Understanding the impacts of climate change on the distribution, population connectivity, and fisheries for summer flounder (*Paralichthys dentatus*) in the Mid-Atlantic

Malin Pinsky, Ken Able, Olaf Jensen - Rutgers
Joel Fodrie - UNC Chapel Hill
Hyemi Kim, Janey Nye - Stony Brook
Chris Kennedy - George Mason

ASMFC - Management & Science Committee
October 28, 2013

RAPID NORTHWARD SHIFT OF FLUKE STOCK

- Summer flounder / fluke distribution moving north with rising SST
  - Trawl surveys finding fluke further north than ever before
  - Both spring and fall surveys finding northward shifts in COB
  - Trends strongly correlated with Atlantic Multidecadal Oscillation (AMO)
- Catch patterns following same trend
  - Commercial catch occurring further north
  - Recreational catches increasing in northern states (NY, MA, CT) and declining in Southern states (NC, VA)

Objectives

- Stock substructure / population dynamics
  - Delineate stocks, use genetic analysis to understand larval connectivity patterns
  - Otolith microchemistry to determine whether natal sources and dispersal corridors have changed over time
- Stock assessment and climate
  - Statistical analysis to investigate interactions between regional climate and spatial abundance patterns; develop spatial stock assessment model
  - Test alternative stock assessment models based on analysis of larval and genetic connectivity
  - Develop predictive model of spatial distribution / stock structure under alternative regional climate scenarios, use to inform scenarios in bioeconomic model

Objectives

- Bioeconomic modeling
  - Commercial fishery
    - Model relationship between stock location and commercial harvests; control for port/state of origin, etc.
    - Develop predictive model of harvest costs as function of fluke distribution
  - Recreational fishery
    - Build model of angler participation and harvests to examine the evolution of effort
    - Develop state-specific angler welfare estimates
    - Develop predictive model of rec participation, harvests, and angler welfare as a function of spatially-explicit stock profiles and catch regulations

Management-relevant outcomes

- Stock dynamics and spatial abundance patterns
  - Reduce modeling uncertainty and offer new strategies for sampling
  - Understanding recruitment pathways allows for more robust prediction of stock sub-structure
- Predictive modeling of stock based on regional climate
  - AMO is a basin-scale climate indicator, can be predicted 2-10 years ahead, strongly correlated with fluke COB trends
- Predictive modeling of rec harvests, participation, welfare
  - Allow states to be more proactive in meeting targets via regulations, permitting
  - Evidence to ASMFC for promulgation of amendments to deal with changing patterns of rec harvests
  - Understand tradeoffs between regulations and welfare

The fishery

- Commercial fishery
  - 1992 - commercial quotas and recreational harvest limits (RHLs); commercial/rec allocation 60/40
  - Overall split and state-specific commercial quotas proportionally allocated based on 1980-1989
  - Uniform gear/size restrictions, relatively consistent regs
  - State- and fishery-level commercial harvests have fallen within 6% of quota since 1998, normally $< 3\%$ deviation
- Recreational fishery
  - Rec fishery has failed to meet RHL; harvests ranging from more than 50% below to more than 100% above targets
  - In response, amendments to FMP in 2001 and 2003 abandoned coastwide RHL; proportional based on 1998
  - States employ customized bag and size limits and season lengths to meet targets - ”Conservation equivalency”

Deeper look at the recreational fishery

- Management of rec fishery is more difficult
- Some stylized facts
  - Changing angler participation / local availability (and issues with 1998 allocation) have resulted in significant differences in utilization rates between states
    - In 2012, coastwide harvest was only 82% of targets. NY and NJ both exceeded targets; NC, MD, DE were all under 50%
  - Already significantly greater restrictions on rec fishing in NY and NJ, and subsequently lower retention rates
    - NY: 19.5" min, 4 fish bag limit, 5 month season; NJ: 17.5", 5, 5 (2012); NC: 15", 6, 12
- Addendum process used on year-to-year basis to allow some states (e.g., NY) to capitalize on forgone harvests by others (e.g., NC) and avoid reductions in targets

Management questions

- For the most part, outside the scope of our proposal
  - However, want to make this work relevant, be thinking about issues that may go beyond this fishery
- Is addendum process sufficient?
  - Appears to be an unstable solution, relying on voluntary cooperation and benefiting some states more than others
  - Are there alternative allocation mechanisms that might work better (and more pro-actively)?
  - How do regional climate trends complicate management?
- How do local regs for flounder impact anglers in multi-species context?
- Other pressing management issues? (looking for advice)

Assessing the Vulnerability of Fish Stocks to Climate Change

ASMFC Management and Science Committee

October 28, 2013

Dr. Wendy Morrison[1, 4], Mark Nelson[1], Roger Griffis[2], and Jon Hare[3]

[1]Office of Sustainable Fisheries, NMFS

[2]Office of Science and Technology, NMFS

[3]Northeast Fisheries Science Center, NMFS

[4]wendy.morrison@noaa.gov

Outline

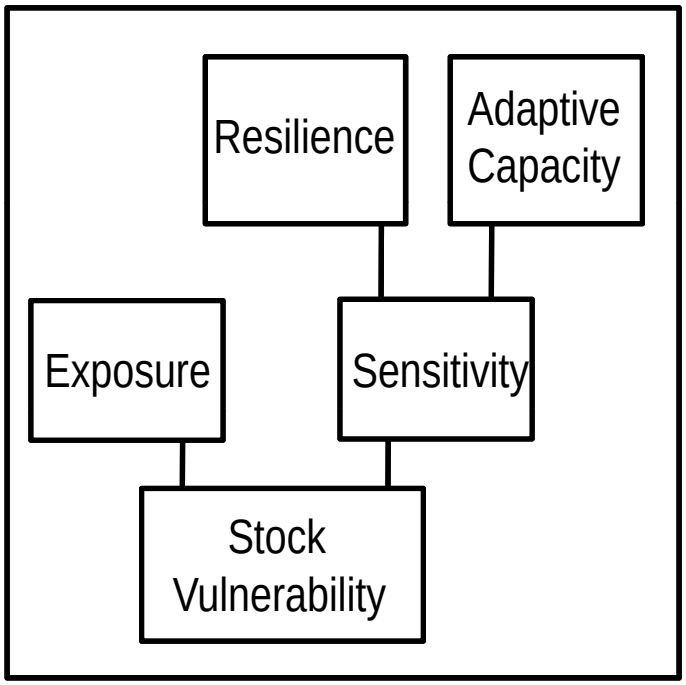
1. Project goal and need
2. Introduction to vulnerability assessments
3. Our methodology
4. Management uses

Project Goal and Need

Goal: Produce a practical and efficient tool for assessing the vulnerability of a wide range of fish stocks in a changing climate

Need: In order to prioritize resources, NMFS needs to identify which federally managed fish stocks are more likely to be impacted by climate change

Vulnerability Assessments

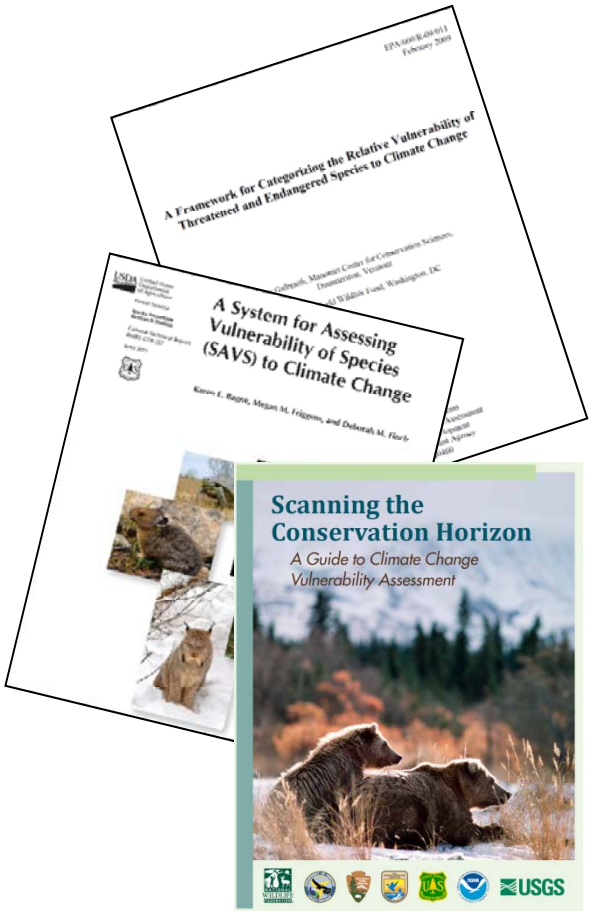


Vulnerability assessments*:

