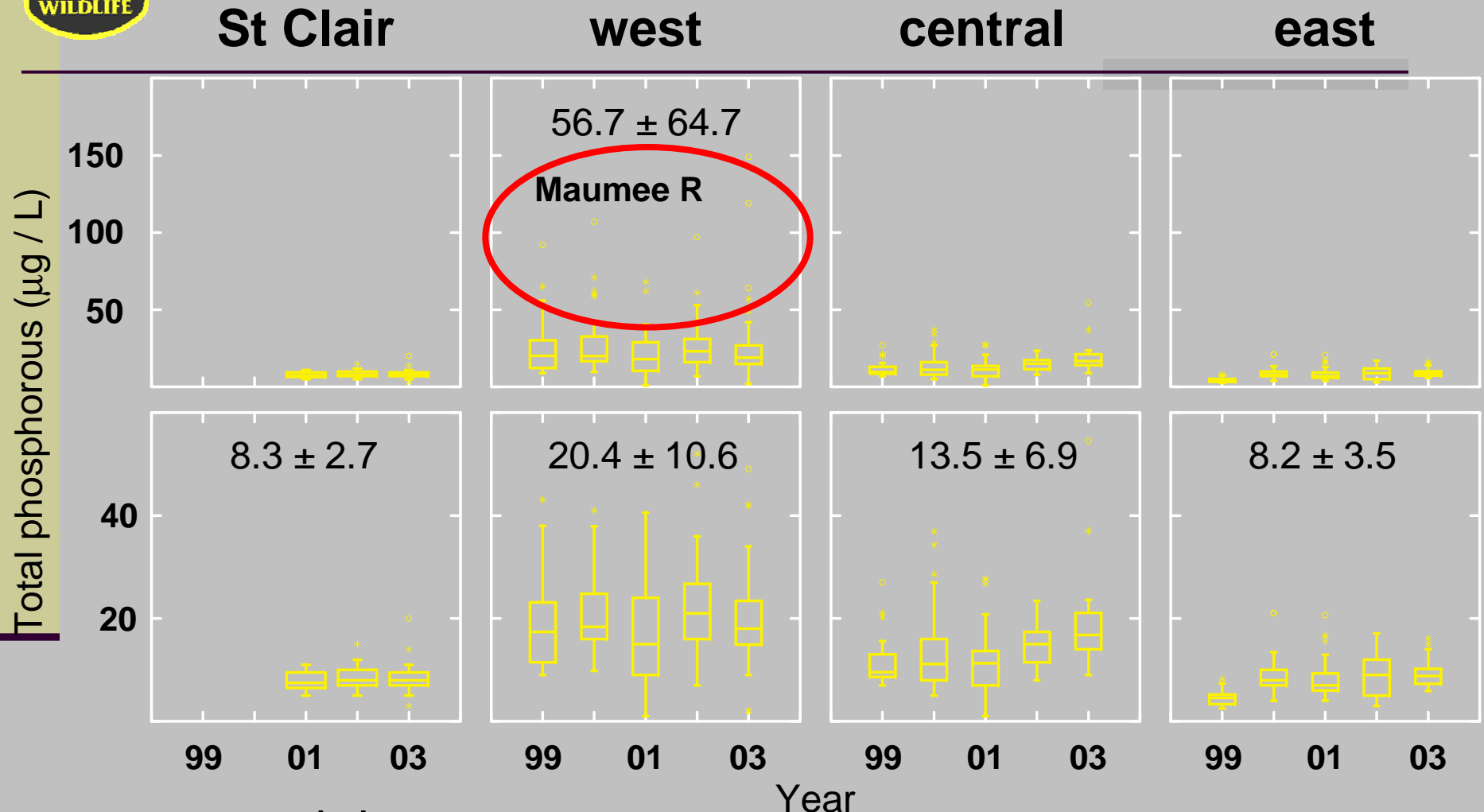
Status of the Lake Erie's Western Basin Fish Populations *Zooplanktivory*





