

Spatially explicit operational fisheries in New England

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Photo courtesy of NOAA NMFS

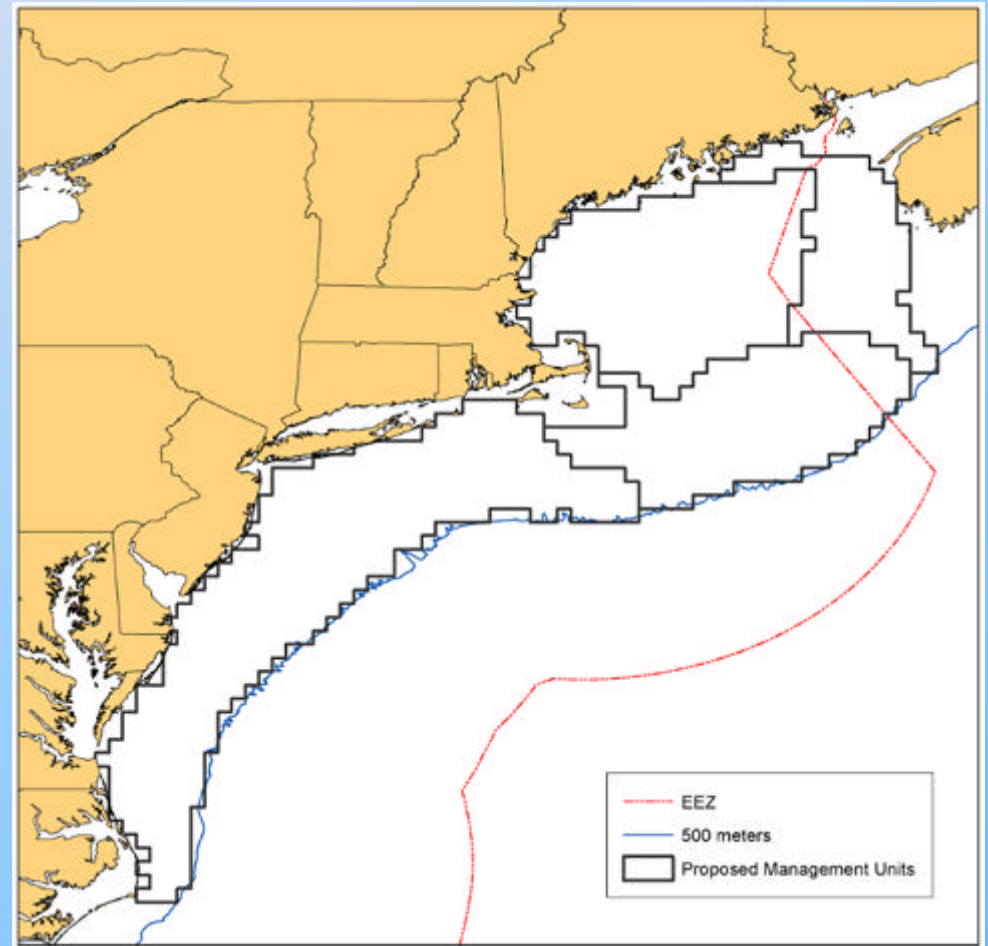
- Northeast U.S. rich tradition of commercial fishing
- Currently managed in a single species/stock context
- Despite legal mandates and precautionary science, many species continue to be overfished



Photo by Daniel Orchard – New York Times.com

Ecosystem Based Fisheries Management

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



Goals

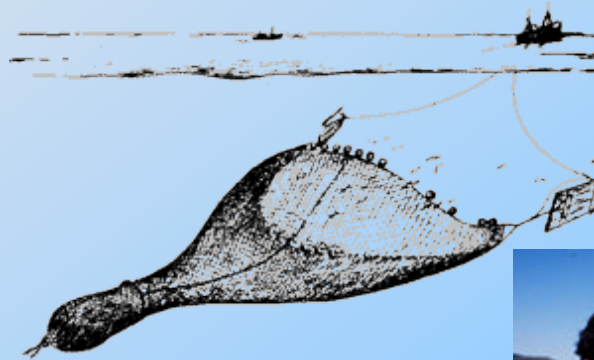
- Identify operational fisheries (i.e., species composition and where the commercial fishermen are catching the fish)
- See how current fishing habits align with proposed management units

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



<http://www.sterlingnets.com/trawls.html>



<http://champneyswestheritage.blogspot.com/2009/01/salmon-cove-west-history-of-salmon-cove.html>