- Identify *which* species are likely to be most strongly affected by projected changes
- Increase our understanding of *why* these species are likely to be vulnerable

*NWF 2011. Scanning the Conservation Horizon

Examples from the Terrestrial Environment



Example Vulnerability Assessments Include:

- U.S. EPA's Threatened and Endangered Species Vulnerability Framework
- USDA System for Assessing Vulnerability of Species
- Climate Change Vulnerability Index for Species in Nevada (Nature Serve)

Methodology

- Based on currently available information and expert opinions
- Uses quantitative information when available, and qualitative opinions when data is lacking
- 4-point scale [low, moderate, high, very high]
- Methodology requires climate data (either downscaled maps or verbal descriptions of expected changes) and detailed stock profiles

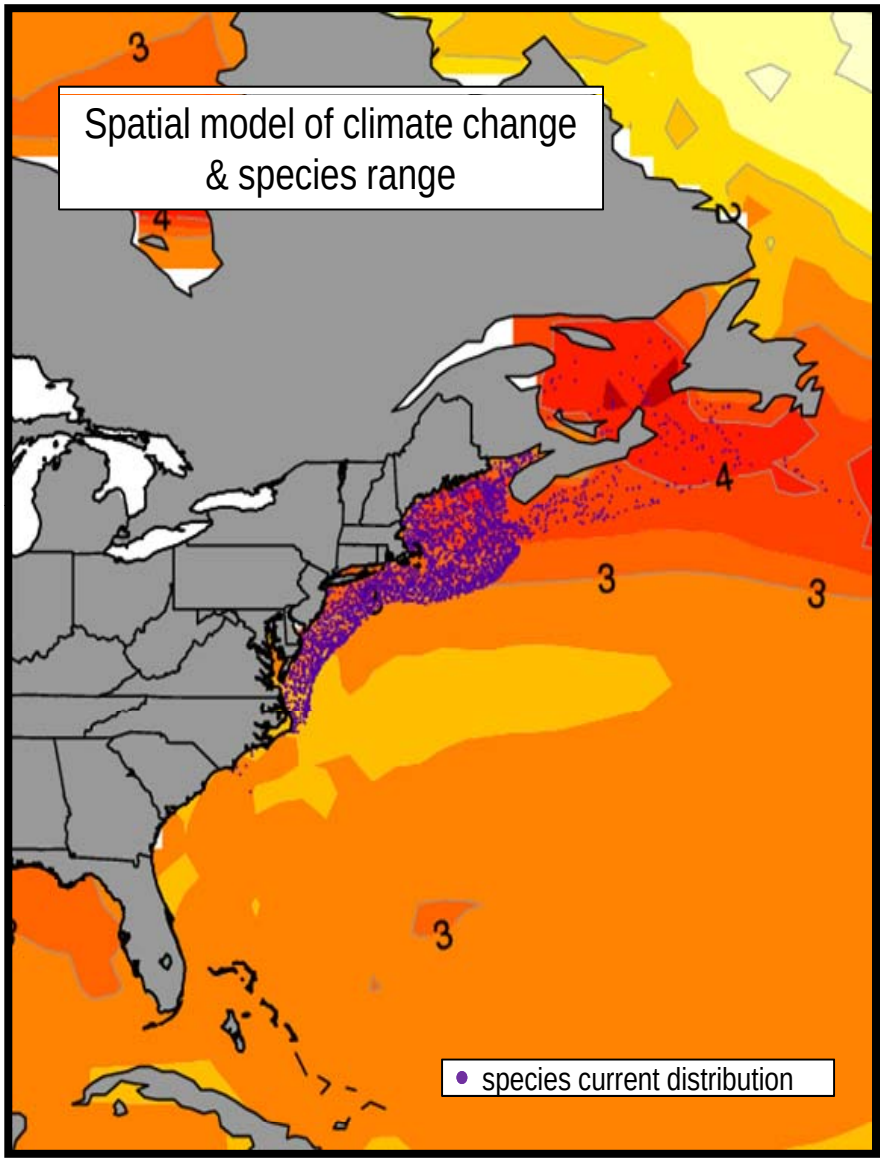
Methodology

Exposure

- *Surface temperature*
- *Freshwater input*
- *Primary productivity*
- *Upwelling*
- *Ocean acidification*
- *Currents*
- *Sea Ice*
- *Frequency of El Nino/La Nina events*

Sensitivity

- *Habitat Specificity*
- *Prey Specificity*
- *Sensitivity to Ocean Acidification*
- *Sensitivity to Temperature*
- *Stock Size/Status*
- *Other Stressors*
- *Adult Mobility*
- *Spawning Cycle*
- *Complexity in Reproductive Strategy*
- *Early Life History Survival and Settlement Requirements*
- *Population Growth Rate*
- *Dispersal of Early Life Stages*



Exposure

- Definition: a measure of how much a stock is likely to experience a change in climate
- Quantified as the spatial overlap between a species' current distribution and the expected climate change
- Also looks at changes in variance

Sensitivity

Definition: Biological attributes believed to be indicative of the stock's response to climate change. They include the stock's resilience and its adaptive capacity[1]

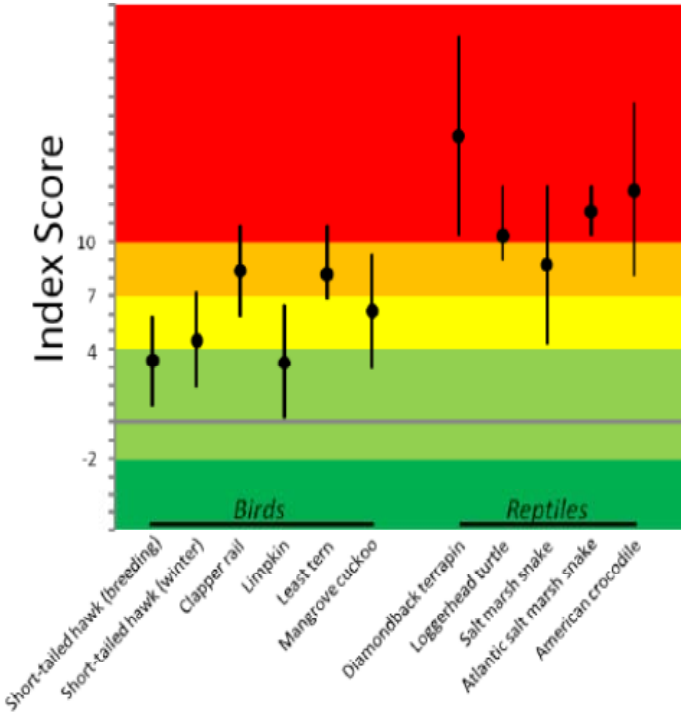
12 attributes relate to current life history characteristics

