

Bycatch Avoidance Programs in Two New England (USA) Fisheries

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Introduction: Collective Action

	Excludable	Non-excludable Collective Goods (Olson) Common pool resources (Ostrom)
Divisible	Private goods food, clothing, cars, personal electronics	Common goods (common-pool resource) fish stocks
Non-divisible	Club goods cinemas, private parks, cable television	Public goods free-to-air television, national defense

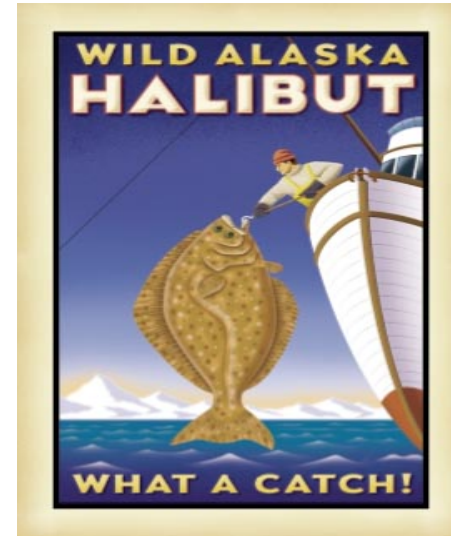
Collective action to restrict use of common pool resource
creates collective good

Collective Goods: Marketing

Marketing programs to increase demand e.g. funding for seafood rating services (Marine Stewardship Council, etc.)

Collective Goods: subject to free riders

Involuntary and voluntary contributions.



Collective Goods: Political Actions

Lobbying for increase in quotas or
reduce illegal fishing

Often successful: Lobbying increase quotas

Contributions are usually voluntary



Collective Goods: Bycatch Avoidance

Avoid bycatch in fisheries with limits on both target (valuable) & bycatch (less valuable)

Using selective gear, area/time closures

Involuntary, e.g. regulations

Voluntary use of selective gear or avoiding areas (hotspots)



Grid to exclude fishfish from squid net

Positive Factors for Voluntary Collective Action

Some members of group gain large share of
benefits (e.g. Individual Benefits $>$ Total Cost)

(Olson 1965)

Conditional cooperators and willing punishers

(Ostrom 2000, Fehr & Gächter 2000)

Contributions to collective action are known and
uncooperative behavior is known

Positive Factors for Voluntary Bycatch Avoidance

Some members expect large benefits relative to total costs at some level of avoidance

Benefit/Cost ratio is high for participants

Small loss in CPUE & low value for bycatch

Expectation (evidence) that other members are participating

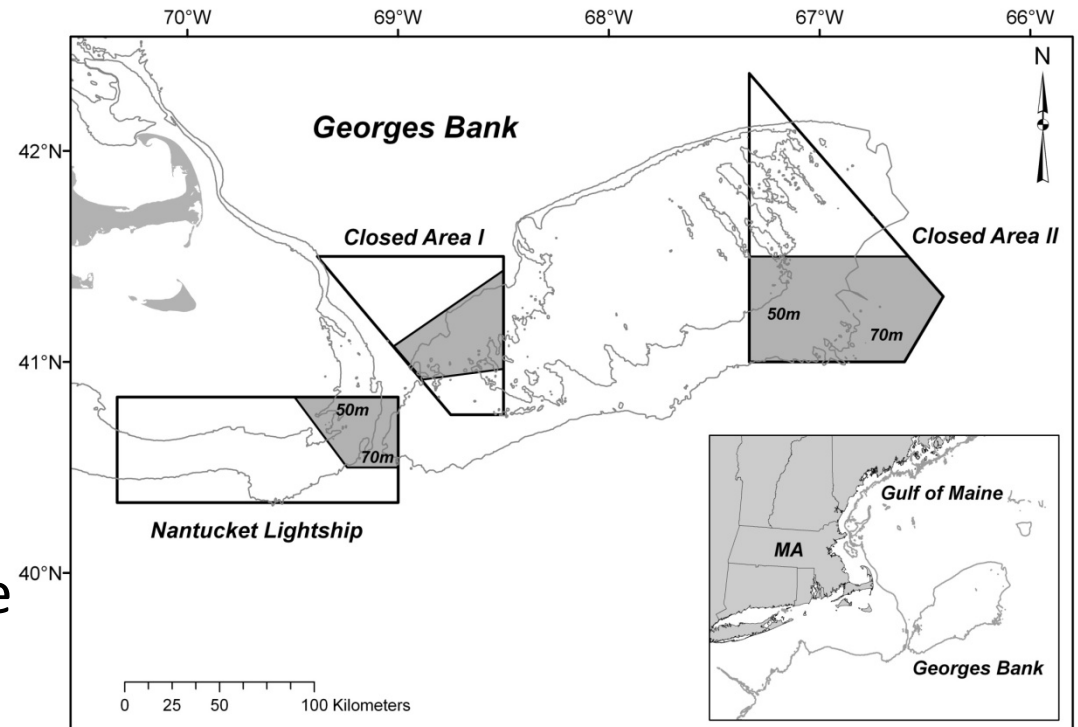
Some minimal level of participation (tipping point)

No negotiation and low organizational costs

All factors more likely in small groups

Rotational Scallop/Yellowtail Fishery

- Days at Sea in open areas
- Trips per vessel with trip limits in closed areas (IFQ)
- Yellowtail flounder TAC in closed areas
- Areas close when fishery reaches the yellowtail TAC, regardless of scallop harvest
- Vessels that do not complete scallop harvest in CAs are compensated with Days at Sea in open areas
- Observer coverage = 10%



Impacts of Early Area Closures

Year	2006	2006	2008	2009
Area	Nantucket	Closed Area II	Nantucket	Closed Area II
Days Open	32	82	49	15
% Yellowtail TAC Caught	176%	103%	98%	81%
% Scallop Target Caught	78%	82%	75%	61%
Forgeone yield (\$)	\$17,850,000	\$21,000,000	\$11,100,000	\$16,000,000

COSTS

- Revenue losses over \$65 million
- Increased mortality of unharvested scallops
- Delay rebuilding yellowtail stocks
- Habitat damage from shifting fishing effort to lower CPUE areas

SMAST Scallop Steering Committee

- Identify problem
 - Industry initiative
 - Science/management ability to respond
- Define objectives
 - Biological, socioeconomic, operational
- Iterative approach for solutions
 - Variety of strategies, not all acceptable
- Refine tactics
 - Focus on buy-in, feasibility, outcomes
- Incorporate feedback
 - Industry expertise, willingness, evaluation of program effectiveness, incentives



Real-time Yellowtail Bycatch Avoidance

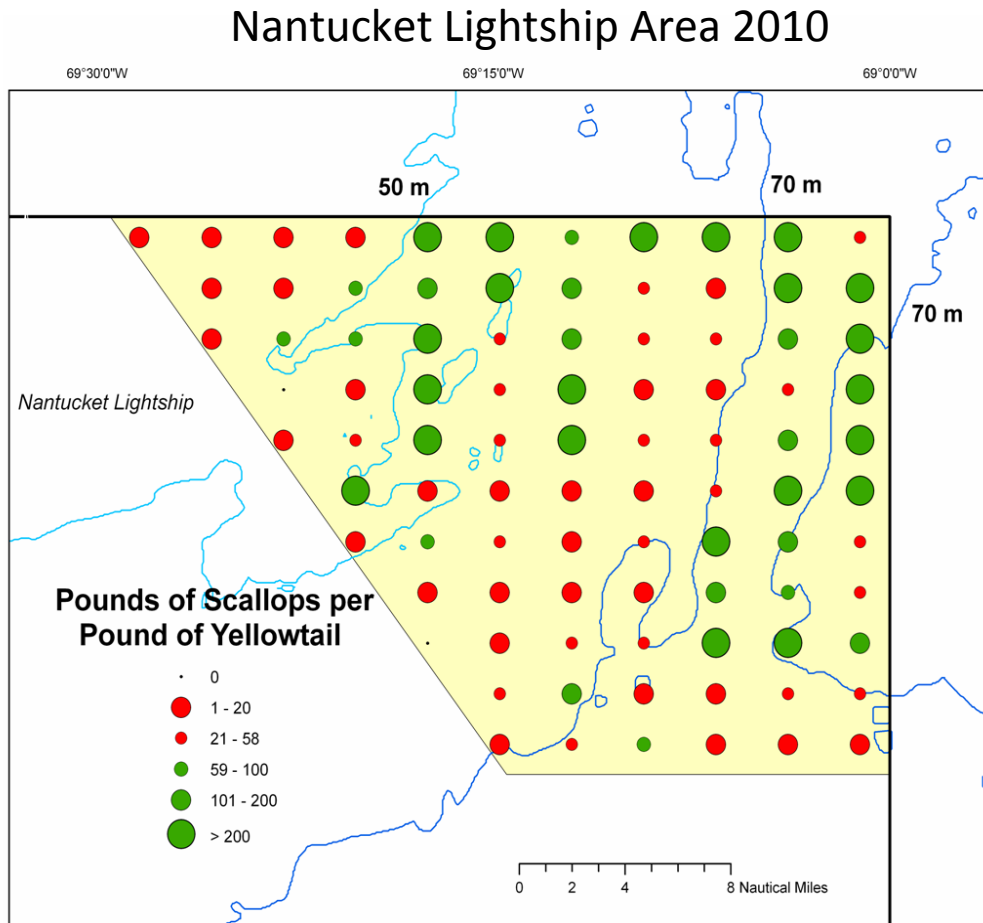
- Phase 1: Distribute existing survey data prior to fishery to inform fleet about yellowtail and scallop distributions
- Phase 2: Real-time communication of yellowtail catch data for fleet avoidance of hotspots