<http://laterallineco.com/blog/category/fish-conservation/page/4/>

Vessel Size

- Small
 - ≤ 150 Gross Register Tonnage
- Large
 - > 150 Gross Register Tonnage



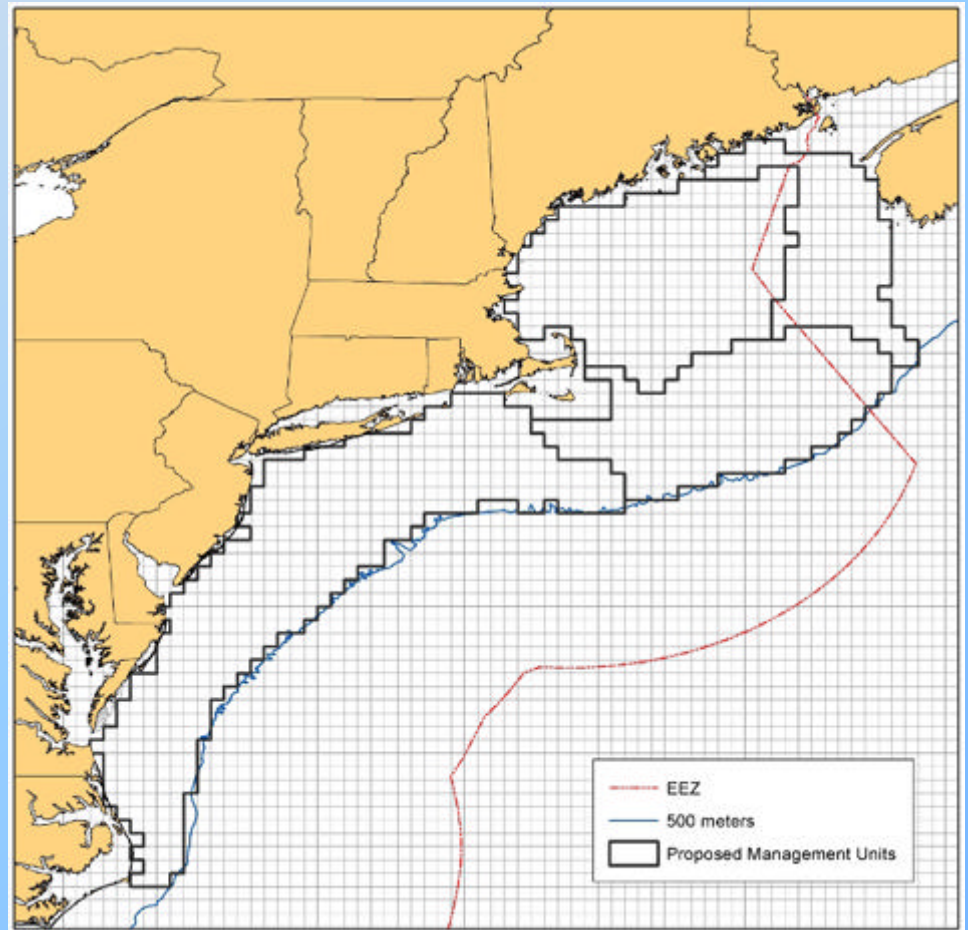
<http://www.dimensionsguide.com/fishing-vessel-sizes/>



<http://shootingmyuniverse.blogspot.com/2009/04/forgotten-photo-friday-three-gloucester.html>