We have created specific definitions and bins for each sensitivity attribute

1 Williams et al. 2008

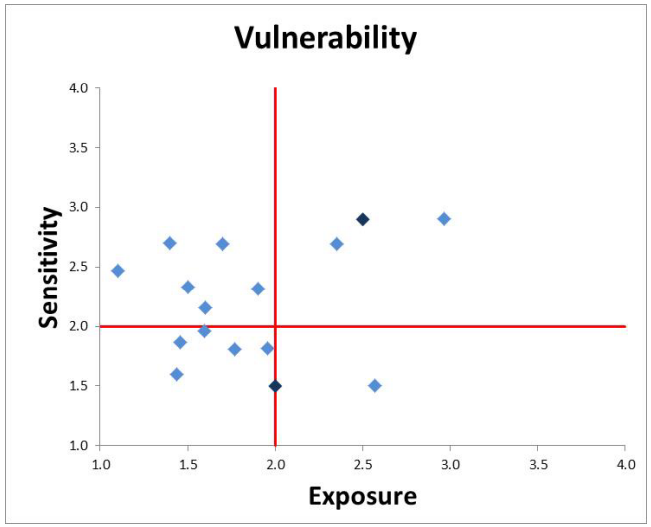
Expected Products

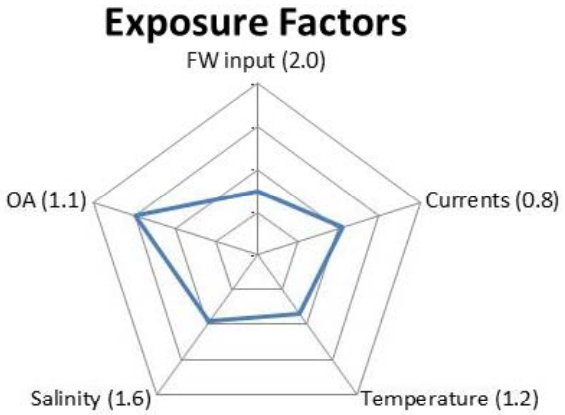
- An index of relative vulnerability across stocks
- Information on the key attributes behind the vulnerability score of each stock
- Identification of the major data gaps
- Completed stock profiles and climate projections available for other projects

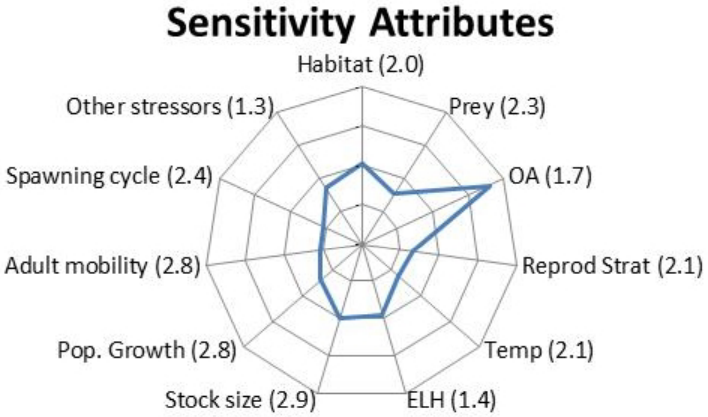


*Source: Defenders of Wildlife

Example outputs:







Potential Uses

Science:

- Identify stocks that can benefit from incorporating environmental variability into stock assessments
- Identify gaps in information for use in shaping research priorities
- Identify stocks that could benefit from increased monitoring to better quantify when expected climate impacts occur

Management:

- Suggest stocks that may have a change in productivity which might influence catch amounts
- Provide information for use in EIS's, BiOps and other decision making documents
- Identify potential management actions that might reduce vulnerability and increase stock resilience in a changing climate

Predicting Stock Changes in Distribution

This methodology may inform which stocks are more likely to have changes in distribution

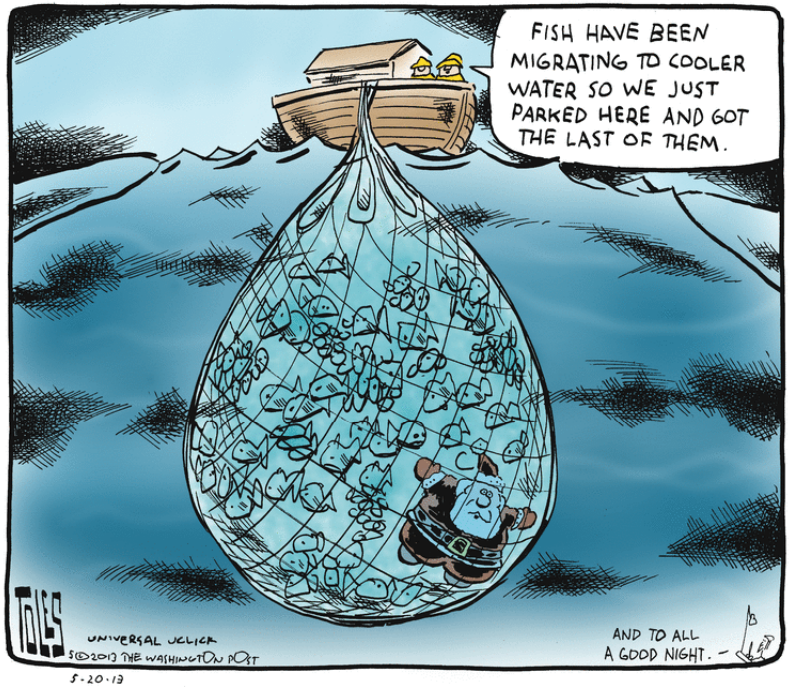
Attributes related to distribution include:

- *Adult Mobility*
- *Dispersal of Early Life Stages*
- *Habitat Specificity*
- *Sensitivity to Temperature*

We will analyze the predictive capacity of our methodology using the results from the NE implementation

Next Steps

- Publish paper on methodology
- Run first full implementation on NE/MA species managed by NMFS
- NCSE workshop in January "Managing Marine Fisheries in a Changing Climate"



www.talkingfish.org

Acknowledgements:

Management Team:

Dr. Wendy Morison (SF) and Mark Nelson (SF) Co-leaders
Roger Griffis (ST), Dr. Jennifer Howard (ST),
Dr. Wes Patrick (SF), Eric Teeters (SF)

Climate Change Projections & Maps:

Jamie Scott (ESRL), Mike Alexander (ESRL)

Pilots:

Jon Hare (NEFSC)
Jim Berkson (SEFSC), Bill Arnold (SERO)

Working Group Members:

Jon Hare (NEFSC), Bill Arnold (SERO), Jon Brodziak (PIFSC), Jonathan Phinney (SWFSC), Paul Spencer (AFSC), Rusty Brainard (PIFSC), Brett Weidoff (PIRO), Josh Lindsay (SWRO), Nick Tolmeri (NWFSC), Mike Pentony (NERO), Tobey Curtis (NERO), Yvonne deReynier (NWRO), Rick Hart (SEFSC), Karla Gore (SERO), Forest Bowers (ARO), and Mike Clark (HMS)

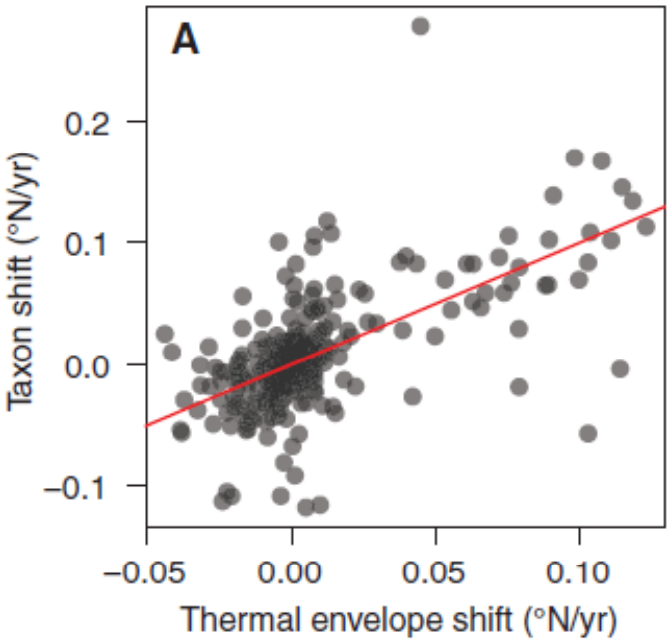
Another Methodology Related to Shifting Distributions.

