A stakeholder-centered approach to resolving conflict in fisheries management: Reflections on the LEPMAG process

Collaborative Modelling

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OVERVIEW

- History of percid management in Lake Erie
- Development of a stakeholder-centered approach
- Review of the LEPMAG Process
  - Walleye focus
- Updates: where we are
  - Walleye
  - Yellow Perch
- Looking forward
History of Walleye Management in Lake Erie

1970
- Harvest moratorium

1976
- International quotas introduced

2004
- Consensus among agencies over walleye harvest was reached & then breached
  - Varying degrees of contention among stakeholders & between stakeholders and managers
Development of Stakeholder-centered Approach

2005
• Walleye Management Plan

2010
• LEC initiated Lake Erie Percid Management Advisory Group (LEPMAG)
  • Stakeholders, fishery managers, agency fishery biologists, stock assessment specialists, & modelers
  • Formally incorporates information provided by stakeholders into the decision-making process
THE LEPMAG Process

- ~35 members

- Series of 14 meetings (2010 – 2014); full day discussions
  - Management objectives
  - Current assessment models
  - Potential refinements/results modeling team
  - Outside experts
  - Develop performance metrics
VISION STATEMENT

Lake Erie percid fisheries will be transparently managed using sound science & partnerships to achieve stable & sustainable harvests from shared stocks providing broad & equitable benefits for all jurisdictions.

RULES OF ENGAGEMENT
Lake Erie percid fisheries

- **Primary objectives:**
  - Minimize economic risk to commercial fishers
  - Maintain acceptable catch rates for recreational fishers
  - Minimize risk of low spawning stock abundance

- **Primary approach:**
  - Adjusting fishing rates for commercial & recreational fisheries
Management Strategy Evaluation

• Process is based on objective evaluation of the management system

• Model of entire management system

• Evaluate performance of alternative “management procedures”

• Account for uncertainties
**Management Strategy Evaluation**

- **Management procedures**
  1. Model of management action
  2. Outcome uncertainty
  3. Model of walleye population

- **Forecast of what we observe**
- **Observation uncertainty**
- **Model Uncertainty and Natural Variation**
- **Forecast of what actually happens**
**Limit**: biomass, relative to maximum, below which fishing rate should be reduced (e.g., 20, 30, 40%)

**Target**: fishing rate, relative to $F_{msy}$, when stock is not below the “limit” (e.g., 50, 75, 100%)

**Harvest control rule**
LEPMAG Harvest Policy Analysis

- Policy determines target fishing mortality
- Depends on assessed stock biomass
- Uses target & limit reference points
- Explicitly accounts for risk
Spawner Biomass

Spawner Biomass (kg, millions)

Maximum F (% of Fmsy)

F-target: 40-80% of Fmsy

P*: 0.05, 0.1, 0.3, 0.5

B-limit
Spawner Biomass

F-target: 40-80% of FMSY

B-limit

P*: .05, .3, .1, .5

20% SSB0

30% SSB0

Spawner Biomass (kg, millions)

Maximum F (% of Fmsy)
Emergent trade-offs

- \( P(\text{angler CPH} < 0.4) \)
- \( P(\text{commercial yield} < 4 \text{ million lbs}) \)

Target \( F \) as \( \% F_{\text{MSY}} \)

40
Emergent trade-offs

\[ P(\text{angler CPH} < 0.4) \]

\[ P(\text{commercial yield} < 4 \text{ million lbs}) \]

Target \( F \) as \% \( F_{MSY} \)

- 50
- 40
Emergent trade-offs

P(angler CPH < 0.4) vs P(commercial yield < 4 million lbs)

Target F as % F_{MSY}

- 60
- 40
Emergent trade-offs

\[ P(\text{angler CPH} < 0.4) \]

\[ P(\text{commercial yield} < 4 \text{ million lbs}) \]

Target F as % \( F_{MSY} \)

- 70
- 40
Emergent trade-offs

\[ P(\text{angler CPH} < 0.4) \]

\[ P(\text{commercial yield} < 4 \text{ million lbs}) \]

Target \( F \) as \( % F_{MSY} \)

\[
\begin{array}{c|c}
\text{Target F} & \text{F}_{MSY} \\
80 & 40 \\
\end{array}
\]
Emergent trade-offs

\[ P(\text{angler CPH} < 0.4) \]

\[ P(\text{commercial yield} < 4 \text{ million lbs}) \]

Target F as \( F_{MSY} \)

- 90%
- 40%
Emergent trade-offs

LEPMAG
Recommended Target F:

60% of MSY
WHERE THE PROCESS IS NOW: WALLEYE

• Based on LEPMAG recommendations:
  • Updated assessment model adopted
  • New HCR formally adopted
  • First applied during the 2014 quota-setting process for Lake Erie walleye

• 2015 Walleye Management Plan
The LEPMAG Process

- Facilitate the understanding among stakeholders of shared management goals

- Provide a forum for discussion of concerns & areas of risk for conflict

- Build trust in the fisheries management process