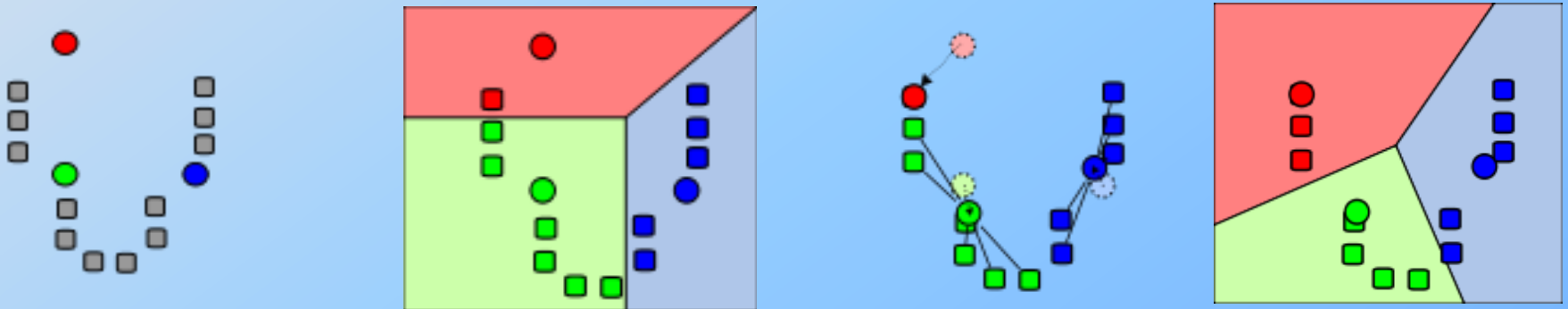
Species Composition

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



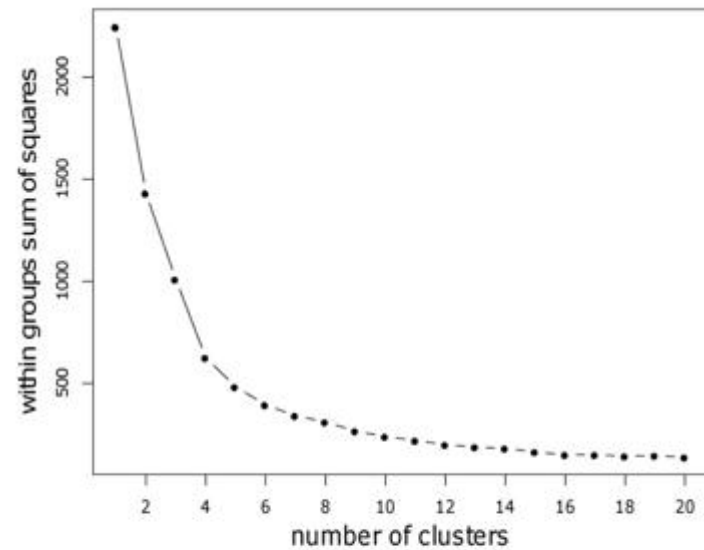
