Desired Outcomes for Atlantic Salmon Nearshore Workshops

1) Testable hypotheses to advance our understanding of current low marine survival of Atlantic salmon.
2) Management prescriptions to increase marine survival that can be tested at a population scale

The Challenge: Present-day Atlantic salmon losses at sea are higher than documented prior to 1990 but scientists and managers are often overwhelmed at the scale of the issue and all the unknowns. This is confounded by the small biomass of salmon in a large ecosystem – needle in a haystack.

Overall Approach: The NOAA Northeast Salmon Team is committed to hypothesis driven research and adaptive management investigations to find mechanisms to 1) understand the factors controlling marine survival and 2) increase marine survival.

Starting Point: Many "priority lists" have been generated in recent years and these will serve as a starting point for this process. A summary of the leading hypotheses is provided in the Excel Spreadsheet entitled "ATS Hypotheses.xls." These were generated from a variety of reports (Cairns 2001, NRC 2004, NMFS and USFWS 2005, Fay et al. 2006, and SEI 2007). The full list of hypotheses is presented in the 1st sheet entitled "all hypotheses." This is a relatively inclusive list of the top "problems with salmon" today. However, the purpose of this process is narrower – the marine phase of the life cycle. As such, we have restricted the starting list to the marine environment in the 2nd sheet entitled "marine hypotheses." They are not meant to limit creativity, only to provide focus to the steering committee and workshop participants based on the collective knowledge of salmon biologists across the North Atlantic.

The challenge is to move beyond list generation and develop testable hypotheses and management prescriptions to guide our future restoration efforts. A hypothetical example is given below.

Example: *From list generation to testable hypotheses* (we purposefully picked a topic that is currently being worked on)

Hypothesis: Abundant runs of river herring reduce predation risks to migrating smolts/postsmolts in lower river and estuarine areas.

a. Background – Historically, Maine Atlantic salmon shared the rivers and estuaries with at least 10 other species of diadromous fish; several species were orders of magnitude more abundant than they are today. River herring (alewife and blueback herring), in particular, were extremely abundant in many watersheds. Today however, most diadromous stocks are at or near historic lows in abundance and river herring are listed as a species of concern by NMFS. With similar body size, numbers that exceeded salmon smolt populations by an order of magnitude (Smith 1898) and a higher caloric content per individual (Schulze 1996), river

herring were likely an alternative prey resource (i.e., prey buffer) that reduced predation on salmon smolts from native predators within shared migratory corridors (Mather 1998, USASAC 2004).

b. Research Activities
    a. Evaluate predation risks in estuaries with and without abundant alewife runs
        i. Use ultrasonic telemetry to evaluate smolt survival in two nearby rivers – one with and one without abundant river herring spawners;
        ii. Use visual implant elastomer tags to evaluate smolt to adult return rates in two nearby rivers – one with and one without river herring spawners.
c. Management Activities
    a. Support local efforts to enhance river herring runs in and around salmon rivers.
        i. Enhance fish passage into lakes that are proximal to Atlantic salmon rearing habitat and where support for river herring restoration exists.
        ii. Stock alewives into lakes that are proximal to Atlantic salmon rearing habitat and where sufficient fish passage exists.
        iii. Stock blueback herring into river reaches that are proximal to Atlantic salmon rearing habitat and where sufficient fish passage exists.
    b. Use adaptive management to evaluate and adjust management strategies above.

References:

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Schulze, M. B. 1996. Using a field survey to assess potential temporal and spatial overlap between piscivores and their prey, and a bioenergetics model to examine potential consumption of prey, especially juvenile anadromous fish, in the Connecticut River estuary. M.S. Thesis. University of Massachusetts. Amherst, MA. 133 pp.

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