River Herring Avoidance and Monitoring in Massachusetts Small Mesh Fisheries

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Sustainable Fisheries Coalition

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Massachusetts *MarineFisheries*

Project Description

- Fishing vessels belonging to SFC and RI SMBT collaborate with MA DMF and SMAST to develop voluntary bycatch avoidance system to minimize bycatch of river herring.

- Funding through National Fish Wildlife Foundation (NFWF) and The Nature Conservancy (TNC)
  - October, 2010 NFWF
  - December, 2011 TNC

Project Description

Three objectives to the project:

1. Expand port sampling program (MA DMF)

2. Reduce Alosine bycatch: Real-time fleet communication system to reduce river herring by-catch (MA DMF/SMAST)

3. Test for environmental predictors of bycatch/abundance (MA DMF/SMAST)

Port Sampling

Port Sampling is an efficient method to gather large amounts of bycatch data from pelagic fisheries

- Full access to fish during offload
  - Increase number of sub-samples
- Less expensive vs. at sea sampling
- Offload pump rates are slower/drawn out, increase number of sub-samples
- No observer effect
- Work in controlled environment
- More accurate weights; accurate scales, stable platform

Sorting a subsample

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Port Sampling

Port sampling does not replace at-sea sampling

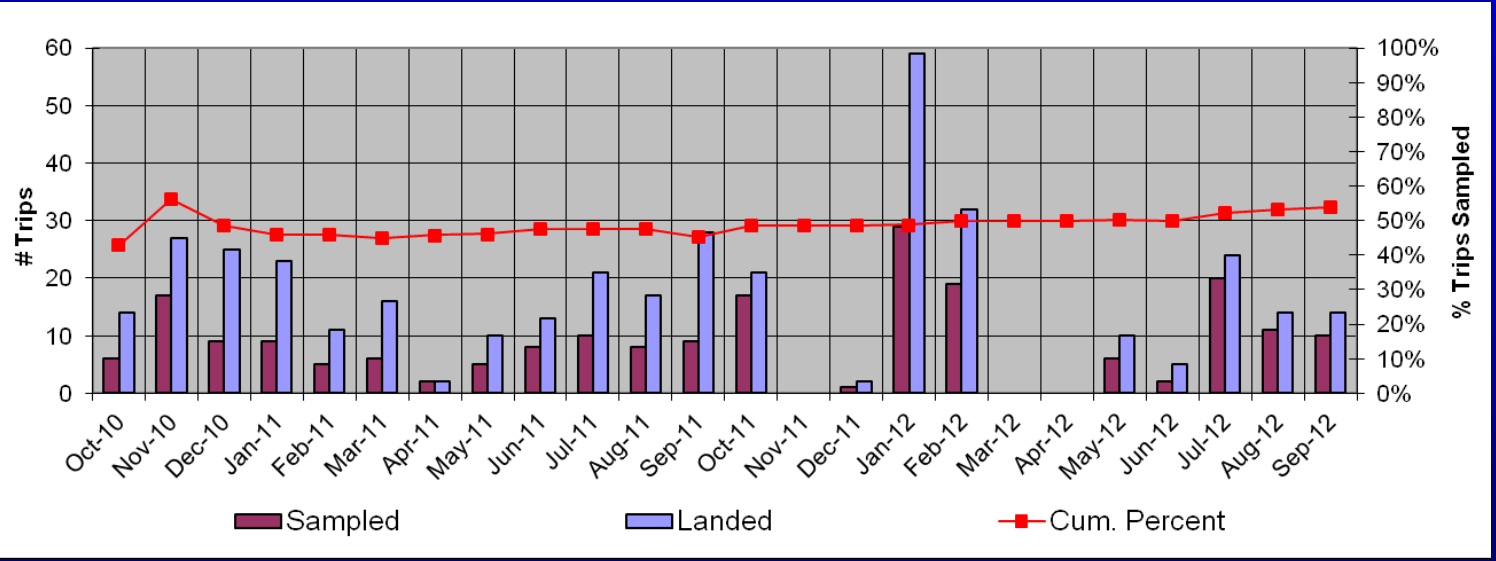
- Real-time results
- Estimates for fish not brought aboard
- Weights for fish removed before going into tank
- Tow by tow information

Port Sampling Design

- Sample MA and RI
  - 2010 through 2012 ~59% Mid-water trawl fish landed in MA
  - 2012 RI SMBT~28%
    - Area 2
- Paired mid-water, single mid-water trawl landed in MA
  - 15 boats
- SMBT in RI
  - 4 boats

Port Sampling Design

Ma Port Sampling Coverage by Month



2010 – 2012 coverage rates

- # trips landed: 388
- # intercepts: 209
- % coverage: 54%

Port Sampling Design

- Sampling scheme varies between each offload site
  - Systematic sampling
  - Whole boat samples
- Typical sampling protocol
  - 1 basket /5 minute
  - M = 45 baskets
  - Max = 112
- Pump out is not homogenous mix of fish
- Stratification
  - Different tows in different tanks
  - Settling in tank due to fish buoyancy

Port Sampling Design

Data Collection

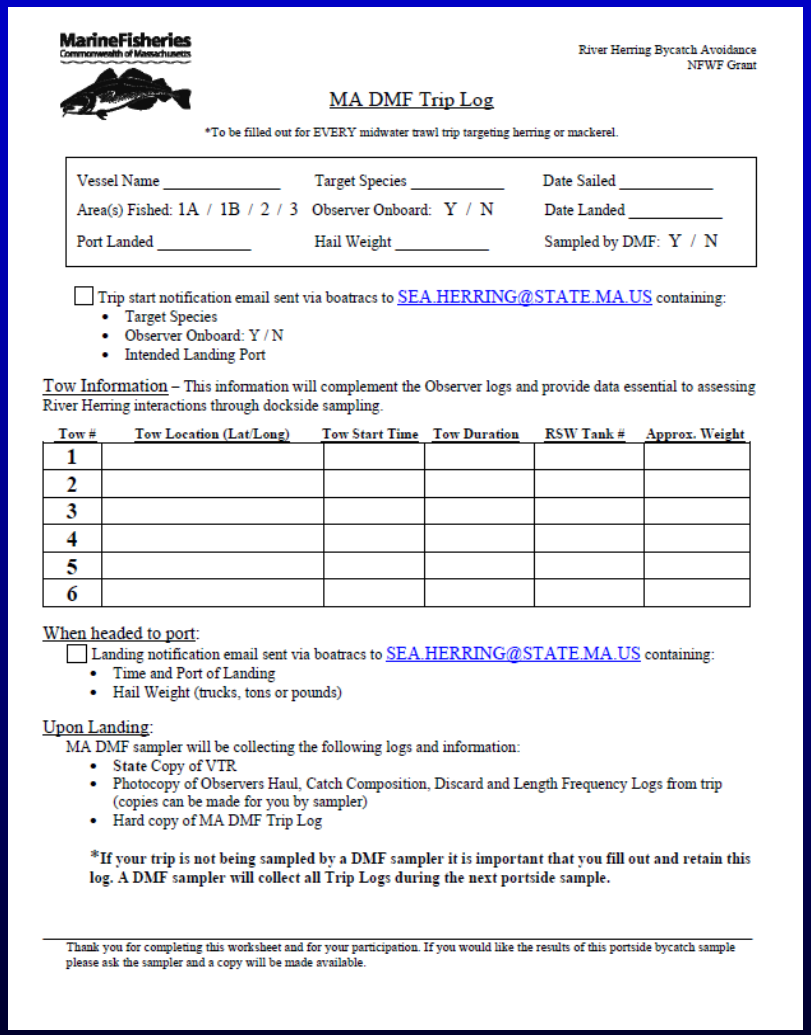
- Trip level data elements
  - Catch Composition – Bycatch Estimates of all species
  - Biological Information – Length Frequencies
  - Specific Data Requests
    - Tissue Samples, whole samples, pictures, catch composition verification