K-mean cluster analysis

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

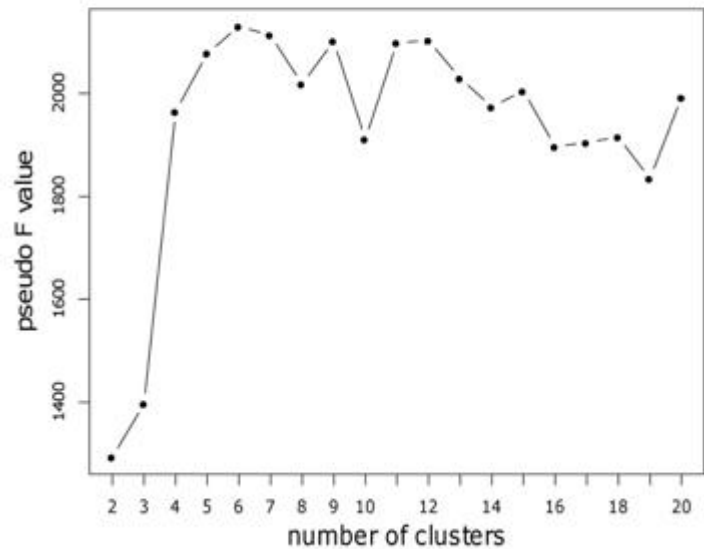


Courtesy of Wikipedia/k means