Status of the Lake Erie's Western Basin Fish Populations

Total Phosphorus

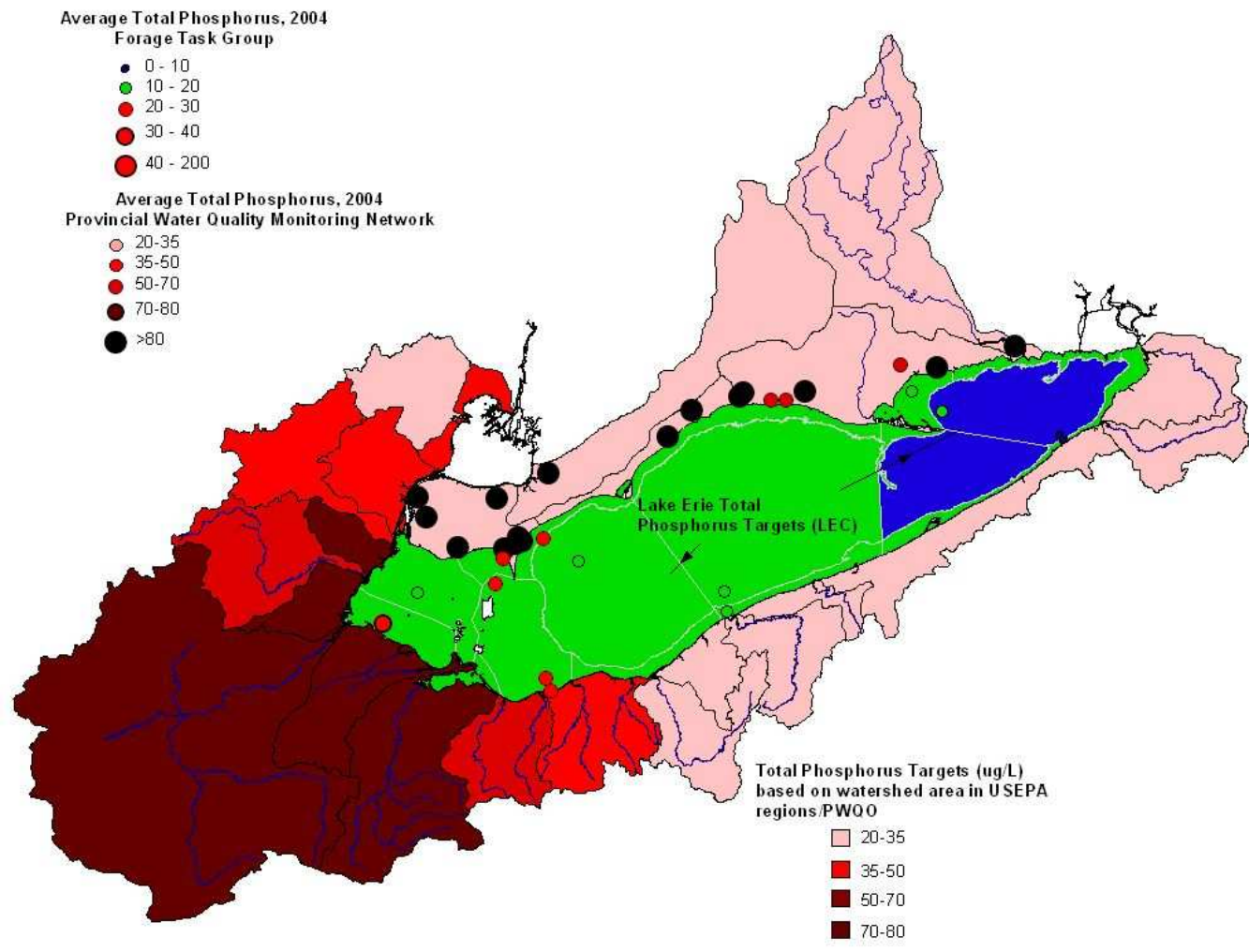


- expected decrease west to east ($F_{2,580} = 135.50, p = 0.00$)
- increasing trend with time (2001 low) ($F_{4,580} = 7.76, p = 0.00$)