O'Keefe et al, Confronting the bycatch issue..., ICES CM 2010

O'Keefe et al, Avoiding bycatch in U.S. Sea Scallop closed areas fisheries, IIFET 2010 Montpelier Proceedings

Phase 1: Distribute Survey Data



Adapted from DuPaul and Rudders, 2010

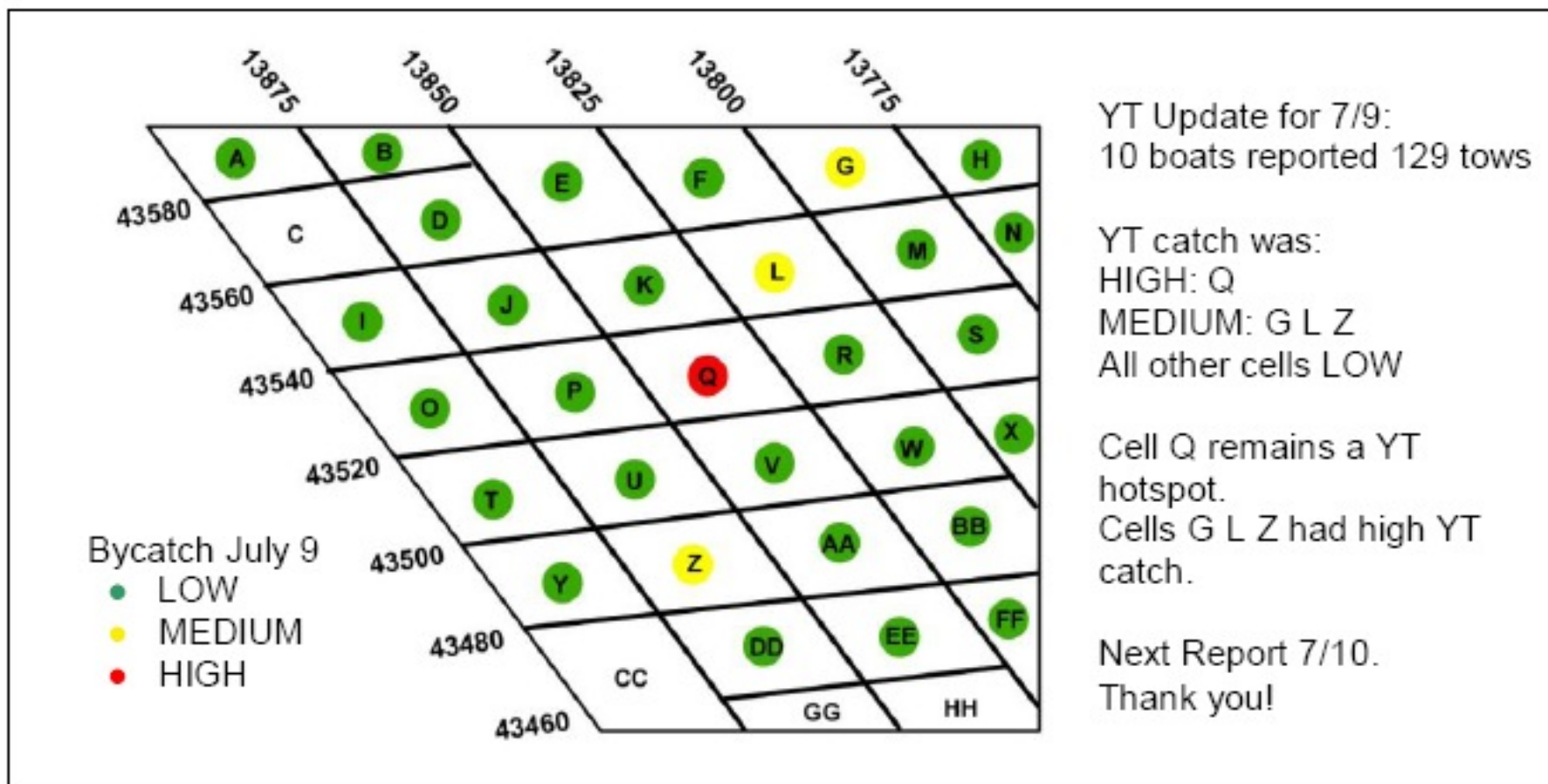
- SMAST scallop video survey & VIMS yellowtail dredge survey
- Ratio of scallops to yellowtail based on scallop target and yellowtail TAC
 - 2,672mt scallop/47mt flounder =
 - 58 lbs scallop/1 lb flounder
- Stop light analogy map provided information before fishery began



SMASST – SCALLOP INDUSTRY



NANTUCKET LIGHTSHIP YELLOWTAIL BYCATCH ADVISORY



Results: Industry Participation

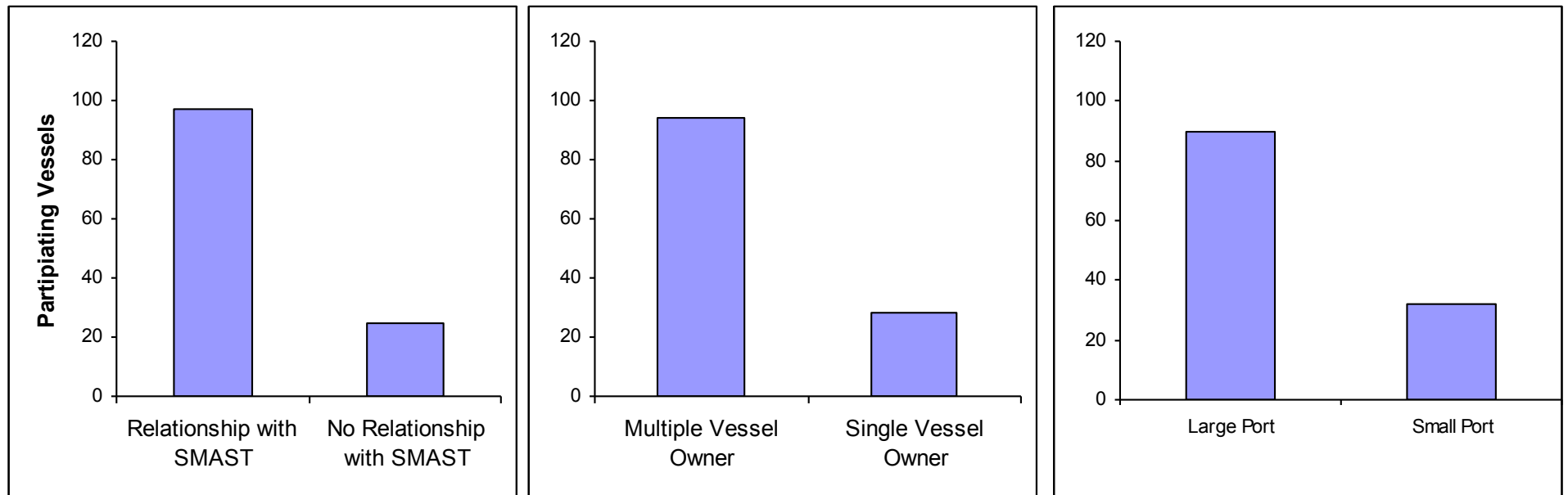


- **Individual vessel data remains confidential**
- **2010** Nantucket Lightship: 122 vessels signed up
 - Collection of yellowtail information only, not scallop information
- **2011** Closed Areas I and II: 211 vessels signed up
 - Data reporting included scallop catch information
- **2012** Nantucket Lightship, Closed Areas I and II: 240 vessels
 - Funding support from Fisheries Survival Fund, American Scallop Association, Research Set-Aside, individual fleet members
 - Expanded to include General Category vessels in open areas in Southern New England



