# Evaluation of Alternate Approaches for Monitoring Recreational Fisheries Catch and Effort to Meet Management Needs

FY 2010 Proposal

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# 1. Overview

## 1.1. Sponsor

Ron Salz

## 1.2. Focus Group

Survey Design and Evaluation

## 1.3. Background

The Magnuson-Stevens Fishery Conservation and Management Re-authorization Act (MSRA) is the primary law governing marine fisheries management in United States federal waters. Originally passed in 1976, the Act was revised and reauthorized in 1996 with the Sustainable Fisheries Act, and again in 2006 with the Fishery Conservation and Management Amendments (FCMA). Each revision has brought new and more stringent requirements to prevent overfishing and rebuild overfished stocks. The SFA required that each fishery management plan (FMP) specify objective and measurable criteria for determining when a stock is overfished or when overfishing is occurring, and to establish measures for rebuilding the stock. The FCMA mandates establishment of science-based annual catch limits (ACLs) and accountability measures (AMs) for many fish stocks. An ACL is the level of annual catch that if met or exceeded triggers accountability measures, such as a seasonal closure or quota closure, while an AM is a management control to prevent an ACL from being exceeded, and to correct or mitigate overages of the ACL if they occur. These new requirements have resulted in increased demands on the fisheries data and statistics used to support stock assessments, monitor catch and effort, and for management decisions. The Magnuson Act requires that conservation and management measures be based upon the best scientific information available (National Standard 2). However, in some cases the best information available does not fully support management needs resulting in fishery managers having to use data and statistics in ways they were not originally intended. This is particularly true of recreational fisheries statistics data generated from the Marine Recreational Fisheries Statistics Survey (MRFSS) which was first implemented in 1979. Current uses of MRFSS catch and effort estimates were not anticipated in the original survey design. Fishery managers now require data with higher temporal and spatial resolution and estimates with higher levels of precision than the MRFSS was designed to produce . It is important that fisheries data collection programs keep up with increasing demands and match the needs of managers and assessment scientists. It is equally important for managers to use recreational fisheries data responsibly. This includes fully understanding and incorporating the risks and uncertainty associated with using statistical estimates for particular decisions, and considering options for managing differently to avoid using data for purposes it was not intended or cannot support (i.e. high levels of uncertainty).Successful implementation and effective monitoring of ACLs and AMs will require improvements in the fisheries data and statistics available to managers. The Marine Recreational Information Program (MRIP) is a collaborative effort to develop and implement an improved recreational fisheries data collection program. MRIP improvements are being implemented incrementally as alternative approaches are designed and tested. Initial improvements are focused on addressing fundamental issues identified by the NRC review, including establishment of a Federal angler registry, assessing and reducing the potential for bias in current surveys, and developing data collection standards. These improvements are intended to provide fishery managers and stock assessments scientists with more accurate, precise, and reliable data and statistics on which to base management decisions. While data quality has been the primary focus of MRIP to this point, another important and related criterion is data timeliness. Managing recreational fisheries under ACLs requires fishery managers to accurately predict when an ACL will be exceeded in order to take preventative measures. In an ideal world fishery managers would have access to highly accurate and precise recreational catch estimates in real-time for making in-season adjustments (e.g., adjust size/bag limits, fishery closure) to avoid exceeding the limit. As the lag time between when catches occur and when catch estimates are available increases, so does the risk of exceeding an ACL. While in-season management requires more timely recreational data than is currently available, timeliness can also be issue with annual management if complete data from the previous year are not available until after the following season is under way1. The goal of this project is to identify, and evaluate trade-offs among, alternatives to current recreational data collection, monitoring and management systems. In particular, the focus will be on alternatives for improving the timeliness of recreational fisheries information availability to support the new Magnuson Act requirements. Key questions that this project will attempt to answer include: 1) Will the proposed MRIP changes result in recreational data and statistics useful for quota monitoring, in-season and/or annual? 2) For what particular species/fisheries/FMPs will MRIP support in-season and/or annual quota monitoring?3) What changes would have to be made to MRIP to make it useful for quota monitoring, in-season and/or annual (for particular species/fisheries/FMPs)? 4) What are the costs associated with these changes, and how might they impact overall data quality? There are practical limits to the degree to which the timeliness of the collection, processing, and reporting of recreational fishery survey data and statistics can be improved. This project will provide us with a better understanding of what survey improvements are possible and what resources will be needed to implement them. A data collection system that produces recreational catch data with the temporal and spatial resolution necessary for in-season quota management may not be cost effective, efficient, or reliable for certain species and stock assemblages. Alternative data collection solutions resulting from this project will need to be compared against alternative management solutions for meeting ACL requirements. It is important to identify management solutions as part of this project since any data collection alternatives involving in-season or real-time management will need to be evaluated against these. Ideally, data collection and management systems will be paired with one another so that they are compatible: i.e., the data collection system provides data users with the information they need, when they need it, to responsibly assess and manage marine fisheries following the guidelines mandated in Magnuson.

### 1.4. Project Description

Species and Recreational Fisheries The extent and nature of the improvements needed in recreational data collection programs to support fisheries management will vary by species. The level of precision, temporal/spatial resolution, and maximum lag time needed will depend on a number of fishery and management related factors. The first consideration is whether a recreational sector ACL is currently in place (or pending) for a particular fishery. For species where the recreational component is fairly small or insignificant, compared to commercial landings, councils may opt not to identify separate sector ACLs for recreational and commercial fisheries. For these species there will be less demand for timely recreational data to make in-season decisions. Magnuson only requires ACLs and AMs for species with a federal FMP. Therefore, species with a federal FMP in place and a recreational sector ACL will likely require catch estimates with higher levels of temporal resolution and shorter lag times. While species without recreational sector ACLs may also benefit from recreational data collection improvements, the focus of the project will be on the subset of species more likely to require timely/precise data for in-season management actions (i.e., species with recreational ACLs in place or pending). Within this sub-set of species/fisheries there are other factors that will determine the level of precision, temporal/spatial resolution, and maximum lag time needed to manage under ACLs. One important factor is how the ACL is divided. NOAA Fisheries has largely left it up to the individual Fishery Management Councils to define and divide their ACLs as needed: by sector (recreational versus commercial), geographically (e.g., state by state), by fishing mode (private boat versus for-hire), as a multi-species complex (e.g. grouper FMP), or some other way. How the ACL is defined will greatly influence the resolution of the catch data needed. Another factor is the length of the fishing season and the relative distribution of landings throughout the season. For in-season management of recreational fisheries that are compressed, with the large majority of landings occurring within a few months, frequent estimates with a very short lag period may be required to avoid exceeding an ACL. By contrast, fisheries where landings are more evenly distributed throughout the year will not have the same data timeliness requirements, although timeliness still may be important. Season length will be affected by both the seasonal availability of the species to anglers and management seasonal closures.Another factor that may play a role is the status of the stock: i.e., is the stock overfished and is overfishing occurring? With overfished stocks recreational landings are more likely to be close to or exceed an ACL than compared to underexploited stocks. More demands will be placed on the temporal and spatial resolution of recreational data for fisheries that are consistently at or near an ACL. Target precision levels on estimates for such species should also be higher since fishery managers will want to reduce the uncertainty associated with estimates used for in-season adjustments or outright closures. This project will attempt to categorize important recreationally managed stocks into different groups based on factors related to the precision and timeliness of recreational catch data. The identification of sub-groups of species/fisheries may give direction and focus to the selection of data collection alternatives and subsequent trade-off analyses. Since no single data collection or management solution (or combination thereof) will work for all species, recommendations resulting from this project may take the form of a menu of options. Categorization of recreational fisheries into homogeneous groups based on data needs and survey precision levels may result in a decision rule to help managers determine 1) for which fisheries a particular recreational data collection program will support ACL in-season monitoring, 2) why in-season monitoring may not be supported for particular fisheries, and 3) if not supported, what alternative uses of recreational data and other management options would be recommended.

### 1.5. Public Description

### 1.6. Objectives

### 1.7. References

National Research Council. 2006. Review of Recreational Fisheries Survey Methods. The National Academies Press, pp.187.

## 2. Methodology

### 2.1. Methodology

Alternatives Considered Recreational data collection alternatives designed to improve estimate timeliness and spatial/temporal resolution will be evaluated in terms of cost, data quality, and feasibility. For this project the scope of alternatives considered will be limited to changes that can be implemented within the basic MRIP re-design of MRFSS. If management needs for data timeliness cannot be met within this basic design, and management solutions cannot be identified, then a follow-up study may be needed to expand this scope to include more specialized data collection programs for particular species or sectors of a fishery. In any statistical survey, precision of catch estimates will vary by species. Typically, in a generalized survey of all species, variances are lower (i.e., higher precision) for more commonly caught species compared to rare event species. For a less common species it may be necessary to design a specialized survey to achieve a high degree of spatial and/or temporal resolution. Although the focus of this study will be on data collection alternatives, management alternatives should also be considered, particularly when the data options cannot support a particular management approach. Areas of investigation for improving the timeliness and resolution of recreational information include the following: 1. Reduce lag timeThe current lag between the end of each 2-month wave and release of preliminary recreational catch estimates is 45 days. For example, preliminary estimates of recreational landings for the period July 1 through August 31 (Wave 4) are typically made available on October 15. The lag time is due primarily to the collection of effort data which starts the last week of the wave and continues one week into the next wave, reviewing and cleaning data (quality control measures), running estimates, and reviewing estimates. One approach to speed up quality control would be to initially focus on cleaning a subset of key questions used in estimation or

a subset of intercepts with catch of key species of interest. Another way to reduce lag time associated with quality control and data processing is to clean intercept data throughout the wave rather than wait until the end. This would require more frequent transfer of intercept data (e.g. weekly) to NOAA Fisheries. If the survey moves to electronic data capture in the field, data could be uploaded virtually in real-time. Simulated catch estimates for key species could also be produced at different stages of the quality control process and compared to each other. If changes in estimates are minimal this would support using estimates derived from very preliminary or even raw (un-cleaned) data to make time sensitive management decisions. ll 2. Increase estimation frequency a. Shorten length of a waveDetermine the cost associated with switching from the current 2-month wave to a shorter wave (e.g., one month or two-weeks) and evaluate the trade-offs between timeliness and data quality. b. Combine real-time catch (intercept) data with forecasted effortWith more frequent (or possibly real-time) transfer of intercept data, catch rates and off-frame correction factors could be computed more frequently during the wave (e.g., weekly, bi-weekly). These could be combined with forecasted effort estimates to produce more frequent catch estimates during the wave. Information from intercept counts of returning trips may also be incorporated into the forecasted calculation of effort.c. Use modeling techniques to forecast catch and effort estimates Develop model to forecast estimates based on previous years/waves data. Forecasted inputs are replaced by real data as it becomes available either in real-time, weekly, monthly or at the end of the wave. 3. Other AlternativesThe project Steering Committee will solicit ideas from recreational fisheries survey design experts, survey program managers, fishery managers, data users, and constituents for improving the timeliness and resolution of recreational information, and how to best use recreational data in fisheries management. The Theodore Roosevelt Conservation Partnership (TRCP) has convened a Blue Ribbon Panel of high level fishery management experts. One of the stated focus areas of discussion for the panel is: “How can timeliness be improved in order to provide for mid-season adjustments capable of preventing a given recreational fishery from exceeding its annual catch limit?” Alternatives to be evaluated as part of this project may also come from this group of experts. Workshop on Using Recreational Fisheries Information A workshop is currently being planned to bring together the expertise needed to address some basic questions regarding recreational fisheries information and the new MSRA requirements. NOAA Fisheries Statistics Division will present results of the evaluation of select alternatives for improving the timeliness and spatial/temporal resolution of recreational estimates. Recreational fisheries data users and managers will be asked to talk about the ways recreational data are used, shortcomings of the current data collection system, and anticipated data needs for managing under ACLs and AMs. Workshop participants will include fisheries scientists, managers, survey statisticians, recreational data collection experts, and industry representatives. The TRCP Blue Ribbon Panel will participate in the recreational fisheries information workshop and contribute their recommendations for improving the collection, analysis, and use of recreational data. The final product resulting from the workshop, and project overall, will be a report that describes alternatives for improving recreational data collection programs to meet management needs including advantages, disadvantages, estimated costs, and feasibility assessment. The report will include recommendations and possibly decision rules for fishery managers in determining whether recreational fisheries information will support annual quota monitoring, in-season quota monitoring, or some other management system for a particular species or fishery.

### 2.2. Region

Alaska, Caribbean, Gulf of Mexico, Mid-Atlantic, North Atlantic, Pacific, South Atlantic, Western Pacific Islands

### 2.3. Geographic Coverage

### 2.4. Temporal Coverage

### 2.5. Frequency

### 2.6. Unit of Analysis

### 2.7. Collection Mode

## 3. Communication

### 3.1. Internal Communication

### 3.2. External Communication

## 4. Assumptions/Constraints

### 4.1. New Data Collection

### 4.2. Is funding needed for this project?

### 4.3. Funding Vehicle

### 4.4. Data Resources

### 4.5. Other Resources

### 4.6. Regulations

### 4.7. Other

## 5. Final Deliverables

### 5.1. Additional Reports

### 5.2. New Data Set(s)

### 5.3. New System(s)

## 6. Project Leadership

### 6.1. Project Leader and Members

| First Name | Last Name | Title | Role | Organization | Email | Phone 1 | Phone 2 |
|---|---|---|---|---|---|---|---|
| Gordon | Colvin | | Team Member | NMFS | | | |
| Jun | Rossetti | | Team Member | ICF International | | | |
| Ron | Salz | | Team Leader | NMFS | | | |
| Dave | Van Voorhees | | Team Member | NMFS | | | |

## 7. Project Estimates

### 7.1. Project Schedule

| Task # | Schedule Description | Prerequisite | Schedule Start Date | Schedule Finish Date | Milestone |
|---|---|---|---|---|---|
| 2 | Develop draft project plan | | 04/01/2010 | 04/30/2010 | |
| 3 | Finalize project plan | | 05/01/2010 | 05/31/2010 | |
| 5 | TRCP Blue Ribbon Panel Meeting | | 07/01/2010 | 07/01/2010 | |
| 6 | Workshop Planning: identify participants, develop agenda/format, logistics | | 08/01/2010 | 09/30/2010 | |
| 7 | Hold workshop | | 10/01/2010 | 10/31/2010 | |
| 8 | Develop draft workshop/project report | | 11/01/2010 | 11/30/2010 | |

| Task # | Schedule Description | Prerequisite | Schedule Start Date | Schedule Finish Date | Milestone |
|---|---|---|---|---|---|
| 9 | Distribute report for review by TRCP Blue Ribbon Panel, MRIP Operations Team, and MRIP EST | | 11/01/2010 | 12/31/2010 | |
| 10 | Finalize report | | 01/01/2011 | 01/31/2011 | |
| 1 | Establish project steering committee | | 03/01/2010 | 03/31/2010 | |
| 4 | Perform analyses to evaluate relative cost, data quality, and feasibility of implementing select alt | | 05/01/2010 | 08/31/2010 | |

### 7.2. Cost Estimates

| Cost Name | Cost Description | Cost Amount | Date Needed |
|---|---|---|---|
| TOTAL COST | | $0.00 | |

## 8. Risk

### 8.1. Project Risk

| Risk Description | Risk Impact | Risk Probability | Risk Mitigation Approach |
|---|---|---|---|

## 9. Supporting Documents

"Final Report", page 1

# Addressing the Fishery Management Need for More Timely Recreational Data

## Final Report

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February 6, 2012

## Acknowledgements

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Several people contributed in planning and organizing the Recreational Data Timeliness Workshop including Sara Heil (NOAA Fisheries), Elan Nardi (ICF Macro), Josanne Fabian (NOAA Fisheries), Anjel Lewis (NOAA Fisheries), Forbes Darby (NOAA Fisheries), Scott Ward (Fifth Estate), and the workshop facilitators Scott McCreary and Bennett Brooks (Concur, Inc.). We would also like to thank all the participants for their role in the success of the workshop. In particular we'd like to recognize the time and effort put forth by the following workshop presenters and group leaders: Mark Nelson (NOAA Fisheries), Corey Niles (Washington Dept. Fish and Game), Lynn Mates (Oregon Dept. Fish and Wildlife), Andy Strelcheck (NOAA Fisheries), Mike Ruccio (NOAA Fisheries), Toni Kerns (ASMFC), Dick Brame (CCA), Jessica Coakley (MAFMC), John Froeschke (GMFMC), Chris Kellog (NEFMC), Russel Porter (PSMFC), David Cupka (SAFMC), Nick Farmer (NOAA Fisheries), John Foster (NOAA Fisheries), Sara Heil (NOAA Fisheries), Kathy Knowlton (Georgia Dept. Natural Resources), Sera Drevenak (Pew Environmental Group), and Kevin Duffy (NOAA Fisheries). John Boreman (NC State University) reviewed the final report and provided valuable edits.

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## Executive Summary

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA) of 2006 mandates establishment of science-based annual catch limits (ACLs) and accountability measures (AMs) for most federally managed fish stocks. These new requirements have resulted in increased demands on the fisheries data and statistics used to support stock assessments, monitor catch and effort, and for management decisions. It is important that fisheries data collection programs keep up with increasing demands and match the needs of managers and assessment scientists. It is equally important for managers to use recreational fisheries data responsibly and strive for consistency between management structures and data availability.

Successful implementation and effective monitoring of ACLs and AMs will require improvements in the fisheries data and statistics available to managers. The Marine Recreational Information Program (MRIP) is a collaborative effort to develop and implement an improved recreational fisheries data collection program. While improving data quality and reducing survey bias are primary MRIP objectives, addressing the issue of recreational data timeliness is also critically important for effective ACL management.

Recent cases of recreational fisheries exceeding their allowable catch limits and thereby triggering emergency closures highlight the need for more timely recreational data. Data timeliness, or the lack thereof, contributes to the uncertainty in fisheries managers' ability to constrain catch so the ACL is not exceeded. Uncertainty associated with catch monitoring lag time (i.e. timeliness) and uncertainty associated with quantifying the true catch amounts (i.e., estimation errors or imprecision) are the primary sources of what is commonly referred to as "management uncertainty." More timely recreational data could help in several ways including: 1) reduce potential for overages; 2) help manage for in-season changes and avoid closures; and 3) allow for more timely notice to industry – improving long-term business planning capabilities.

The primary objectives of the study were to:

1. Identify, and evaluate trade-offs among, alternatives for improving the timeliness of recreational fisheries information availability;
2. Provide recommendations for addressing recreational data timeliness needs through MRIP survey design changes;
3. Identify current recreational catch and effort forecasting approaches, evaluate the effectiveness of forecasting in reducing management uncertainty, and explore ways models can be improved;
4. Identify and evaluate management alternatives for addressing the uncertainty associated with time lags in recreational catch availability;
5. Engage the primary MRIP data users and other affected stakeholders in an informed dialogue about alternatives and trade-offs for addressing the issue of recreational data timeliness.

A Recreational Fisheries Data Timeliness Workshop was held in March 2011 with the primary objective of engaging MRIP data users and other affected stakeholders in an informed dialogue about alternatives and trade-offs for addressing the issue of recreational data timeliness. Workshop participants were presented with data collection alternatives for improving the timeliness of recreational survey data. Survey design alternatives for improving the timeliness of recreational fisheries information availability were evaluated in terms of relative cost, data quality, and feasibility. The two types of alternatives evaluated for improving timeliness were: 1) reduction of lag time between the end of the sampling wave and when estimates are available to fishery managers, and 2) increasing the frequency of estimation by reducing the length of the sampling wave. The evaluation of survey design alternatives and the ensuing recommendations focused on the recreational surveys NOAA Fisheries administers on the Atlantic and Gulf of Mexico Coasts. However, findings could be applicable to other regions and survey programs, as could the evaluation of forecasting approaches and management alternatives for addressing uncertainty associated with recreational catch lag time.

The lag time analysis indicated that with modest levels of additional funding preliminary wave estimates could be released about 31 days after the end of a wave instead of the current 45 days. Reducing lag beyond this point would put considerable strain on the process, which could start to negatively affect the accuracy of estimates. Workshop participants identified the advantages of monthly waves for reducing management uncertainty to avoid exceeding an ACL. While monthly waves would be beneficial, data users were not willing to sacrifice overall annual precision of catch estimates for increased timeliness. Switching from bi-monthly to monthly waves with no increase in overall sample size will likely result in a significant decline in precision on cumulative catch estimates for many species. Switching to monthly waves while maintaining current precision levels will require significant additional funding associated with increasing sample sizes.

Forecasting techniques can provide an efficient, cost effective mechanism for in-season projections of recreational catch and effort in cases where the timeliness of survey data is not adequate for in-season adjustments. Regional variation exists in the extent to which forecasted or projected landings are currently being used as an in-season management tool. The Mid-Atlantic and New England Fishery Management Councils have not, to date, chosen to use forecasting as a tool for in-season management, although workshop participants suggested that this management tool could have more utility in these regions with improved data quality and timeliness. In regions where forecasting approaches are used, success in terms of reliably predicting recreational estimates has also varied by approach and by species. Several participants also identified the potential to improve recreational forecasting models by including external correlates (e.g., angler behavior, fuel prices, and weather data).

Specific MRIP recommendations for improving recreational data timeliness include:

1. Move towards implementation of one-month waves:
    a. New MRIP catch and effort survey designs should have the flexibility to allow for generation of monthly catch and effort estimates.
    b. MRIP should fund a Recreational Data Timeliness Simulation Project with the goal of developing a model to simulate recreational catch estimates and associated variances from one-month waves. Comparisons of cumulative estimate precision levels using one-month versus two-month waves should be done for key management species.
    c. Building off the simulation model, a secondary project should develop an Optimal Sample Allocation Tool that will provide information on tradeoffs between timeliness, precision, and cost and allow for more informed decisions regarding sample allocation.
    d. Recognize that if funds are limited it may be optimal to produce monthly estimates during certain times of year (e.g., "core" months) and bi-monthly estimates during other times. This may also vary by region or sub-region (i.e., coordination of "core" months with "core" geographic areas).
2. Reduce lag time between the end of a sampling wave and production of recreational catch estimates by up to two weeks.
3. If the revised MRIP effort survey design uses a mail survey as part of a mixed survey mode approach, models should be developed that can reliably forecast effort based on partial results from the faster survey mode (i.e., phone) and from early mail survey returns.
4. MRIP should continue to support and encourage development of models for reliably forecasting recreational catch and effort estimates as a potentially more timely and cost effective approach for in-season quota management.
5. MRIP should continue to test the feasibility of innovative electronic data collection options, analyze costs/benefits, and make recommendations for implementation in particular regions as warranted.
6. MRIP should continue to support development of innovative methods for collecting detailed data on catch and effort that may supplement and assist in the interpretation, validation, and tuning of data derived from the baseline survey methods, or provide improved timeliness and precision to support management of particular species (e.g., rare event, small catch limits, or relatively short seasons).

A general theme of the Timeliness Workshop was the need to consider adapting management to data constraints rather than adapting data to meet management needs. Improvements in recreational data quality and timeliness that can feasibly be implemented through MRIP should not be viewed alone as a panacea for management of recreational ACLs. Rather, management approaches for addressing the management uncertainty associated with data imprecision or estimation lag times must also be considered for successful management of recreational sector ACLs.

Summary of key findings related to management approaches for addressing management uncertainty associated with recreational data:

- Anticipated MRIP improvements in data timeliness, accuracy and precision will reduce but not eliminate management uncertainty associated with recreational estimates. For some stocks, management uncertainty will remain relatively high and fishery managers need to anticipate and address this uncertainty.
- Councils can address management uncertainty and effectively reduce their risk of exceeding an ACL by establishing Annual Catch Targets (ACTs) at some catch level below the ACL.
- ACT control rules for setting reduction buffers should take into account the precision, accuracy, and timeliness of recreational data, as well as the distribution of recreational landings across survey waves.
- The relative advantages and disadvantages of multi-year averages for managing ACLs should be thoroughly analyzed and evaluated, particularly for species with relatively low precision on annual catch estimates.
- The choice of regulatory controls used not only impacts fishery participants and associated businesses but can also influence the level of management uncertainty associated with monitoring an ACL. Fishery managers should thoroughly evaluate trade-offs of longer versus shorter recreational fishing seasons and other associated controls (i.e., bag limits, size limits, and area closures).
- Improvements in the timeliness of recreational data are only as valuable as management's ability to use the information in a timely manner. The ability of management to respond quickly with in-season closures or other regulatory measures varies considerably by region and states within regions. Councils and states may be able to reduce the risk of exceeding ACLs by minimizing the time needed to implement in-season controls once recreational data become available.
- Other mechanisms aimed at buffering the risk of exceeding an ACL should also be considered including sharing agreements among states (for state level quotas) and the use of stock complexes for rare event species with relatively low precisions levels.

## Background

### *Increasing Demands on Fisheries Data*

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary law governing marine fisheries management in United States federal waters. Originally passed in 1976, the Act was revised and reauthorized in 1996 with the Sustainable Fisheries Act (SFA), and again in 2006 with the Magnuson-Stevens Reauthorization Act (MSRA). Each revision has brought new and more rigorous requirements to prevent overfishing and rebuild overfished stocks. The SFA required that each fishery management plan (FMP) specify objective and measurable criteria for determining when a stock is overfished or when overfishing is occurring, and establish measures and required time frames for rebuilding overfished stocks. MSRA mandates an end to overfishing and maintains and strengthens the rebuilding provisions of SFA. It includes provisions for establishment of science-based annual catch limits (ACLs) and accountability measures (AMs) for many fish stocks. An ACL is the level of annual catch that, if met or exceeded, triggers accountability measures, such as a seasonal closure or quota closure, while an AM is a management control to prevent an ACL from being exceeded or to correct or mitigate overages of the ACL, if they occur.

These new requirements have resulted in increased demands on the fisheries data and statistics used to support stock assessments, monitor catch and effort, and for management decisions. The MSA requires that conservation and management measures be based upon the best scientific information available (National Standard 2). However, in some cases the best information available does not fully support management needs resulting in fishery managers having to use data and statistics in ways they were not originally intended. This is particularly true of recreational fisheries statistics data generated from the Marine Recreational Fisheries Statistics Survey (MRFSS), which was first implemented in 1979. Current uses of MRFSS catch and effort estimates were not anticipated in the original survey design. Fishery managers now require data with higher temporal and spatial resolution and estimates with higher levels of precision than the MRFSS was designed to produce[1]. It is important that fisheries data collection programs keep up with increasing demands and match the needs of managers and assessment scientists. It is equally important for managers to use recreational fisheries data responsibly and strive for consistency between management structures and data availability. This includes fully understanding and incorporating the risks and uncertainty associated with using statistical estimates for particular decisions, and considering options for managing differently to avoid using data for purposes it was not intended or cannot support (i.e., high levels of uncertainty).

[1] National Research Council. 2006. Review of Recreational Fisheries Survey Methods. The National Academies Press, pp.187.

Successful implementation and effective monitoring of ACLs and AMs will require improvements in the fisheries data and statistics available to managers. The Marine Recreational Information Program (MRIP) is a collaborative effort to develop and implement an improved recreational fisheries data collection program. MRIP improvements are being implemented incrementally as alternative approaches are designed and tested. Initial improvements are focused on addressing fundamental issues identified by the NRC review, including establishment of a Federal angler registry, assessing and reducing the potential for bias in current surveys, and developing data collection standards. These improvements are intended to provide fishery managers and stock assessment scientists with more accurate, precise, and reliable data and statistics on which to base management decisions.

While high quality recreational fisheries data and catch estimates are critically important for management, another important and related criterion is data timeliness. Managing recreational fisheries under ACLs requires fishery managers to accurately predict when an ACL will be exceeded in order to take preventative measures. More timely recreational data could help in several ways, including: 1) reduce potential for overages; 2) help manage for in-season changes and avoid closures; and 3) allow for more timely notice to industry to improve long-term business planning capabilities. Recent cases of recreational fisheries exceeding their allowable catch limits triggering emergency closures highlight the need for more timely recreational data. Examples include the Northeast black sea bass emergency closure from October 2009 through May 2010, the Gulf of Mexico greater amberjack emergency closure from October through December 2009, and the South Atlantic black sea bass closure in February 2011.

***Timeliness and Management Uncertainty***

In an ideal world fishery managers would have access to accurate and precise recreational catch estimates in real-time for making in-season adjustments (e.g., adjust size/bag limits, fishery closures) to avoid exceeding specified catch limits. However, real world constraints, including budget limitations, late reporting of data, and data processing and error checking time, make "real-time" availability of accurate and precise estimates impractical for most recreational fisheries. The sheer number of recreational anglers, their diverse fishing behaviors, and the myriad means by which they access the fishery all add to the challenges associated with monitoring recreational fisheries in a timely manner. Compounding the issue is that previous years and waves are often not good predictors of current year recreational landings due to significant inter-annual variability in factors such as fish availability, targeted fishing effort, and weather.

As the lag time between then end of the wave and when catch estimates are available increases, so does the risk of exceeding an ACL. Therefore, data timeliness, or the lack thereof, contributes to the uncertainty in fisheries managers' ability to constrain catch so the ACL is not exceeded. Uncertainty associated with catch monitoring lag time (i.e.,

timeliness) and uncertainty associated with quantifying the true catch amounts (i.e., estimation errors or imprecision) are the primary sources of what is commonly referred to as "management uncertainty." Management uncertainty differs from "scientific uncertainty" which refers to all the uncertainty associated with the collection and analysis of stock information, including establishment of an overfishing level. Whereas timeliness only affects management uncertainty, imprecision on catch estimates can affect both management and scientific uncertainty. The NOAA Fisheries revised National Standard 1 Guidelines underscore the importance of accounting for both scientific and management uncertainty when specifying catch limits and accountability measures[2].

[2] 50 CFR Section 600.310 National Standard One.

## Project Objectives

The primary objective of this project was to identify, and evaluate trade-offs among, alternatives for improving the timeliness of recreational fisheries information availability. There are practical limits to the degree to which the timeliness of the collection, processing, and reporting of recreational fishery survey data and statistics can be improved. This project was intended to provide a better understanding of what survey improvements are possible and what resources will be needed to implement them. Specific recommendations for addressing recreational data timeliness needs through MRIP survey design changes are proposed based on this evaluation.

A different approach to increasing the frequency of estimation involves using models to forecast catch and effort estimates. Another objective of this study was to identify and compare current approaches being used to forecast recreational catch and effort estimates, evaluate the effectiveness of forecasting as a tool for reducing management uncertainty, and explore ways forecasting models can be improved for future application. Forecasting is a fundamentally different approach for addressing timeliness in that it does not necessarily require changes in survey design or data processing. Instead, forecasting utilizes new model-based approaches to estimate catches based on catch and effort data from previous waves and years, and other correlates as available. However, in some instances survey design changes may be needed to improve model inputs, thus enhancing the ability to reliably forecast catch estimates.

Another important objective of this project was to identify and evaluate management alternatives for addressing the uncertainty associated with recreational catch lag time. A data collection system that produces recreational catch data with the temporal and spatial resolution necessary for in-season quota management may not be cost effective, efficient, or reliable for certain species and stock assemblages. Alternative data collection solutions resulting from this project will need to be compared against alternative management solutions for meeting ACL requirements. It is important to identify management solutions as part of this project, since any data collection alternatives involving in-season or real-time management will need to be evaluated against these solutions. Ideally, data collection and management systems will be paired with one another so that they are compatible; i.e., the data collection system provides data users with the information they need and when they need it to responsibly assess and manage marine fisheries following the guidelines mandated in the MSA.

Evaluation of alternatives for improving the timeliness of recreational data would not be possible without significant input from the fishery managers and scientists who rely on the data. An overarching objective of this study was to engage the primary MRIP data users and other affected stakeholders in an informed dialogue about alternatives and trade-offs for addressing the issue of recreational data timeliness.

The evaluation of survey design alternatives and the ensuing recommendations focused on the recreational surveys NOAA Fisheries administers on the Atlantic and Gulf of

Mexico coasts. However, findings could be applicable to other regions and survey programs, as could the evaluation of forecasting approaches and management alternatives for addressing uncertainty associated with recreational catch lag time.