Common_Name	Total Lengths
Herring,Atlantic,Sea	13,613
Herring,Blueback	3,199
Alewife	2,608
Mackerel,Atlantic	2,582
Haddock	1,831
Hake,Silver (Whiting)	446
Shad,American	433

Port Sampling Design

Data Collection

- Tow level data elements
  - Tow location, tow duration and hail weight
- Hail weights
  - MA DMF trip log
  - VTR
  - Observation by sampler
  - Combination plant/truck



MarineFisheries
Commonwealth of Massachusetts

River Herring Bycatch Avoidance
NFWF Grant

MA DMF Trip Log

*To be filled out for EVERY midwater trawl trip targeting herring or mackerel.

Vessel Name _____ Target Species _____ Date Sailed _____
Area(s) Fished: 1A / 1B / 2 / 3 Observer Onboard: Y / N Date Landed _____
Port Landed _____ Hail Weight _____ Sampled by DMF: Y / N

☐ Trip start notification email sent via boatracs to SEA.HERRING@STATE.MA.US containing:
- Target Species
- Observer Onboard: Y / N
- Intended Landing Port

Tow Information – This information will complement the Observer logs and provide data essential to assessing River Herring interactions through dockside sampling.

Tow #	Tow Location (Lat/Long)	Tow Start Time	Tow Duration	RSW Tank #	Approx. Weight
1					
2					
3					
4					
5					
6					

When headed to port:
☐ Landing notification email sent via boatracs to SEA.HERRING@STATE.MA.US containing:
- Time and Port of Landing
- Hail Weight (trucks, tons or pounds)

Upon Landing:
MA DMF sampler will be collecting the following logs and information:
- State Copy of VTR
- Photocopy of Observers Haul, Catch Composition, Discard and Length Frequency Logs from trip (copies can be made for you by sampler)
- Hard copy of MA DMF Trip Log

***If your trip is not being sampled by a DMF sampler it is important that you fill out and retain this log. A DMF sampler will collect all Trip Logs during the next portside sample.**

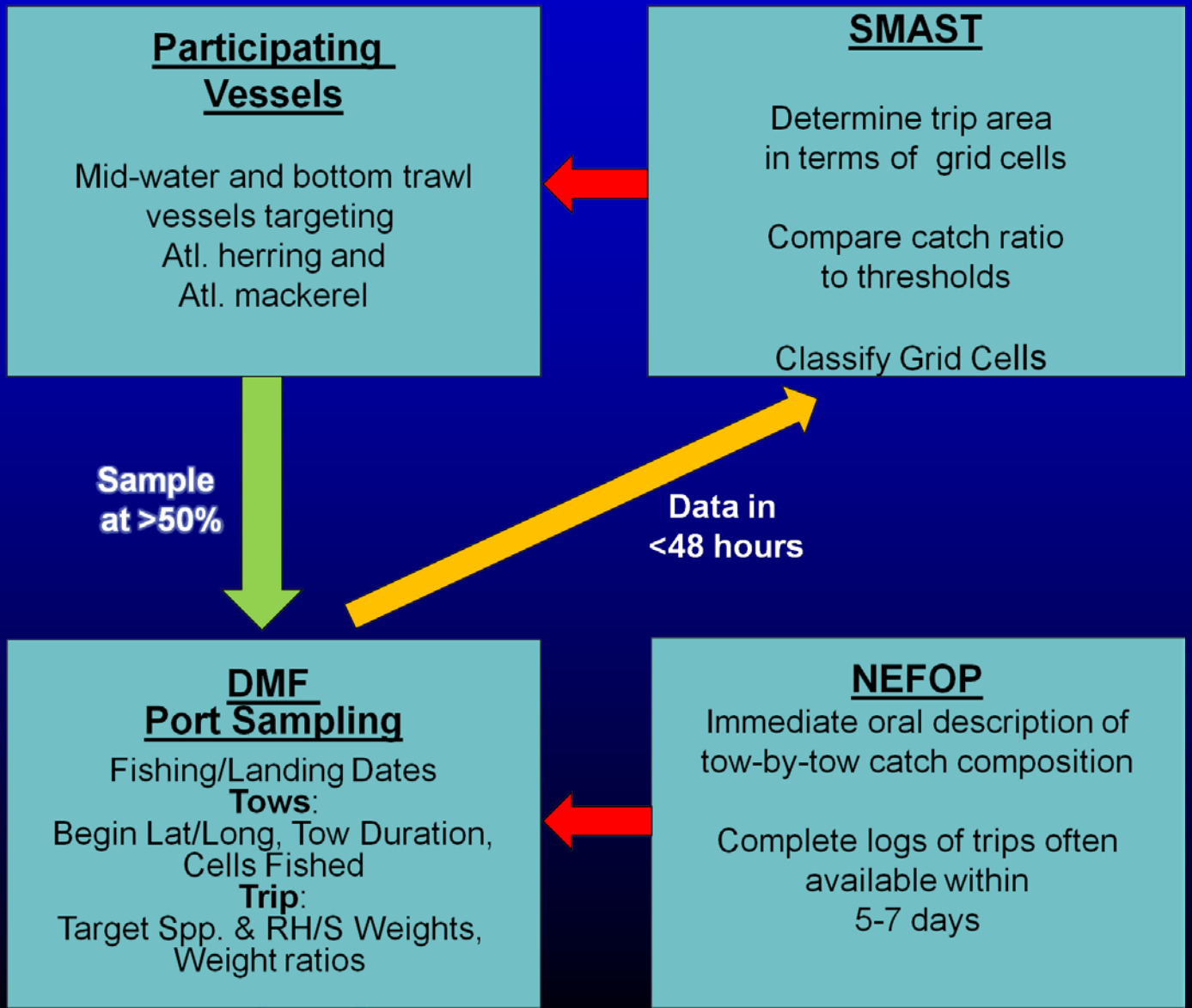
Thank you for completing this worksheet and for your participation. If you would like the results of this portside bycatch sample please ask the sampler and a copy will be made available.