Total Phosphorus

Tributary Loads and Open Water Values

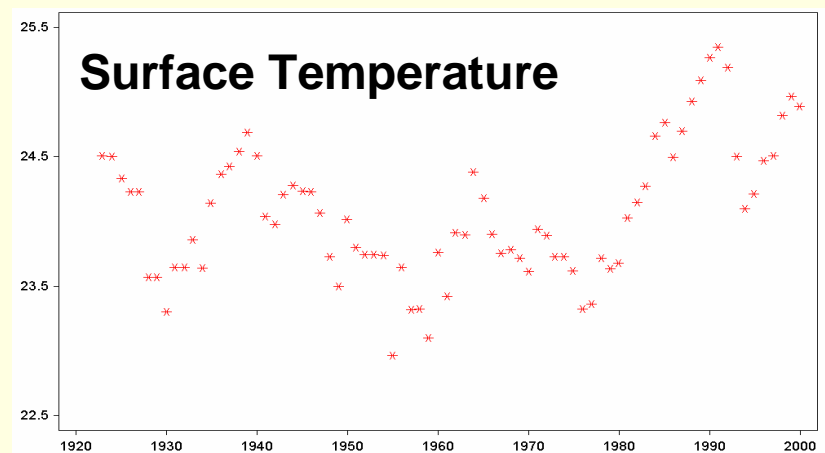
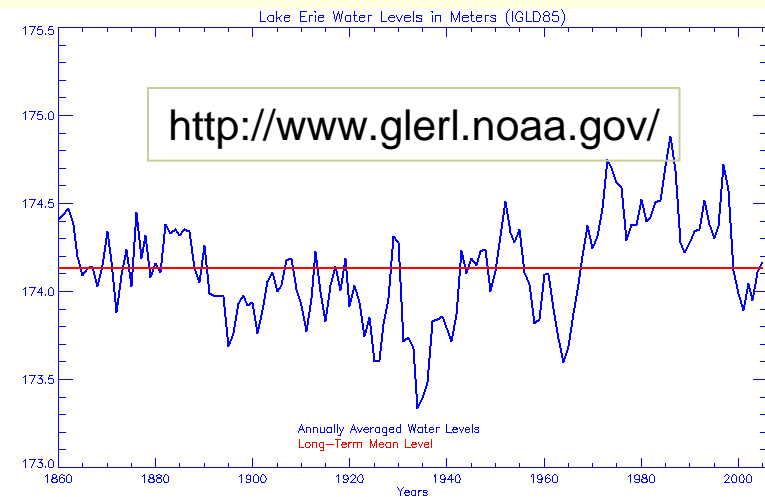


