

Science, Service, Stewardship



Cooperative Research

Overview, Assessments & Opportunities

National Science Workshop on
Implementation of Annual Catch Limits

*Crowne Plaza Washington DC – Silver Spring
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National Cooperative Research Working Group

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Patricia Burke – NWFSC & NWRO

John Clary – AKFSC & AKRO



Presentation Outline

1. Cooperative Research Goals and Scientific Objectives
2. Historical Perspective
3. Research Themes
4. Lessons Learned – Requirements for Success
5. Assessment Process – Data Inputs
6. Specific – Timely CR Research Inputs for Assessments:
 - Biology - Age - Size - Growth - Maturity
 - Abundance
 - Catch - Fishery Selectivity Characteristics



Cooperative Research Goals

- Improve the data upon which fishery management decisions are made,
- Foster coordination, cooperation, communication, and mutual respect among scientists, managers, and industry.

Scientific Objectives:

- Improve precision of analytical stock assessments and address concerns about bias in sampling.
- Fill Data Gaps.
- Improve the temporal and spatial resolution of multi-species catch (haul based), gear performance, and life history data to support more timely analysis of a greater diversity of management options.



Pre-NMFS & Early NMFS History

- Voluntary commercial landings, interviews and biological sampling prior to 1980's.
- Early Fishery / Fleet Studies – CA sardine – AK Halibut – Boston Haddock Logs
- Exploratory Fishery Development – Atl & Pac Tropical Tunas – Atl Swordfish – Gulf Red Snapper – Gulf Shrimp.
- Tagging Studies – Cod early 1900's – Billfish, Tuna, Sharks 1958-1963
- New gear and operating practices – early bycatch reduction initiatives – Tuna Purse Seine - marine mammal – shrimp trawl – sea turtle excluders - trawl mesh selectivity – halibut hook selectivity.





Recent NMFS History

Abbreviated list of regional projects initiated in early 1990's:

NE – cod tagging – IBS YTF, Cod, NEAMAP, & ME-NH surveys - Study Fleet eLogbook.

NW – Pacific Groundfish Trawl Survey

SE – Shrimp fishery effort logger – SE State & Fed Cooperative Statistics Program - w/ HMS - circle hook turtle bycatch reduction in pelagic longlines.

SW – Albacore logbook biosampling – Commercial Passenger Vessel survey

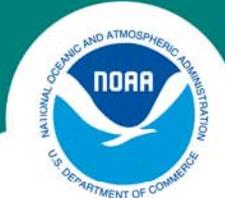
PI – lobster tagging and assessments – bottom fish life history



Lessons Learned Requirements for Success

- **Frequent dialogue and periodic formal strategic planning**
- **Responsiveness to management – Councils & Commissions**
- **Collaboration with NMFS scientists and technical Council staff can speed management consideration**
- **Field Operations require extensive infrastructure support**
- **Research Competitions require administrative support**
- **Timely peer reviews**
- **Industry Feedback**
- **Industry Feedback**
- **Industry Feedback**





- Over 600 Industry Participants
- More than 20 NGO & University Partners
- Over 114,000 Gulf of Maine cod tagged
- More than 250 Fishermen trained in Safety-At-Sea Programs
- Over 150 Fishermen educated in Fishery Science and Management



Cooperative Research Works!



Overview Cooperative Research Themes

- **Industry Based Surveys** - Fishery Independent Survey Designs.
- **Fishery Dependent Sampling** (Fishery Wide or Study Fleet Designs).
- **Tagging Programs**
- ***Conservation Engineering***
- *Habitat and Oceanographic Observations*
- *Resource Dynamics*
- *Socio-Economic Surveys*
- *Outreach – Education – technology transfer*
- *Strategic Planning – Management Strategy Evaluations*



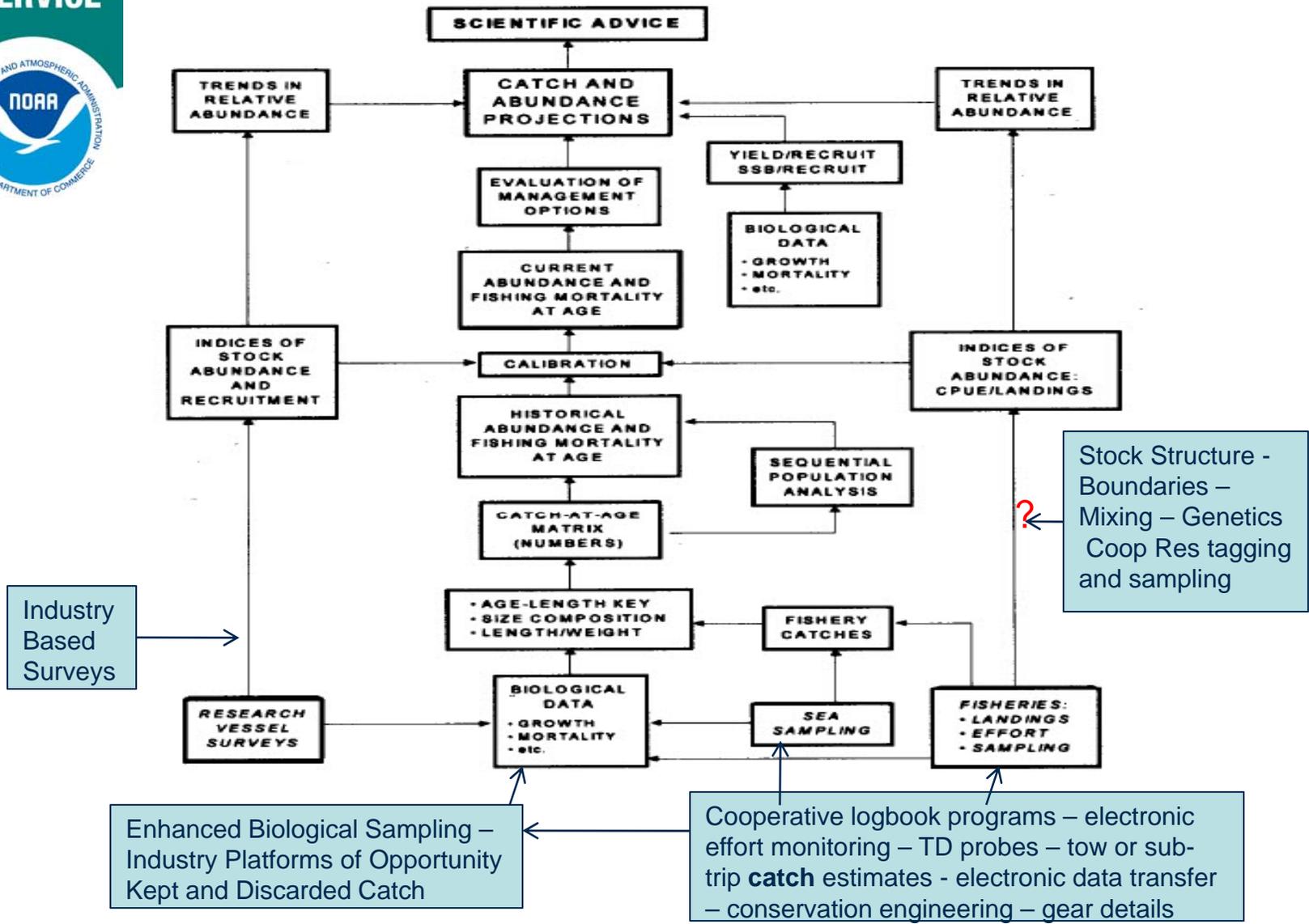
Advanced Models

Longer Term Cooperative Investigations – data fundamental to ecosystem dynamics and response.