Utility of Data

- Support SMAST/DMF move along and analysis of environmental predictors
- Enable possible biases and problems to be identified and corrected
- Compare estimates derived from different methodologies
  - At-sea vs. port side
  - Lot sample vs. whole boat sample
- Collaboration with Observer Program to confirm species composition
- Provide information to the council on port sampling strategies and program design that were helpful in developing similar measures in Amendment 5

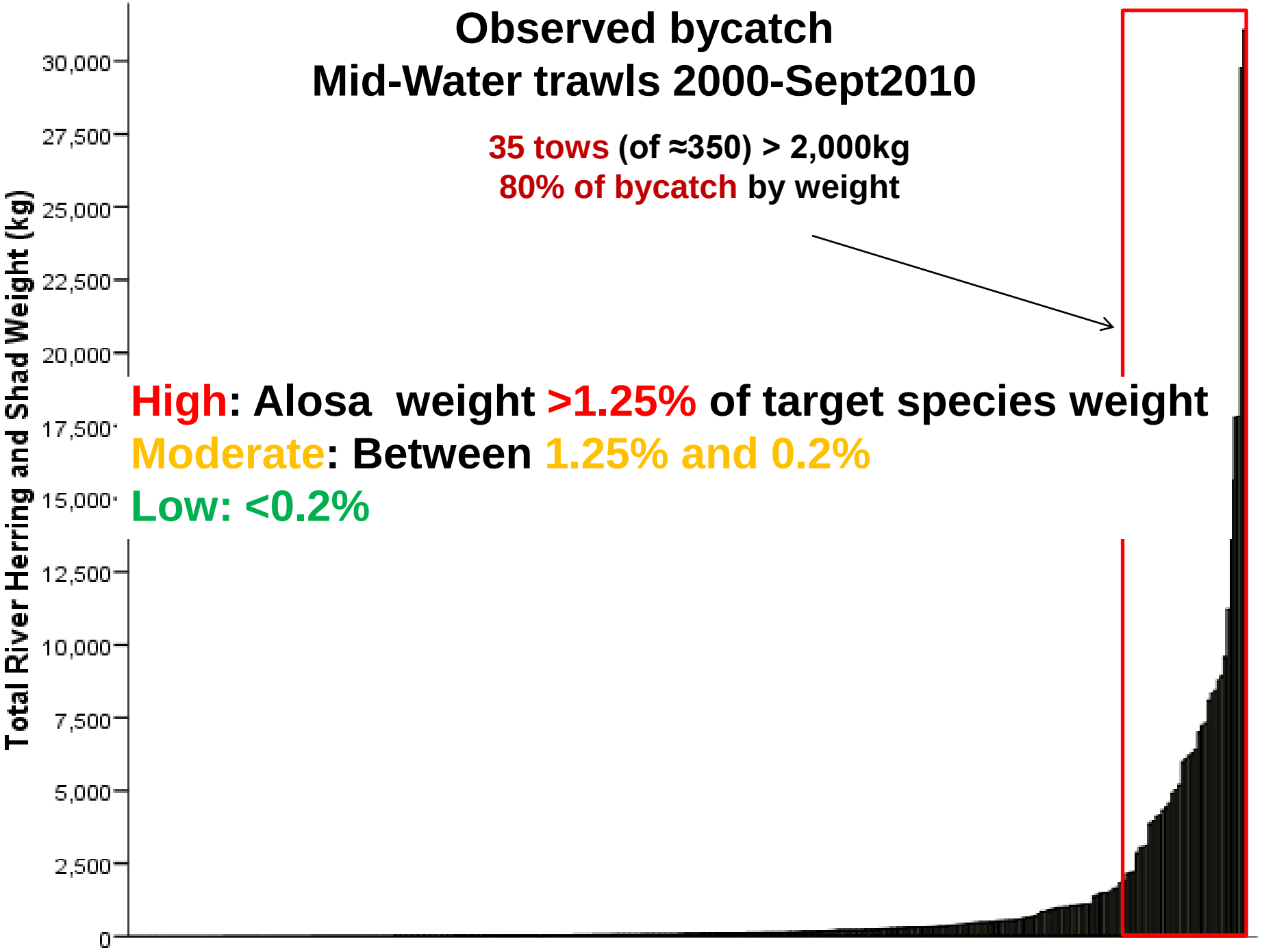
River Herring Avoidance System

Flow of Information and Communication



Observed bycatch
Mid-Water trawls 2000-Sept2010

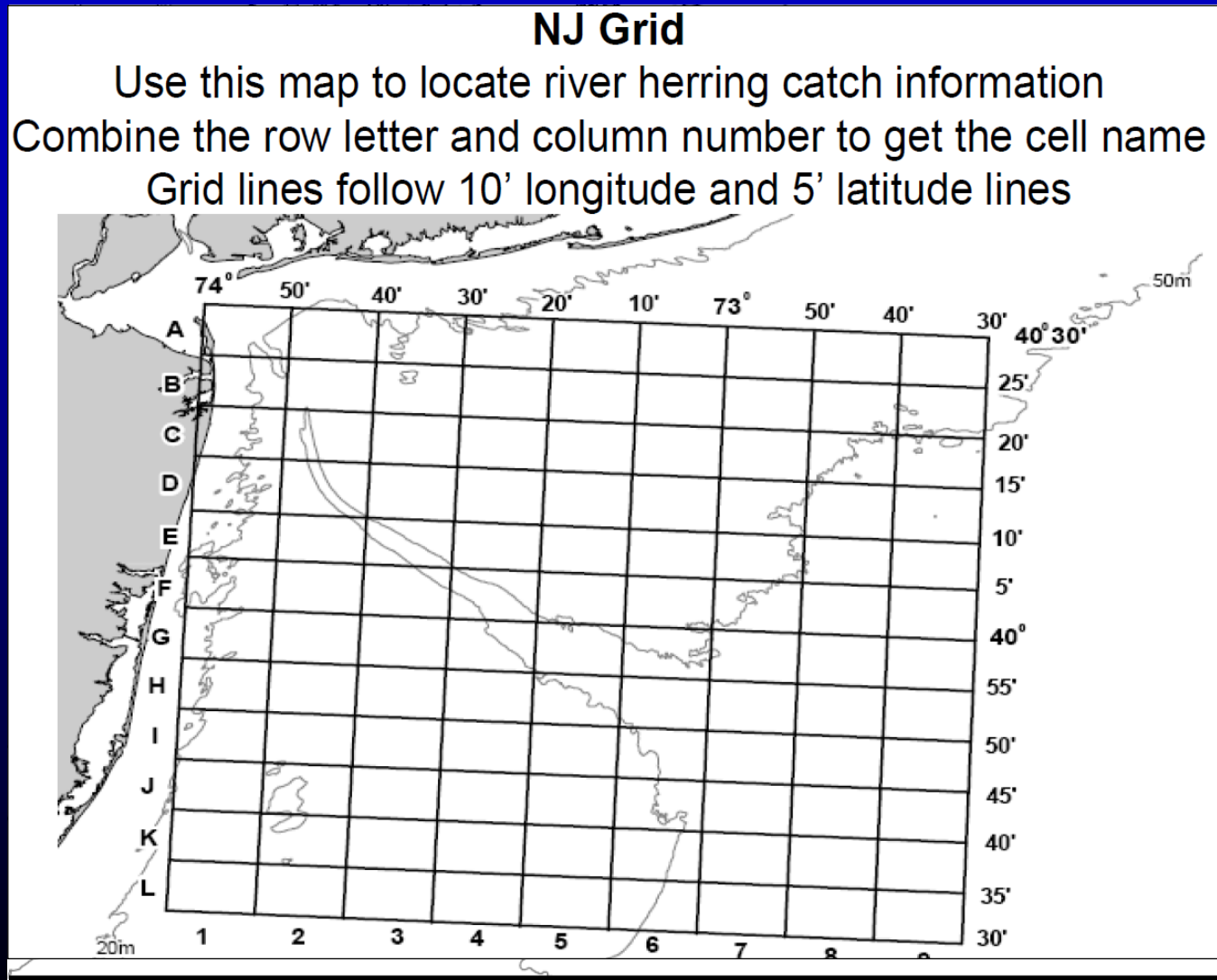
35 tows (of ≈350) > 2,000kg
80% of bycatch by weight