Pinsky et al. 2013. Marine Taxa Track Local Climate Velocities. Science

Climate velocity is the rate and direction that isotherms shift through space. It can be calculated individually for each taxon

They measured range shifts by tracking the location of range centroids

Across all taxa, 74% shifted latitude in the same direction as climate velocity



RPS asa
Applied Science Associates

MARACOOS
Ocean Information for a Changing World

NOAA

Chesapeake Bay
INTERPRETIVE BUOY SYSTEM

MATOS: The Mid-Atlantic Acoustic Telemetry Observation System

Doug Wilson
RPS ASA
Applied Science Associates

ASMFC
Management and Science Committee
28 October 2013
St. Simon's Island, GA

Contents

- Who am I
- Origins of MATOS
- Recent Progress
- Immediate and Future plans

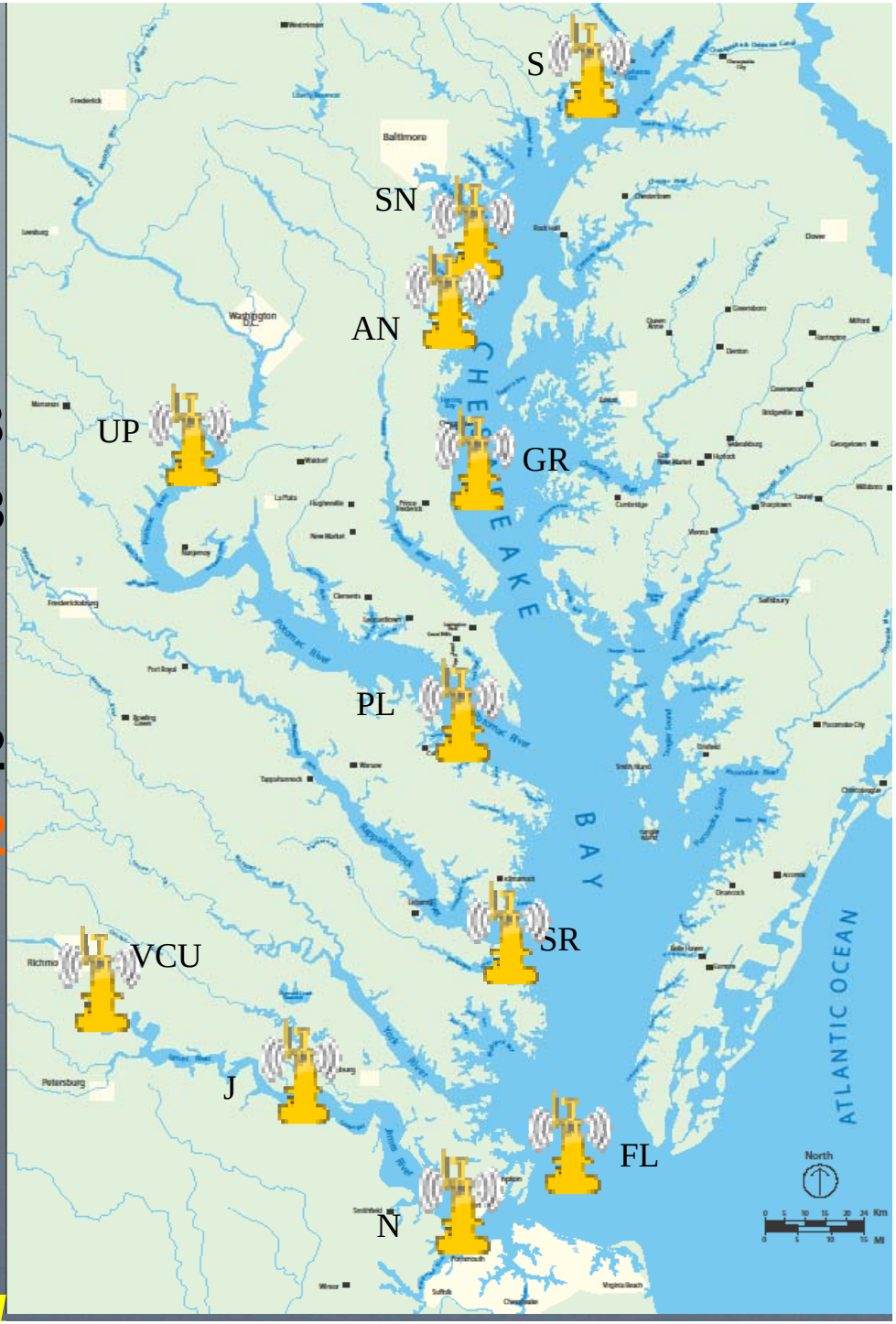
  (and issues)
- MATOS and…

Doug Wilson

- Physical Oceanographer
- NOAA Chesapeake Bay Office (ret.)
- Chesapeake Bay Interpretive Buoy System
- Global Ocean Observing System
- US Integrated Ocean Observing System
- Mid-Atlantic Regional Association for Coastal and Ocean Observing (BoD for Chesapeake Bay)
- Applied Science Associates (Sr. Oceanographer)

Presently 10 Buoys in CBIBS

S	Susquehanna	44057
SN	Six Ft Knoll	44053
AN	Annapolis	44063
UP	Upper Potomac	44061
GR	Gooses Reef	44062
PL	Point Lookout	44042
SR	Stingray Point	44058
J	*Jamestown*	*44041*
N	Nauticus (Norfolk)	44059
FL	*First Landing*	*44064*



MARACOOS
Ocean Information for a Changing World

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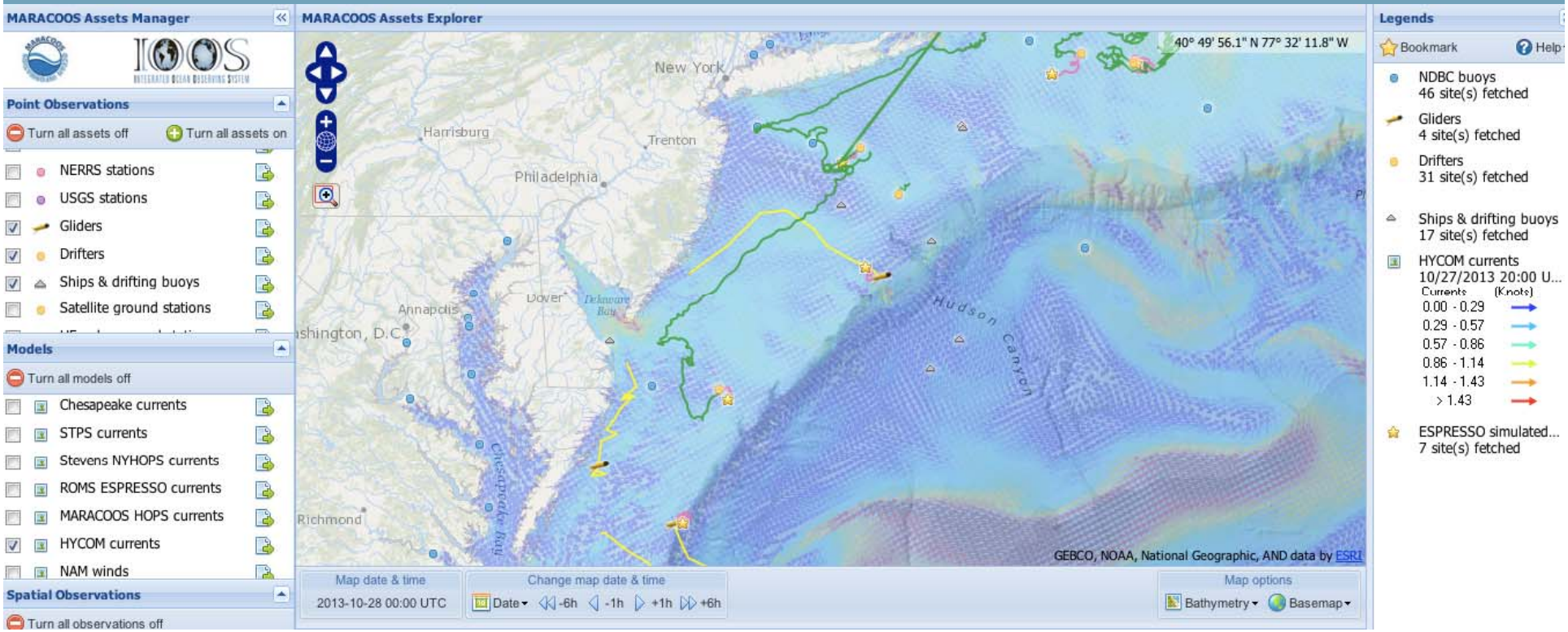
Applied Science Associates