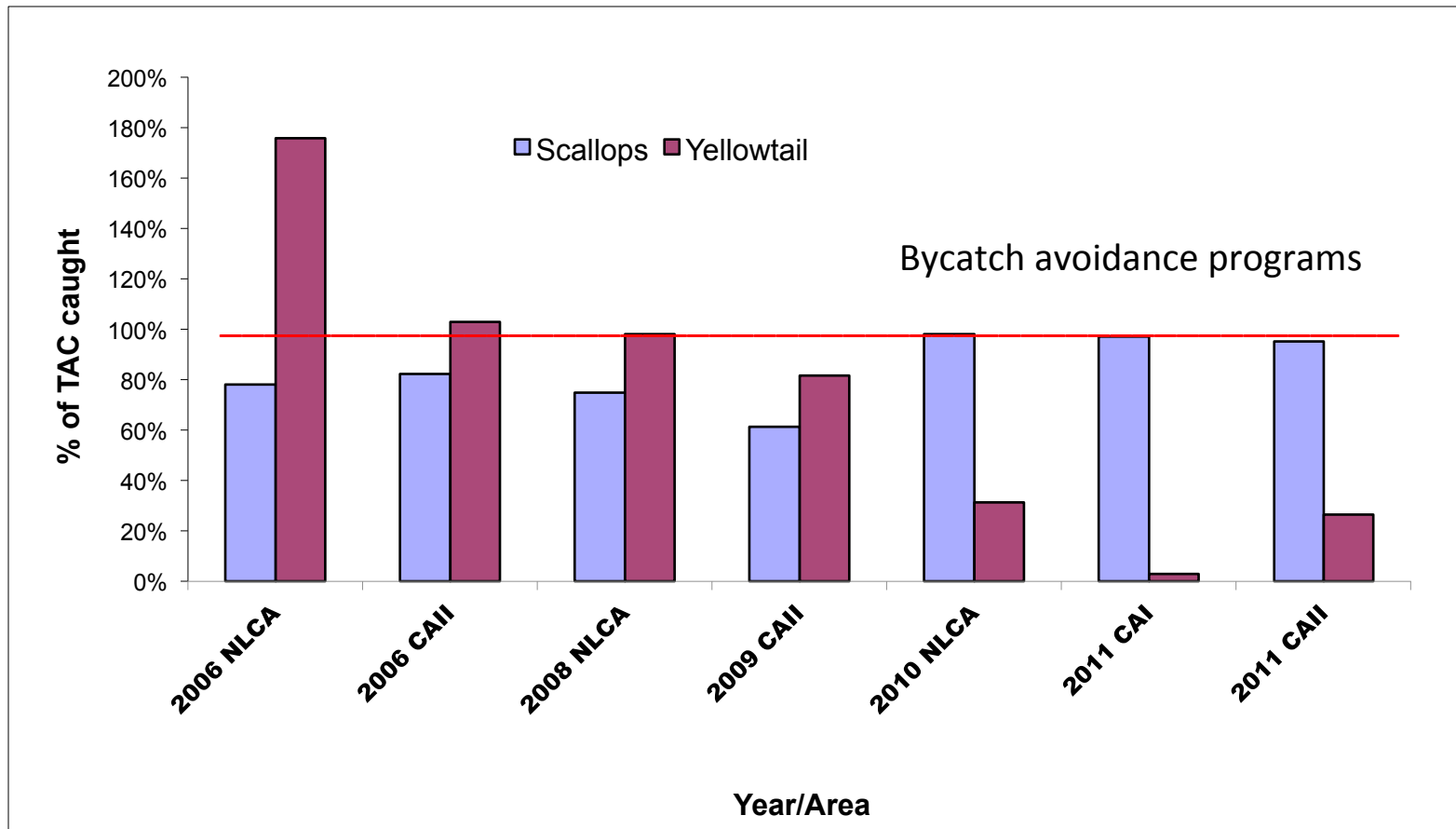
Results: Principles of Collective Action

1. Open decision-making process within clear boundaries
2. Some participants gain large share of benefits
3. Conditional cooperators and willing punishers



2010 Yellowtail Avoidance Program

Results: Catch Ratios

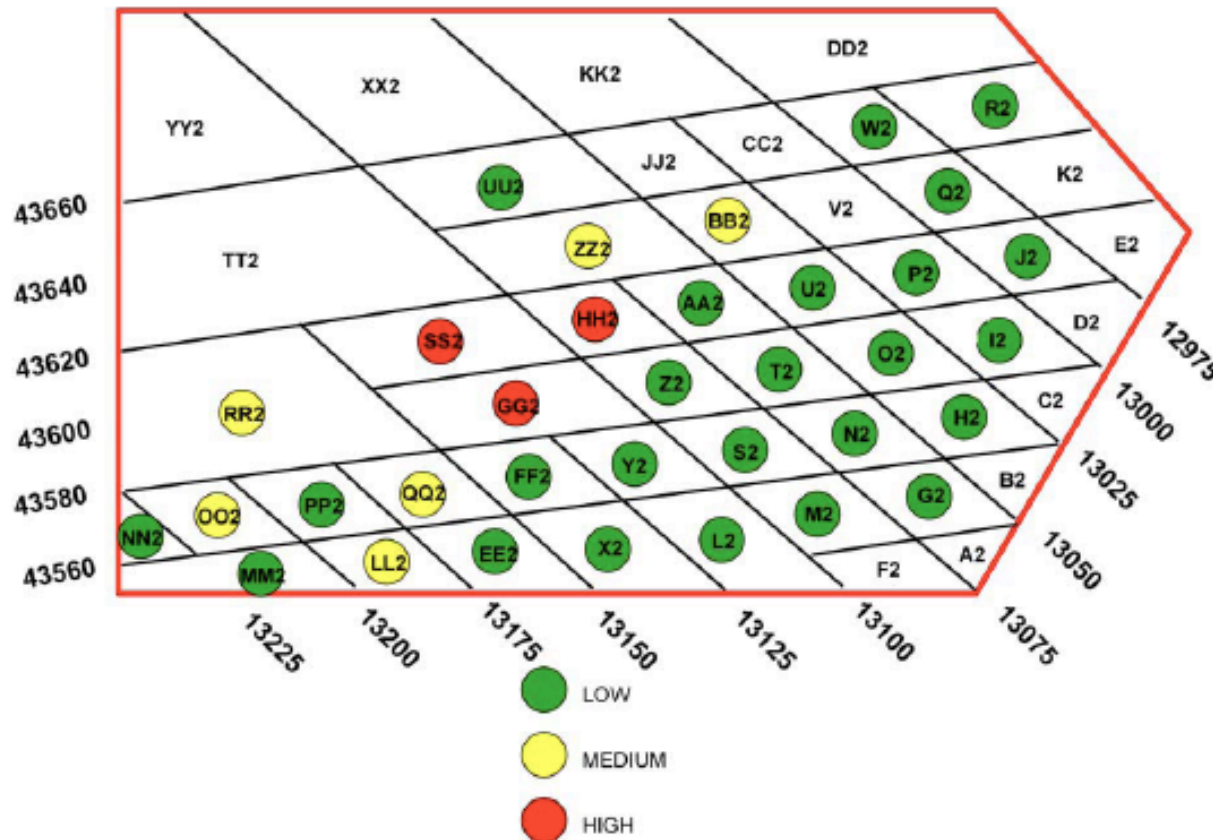


2012 Scallop Management Changes

1. Bycatch TAC no longer closes access area; Bycatch TAC applied to entire stock area (Accountability measures)
1. Three closed areas opened for scalloping on Georges Bank
2. Large cut in yellowtail TAC for groundfishery
3. Bycatch transferred from scallop fishery to groundfishery
4. Yellowtail TAC reduced after fishery started

2012 Scallop C&I Fishery

CLOSED AREA 2



TUESDAY 6/26/2012:

15 boats reported 273 tows

YT catch:

HIGH: GG, SS, HH

MEDIUM: RR, OO, LL, QQ, ZZ, BB

LOW: J, I, H, G, M, N, O, P, Q, R, W, U, T, S, L, X, Y, Z, AA, EE, FF, MM, PP, NN, UU

NO DATA: All other cells

New LOW cell R2. Cells GG2, SS2, HH2 are bycatch hotspots.