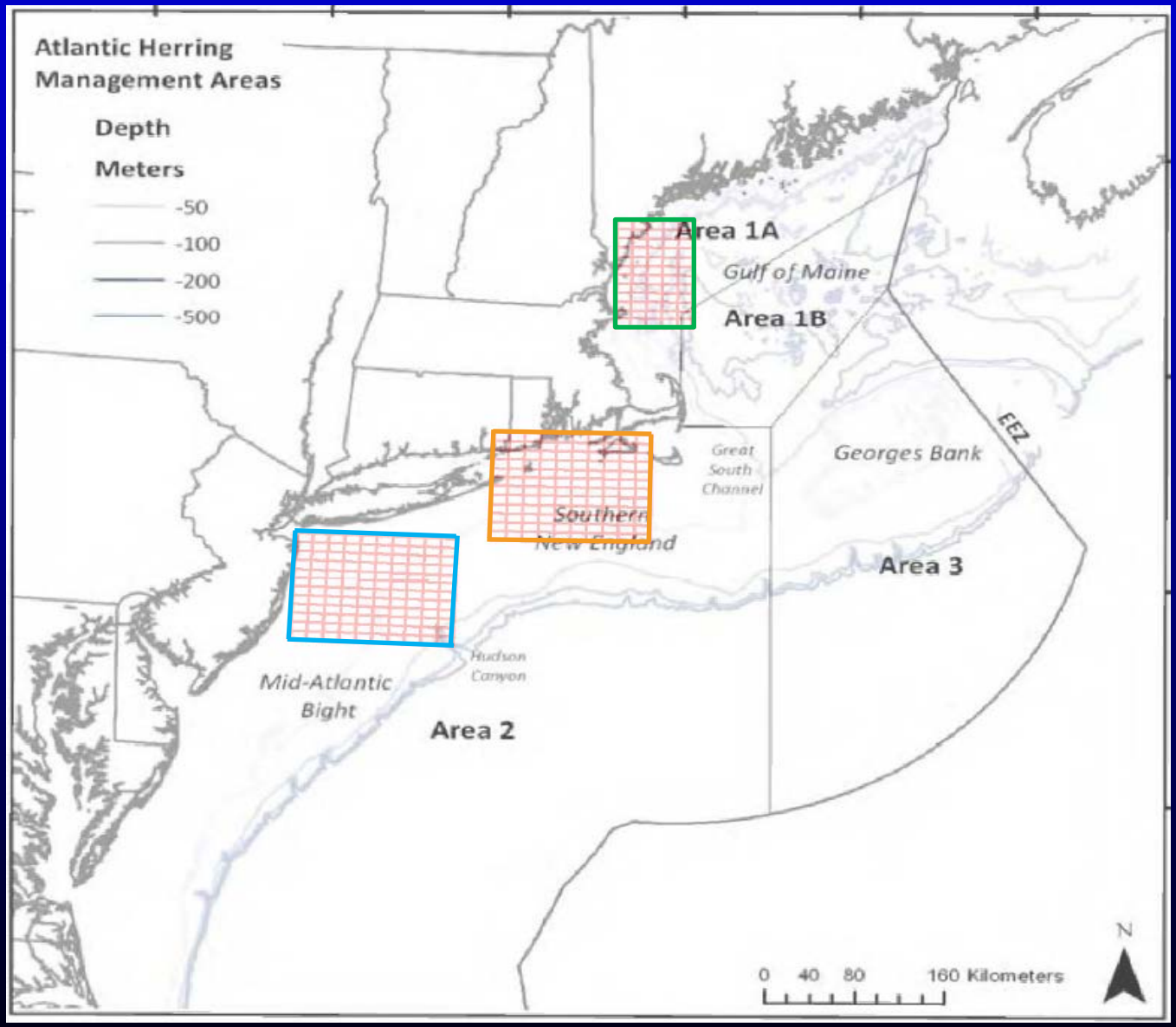
High: Alosa weight **>1.25%** of target species weight
Moderate: Between **1.25% and 0.2%**
Low: <0.2%

