Spatially explicit operational fisheries in New England

Sean Lucey
and
Mike Fogarty
• Northeast U.S. rich tradition of commercial fishing
• Currently managed in a single species/stock context
• Despite legal mandates and precautionary science, many species continue to be overfished
Ecosystem Based Fisheries Management

- More holistic
- Humans as part of the ecosystem
- Place based rather than stock based
Goals

• Identify operational fisheries (i.e., species composition and where the commercial fishermen are catching the fish)
• See how current fishing habits align with proposed management units
Identify operational fisheries

- Vessel Trip Reports (VTR)
  - Principal ports located in New England
  - 2004-2008
- Segregated trips
  - Gear type
  - Vessel Size
Gear Types

- Otter Trawl
- Dredge
- Gillnet
- Pot
- Longline
- Seine
Vessel Size

- **Small**
  - $\leq 150$ Gross Register Tonnage
- **Large**
  - $>150$ Gross Register Tonnage

http://www.dimensionsguide.com/fishing-vessel-sizes/
Species Composition

- Species summed
  - Ten minute lat/lon
  - Quarter year
- Weights converted to percentages
  - Arc sine square root transformed
K-mean cluster analysis

- Start with random seed
- Assigns each unit to nearest seed
- Re-evaluates centers
  - Minimizes the total error sum of squares

Courtesy of Wikipedia/k means
Determine the number of clusters

- Scree Plot
- Pseudo-F
### Tonnage Class

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**Contribution Size**

- Small (Light Blue)
- Medium (Light Blue with Border)
- Large (Dark Blue)
Pot Fisheries

Species

American Lobster
Jonah Crab
Rock Crab
Red Crab
Blue Crab
Channeled Whelk
Hagfish
Black Sea Bass
Scup
Pot Fisheries

April-June

July-September
Seine Fisheries
Conclusions

- VTR data complex
- Actual extent on operational fisheries could be masked by more dominate fisheries
- Some fisheries could be considered sub-fisheries of a larger cluster
Conclusions Continued

• Success of EBFM will be in the involvement and buy-in of stakeholders
• Reflect current fishing practices
• Simplify regulations
Finally

- Operational fisheries match well with management units determined by oceanographic/biological properties
- Borders need to be treated as fluid and be periodically reassessed
- Should simply fishery management plans
Questions?