In summary, the main objectives of the study were to:

1. Identify, and evaluate trade-offs among, alternatives for improving the timeliness of recreational fisheries information availability;
2. Provide recommendations for addressing recreational data timeliness needs through MRIP survey design changes;
3. Identify current recreational catch and effort forecasting approaches, evaluate the effectiveness of forecasting in reducing management uncertainty, and explore ways models can be improved;
4. Identify and evaluate management alternatives for addressing the uncertainty associated with time lags in recreational catch availability;
5. Engage the primary MRIP data users and other affected stakeholders in an informed dialogue about alternatives and trade-offs for addressing the issue of recreational data timeliness.

## Approach

### *Recreational Fisheries Data Timeliness Workshop*

A two-day workshop was held in St. Petersburg Florida with the primary objective of engaging MRIP data users and other affected stakeholders in an informed dialogue about alternatives and trade-offs for addressing the issue of recreational data timeliness. Workshop planning and agenda (Appendix A) development included the following tasks:

- Establish participant list of key MRIP data users impacted by the timeliness issue and other affected stakeholders with input from the Project Steering Committee and referrals from identified participants;
- Hire professional workshop facilitators;
- Obtain input for workshop agenda through phone calls with participants, emails, online pre-survey questionnaire, and meetings with outside consultants;
- Recruit workshop speakers, panelists, and regional break-out session group leaders;
- Develop key questions and instructions for regional break-out session groups to discuss and report back on (Appendix B);
- Develop recreational species fact sheets for key management species most affected by the data timeliness issue (see below for details); and
- Assess trade-offs associated with options for improving recreational data timeliness and develop alternatives for participants to discuss during workshop break-out sessions (see below for details).

### *Species Fact Sheets*

The purpose of the fact sheets was to provide a graphical presentation of recreational survey data to aid in the workshop break-out session discussion of timeliness for particular species. The project team identified 28 managed stocks covering the Atlantic, Gulf, and Pacific Coasts for which recreational data timeliness was currently, or could become, a source of management uncertainty. The focus was on federally managed species with mandated ACLs and AMs that were more likely to require timely and precise data for in-season management actions. Fact sheet content focused on factors that influence management uncertainty including recent landings trends in relation to catch limits or quotas, temporal distribution of landings across waves, precision of estimated landings (by wave and cumulative), and geographic distribution of landings across states. Other basic information about the stock including stock status, geographic range, proportion of overall quota for recreational fishery, and previous year's season dates were also provided. An example fact sheet is provided in Appendix C.

***Evaluation of Survey Design Alternatives for Improving Timeliness***

Survey design alternatives for improving the timeliness of recreational fisheries information availability were evaluated in terms of relative cost, data quality, and feasibility. The two types of alternatives evaluated for improving timeliness were: 1) reduction of the lag time between when catches occur and when estimates are available to fishery managers, and 2) increasing the frequency of estimation by reducing the length of a sampling wave. For this project, the scope of data collection alternatives considered was limited to changes that can be implemented within the basic MRIP re-design of MRFSS. Ultimately, fishery managers must consider the timeliness of all sources of recreational data used to monitor an ACL for a particular fishery. This includes headboat landings reported through the NOAA Fisheries Southeast Headboat Survey (for South Atlantic and Gulf of Mexico fish stocks) and Texas landings estimated through the Texas Parks and Wildlife recreational survey (for Gulf of Mexico stocks). While evaluation of alternatives for improving the timeliness of these additional data sources was not a project objective, the need for more timely data from these programs was discussed during the timeliness workshop.

Workshop participants also recognized that, for some stocks, management needs for recreational data quality and timeliness may only be met through more specialized data collection programs. Evaluation of such programs was not part of this project but should be a consideration of MRIP more broadly.

Reducing Lag Time

The current lag between the end of each two-month wave and release of preliminary recreational catch estimates is 45 days. For example, preliminary estimates of recreational landings for the period July 1 through August 31 (Wave 4) are typically made available on October 15. The first step in evaluating lag reduction alternatives was to identify all the particular steps involved in the process from data collection to data processing and error-checking to estimation. Conference calls were held with the current federal contractors of the three complementary surveys (i.e., Coastal Household Telephone Survey - ICF Macro, For-Hire Survey - Quantech, Inc., and Atlantic Access Point Angler Intercept Survey – ICF Macro) to better understand the details involved with each step in the process, the time required for each, and to brainstorm ideas for reducing lag at various stages. Input was also obtained from Gulf States Fisheries Information Network (GulfFIN) staff who coordinate the For-Hire and Intercept survey components in the Gulf of Mexico and from Maryland Department of Natural Resources staff for the Chesapeake Bay for-hire logbook component.

Detailed timelines were developed for each of the component surveys that are combined to produce recreational catch estimates. A timeline was also developed for the estimation phase, which begins once all component data have been delivered to NOAA Fisheries.

Survey timelines were combined to identify the time limiting steps, which could be further investigated for lag reduction. Different scenarios for reducing lag were identified and evaluated by the project team. A formal Request for Information (RFI) was sent by the NOAA Acquisitions and Grants Office (AGO) to the data collection contractors to evaluate the feasibility, relative cost, and data quality impacts of each scenario. The RFI asked the contractors to consider: 1) if the shortened data delivery deadline could be met for each particular scenario; 2) whether meeting the deadline would result in some reduction in data quality compared to the status quo; and 3) if there were any special considerations that would be required to meet the revised schedule. Alternatives for reducing lag time and the associated trade-offs were presented to workshop participants and discussed during the workshop break-out session.

Shortening Length of a Sampling Wave

Currently MRIP recreational catch estimates for the Atlantic Coast, Gulf of Mexico, Puerto Rico and Hawaii are available in two-month waves (i.e., wave 1 = Jan/Feb, wave 2 = Mar/Apr, …., wave 6 = Nov/Dec). Combined with the 45-day lag described above, this means that landings at the beginning of a wave will not be estimated until more than three months later. Switching from two-month estimation waves to a shorter wave period (i.e., monthly or bi-weekly) involves trade-offs among timeliness, precision, and cost.

The approach for this analysis was to use a simple simulation exercise to demonstrate the trade-offs that need to be evaluated when considering a design change to shorter wave lengths. The objective was to present this simple example to workshop participants to encourage an informed discussion of these trade-offs during the break-out session. The simulation focused on two facets: 1) the relative impacts on precision, both wave precision and cumulative precision, as the sampling wave is shortened while the overall sample size remains constant; and 2) the additional sample size (and cost) needed to maintain precision at the two-month wave level when switching to monthly waves.

## Findings

### *Survey Design Alternatives for Improving Recreational Data Timeliness*

Reducing Lag Time

The combined survey component timeline for producing MRIP wave estimates is shown in Figure 1 below. The data collection period, data entry completion date, and data delivery due date were identified for each survey component in relation to the estimates posting date 45 days after the wave ends. To identify segments of the timeline, which could be shortened with additional resources, the individual steps associated with the data processing phases for each survey were identified and evaluated in more detail (see Appendix D for more detailed flow charts). The initial focus was on the effort surveys, which were identified as the time limiting factor for data delivery. The data delivery due date for the Coastal Household Telephone Survey (CHTS), For-Hire Survey (FHS) and Maryland Logbook program is 28 days after the wave ends (intercept data are delivered 21 days after). The primary reason for this difference is that the effort survey data collection continues for between 7 to 10 days after the end of the wave. Therefore, while the overall lag from the end of the fishing period being estimated is 45 days, the lag from the end of effort data collection is only about 35 days. Feedback from the current data collection contractors suggested that the data delivery timeline for both the CHTS and FHS could be reduced by one week (i.e., 21 days after the wave) without a detectable decline in data quality. The only identified trade-off for this time lag reduction was additional resources (i.e., cost) to speed up the data processing phase.

Both the CHTS and FHS contractors also seemed to suggest that this seven-day reduction in data delivery time lag was right around the breaking point beyond which data quality may be affected regardless of how much additional resources are available. Some steps in the process, like following up outliers by re-contacting respondents, are more time limited than cost limited and therefore cannot be easily sped up. Given the overall emphasis on data quality and bias reduction in the MRIP redesign of the MRFSS, the project team decided to focus on options for reducing lag time that would not result in decreased data quality. For the most part, MRIP data users and constituents were also not willing to sacrifice data accuracy for reduction of lag time.

Some options for reducing the data delivery time lag for dockside intercept surveys were also identified including speeding up interviewer data submittal time, increase staffing for data entry and review during high volume periods and near the end of the wave, and electronic data collection. However, using additional resources to deliver catch data before the 21$^{st}$ of the month will not result in quicker estimates, since this is the earliest date that effort data can be delivered without a reduction in data quality.

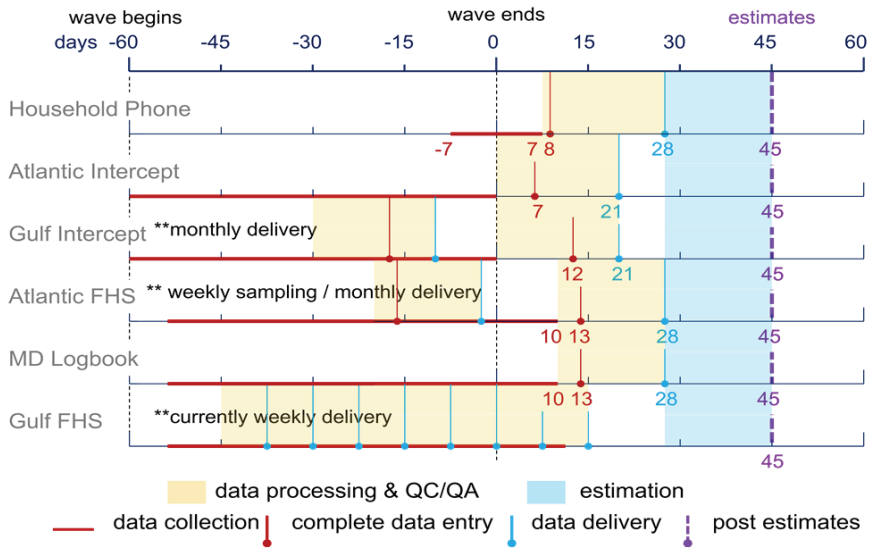



Figure 1. Timelines for data collection and processing for each of the component surveys that are combined to produce Atlantic and Gulf of Mexico recreational catch estimates.

The period between when all data have been delivered (28 days after wave) and estimates are posted (45 days after wave) was also evaluated for possible lag reduction options. Once all the necessary data have been delivered the actual running of estimates is an automated process that can be done in a day or two. Assuming all data are delivered on time and in the proper format, this leaves about two full weeks for review of preliminary estimates in-house by NOAA Fisheries staff. Although estimate review typically does not take this long, extra time is sometimes needed if any data are delivered late, anomalies are found that need to be further investigated, or higher priority tasks need to be done first by staff. This evaluation suggested that the time between data delivery and estimate release could be reduced by about seven days. The trade-off for this lag reduction is that NOAA Fisheries would need to prioritize estimate review such that this task is the highest priority for designated reviewers once estimates are available. Back-up reviewers would also need to be identified in case a reviewer is on leave or travel and cannot complete the review on time.

This analysis indicated that modest reductions in lag time (about seven days maximum) could be achieved for both the data delivery and estimation phases if additional resources (i.e., cost) were made available. The combined effect could result in preliminary wave estimates being released about 31 days after the end of a wave instead of the current 45 days. Reducing lag beyond this point would put considerable strain on the process, which could negatively affect the accuracy of estimates.

Results of the lag reduction analysis were presented to recreational fisheries data users and MRIP constituents at the workshop. Workshop participants were asked to consider the advantages (and disadvantages, if any) of reducing the lag time and to evaluate the identified trade-offs in regional break-out sessions. In general, regional groups were more focused on shortening the sample wave (see below) and did not spend much time discussing the lag reduction. Although no one was opposed to reducing estimation lag time by one or two weeks, the general consensus was that, by itself, such a modest reduction would not significantly improve the ability to manage recreational ACLs using in-season landings estimates. This was particularly true for fisheries with very short seasons (e.g., one or two months) where the two-month sampling wave may be more of a limiting factor for in-season ACL management.

Shortening Length of a Sampling Wave

Results of the simulation exercise showed that a significant decline in precision of both wave level estimates and, more importantly, cumulative estimates would occur when switching from bi-monthly to monthly wave length with no increase in overall sample size (i.e., splitting the bi-monthly sample across two months; Figure 2 below). Although this exercise was based on one very generic model with many simplifying assumptions, results suggest that, for many species to achieve monthly estimates that are as precise as those based on standard bi-monthly estimates, samples sizes would need to be roughly doubled. However, the precision of individual monthly estimates should be less important than the precision of the cumulative estimate for managing an ACL in-season. To maintain the *status quo* precision of cumulative catch estimates when switching from bi-monthly to monthly waves, sample sizes will still need to be increased significantly but likely will not have to be doubled. Based on the simplified model, sample size increases needed to maintain precision on cumulative estimates are expected to vary from 40 to 60% depending on the region, species, and the number of months combined in the estimate. Sample size increases will likely be needed for both the effort survey and intercept survey components, although the proportional increase may differ by component. It should also be noted that any increased costs associated with increasing sample sizes to maintain precision on more timely estimates will be in addition to the anticipated increased costs associated with new MRIP survey designs. New MRIP intercept and effort survey designs are still being pilot tested and analyzed so the increased costs associated with implementation are still unknown. A less costly approach to maintaining precision while shortening the sampling wave involves shifting sample among waves. Optimal allocation of sample sizes across months could improve precision for particular species of interest. For example, sampling could be "front-loaded" or targeted at particular times of year to improve cumulative precision for species managed in-season. The trade-off is that less sample would be available for other months, which could negatively impact precision of important recreational species with different seasonal landings patterns.

Workshop participants were asked to evaluate the advantages and consider the trade-offs associated with switching to monthly waves. All regional break-out groups identified the

advantages of monthly waves for reducing management uncertainty to avoid exceeding an ACL. Workshop break-out groups noted that for some important recreational fisheries a significant portion of the ACL is landed in one or two high pressure waves. With bi-monthly waves, by the time estimates are available it is often already too late to control a quota overage. As one workshop participant put it "We're really in the dark during a period of great activity." In addition to providing more timely information for in-season management, increased estimation frequency would improve and refine fishery managers understanding of seasonal variability in the fishery.

While monthly waves would be beneficial, the general consensus among data users was that they were not willing to sacrifice overall annual precision of catch estimates for increased timeliness. Two regions (South Atlantic and Northeast), however, did indicate that they would be willing to accept lower precision on wave level (monthly) estimates for increased timeliness as long as the cumulative precision was not negatively affected. The Gulf of Mexico group noted that for some recreational species with very short seasons maintaining individual wave precision was still important.

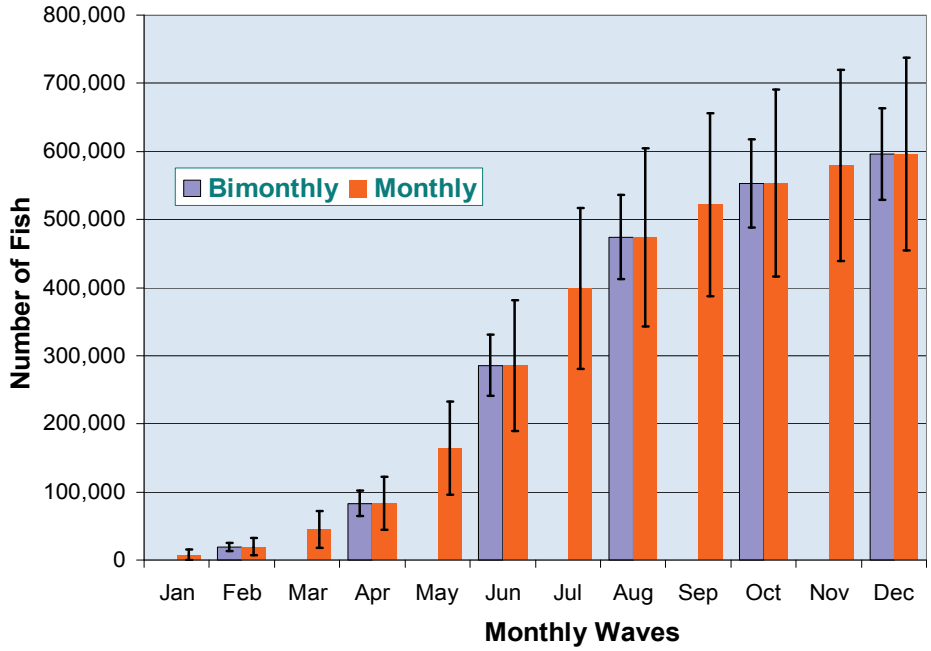



Figure 2. Simulation showing the possible impact on precision of cumulative recreational catch estimates when switching from bi-monthly to monthly estimation waves through splitting of the bi-monthly sample across two months (Bars represent 95$^{th}$ percent confidence intervals around the point estimate).

Switching to monthly waves while maintaining current precision levels will require additional funding associated with increasing sample sizes, and for some species and waves substantial new funds will be needed. Operating under the assumptions that survey funds are limited and data users are not willing to sacrifice overall precision for timeliness, break-out groups discussed ways to optimize additional funds that may be available for improving timeliness to mesh with management priorities. One group suggested that additional funds for timeliness improvements should first be used to switch to monthly effort estimates, and then applied to monthly catch estimates for the "core" months as funds allow. Presumably, more frequent effort estimates could then be used to predict or forecast catch estimates (see Forecasting section below). A common theme among all groups was the concept of optimizing for "core fishing seasons" or months when timeliness was particularly critical. Sample size can be added during these more important management waves to allow for monthly, or more frequent, estimates while maintaining (or improving) precision. Similarly, it may be possible to lengthen waves and reduce sampling effort at less critical times with minimal impact on fisheries management. Increasing estimation frequency beyond monthly (i.e., bi-weekly or weekly) may be desirable for certain key management species during particularly critical management months. However, the cost may be prohibitive to maintain precision at desired levels.

The prioritization for shorter waves during particular months varies by region and fishery. Some participants focused on Wave 4 (July/August) as the most critical for many recreational species. Others identified Waves 3 (May/June) and 5 (September/October) as more critical for timeliness for some species despite having lower landings than Wave 4. For some species, landings during these "shoulder" waves may be more variable from year to year compared to Wave 4 and therefore more difficult to predict or control. The wave following the peak landings wave may also be more important for timeliness since more frequent estimates are needed later in the season as you approach the ACL or ACT. It was also noted that increased estimation frequency at particular key times of year could result in additional waves of data being available to fisheries technical advisors at the start of the specification-setting process for the following year.

Following on the idea of "core fishing seasons", sample sizes can also be optimally allocated to cover "core areas" during particularly important times of year when increased timeliness and precision are needed by management. The concept of "core areas" could be considered for particular regions, states, or sub-regions within a particular state.

Some workshop participants wanted to explore moving away from a fixed "wave" model for recreational data availability and towards a continuous reporting system whereby data are available virtually in "real-time." However, it was pointed out that there is no estimation design in place to produce catch estimates in real-time without some temporal stratification of sampling. Sampling could be stratified by day in paired surveys of fishing effort and catch, but total sample sizes would have to be extremely large to

support reasonably precise daily estimates of effort that could be paired with catch data collected on site. The costs of implementing an effective daily survey approach would most likely be prohibitive. Surveys for the collection of fishing effort data needed to produce catch estimates are conducted at the end of each wave. A major part of the MRIP re-design is that these effort surveys will rely more heavily on lists of licensed and registered anglers as the effort-sampling frame and less on random-digit dialing of households. "Raw" (uncleaned) intercept data could be provided throughout the wave, perhaps not in "real-time" but at more frequent intervals (e.g., weekly) as it becomes available. Such updates could provide fishery managers with information at critical times during the fishing season. As an example, both Oregon and Washington use raw intercept data to produce weekly "rough" catch estimates for recreational bottomfish species that are occasionally used to inform in-season decisions. Several participants expressed concerns about basing management decisions on "raw" data that had not been subject to at least some error-checking or quality control measures. It was also pointed out that releasing "raw" data for use by fisheries managers might be in violation of the federal Information Quality Act.

If raw intercept data are to be used as a "real-time" rough gauge of catch throughout the wave, data transmittal and processing time will need to be sped up significantly to get data from the field into a usable database. There was some discussion at the workshop about the use of electronic data collection for improving recreational data timeliness. The use of electronic data capture devices could not only speed up the flow of data from field intercept surveys but could also improve data quality if programmed with built-in error-checking routines. Testing of different hand-held electronic data collection devices for application in recreational fisheries intercept surveys continues to be conducted. Electronic logbook data collection programs are also being tested in the South Atlantic and Gulf of Mexico for-hire fisheries. Electronic data collection options should continue to be explored and evaluated through MRIP.

Pacific Coast Recreational Surveys

In response to changing management needs in the late 1990s and early 2000s, the Pacific Coast states developed new, or modified existing, recreational surveys that differed from the predecessor MRFSS design. One primary difference between MRFSS and the newly designed Pacific surveys is the estimation of effort. Whereas MRFSS used a random-digit dialing coastal household telephone survey as the primary frame for effort estimation and the access-point intercept survey to correct for biases, the Pacific surveys use a combination of access-point and roving surveys to estimate effort and a telephone frame to correct for biases. Although variation exists among the three state recreational data collection programs (California, Oregon, and Washington)[3], a primary management need addressed by all three was improved data timeliness. The Pacific Coast states recreational surveys currently generate monthly catch and effort estimates. Preliminary

[3] See Pacific States Marine Fisheries Commission Recreational Fisheries Information Network (RecFIN) website for detailed descriptions of the recreational survey designs: http://www.recfin.org/resources

data used to inform management decisions in-season are available one week after the month and catch estimates are typically available with a one-month lag. By accepting trade-offs between timeliness, cost, and sampling coverage, West Coast fishery managers now have the timeliness needed to effectively manage most recreational sector quotas. To achieve monthly estimates without sacrificing precision, the Pacific states surveys concentrate sampling effort during high effort months (March through September) and particular fishing modes (shore mode not sampled in Oregon and Washington). Pacific coast states have been willing to accept the trade-off of reduced or incomplete sampling coverage in order to achieve desired levels of precision. Estimates for October through February are extrapolated from sampled months based on historical temporal distribution of catch. This approach, which could potentially bias catch estimates, is currently being reevaluated with MRIP funding. MRIP is also in the process of working with Pacific RecFIN to reduce or eliminate other potential biases in the Pacific survey designs and estimation methods.

Even with reduced sampling coverage, the new surveys are still considerably more costly than the (MRFSS), which was conducted on the Pacific Coast prior to 2004. The Pacific RecFIN 2011-2012 budget to conduct all tasks is $6.9 million (not including another 965,000 for monitoring recreational salmon fisheries). Eliminating shore mode sampling in Oregon and Washington and the Oregon phone survey reduces the budget to $5.4 million. By comparison, the RecFIN grant to conduct MRFSS on the Pacific Coast in 2003 was $1.2 million. Therefore, improvements in recreational data quality and timeliness on the Pacific Coast have not come without a price. RecFIN has been funded at $2.2 million for the past 10 years with the states accounting for the substantial gap between the RecFIN grant and the current costs associated with running the surveys.

A thorough evaluation of the cost, feasibility, and data quality impacts of implementing Pacific Coast survey methods on the Atlantic and Gulf Coasts was not within the scope of this project. Such an evaluation would need to consider significant differences among the recreational fisheries in these regions, including the number and type of fishing access sites, temporal and spatial distribution of fishing effort, number of inlets or points of egress for ocean boat trips, among other factors. As mentioned above, the Pacific surveys primarily use a combination of access-point and roving survey methods to estimate effort as opposed to phone surveys. A recent report prepared for The Ocean Conservancy analyzed the relative strengths and weaknesses of the California Recreational Fisheries Survey (CRFS) in comparison to the MRFSS for providing reliable in-season monitoring of the private recreational reef-fish fishery in the Gulf of Mexico[4]. In terms of timeliness, the report notes that both on-site and telephone methods for estimating effort can be made more timely by shortening the estimation period – i.e., telephone waves could be shortened to one month. The report also suggests that given the sheer number of access sites in the Gulf, including a significant private access component, and relatively high costs associated with on-site survey methods, a

[4] Jones, Cynthia M. Report on a Comparative Analysis of MRFSS and CRFS with Emphasis on the Gulf of Mexico Private Recreational Reef-fish Fishery. Unpublished report prepared for the Ocean Conservancy, July 16, 2010.

phone survey based on a list frame of anglers would be a more cost effective and efficient method for estimating effort. MRIP is currently pilot-testing more efficient and less biased recreational fishing effort survey designs. These include dual-frame approaches that utilize angler license frames as well as mixed mode designs that combine phone surveys with mail surveys.

***Forecasting as a Tool for Reducing Management Uncertainty***

Forecasting techniques can provide an efficient, cost-effective mechanism for in-season projections of recreational catch and effort in cases where the timeliness of survey data is not adequate for in-season adjustments. Regional variation exists in the extent to which forecasted or projected landings are currently being used as an in-season management tool. All three Pacific Coast states use in-season projections to track recreational groundfish quotas based on the most recent monthly survey data and, in some cases, "raw" weekly survey data. Recreational landings are also projected in-season by the NOAA Fisheries Southeast Regional Office for greater amberjack and red snapper in the Gulf of Mexico and black sea bass in the South Atlantic. However, in recent years the red snapper season has been so short that season length projections have had to rely on prior year's data, which are often not a reliable predictor or current year landings patterns. The Mid-Atlantic and New England Councils have chosen not to use forecasting as a tool for in-season management due to concerns about the reliability of projected landings as the basis for management decisions. Workshop participants in the Northeast Region breakout group did, however, recognize the value of forecasting and indicated that, if the frequency and quality of data supported reliable forecasts, this management tool could have future utility for Mid-Atlantic and New England recreational fisheries as well.

The workshop provided data users with an opportunity to compare forecasting approaches, share knowledge, and discuss ways to improve current methods for future application. Several methods of forecasting recreational data were presented and discussed during the workshop. These ranged in complexity from ratio estimators and basic regression analysis to more complex model-based approaches, such as Autoregressive Integrated Moving Average (ARIMA) and Econometric Time Series (ETS) models. Success in terms of reliably predicting recreational estimates has also varied by approach and by species. Workshop participants identified several challenges associated with forecasting recreational estimates including:

- Accounting for changes in catch rates and fish sizes from one year to the next in stocks that are rebuilding;
- Accounting for the impacts of time/area closures and other regulatory changes on targeted effort, catch rates, and average fish size; and
- The ability to forecast estimates reliably and in a timely manner may be hindered by recreational data lags and data imprecision.

Several participants identified the potential to improve recreational forecasting models by including external correlates such as angler behavior, fuel prices and other economic indicators, weather data, management regulations, and survey metrics. Forecasts of total catch and effort may also be improved with independent indicators of fishing activity from other data sources. MRIP should continue to support development of innovative methods for collecting detailed data on catch and effort that may supplement and assist in the interpretation, validation, and tuning of data derived from the baseline survey methods. These innovative methods may include but are not limited to panel surveys, voluntary self-reporting systems (e.g., catch cards, internet surveys, mobile phone apps, or the eLOGBOOK application of SAFIS), alternative platform surveys (i.e., on the water intercepts), or voluntary video monitoring surveys. Specialized species-specific surveys may be needed to help councils manage "rare event" recreational fisheries (e.g., HMS) or fisheries with particularly short seasons or small catch limits.

More timely data (e.g., one-month waves) can reduce the time period being forecasted, thus resulting in more accurate projections (i.e., reduced management uncertainty). Forecasting approaches may also be able to make use of timelier intercept data (e.g., weekly updates) throughout the wave. Combined with forecasted effort estimates, this catch information could be used to forecast landings for the entire wave and future waves. As discussed above, the quality of intercept data released throughout the wave is an issue that will most likely need to be addressed before such data can be reliably used for projections. Electronic data collection innovations may improve the speed with which intercept data can be processed and cleaned and thus the utility of mid-wave data for forecasting landings.

Forecasting options should also be explored for recreational fisheries with different sources of data with different time lags. For example, if MRIP landings estimates are timelier than Southeast Headboat Survey data or Texas Parks and Wildlife estimates, landings from these two sources can be projected using MRIP data and possibly other external correlates. Similarly, if timelier data are available for one particular mode of fishing it may be possible to forecast recreational landings in the other modes. For example, if there is a strong correlation between landings in different modes, a mandatory for-hire electronic logbook program could be used to forecast landings in the private boat and shore modes for particular species. However, the effectiveness of electronic logbook data as a forecasting tool will be dependent on compliance rates and the timeliness of captains' submissions.

MRIP is also exploring more efficient and less biased recreational fishing effort survey designs. Based on initial pilot studies it appears that mail surveys have distinct advantages over phone surveys in terms of survey coverage and possibly response rates. One likely disadvantage of mail surveys is timeliness since they often involve multiple mailings and responses can trickle in weeks or months after the final survey mailing. A mixed survey mode design that uses both phone and mail methods may be optimal. If the revised MRIP effort survey design uses a mail survey as part of a mixed survey mode approach it will be beneficial to develop models that can forecast complete effort based

on partial results from the faster survey mode (e.g., phone) and from initial mail returns. Adjustments could be made later for final catch and effort estimates once complete data from all survey modes have been included.

***MRIP Recommendations Regarding Data Timeliness***

Based on a critical analysis of recreational survey data timeliness and with significant input from data users, industry representatives, and other interested stakeholders, the project team proposes the following specific recommendations for MRIP consideration:

1. Move towards implementation of one-month waves:
   a. New MRIP catch and effort survey designs should have the flexibility to allow for generation of monthly catch and effort estimates.
   b. MRIP should fund a Recreational Data Timeliness Simulation Project with the goal of developing a model to simulate recreational catch estimates and associated variances from one-month waves. Comparisons of cumulative estimate precision levels using one-month versus two-month waves should be done for key management species.
   c. Building off the simulation model, a secondary project should develop an Optimal Sample Allocation Tool that will provide information on tradeoffs between timeliness, precision, and cost and allow for more informed decisions regarding sample allocation.
   d. Recognize that if funds are limited it may be optimal to produce monthly estimates during certain times of year (e.g., "core" months) and bi-monthly estimates during other times. This may also vary by region or sub-region (i.e., coordination of "core" months with "core" geographic areas).
   e. Decisions regarding when to produce monthly estimates and when to produce bi-monthly estimates should be informed by: 1) results from the simulation model and sampling allocation tool, 2) MRIP budget realities and priorities, and 3) sample size add-ons from MRIP partners.
2. Reduce lag time between the end of a sampling wave and production of recreational catch estimates by up to two weeks.
   a. If telephone surveys are part of the new effort survey design, the Request for Proposals (RFP) should include contractor pricing for delivery of error-free data 21 days after the end of the previous month (in addition to the status quo 28 days after end of month) for comparison.
   b. NOAA Fisheries Statistics Division should reduce the time needed to produce and review recreational catch estimates to about one week (current lag is about two weeks) after all data have been delivered and forecasted effort estimates have been produced (if forecasting needed for effort). Additional staff resources should be dedicated to this task, as needed, to achieve the faster turnaround time. Back-up staff should be

identified well in advance to assure timely completion of this task when primary staff responsible are on leave, travel or otherwise unavailable.

3. If the revised MRIP effort survey design uses a mail survey as part of a mixed survey mode approach, models should be developed that can reliably forecast effort based on partial results from the faster survey mode (i.e., phone) and from early mail survey returns.
4. MRIP should continue to support and encourage development of models for reliably forecasting recreational catch and effort estimates as a potentially more timely and cost effective approach for in-season quota management.
   a. If MRIP landings estimates are timelier than other recreational data sources (e.g. Southeast Headboat Survey data or Texas Parks and Wildlife Survey), landings from these sources can be projected using MRIP data.
   b. If timelier data are available for one particular mode of fishing it may be possible to forecast recreational landings in the other modes based on the more timely data and other sources of information.
   c. MRIP should continue to test and analyze the use of other external correlates for forecasting recreational catch and effort such as fuel prices, bait and tackle sales, other economic indicators, weather data, and management regulations.
5. MRIP should continue to test the feasibility of innovative electronic data collection options, analyze costs/benefits, and make recommendations for implementation in particular regions as warranted. Potential benefits of electronic data collection that should be further evaluated include:
   a. Improve the timeliness of data delivery from the field;
   b. Shorten time lag for verifying questionable reported values with the data provider;
   c. Eliminate time needed for data entry or scanning paper forms;
   d. Built-in error checks and identify errors at point of interview;
   e. Drop-down menus reduce the amount of writing interview needs to do thus reducing potential for errors and speeding up the interview process; and
   f. May allow for forecasting of catch estimates at various points throughout the wave (e.g., weekly) if data can be processed more quickly.
6. MRIP should continue to support development of innovative methods for collecting detailed data on catch and effort that may supplement and assist in the interpretation, validation, and tuning of data derived from the baseline survey methods or provide improved timeliness and precision to support management of particular species.