Communication approach

- Coded grids
  - Cells:≈5x8Nm
  - Distributed to vessels



Avoidance Areas



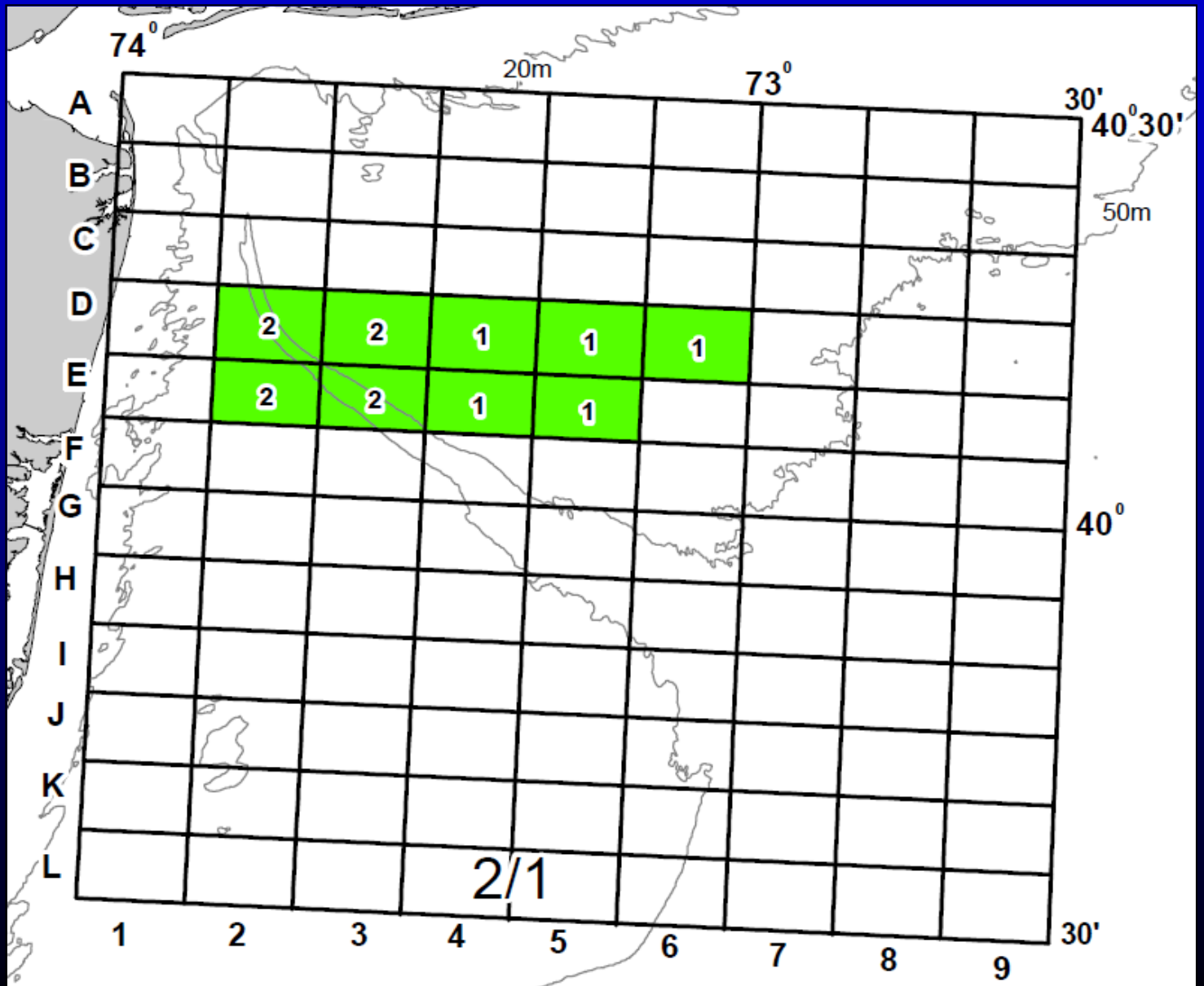
Evaluation Metrics

- Industry Support
  - Collaboration
  - Movement
- Separation of target species and river herring
  - Patterns
  - Space/time
- Bycatch reduction

Industry Collaboration

- Participation
  - 13 of 14 mid-water trawl vessels
- Consistent Communication
  - Phone calls/Emails/In person
    - Captains, crew, or onshore managers
  - MA DMF trip log completion
- Movement patterns
  - Re-entry into high bycatch cells
    - 1 of 9
  - Direction of effort