Next report 6/27.

Thank you!

Herring and Mackerel Fisheries

Permitted open access fisheries

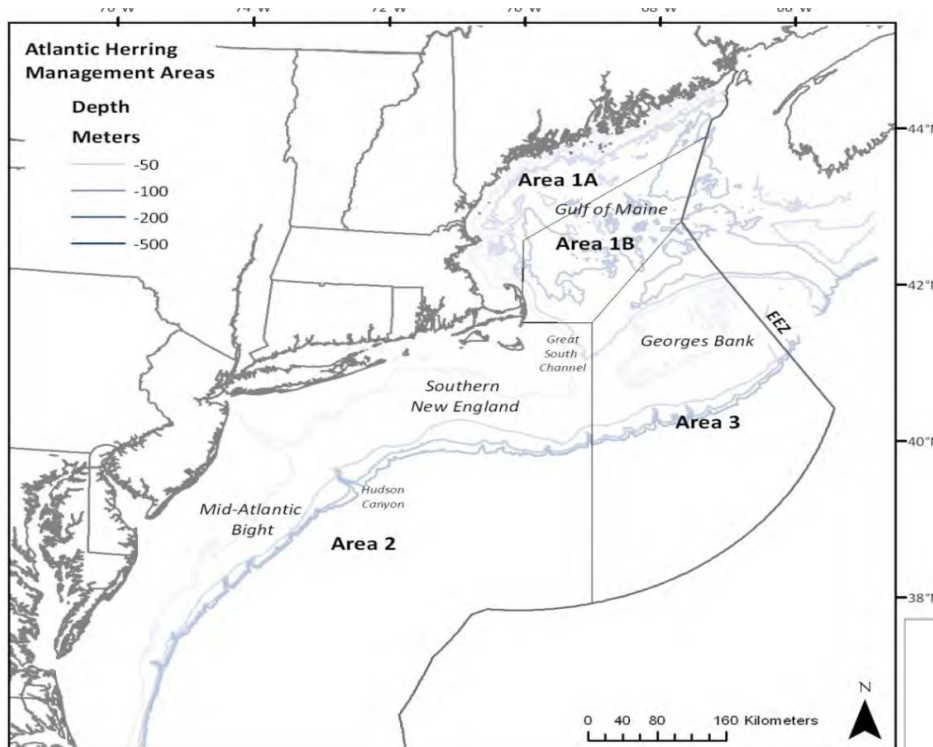
Two target species & three bycatch species very similar in appearance