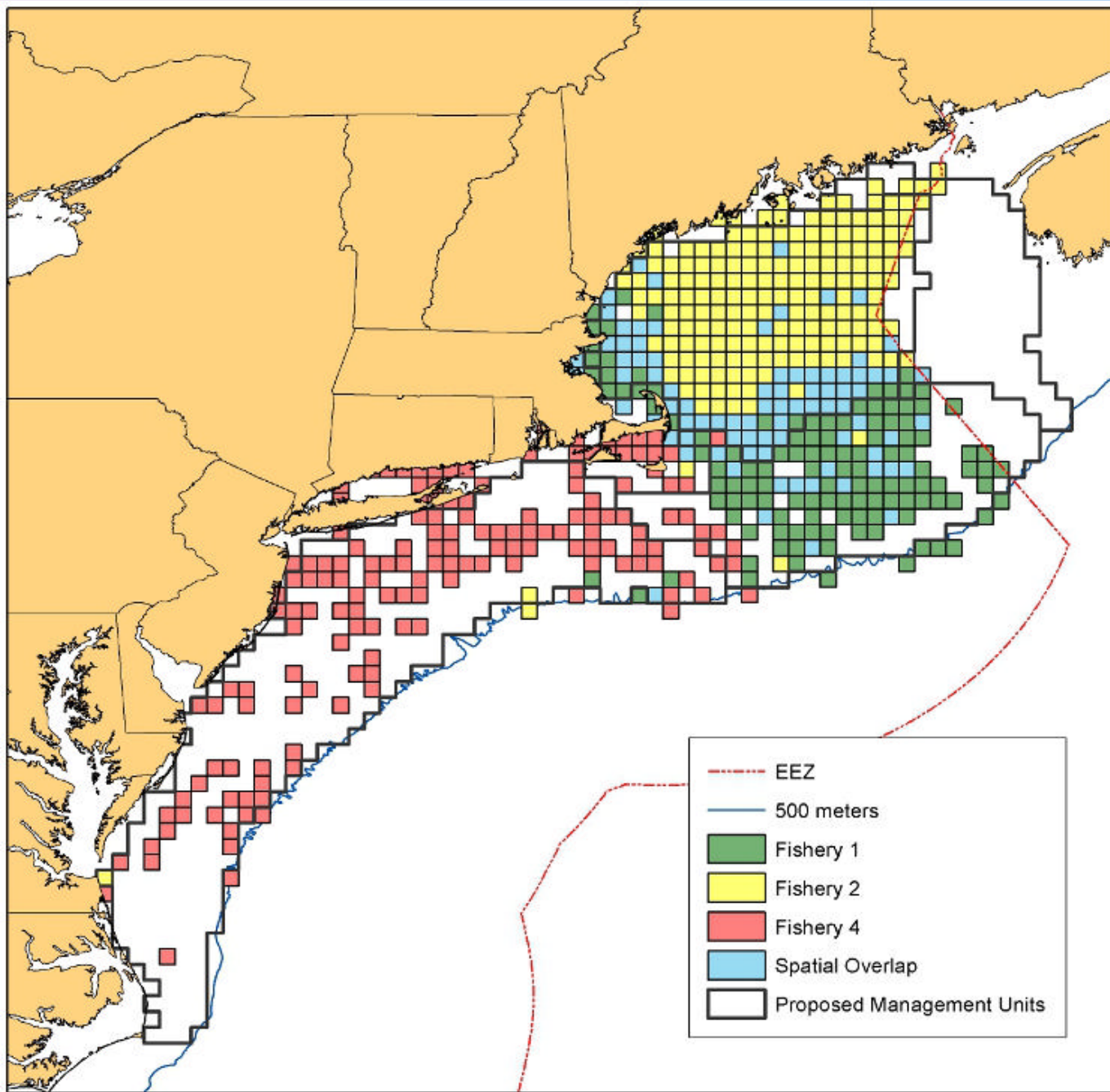
Determine the number of clusters

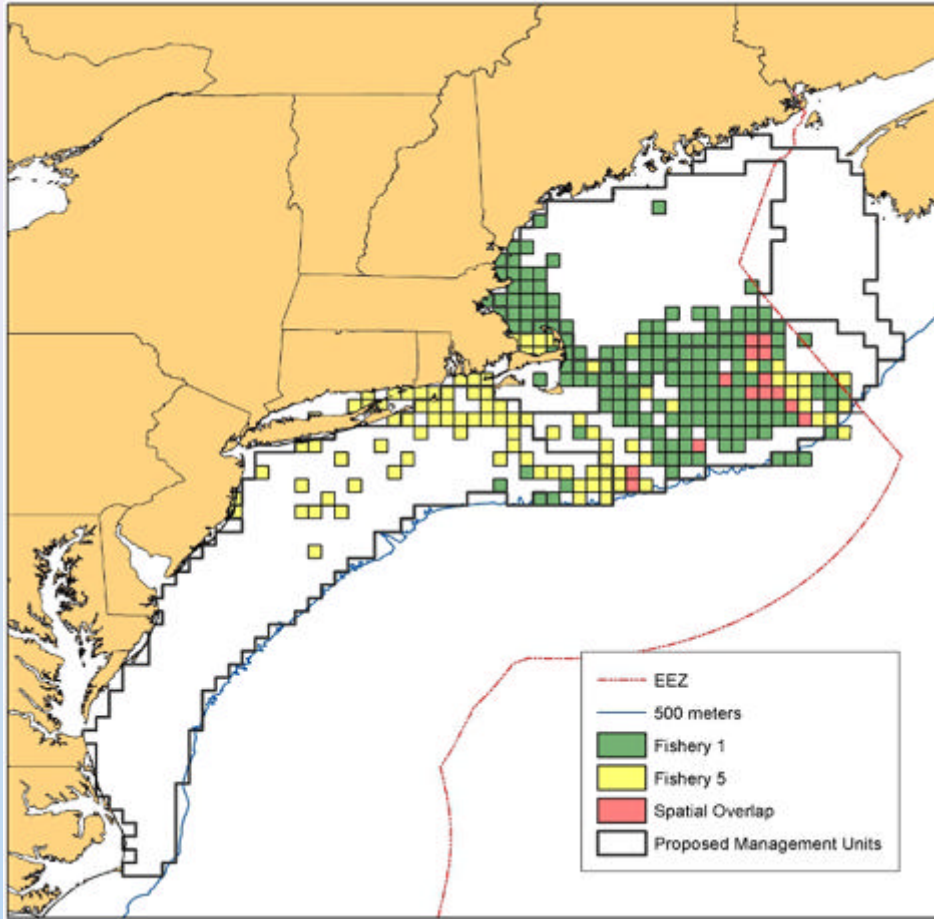


- Scree Plot

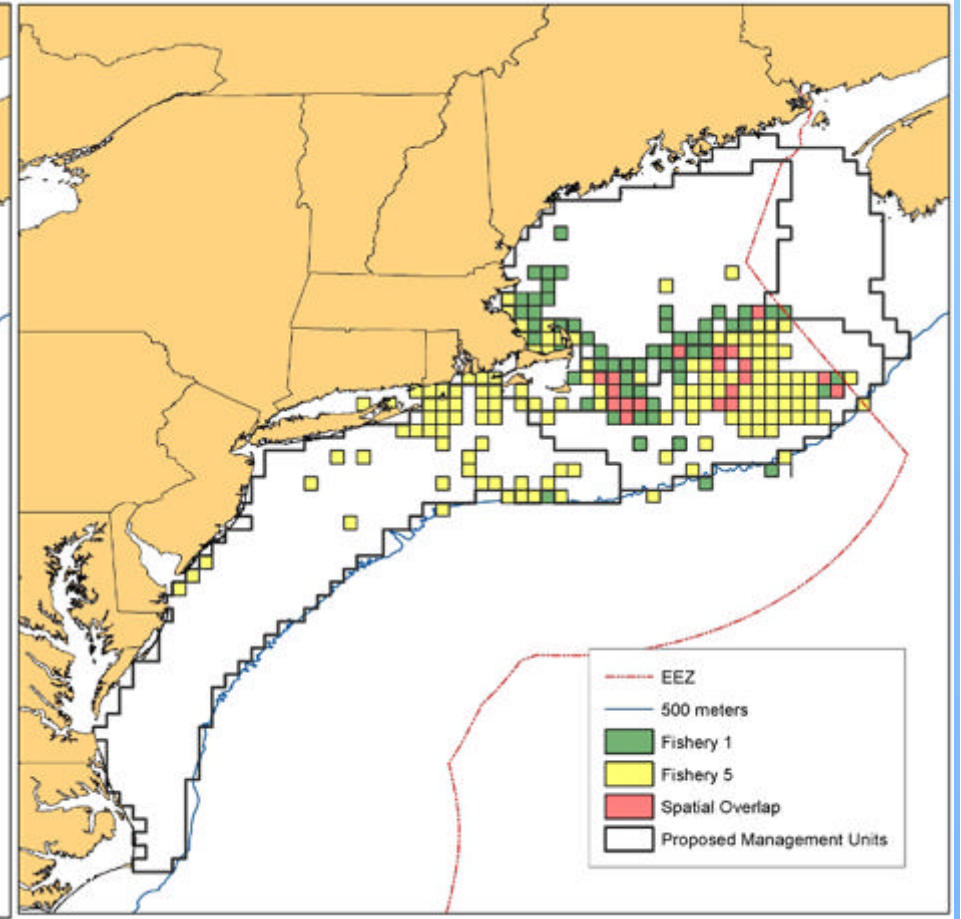