Spatial, Temporal Separation Winter 2011



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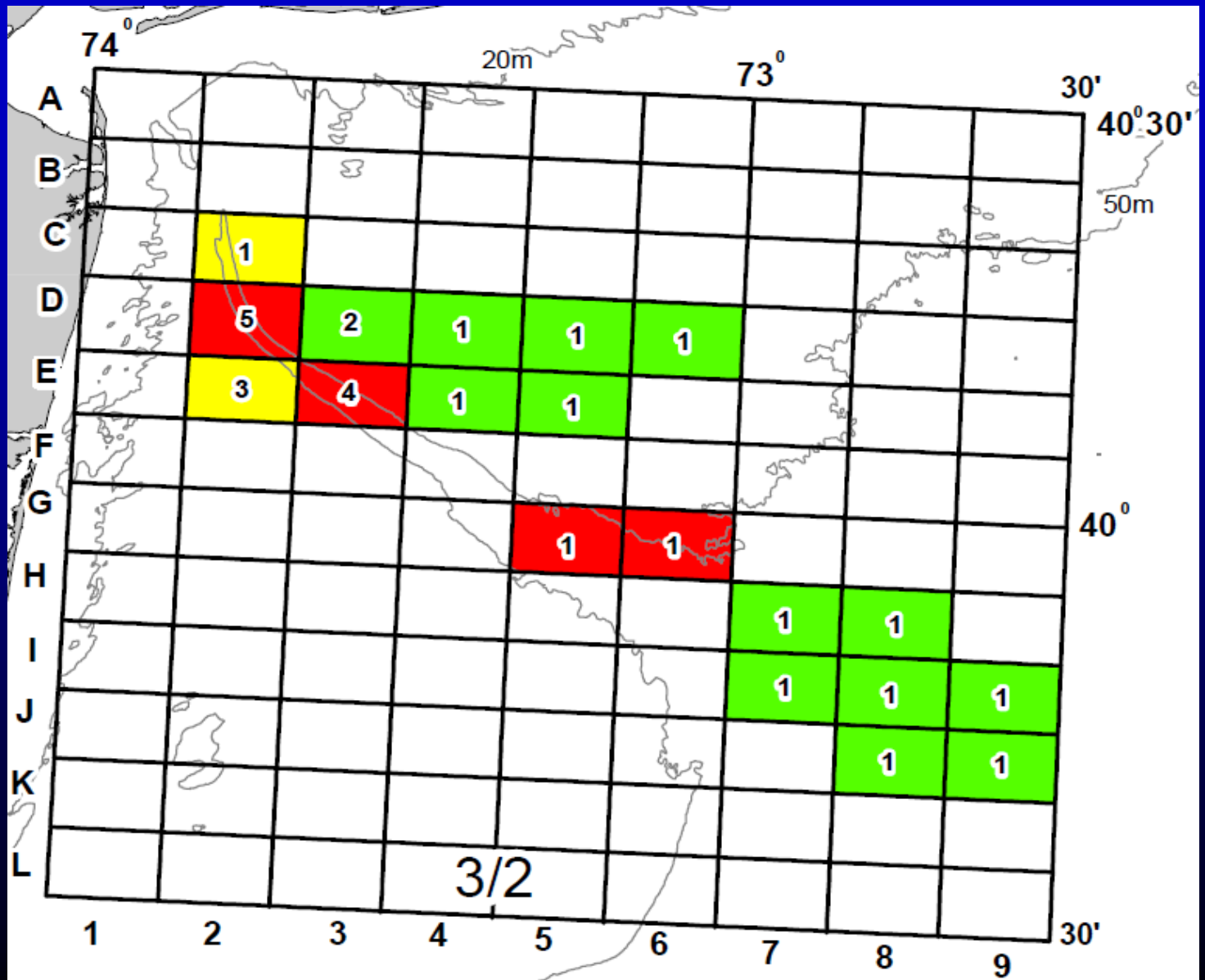
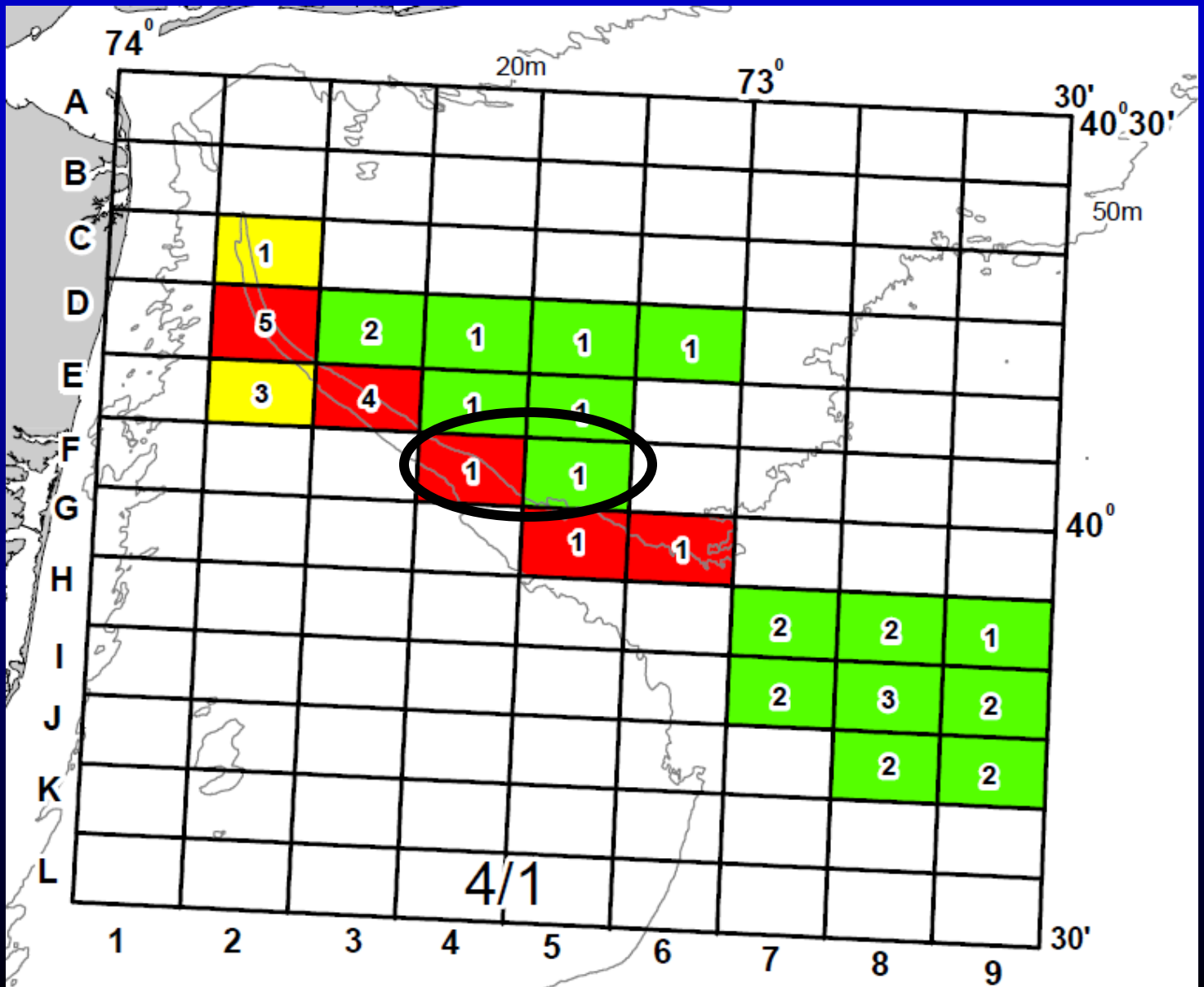
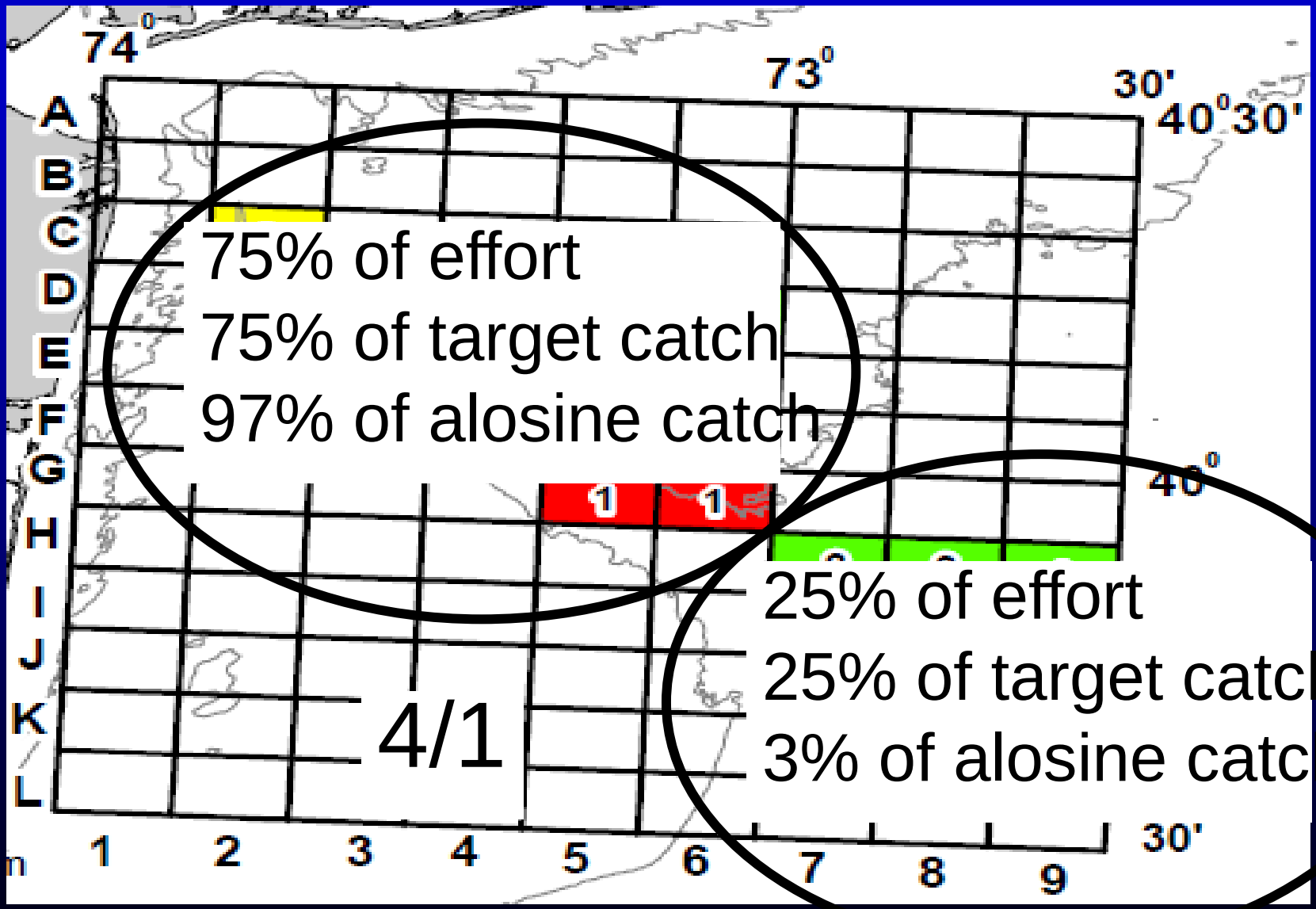