***Management Approaches for Addressing Uncertainty Associated with Recreational Data***

A general theme of the Timeliness Workshop was the need to consider adapting management to data constraints rather than adapting data to meet management needs. This will be particularly important in the short-term as improvements in recreational data quality and timeliness are being developed, tested, validated, and implemented gradually over time as part of MRIP. However, as noted by several workshop participants, improvements in recreational data quality and timeliness that can feasibly be implemented through MRIP should not be viewed alone as a panacea for management of recreational ACLs. Therefore, management approaches for addressing the management uncertainty associated with data imprecision or estimation lag times will continue to play an important role even after the MRIP data quality and timeliness improvements are fully implemented. Below are some management approaches or strategies for managing recreational sector ACLs that were discussed during the workshop.

Uncertainty Buffers

Councils can address management uncertainty and effectively reduce their risk of exceeding an ACL by establishing Annual Catch Targets (ACTs) at some catch level below the ACL. ACTs are an optional tool that managers can use as a proactive Accountability Measure to reduce the risk of exceeding an ACL. As illustrated below (Figure 3), the gap or buffer between ACL and ACT will be directly influenced by the timeliness of catch data. Timelier data allows managers to set ACTs closer to ACLs, thus increasing fishing opportunities and revenues for the fishing industry and associated businesses. While overages may still occur, their probability of occurrence and relative magnitude when they do occur will both be decreased with more timely data.

ACT Control Rules

National Standard 1 guidelines also suggest that Councils establish an ACT control rule, which specifies an approach to setting the ACT for a stock (or stock complex) such that the risk of exceeding the ACL due to management uncertainty is at an acceptably low level. Control rules for setting reduction buffers should take into account the precision, accuracy, and timeliness of recreational data. The distribution of recreational landings across survey waves may also be an important control rule criterion. For example, stocks where all (or the large majority) of landings occur within one or two key waves will be subject to higher levels of management uncertainty than stocks with more even distribution of landings across several waves. Inter-annual variability could also be a factor used for setting control rules (i.e., greater uncertainty for stocks with more variability from year to year). ACT control rules can include tiers established based on levels of management uncertainty associated with the fishery, frequency and accuracy of

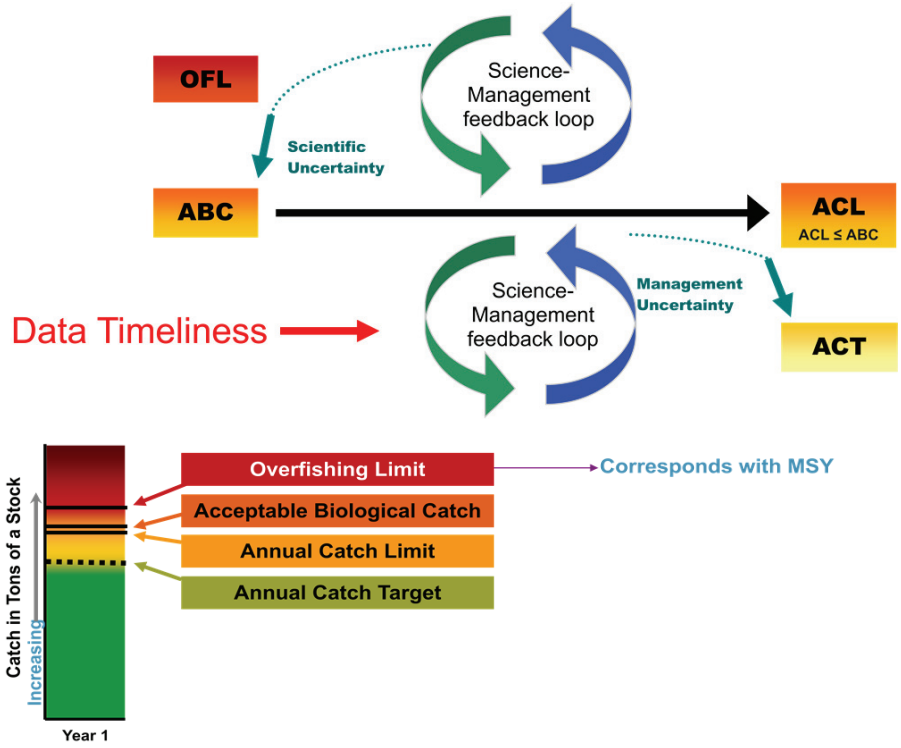



Figure 3. Schematic showing possible reductions in allowable catch to address two kinds of uncertainty (management and scientific) in fisheries management[5].

available catch monitoring data, and risks of exceeding the limit. An ACT control rule could be established for each tier and have, as appropriate, different formulas and standards used to establish the ACT.

A draft example of an ACL-ACT control rule proposed by the Gulf of Mexico Fishery Management Council was presented at the timeliness workshop (Figure 4). The Gulf Council is considering options for defining each Tier in terms of percent reduction from ABC or ACL. Terms such as "High", "Medium", and "Low" in reference to precision and accuracy may also need to be better defined (e.g., High precision = PSE < 10%) as this process continues.

[5] Mark Nelson, NOAA Fisheries, personal communication.

Multi-year Averaging of ACL

The use of multi-year averages for managing ACLs was discussed during the workshop. This approach has the advantage of smoothing inter-annual variability in landings and allows fishery managers the flexibility to exceed an ACL in any given year so long as the multi-year average landings do not exceed the limit. Precision on landings estimates also improves when several years are combined. While multi-year averages can be viewed as a coping strategy for estimation lags and inadequate data precision, some disadvantages were also noted. For example, while multi-year averages will smooth inter-annual variability, a single high landings year that significantly exceeds the ACL could have multi-year ramifications. Another concern raised is that multi-year averaging could have unknown, and possibly deleterious, impacts on the resource. For example, exceeding an ACL by 50% in Year One and subsequently catching 50% less than the ACL in Year Two may not be equivalent to catching the exact ACL in both years in terms of impacts on the stock (e.g., recruitment, growth, mortality).

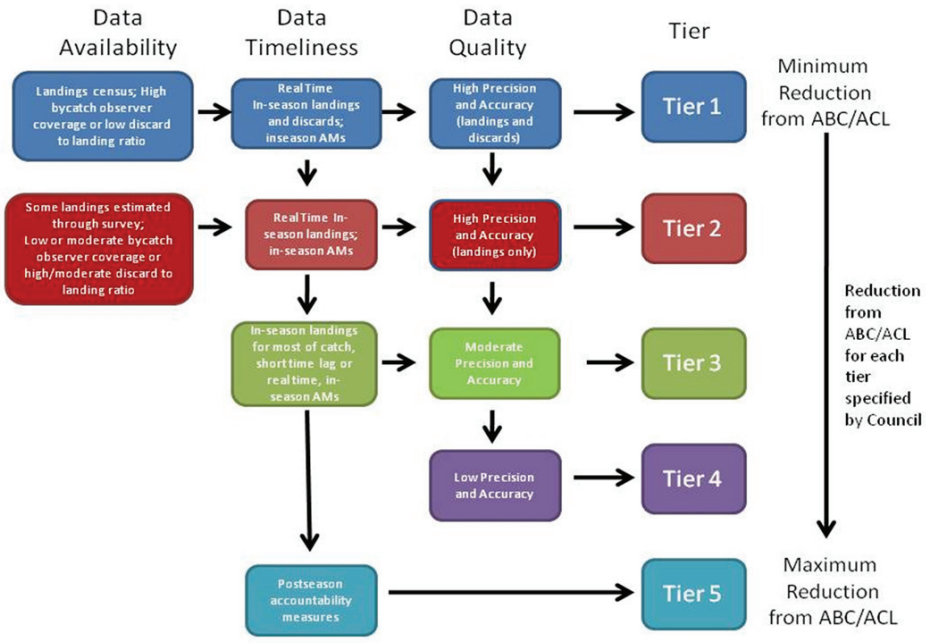



Figure 4. Draft Gulf of Mexico Fishery Management Council Control Rule Schematic for Reducing from ABC/ACL as a buffer to control for management uncertainty.[6]

[6] John Froeschke, Gulf of Mexico Fishery Management Council, personal communication.

Choice of Regulatory Control

Fishery managers use a variety of catch and effort controls to restrict recreational landings to avoid exceeding specified limits. These include seasonal closures, area closures, depth limits, daily possession limits, minimum size limits, and slot size limits. The choice of regulatory controls used not only impacts fishery participants and associated businesses but can also influence the level of management uncertainty associated with monitoring an ACL. Managers must weigh the advantages and disadvantages in determining which control or suite of controls to use to limit recreational catches. As discussed above with regard to ACT control rules, the distribution of recreational landings across survey waves can influence the probability of not exceeding an ACL. If the majority of landings all occur within a short time frame, by the time fishery managers receive landings estimates for the peak wave it is likely too late to make in-season adjustments to prevent an ACL overage. By contrast, fisheries where landings are more evenly distributed throughout the year allow managers more opportunities to make adjustments based on evaluation of cumulative landings and seasonal trends. The distribution of landings across waves for a given species can be affected by seasonal availability, seasonal distribution of targeted effort, and other fishery related factors.

The choice of regulatory control can also influence the temporal distribution of landings and, in turn, the management uncertainty associated with recreational data lags. For example, seasonal closures that restrict landings to certain times of year often have the effect of condensing landings into a shorter time frame than would be the case with bag limits and size limits alone. Short fishing seasons put more pressure on fishery managers to stay within specified catch limits and provide little margin for error in the models used to predict landings and the assumptions upon which those models are based. This is particularly true in the Gulf of Mexico where fishing seasons for high profile, popular species such as red snapper and gag have been reduced to two months or less in recent years. Workshop participants noted that for these species fishing seasons would need to be substantially longer to even consider in-season adjustments based on more timely recreational survey catch estimates. For recreational fisheries with particularly short seasons or small catch limits it may be necessary to identify additional management and reporting tools. These could include fishery specific permits, mandatory reporting requirement, catch card and landings tag programs, check stations, and specialized species specific surveys.

If seasons are lengthened as a strategy for reducing management uncertainty, the trade-off will be more restrictive possession limits and/or size limits in order to maintain the same level of fishing mortality. Evaluation of trade-offs among different types of catch and effort controls available to limit recreational landings is a standard part of the fishery management process. Selection of which suite of controls to use will be fishery specific and based on the particular characteristics of each fishery. Management alternatives are routinely discussed and debated at scoping meetings, public hearings, council and

commission meetings, technical committee meetings, and other gatherings of fisheries stakeholders. The advantages associated with extending fishing seasons of reducing management uncertainty and possibly allowing for in-season adjustments should be considered and evaluated by fishery managers, and integrated into the regulatory control decision-making process.

Timeliness of Management Decision-Making and Specification Process

The speed with which different fisheries management authorities can implement in-season actions based on more timely recreational landings updates was discussed and compared during the workshop. It was widely recognized by workshop participants that more timely recreational data was only as valuable as management's ability to use the information in a timely manner. The ability of management to respond quickly with in-season closures or other regulatory measures varies considerably by region and states within regions. As discussed above, the Pacific Coast state surveys provide managers with more timely recreational landings updates compared to the Atlantic and Gulf. All three Pacific Coast state agencies have management systems designed to react quickly to utilize the timelier in-season updates. Oregon and Washington can implement closures within a few days of receiving landings updates, and California can react with a few weeks. In addition, all three states have landings laws that can effectively extend state regulations to federal waters. Management reaction time is more variable on the Atlantic Coast where some states can react quickly by proclamation or emergency rule while others can take up to four months. For in-season actions in federal waters, considerable variability exists among Councils, FMPs, and even sectors in terms of providing in-season closure authority to NOAA Fisheries. For example, the Gulf Council provides NOAA Fisheries with in-season closure of the recreational greater amberjack fishery if the sector quota is reached or projected to be reached. By contrast, for gray triggerfish federal in-season closure authority is provided for the commercial sector but not for the recreational sector. Not granting in-season closure authority to NOAA Fisheries could add several weeks (or more) to the process of closing federal waters to recreational fishing. A distinction can also be made between closure authority that is triggered only after an ACL is actually exceeded, versus closure authority that can be implemented to avoid exceeding an ACL based on projected or forecasted landings.

Related to differences in reaction time, workshop participants discussed the challenges associated with institutional coordination for stocks, which are jointly managed among federal and state entities. For example, ASMFC has not yet developed complementary measures regarding ACLs and AMs for the stocks that are jointly with the MAFMC. The involvement of multiple agencies increases the complexity of coordination and can complicate timeliness of management responses.

State-Level Quotas and Sharing Agreements

For some stocks the overall recreational quota is further subdivided among individual states. State agencies are then responsible for monitoring landings and staying within the specified state sub-quotas. From a data quality perspective, landings estimates at lower levels of stratification will have lower precision than higher levels (i.e., state-level estimates will be less precise than regional or coast-wide estimates). Therefore, management uncertainty typically increases when trying to manage within sub-quotas or smaller shares of the pie. Inter-annual variability will also likely be greater at smaller geographic scales due to natural variability in fish availability, weather events, or other more localized factors that may not impact the entire range of the stock. While there may be valid political or socio-economic justifications for state level quotas, in most cases they increase the risk of exceeding the specified limits and place greater demands on the quality and timeliness of recreational data. One approach to buffering this risk is to establish sharing agreements among states. If one state exceeds its annual recreational limit the state can borrow quota from a state that may be under quota. The Pacific Coast states currently have sharing agreements in place for some of their quota managed recreational stocks.

Stock Complex Annual Catch Limits

The precision on recreational landings estimates may be inadequate for effectively managing an ACL for some managed species. This is particularly true for less common or "rare event" species. While precision can often be improved through increased sample sizes, for some species the increase needed to achieve adequate precision is impractical given budget realities and other priorities. Specialized surveys could be considered for these species but these too can be very costly to implement on a species by species basis. Another approach that fishery management Councils are currently evaluating for addressing data quality and timeliness deficiencies is the establishment of stock complex ACLs. The cumulative precision on a stock complex landings estimate will be higher than the precision on each individual species estimate. The use of stock complexes can serve as a buffer against anomalous individual species level estimates that may result in a closure not just for that species but for other species in the same fishery complex as well (e.g., Pacific rockfish fishery closes if one species quota is exceeded). However, creating effective stock complexes can be difficult. National Standard 1 discusses the principles that should be followed when creating stock complexes, to ensure that overfishing does not occur on any particular stock within the complex.

Summary of Management Approaches for Addressing Uncertainty Associated with Recreational Data

Below is a summary of key findings related to management approaches resulting from the workshop:

- Anticipated MRIP improvements in data timeliness, accuracy, and precision will reduce but not eliminate management uncertainty associated with recreational estimates. For some stocks, management uncertainty will remain relatively high and fishery managers need to anticipate and address this uncertainty.
- Councils can address management uncertainty and effectively reduce their risk of exceeding an ACL by establishing Annual Catch Targets (ACTs) at some catch level below the ACL.
- ACT control rules for setting reduction buffers should take into account the precision, accuracy, and timeliness of recreational data, as well as the distribution of recreational landings across survey waves.
- The relative advantages and disadvantages of multi-year averages for managing ACLs should be thoroughly analyzed and evaluated, particularly for species with relatively low precision on annual catch estimates.
- The choice of regulatory controls used not only impacts fishery participants and associated businesses but can also influence the level of management uncertainty associated with monitoring an ACL. Fishery managers should thoroughly evaluate trade-offs of longer versus shorter recreational fishing seasons and other associated controls (i.e., bag limits, size limits, and area closures).
- Improvements in the timeliness of recreational data are only as valuable as management's ability to use the information in a timely manner. The ability of management to respond quickly with in-season closures or other regulatory measures varies considerably by region and states within regions. Councils and states may be able to reduce the risk of exceeding ACLs by minimizing the time needed to implement in-season controls once recreational data become available.
- Other mechanisms aimed at buffering the risk of exceeding an ACL should also be considered including sharing agreements between states (for state level quotas) and the use of stock complexes for rare event species with relatively low precisions levels.

## Appendices

***Appendix A. Recreational Fisheries Data Timeliness Workshop final agenda.***

### Recreational Data Timeliness Workshop
**March 15-16th**
**St. Petersburg III Room, Hilton Bayfront, St. Petersburg Florida**

**FINAL AGENDA**

**Tuesday March 15th**

12:45 Arrival and Sign-in
1:00 Introductory Remarks, Review Agenda, Ground Rules
Ron Salz, NOAA Fisheries, Fisheries Statistics Div./ Facilitator, CONCUR, Inc.
1:15 MRIP Overview - Gordon Colvin, NOAA Fisheries, Fisheries Statistics Division
1:45 Overview of Annual Catch Limits and National Standard 1 Guidelines
Mark Nelson, NOAA Fisheries, Sustainable Fisheries Division HQ
2:00 Recreational Data Timeliness Case Studies
Pacific Coast Species - Corey Niles, Washington Dept. of Fish and Wildlife and Lynn Mattes, Oregon Department of Fish and Wildlife
South Atlantic and Gulf of Mexico Species – Andy Strelcheck, NOAA Fisheries, Southeast Regional Office, Sustainable Fisheries
Black Sea Bass (Northeast) - Mike Ruccio, NOAA Fisheries, Northeast Regional Office, Sustainable Fisheries
Summer flounder - Toni Kerns, Atlantic States Marine Fisheries Commission
3:20 Break
3:35 Fish Collaborative Blue Ribbon Panel Summary on Recreational Data Timeliness
Dick Brame, Coastal Conservation Association
3:50 Consistency between Management Structures and Data Availability/Quality
Topic Presentation: Jessica Coakley, Mid-Atlantic Fishery Management Council
Panelist Presentations
Panelists: John Froeschke, Gulf of Mexico Fishery Management Council; Chris Kellogg, New England Fishery Management Council; Russel Porter, Pacific States Marine Fisheries Commission; David Cupka, South Atlantic Fishery Management Council.
Discussion/Questions
5:05 Public Comment
5:20 Synthesis of Day 1 / Preview of Day 2 - Facilitator, CONCUR, Inc.
5:40 Adjourn Day 1

**Wednesday March 16th**

8:30 Welcome Back / Preview of Day 2 - Facilitator, CONCUR, Inc.

8:35 Options for Improving Recreational Data Timeliness: Forecasting Recreational Catch Estimates
Panelist Presentations
Panelists: 1) Nick Farmer, NOAA Fisheries, Southeast Regional Office, Sustainable Fisheries; 2) Lynn Mattes, Oregon Department of Fish and Wildlife; 3) John Foster, NOAA Fisheries, Fisheries Statistics Division
Discussion/Questions

9:35 Options for Improving Recreational Data Timeliness: Increase Frequency of Estimation
Dave Van Voorhees, NOAA Fisheries, Fisheries Statistics Division

10:00 Options for Improving Recreational Data Timeliness: Reducing Lag Time
Jun Rossetti, ICF Macro International / Ron Salz, NOAA Fisheries

10:30 Break

10:45 Regional Break-out Session Introduction
Alternatives for Addressing Recreational Data Timeliness Needs – Ron Salz, NOAA Fisheries
Species Fact Sheets – Ron Salz, NOAA Fisheries
Session Instructions and Objectives - Facilitator, CONCUR, Inc.

11:15 Regional Break-out Session: Part One
Regional Leaders:
Northeast – Sarah Heil, NOAA Fisheries, Northeast Regional Office, Sustainable Fisheries
South Atlantic – Kathy Knowlton, Georgia Department of Natural Resources
Gulf of Mexico and Caribbean – Sera Drevenak, Pew Environmental Group
Pacific and Western Pacific – Kevin Duffy, NOAA Fisheries, Northwest Regional Office, Sustainable Fisheries

12:15 Lunch

1:30 Regional Break-out Session: Part Two

2:45 Break

3:00 Regional Groups Report Out

3:45 Public Comment

3:50 Workshop Wrap-up and Next Steps - Facilitator, CONCUR, Inc.

4:30 Adjourn Workshop

***Appendix B. Organizing questions for workshop breakout group discussions.***

## Recreational Fisheries Data Timeliness Workshop
## Organizing Questions for Day 2 Regional Break-out Session

**STEP ONE**: Categorize recreational fishery species/stocks into 3 groups based on priority need for more timely recreational catch estimates – **high, medium, low**.
Note: You are not limited to the species provided in the NOAA Fisheries Fact Sheets.
**STEP TWO**: For each high priority species, discuss the following

1. What are the positive and negative impacts of each of the 5 recreational data timeliness alternatives identified in the attached table?
   Note: Pacific Region group should develop their own list of alternatives based on the data timeliness needs for their high priority species and particulars of their recreational data collection programs.
2. What are the anticipated tradeoffs between timeliness and data quality for this species/stock? Would you be willing to sacrifice data quality for timeliness for this species/stock?
   2a) In particular, would you accept lower precision on catch estimates in exchange for monthly estimates?
   2b) If we switch to monthly estimates, where are increased sample sizes particularly important in order to achieve (or maintain) a desired level of precision for this species/stock? Distinguish, as possible, by time of year, geographic location and fishing mode (e.g., private, for-hire, shore).

3. Is forecasting of recreational landings currently used as a management tool?
   If not, consider whether forecasting should be explored for this species and what improvements in terms of data timeliness, quality (accuracy/precision) might be needed to effectively forecast estimates.
   If forecasting is currently used, in what ways might the models be improved to provide more reliable/predictive estimates for management purposes?

4. Are there solutions to the problem of data timeliness that can be addressed by a different management approach? Is the current management regime for this species/stock consistent with the availability, quality and timeliness of recreational data? If there is a mismatch, are there management changes that can be recommended to work better with the available data?

5. If none of the identified alternatives (more timely estimates, forecasting, or management solutions) result in a significant improvement, discuss what additional steps are needed in terms of recreational data availability, quality and timeliness for this species/stock. Consider if a specialized survey effort or census-based landings program (e.g. carcass tags or catch card program) would be needed to more effectively manage this recreational fishery.

***Appendix C. Example of species fact sheets prepared for timeliness workshop.***

Species: Black Sea Bass (Northeast)
Current Status: Overfished NO  Overfishing NO
States Included: Massachusetts through North Carolina
2010 Recreational ACL or Harvest Quota: 1,830,000 pounds.
% Overall 2010 Limit for Recreational Fishery: 51%
2010 Season: May 22 – Oct. 11, Nov. 1 – Dec. 31

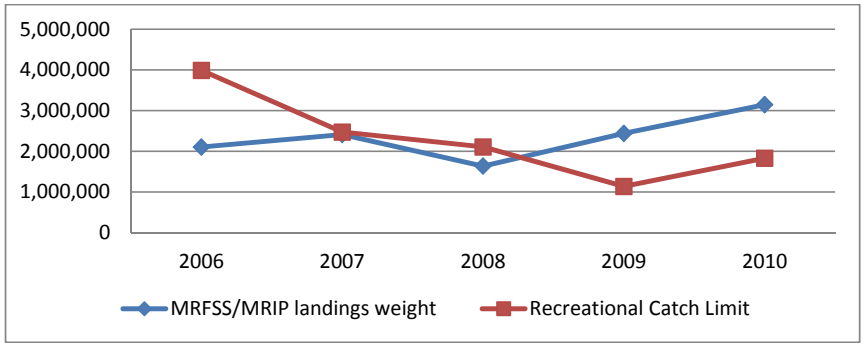



Figure 1. Black Sea Bass (Northeast) MRFSS/MRIP Landings Weight (lbs) and Recreational Catch Limits 2006-2010.

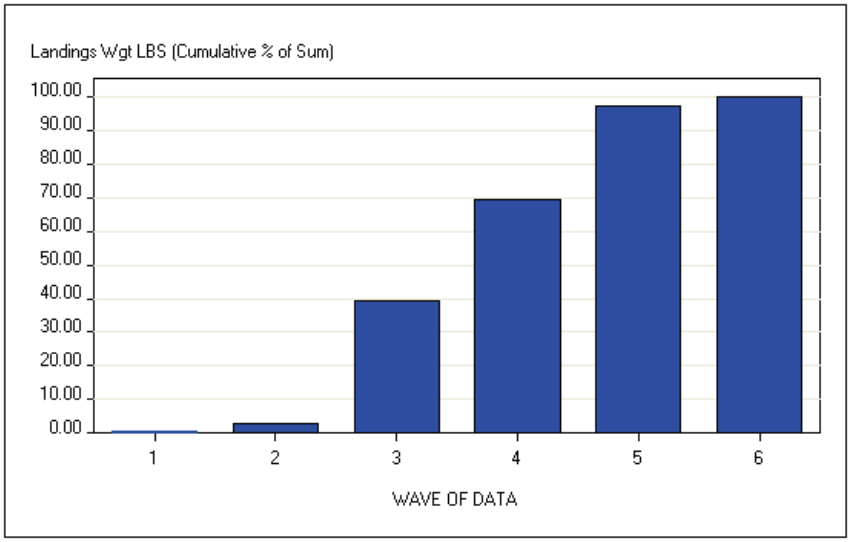



Figure 2. Cumulative Percent of Black Sea Bass (Northeast) MRFSS/MRIP Landings Weight by 2-month Wave, 2006-2010 Combined (Note:  Wave 1 landings only for North Carolina as other states not sampled).

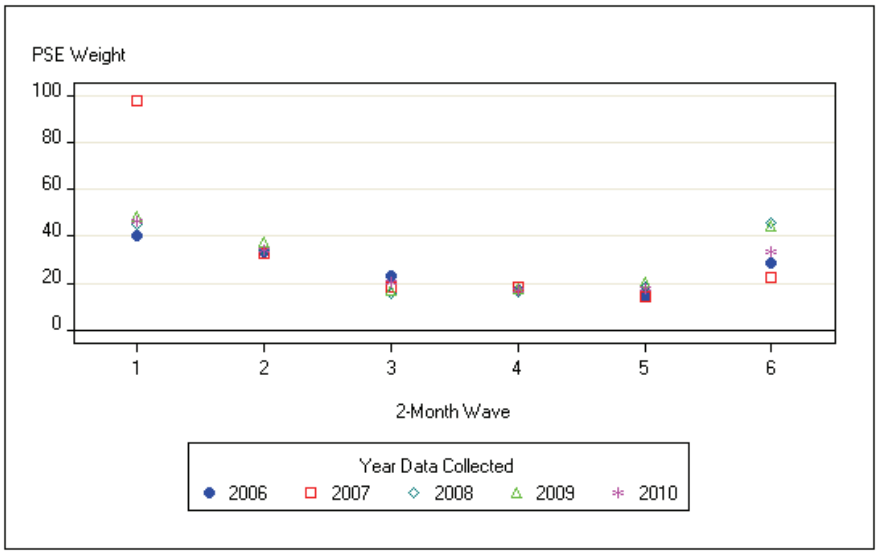



Figure 3. Black Sea Bass (Northeast) MRFSS/MRIP Landings Weight PSE's by Wave 2006-2010.

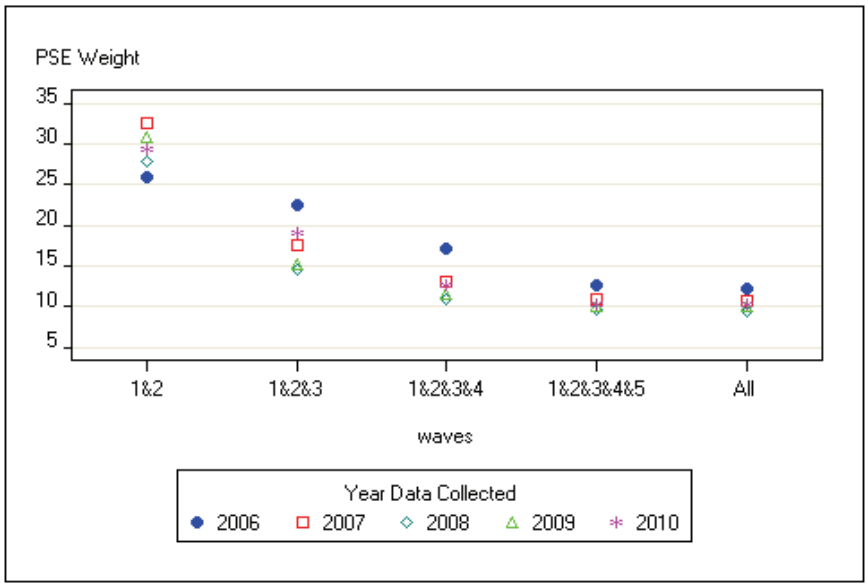



Figure 4. Black Sea Bass (Northeast) MRFSS/MRIP Landings Weight PSE's Cumulative by Wave for 2006-2010.

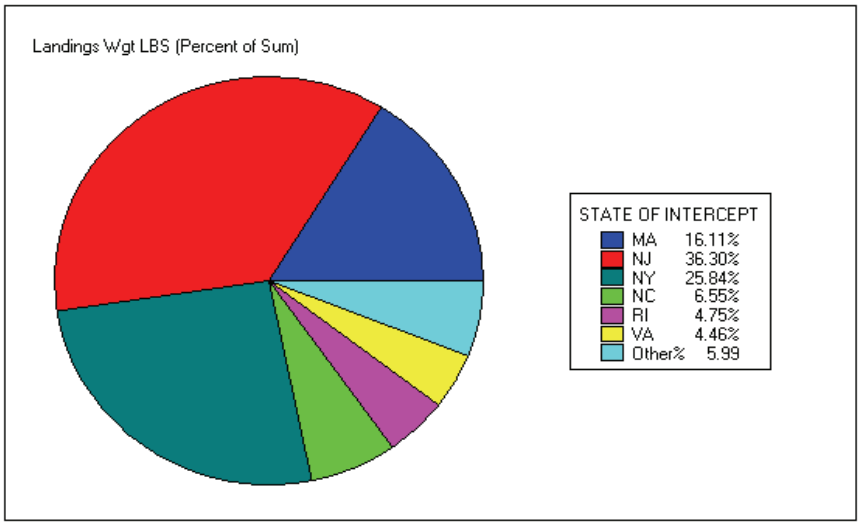



Figure 5. Distribution of Black Sea Bass (Northeast) MRFSS/MRIP Landings Weight by State, 2006-2010 Combined.