Targets and bycatch species migrate in circular pattern

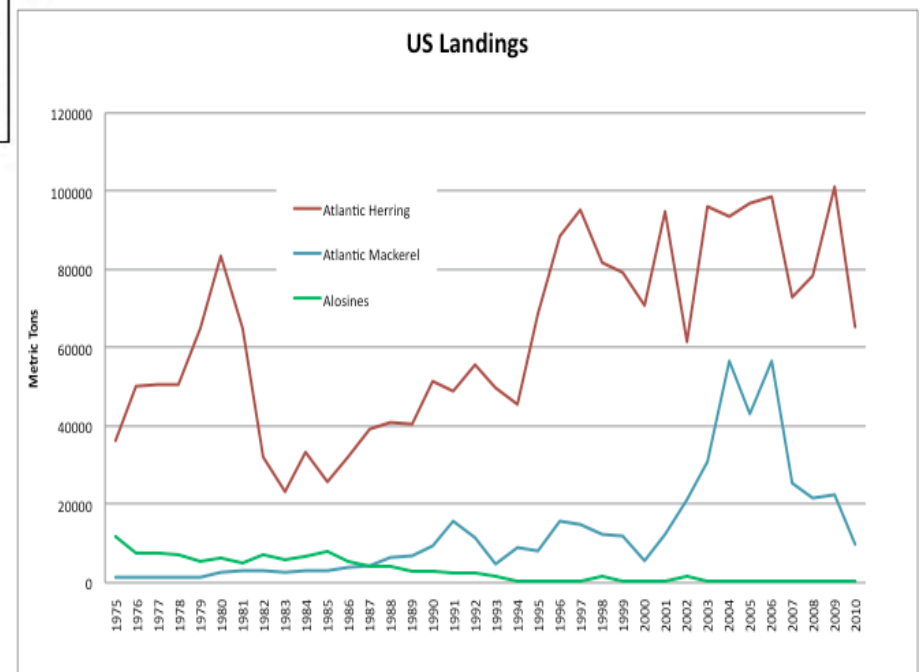


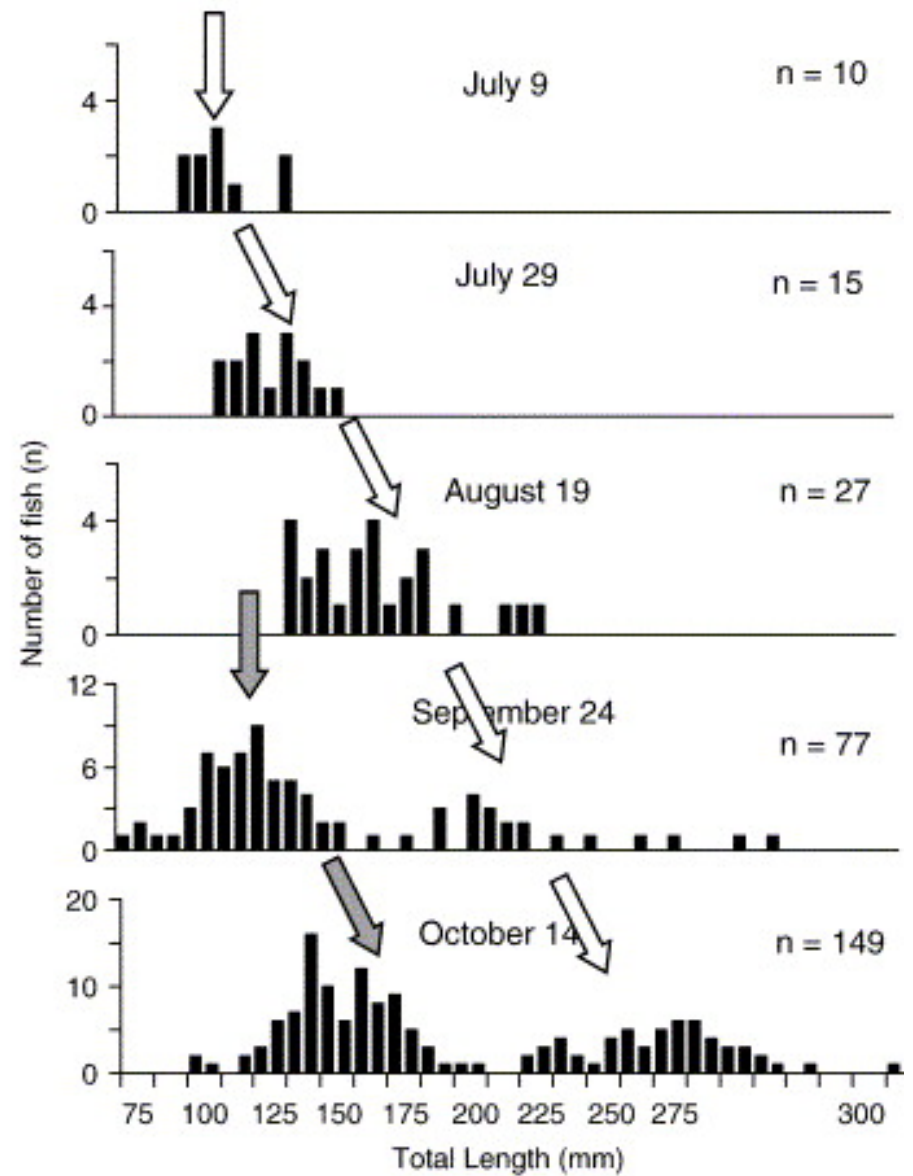
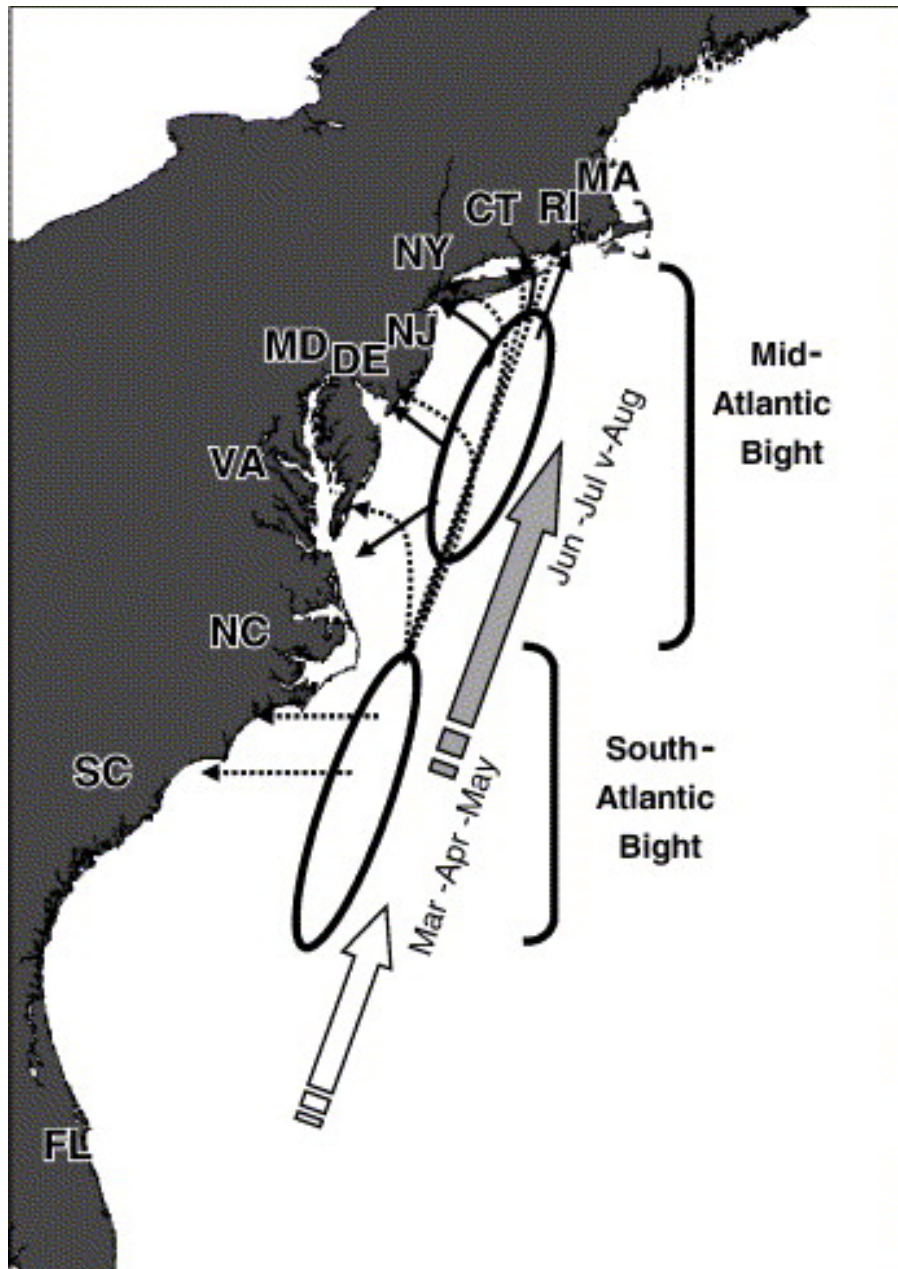
Bethoney et al, A fine scale system to to address bycatch in U.S. midwater trawl fishery, in review

Target Fishery Management



- Atlantic herring
 - Area TACs
 - Landings: ≈\$26.0 million
- Atlantic Mackerel
 - Single TAC
 - Landings: ≈\$9.5 million

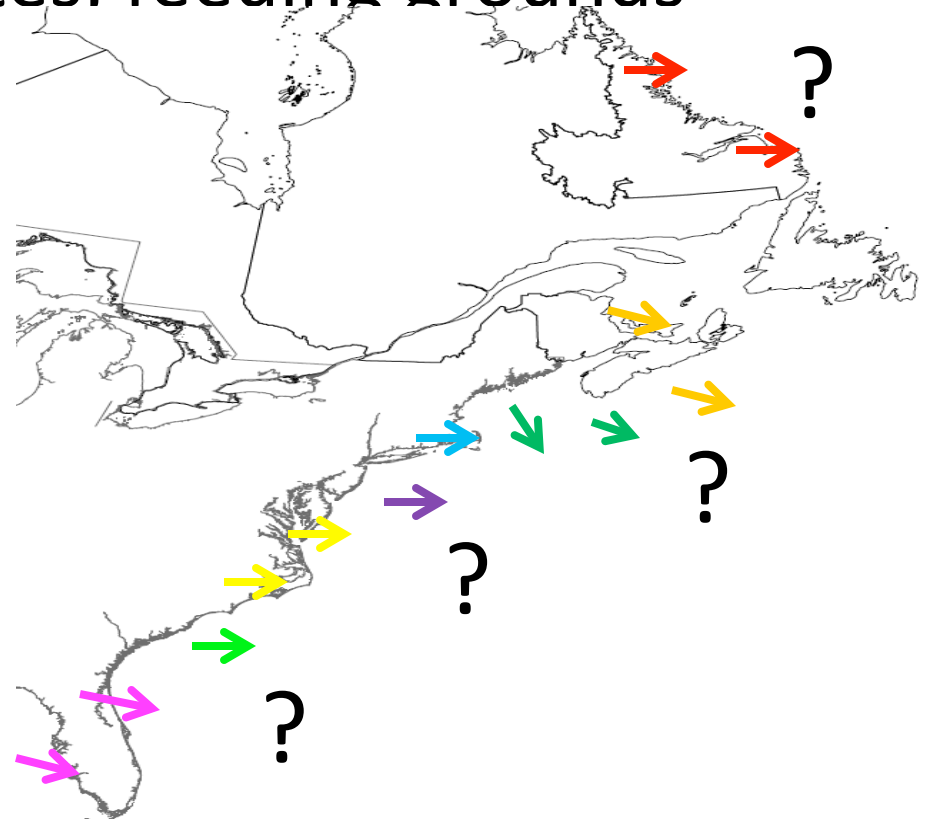




Atlantic Herring migration & size patterns

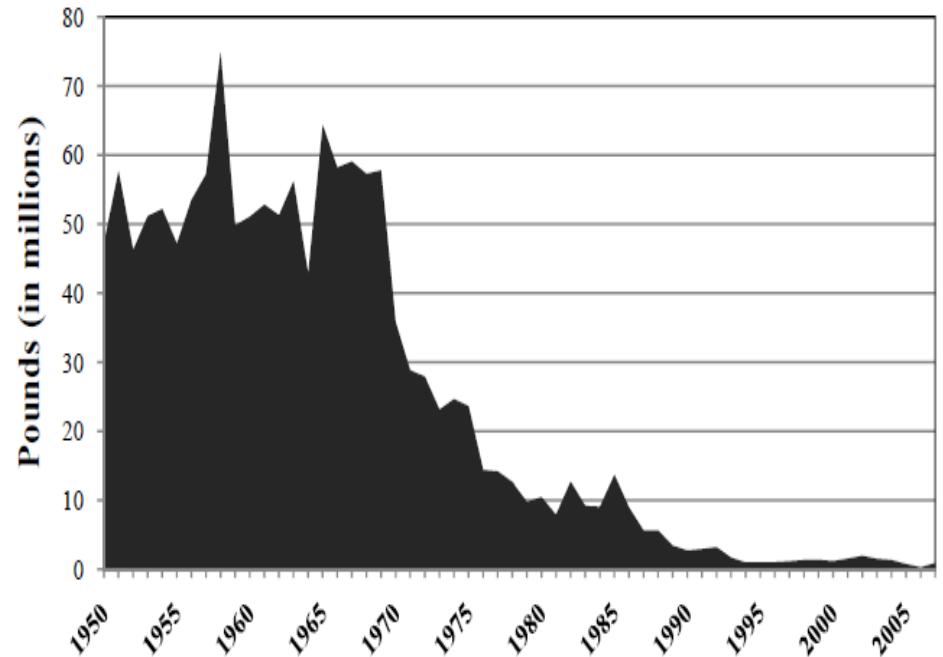
River Herring Unknowns

- Natal homing
- Common migratory routes. feeding grounds
- Bycatch composition
 - Single Region
 - Mixed
 - Seasonal/Geographical
- Herring fishery impacts
 - Focus reduction efforts
 - Stock assessments



