Fish Ecology and Management Workshop

Fisheries management options
Management Options to Enhance Fishing (Lake Assn.)

• Stocking
• Artificial Structures
• Vegetation Control
• Natural shoreline
• Other considerations

* Additional mgt. tools for DNR
Fish stocking

• Can be a tool to improve fishing & fish community
• Not a panacea
• Not every lake can be (or should be) a walleye lake
Fish stocking permit

• Application available online

• Permit **required** to stock fish into Michigan Public Waters

• Ensures fish stocked are:
  – Healthy and won’t pose disease risk
  – Species is currently in the watershed, no long term management problems
  – Species is compatible with management goals
Talk to the biologist!!!!

• Tell the biologist WHY you want to stock (i.e., what’s the problem?)
• Tell the biologist WHAT you want to stock
• Know WHAT FACILITY you plan to get the fish from
• Know THE HEALTH STATUS of that facility
  – Note the expiration date of certificate

The biologist can tell you:
• Management goals for waterbody
• Is it likely to work (we’ll be honest!)
Fish Structures in Lakes: The Good and the Bad
Artificial Structure Types

• Half-log
• Benches
• Whole tree log drops
• Brush bundles
• Rock reefs
• Log Cribs
• Porcupine structures
The Givens

- DEQ permit is needed – Part 301
- USACE review may also be needed
- Structure needs to be placed so it doesn’t impede navigation
- There’s no “magic solution”!

- Natural features act as “structures” too
The Good

• Artificial Structures
  – Can concentrate fish
  – Provide cover for a variety of fish species
  – Can work in waterbodies with a relatively homogeneous bottom, lack of natural habitat, and lack of aquatic vegetation (where habitat is limiting fish production)
The Bad

• Structures concentrate fish
• May increase the amount of angler harvest
• May create unrealistic expectations
• Can be a hazard if improperly built or placed
Considerations

• What’s the goal?
• Should be designed to improve existing habitat if habitat is limiting fish production
• Where habitat is lacking, structures may be used for restoration or enhancement purposes to increase fish growth rates and spawning success
• Natural material should be used
Considerations –cont.

• Structures should be placed above the thermocline at depths of 9-18 feet and at least 3 feet below the water surface or near the shoreline
• Construction/design should reflect target species preference
Aquatic Vegetation Control – Options and Ecological Effects
Aquatic Vegetation Control

• Government roles
• Effects of aquatic plants on ecosystems and human users
• Control options
  – Pros
  – Cons
Government Roles

State Legislature
• PA 451 of 1994 – Part 33 (Aquatic Nuisance Control)

Michigan Department of Environmental Quality
• Administrative rules
• Reviews permit applications and establishes permit conditions

United States Environmental Protection Agency
• Registers herbicides

Michigan DNR – Fisheries Division
• Provides recommendations to DEQ and stakeholders regarding effects of proposed activities on fish and other aquatic organisms
• Natural resource damage assessment
Aquatic Plants - Functions

• Produce oxygen by day and use oxygen at night
• Base of food chain
  sunlight $\rightarrow$ plants $\rightarrow$ insects $\rightarrow$ fish (shoreline)
  sunlight $\rightarrow$ algae $\rightarrow$ zooplankton $\rightarrow$ fish (offshore)
• Cover for fish, frogs, and turtles
  diversity of plant types important
  milfoil better than no vegetation
  especially important for juvenile fish
Aquatic Plants - Functions

- Spawning habitat for northern pike and perch
- Erosion control
  reduce wave energy at the shoreline
  emergent plants can stabilize soil
Aquatic Plants - Drawbacks

- Summer fish kills in shallow lakes or bays with extremely dense weed growth
- Aesthetics?
- Interfere with boating and swimming
Vegetation Control Options

- Chemical
- Biological
- Mechanical
- Integrated

Wisconsin DNR
Vegetation Control

Selective

- Goal = eliminate or control **invasive** species
- Methods:
  - selective herbicides
    - (e.g., 2,4-D)
  - milfoil weevils
  - hand pulling
Vegetation Control
Non-selective
• Goal = eliminate or control all types of vegetation
• Methods:
  broad spectrum herbicides
  bottom barriers
  mechanical harvesting or raking
  aeration
Selective treatment options

2,4-D (Navigate®)
- Target = milfoil (native and Eurasian)
- Also kills coontail, water lilies, and some emergent plants at higher concentrations
- Used for small and large-scale treatments
- Most applicable for spot treatments (milfoil is limited to one or a few isolated patches)

Wisconsin DNR
Non-Selective treatment options

Fluridone (Sonar®)
- Target = Eurasian milfoil
- Typically is successful in reducing abundance of milfoil for 1-2 years
- Effects on fish and native plant communities vary
  - fluridone concentrations
  - species composition of plant community
  - sampling methods
- Clifford Lake example
  - Eurasian milfoil 5.6% of biomass pre-treatment
  - Plant bio-volume was severely reduced
  - Macroalgae 50% of biomass (pre) → 90% (post)
  - Significant reduction in coontail, eel grass, and thin-leaved pondweeds
Herbicides

Herbicide effects on other aquatic organisms

Short-term effects:
- fish kills (oxygen deprivation) – timing restrictions
- large-scale habitat loss
- algal blooms
- reduced abundance of milfoil weevils
- potential toxicity to other organisms
  - fluridone → water mites
  - copper → snails

Long-term effects:
- less clearly understood
- accumulation of copper in sediments
- resistance to herbicides
Herbicides

“Overall, whole-lake aquatic plant treatment is risky. Significant biological risks associated with large-scale manipulations include excessive removal of fish habitat and thus decline of fish populations, loss of sensitive plant species, declines in water clarity and potential long-term cumulative effects of multiple treatments, since eradication of non-native plant species is highly unlikely.” [Valley et al. 2004]
Mechanical

- Hand-pulling
- DASH (Diver-Assisted Suction Harvesting)
- Harvester
- Raking
Biological

- Milfoil weevil
- Others being researched/developed
Natural shorelines & Riparian Wetlands

- Includes shoreline and nearshore areas
- Provides shore protection from erosion
- Protects waterbody from excess sediment/nutrient inputs
- Provides spawning and nursery habitat for a number of fish species
- Provides habitat for reptiles/amphibians
Other considerations

• Say No to sea walls
  – Consider soft-engineering instead, or rip-rap (not angular)
  – Natural shoreline preferable

• Docks
  – Say NO to sheet pile
  – Open pile preferred
  – Cribs okay if necessary, but should have spacing between
Other considerations – cont.

• Minimize dredging
• Minimize beach sanding

• Caveat Emptor
  – Not every lake is (or should be) a Higgins Lake or <insert lake name here>
  – Appreciate your lake for what it is, try to protect and enhance it
Questions?