- Pseudo-F

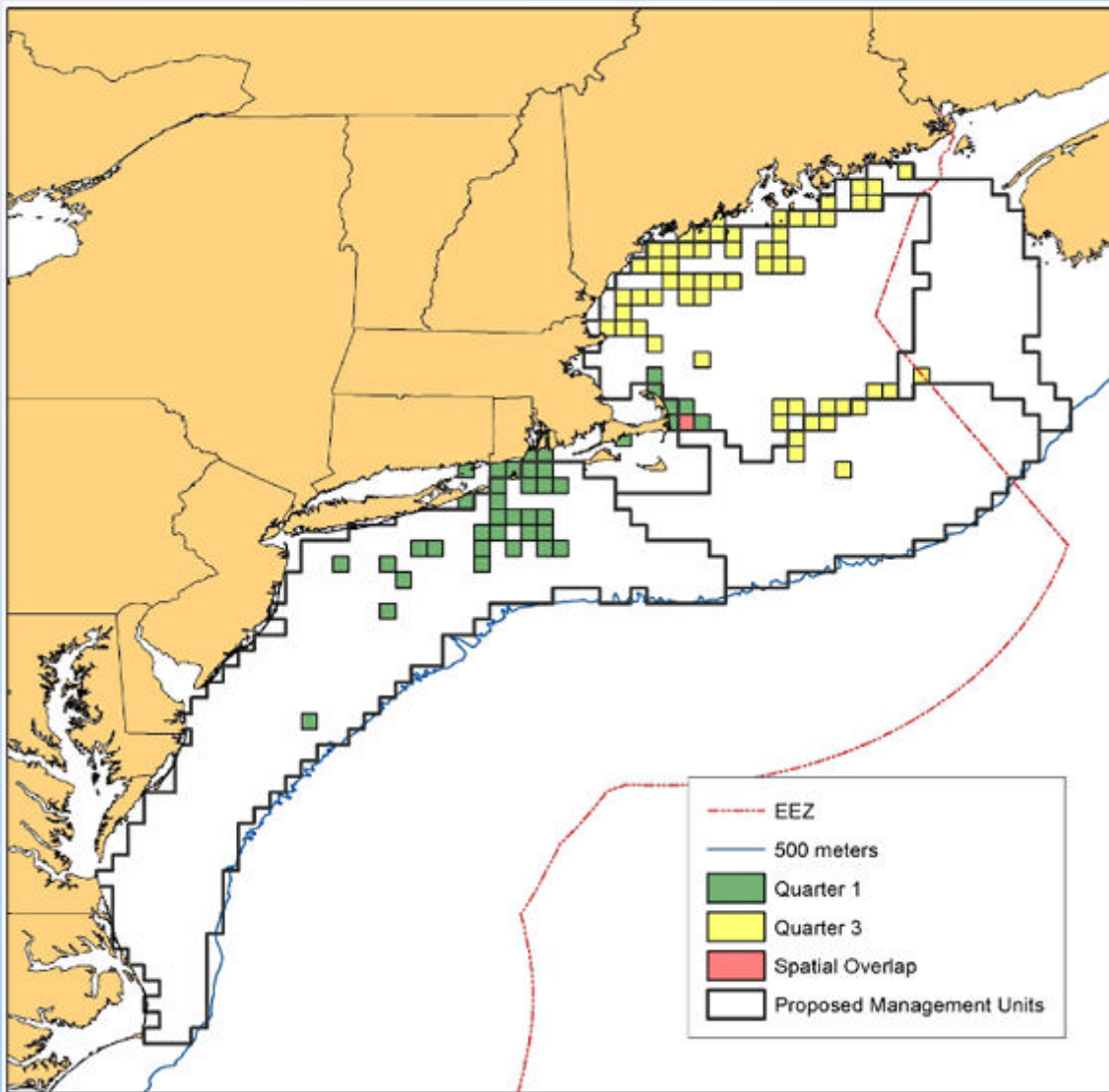




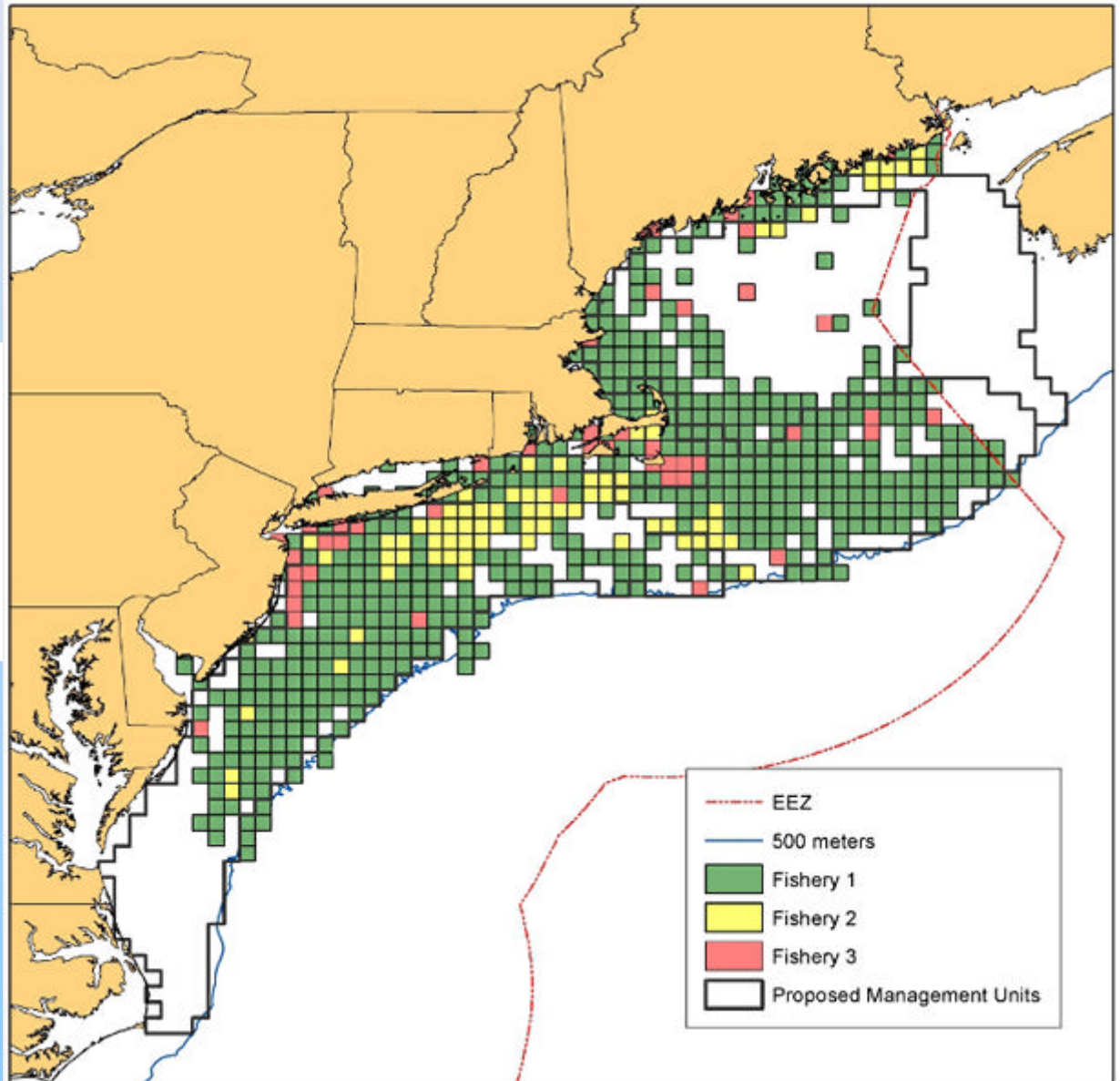
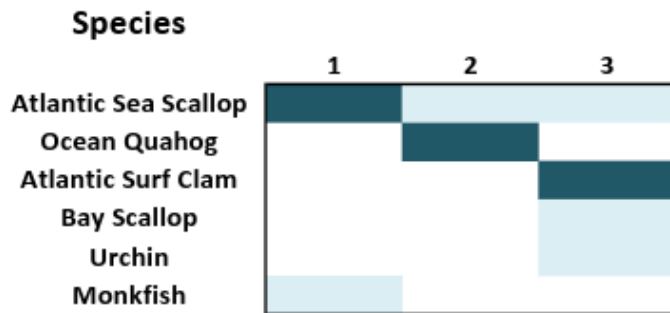
April-June