- **Habitat and Oceanographic Observations.** (various video and acoustic mapping - NW – SeaKeeper – NE eMolt – TD probes on lobster traps – SF trawl TD-GPS tow data).
- **Resource Dynamics** – Predator - Prey
- **Socio-Economic Surveys** – Infrastructure – Regulation impacts



Assessment Opportunities





Conservation Engineering

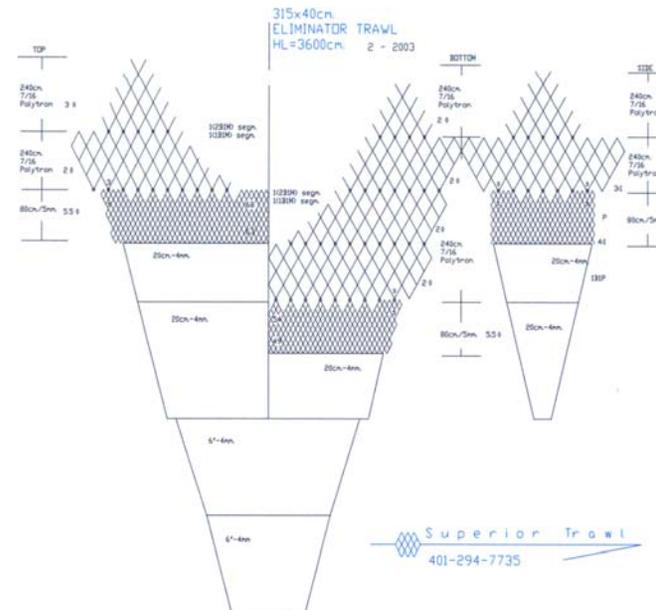
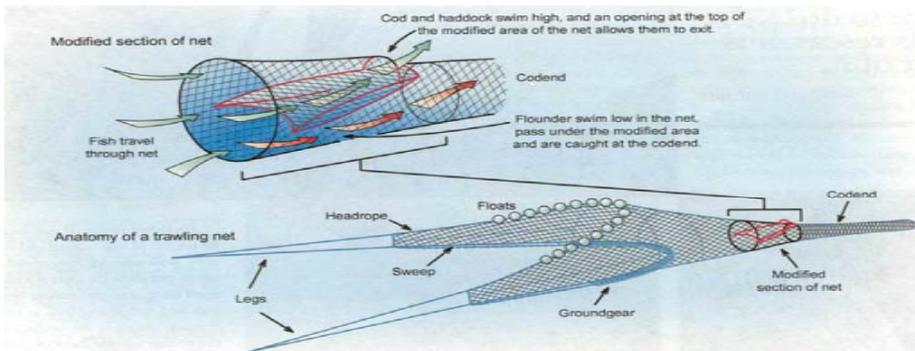
An abbreviated list of conservation engineering projects
(emphasizing those funded at least in part by Cooperative Research)

AK & NW – Minimizing seabird bycatch in longline fisheries - salmon excluders in Alaska Pollock fishery, reduced groundgear (sweep) impacts - Sweep effects on flatfish and pollock catch rates.

SE – Minimizing recreational red snapper discards – bait and circle hook selectivity. Turtle and finfish excluder devices tropical shrimp fishery – circle and weak hook studies in longline fisheries.

NE – Ruhle trawl haddock fishery – topless northern shrimp trawl, raised footrope nets, drop chain flounder trawl, scallop dredge twine top mesh and turtle chains,

SW – PI – HMS w/ SE – longline turtle bycatch





Fishing Operations will change!

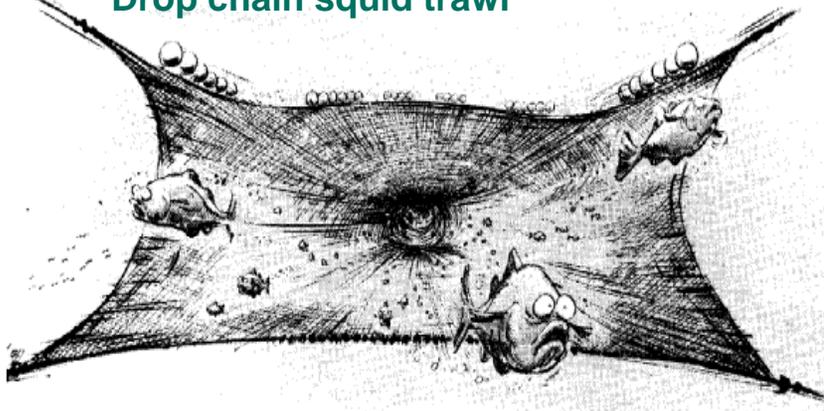


Standard shrimp trawl catch



Topless shrimp trawl catch

Drop chain squid trawl





Tagging Programs

Brief List – emphasizing Cooperative Research funded tagging

NE – cod, haddock, monkfish, halibut, black sea bass,
yellowtail flounder, winter flounder, spiny dogfish, pelagic and
coastal sharks – loggerhead sea turtles, scallops

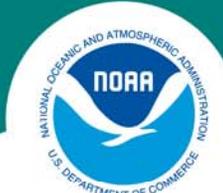
SE – Red snapper, grouper, Atlantic tuna, billfish, swordfish,
coastal and pelagic sharks.

SW – Albacore tuna, swordfish and leatherback turtles,
thresher and other pelagic sharks.