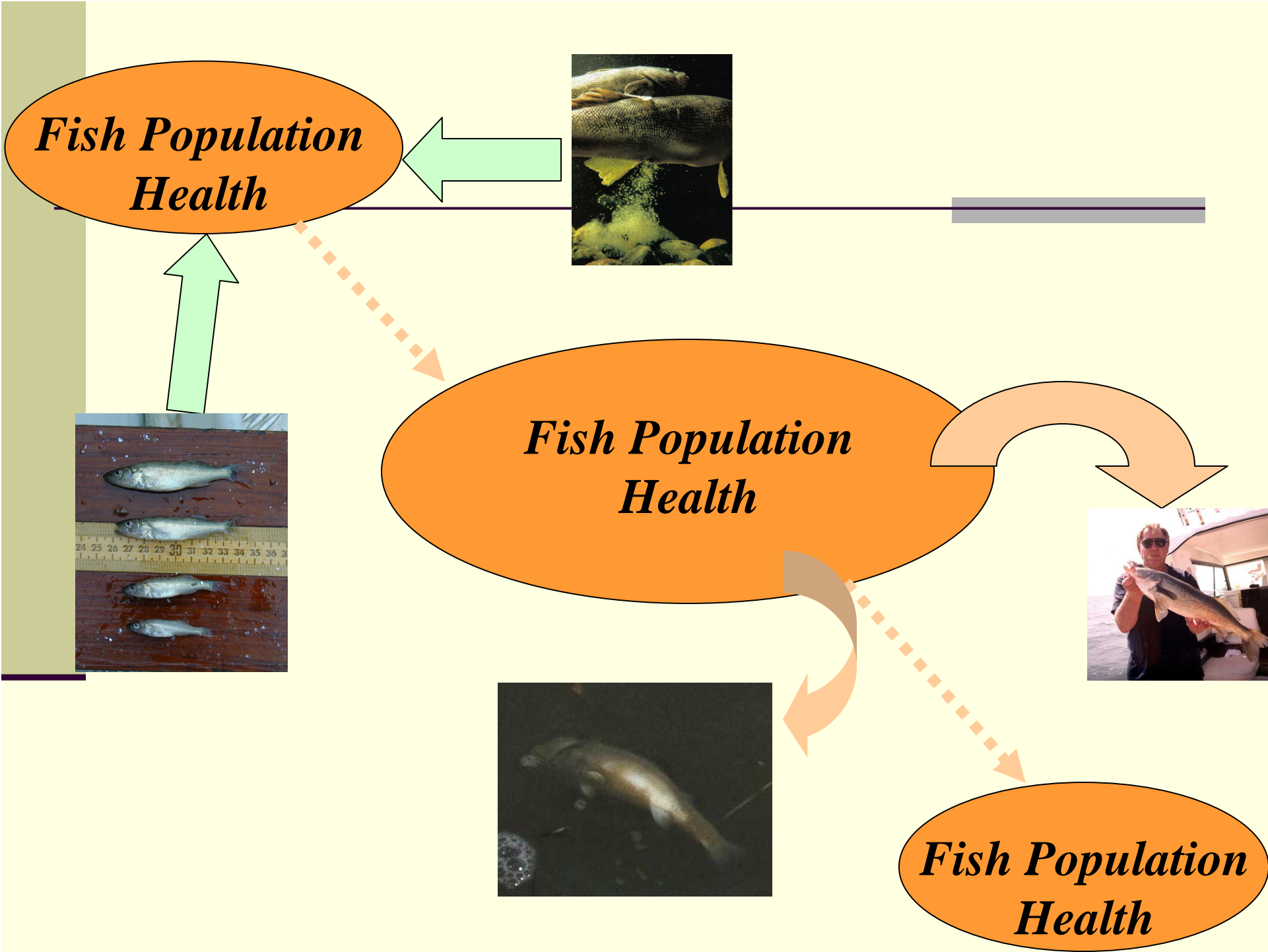


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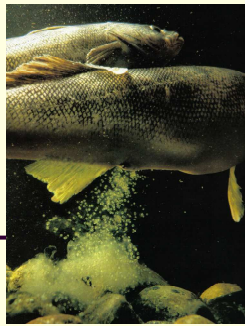
Environmental Conditions

- **Water Clarity**
 - Walleye
 - Aquatic Vegetation
- **Water quality**
 - Blue-green algal blooms
 - Dissolved oxygen
 - Dreissenids
- **Water Level Changes**
- **Climate variability/change**
- **Exotic introductions**
- **Habitat degradation**