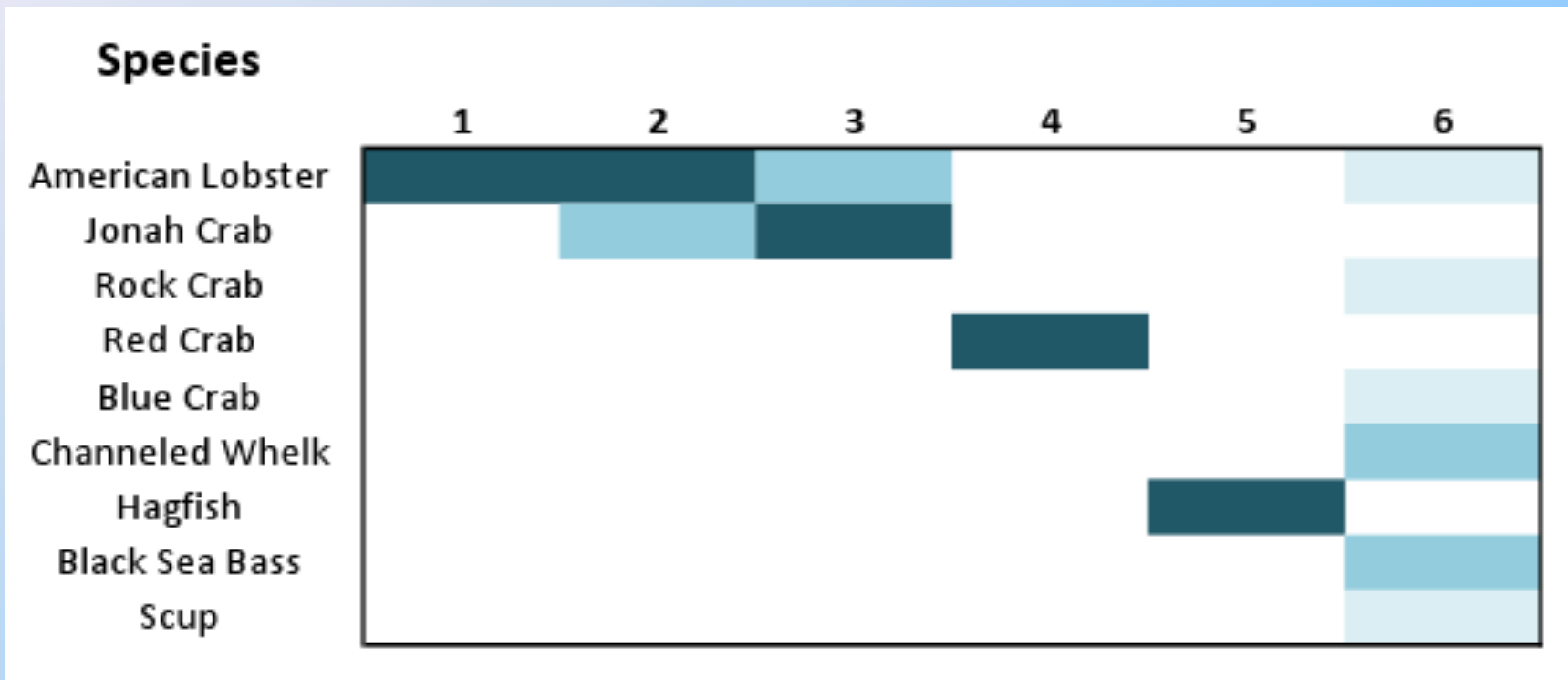
July-September



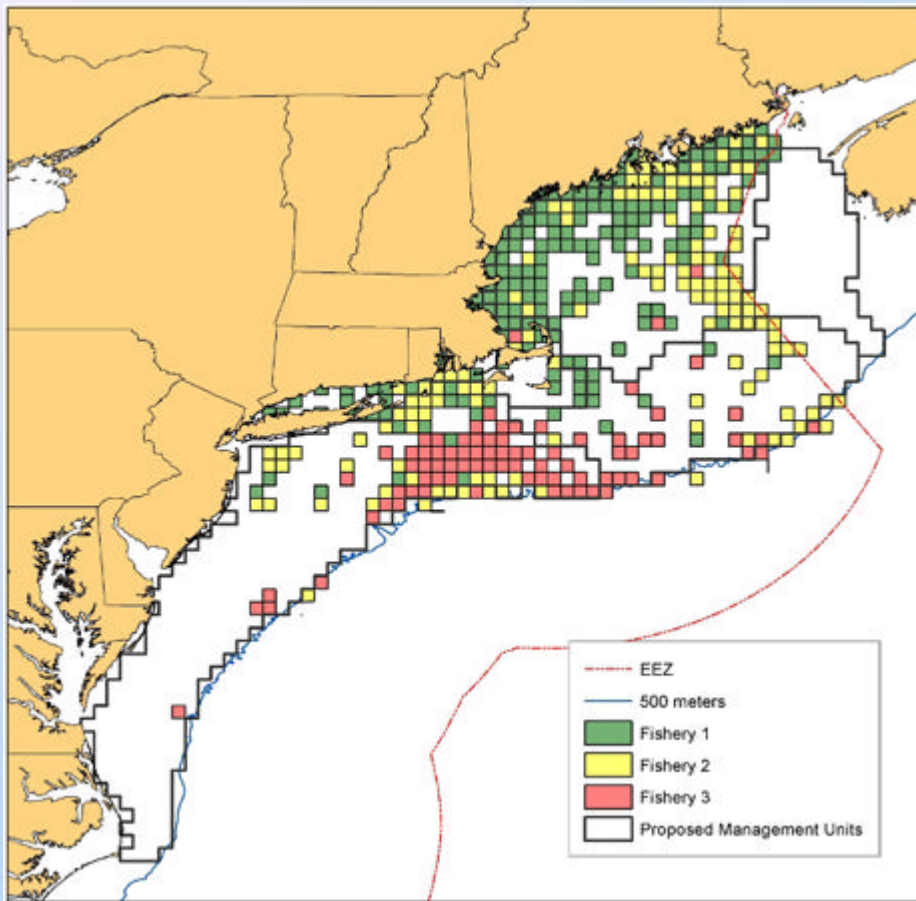
Dredge Fisheries



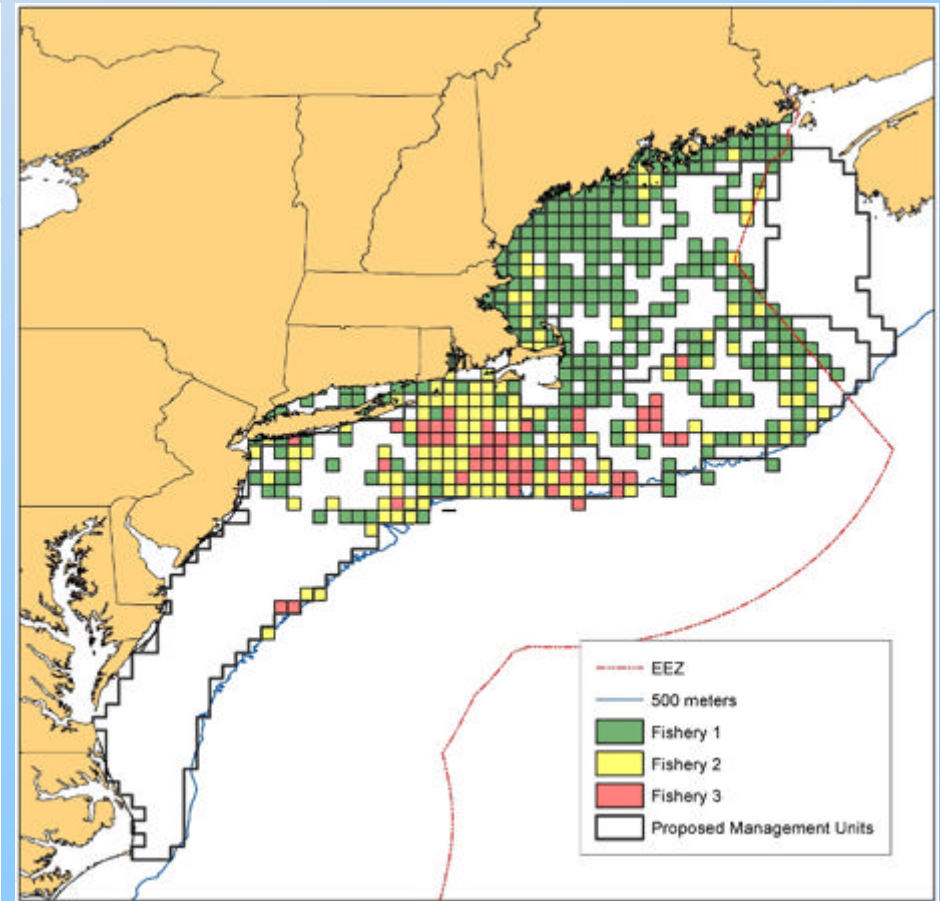