MARACOOS

Mid Atlantic Ocean and Coastal Regional Association for Ocean Observing

Data Collection, Aggregation, and Integration

Powered by ASA



MATOS Timeline

2007 CBIBS established

2009 Placed VR2 on CBIBS J buoy

2011 Hosted meeting in Annapolis to discuss tagging and buoy receivers; considered James R pilot

2011 A. Wright's Beta VR2C on J buoy providing Real Time data

2011 Further discussions with IOOS, MARACOOS, OTN, ACT, regional PIs

2012 ASMFC proposal for James R pilot project funded

2013 MATOS operational

2014 James R real-time array operating

Work Plan (Jan 2013) Applied Science Associates / MARACOOS

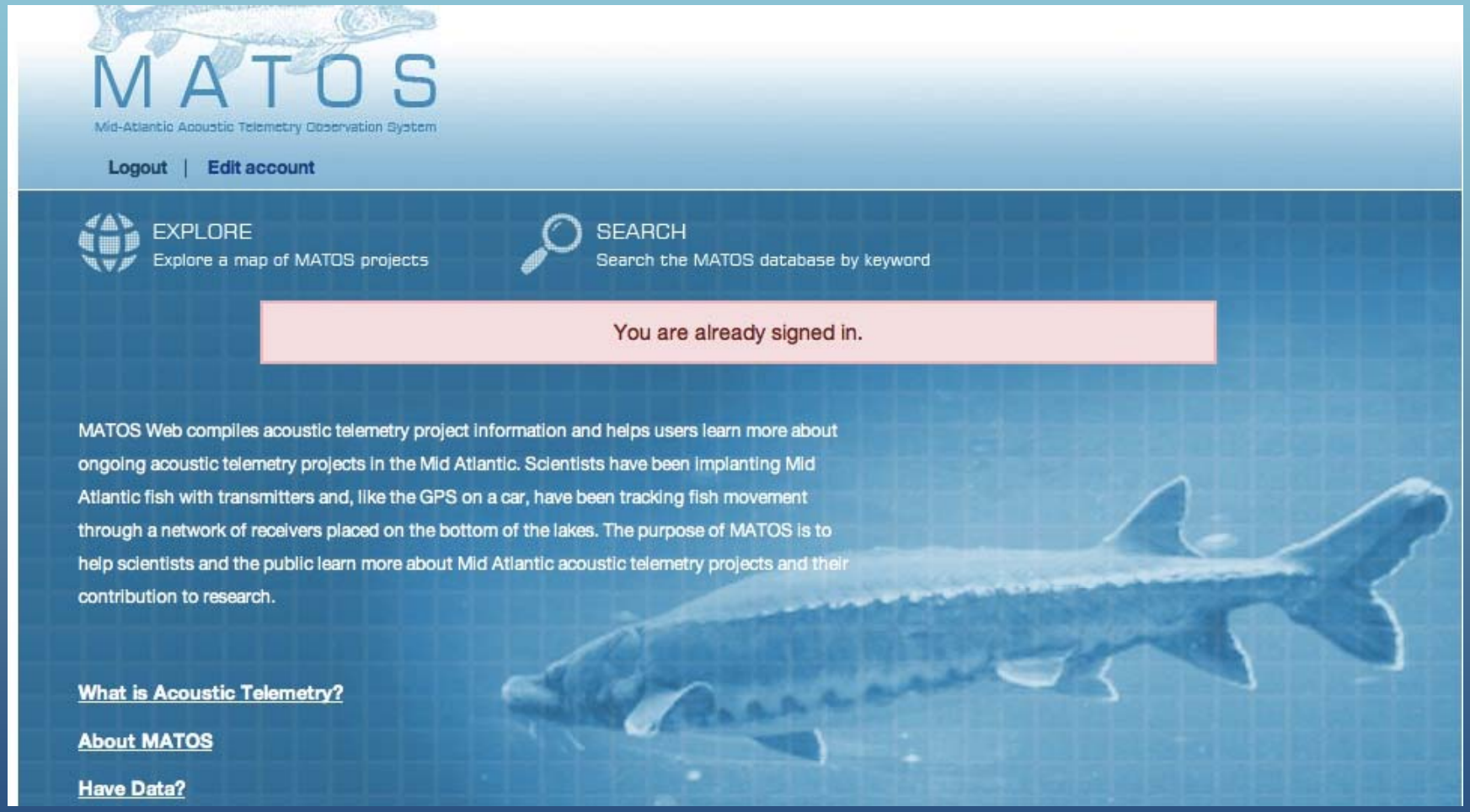
- **ASMFC provided TAGS, RECEIVERS (including real-time) for James R and funded the development of MATOS – the Mid Atlantic Acoustic Telemetry Observing System.**
- **Re-brand GLATOS Web Content and Documents to MATOS as required, to support straw man prospectus distribution**
- **Engage MARACOOS for sponsorship as MARACOOS Observing System Program; Form MARACOOS Acoustic Fish Telemetry Workgroup**
- **Identify regional Taggers, Receiver Operators, Other Persons of Interest for discussion and distribution**
- **Develop and Circulate Draft Prospectus (Feb 2013 VCU workshop)**

- Begin System Build
  - Tag Database and input interface
  - Receiver Database and input interfaces
    - Delayed Mode input
    - Real Time / Mobile input
  - Receiver – Tag Link
  - Data reporting / delivery system
- Enlist Pilot Project Participants (James R / Ches Bay)
- Live / Virtual Workshop for System Discussion with potential participants
- Build out full pilot system
- Integrate with MARACOOS data systems
- Solicit further use /product proposals

MATOS 2103 Accomplishments (ASMFC Proposal)

- Web Site Design
- Database Development, including compatibility with external standards
- Basic Login-based access structure and rules
- Flexible input capabilities for tag data and metadata, Receiver data files
- API web service to facilitate data access
- Google Earth-based visualization capability
- Documentation
- Management and Promotional activities

http://matos.asascience.com



Objectives and Results summarized in *MATOS FACT SHEET*

The Objectives of MATOS are to support:

- **Broader and more efficient use of acoustic tag tracking information collected in the Mid-Atlantic and adjacent regions;**
- **The integration of regional tag tracking information with the IOOS, GOOS, and other observational networks, for the benefit of all parties;**
- **Scientists, Managers, Fishermen, Conservationists, and other users and potential users of acoustic tag tracking information.**

MATOS will be implemented following these principles:

- **MATOS is committed to supporting regional acoustic tagging activities by working with taggers and receiver operators to rapidly and easily connect tag identification and metadata to reception data and exposing the results only as specified by the tag operator.**
- **MATOS will have data security and distribution limits determined by the data providers.**
- **MATOS is committed to working with existing tagging investigators, networks, suppliers, and systems to add value, efficiency, and streamlining to their ongoing operations.**

MATOS Principles (cont.)