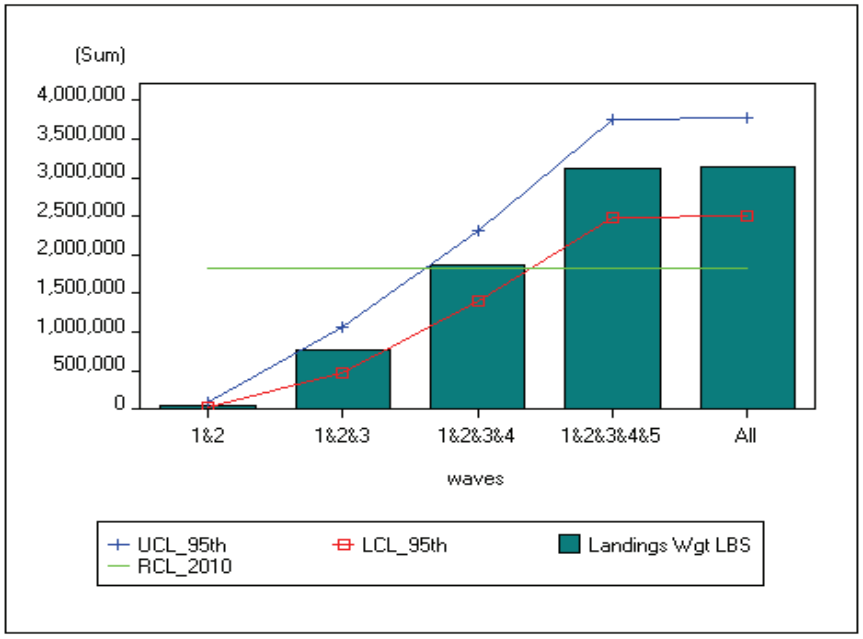
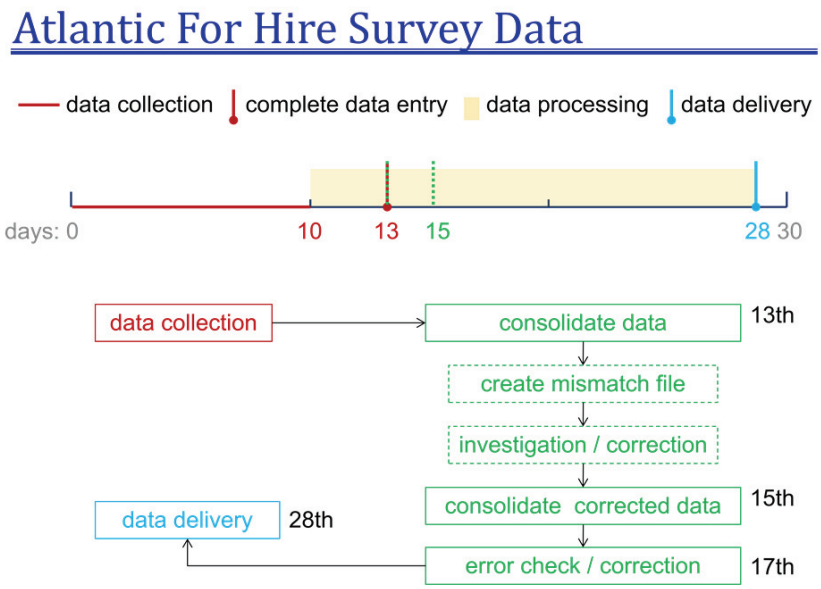



Figure 6. Black Sea Bass (Northeast) 2010 Recreational Landings Weight and 95th Percentile Upper and Lower Confidence Intervals (UCL_95th , LCL_95th) Cumulative by Wave, and 2010 Recreational Catch Limit (RCL).

***Appendix D. Detailed timelines showing individual steps associated with the data processing phases for the Coastal Household Telephone Survey, Atlantic Intercept Survey, and Atlantic For-Hire Survey.***

"Final Report", page 41



"Brame pres.", page 1

**Recreational Timeliness Presentation – Dick Brame**

*** Commercial Harvest counted – catch is managed

*** Rec anglers estimated - regulate behavior rather than catch

*** New requirements in MSRA and by NMFS implementation

*** Timeliness, as used in this report, refers to lags in reporting recreational catches that limit a manager's capacity to adjust in-season harvests to prevent overages in quota allocations.

*** It also pertains to time lags in producing annual fishing effort and catch estimates. In both scenarios, timeliness must be improved to more effectively monitor the magnitude of recreational catches, both while the fishery is ongoing and for the management process as a whole.

*** Increasing timeliness will be expensive in most cases, investments should be prioritized to address "valuable fisheries," i.e. either in terms of biological condition (overfished/overfishing or rare – salmon) or economic potential (billfish).

*** In general, it is important to improve both the availability of data necessary for management. In at least some cases, it may make more sense from both fiscal and management effectiveness standpoints to adapt management approaches, tools and strategies to reflect available information rather than doing the reverse. This may mean greater degrees of precaution are incorporated or maintained in management while long term investments are considered to reduce uncertainty and maximize harvest opportunities on time scales relevant to each fishery.

Our group's discussion on timeliness fell into 2 broad categories:

## 1. What to do with the data as collected?

Most of the BRP discussion centered on means by which the time between data collection, reporting and analysis can be reduced.

While there are improvements in efficiency that may allow for faster turnaround times, such changes likely would add additional expenses by a currently unknown but probably significant amount, and they also may compromise data quality.

Recreational catch increases with the abundance of the stock, which can cause problems for managers. It may be possible to develop complementary indicators (e.g., tackle sales, boat traffic and bait sales) that would allow managers to detect increases in catches and/or effort and adjust catch accordingly.

When it comes to how and when to use data and the question of whether in-season adjustment can and should be a realistic goal, our group had varying opinions. Clearly, however, the degree to which data collection systems can adequately support near-real time or in-season management varies, both in cost and in suitability. But for many fisheries, it may well be possible – certainly for the for-hire sector.

## 2. What to do with management?

Management must do a better job of determining the amount and impacts of recreational fishing effort to keep harvests below target levels. Recreational effort likely will increase as abundance increases in recovering fisheries stocks. Harvest control has traditionally been

accomplished with the season timings, closed areas, bag limits and size limits. However, management usually sets regulations for the next year based on conditions (exploitation rate, spawning stock size, etc.) in the current or even past years. Management should develop better means to project trends in recreational effort over shorter time scales (i.e., using the most recent data) to better estimate future harvests.

A key component of improved management is to match available funds with fishery goals. For example, if a primary goal is to maximize recreational opportunities throughout the year, then bag limits should be conservative to reflect the lag time in data collection and analysis. If a primary goal is to maximize catch, then a great deal more funding is necessary to shorten the lag time in data collection and analysis.

**Ideas**

•Implement recreational management plans with goals established for a 3-5 year time horizon, recognizing that catches may vary and exceed allowable levels in one year but could fall below the next, which should mitigate the inherent volatility in recreational management measures.

•Currently management has usually implemented the longest open season possible, running the risk of an overage or, if possible, an early closure, which is very unpopular with anglers. A better strategy may be to set more conservative (shorter) harvest seasons so that adjustments only would lengthen the open season and work in the anglers' favor.

"Coakley pres.", page 1

# Consistency Between Management Structures and Data Availability and Quality

Jessica Coakley (MAFMC Staff)

Mid-Atlantic Fishery Management Council

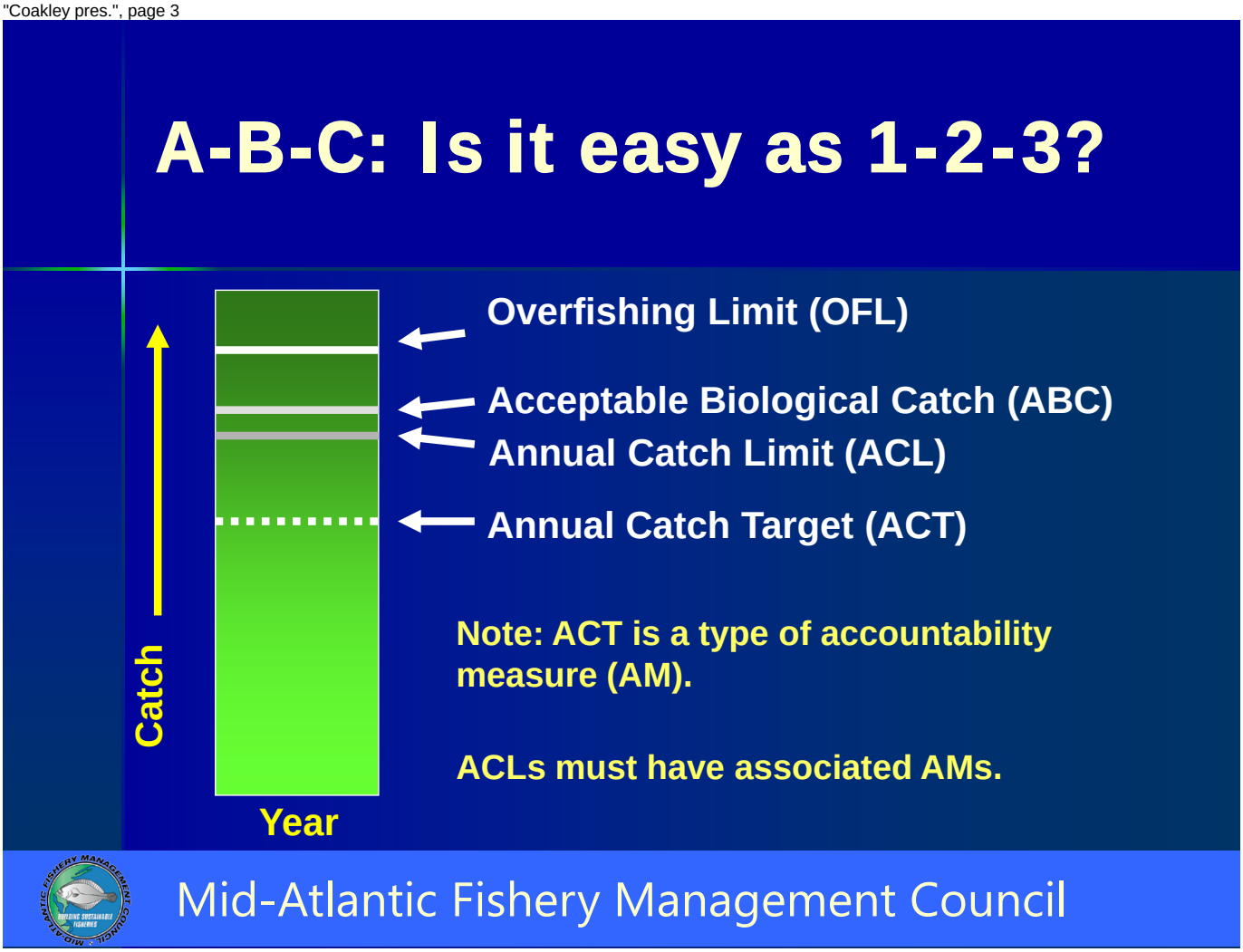
"Coakley pres.", page 2

# Talk Overview

- What has the Mid-Atlantic Council recommended for recreational ACLs and AMs?
- What recreational data factors were considered by the Council?
- Where are the mismatches in our current management infrastructure (not just limited to ACLs and AMs)?
- Final thoughts.

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 3



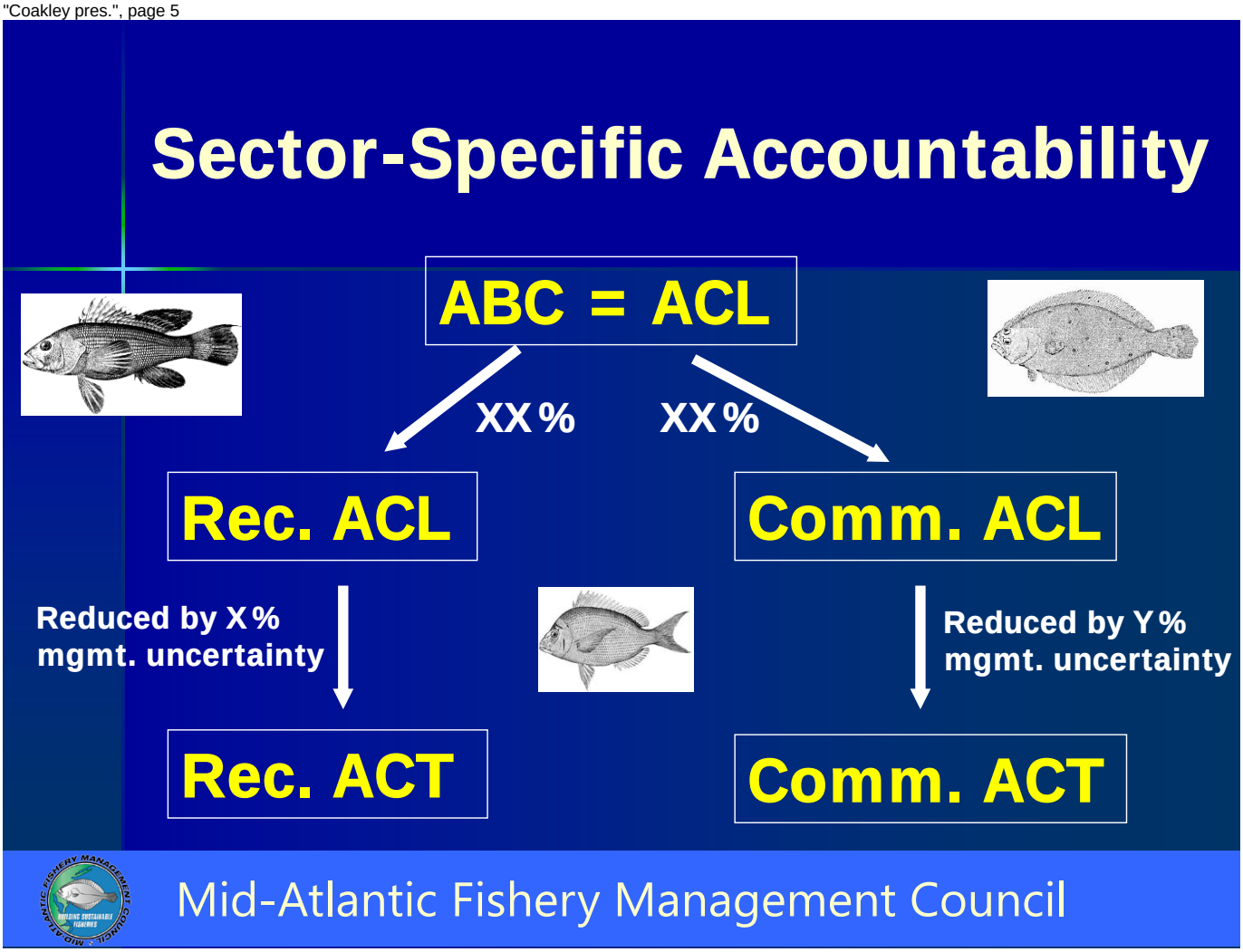
"Coakley pres.", page 4

# It's Complicated……

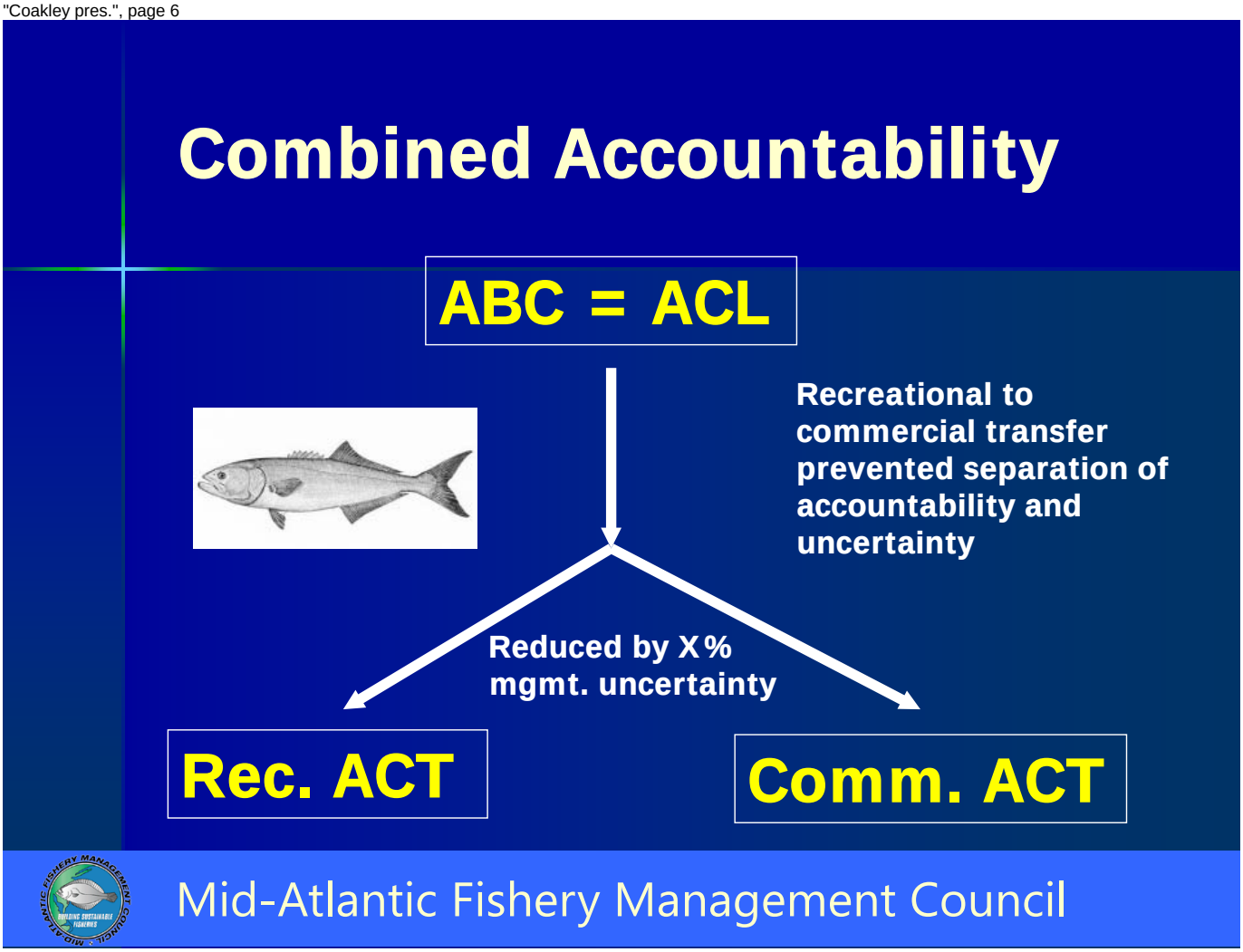
- Both the Council and Commission manage these 4 species under two different laws
- The ACLs developed include catch from all areas in mgmt. unit (self-reported area not used)
- Decisions for these species done under joint meetings/joint rules

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 5



"Coakley pres.", page 6



"Coakley pres.", page 7

# This means that…

- Addressing management uncertainty for summer flounder, scup, and black sea bass is sector-specific (rec. versus comm. sector)
- Allow for data quality issues and fishery control to be considered for each fishing sector

Mid-Atlantic Fishery Management Council

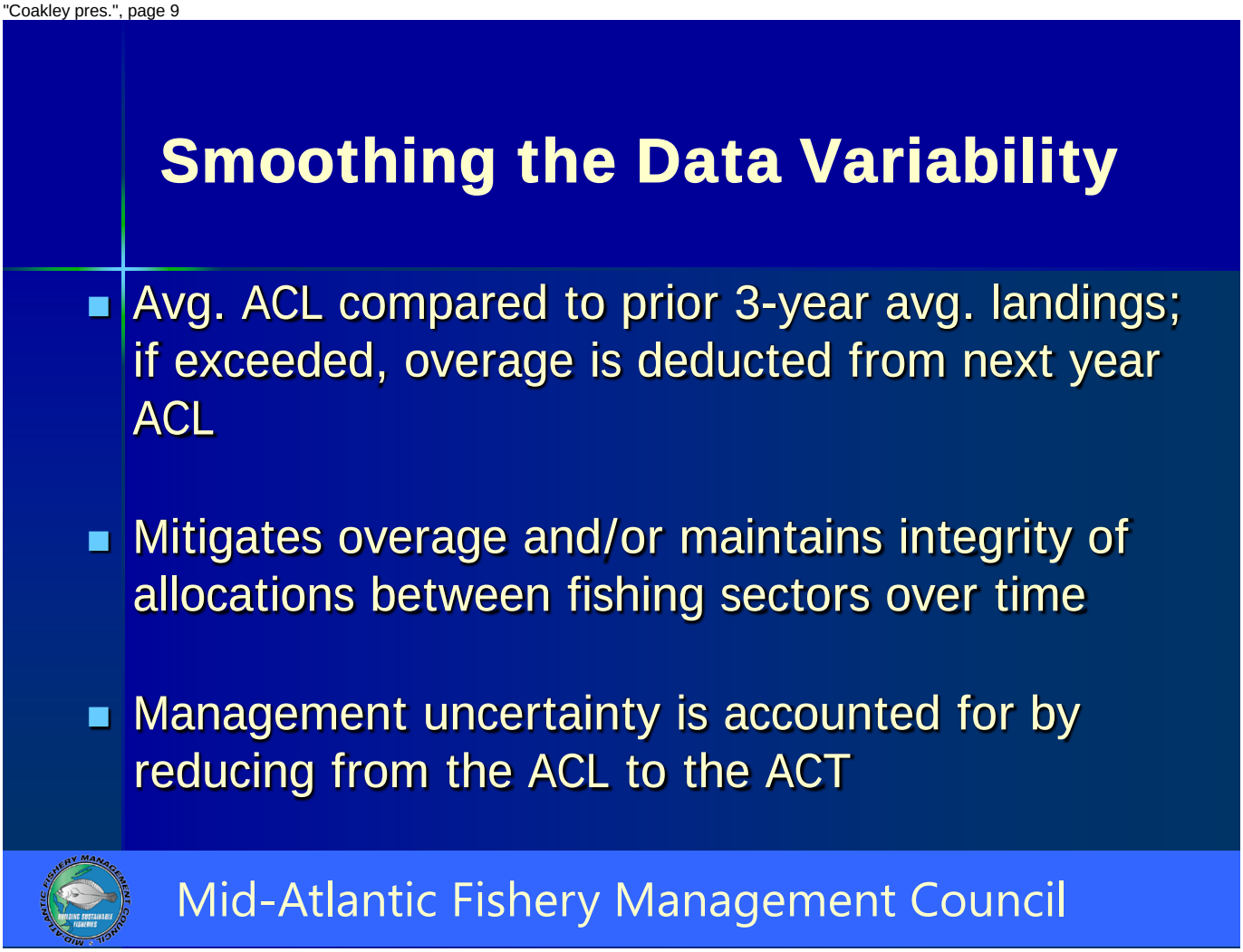
"Coakley pres.", page 8

# This also means that….

- Recreational fishery is accountable if the Rec-ACL is exceeded
- There are consequences for exceeding the ACL
  - Not as rigid as commercial sector (i.e., comm. landings overage deducted irrespective of whether ACL is exceeded)
  - Not based on single year data comparisons

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 9



"Coakley pres.", page 10

# Importance of Data Availability/Quality

- The magnitude of difference between the recreational ACL and ACT will be driven by:
  - Lack of sufficient information about the catch (i.e., data precision and accuracy)
  - Lack of management precision (i.e., ability to control catch)
- Intended to be an adaptive process; improving those factors will allow for less buffer between ACL and ACT

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 11

# Council Accountability

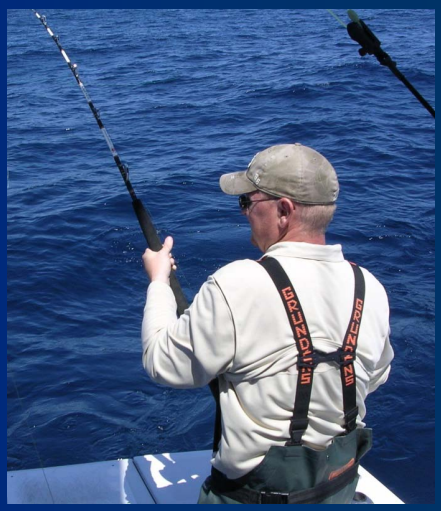
- Proactive AM: Use of ACTs
- Proactive AM: General inseason closure authority for the NMFS
  - If observed landings exceed the landings limit; Council was concerned about instability in projected data
  - Closure linked to more reliable and estimable component of rec catch; regulations regulate "retention" of fish (landed fish)
- Reactive AM: If the avg. ACL is exceeded, deduction from next year.

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 12

# Council Considerations for Inseason Closure Authority

- Data timeliness: 45 day lag time, frequency 2 months
  - Highly seasonal fisheries
  - Significant landings start at the end of wave 3
  - Waves 4 and 5 are peak
  - Wave 4 data available in October; that's late in the season!



Mid-Atlantic Fishery Management Council

"Coakley pres.", page 13

# Can management entities respond quickly enough?

- Giving authority to NMFS means no lag time for emergency action
- Some states can react quickly inseason by proclamation; others take up to 4 months
- Inability to respond quickly limits the effectiveness of inseason closure

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 14

# Are there other usable proxies?

- Development team considered other data options as proxies
- Catch rates, effort, anything that might be used faster; couldn't find right fit

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 15

# Resolution Of Management Measure Application

- Black sea bass - coastwide (state-waters and EEZ)
- Scup - coastwide (EEZ), regional (state-waters)
- Summer flounder (state-by-state; some sub-state sub-regions)
- Bluefish - coastwide (state-waters and EEZ)

Mid-Atlantic Fishery Management Council

"Coakley pres.", page 16

# More Data Issues

- State level data
  - reduced intercept lengths on which to craft regulations
  - exacerbated by increased intercept costs and higher minimum size/lower possession limit regulations
- Difficult to estimate demand for trips for upcoming fishing years (socioeconomic factors, weather)
- Angler behavior is fluid and can trade-off between species (this is influenced by changes in regulations)

Mid-Atlantic Fishery Management Council

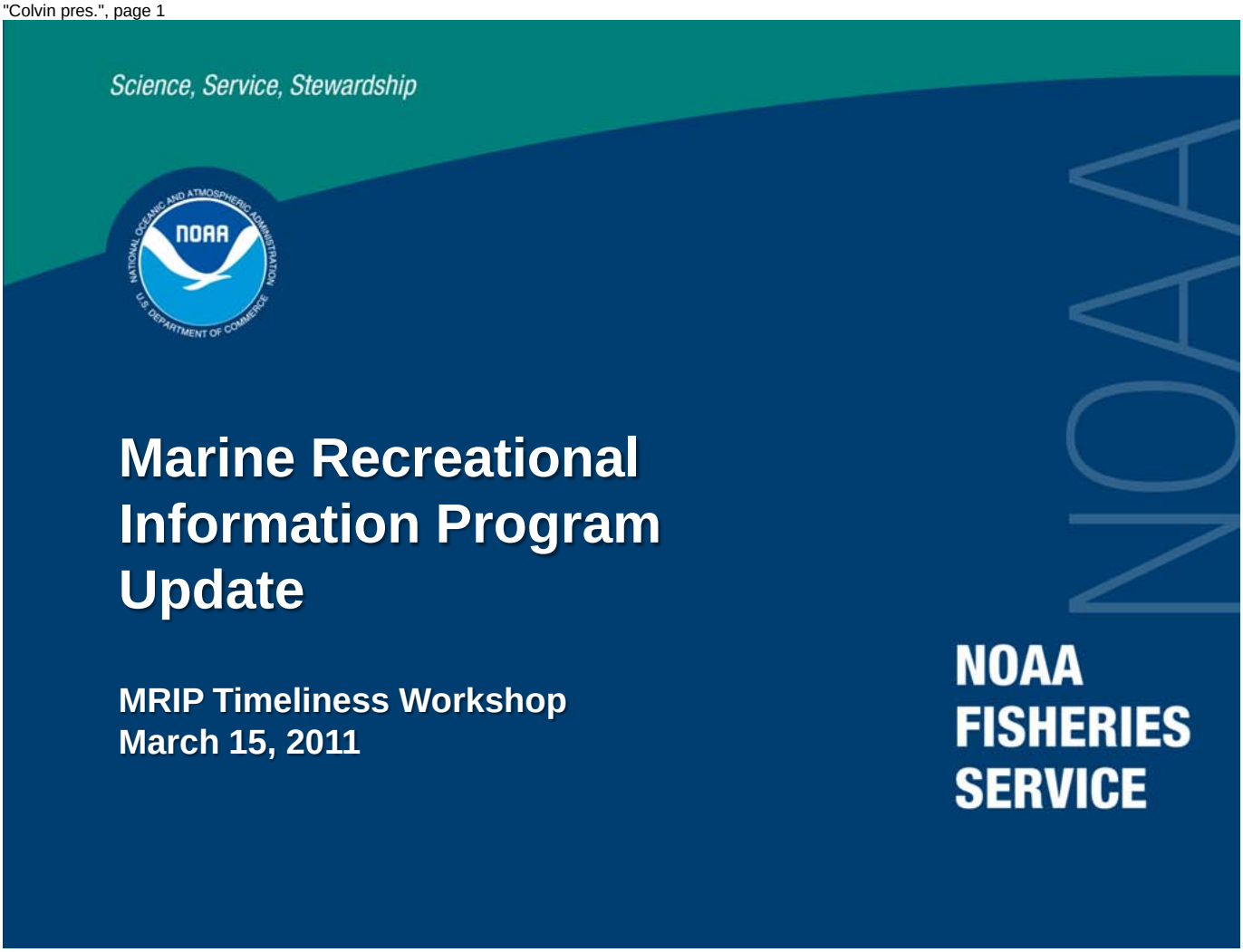
"Coakley pres.", page 17

# Final thoughts

- More timely data and more frequent data would help, but....
  - Can management entities move fast enough?
  - Are we prepared to address data at greater frequency?
  - Tradeoffs between cost of increased timeliness and frequency and realized benefits?
- To reduce management uncertainty, we need to consider more factors, such as angler behavior and trip demand

Mid-Atlantic Fishery Management Council

"Colvin pres.", page 1



"Colvin pres.", page 2

NOAA FISHERIES SERVICE

# Overview

1. What we've done
2. What we're working on
3. What you can expect

"Colvin pres.", page 3


# The Magnuson-Stevens Reauthorization Act called for more accurate and precise recreational fishing information.

**Implement recommendations of the National Research Council review.**

**Improve the quality of our catch and effort surveys.**

**Create a national registry of saltwater anglers.**

"Colvin pres.", page 4

NOAA FISHERIES SERVICE

# Meeting Two Critical Needs

1. Provide the detailed, timely, scientifically sound estimates that fisheries managers, stock assessors and marine scientists need to ensure the sustainability of ocean resources.

2. Address head-on stakeholder concerns about the reliability and credibility of recreational fishing catch and effort estimates.

