Eulachon: State of the Science and Science-to-Policy Forum

ANCHOR QEA

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August 21, 2015

Identifying Uncertainty – Sources of Information

- Today's presentations
- Scientific findings
- Status Reviews (Biological Opinion)
- Recovery planning
- Council's F & WL Program

Key takeaways from today's presentations

- I covered these in the discussion after lunch.

Moody and Pritcher 2010 (UBC)

- Key Ho for decline
  - Land use practices
  - Pollution (Pichard and Marmorek 2007)
  - Dredging
  - Shoreline development and flow management
  - By catch in fisheries
  - Climate change
  - Marine food, ocean productivity
  - Increased competition and predation

Moody and Pritcher 2010 (UBC)

- Columbia River analyses – correlation factors
  - Shrimp catch (-) $r^2 = 0.28 – 0.45$
  - Hake catch (-) $r^2 = 0.17 – 0.20$
  - Sea lion abundance (-) $r^2 = 0.33 – 0.36$
  - Hake biomass (+) $r^2 = 0.37 – 0.46$
  - Climate indices – found no correlation

Status Review - Qualitative Ranking of Columbia River Threats (BRT mean score)

- Major threats
  - Climate change impacts on ocean conditions (4.3)
  - Eulachon by-catch in fisheries (3.8)
  - Climate change impacts on freshwater habitats (3.4)
  - Dams/water diversions (3.3)
- Minor threats
  - Water quality (3.0)
  - Dredging (2.9)
  - Predation (2.9)

Biological Opinion

- Uncertainties
  - Eulachon larvae in the estuary-plume environment depend on phytoplankton abundance – how is this affected by FCRPS operations?
  - Because of population structure, populations may be vulnerable to environmental catastrophe and year-class failure, such as poor ocean conditions (e.g., El Nino)
  - What are the effects of quantity and timing of instream flows on critical habitat?

Draft List of Critical Uncertainties in NPCC F & WL Program Draft Research Plan

	Research question or critical uncertainty
1	What are the life history characteristics of eulachon, and what actions could be aimed at rebuilding eulachon populations? Monitor eulachon returns through a combination of scientific test sampling of adults, and early life history (larval and egg) investigations; support actions aimed at rebuilding those populations towards desired and historic levels.
2	Monitor and evaluate the causal mechanisms and migration/behavior characteristics affecting survival of larval eulachon during their first weeks in the Columbia River estuary, plume, and ocean environments.
3	What is the ecological importance of the tidal freshwater, estuary, plume, and nearshore ocean environments to the viability and recovery of the Columbia River subpopulation of eulachon?
4	Develop an oceanographic indicators ecosystem conditions model to determine the significance of plume and nearshore ocean conditions that affect eulachon survival.
5	How are climate change, ocean acidification, salinity, estuary turbidity maximum (ETM), and localized hypoxia likely to affect forage fish in the coming decades?
6	How do changes in the Columbia River hydrograph effect survival, productivity and recovery potential of eulachon?
7	How do restoration projects in the estuary contribute to reproductive success and rearing of forage fish?
8	What role do forage fish have in survival of juvenile Chinook salmon, coho, and steelhead, such as by providing alternative prey to avian predators and sea lions?

Summary – common themes for uncertainties

- Climate change and ocean conditions
  - Eulachon abundance is highly variable
    - Acute responses to ocean productivity
  - Eulachon are not commercially harvested
    - Little evaluation of ecological drivers of productivity
  - Columbia River – data collected linking salmonid growth and survival to ocean conditions and plume characteristics is a logical starting point for data analysis
  - If productivity appears linked to ocean conditions, why did Moody and Pritcher (2010) find no correlation with ocean climate indices? Do we have the right metrics for assessing Eulachon?

Summary – themes and uncertainties

- Freshwater productivity
  - Overall – general lack of juvenile data
  - Potential effects of climate change?
    - Water temperature, altered hydrograph, low flow
  - Is existing habitat limiting spawning/rearing?
  - To what extent have dams (Columbia, Cowlitz, Sandy) constrained distribution and access to key habitats?
  - FCRPS flow regulation and effect on plume size and productivity?

Summary – themes and uncertainties

- By-catch
  - Recent reduction methods appear to be working
    - Excluder devices and LED lights
    - How confident are we in this conclusion?
    - Is more monitoring needed?
- Predation and competition
  - Hake
  - Pinnipeds

Closing remarks:

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Robert Anderson

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