River Herring Catch

- Accepted “knowledge” of decline in herring runs
- Landings prohibited in most areas
- Species of concern, some possibility of named endangered species
- Strong pressure from NGOs, local conservation groups



Environmental Factors

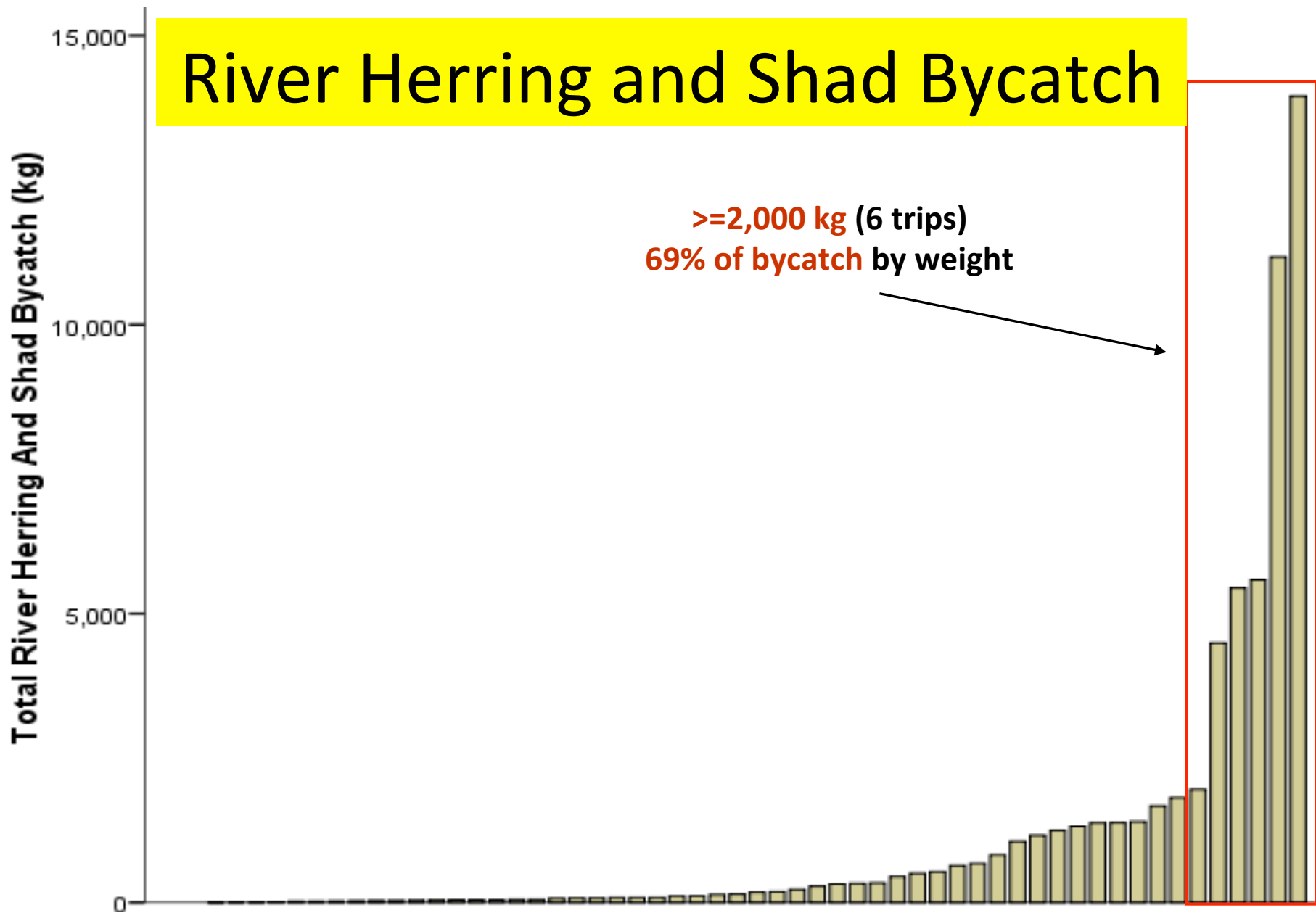
Pollution --Spawning Habitat Loss

↑ Predator Populations

Fishing Factors

↑ Incidental catch at sea

River Herring and Shad Bycatch



Phase 1: Predict Bycatch Rates

Biological evidence of separate schooling

Some evidence of differences in stock migration patterns

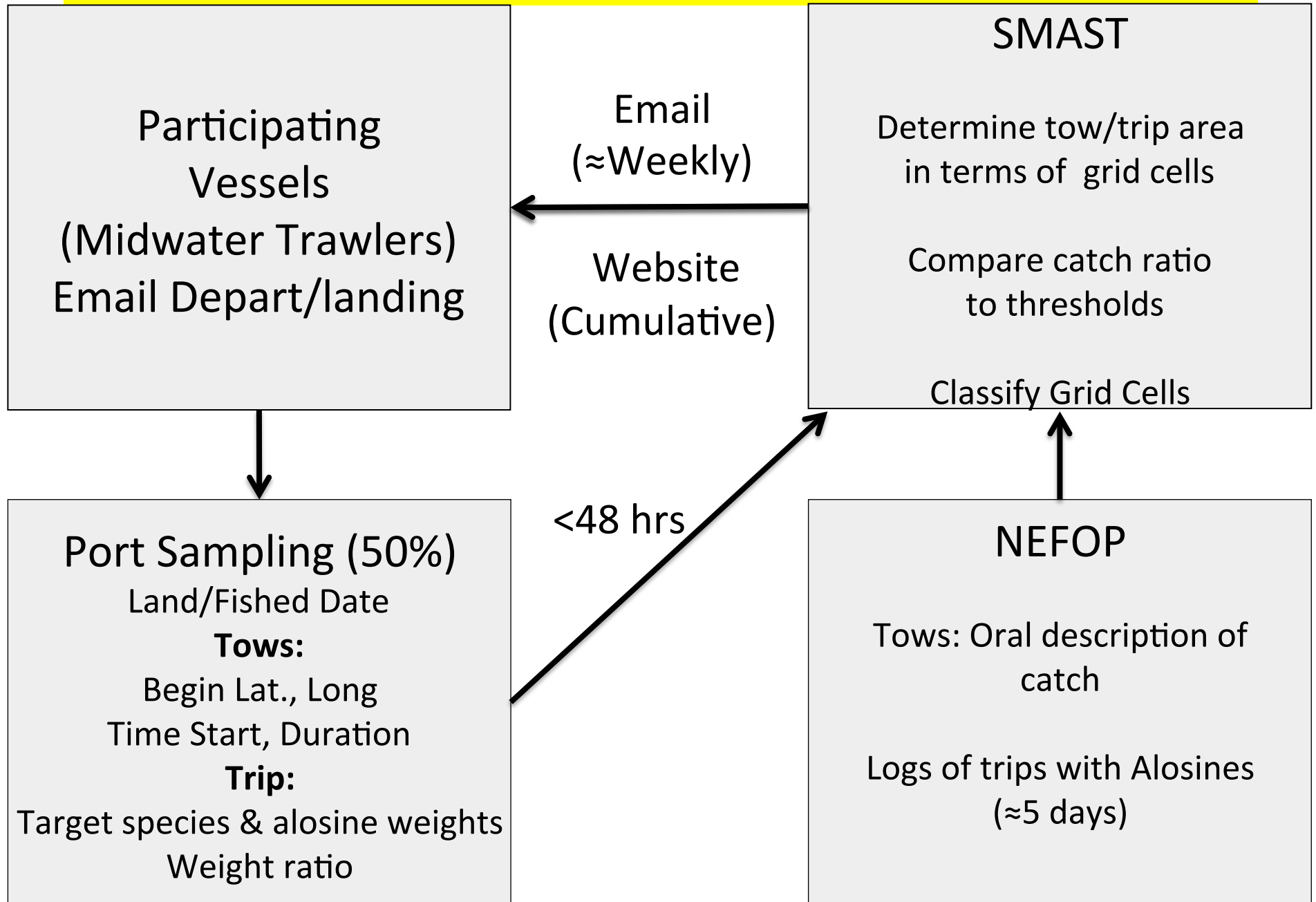
Water temperature & spawning strategies differentiate stocks