"Colvin pres.", page 5

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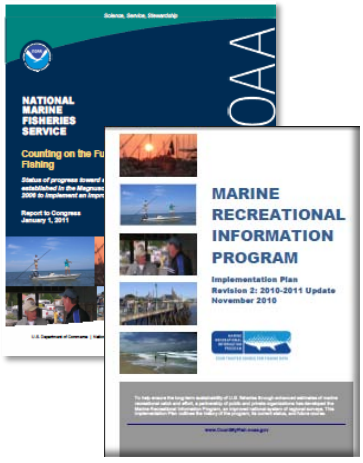
# Dynamic and Evolving




## 2011 Report to Congress

and

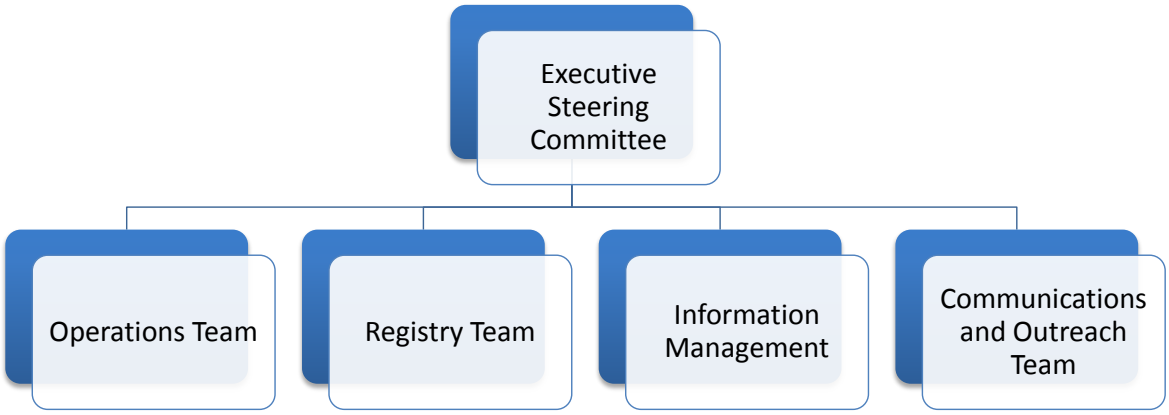
## Implementation Plan Update

- Update on MRIP progress to date
- Blueprint for future action
- Revised annually
- Commitment to transparency

"Colvin pres.", page 6

NOAA FISHERIES SERVICE

# Governance Structure



"Colvin pres.", page 7

NOAA FISHERIES SERVICE

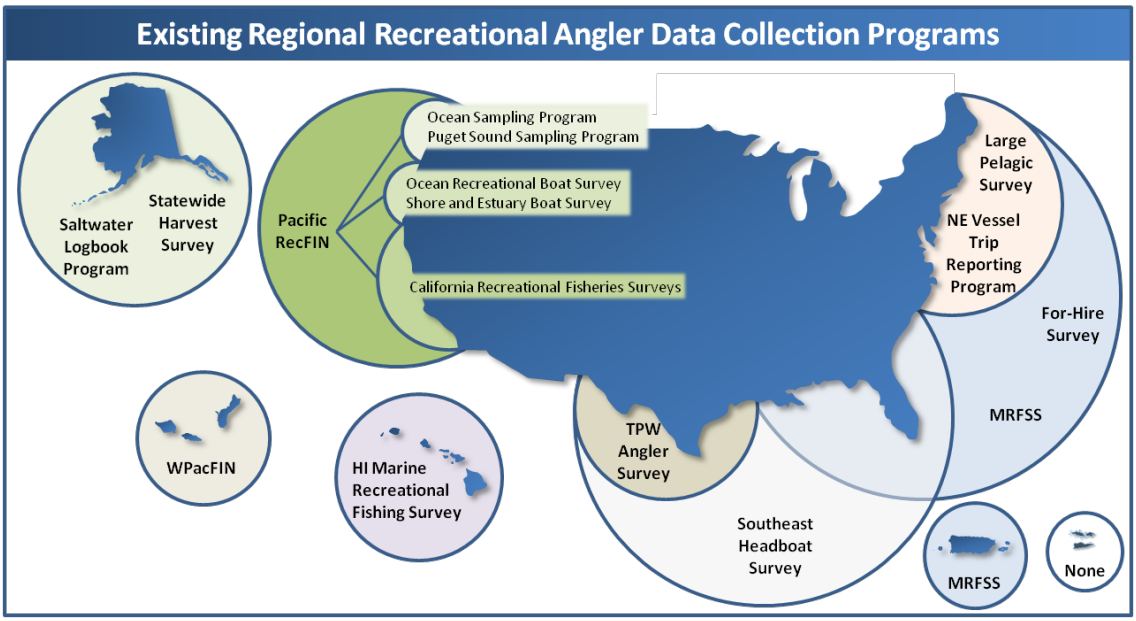
# Budget

| | | | |
|---|---|---|---|
| **FY 2008** | **$3.5 Million** | **FY2010** | **$9.0 Million** |
| **FY 2009** | **$6.2 Million** | **FY2011** | **$9.0 Million** *(President's Request)* |
| | | **FY2012** | **$12.0 Million** *(President's Request)* |

"Colvin pres.", page 8

NOAA FISHERIES SERVICE

# How Did We Get Here?



"Colvin pres.", page 9

NOAA FISHERIES SERVICE

# National Strategy

- Regional flexibility
- Development of survey design, estimation and management standards and best practices
  - Utilization of angler registries as sample frames
  - Unbiased sampling and estimation designs
- For-hire specific data collection approaches
- Quality assurance and quality control standards
- Enhanced information management and data dissemination tools

"Colvin pres.", page 10

NOAA FISHERIES SERVICE

# Regional Surveys

Regional survey partners will make their own decisions to meet regional needs within the “umbrella” guidance of MRIP to apply survey parameters such as:

- Basic survey design choices
- Coverage and resolution beyond standard minimums
- For-hire data collection approach
- Biological sampling requirements

"Colvin pres.", page 11

NOAA FISHERIES SERVICE

# Progress to Date

- NOAA funded 31 projects across the country
- Developed cooperatively with state and regional partners
- Address major concerns identified by NRC
  - Focus on fundamental design and sampling methods

"Colvin pres.", page 12

NOAA FISHERIES SERVICE

# Key Accomplishments

- Pilot testing electronic for-hire logbook in Gulf
- Implement National Saltwater Angler Registry
- Test registry-based surveys
- Address potential sources of bias in survey designs
  - New design for estimating catch
  - Alternative sampling design for conducting dockside interviews

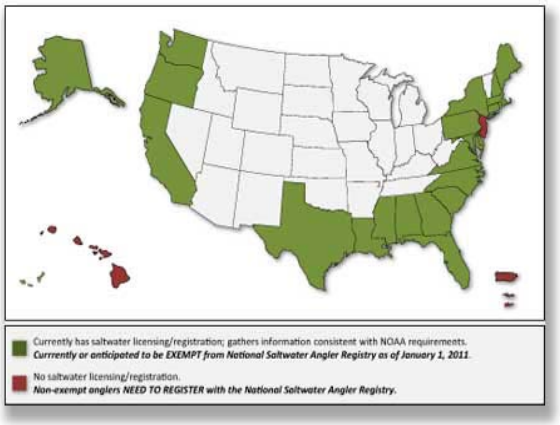
"Colvin pres.", page 13

NOAA FISHERIES SERVICE

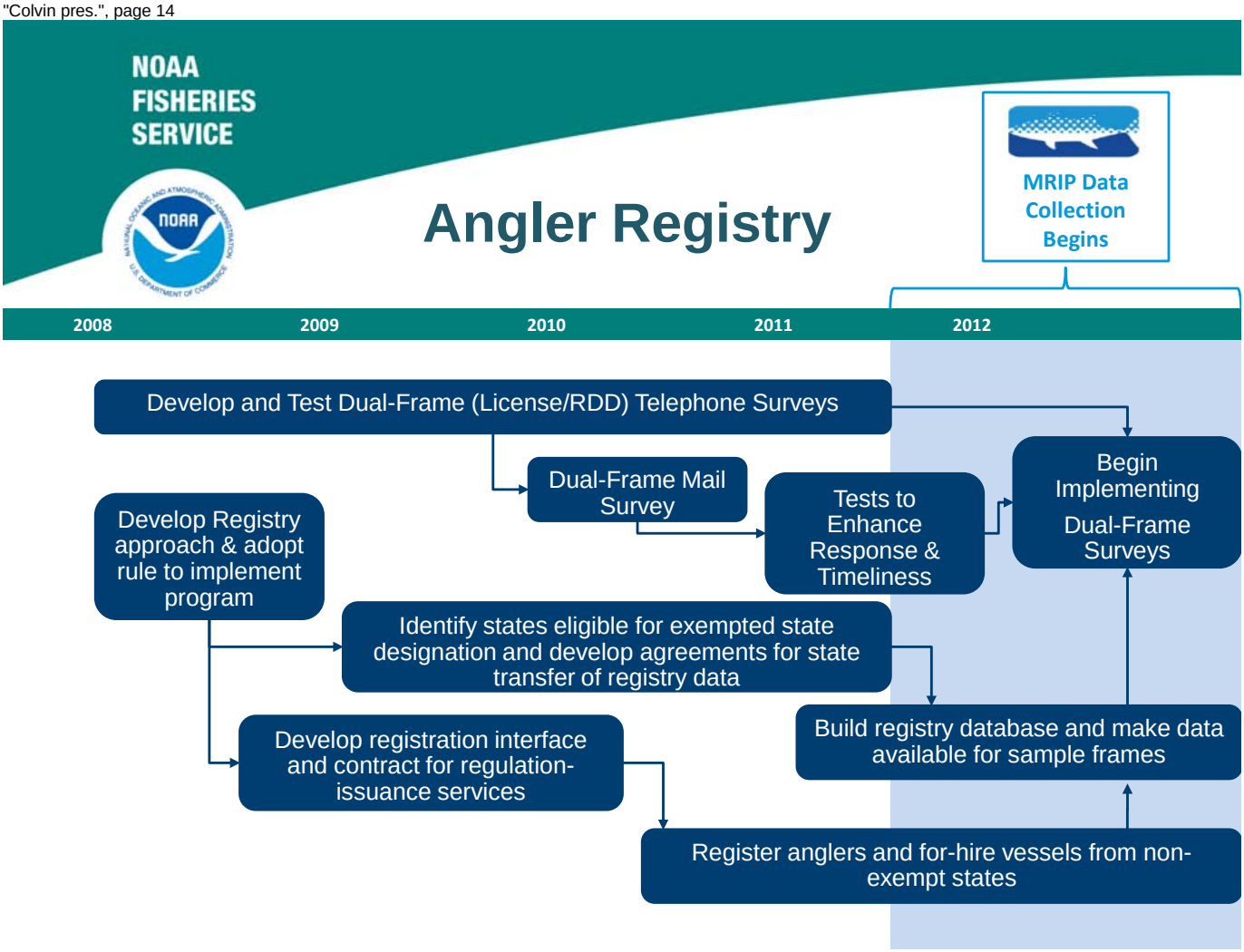
# Angler Registry

## 5 Things to Know

- 25 of 29 coastal states and territories exempt
- New Jersey just signed legislation, but not yet exempt
- Over 700,000 registered anglers
- $15 registration fee in effect Jan 1, 2011
- Pilot testing dual-frame phone and mail surveys to determine effort



"Colvin pres.", page 14



"Colvin pres.", page 15

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## Reducing Potential for Bias

# The potential for bias was the NRC's chief concern about MRFSS

**potential for bias** is the result of unaccounted for factors or untested assumptions

"Colvin pres.", page 16

NOAA FISHERIES SERVICE

# Reducing Potential for Bias

## New Estimation Design

- Subject to 3 peer reviews
- NOAA and MRIP reviews and approvals
- New estimates in 2011, rerun estimates back to 2003
- Onboarding and outreach
  - Observer team of experts and stakeholders
  - Briefings to internal and external partners
  - Create informed, trusted group to address questions

**Maximize factual understanding and minimize the possibility that the effort will be misconstrued or mischaracterized**

"Colvin pres.", page 17

NOAA FISHERIES SERVICE

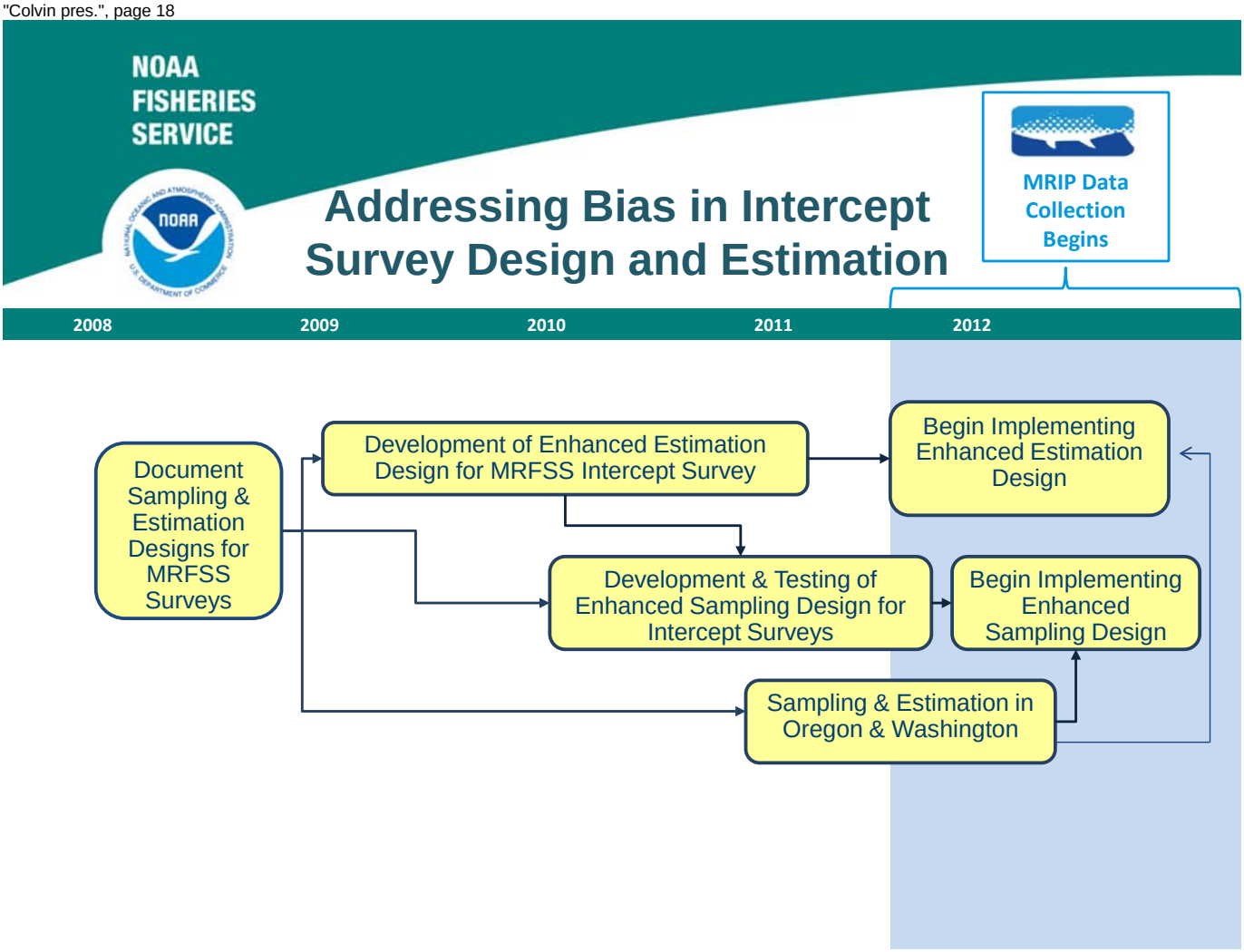
# Reducing Potential for Bias

## Improved Sampling Design for Dockside Intercept Survey

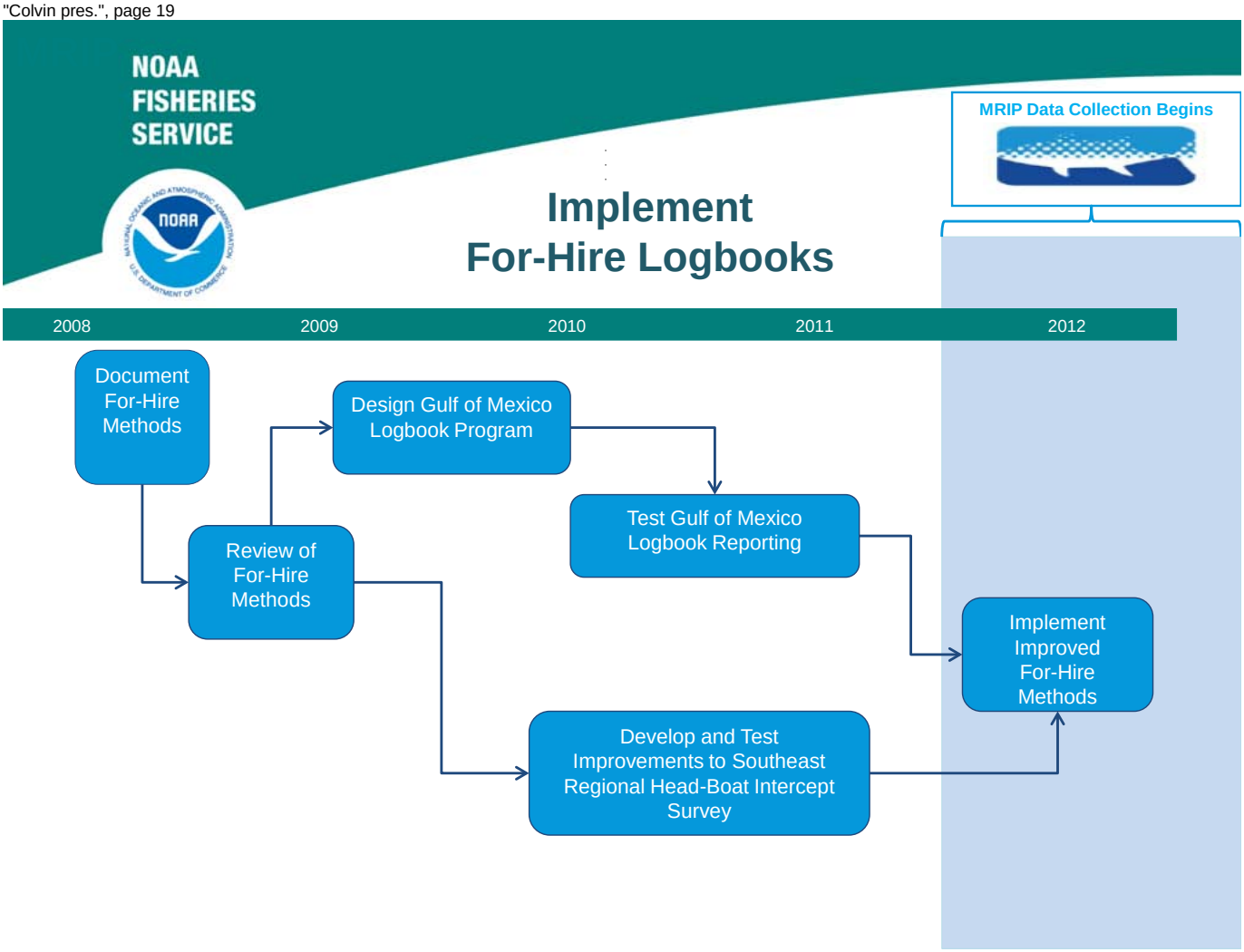
- North Carolina Pilot Project
  - Revised sampling frame
  - Assigned to specific sites and clusters
  - Assigned order and length of time
  - Assigned specific day parts
  - Sample at night


Video created in partnership with North Carolina Division of Marine Fisheries available at **www.CountMyFish.noaa.gov**

"Colvin pres.", page 18



"Colvin pres.", page 19



"Colvin pres.", page 20

NOAA FISHERIES SERVICE

# When Does MRIP Begin?

## Transition to MRIP has already started and is ongoing

- Angler registry
- New catch estimation methods
- Revised dockside sampling design

*"MRIP is a new data collection and reporting effort created by NOAA Fisheries and a broad collection of partners…to generate better estimates of anglers' catch and effort."*

"Colvin pres.", page 21

NOAA FISHERIES SERVICE

# What you can expect

## Newly refined and robust process mean quality of the numbers are improved.

*Be on the watch for:*

- ✓ Catch estimates using new estimation methodologies *(Spring 2011)*
- ✓ Expanded use of angler registries in mixed mode surveys (*Fall 2011)*
- ✓ Application of improved intercept survey design (*Fall 2011)*
- ✓ Completion of Gulf For-Hire Pilot and regional dialogues about transition to for-hire electronic logbooks

"Colvin pres.", page 22

NOAA FISHERIES SERVICE

# Contact:

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NOAA Fisheries

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# Management Structures and Approaches in the South Atlantic and Their Relationship to Recreational Data Quality and Availability

David Cupka
South Atlantic Fishery Management Council

The South Atlantic Fishery Management Council faces significant challenges in regards to data quality and availability when it comes to managing recreational fisheries in our area of jurisdiction. There are large recreational fisheries in the south Atlantic and the data available to properly manage these fisheries ranges from good to virtually non-existent. In the Snapper Grouper Fishery Management Plan alone there are 73 species in the Fishery Management Unit. There are currently seven amendments under development for the snapper/grouper FMP. All of these activities require quality and timely data. I want to focus on one of these amendments – our Comprehensive Annual Catch Limit Amendment – to illustrate some of the data problems we are facing and some of the approaches being considered to address these problems.

One thing that I want to emphasis is that this amendment is evolving as we speak and what I tell you about an approach today may change the next time our council or Scientific and Statistical Committee meets.

One of the approaches that we are looking at in the comprehensive ACL amendment is reducing the number of species in the fishery management unit. Many of these species are represented by small catches and have not had a stock assessment. Our current preferred alternative would remove species based on one of three criteria- 1) 80% or more of their landings occur in state waters (except hogfish); 2) combined state and federal landings are less than 20,000 pounds annually (except cubera snapper, Warsaw grouper, lesser amberjack, and speckled hind); and 3) species which are managed under the Florida Marine Life Rule.

In addition to removing species from the FMU, we are looking at establishing species groups in this amendment because of the difficulty in tracking numerous individual quotas. We are also considering a species group approach in order to meet the statutory deadline for completing the amendment and to deal with some of the data quality and timeliness problems. Under this approach, species groups would be established for

non-assessed species using associations based on life history, catch statistics from logbooks, observer data, private/charter boat surveys, and fishery-independent MARMAP data. A group ACL would then be set for each of these species groups.

The South Atlantic Council is establishing sector-specific Annual Catch Limits in this amendment using a commercial sector and a recreational sector approach. The council had discussed further dividing the recreational sector into a for-hire sector and a private recreational angler sector but we are currently not going down this road.

The council intends to specify Annual Catch Targets for the recreational sector. Options being considered are 85% of the ACL, 75% of the ACL, and a percentage of the ACL derived from the Percent Standard Error of the MRIP catch estimate. In this option, ACT = ACL x (the greater value of 1-PSE or 0.5). Annual Catch Target values would be used to establish management measures. Setting the management measures based on an ACT that is lower than the ACL is expected to reduce the chance that observed catches in a year will exceed the ACL.

The Council has had extensive discussions over the last several years regarding data uncertainty and availability. A primary concern is that uncertainty in catch estimates will significantly impact the comparison of current stock conditions to the management benchmark of ACL and the biological benchmarks of OFL and ABC. Addressing this uncertainty is one of the biggest challenges before the Council. This is largely because recreational fisheries comprise a considerable portion of the South Atlantic fisheries as I indicated earlier, and many managed species have high uncertainty and high annual variability in catch estimates. Therefore, the Council is concerned that severe management actions could be triggered based on measurement error and not on real fishery problems.

The Council is looking at ways of addressing this variability issue. Initially, a 3-year running average of catches was considered for comparison to benchmark levels. There is some concern that this approach could result in undesirable consecutive determinations that landings exceed ACL if a single year of high catch occurs, as that year would have an influence on the average over the next 3 years. Likewise, a year of unusually low catch could

force the average low value over several years, potentially masking the overall risk of exceeding ACL. The Council believes that some type of smoothing technique would be useful in comparing the ACL and current catches, but the 3-year running average approach may not be appropriate when the wide annual variability in estimates for many managed species is considered. During our council meeting last week, the Council devised an alternative approach for addressing uncertainty in recreational catch estimates that incorporates confidence bounds and applies a two step process to ensure action is not triggered due to variable data. The first step is to determine if an overage has occurred, by comparing the lower confidence bound of the annual catch estimate to the ACL. If this value exceeds the ACL, than a “modified mean” catch estimate, defined as the mean of the prior five years with the lowest and highest values dropped, is calculated to determine whether the possible overage is due to a single large spike in estimates or whether there is evidence of a more sustained trend. The Council supports the idea of using some sort of a multi-year comparison approach to account for expected year to year variability in recreational catch estimates. At this time a preferred technique has not emerged but this issue is continuing to be looked at by our Scientific and Statistical Committee and our Council staff.

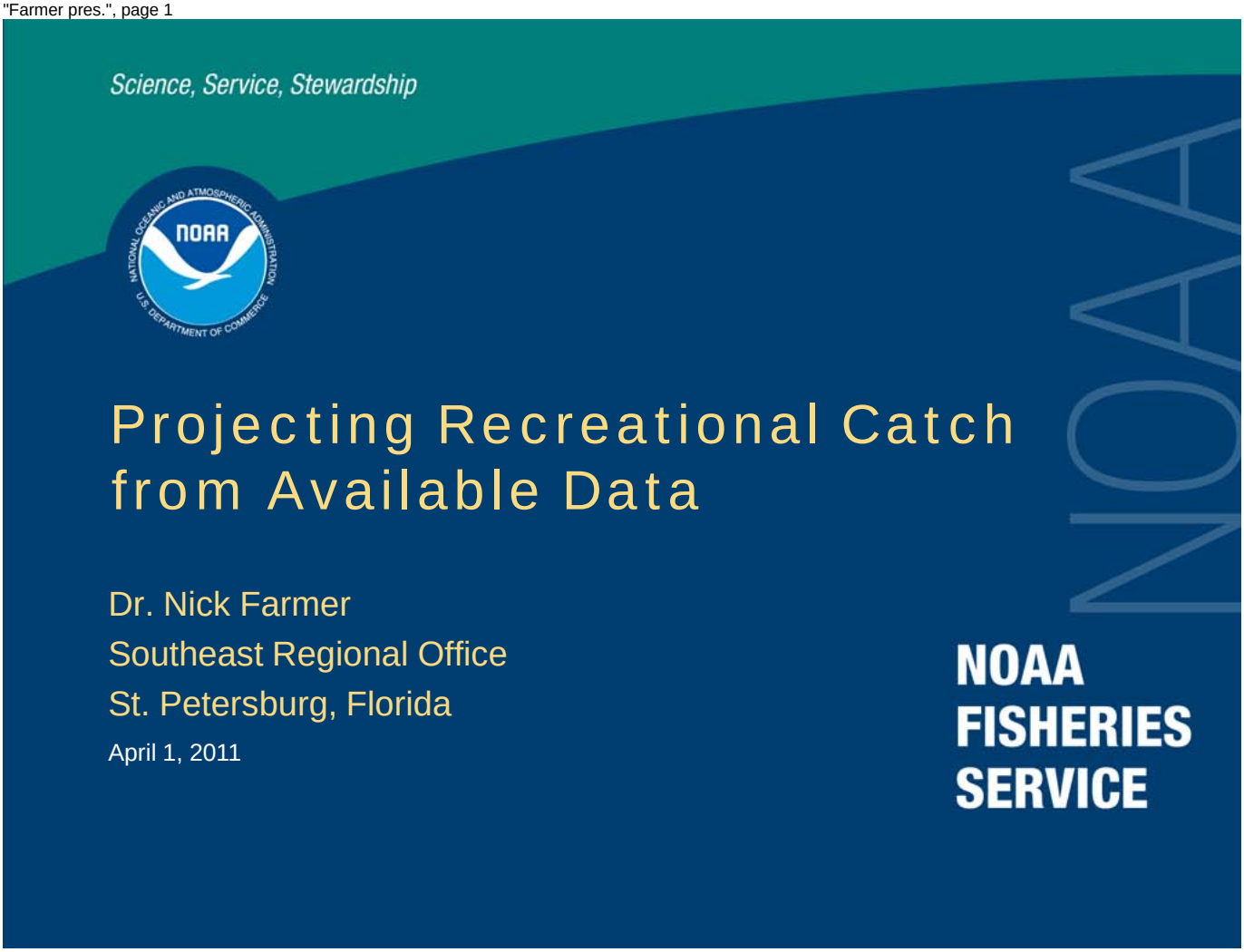
The Council has several Accountability Measures that will be applied if the Annual Catch Limits are exceeded. First, the Regional Administrator will publish a notice to reduce the ACL in the following fishing year by the amount of the overage. He can also publish a notice to reduce the length of the following fishing season by the amount necessary to ensure landings do not exceed the ACL. Other options include closing the recreational fishery when an ACL is met or projected to be met and reducing the bag limit in the following year. All of these options will be influenced by the uncertainty and timeliness in the recreational catch estimates.

It is recognized that delays in receiving catch information could lead to unexpected and additional overages, especially if catches suddenly increase during a wave. Lags in recreational data availability, from both MRIP and the Southeast head boat survey, could result in increased penalties to subsequent years' catches in such circumstances. One way the Council has partly addressed this lag is to enable the Regional Administrator to close fisheries and adjust seasons directly, without specific council action, when catches are projected to exceed Annual Catch Limits.

Improving recreational fisheries management in the South Atlantic Region will require addressing the Southeast Head Boat Survey. The Council faces significant data lags in the head boat component of the recreational fishery, as data is typically not available until 4-6 months after year's end. Moreover, mid-year data are not available from the head boat survey at this time. This is a considerable data availability problem, as some head boat catches are large for several of the species managed by the Council. The Southeast Fisheries Science Center is currently working on methodology to provide mid-year estimates from the head boat survey which will improve the timeliness of these important data.

In summary, it appears that in terms of comparing and contrasting the management approaches and structures utilized by the Mid-Atlantic Council and the South Atlantic Council, there are a lot of similarities. In the area of accountability, both councils are using a similar approach and applying sector-specific Annual Catch Limits. Both councils are interested in smoothing the data variability and addressing year-to-year variability while their approaches differ in that the South Atlantic has concerns about using a three-year running average. Both councils approach management uncertainty by applying a reduction from the annual catch limit to the annual catch target. And lastly, in the area of accountability measures both councils utilize annual catch targets, in-season closures, and post-season measures including the deduction of overages in catches from the next fishing year and adjusting the fishing season and/or bag limits. One apparent difference in regards to accountability measures is that the South Atlantic Council authorizes the NMFS Regional Administrator to enact post season accountability measures.