- **MATOS will partner with MARACOOS, IOOS, GOOS, and OTN in attempting to establish and utilize community data and metadata standards and data access capabilities.**
- **MATOS covers the MARACOOS, SECOOS, NERACOOS, and adjacent regions, and will work with investigators, observing systems, and managers in those regions.**
- **MATOS will support real-time receiver data, including buoys and mobile receivers (fish, AUVs, gliders)**
- **MATOS will support delayed mode receiver data input in VEMCO other formats supporting ease of submission (drag and drop, direct IP transfer)**
- **The resulting MATOS database will be available for data queries, visualization, display, product development**

Concept of Operations

MATOS will consist of the following basic components:

- **An online, searchable, full metadata TAG database**
- **An online, searchable, full metadata RECEIVER database**
- **Both based on OTN & other community technical and metadata standards,**
- **Data access and distribution controls**
- **Automated INPUT of real-time RECEPTION data and delayed mode RECEIVER FILES**

Concept of Operations (cont.)

- **Machine level matchups of RECEPTION information with TAG ID information, resulting in a continuously updated TAG / TIME / POSITION / ANCILLARY DATA / DISTRIBUTION LIMITS (‘HITS’) database**
- **Login-enabled graphical user interfaces to facilitate access, input, manipulation, and viewing of all databases**
- **Map-based visualization tools for each database**
- **Web services to facilitate data exchanges, integration, and downloading**

Access and Data Protection

- Access to the MATOS site will be by password-protected login.
- Users submitting tag or receiver data will set up preferences for sharing of that data – either public or private, with private limiting access to the individual or a project group designated by the individual.
- Public data will be available through the MARACOOS data system web interfaces and services.

Data Input

MATOS will accept tag and reception data in almost any format.

Tags: Online templates associated with a user will be available for efficient tag and metadata input. Release forms are available to be filed with VEMCO to allow VEMCO to forward purchased tag metadata directly to MATOS. ACT collaborators may allow ACT data to be shared with MATOS, subject to individual privacy settings.

Receptions: MATOS will accept .vrl files or .csv files created by VUE. There is an FTP site for uploading;

Data Input (cont.)

- **We are working with VEMCO so that future versions of VUE will allow direct uploading to MATOS, with including ancillary data for services like false detection analysis and site evaluations.**
- **MATOS will have an email address for accepting Iridium and other real time and near-real time data messages.**
- **MATOS will develop standard data exchange protocols with individual platforms (buoys, gliders, etc.) collecting real-time reception data, including other concurrent environmental measurements taken by the platform.**

Data Integration

- MATOS will support IOOS DMAC compliant and other standard Web Services.
- MATOS will be integrated into the MARACOOS data management system, with public data accessible via the MARACOOS asset viewer, and protected data available to investigators and projects via MyMARACOOS.
- Data services will be incorporated into MATOS to support activities conducted by ACT, other projects, and individual contributors.

Oversight

MATOS will be operated and maintained under the guidance of MARACOOS and an advisory group composed of active users and contributors.

Long Term Funding and support

MARACOOS will seek funding to support MATOS from interested agencies and other interests, in consultation with the MATOS Advisory Group.

MATOS
Mid-Atlantic Acoustic Telemetry Observation System

A69-9001[redacted]

2011-11-09

Tag	Link
Model	v16-6h
Serial	
Manufacturer	

Total Hits	85
Receivers with Hits	14
Report	

Study that deployed tag	ACT
Tagger	
Common name	atlantic sturgeon
Scientific name	acipenser oxyrinchus oxyrinchus
Capture location	
Capture geo	
Capture date	
Capture depth	
Wild or hatchery	
Stock	
Length	
Weight	
Age	
Sex	
Dna sample taken	
Treatment type	
Temperature change	

Hit	Time	Lat	Lon	Receiver
1	2012-12-26T07:45:11Z	36.83067	-75.96231	DOD -RR2
2	2012-12-26T07:46:53Z	36.83067	-75.96231	DOD -RR2
3	2012-12-27T12:03:39Z	36.96698	-76.33304	DOD -ER5new
4	2012-12-27T12:05:33Z	36.96864	-76.34184	DOD -NN2
5	2012-12-27T12:09:47Z	36.96698	-76.33304	DOD -ER5new
6	2012-12-27T12:11:32Z	36.96698	-76.33304	DOD -ER5new
7	2012-12-27T12:46:34Z	36.95066	-76.33902	DOD -NH8
8	2012-12-27T12:48:21Z	36.95066	-76.33902	DOD -NH8
9	2012-12-27T12:52:43Z	36.95066	-76.33902	DOD -NH8
10	2012-12-27T12:54:15Z	36.95066	-76.33902	DOD -NH8
11	2012-12-27T12:56:03Z	36.95066	-76.33902	DOD -NH8
12	2012-12-27T12:58:23Z	36.95066	-76.33902	DOD -NH8
13	2012-12-27T13:02:05Z	36.95066	-76.33902	DOD -NH8
14	2012-12-27T13:04:03Z	36.95066	-76.33902	DOD -NH8
15	2012-12-27T13:05:23Z	36.95066	-76.33902	DOD -NH8
16	2012-12-27T13:06:48Z	36.95066	-76.33902	DOD -NH8

Immediate and Future Plans (and Issues):

The critical obstacle to date has been lack of provision of receiver data from researchers and operators.

MATOS database presently contains

- **Atlantic Cooperative Tracking Network Tag database**
- **NCBO Real-time and Delayed receiver data**
- **One (1 month set) of Navy Hampton Roads / York R receiver deployment data**
- **One (~1 month) set of James River receiver deployment data**

MATOS Initial Receiver Database

CBIBS
Navy Hampton Roads
James R

Immediate and Future Plans (and Issues)

- **We underestimated the degree and complexity of data protection and exclusivity that would be required to be built into the system in order to achieve a comfort level for contributors.**

- **We are requesting additional funding to work with taggers and data contributors to build those protections to the required level, as well as to continue system and product development.**

There will soon be ~10 real-time transmitting receivers in the S Chesapeake Bay, and >100 delayed mode receivers.

Need assurance from implementors that they will participate and support this project.

- **Define the conditions of that support, to be included in grants and MOUs.**
- **Create a MATOS Chesapeake Bay Advisory group to provide review and feedback on the system operations and products**

The Value:

- **Easier, automated access to data, data products, and visualizations**
- **Support for other regional projects and cooperative networks (e.g., ACT)**
- **Integrated data availability – all tag data, real & near real time, in situ environmental data, integration with fields from observing platforms (including satellites) and models**

MATOS has been developed by RPS Applied Science Associates through support from ASMFC, NOAA, NCBO, and gratefully acknowledges cooperation from the Atlantic Cooperative Telemetry Network and regional investigators.

MATOS *and*… MARACOOS

Leveraging present MARACOOS activities

- **Academic, state, private, Federal partnerships**
- **GLIDER, buoys, other real-time data platforms**

Data collection / management / distribution services

Link to U.S. IOOS, other Regional Associations, GOOS, OTN

New expansion opportunities

- **Biodiversity proposal with ECU, WHOI, Liquid Robotics**

MATOS *and*… ASMFC

Provide Data Management services for ASMFC-supported Projects utilizing Acoustic tagging

Data available to management and researchers

Flexible access formats and controls

Support development of integrated management programs

Support development of outreach programs and public engagement

MATOS *and*… Atlantic Cooperative Tracking Network

ACT presently connects tagging activities in the region and provides a simple metadata collection and exchange framework

MATOS will support ACT activities by providing flexible, Efficient, managed access to metadata and data

ACT could provide management services for MATOS as part of a jointly funded MATOS project

MATOS *and*… NOAA

NMFS

- **Data management system for NOAA funded projects**
- **Cross-agency integration**
- **Intra-NOAA integration**

NCBO

- **Added dimension to CBIBS**
- **Supports local CB research and outreach**
- **Connects NOAA / Fed / State Living Resource Activities**
- **Supports Ecosystem Based Management and Habitat studies**

MATOS *and*… the US Integrated Ocean and Coastal Observing System (IOOS)

IOOS links ocean observing activities among US Agencies Including NOAA, EPA, FWS, USGS, DoD through IOOC