FVCOM model to predict ocean temperature

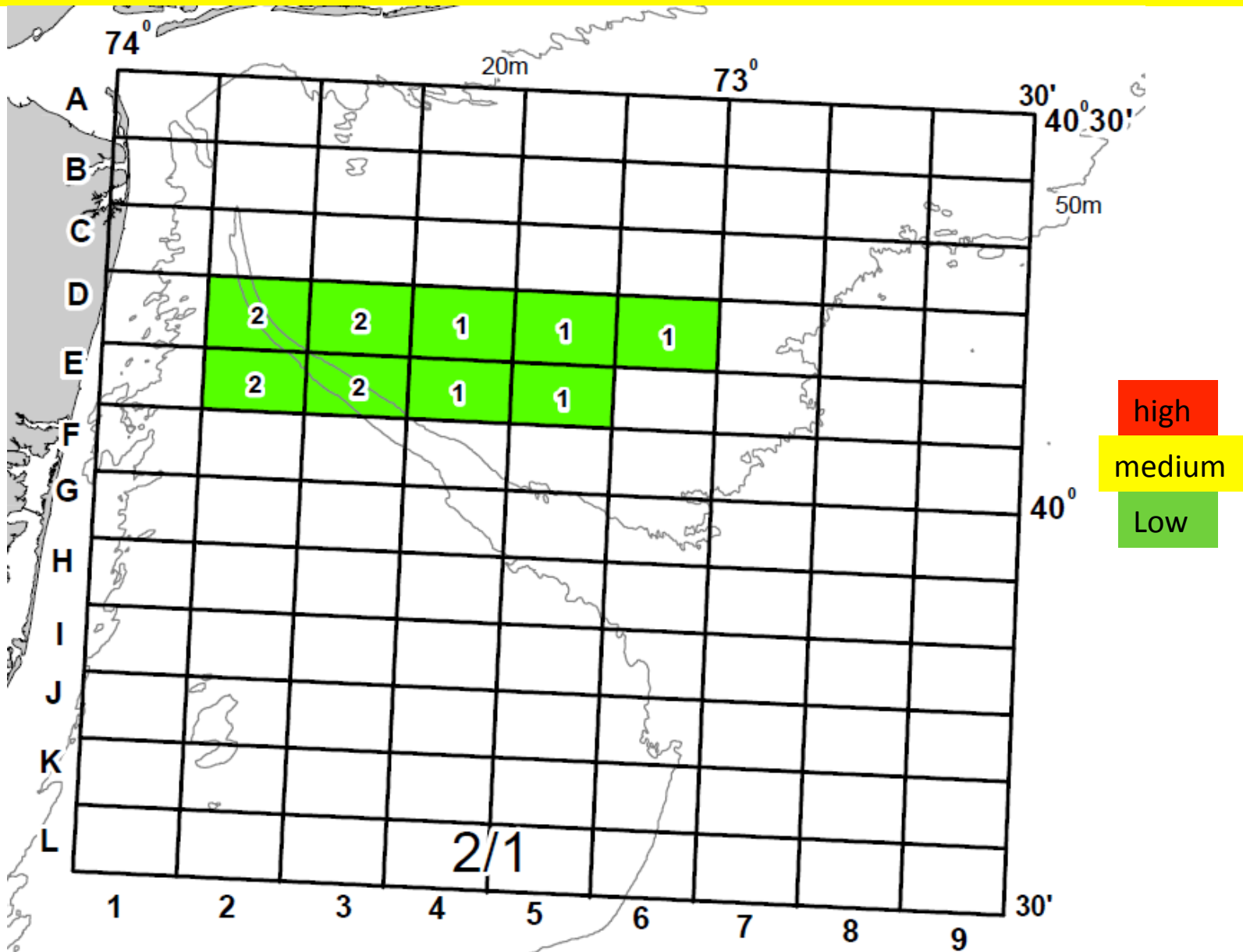
General Advice to fish at specific depths

> 40 fathoms (river herring prefer warmer water)