Pot Fisheries



Pot Fisheries

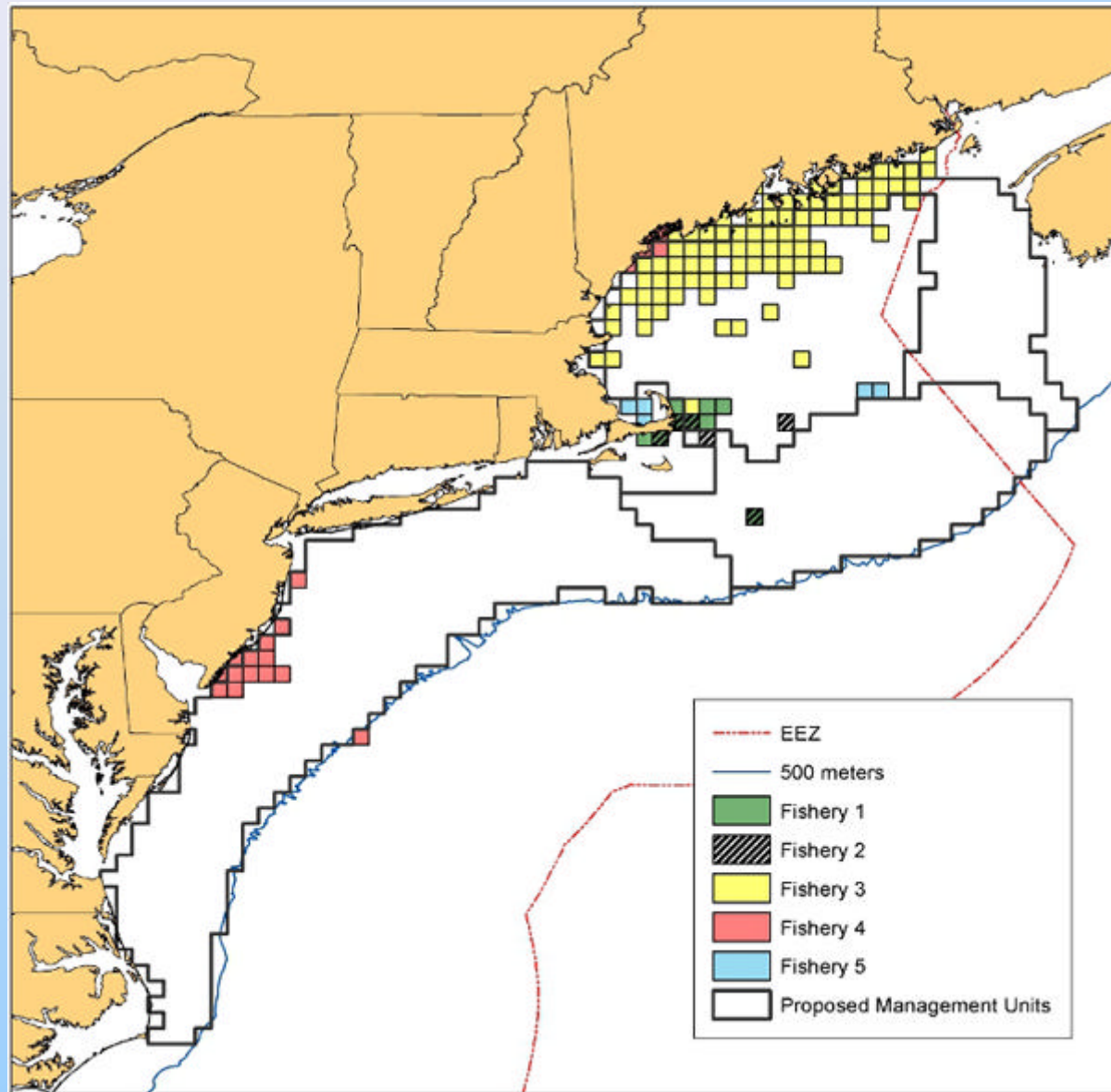


April-June



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?