IOOS has an Animal Telemetry Network program seeking to collaboratively link activities including acoustic tracking satellite/remote tracking, and animal observers

IOOS works through Regional Associations and common data and metadata standards (IOOS DMAC – Data Management and Communications)

US IOOS is GOOS partner with OTN

MATOS *and*… Researchers

Provide Common Data and Metadata management and analysis tools

Provide shared data and metadata repository for collaboration and archival

Provide access to integrated concurrent environmental data for context and analysis

Expand geographic, programmatic, and organizational Reach of research activities

Marine Recreational Information Program UPDATE

NOAA FISHERIES

Office of Science and Technology

Atlantic States Marine Fisheries Commission

October, 2013

Agenda

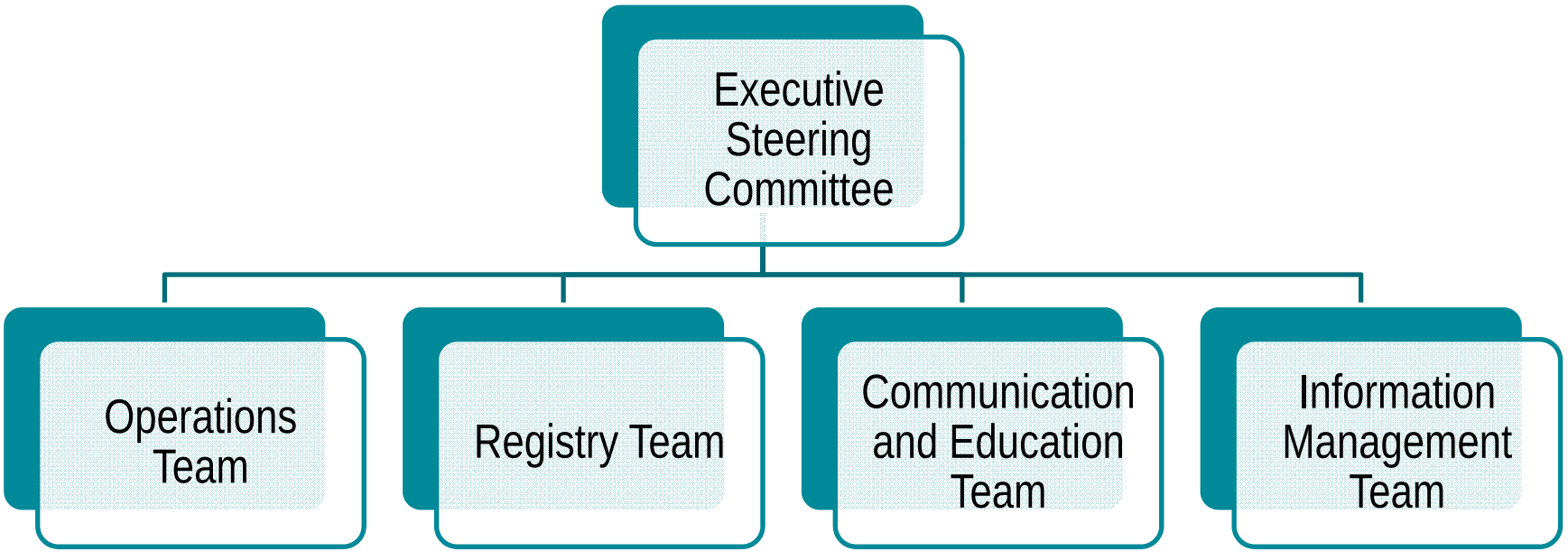
- What is MRIP
- Status of Atlantic coast improvements
- For-hire survey considerations
- 2014 Priorities
- Regional implementation

Marine Recreational Information Program

The new way we're collecting and reporting recreational fishing catch and effort data.

MRIP plays a critical role in sustainably managing our ocean resources by providing estimates of fishing activity are both **accurate** and **trusted**.

MRIP Governance Structure



MRIP Strategy

- FIRST: Address NRC Review findings about need for fundamental survey design improvements:
  - Inventory and document survey designs in use;
  - Develop revised and new methods that address NRC findings;
  - Pilot test methods and peer review results;
  - Certify new methods/designs that resolve issues and are supported by peer review.
- THEN: Implement certified survey design improvements;
  - Improved methods are likely to be more costly than status quo.
- FINALLY: Increase sampling scope and frequency to increase: precision; coverage, timeliness; address special needs for supplemental data
  - We must evaluate the tradeoffs among these competing priorities and invest carefully to get the best bang for the buck.

Recent Accomplishments

New method for estimating catch.

- Removes potential bias
- Increases accuracy
- Foundation for all other survey improvements
- Revised estimates for 2004 to 2012
- Re-calibration via ratio estimator

Greater access, transparency, and context.

- Online project inventory and updates
- Advanced queries and graphing features
- User-friendly website: http://www.st.nmfs.noaa.gov/recreational-fisheries/index
- Atlantic Coast “road show”
- On-line site register
- New outreach materials

Recent Accomplishments

New design for APAIS implemented in 2013

- New site register descriptions and pressures; completely re-done last year
- Site assignments must be completed entirely. No substitution of alternate modes or alternate sites.
- Assignments will be in clusters of 1 to 3 locations, depending on the level of activity ("pressure rating") of the sites. Sites in a cluster must be sampled in a specified order for a specified duration.
- Site assignments will cover four 6-hour time blocks, assuring coverage at all times of day.
- As in the past, interviewers are instructed to try to sample all eligible trips, regardless of whether the anglers caught anything. In addition, complete counts of all eligible trips must be made, whether or not they were sampled.
- Fact Sheet and FAQs widely distributed. Wallet cards and state-custom handouts developed.

Recent Accomplishments

New APAIS Design: managing implementation

- Sample draw program
- Productivity: number of intercepts
- Fit of time blocks to fisheries activity periods, particularly charter mode
- Pressure ratings
- Inactive assignments
- Reviewing estimates to determine whether there are design effects from new design (Gulf of Mexico reef fish example)
- Sub-regions within states (FL, NC)

Recent Accomplishments

Collecting data from the for-hire sector.

- Testing electronic reporting and validation for headboats in Southeast
- Completed for-hire logbook reporting pilot in Gulf of Mexico
- Findings and next steps:

Overview of Gulf Charter Boat Logbook Pilot

NRC Recommendation:

> "In most cases, charter boat, head boat, and other for-hire recreational fishing operations should be required to maintain logbooks of fish landed and kept, as well as fish caught and released. Providing the information should be mandatory for continued operation in this sector, and all the information should be verifiable and made available to the survey program in a timely manner."

In 2010 MRIP funded a pilot study in the Gulf of Mexico to determine feasibility of a for-hire census using electronic reporting methods.

Summary of Select Key Findings

- **Reporting Tools:** Properly designed electronic reporting is an effective method for receiving high-quality self-reported data from a large number of participants.

- **Enforcement:** Current authority was ultimately effective at achieving compliance, but not at achieving timeliness.

- **Reporting Compliance and Timeliness**: If logbooks were to be used as a census of catch and effort, the timeliness and accuracy of reporting would need to be improved.

Summary of Select Key Findings

- **Validation:** Study confirmed that self reported data are subject to recall bias and inaccuracies in reporting and therefore require validation.

- **Feasibility for Regional Implementation:** Several potential benefits from a logbook reporting system were recognized from this study.

Implications and Next Steps

Insights from the pilot study

- Clearer picture of the resource commitments necessary for implementation.
- Detailed recommendations for the necessary elements of a logbook program, including built-in quality control features.
- Necessity for effective compliance and enforcement mechanisms.
- Potential exists for using logbook data in conjunction with dockside validation data to develop a useful estimator of catch.
- Follow up technical report has been completed and will be released soon, following peer review.

Implications and Next Steps

Clear that immediate implementation of a logbook requirement is unlikely to achieve a complete and accurate census.