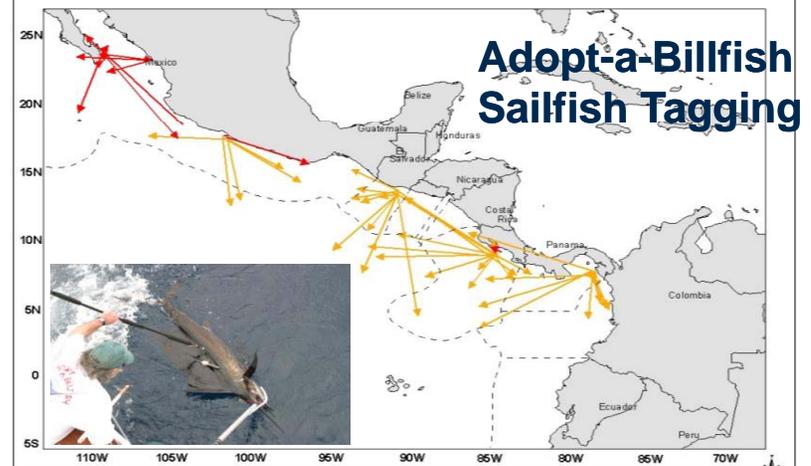
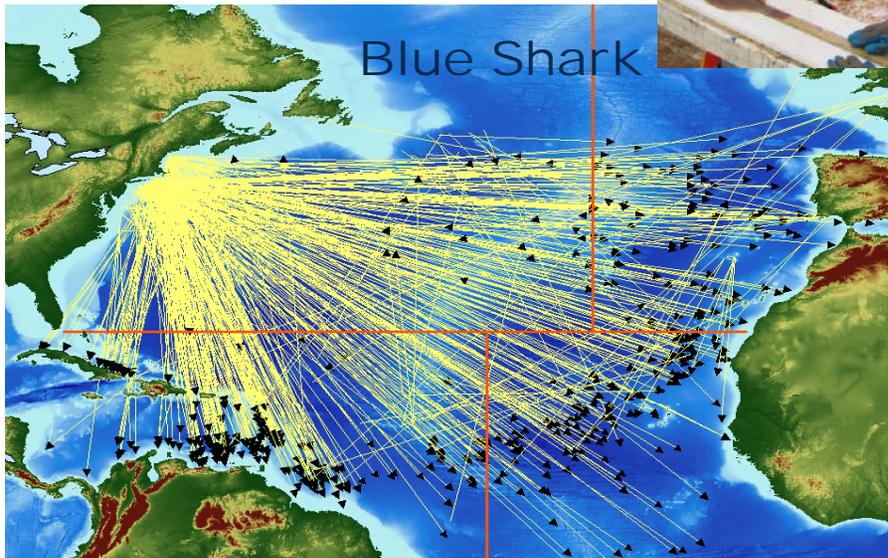
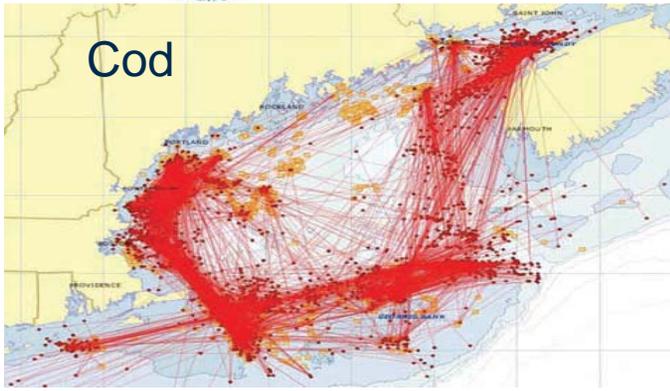
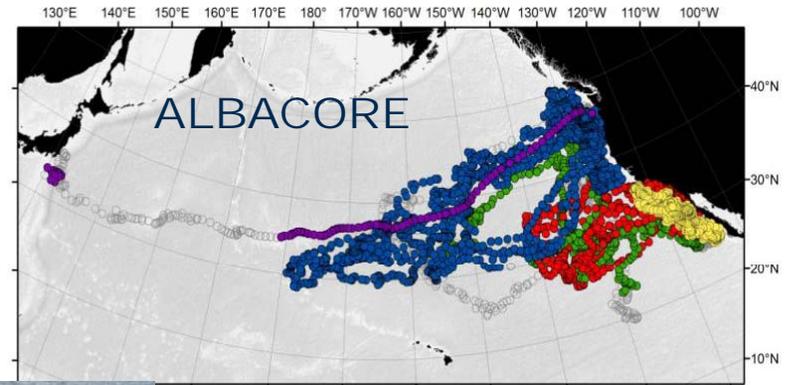
AK – Pacific cod, juvenile sablefish,

PI – HMS, Deepslope bottomfish,





Tagging -- ???





If your gonna stick em make it count –
timely data accessibility is critical!

Black Sea Bass



Released: 13,837
Recaptured: 2,530
Furthest Distance: 435 nm
Longest Time at Liberty: 1,968 days

Yellowtail Flounder



Released: 45,661
Recaptured: 3,811
Furthest Distance: 351 nm
Longest Time at Liberty: 1,698 days

Sharks



Released: 203,997
Recaptured: 13,749
Furthest Distance: 3740 nm
Longest Time at Liberty: 27.8 yrs

Haddock



Released: 20,418
Recaptured: 352

Cod



Released: 114,693
Recaptured: 6,720
Furthest Distance: 688 nm
Longest Time at Liberty: 1,140 days

Scup



Released: 5,664
Recaptured: 70



Abundance Indices

Assessment use requires a pilot survey period, verification that cohorts are being tracked, and a peer review.

Trawl

- NE NEAMAP – ME-NH
- NE Monkfish
- AK GOA Rockfish
- NW – WC Groundfish
- NE Survey sweep study
- AK – survey crab catchability

Dredge

- NE Surf Clam
- NE Scallop

Longline

- AK EBS & GOA Bottom LL
- SW Thresher shark
- NE GOM halibut – cusk
- NE GB Blue Shark

Video – Acoustic

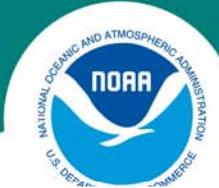
- NE Scallop Video (SMASST & HABCAM)
- PI Deepslope Bottomfish (Guam) AUV, TOAD, Baited Camera
- AK WGOA Pollock acoustics
- SW ROV cow cod conservation areas
- SW acoustic – optical sardine - jellyfish

Hook & Line

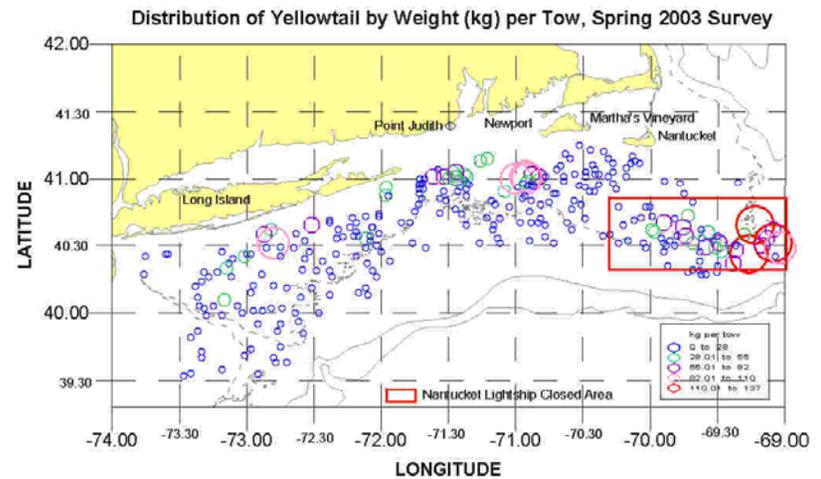
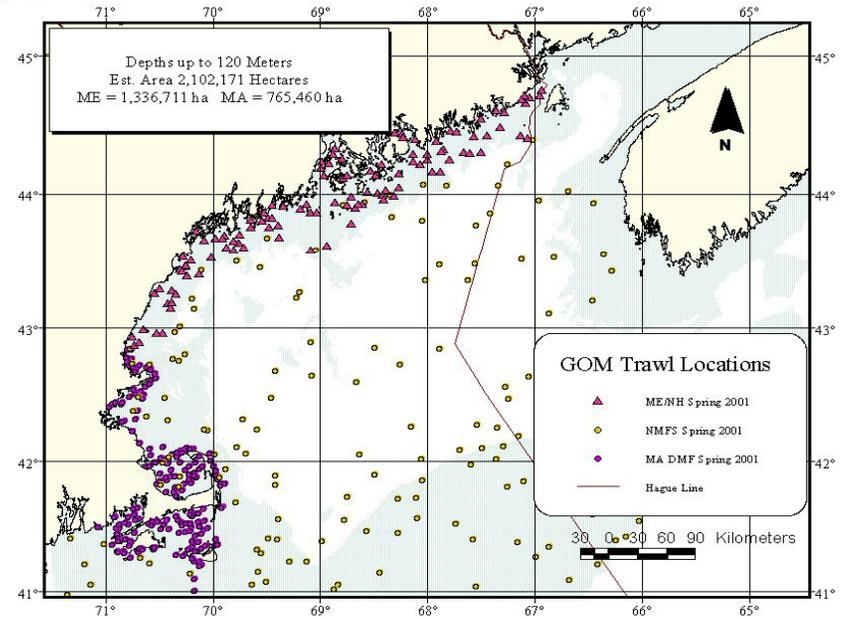
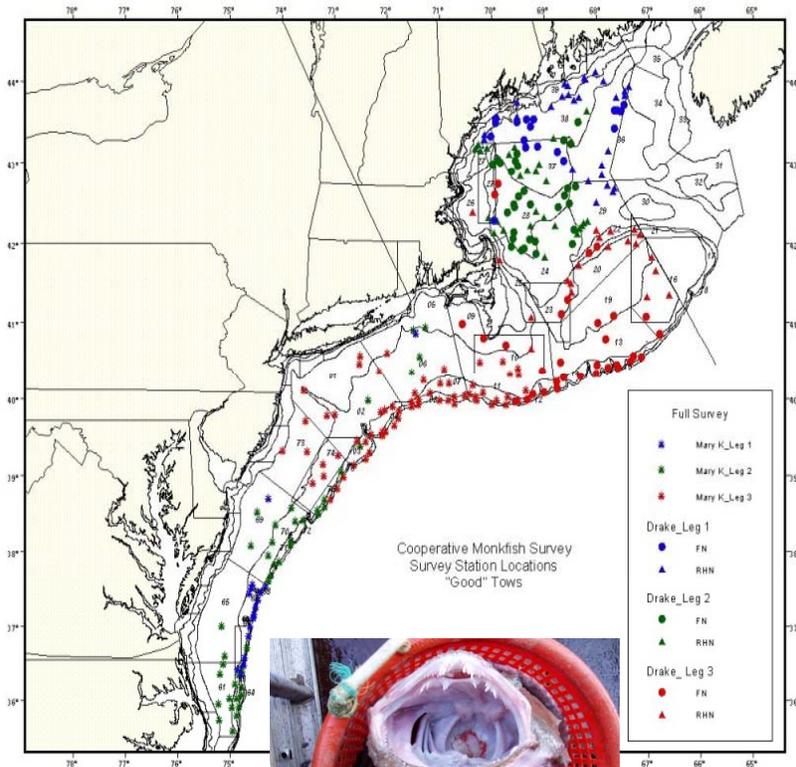
- NW – SCB rockfish
- PI Deepslope Bottomfish
- SE Bandit & Rec Reef Fish