"Farmer pres.", page 1



"Farmer pres.", page 2

NOAA FISHERIES SERVICE

# Data Sources

## MRFSS:

- 2-month waves
- Delivery ~ 45 days after end of wave

## HEADBOAT:

- Monthly data
- Delivery varies

## TEXAS PARKS & WILDLIFE DEPARTMENT:

- ‘High’ (May 15-Nov 20) & ‘Low’ use (Nov 21-May 14) waves
- Delivery varies

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"Farmer pres.", page 3

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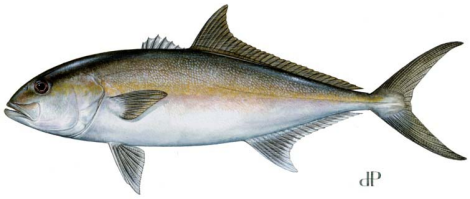
# Methods

## Greater Amberjack

- Regression
- Cumulative landings



## Red Snapper

- Prior year landings used as proxy; adjust for average weight increases

## Black Sea Bass

- Historical ratios of landings used to expand reported landings

3

"Farmer pres.", page 4

NOAA FISHERIES SERVICE

# Common Assumptions

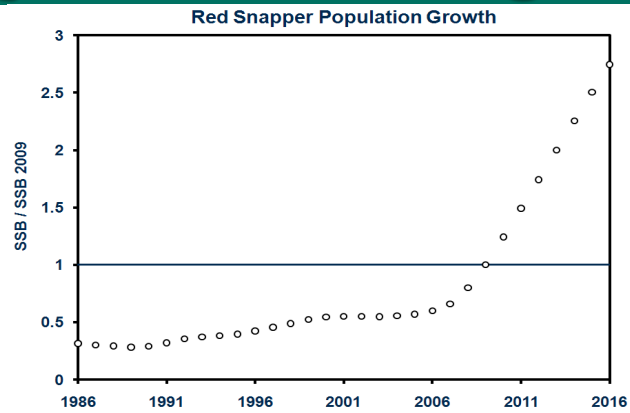
- Historical Landings ~ Proxy for Future Landings
- Landings uniformly distributed within waves
- All landings from wave when season is open
- States will adopt compatible regulations

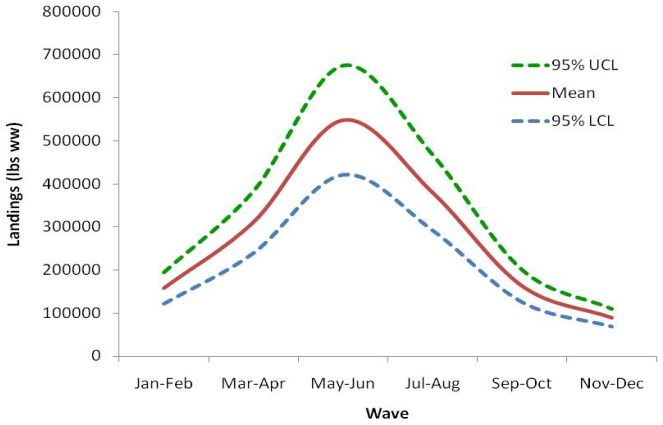
4

"Farmer pres.", page 5

# Basic Projection Challenges

- **Time Lags**
  - Vary by data sources
  - Lags for management changes
- **Data Precision / Accounting for Uncertainty**
  - MRFSS PSE
  - Headboat? TPWD?
- **Impacts of Rebuilding**
  - Changes to TAC
  - Changes in Average Size
  - Changes in CPUE
- **Landings not Uniformly Distributed**
- **Handling Florida Keys**

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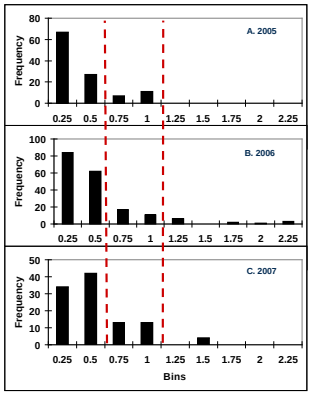
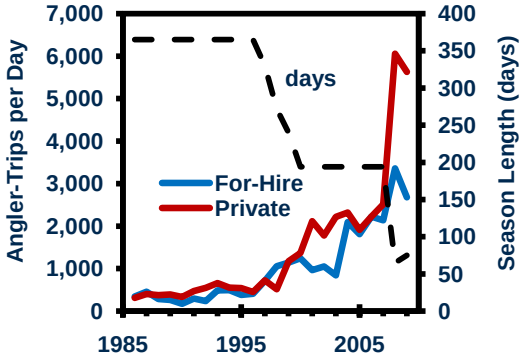
"Farmer pres.", page 6

# Advanced Projection Challenges

- **Impacts of Time/Area Closures**
  - Poor Spatial Data
  - Effort Shifting
  - Weekend openings
- **Impacts of Recently Implemented or Proposed Regulations**
  - Trip elimination
  - Changes in release mortality
  - Compliance rate
  - State compatibility
- **Changes in Participation**
  - Changes in targeting
  - Changes in fishing population
- **Effort Compensation**
  - Shortened season → Derby fishery

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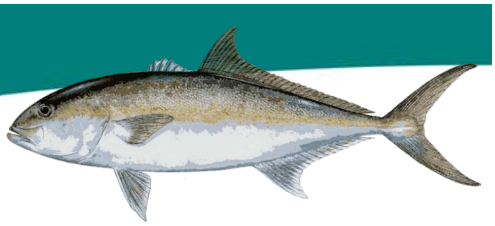
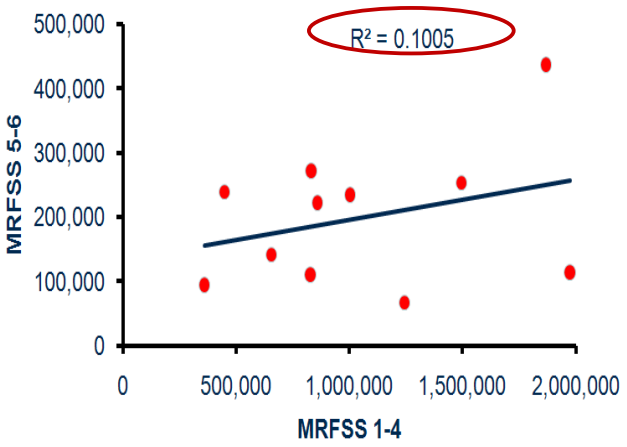
"Farmer pres.", page 7

NOAA FISHERIES SERVICE

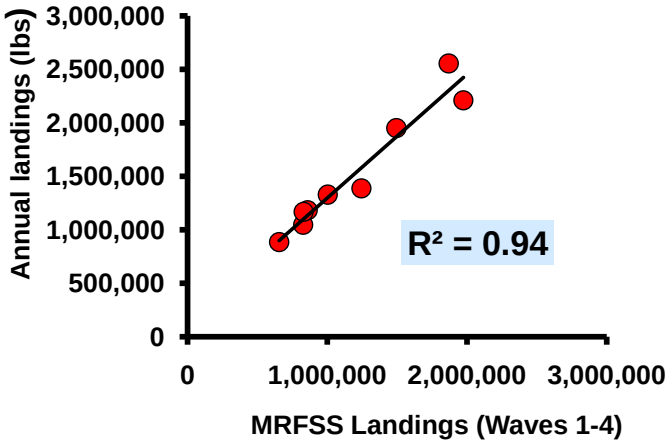


# Regression Approach

Reported 2009 MRFSS landings (Waves 1-4) used to predict 2009 MRFSS landings based on regression of 2000-2008 data




**ISSUE: Waves 1-4 poor predictor**




**ISSUE: Data autocorrelated**

7

"Farmer pres.", page 8

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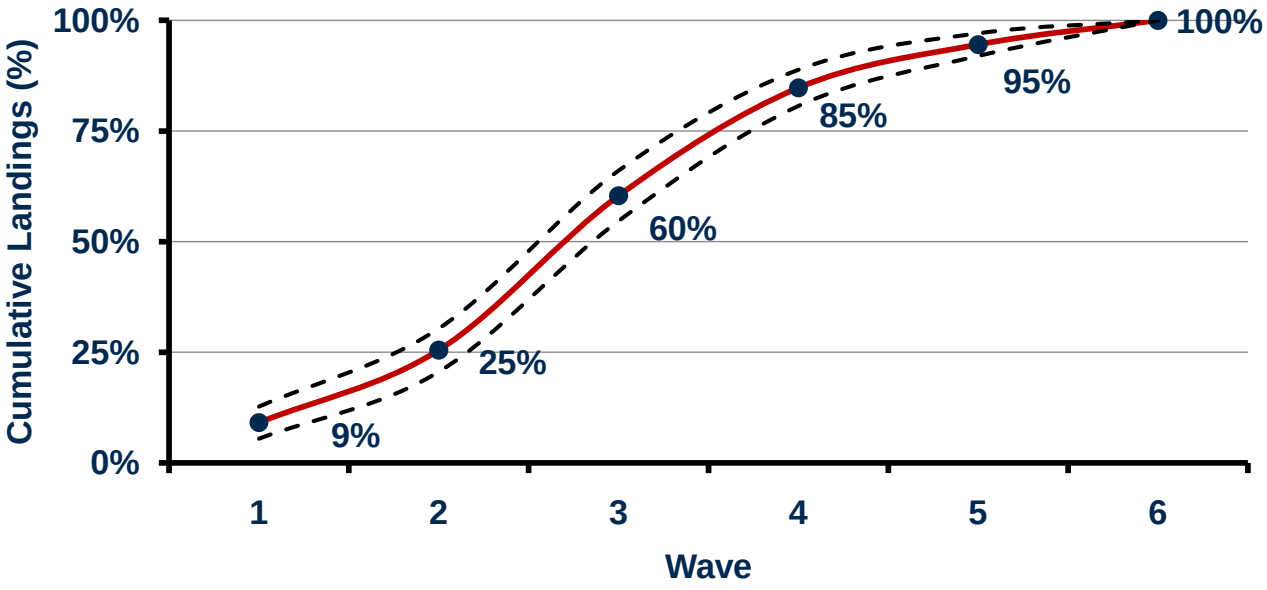
# Cumulative Landings as a Predictor

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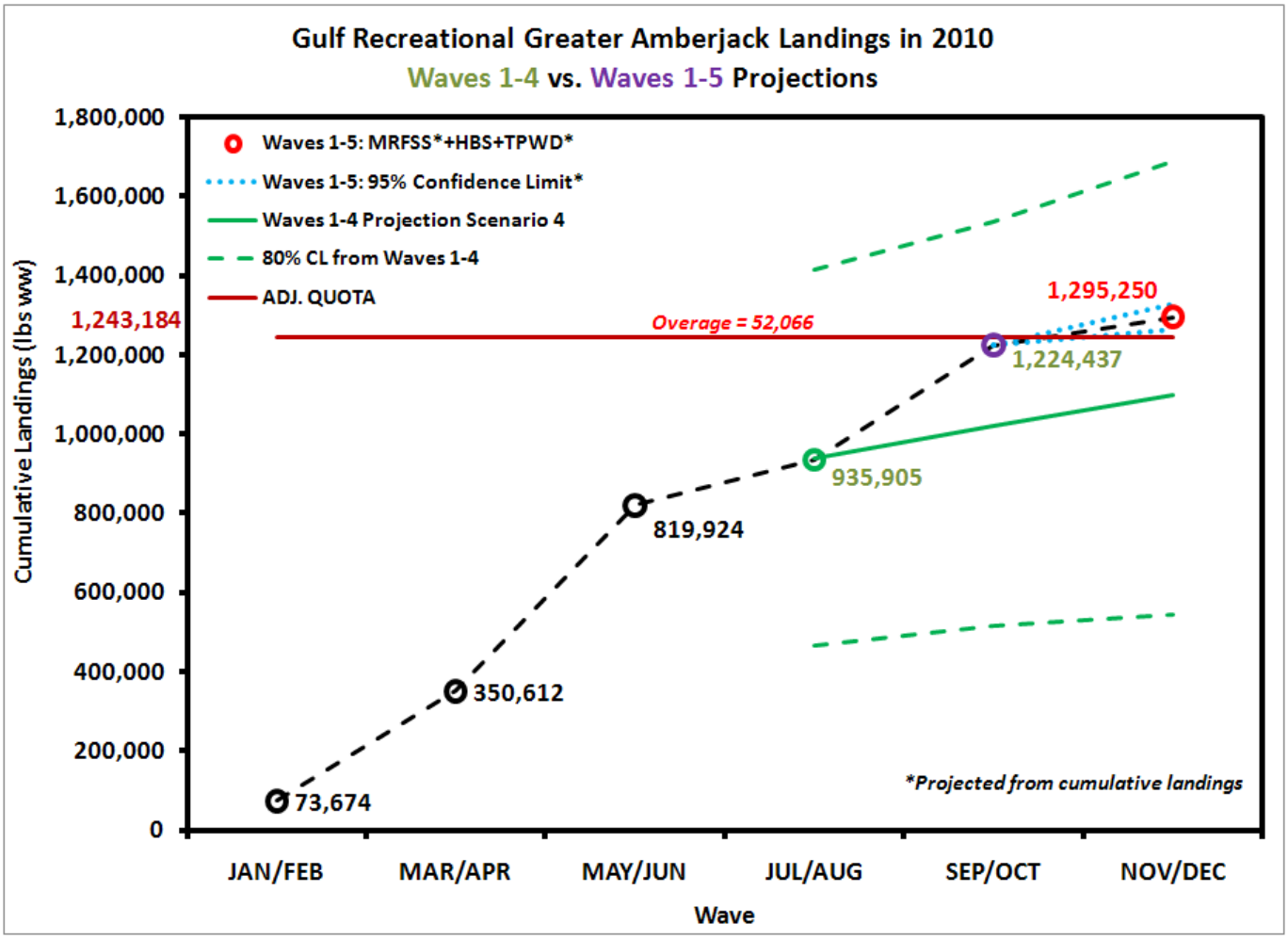
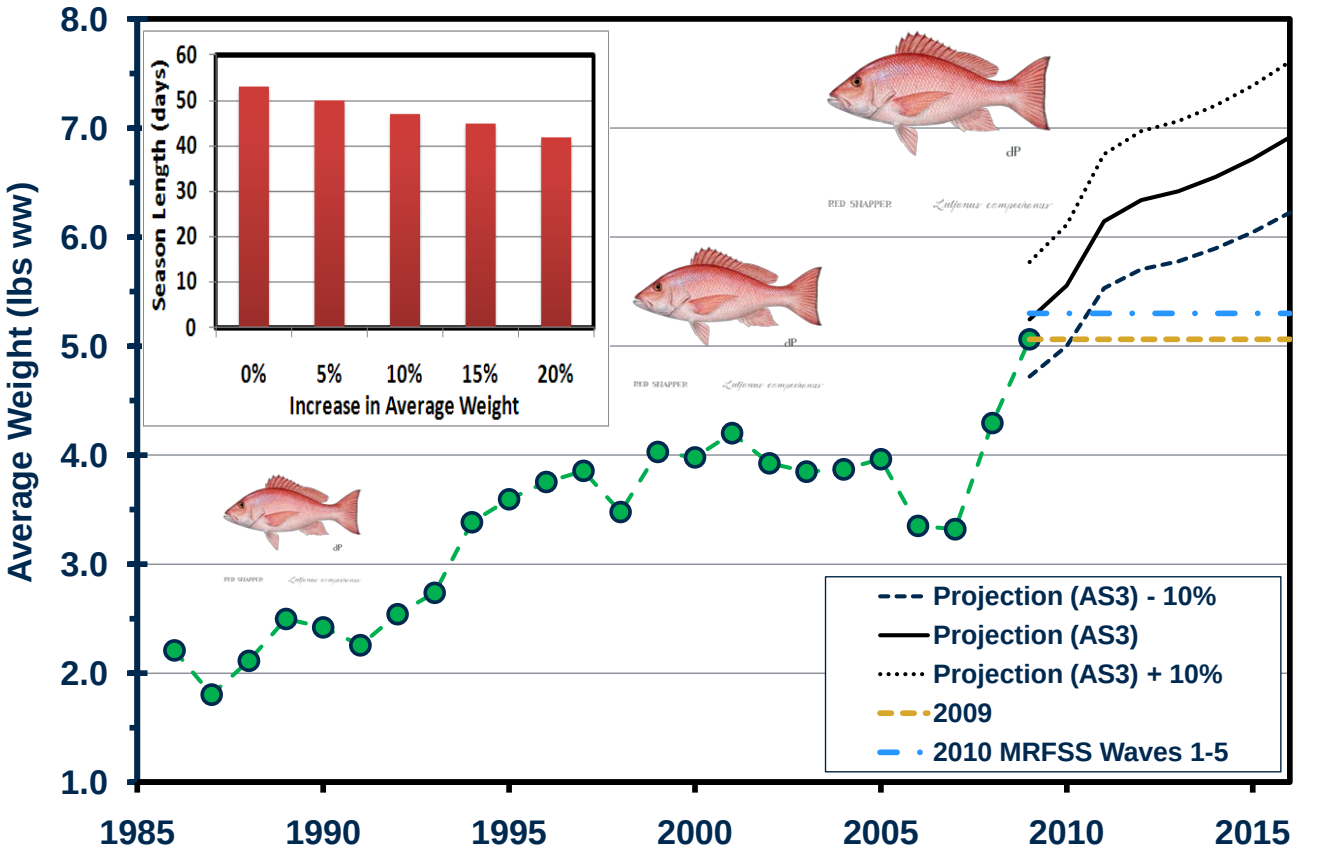
"Farmer pres.", page 9



"Farmer pres.", page 10

# Changes in Average Weight

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"Farmer pres.", page 11

NOAA FISHERIES SERVICE

# Fishing Season Projections: Potential New Approach

$$\frac{Catch_{lbs}}{day} = AvgWeight * \frac{Catch_{N}}{trip} * \frac{Trips}{day} * \Delta Effort$$

$$Days_{open} = \frac{TAC}{\left(\frac{Catch_{lbs}}{day}\right)}$$

***Can compute by sector; solve for days open that brings landings closest to TAC***

***CATCH (N)/TRIP LIMITED BY REGS***

***RECENT YEARS ~ BEST PROXY****

****could increase with increasing SSB***

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"Farmer pres.", page 12

NOAA FISHERIES SERVICE

# Why We Need More Accurate & Timely Data

- **More accurate projections**
  - Reduced time period for projection = Reduced uncertainty
- **Did an overage occur? Are AMs necessary?**
- **More advance notice for quota closures**
  - Reduced economic hardship
  - Improved business planning
- **Reduced overages and associated payback**
- **Reduced probability of closure before quota is met**

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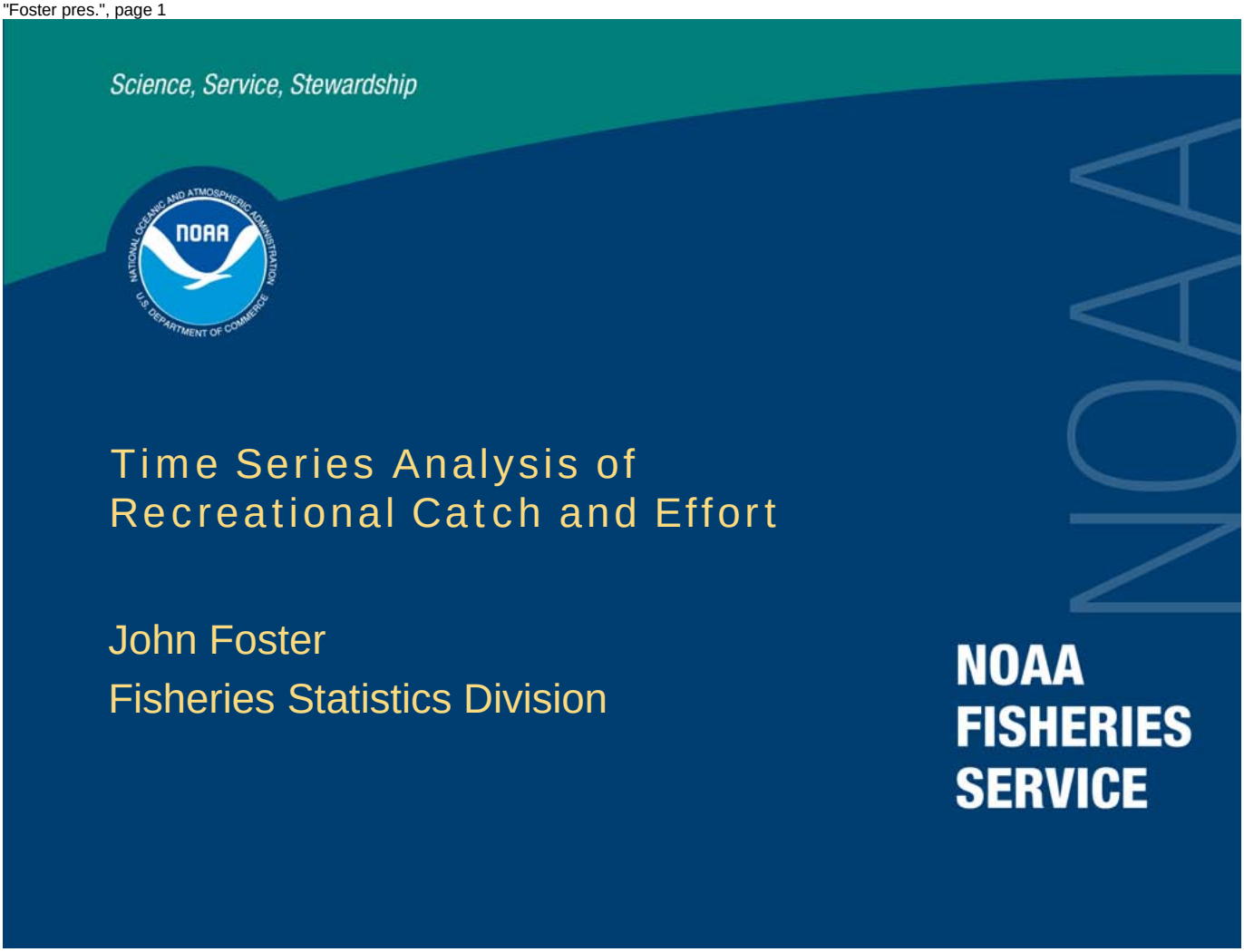
"Farmer pres.", page 13

"Foster pres.", page 1



"Foster pres.", page 2

NOAA FISHERIES SERVICE

# Overview

- Data series diagnostics
- ARIMA times series models
- Total effort by state and wave
- Total landings by wave
- Forecasting

2

"Foster pres.", page 3

NOAA FISHERIES SERVICE

# ARIMA Models

- Concept
  - Values in a time series are correlated
  - Correlation is a function of time
- Parameters for ARIMA
  - p: autoregressive (AR), q: moving average (MA)
  - d: difference (I)
- Highly flexible
  - Parameterization
  - External correlates (tuning series)
- Implementation
  - SAS/ETS, proc arima

3

"Foster pres.", page 4

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# Model Formulations

- ARMA ($p$, $q$) $$X_t = \mu + \sum_{i=1}^{p} b_i X_{t-i} + e_t + \sum_{i=1}^{q} a_i e_{t-i}$$
- ARIMA (1,1,1)

$$\left(X_t - X_{t-1}\right) = b\left(X_{t-1} - X_{t-2}\right) + e_t + a_1 e_{t-1}$$

$$\left(X_t - X_{t-6}\right) = b\left(X_{t-1} - X_{t-6}\right) + e_t + a_6 e_{t-6}$$

- ARIMA (0,2,3)

$$\left(X_t - X_{t-1}\right) - \left(X_{t-6} - X_{t-7}\right) = e_t + a_1 e_{t-1} + a_6 e_{t-6} + a_7 e_{t-7}$$

4

"Foster pres.", page 5

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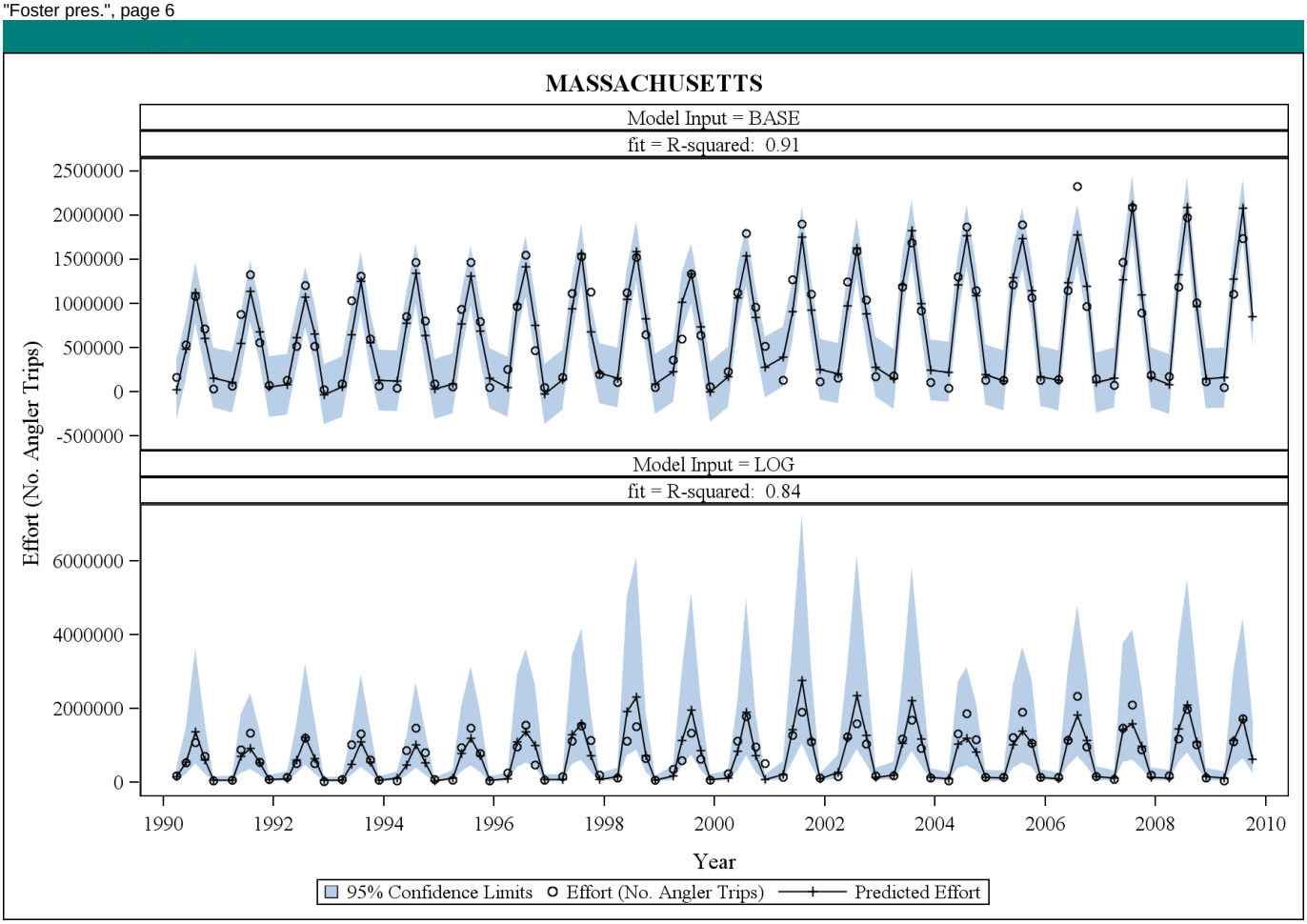
# Effort Models

- Total Effort (angler trips) by Wave, 1990-2009
- Separate models by State: MA, AL, FL
- Untransformed, Log transformed, No correlates

5

"Foster pres.", page 6

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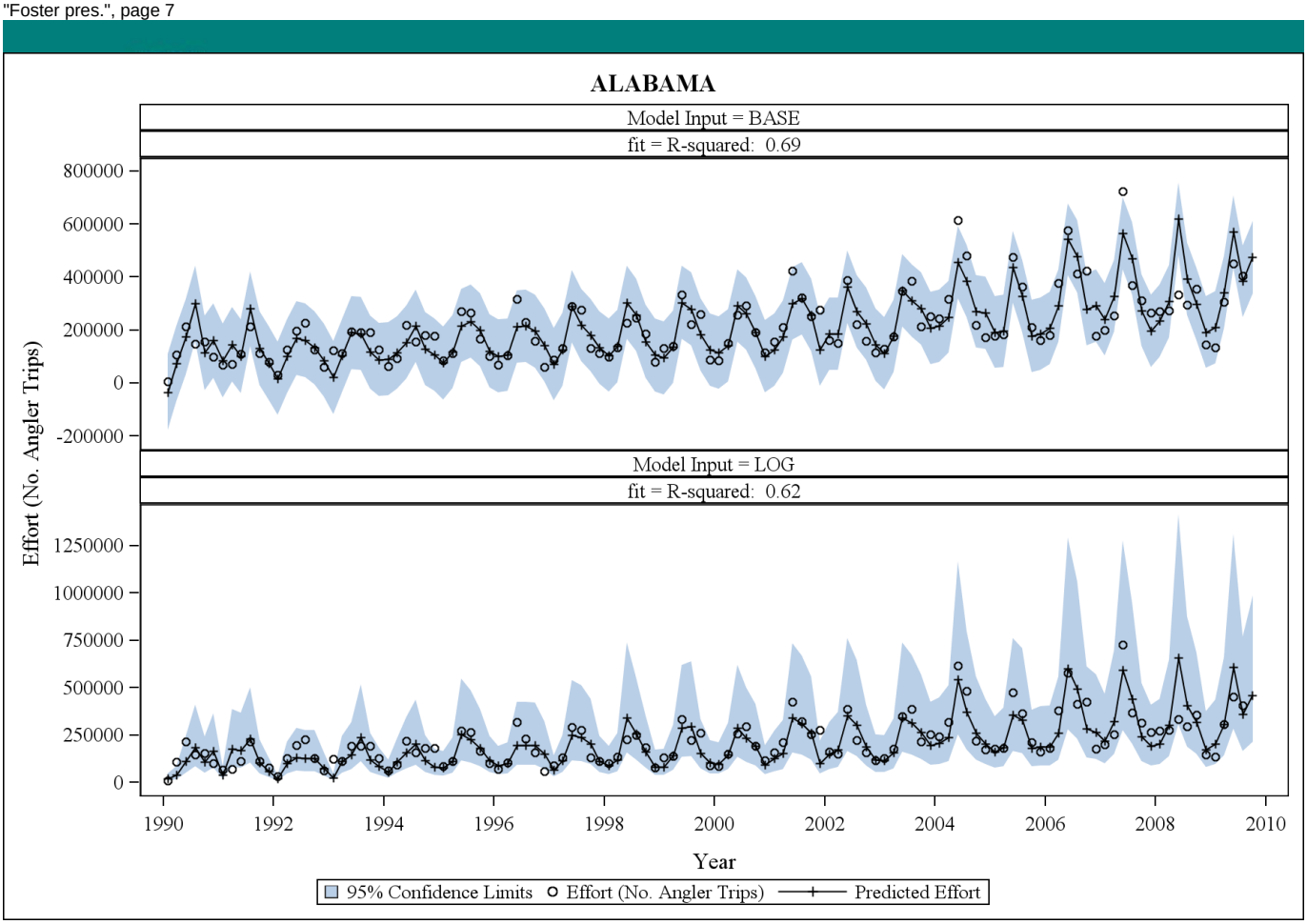
"Foster pres.", page 7

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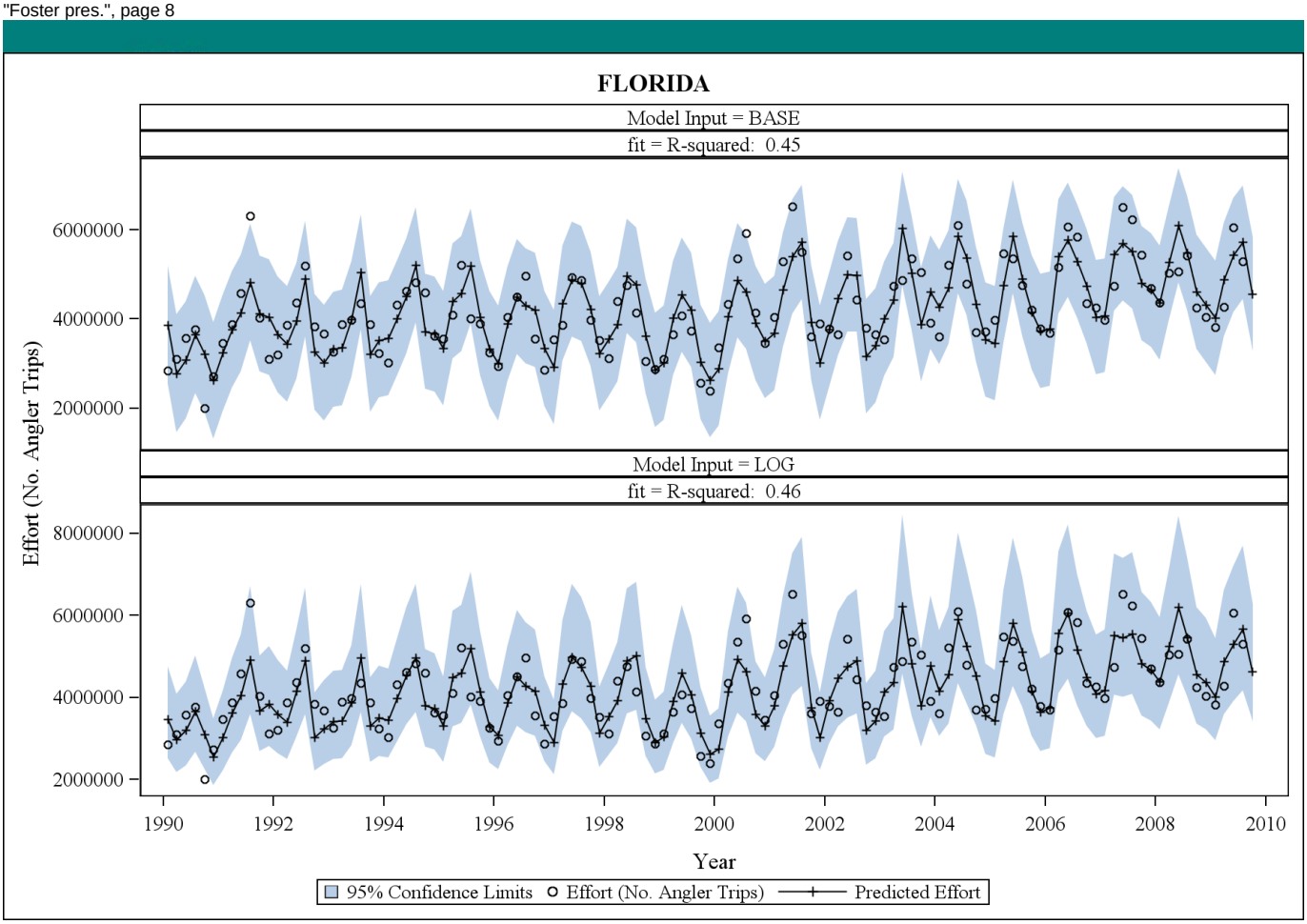
"Foster pres.", page 8



"Foster pres.", page 9

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# Effort Models

- Model Fit:
  - Large states better than small states
  - Mid Atlantic, NE better than SA, Gulf
  - Short series better than long

