ATLANTIC HERRING ACCEPTABLE BIOLOGICAL CATCH CONTROL RULE MANAGEMENT STRATEGY EVALUATION

Summary of recommendations to the New England Fishery Management Council

INTRODUCTION

A Management Strategy Evaluation (MSE) approach is being used to support the development of alternatives regarding the Acceptable Biological Catch (ABC) control rule in Amendment 8 of the Atlantic Herring Fishery Management Plan - to help determine how a range of control rules may perform relative to identified objectives. An early step of this MSE was a public workshop on May 16-17, 2016 in Portland, Maine to develop recommendations to the Council for a range of potential objectives of the Atlantic herring ABC control rule, how these objectives may be evaluated (i.e., associated performance metrics), and the range of control rules that would undergo simulation testing. Outcomes were then reviewed by the Atlantic Herring Plan Development Team, Advisory Panel, and Committee. This document briefly summarizes the workshop outcomes and subsequent input, focusing on the fishery objectives, performance metrics, and control rule characteristics that can be evaluated in the current, first iteration of the MSE ï with current data and modeling capacity. Refer to meeting summaries for details.

WORKSHOP OUTCOMES

The workshop developed a list of fishery objectives and associated performance metrics. Table 1 lists those that could most clearly be met with an ABC control rule and evaluated by the current MSE. The workshop also identified features of control rules that should be tested in the simulation work (Table 2). Generally, participants felt that herring catch or fishing mortality rate (F) should respond to herring biomass changes. Upper and lower bounds should be considered, the value of which could be driven by several things: amount for forage, amount for uncertainty, amount for climate change effects, etc. The justification for any threshold value should be clear. In addition to the current three-year catch setting process, participants would like one- and five-year processes evaluated.

HERRING PDT INPUT

ÅNo specific changes were recommended; workshop outcomes relevant to the current MSE were fairly thorough, straightforward and well-developed.

ÅIt may not be possible to directly include some of the performance metrics, but proxies can be used that address the intent. For example, ñmaintain B_{MSY} at four times natural mortality (M)ò - B_{MSY} has an absolute scale and natural mortality is a rate. The likely intent is to maintain biomass at some level that is greater than B_{MSY} (i.e., the B_{MSY} that would be produced by assuming four times M). Another proxy could be the frequency of years where biomass is less than some threshold.

ÅMeasuring when ñCommon tern productivity of 0.8ò can be maintained will be difficult. A subsequent letter to the Council indicated that this may not be the best performance metric to use for common tern. The amount of age 1 herring can be simulated, as well as the reproductive capacity of birds generally. The ability to define how a predator responds (reproductive success, growth, migration) to herring abundance is a large uncertainty. The MSE can and should test scenarios where predators are insensitive as well as highly sensitive to herring abundance and determine if there are control rules that are robust under either scenario.

Å Analyzing the status quo control rule is within the scope of the workshop recommendations. Under status quo, a rebuilding plan is required when biomass falls below ½ B_{MSY}. The plan would include an F that would rebuild the stock within 10 years. Determining this F (i.e., $F_{rebuild}$) requires projections, which is very difficult to build into simulations and probably not possible in the current MSE. However, a close proxy can be analyzed.

HERRING ADVISORY PANEL INPUT

Å No specific changes were recommended. Some AP members did not support certain recommendations, but the AP supported evaluation of the full range of concepts.

HERRING COMMITTEE INPUT

Å No specific changes were recommended.

Table 1 - Objectives and associated performance metrics recommended by workshop participants that can be met with an ABC control rule and evaluated by the current MSE

Objective		Performance Metric
Fundamental	Means	
• Maintain sufficient herring population for forage needs • Prevent overfishing of herring	• Ensure that catch limits allow sufficient herring for predators	• % years herring SSB > B_{MSY} • % years herring SSB < ½ B_{MSY} • % years herring SSB is 30-75% of B_0 • B_{target} > B_{MSY} • Are predators at their ~B_{MSY} when not overfished? • Weight/length or fat content of predator groups (birds, tuna, whales, demersal fish) and herring • Degree of herring surplus production • Maintain B_{MSY} at 4x natural mortality
• Maximize yield for herring fleet • Maximize profit for herring fleet	• Achieve Maximum Sustainable Yield or Optimum Yield	• F relative to F_{ref} • Proportion of years ABC > the catch associated with F_{MSY} • Average annual catch • Minimum number of years fishery closes • Revenue or cost over time • Profit per ton or unit effort
• Ensure herring catch temporal stability	• Limit annual variation in quota	• Fluctuations in catch from one time step to the next
• Maintain a herring population with normal size/age structure	• Ensure appropriate fishing selectivity/ intensity	• Herring age structure • Common tern productivity of 0.8[a]
• Maintain predator abundance/ condition	• Ensure that catch limits allow sufficient herring for predators • Establish a forage set-aside	• Abundance or condition of some generic herring predators

Notes:
[a] Productivity measured as the number of chicks per nest that survive to fledge. Common terns are present throughout the range of herring, and their chicks eat <10 cm herring. A May 27, 2016 letter to the Council from the U.S. Fish and Wildlife Service indicated that a productivity of 0.8 might not actually be the best indicator.

Table 2 - Characteristics of control rules that workshop participants would like to be evaluated

- Explore a broad range of control rule shapes in terms of how catch or F respond to biomass. Examples include:
  - Set-aside (as unfished) 30% of herring biomass as forage for birds and other predators
  - Reduce catch (F) beginning at 75% of the unfished SSB
  - Close the fishery (catch = 0) when SSB is at or below 40% of the unfished SSB
  - Do not close the fishery.
  - Use B_{MSY} and B_0 as references in control rule and metrics
- Evaluate effect of setting catch annually, versus using the same catch for three or five years.
- Maintain a constant catch at "high biomass" but cap mortality at some point as biomass declines (in control rule literature this is called conditional constant catch).
- Restrict the degree to which catch can change annually.
- Consider including a specific forage buffer within scientific uncertainty (ABC=OFL-forage need), however, the forage need is uncertain.
- Explore constant catch (in perpetuity).
- Identify minimum and max catch amounts at low and high biomass respectively.