Trap

- NE lobster
- NE SNE Scup – Sea Bass
- NE GOM wolfish



NE – Industry Trawl Surveys



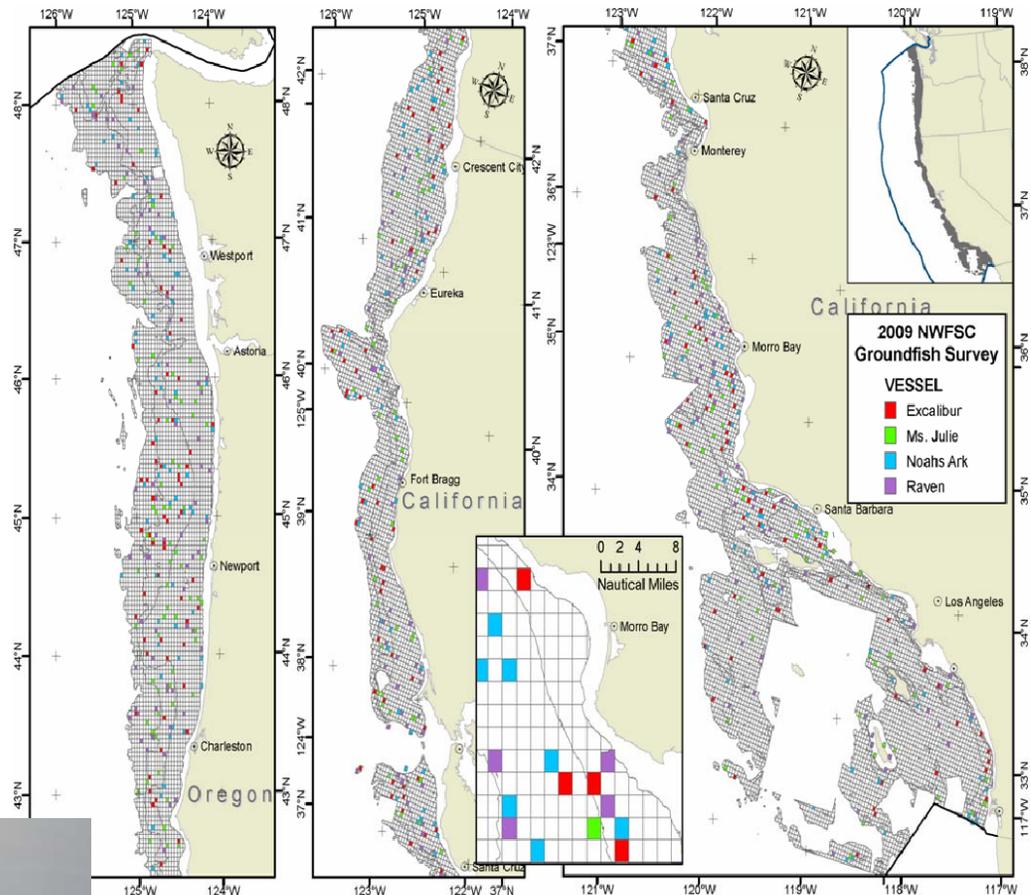
NOAA FISHERIES SERVICE



Four west coast commercial trawlers.
@ 5.5 Months @ 188 stations/vessel
684 successful