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"Foster pres.", page 10

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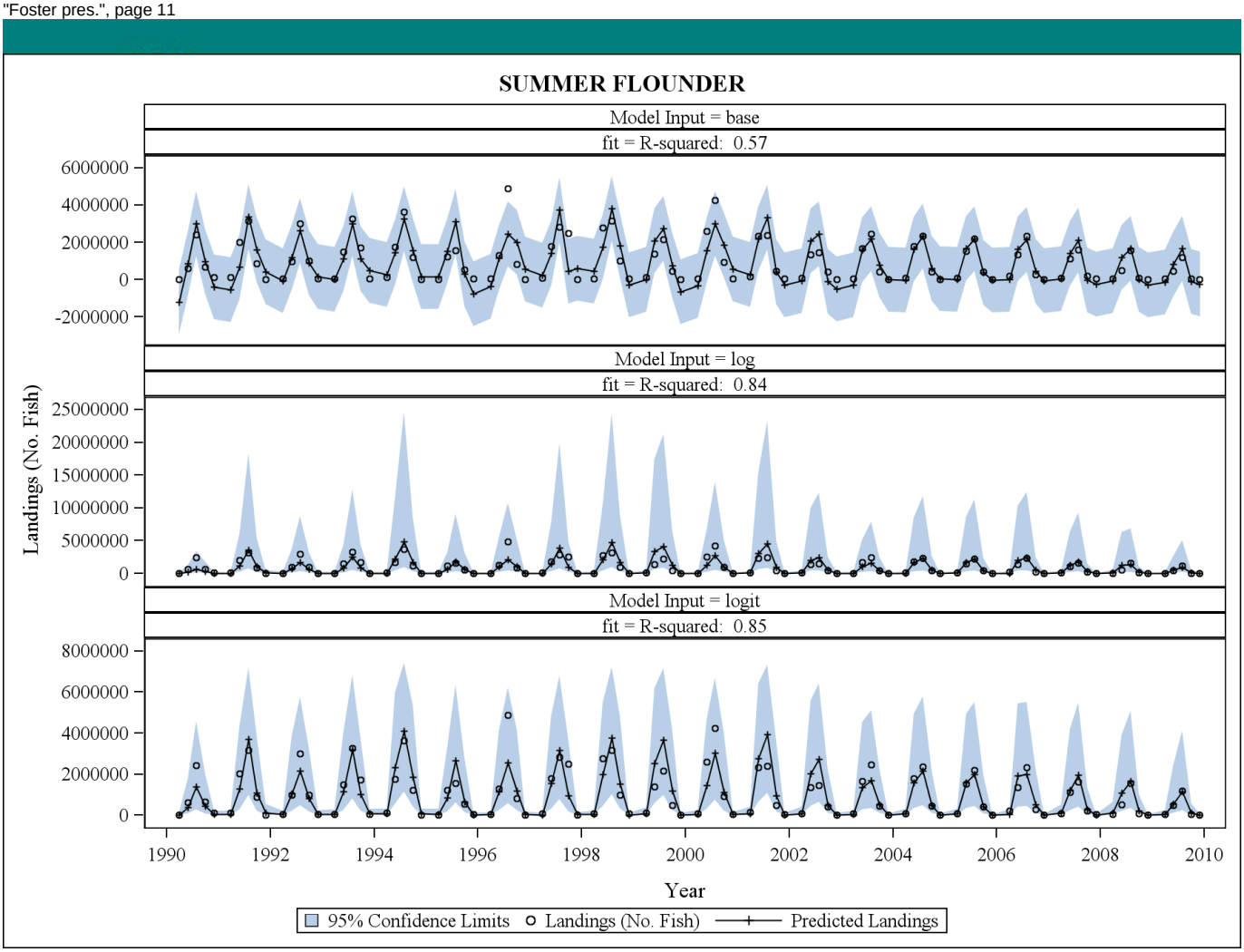
# Catch Models

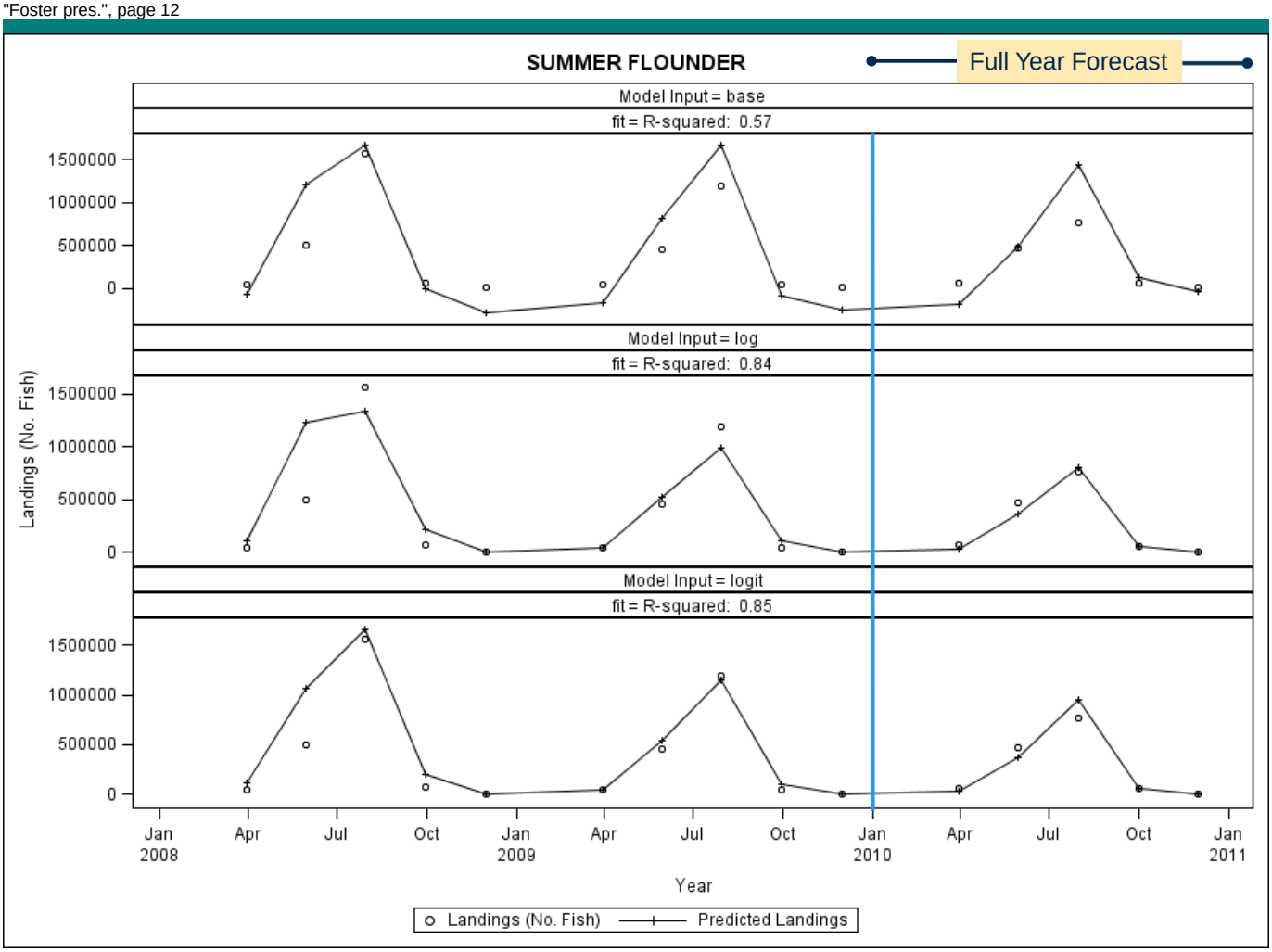
- Total Landings (no. fish) by Wave, 1990-2009
- Coastwide models by species
- Summer flounder, Scup, Striped Bass
- Untransformed, Log and Logit transformed
- No Correlates

10

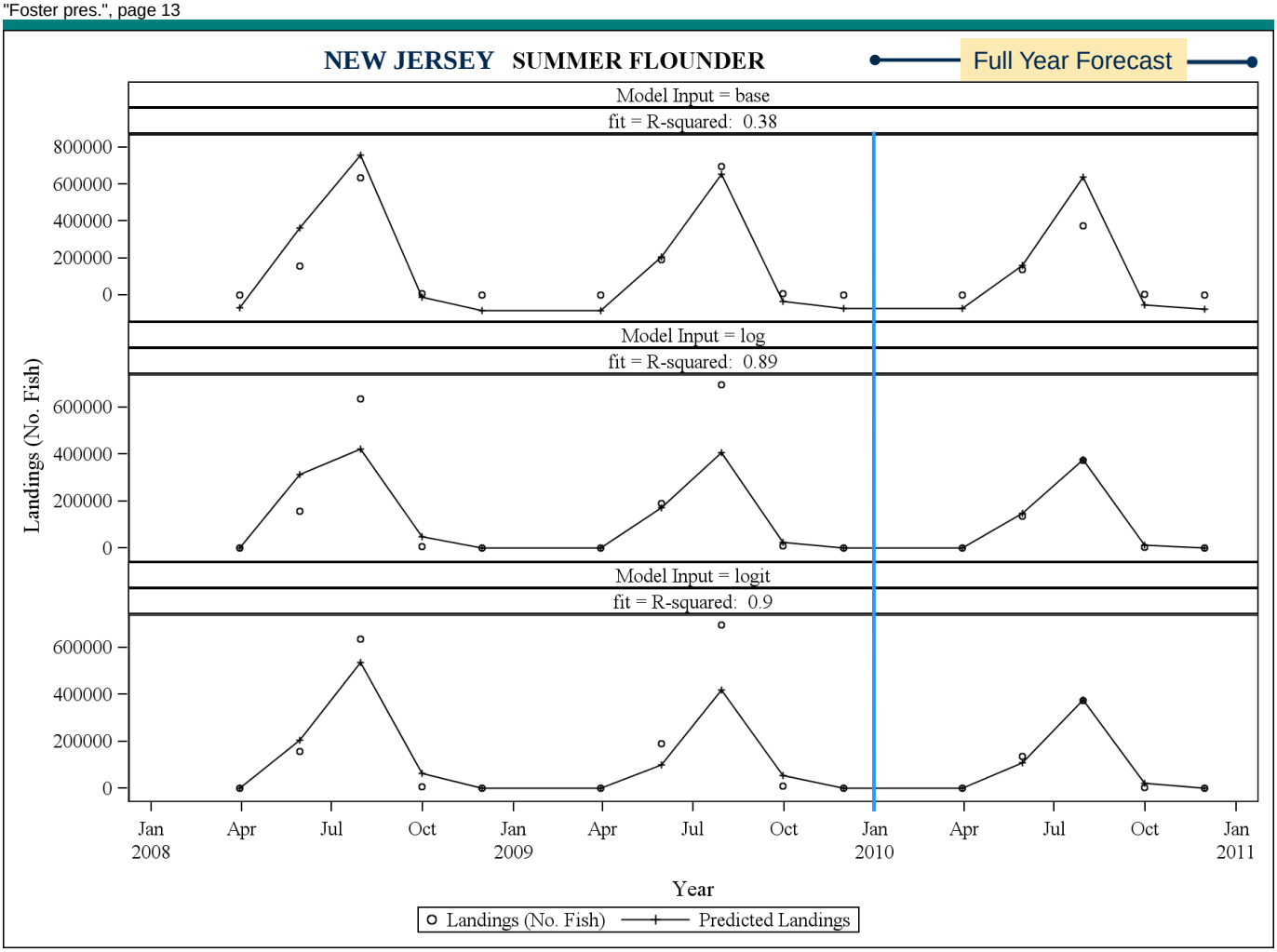
"Foster pres.", page 11



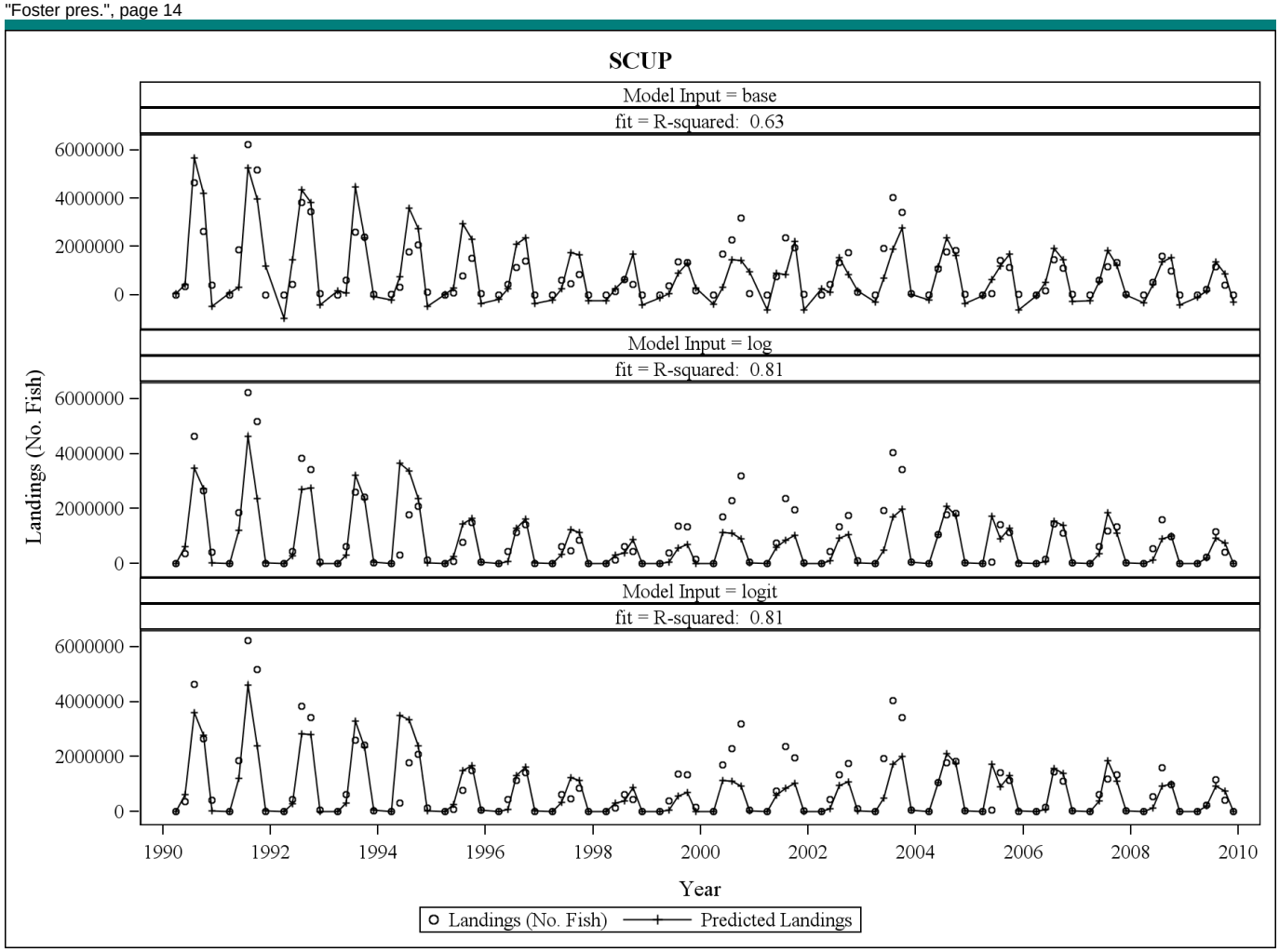
"Foster pres.", page 12



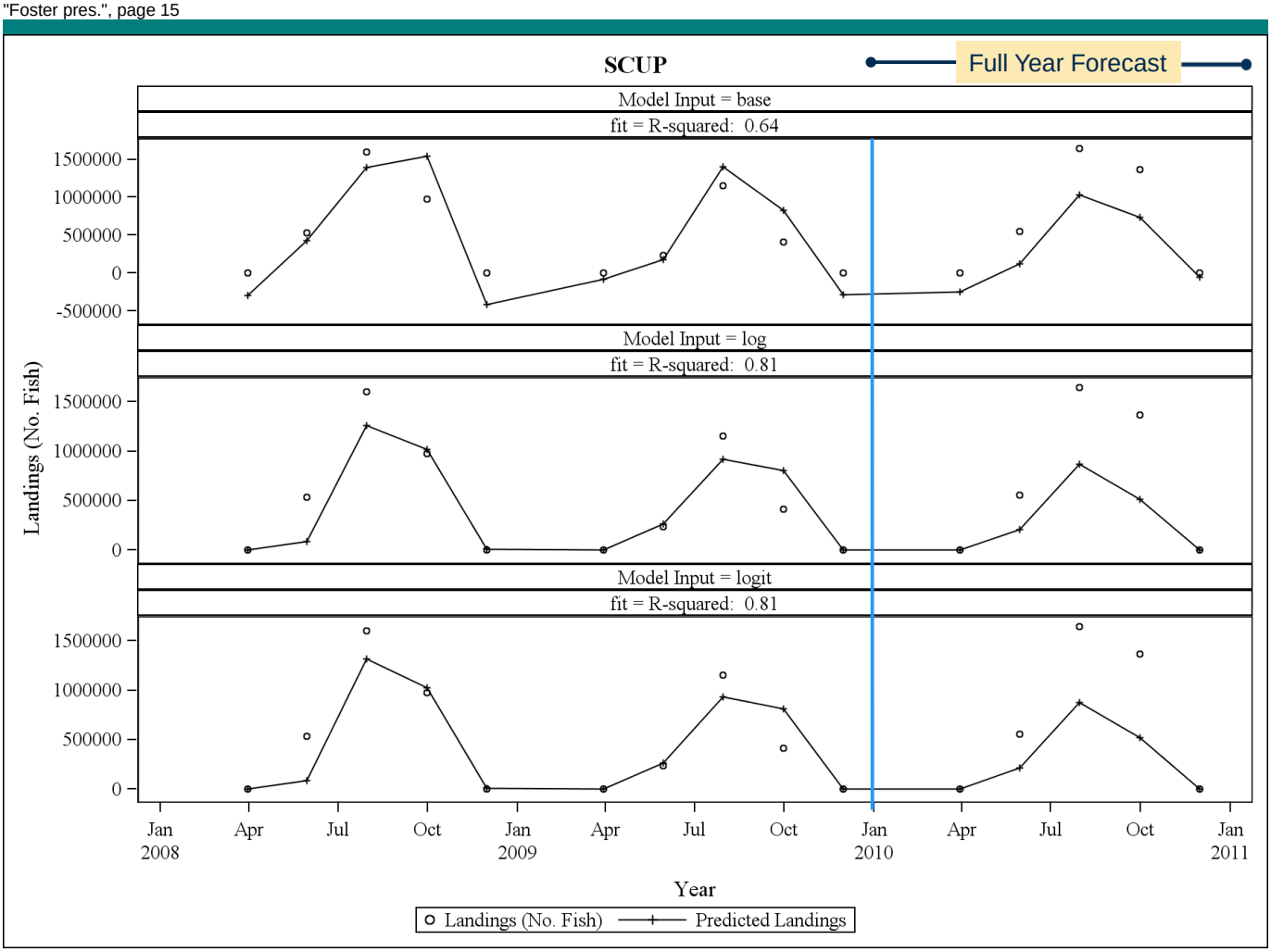
"Foster pres.", page 13



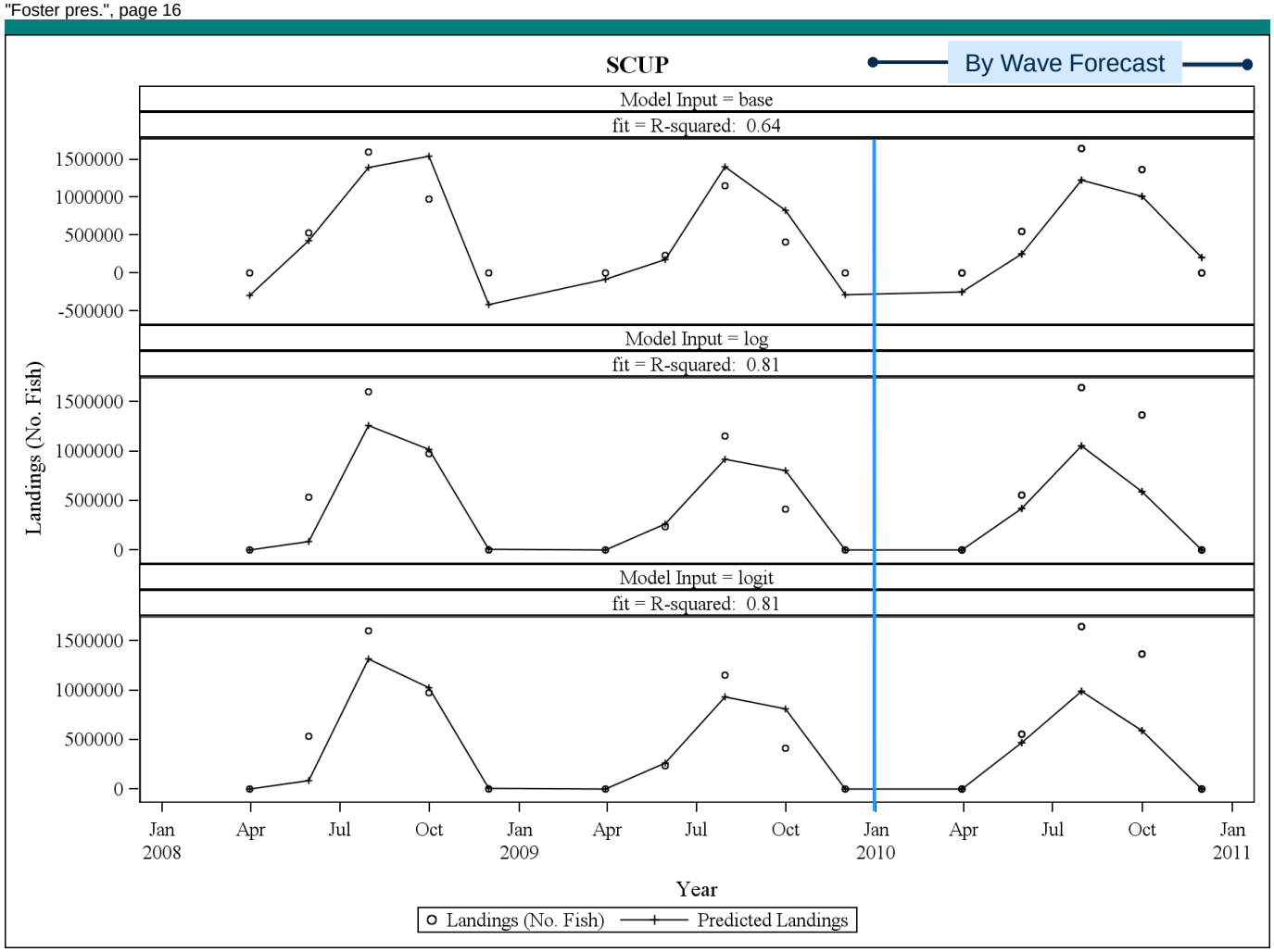
"Foster pres.", page 14



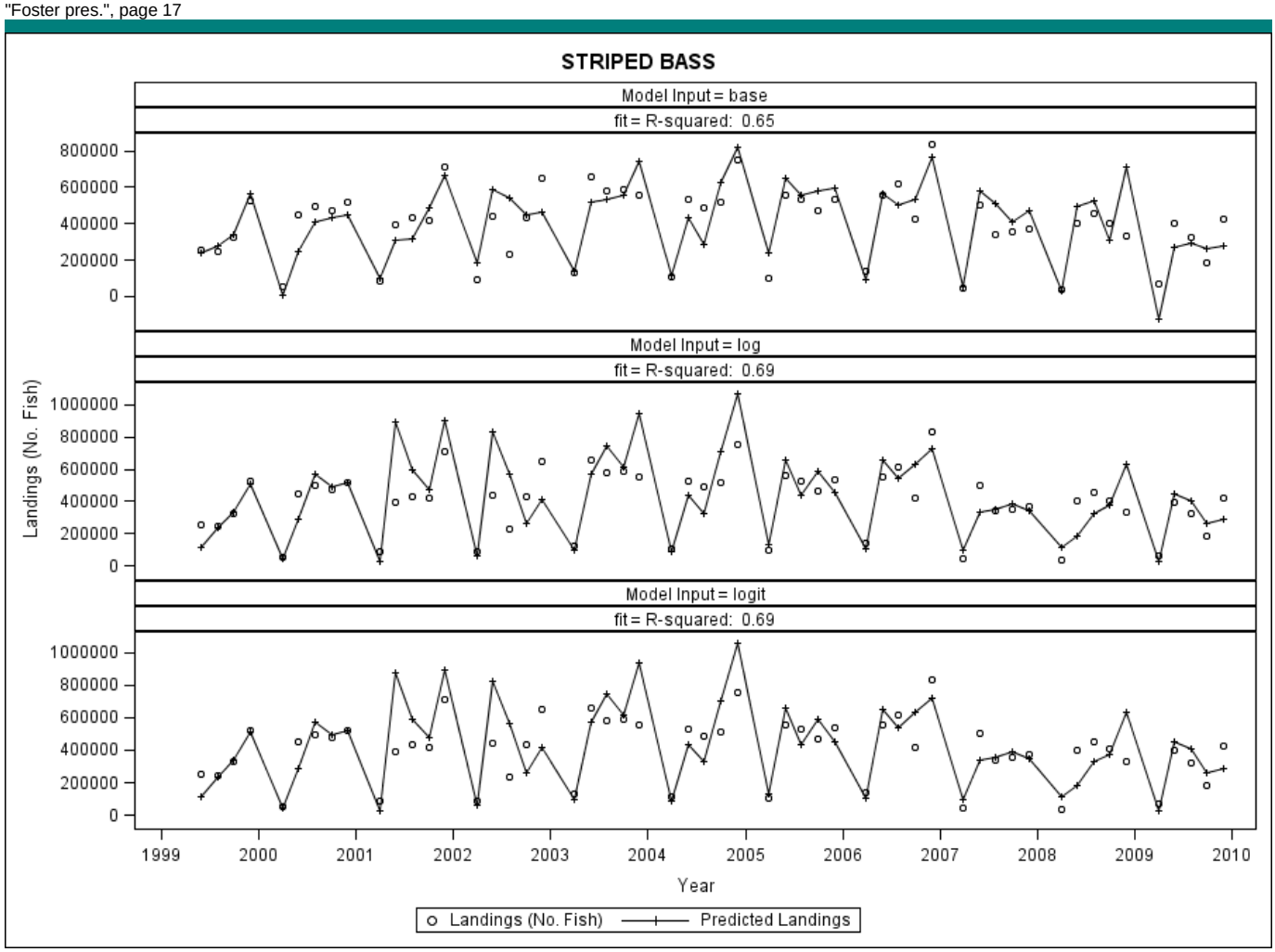
"Foster pres.", page 15



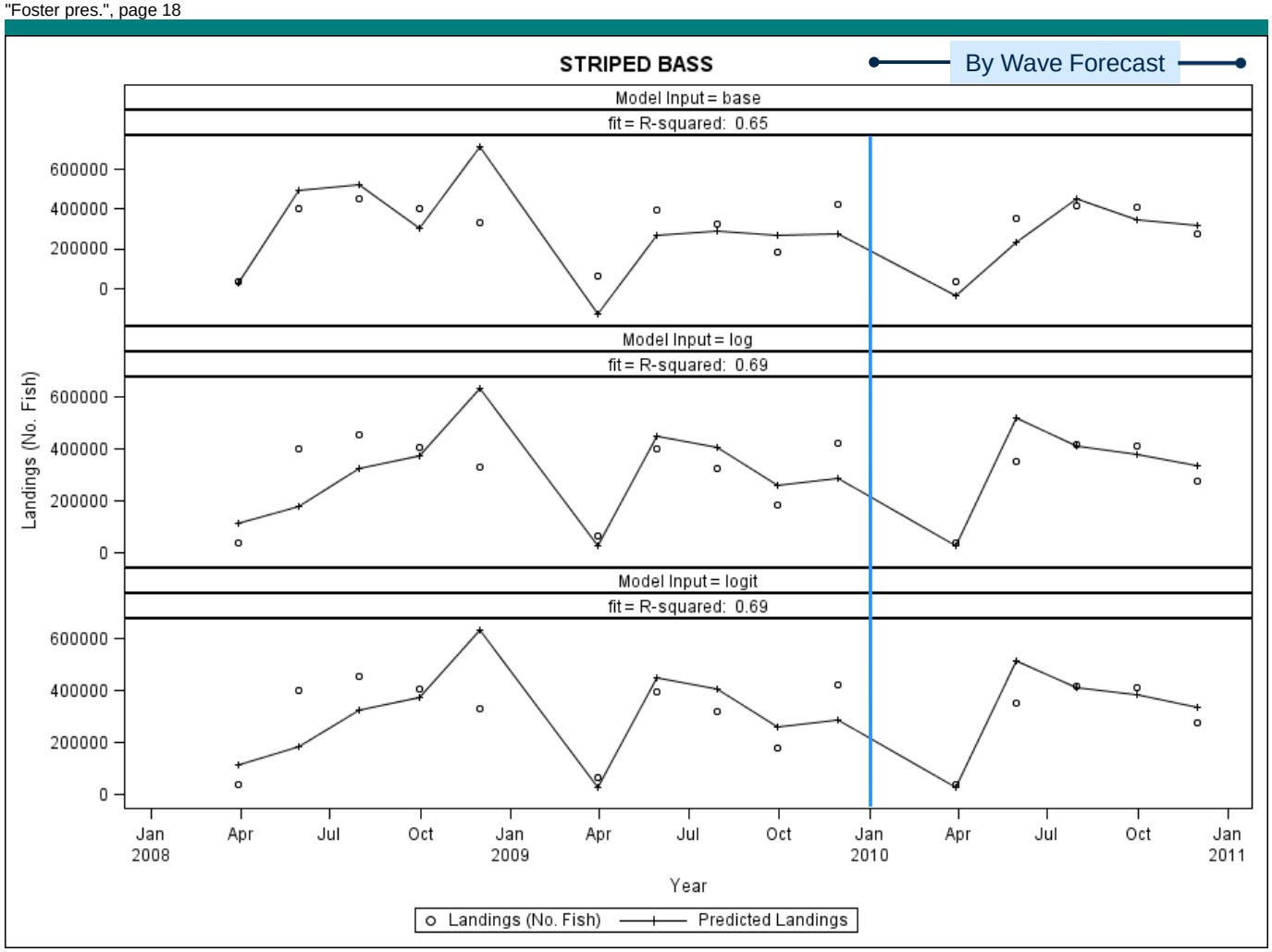
"Foster pres.", page 16



"Foster pres.", page 17



"Foster pres.", page 18



"Foster pres.", page 19

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# Future Development

- External correlates
  - Effort
  - Weather data: wind, precipitation, storm series
  - Economic data: fuel prices, state level gdp
  - Management regulations
  - Survey metrics
- Optimizing model specifications

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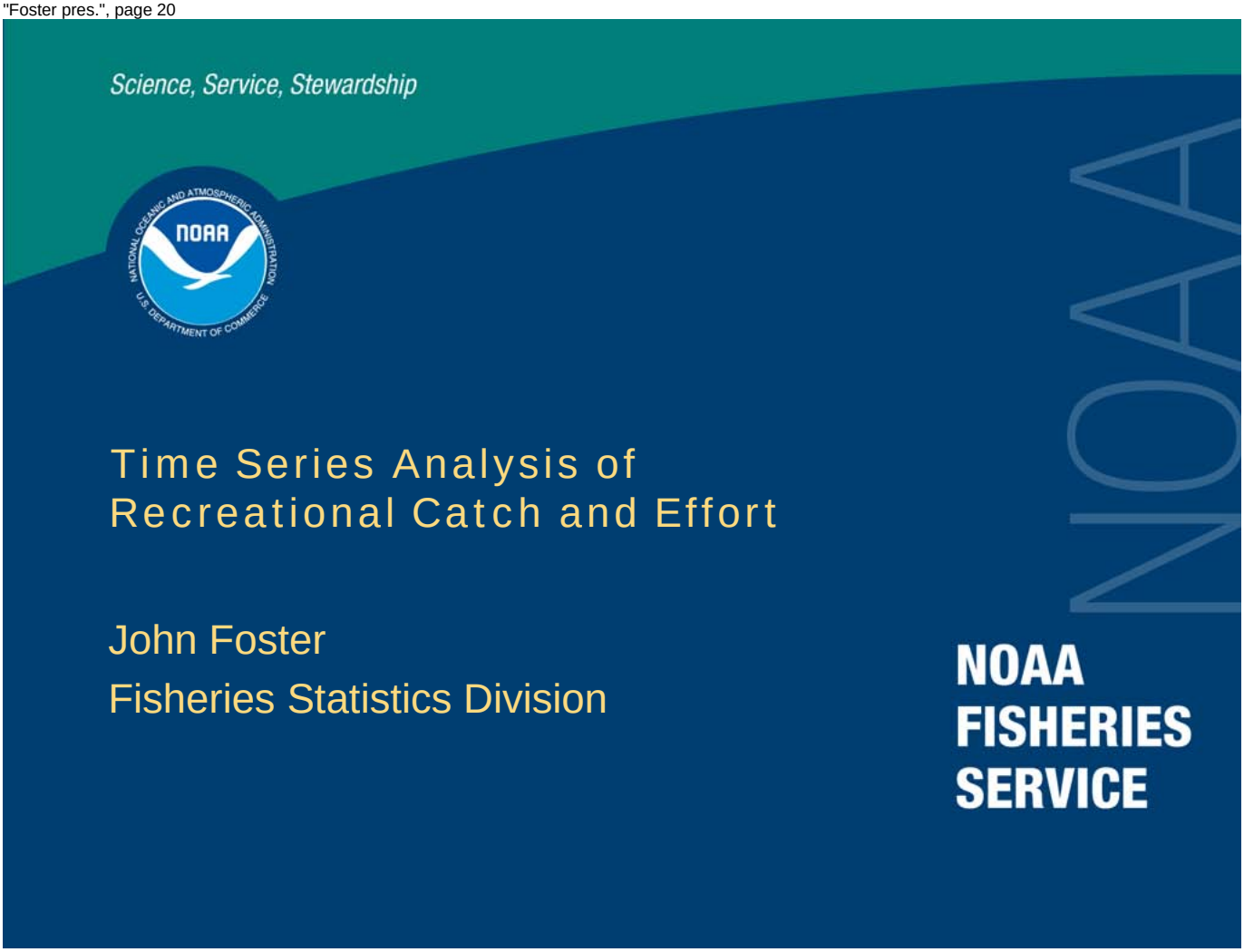
"Foster pres.", page 20



"Kellogg pres.", page 1

# Timeliness of Recreational Catch Data for the New England Fishery Management Council

Christopher Kellogg
New England Fishery Management Council
March 15, 2011

"Kellogg pres.", page 2

# NEFMC Rec Data Needs

1. To implement ACLs and AMs
   - GOM cod & GOM haddock
   - Data needed annually by fishing year (May – April) in mid-summer under current fishing year schedule
   - Method for estimating discards would be helpful
   - Wave 1 data needed for SNE

"Kellogg pres.", page 3

# NEFMC Rec Data Needs

2. Input into stock assessments
   - GOM cod, GOM haddock, GOM winter flounder, pollock, GB cod, GB haddock, SNE/MA winter flounder
   - Data needed by March
   - Specifications anticipated on a biannual schedule, but Council may initiate unanticipated adjustments

"Kellogg pres.", page 4

# Data Timeliness Issues

- At present, data quality improvement is more important than data timeliness.
- The NEFMC does not have in-season quota management, but it still might benefit from a one-month wave interval for wave 4 in terms of meeting implementation deadlines for ACLs and AMs.

