The Fish Habitat Decision Support Tool: An Example of How Managers and Scientists can Partner to Conserve Fish Habitat in Atlantic Estuaries

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A Quick Background...

National Fish Habitat Action Plan developed in 2001
Attempts to address loss & degradation of fish habitat
20 regional partnerships under national umbrella
Atlantic Coastal Fish Habitat Partnership

Mission

To accelerate the conservation, protection, restoration, and enhancement of habitat for native Atlantic coastal, estuarine-dependent, and diadromous fishes through partnerships between federal, tribal, state, local, and other entities.
A Quick Background...

Atlantic Coastal Fish Habitat Partnership

**Mission**
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**Vision**
Healthy, thriving habitats of sufficient quantity and quality to support all life stages of Atlantic coastal, estuarine-dependent, and diadromous fishes.
To Be Considered a Fish Habitat Partnership

“Must have the capability for scientific assessment.

• Organizations involved in each FHP will have capabilities to measure and demonstrate progress using science-based resource assessment, project evaluation, and reporting of outcomes in coordination with the Board.

• FHPs will adopt the national science assessment framework established by the Board’s Science and Data Committee for resource assessment and project evaluation...”

- Fish Habitat Partnerships Policies and Guidance, 2008
A Quick Background...

**Objective 4**

Fill gaps in the National Fish Habitat Assessment and its associated database to empower strategic conservation action supported by broadly available scientific information, and integrate socio-economic data in the analysis to improve people’s lives in a manner consistent with fish habitat conservation goals.
A Quick Background...

Science and Data Objective 2
Work to achieve ACFHP Science and Data Needs and fulfill science and data responsibilities established by NFHAP.
Development

Goal
Develop Decision Support Tool to assess aquatic habitats and threats in North Atlantic watersheds and estuaries – help prioritize areas for protection and restoration.

2013

North Atlantic LCC
North Atlantic Landscape Conservation Cooperative

Downstream Strategies
building capacity for sustainability

Atlantic Coastal Fish Habitat Partnership

West Virginia University
Development

Review Team

**Federal & State**
- Kristan Blackhart, NOAA
- Julie Devers, USFWS
- Moe Nelson, NOAA
- Scott Schwenk, NALCC
- David Stevenson, NOAA
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- Eric Schneider, RIDEM
- Dawn McReynolds, NYDEC
- Penny Howell, CTDEEP

**NGO, Consultants, Partnerships**
- Emily Greene, ACFHP
- Lisa Havel, ACFHP
- Michael Scherer, Normandeau Assoc.
- George Schuler, TNC
- Caroly Shumway, MRWC
**Winter flounder**

*Pseudopleuronectes americanus*

- Well-studied – lots of data
- Recreationally- and commercially-important
- NOAA Essential Fish Habitat Source Document
- Managed by Atlantic States Marine Fisheries Commission
- Species is closely associated with the benthos
- Adults move inshore during winter and early spring to spawn
- Migration out of estuaries triggered by 15°C or food availability
- Newly hatched in estuaries up to 1 year, inhabit shallow areas
Development

- Created a working methodology using boosted regression trees
- Based on the inland modeling effort
- Several iterations of stakeholder input and research
- Consisted of 1 km$^2$ hexagonal grids
- Each grid had unique identifier
- Predictor and response variable values were assigned to each discrete hexagon
Narragansett Bay

- 380 km² estuary
- Massachusetts & Rhode Island
- Data-rich: winter flounder
- Seine-only
- YOY
- Hexagons bordering shore
- 2001-2013
Development

Predictor Variables

- Depth/bathymetry (NOAA)
- Eelgrass/SAV (URI)
- Habitat type (RIDEM)
- Hardened shoreline (RIDEM)
- Imperv. Surfaces (NLCD)
- NPDES outfalls (RIDEM)
- Nutrient levels (NOAA)
- Salinity zones (NOAA)
- Substrate comp. (Brown & TNC)

Relative Influence

- Salinity zone (24.7)
- Percent beach (18.3)
- Percent salt marsh (17.7)
- Mean total P (12.7)
- Dist. To NPDES outfall (9.8)
- Mean water depth (7.2)
- Dist. to deep water (6.0)
- Dist. to hardened shoreline (2.0)
- Percent sand (1.7)
Predicted YOY winter flounder abundance
Long Island Sound

- 3,367 km² estuary
- Connecticut & New York
- Data-rich: winter flounder
- Trawl-only
- All samples
- All hexagons
- April and May 2001-2013
Development

Predictor Variables

- Min. depth (NOAA)
- Max. depth (NOAA)
- Mean depth (NOAA)
- Mean bottom temp. (NECOFS)
- Mean bottom salinity (NECOFS)
- Mean chlorophyll-a (TNC)
- Dist. to marsh (TNC)
- Percent gravel (TNC)
- Percent sand (TNC)
- Percent silt and mud (TNC)
- Percent depression (TNC)
- Percent low slope (TNC)
- Percent steep bottom (TNC)
- Percent mid flat (TNC)
- Percent side slope (TNC)
- Percent high flat (TNC)
- Percent high slope (TNC)
- Percent erosion sed. (USGS)
- Percent sorting sed. (USGS)
- Percent deposition sed. (USGS)
- Percent transport sed. (USGS)
- Mean imperv. surface (NLCD)
Development

Relative Influence

Mean spring salinity (37.2)
Max. depth (32.8)
Mean spring temp. (14.1)
Percent high flat bottom (5.0)
Percent sand (4.0)
Percent low slope (3.0)
Mean imperv. surface within 2 km (2.1)
Percent gravel (1.7)
Predicted winter flounder abundance for LIS
Lessons Learned

• Utilizing habitat data to predict density is feasible
• Majority of findings corroborated by prev. research
• Biggest limiting factor: data availability & time to acquire datasets
• Engaging a broad team is essential for efficiency
• Careful consideration of data availability and structure is critical for comparisons and extrapolations.
• 1 km$^2$ hexagon was a suitable size.
Lessons Learned

• Best to incorporate one sampling method.
• Water quality data most difficult to acquire.
• Important benefit of this study is the web-based decision support tool.
  o Visualize and download data
  o Model outputs and evaluate priorities based on user-defined ranking criteria
The Decision Support Tool

www.fishhabitattool.org
The Decision Support Tool

Reference layers
The Decision Support Tool

Visualization Tool
The Decision Support Tool

Ranking Tool
The Decision Support Tool

Ranking Tool
Contact Information

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Questions?

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