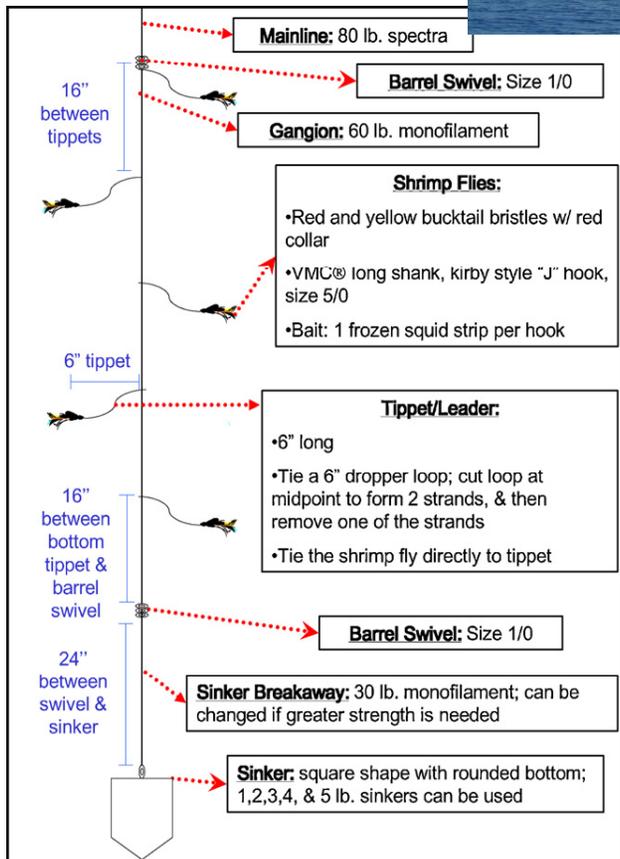
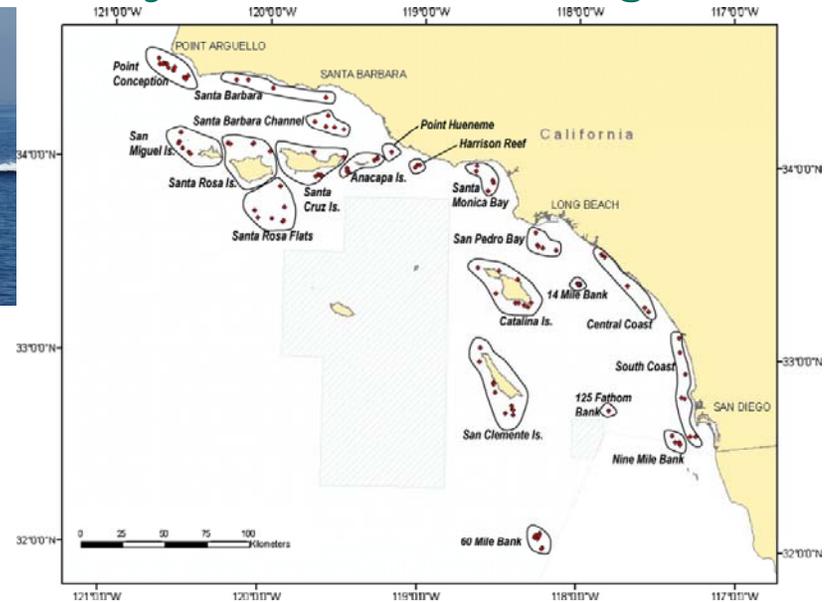


West Coast Groundfish Bottom Trawl Survey





Hook and Line Survey - Southern CA Bight



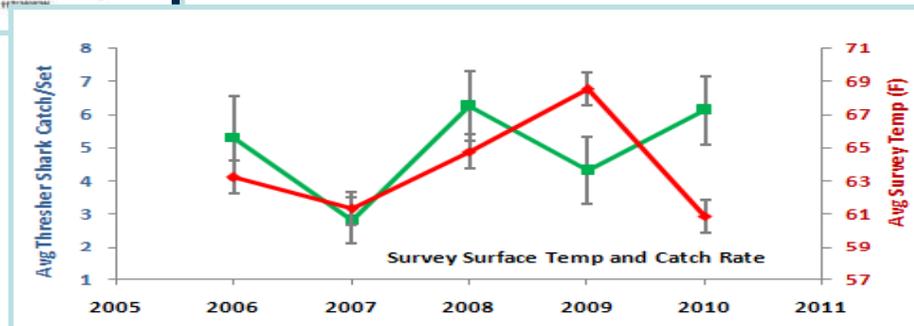
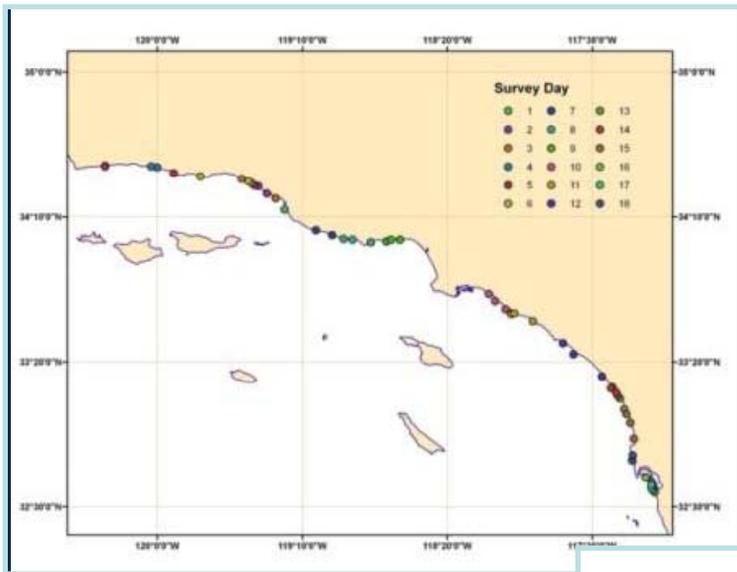
- 2004 to Present – 2 chartered sportfishing vessels
- Crew of 8 – Captain & mate – 3 deckhands – 3 biologist
- 12 days each vessel – 121 fixed sites – Hook& line sampled
- 3 deckhands – 5 coordinated drops – 5 hook sampling rig (75 hooks per site) 5 minute max soak.
- ~ 3,000 fish sampled / survey
- 5 assessments
- **Bayesian GLM model**





Thresher Shark Pre-recruit Survey

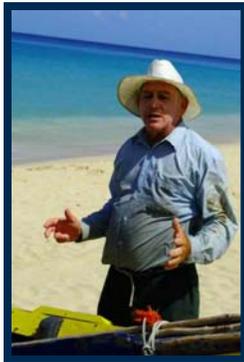
- Track trends in abundance of neonate thresher sharks as an index of reproductive female sharks
- Tagging and biological studies on thresher sharks





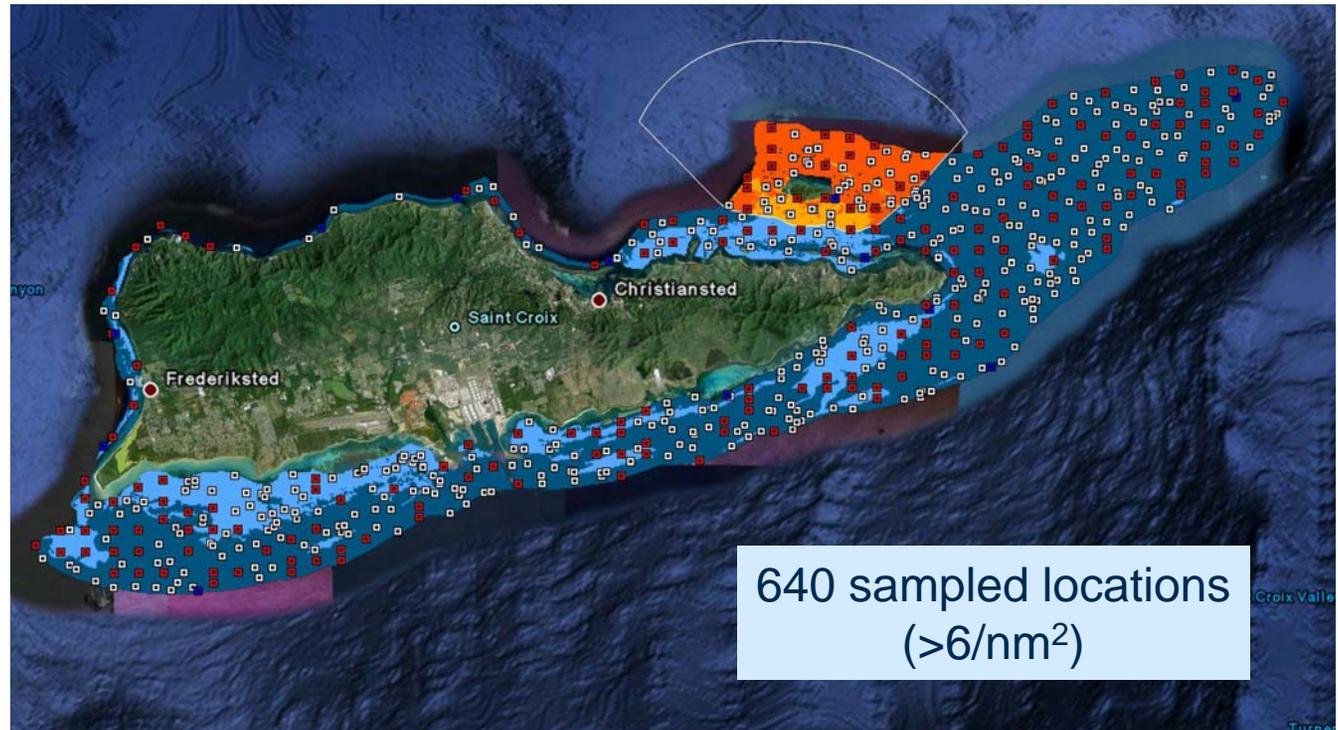
St. Croix Cooperative Fishery Independent Trap Survey