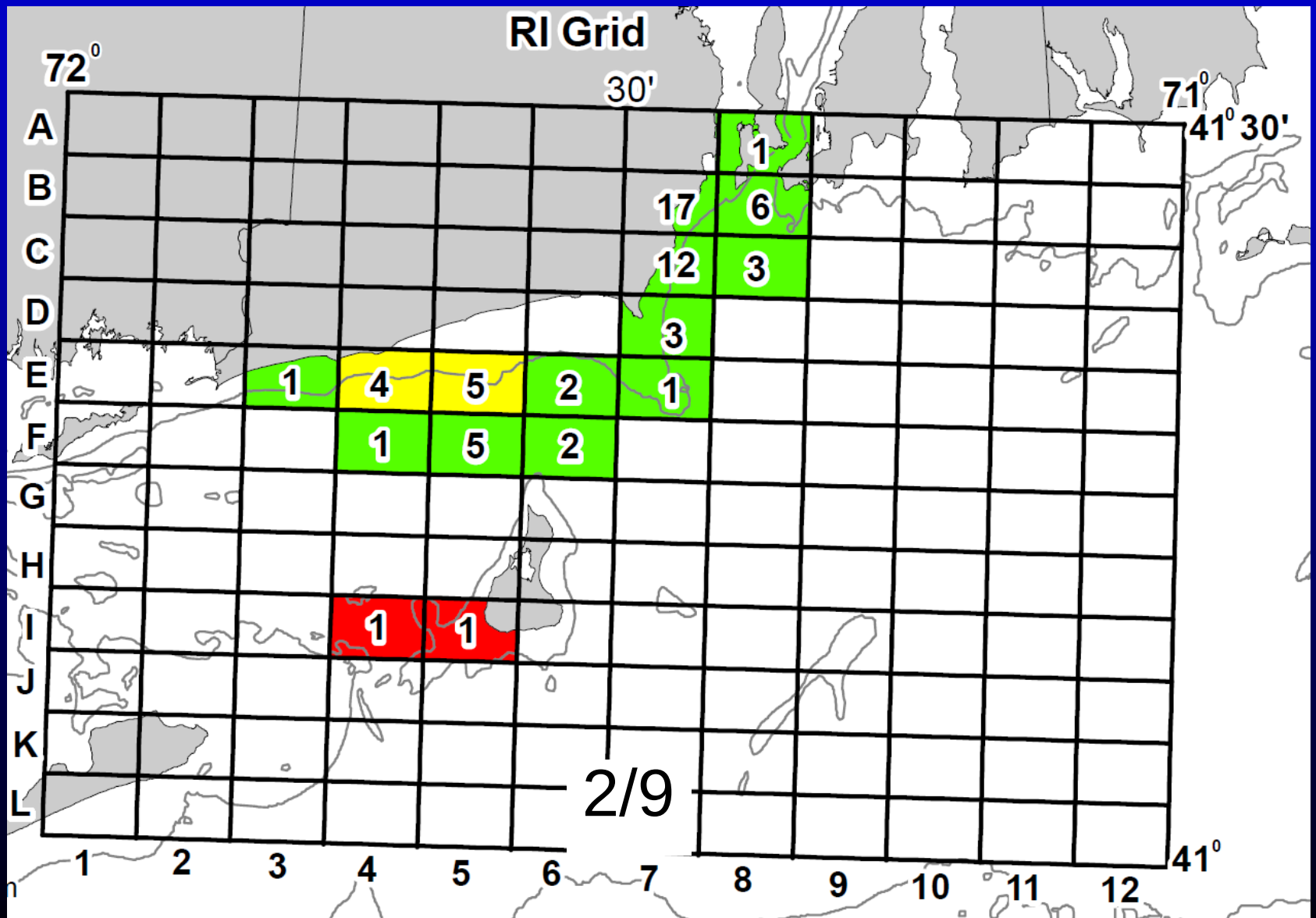
Spatial, Temporal Separation Winter 2011