- More work is needed to develop an effective logbook-based census or estimation design.
- Until new methods are tested and implemented, MRIP expects to maintain the current surveys of the for-hire sector (FHS/APAIS = current ACCSP standard).
- Improvements already made to our catch surveys are being incorporated.
- Using the findings of the study, MRIP will work with partners seeking to create complementary logbook and validation programs.

Implications and Next Steps

Issues that must be addressed before moving forward include:

- Ensuring a complete registry exists of all for-hire vessels.
- Enhanced validation of catch and effort through dockside/at-sea sampling.
- Assuring compliance in a timely manner.
- Creation of easy-to-use reporting technologies in consultation with industry.
- Discussing shared resource commitments to address such implementation issues as:
  - Managing data quality, editing and integration.
  - Running dockside catch validation and at-sea discard validation programs.
  - Compliance and enforcement actions.
  - Conducting outreach to inform vessel operators of reporting requirements.

Effort Survey Pilot Project

- MRIP has been conducting pilot studies of new effort survey methodologies since 2008.
- In general, we have determined that:
  - Surveys that use only a single sample frame—a coastal household telephone directory or state angler registry—are subject to undercoverage bias.
  - Telephone surveys generally have become subject to non-response error.
- Based on what we learned from pilot projects in 2008 – 2011, we have designed two major pilot projects, the results of which will enable a final decision on effort survey design:
  - Dual frame (postal address and license registry) , mixed-mode (mail and telephone) pilot conducted in 2011/2012 in FL, GA, SC, NC;
  - A new Single-phase Address-based Sample pilot using a postal address frame with address matching from state angler registries in MA, NY, NC and FL in 2013.
- See handout and MRIP website for more details.

2013/2014 Implementation Plan Update

MRIP Team priorities for FY 14:

Operations Team: Continue to implement and evaluate alternative data collection designs. Prioritize ongoing studies, and design and implement necessary follow-up studies to finalize data collection approaches. As new sampling and estimation approaches are implemented, research priorities will shift toward more subtle refinement of data collection methods to better address stakeholder needs. Examples of possible project areas include:

- Continued evaluation of catch and effort surveys administered by state natural resource agencies;
- Development of methods to estimate catch and effort at greater levels of temporal and spatial resolution, including both design- and model-based approaches;
- Assessment of non-sampling errors, such as non-response error, coverage error and measurement error, in recreational fishing surveys;
- Continued development and testing of new technologies, such as electronic data capture and online reporting, to support recreational fisheries data collection; and
- Optimization of sampling allocations within and among recreational fishing surveys to satisfy stakeholder needs for precision.

2013/2014 Implementation Plan Update

MRIP Team Priorities for FY 14:

Registry Team:

- Continue to work with states to complete registry data quality improvement plans that address the recommendations of the advanced data quality reports provided to states in 2011/12, and any other requirements of the states' MOAs.
- Continue to provide grants to states through the Interstate Marine Fisheries Commissions to assist the states in implementing the provisions of their data quality improvement plans.
- Supply registry data from the states of Florida, Massachusetts, New York and North Carolina, and to support the MRIP pilot project Finalize Design of MRIP Effort Surveys (the project plan and update are available on our website under "projects").
- Maintain registry databases for the Atlantic and Gulf Coast states and make them available for additional pilots or new survey method deployment, as needed.
- Obtain state data on for-hire vessel licenses and registrations to support the MRIP effort to establish a new and more compete for-hire vessel registry.

2013/2014 Implementation Plan Update

MRIP Team Priorities for FY 14:

Information Management Team:

- Include fully documented metadata (the contents and context of data) for all ongoing and legacy programs, and make it available online to the public.
- Add user guides to help new users correctly interpret the characteristics, uses, and limitations of the data.
- Develop analytical tools to enhance the understanding of the data.
- Continue to add selection, download and output options to the website query tools.
- Continue to expand MDMS to tie pilot projects to the resulting data, as well as project management needs.
- Develop an integrated for-hire vessel directory.

2013/2014 Implementation Plan Update

MRIP Team Priorities for FY 14:

Communication and Education Team

- Continue conducting field visits to gather feedback, with a focus on the West Coast.
- Support release of the new angler effort survey.
- Enhance for-hire survey awareness.
- Address growing interest in emerging electronic technologies for data collection and reporting.
- Foster productive relationships with internal and external partners and stakeholders
- Continue to support the release of historic data using the improved catch estimation method.

Executive Steering Committee:

- New Regional Implementation Strategy resulting from ESC Workshop held in July

Regional Implementation Strategy

The Vision:

National Quality & Regional Control

Series of regionally-based data collection programs, adhering to a rigorous set of national standards, using survey methods “certified” via MRIP.

Strategies:

- Open dialogue with partners, stakeholders
- Use existing channels (i.e. FINs—ACCSP in Atlantic regions)
- Establish a forum for regional partners to make key decisions about what survey methods/designs to use, and how to most cost effectively invest in increased sampling for precision, timeliness, coverage

Regional Implementation Workshop; July, 2013 (1)

Key Conclusions:

- A hybrid approach to MRIP implementation should be established, whereby NOAA Fisheries (through MRIP) maintains a central role in developing and certifying survey methods and establishing national standards and best practices, and regions (through the regional fishery information networks (FINs) or equivalent) would have responsibility for selecting survey methods and managing data collection.
- The MRIP National Team (the ESC) should maintain its role of program overview and participation as MRIP transitions from research and development to implementation. As an overview body, the ESC should identify issues regarding implementation; seek feedback from regions on progress in implementation and any problems being encountered; determine if regional needs are being met and identify information gaps; and determine how MRIP can provide assistance in filling in those gaps.
- The FINs and their equivalents (i.e., ACCSP) will serve as the regional MRIP Implementation teams. The Caribbean and West Pacific groups that currently exist for information sharing will be sufficient to serve as implementation teams for those regions.
- MRIP should continue its role of supporting review of non-MRIP surveys to evaluate methodologies and/or identify areas for improvement.

Regional Implementation Workshop; July, 2013 (2)

Key Conclusions:

- MRIP priorities for investment of expanded survey implementation resources will generally be guided by whether the survey, alone or in combination with other surveys being implemented in a region:
  - Utilizes a MRIP-certified survey design or methodology;
  - Conforms to the MRIP standards for survey coverage and basic data elements;
  - Conforms to any additional national standards or best practices that the MRIP national implementation team may adopt in the future; and
  - Provides catch estimates for fisheries managed under MSRA (including Atlantic HMS) or jointly by the states and NOAA Fisheries that are deemed by the MRIP regional implementation team to provide recreational catch statistics sufficient to:
    - Complete generally reliable stock assessments;
    - Support development of annual catch limits that meet MSRA requirements; and
    - Support development of recreational regulations that minimize triggering of accountability measures.

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Regional Implementation Strategy (1)

Program element	MRIP ESC/National Team	Regional Teams/FINs
Assuring surveys adhere to certification methods	Certifications	X
Operational Requirements		
• Develop/certify data collection design	X	Choices
• Data collection approval		X
• Procurement/Grant management	X	X
• Survey operations and Oversight	QA/QC Standards	X
• Information management	Standards	X
• Research and Development	X	
• Compliance/Enforcement		X
• Outreach/Communication	Resources, Tools	X

Regional Implementation Strategy (2)

Program element	MRIP ESC/National Team	Regional Teams/FINs
Choosing among methods		X
Choosing among options for coverage-timeliness-precision	Policies and Priority	X
Get feedback from regions and advise NMFS leadership regarding needs	X	Input
Get feedback from data users	X	Input

Atlantic Atlantic Coastal Cooperative Statistics Program Targets (updated, 2013)

• New estimation method	adopted
• Shoreside intercept survey	reflected in targets
• For-hire trip reporting	decisions pending
• Coverage and timeliness	reflected in targets
• Precision	workshop planned
• Evaluation of tradeoffs	developing model
• Effort survey design	expected 2013
• Choices for coverage, precision, timeliness and partner resource commitments	beginning in 2014

Thank you.

Please visit us at:

www.CountMyFish.noaa.gov

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