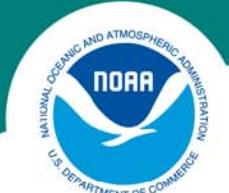
- **first spatially comprehensive fishery-indep. survey**
- **cooperative design is cost-effective and will begin to build bridges between stakeholders and managers.**
- **will aid efficient design for other US Caribbean regions**
- **Funded by Coral Reef Conservation Program**



Novel sampling design

- **Stratified random- 400 (white) by bottom type**
- **Systematic- 200 (red) - model-based estimates**
- **Fixed stations- 8 (blue) (UVI time series)**





Deepslope Bottomfish Research Main Hawaiian Islands (MHI)

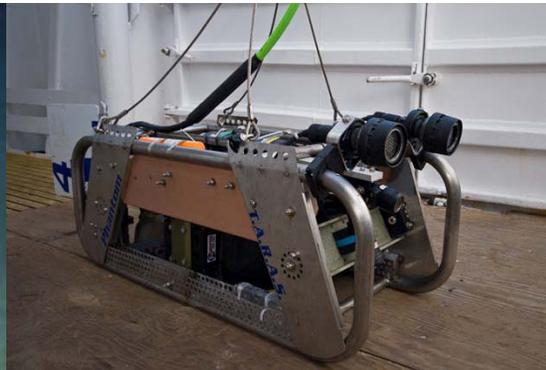
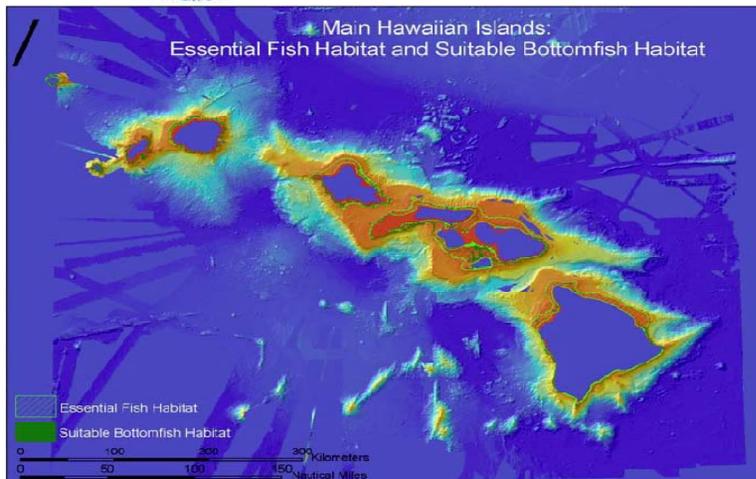
Three integrated Projects:

Fishery Independent Survey Feasibility Study

- ➔ Geo. Scope limited to Oahu-Maui area
- ➔ Includes biosampling

MHI Bottomfish Tagging – Deep 7 Focus

MHI CPUE Workshops / Outreach





Biology – Age Growth Reproduction

Cooperative Research can be effectively focused on priority data gaps:

- Rare species w/ limited observer sampling.
- Expanded sampling of discarded catch (regulatory discards as well as unmarketable species).
- Fresh reproductive samples not usually available or sampling focused on time-area strata where critical reproductive stages have been inadequately sampled.
- Periodic focused efforts to monitor changes in growth and reproductive parameters as stock demographics change.



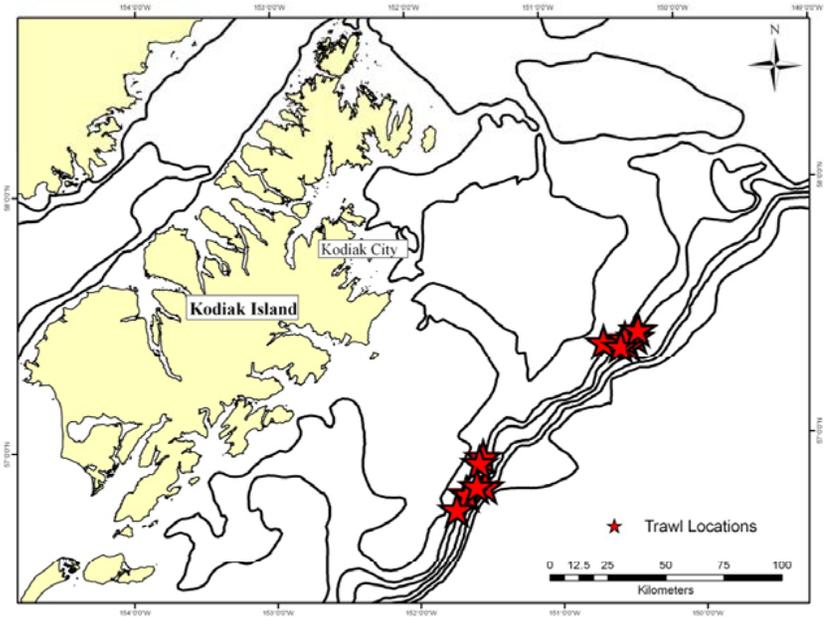
Figure 2. Locations fished with a bottom trawl during charter operations.

Table 1. Rockfish sampled during charter days.

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AK – GOA Multi-Species Rockfish Reproduction



Species	Number sampled
Pacific ocean perch	271
Blackspotted rockfish	256
Rougeye rockfish	251
Shortraker rockfish	190
Northern rockfish	190
Dusky rockfish	61
Harlequin rockfish	17
Redstripe rockfish	16
Sharpchin rockfish	2
Redbanded rockfish	1

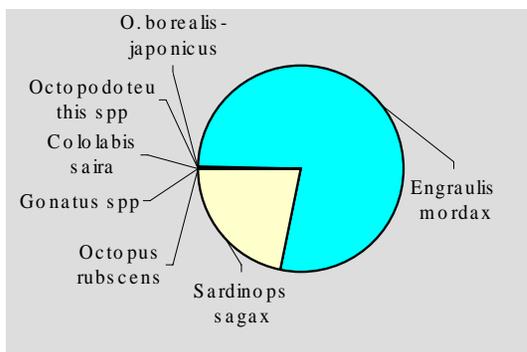


	2007	2008	2009	2010
Albacore	116	35	93	309
Yellowfin	15	45	122	71
Bluefin	0	94	83	54