Fish Population Health

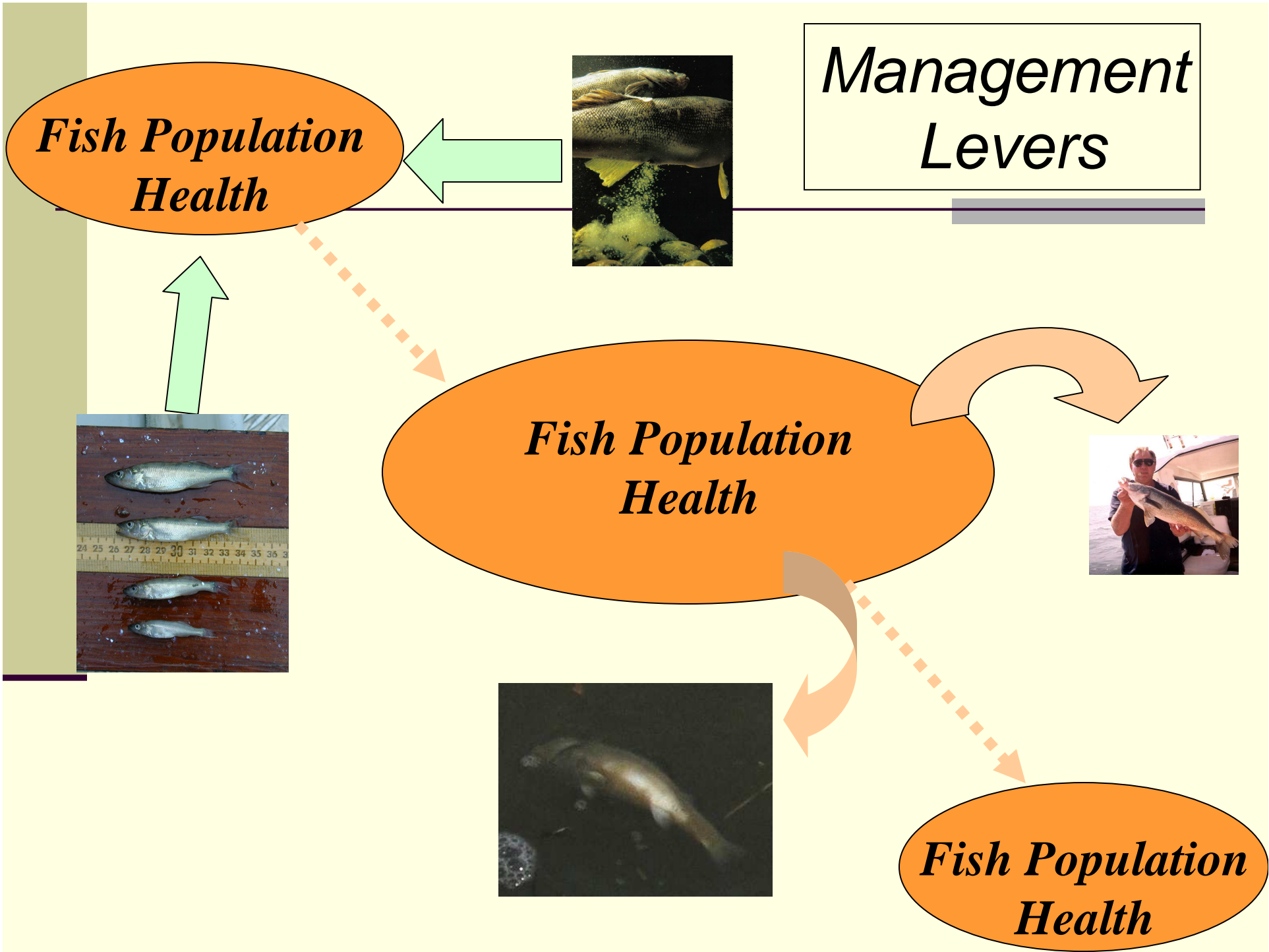


Management Levers

Fish Population Health



Fish Population Health





Management Levers - Environment





Conclusions

- Instability pervasive – predators, forage, lower trophics, habitat
- Fisheries Managers manage “at the end of the pipe”
 - Assessment
 - Exploitation (harvest) management
- Production management?