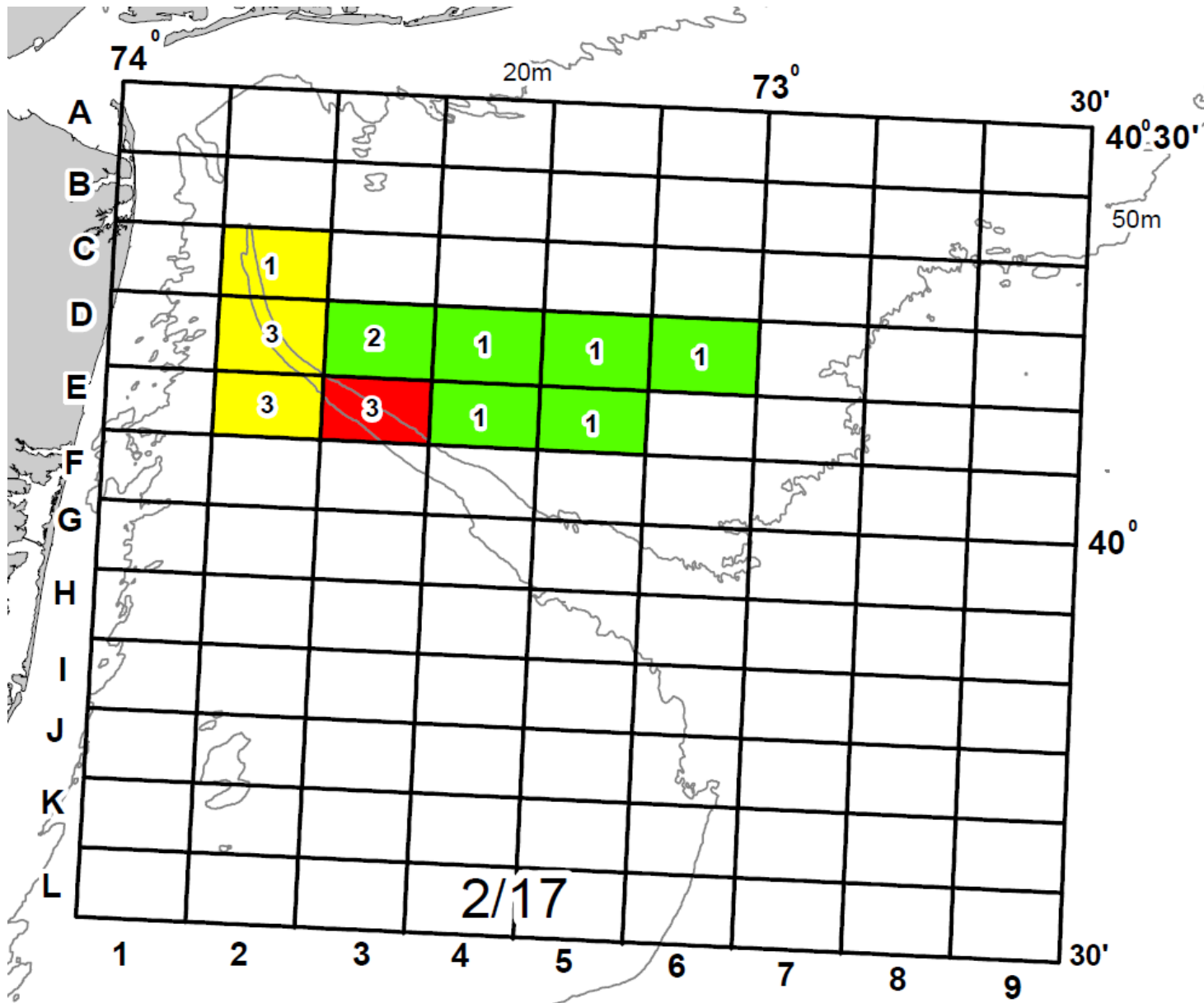
Near real time information system



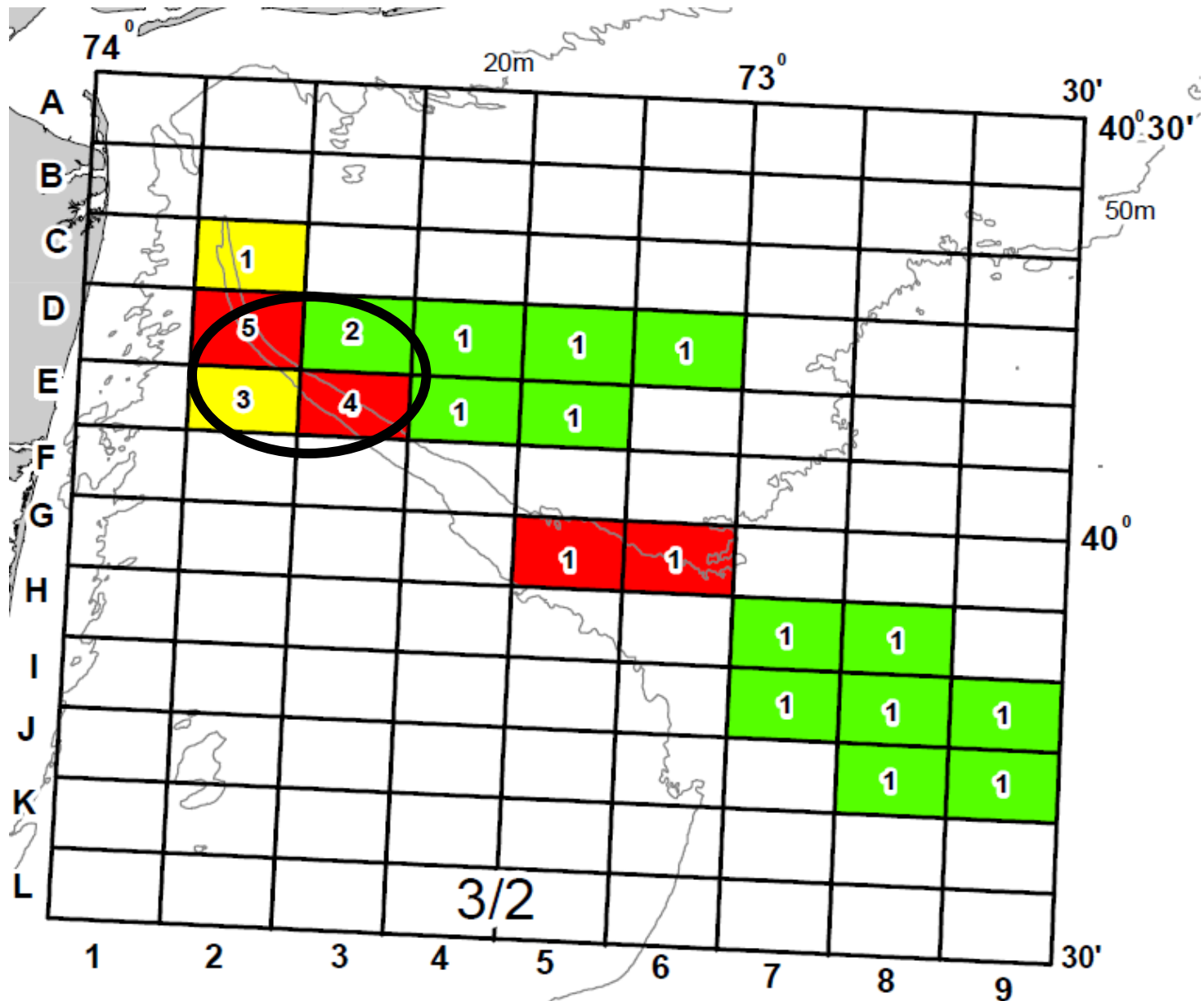
River Herring Densities



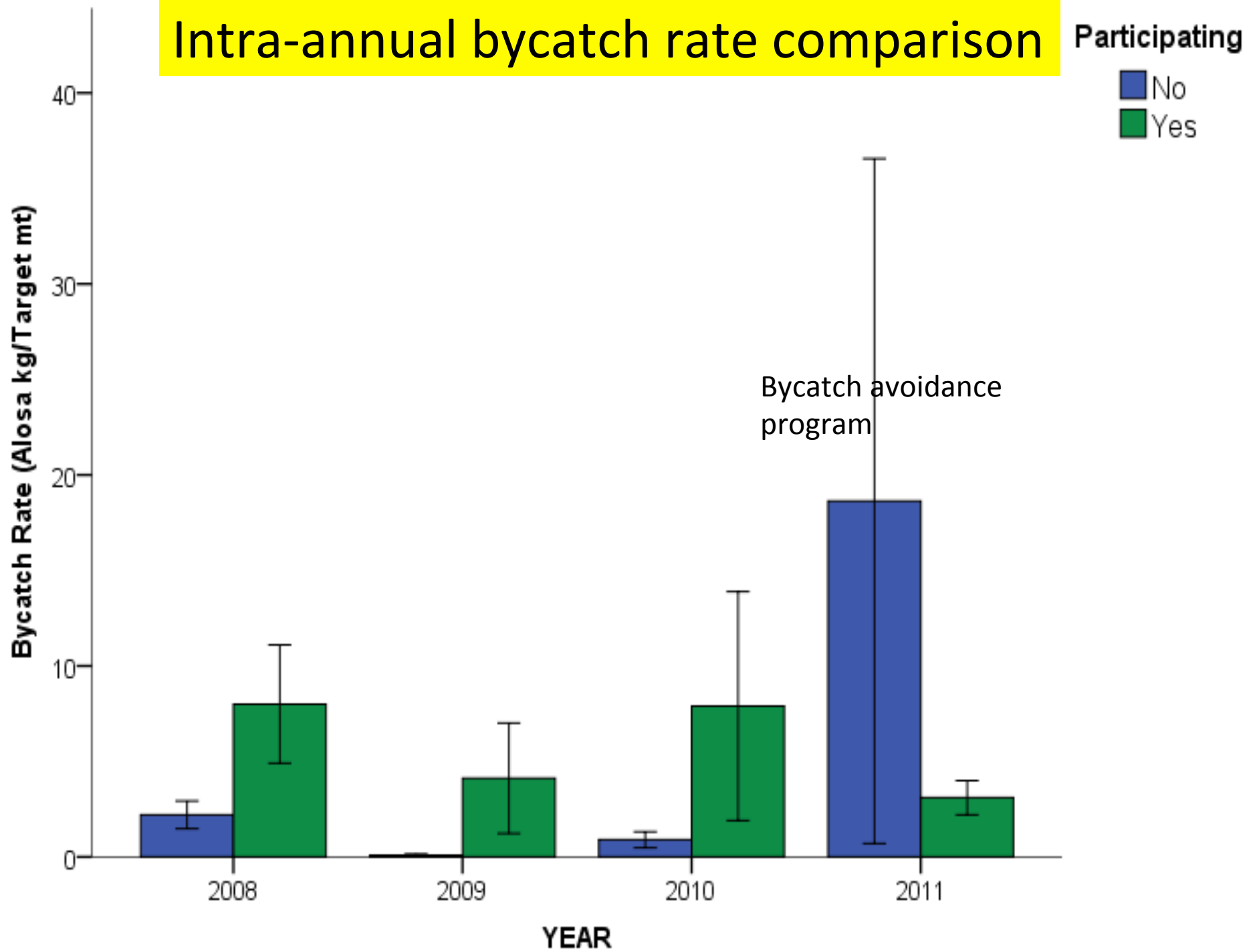
River Herring Densities



River Herring Densities



Intra-annual bycatch rate comparison



Future Work

- Bio-economic model to test effect of programs on bycatch rates (volunteers?)
- Examine effects of Ostrom's design principles, eg, importance of self-determination recognized by authorities
- Effects of low observer coverage on programs

THANKS TO
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