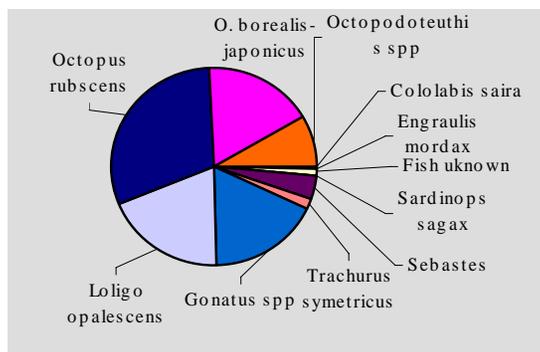


- Otoliths, fin clips, scales, muscle tissue, liver, stomachs and gonads archived
- Initial analyses focused on foraging ecology and show interannual variation linked with climatic variability

Albacore Feeding Habits



2007



2008



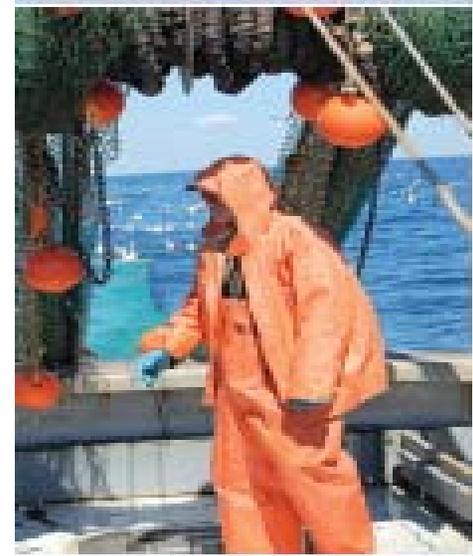


Fishery Dependent Cooperative Sampling

Cooperative Research is focused on complementing existing programs.

eLogbooks – ready to go?

- **Filling data gaps.**
 - **Developing, testing and verifying new technology.**
 - **Platforms for targeted biological sampling.**
 - **Gear and Operational characteristics.**
-
- **Increasing the detail and number of observations used to characterize catch, harvesting patterns of fleet components to support the estimation of discarded catch.**

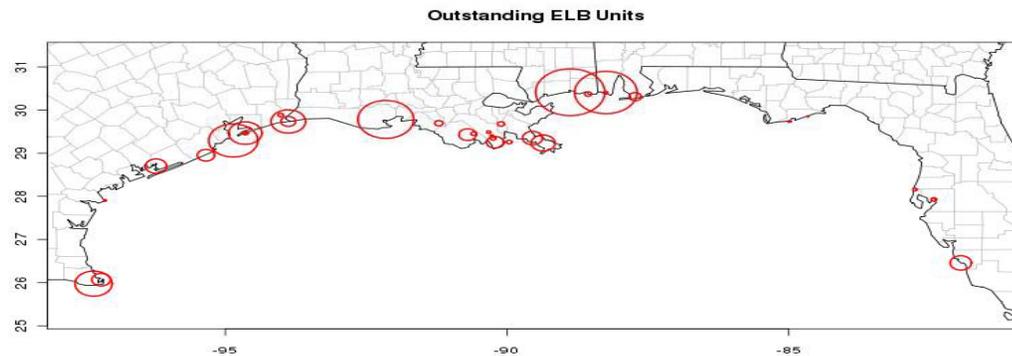




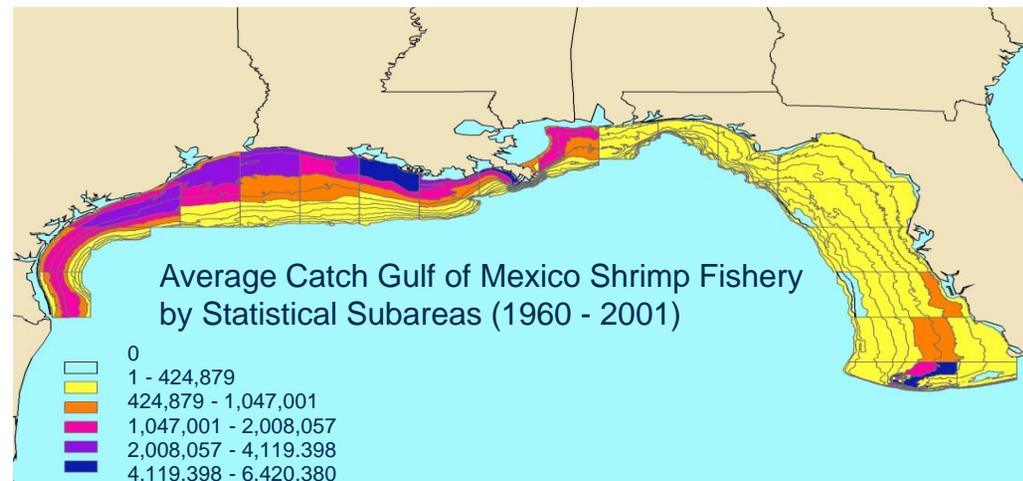
GOM Shrimp ELB Distribution

Effort is a primary component in the calculation of bycatch for sea turtles, red snapper and other species. A catch rate is created then multiplied times the effort estimate for an area / time to calculate bycatch.

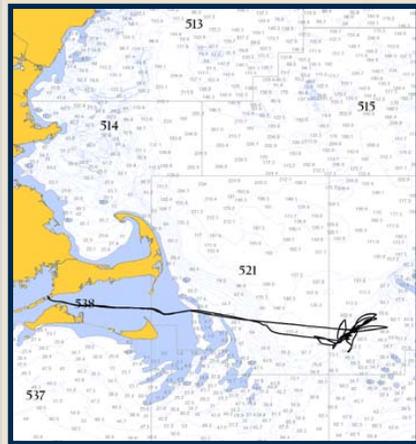
$$\text{Bycatch} = \text{CPUE} * \text{Effort}$$



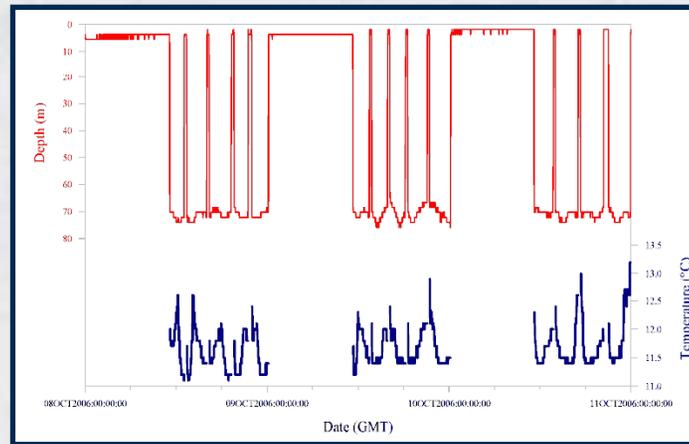
Largest circle is approximately 50 vessels