Information System Results Winter 2011



Spatial, Temporal Separation Winter 2012: RI SMBT



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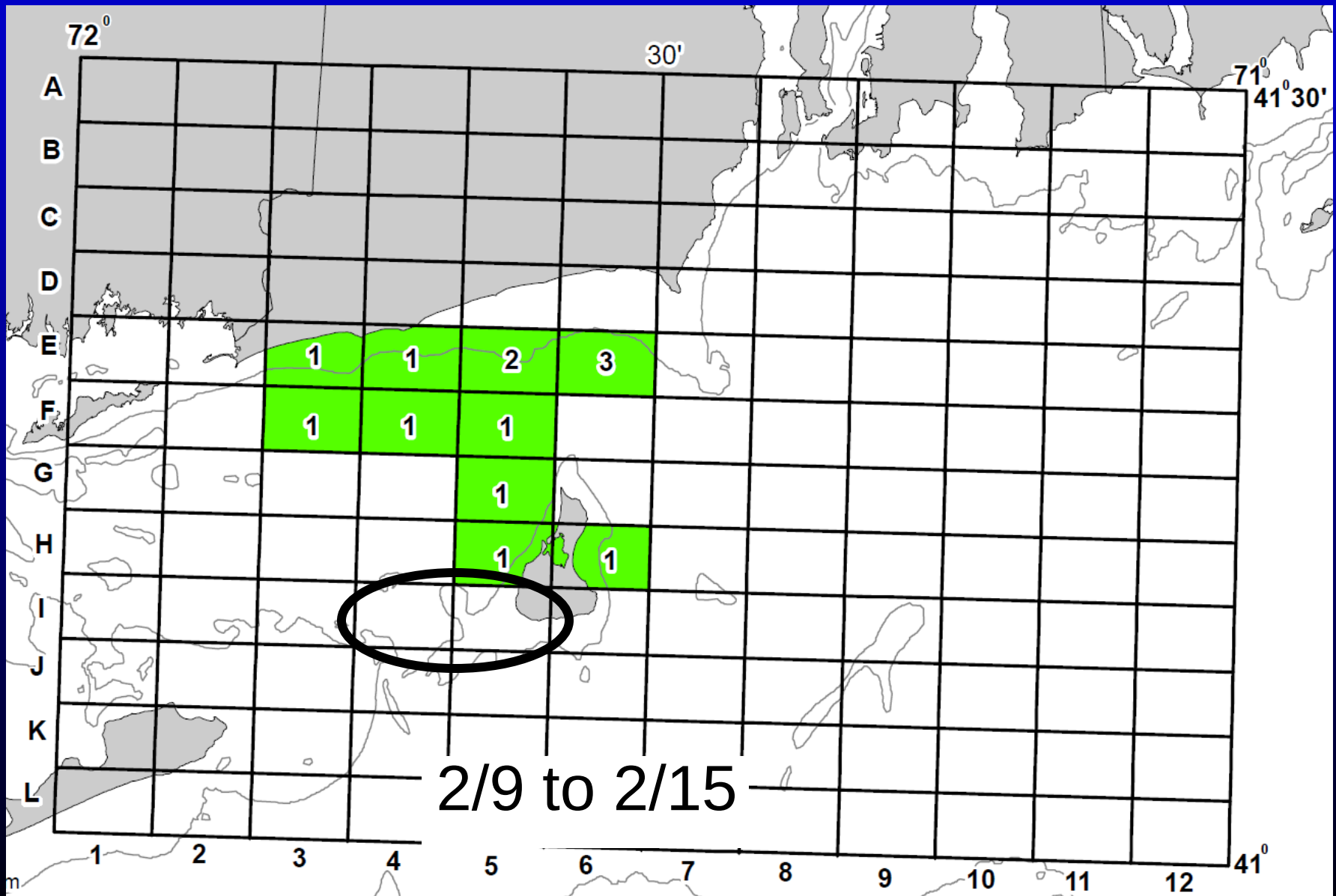
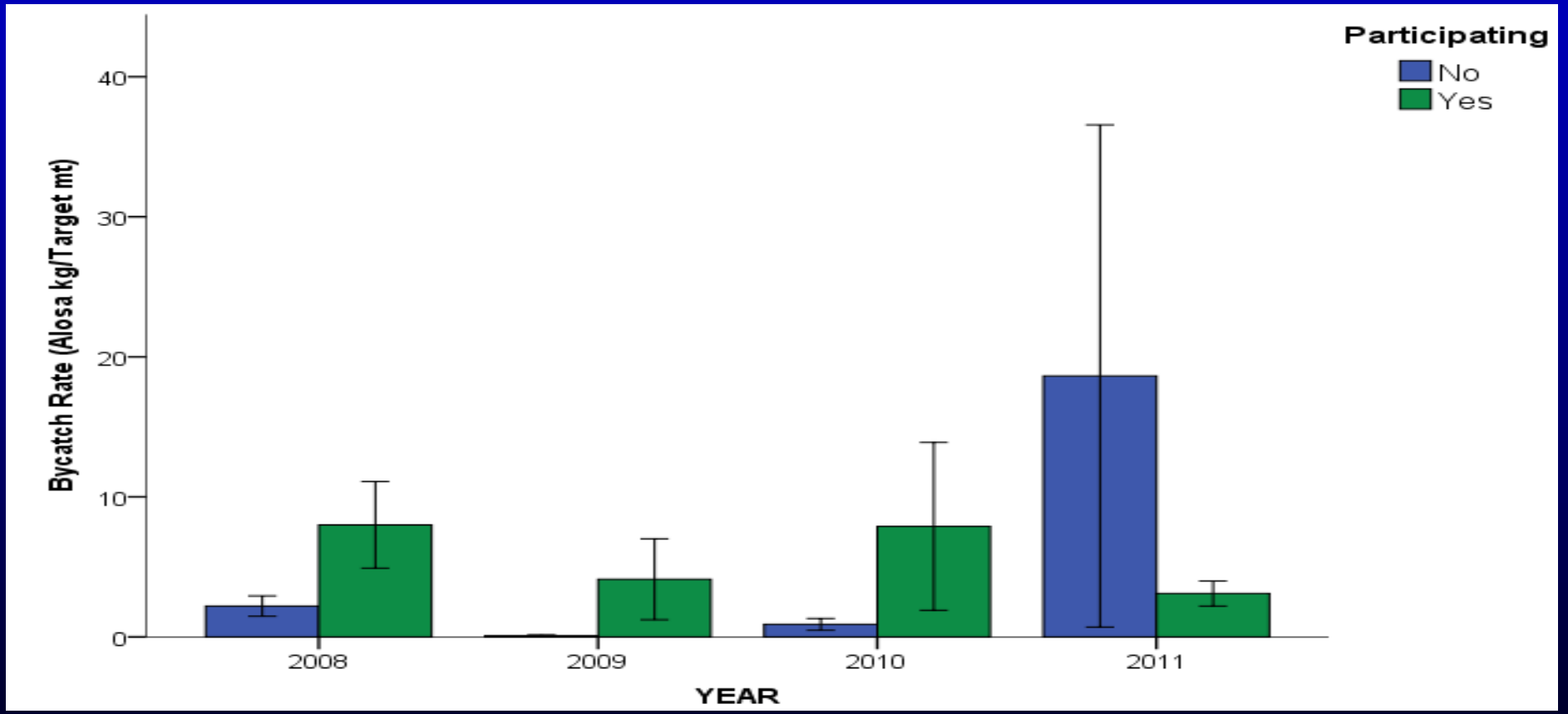


Bycatch reduction

- Grant objective: 50% reduction
  - Acceptable range 44 to 380 mt
- Bycatch Rates



- Reduced frequency of high bycatch events

Future

- Integrate tow by tow at-sea-observer data daily
  - Enhance real-time advisories
  - Increase frequency decrease lag time

- Proactive program
  - Environmental links
  - Fall 2011
- River herring catch caps

- Fishery effort, CPUE and bycatch levels are recorded. DMF has most extensive data set on MWT herring fishery.

N. David Bethoney, et al. (in press) Developing a fine-scale system to address river herring (*Alosa pseudoharengus, A. aestivalis*) and American shad (*A. sapidissima*) bycatch in the U.S. Northwest Atlantic mid-water trawl fishery. Fisheries Research.

Acknowledgements

- Mid-water trawl vessels and crew
  - F/Vs Western Venture, Osprey, Challenger, Endeavour, Dona Martita, Nordic Explorer, Retriever, Enterprise, Starlight, Sunlight, Jean McCausland, Isabella Taylor
- SFC on-shore members: Peter Moore, several others
- RI vessels and crew
  - F/Vs Sea Breeze Too, Ocean State, Heather Lynn, Darana R, Tiger Jo
- Port-samplers
- Northeast Fisheries Observer Program
- AIS Inc.
- Funding:
  - **National Fish and Wildlife Foundation**
  - **Nature Conservancy**