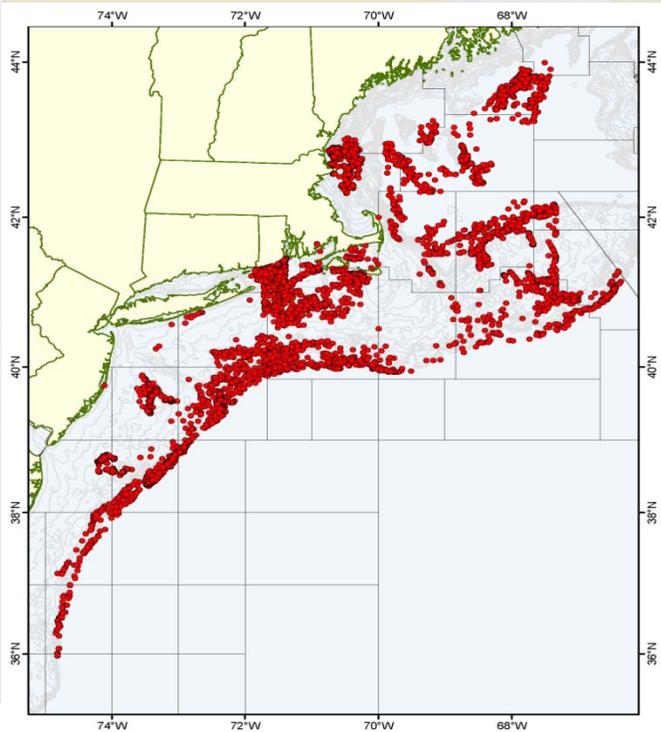
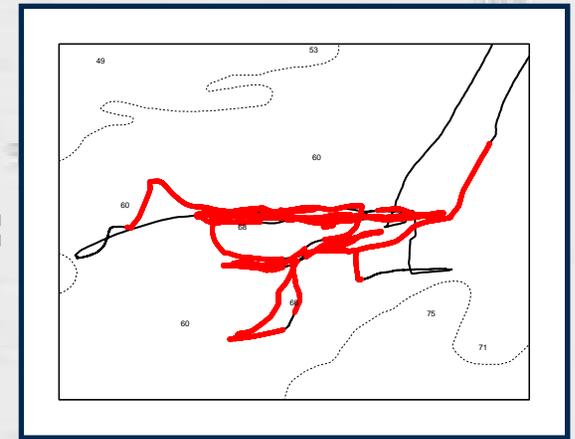
NE Study Fleet - Post-processing of GPS and temperature-depth data



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Study Fleet Summary

Year	Trips	Tows
2006	134	792
2007	409	2,370
2008	608	5,304
2009	1,273	9,192
2010	1,385	9,395
2011	122	580

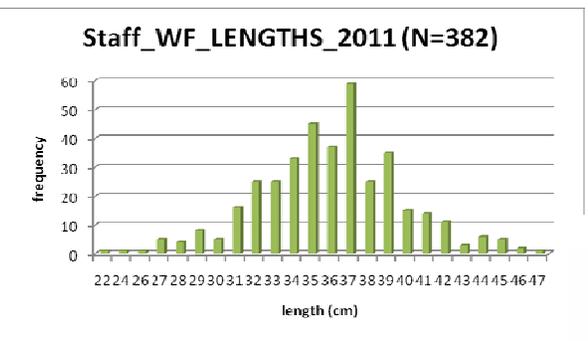
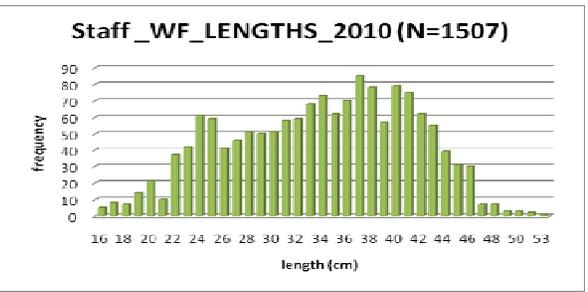
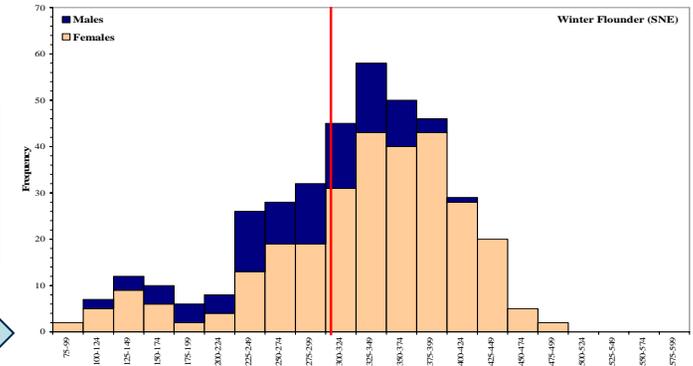
•By combining the GPS polling data with the TD probe data we can determine the location and timing of fishing effort from which the time-of-day, haul duration, haul location, distance fished, haul depth and water temperature can be determined.



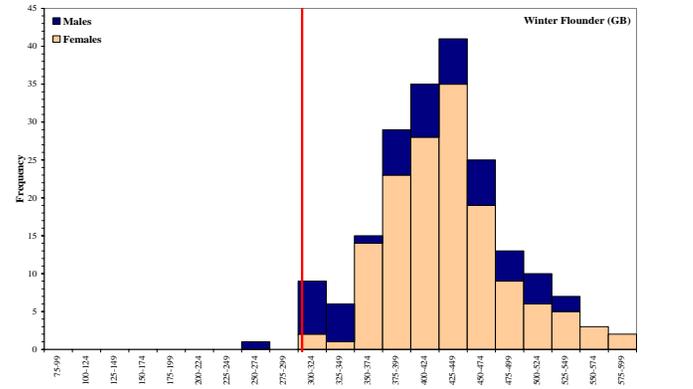
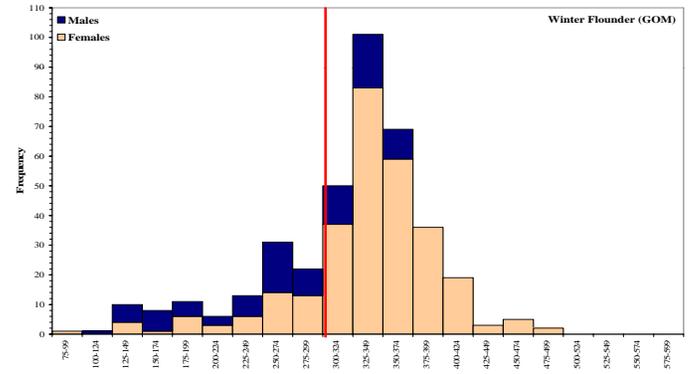
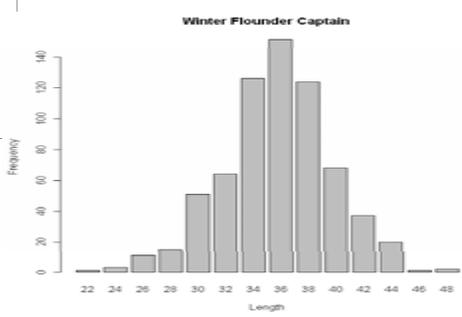


Synoptic monthly sampling target numbers by length
repro - age – energetics - feeding

Winter Flounder



Monthly representative length frequencies
SF field staff & Captains





How can cooperative research augment the data needed to conduct more timely and precise assessments?

Regional Cooperative Research Programs have capacity, expertise and the ability to adapt and respond to emerging priorities.

- Surveys for data poor stocks w/ traditional and new techniques – catchability studies – depletion - intercalibration.
- Tagging – align stock boundaries and management areas with sub-stock – population level spatial demographics.
- Enhanced biological sampling (survey or fishery dependent).
- Fishery Characteristics – precise effort metrics – improved gear details – fleet sub-component (sectors – metiers) performance – fine scale depth and temp patterns can influence discarding patterns.