"Mattes pres. ", page 1

# Oregon Recreational Groundfish Inseason Projection Model

Lynn Mattes (ODFW)

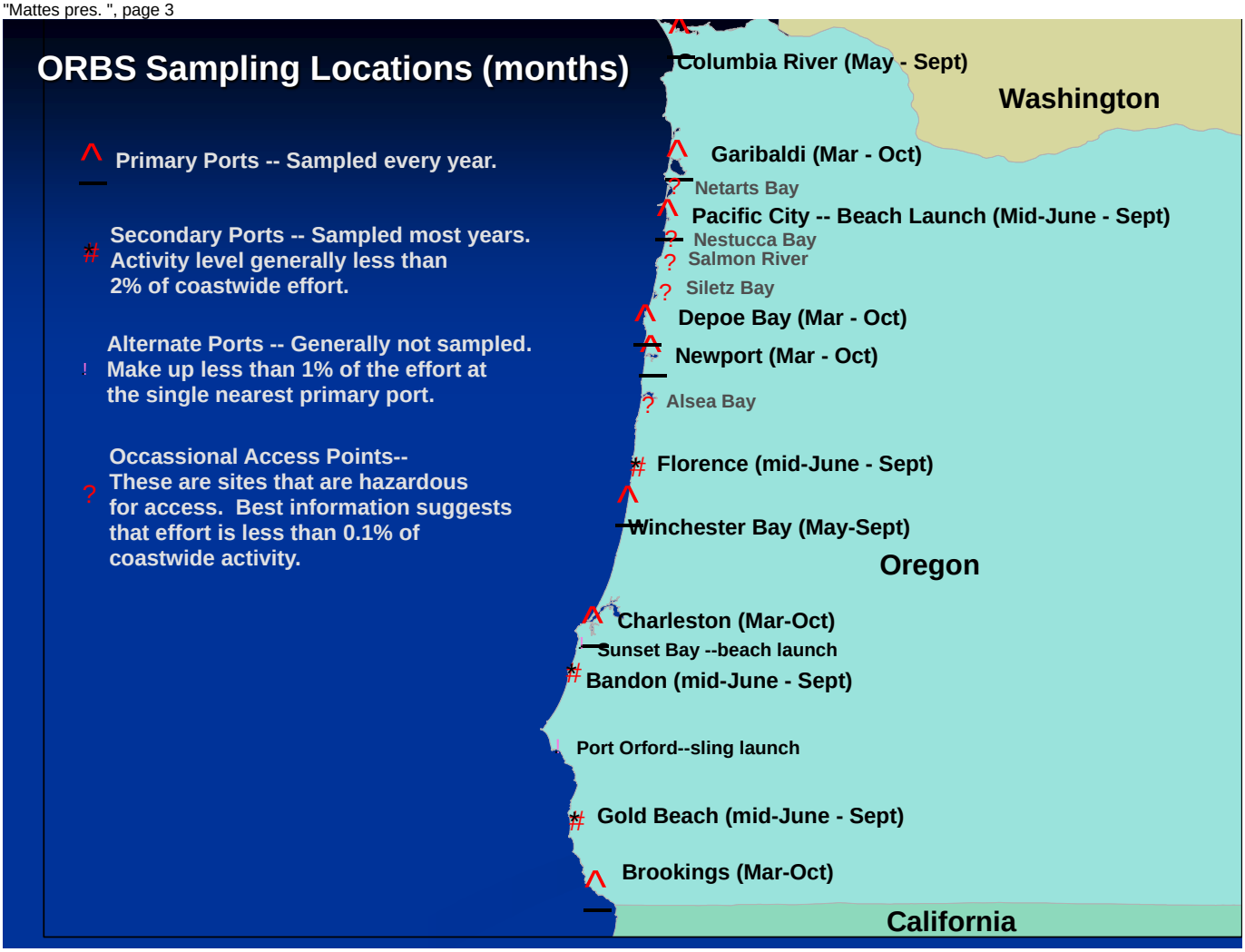
MRIP Data Timeliness Workshop

March 15-16, 2011

St. Petersburg, FL

"Mattes pres. ", page 2

"Mattes pres. ", page 3



"Mattes pres. ", page 4

# Inseason Tracking/Projection Model

Model Inputs—by month and species

- # fish landed
- # fish released
- Depth of released fish
- Discard mortality % for discarded species
- Average weight
- Get estimated weight (mt)

"Mattes pres. ", page 5

# Inseason Tracking/Projection Model

## Data flow from ORBS to fishery managers

- **Final** data on a month time lag
  - Get data for March during first week in May
- Can get preliminary data 4-5 days after month end
  - Get data for March during first week in April
  - Data has not been completely error checked
  - Usually not much difference between preliminary and final
- Can get *really rough* data on weekly or bi-weekly
  - Data is likely to change, but gives managers an idea about effort and catch composition
  - Problem—chase a lot of noise in estimates

"Mattes pres. ", page 6

# Inseason Tracking/Projection Model

- Compare cumulative to same time period previous 2 years to gauge how we are tracking
- Projection (prior to 2011)
  - (YTD observed)/(YTD Expected)* expected for month
  - Fill that in for the "observed" for remaining months
- Problems
  - Small sample sizes and large differences between observed and expected in early months (Jan-Mar) can provide inflated year end estimates

"Mattes pres. ", page 7

# Inseason Tracking/Projection Model

**Data through** **08/30/2009**

| | Black rf | | | Black & blue rf combo | | | Other nearshore rf | | | Cabezon | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Expected | Obs ▸ Proj | Proj cum | Expected | Obs ▸ Proj | Proj cum | Expected | Obs ▸ Proj | Proj cum | Expected | Obs ▸ Proj | Proj cum |
| Jan | 3.2 | 7.18 | 7.2 | 2.6 | 6.75 | 6.7 | 0.1 | 0.32 | 0.3 | 0.2 | 0.71 | 0.7 |
| Feb | 6.8 | 6.43 | 13.6 | 6.5 | 6.00 | 12.7 | 0.2 | 0.23 | 0.6 | 0.6 | 0.39 | 1.1 |
| Mar | 18.0 | 8.26 | 21.9 | 18.0 | 7.39 | 20.1 | 0.6 | 0.19 | 0.7 | 1.5 | 0.51 | 1.6 |
| Apr | 26.3 | 25.61 | 47.5 | 26.6 | 24.95 | 45.1 | 0.8 | 0.59 | 1.3 | 1.9 | 2.00 | 3.6 |
| May | 47.4 | 33.73 | 81.2 | 48.8 | 33.01 | 78.1 | 1.6 | 1.38 | 2.7 | 4.1 | 2.76 | 6.4 |
| June | 75.8 | 58.93 | 140.1 | 81.1 | 58.95 | 137.1 | 2.3 | 1.60 | 4.3 | 5.4 | 3.04 | 9.4 |
| July (5 wks) | 83.6 | 65.52 | 205.7 | 87.3 | 65.70 | 202.8 | 3.2 | 1.56 | 5.9 | 5.8 | 3.64 | 13.1 |
| Aug (4 wks) | 96.9 | 55.44 | 261.1 | 100.6 | 55.36 | 258.1 | 4.5 | 1.31 | 7.2 | 7.6 | 2.08 | 15.1 |
| Sept | 41.2 | 30.04 | 291.1 | 42.8 | 29.74 | 287.8 | 1.9 | 1.05 | 8.2 | 2.8 | 1.54 | 16.7 |
| Oct | 14.7 | 10.75 | 301.9 | 16.3 | 11.33 | 299.2 | 0.5 | 0.26 | 8.5 | 1.0 | 0.56 | 17.2 |
| Nov | 5.9 | 4.31 | 306.2 | 5.8 | 4.03 | 303.2 | 0.1 | 0.05 | 8.5 | 0.1 | 0.08 | 17.3 |
| Dec | 3.3 | 2.39 | 308.6 | 2.6 | 1.79 | 305.0 | 0.1 | 0.04 | 8.6 | 0.5 | 0.28 | 17.6 |
| Total | 423.1 | 308.6 | | 439.1 | 305.0 | | 15.7 | 8.6 | | 31.5 | 17.6 | |
| Catch Limit | 440.8 | | | 481.8 | | | 13.6 | | | 15.8 | | |
| **thru Aug** | 358.0 | 261.1 | | 371.6 | 258.1 | | 13.2 | 7.2 | | 27.1 | 15.1 | |
| | | 70% | | | 63% | | | 63% | | | 111% | |
| Yr-end projection | | **308.6** | 132.2 | | **305.0** | 176.8 | | **8.6** | 5.0 | | **17.6** | -1.8 |
| | | | over/under | | | over/under | | | over/under | | | over/under |

red font = projected (Proj):
Monthly projections were calculated using factor [(YTD obs/YTD expected)(expected)].

"Mattes pres. ", page 8

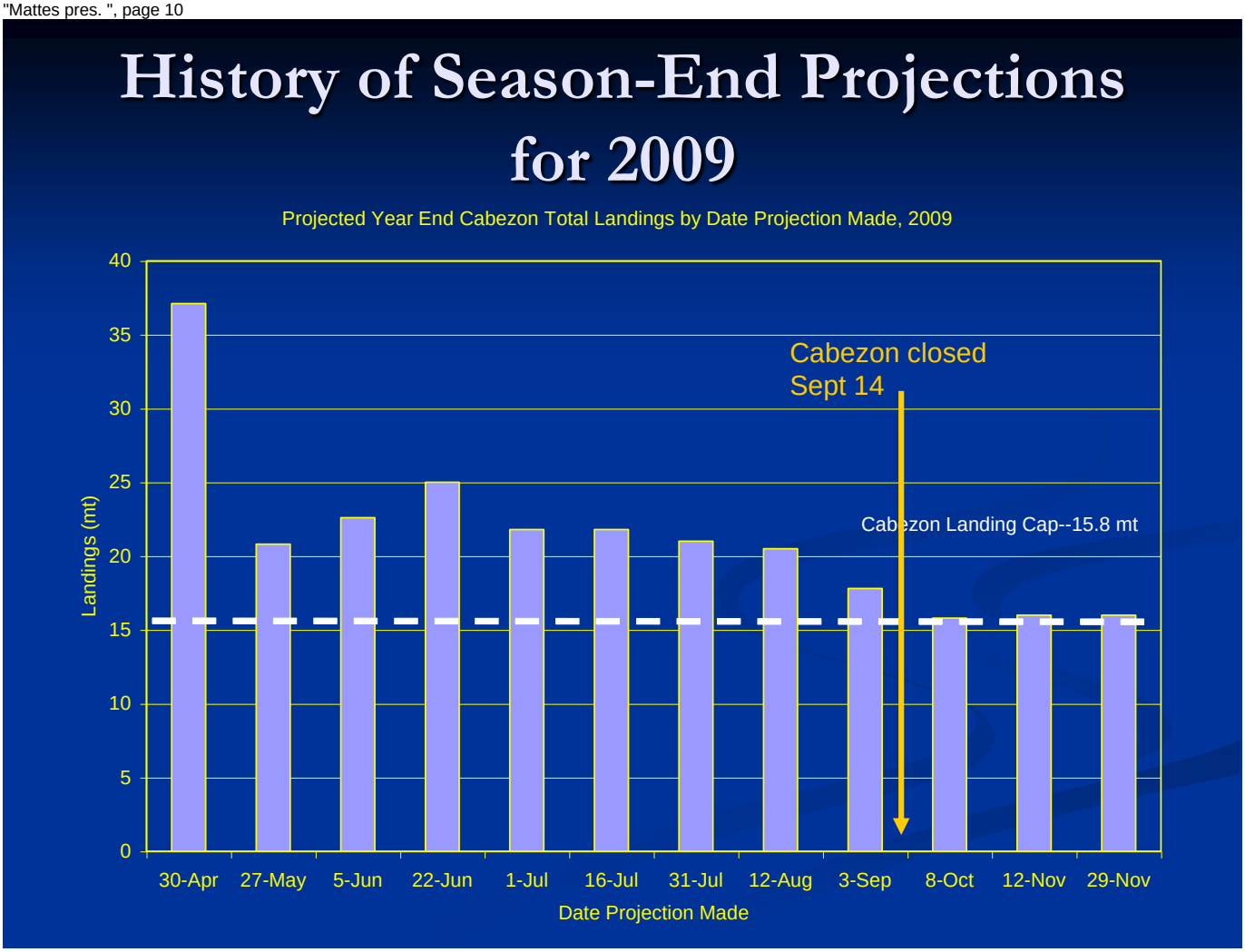
# History of Season-End Projections for 2009

**History of Revised Season Projections by Week for 2009**

| | Limit (mt) | Year-end projection (mt) made on | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30-Apr | 27-May | 5-Jun | 22-Jun | 1-Jul | 16-Jul | 31-Jul | 12-Aug | 3-Sep | 8-Oct | 12-Nov | 29-Nov |
| Black | 442 | 337 | 285.6 | 310.3 | 360.9 | 341.8 | 351.5 | 330.2 | 333.6 | 308.1 | 307.1 | 307.2 | 307.2 |
| Black+Blue | 482 | 333 | 276.6 | 305.0 | 351.1 | 336.0 | 344.5 | 325.7 | 328.2 | 304.8 | 306.2 | 306.2 | 306.2 |
| Yelloweye | 2.5 | 3.34 | 2.78 | 2.83 | 3.54 | 2.9 | 2.48 | 2.5 | 2.4 | 2.2 | 2.0 | 2.1 | 2.1 |
| ONSRF | 13.6 | 10.6 | 9.5 | 11.0 | 12.2 | 12.6 | 10.9 | 10.6 | 10.5 | 8.7 | 8.4 | 8.6 | 8.6 |
| Canary | 16 | 5.6 | 3.8 | 4.8 | 4.8 | 3.9 | 3.1 | 3.3 | 3.2 | 2.9 | 2.8 | 3.0 | 3.0 |
| Cabezon | 15.8 | 37.1 | 20.8 | 22.6 | 25.0 | 21.8 | 21.8 | 21.0 | 20.5 | 17.8 | 15.8 | 16.0 | 16.0 |
| Greenling | 5.2 | 5.1 | 4.4 | 5.0 | 4.9 | 5.1 | 5.5 | 5.3 | 5.0 | 4.2 | 4.0 | 4.1 | 4.1 |

"Mattes pres. ", page 9

"Mattes pres. ", page 10



"Mattes pres. ", page 11

# Inseason Tracking/Projection Model

- Projection (starting in 2011)
  - Examining 3 other projection methods
    - ETS (Econometric Time Series)
    - ARIMA (Autoregressive Integrated Moving Average)
    - ETS + ARIMA
  - Will still be doing "standard" method
  - See which one is most accurate
    - Hope for less chasing of "noise" during the season

"Mattes pres. ", page 12

# ARIMA

- Autoregressive Integrated Moving Average
- Developed by Box and Jenkins (1976)
- Form: ARIMA(p,d,q), where p=order of autoregressive term, d=degree of differencing involved in order to reach stationarity, q=order of moving average
- Used to forecast data where there are observable non-stationary process with clearly identifiable trends, such as a constant (d=0), linear (d=1) or quadratic (d=2) trend
- 3 main components:
  - Autoregressive component – each observation made up of a random error component and a linear combination of prior observation
  - Stationarity component – an autoregressive process must fall within a certain range to be stable (i.e. if p=1, then autoregressive parameter, $\varphi$, must be between -1 and 1), must difference data set to achieve stability
  - Moving average component – each observation made of random error and linear combination of prior random errors

"Mattes pres. ", page 13

# ETS

- Econometric Time Series
  - originally used to forecast revenue and stock price fluctuations
- Simplest equation $C_t = a + bY_{t-1} + e_t$ , where a and b = parameter estimates, Y= value from previous time step, $e_t$ = error term
- Model form (ETS (Error, Trend Type, Season Type))
- Implemented in R software, program automatically chooses exact model if not specified.
  - However, can be manipulated, ie. dampening, lower parameter bounds, optimization criteria, etc

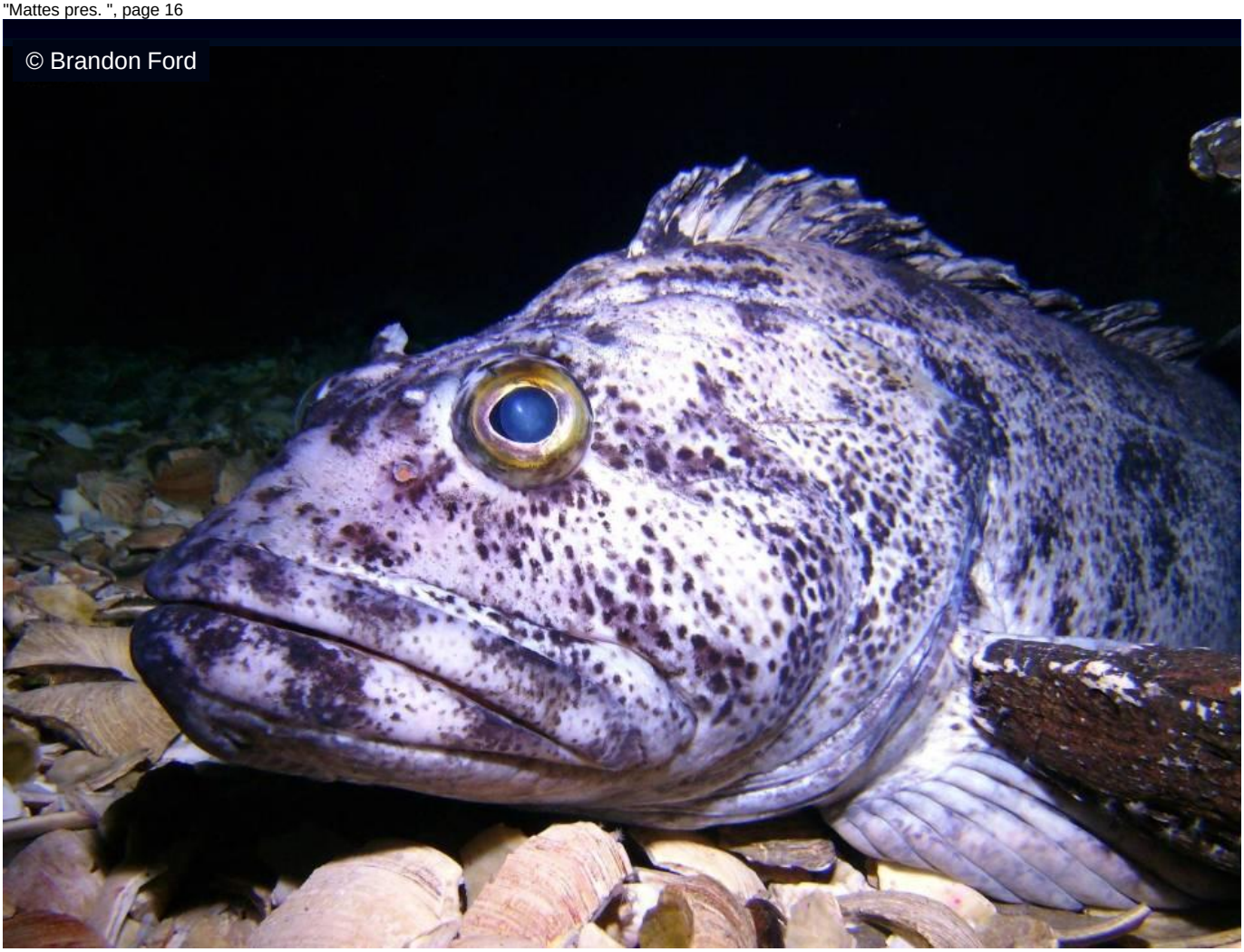
"Mattes pres. ", page 14

| | Black rockfish | | | | | Other rockfish spp. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **PROJECTIONS** | | | | | **PROJECTIONS** | | | |
| | default | ETS | ARIMA | ETS+ARIMA | | default | ETS | ARIMA | ETS+ARIMA |
| jan | 4.5 | 3.6 | 0.0 | 1.8 | jan | 0.0 | 0.0 | 0.1 | 0.0 |
| feb | 7.9 | 7.1 | 2.3 | 4.7 | feb | 0.3 | 0.3 | 0.3 | 0.3 |
| mar | 10.2 | 13.5 | 7.0 | 10.2 | mar | 0.2 | 0.3 | 0.5 | 0.4 |
| apr | 22.4 | 25.5 | 19.3 | 22.4 | apr | 0.3 | 0.6 | 0.7 | 0.7 |
| may | 35.8 | 37.1 | 36.5 | 36.8 | may | 1.8 | 1.5 | 1.5 | 1.5 |
| jun | 56.9 | 55.5 | 56.3 | 55.9 | jun | 2.0 | 1.9 | 1.8 | 1.9 |
| jul | 69.5 | 63.2 | 71.6 | 67.4 | jul | 2.7 | 2.2 | 2.1 | 2.2 |
| aug | 62.8 | 63.8 | 67.7 | 65.8 | aug | 2.2 | 2.4 | 2.1 | 2.3 |
| sep | 30.2 | 27.4 | 37.9 | 32.7 | sep | 1.0 | 1.2 | 1.1 | 1.1 |
| oct | 7.9 | 8.2 | 15.2 | 11.7 | oct | 0.0 | 0.1 | 0.3 | 0.2 |
| nov | 1.2 | 3.1 | 5.9 | 4.5 | nov | 0.0 | 0.1 | 0.2 | 0.1 |
| dec | 1.5 | 2.9 | 1.7 | 2.3 | dec | 0.0 | 0.1 | 0.1 | 0.1 |
| **2011** | **311.0** | **310.9** | **321.4** | **316.2** | **total** | **10.7** | **10.6** | **10.7** | **10.7** |
| Limit: | 440.8 | 440.8 | 440.8 | 440.8 | Limit: | 13.6 | 13.6 | 13.6 | 13.6 |
| % limit | 70.55% | 70.53% | 72.92% | 71.73% | % limit | 78.59% | 78.08% | 78.99% | 78.53% |
| current % | sum | sum | sum | sum | current % | sum | sum | sum | sum |

"Mattes pres. ", page 15

| | Yelloweye | | | | | Canary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Halibut Fishery** | default | ETS | ARIMA | ETS + ARIMA | | default | ETS | ARIMA | ETS + ARIMA |
| may | 0.143 | 0.261 | 0.312 | 0.287 | may | 0.112 | 0.184 | 0.133 | 0.158 |
| jun | 0.260 | 0.233 | 0.232 | 0.233 | jun | 0.202 | 0.147 | 0.111 | 0.129 |
| jul | 0.102 | 0.143 | 0.110 | 0.127 | jul | 0.094 | 0.098 | 0.069 | 0.084 |
| aug | 0.297 | 0.207 | 0.131 | 0.169 | aug | 0.322 | 0.162 | 0.147 | 0.155 |
| sept | 0.000 | 0.138 | 0.122 | 0.130 | sept | 0.000 | 0.124 | 0.067 | 0.096 |
| total | 0.802 | 0.982 | 0.907 | 0.945 | total | 0.730 | 0.715 | 0.528 | 0.622 |
| **Bottomfish Fishery** | default | ETS | ARIMA | ETS+ARIMA | | default | ETS | ARIMA | ETS+ARIMA |
| Jan | 0.075 | 0.000 | 0.077 | 0.039 | Jan | 0.074 | 0.005 | 0.000 | 0.003 |
| Feb | 0.078 | 0.012 | 0.091 | 0.052 | Feb | 0.166 | 0.043 | 0.062 | 0.053 |
| Mar | 0.040 | 0.076 | 0.105 | 0.091 | Mar | 0.120 | 0.146 | 0.181 | 0.163 |
| Apr | 0.064 | 0.090 | 0.096 | 0.093 | Apr | 0.185 | 0.223 | 0.326 | 0.274 |
| May | 0.107 | 0.342 | 0.215 | 0.279 | May | 0.473 | 0.423 | 0.574 | 0.498 |
| Jun | 0.303 | 0.270 | 0.254 | 0.262 | Jun | 0.438 | 0.378 | 0.643 | 0.510 |
| Jul | 0.248 | 0.180 | 0.203 | 0.192 | Jul | 0.600 | 0.438 | 0.722 | 0.580 |
| Aug | 0.225 | 0.283 | 0.200 | 0.242 | Aug | 0.483 | 0.480 | 0.473 | 0.477 |
| Sept | 0.084 | 0.114 | 0.108 | 0.111 | Sept | 0.188 | 0.141 | 0.234 | 0.188 |
| Oct | 0.178 | 0.066 | 0.120 | 0.093 | Oct | 0.143 | 0.067 | 0.023 | 0.045 |
| Nov | 0.006 | 0.002 | 0.060 | 0.031 | Nov | 0.029 | 0.005 | 0.000 | 0.003 |
| Dec | 0.016 | 0.000 | 0.067 | 0.034 | Dec | 0.017 | 0.000 | 0.000 | 0.000 |
| total | 1.421 | 1.435 | 1.596 | 1.516 | total | 2.916 | 2.350 | 3.238 | 2.794 |
| **Total** | | | | | **Total** | | | | |
| Jan | 0.075 | 0.000 | 0.077 | 0.039 | Jan | 0.074 | 0.005 | 0.000 | 0.003 |
| Feb | 0.078 | 0.012 | 0.091 | 0.052 | Feb | 0.166 | 0.043 | 0.062 | 0.053 |
| Mar | 0.040 | 0.076 | 0.105 | 0.091 | Mar | 0.120 | 0.146 | 0.181 | 0.163 |
| Apr | 0.064 | 0.090 | 0.096 | 0.093 | Apr | 0.185 | 0.223 | 0.326 | 0.274 |
| May | 0.250 | 0.603 | 0.527 | 0.565 | May | 0.585 | 0.607 | 0.707 | 0.657 |
| Jun | 0.563 | 0.503 | 0.486 | 0.495 | Jun | 0.640 | 0.525 | 0.754 | 0.640 |
| Jul | 0.350 | 0.323 | 0.313 | 0.318 | Jul | 0.693 | 0.537 | 0.791 | 0.664 |
| Aug | 0.522 | 0.490 | 0.331 | 0.411 | Aug | 0.805 | 0.643 | 0.620 | 0.631 |
| Sept | 0.084 | 0.252 | 0.230 | 0.241 | Sept | 0.188 | 0.265 | 0.302 | 0.283 |
| Oct | 0.178 | 0.066 | 0.120 | 0.093 | Oct | 0.143 | 0.067 | 0.023 | 0.045 |
| Nov | 0.006 | 0.002 | 0.060 | 0.031 | Nov | 0.029 | 0.005 | 0.000 | 0.003 |
| Dec | 0.016 | 0.000 | 0.067 | 0.034 | Dec | 0.017 | 0.000 | 0.000 | 0.000 |
| total | 2.222 | 2.417 | 2.503 | 2.460 | total | 3.646 | 3.065 | 3.766 | 3.416 |
| Limit: | 2.3 | 2.3 | 2.3 | 2.3 | Limit: | 7 | 7 | 7 | 7 |
| **% limit** | **96.61%** | **105.09%** | **108.83%** | **106.96%** | **% limit** | **52.09%** | **43.79%** | **53.80%** | **48.79%** |
| current ' | sum | sum | sum | sum | current ' | sum | sum | sum | sum |

"Mattes pres. ", page 16



Pacific Council Recreational Status

Russell Porter, PSMFC RecFIN Technical Committee Chairman

PSMFC and its member states commenced conducting the MRFSS in 1979 and continued to do so until 2003. In these years, salmon trips were excluded from the MRFSS Intercept sampling as the states have done biweekly soft estimates of salmon catch for a number of decades. During the MRFSS sampling period 2-month wave estimates for catch and effort were made. During the 1980's through the mid 1990's, the recreational catch was not used much in Council management decisions.

In 2003 in Washington and Oregon, MRFSS sampling was discontinued to move forward with expanded state sampling making monthly catch and effort estimates. To respond to Council Management needs for recreational fisheries. The MRFSS was replaced with the Oregon Recreational Boat Survey (ORBS), and in Washington with the Ocean Sampling Program (OSP). In 2004, California followed suit and replaced the MRFSS with the new California Recreational Fisheries Survey (CRFS). The three state sampling programs use a mix of daily exit counts or tallies of all boats at launch ramps and the electronic license frames that are in place in all three states along with increased intercept sampling rates compared with the MRFSS.

Pacific Council Management for Groundfish and salmon necessitate monthly in-season monitoring of catch against Harvest Goals and Guidelines set in the management plans. Catch Projections forward to the end of the year are also utilized to provide for timely action prior to exceeding any Harvest Goals. Discarded fish are also incorporated into the total removals by applying mortality rates based on depth of catch. Challenges include identification of discarded fish not seen by the sampler as well as appropriate mean weights to convert total harvest to Metric Tons.

Costs for sampling recreational fisheries have increased four-fold over the MRFSS costs, and some shore and man-made modes are currently not sampled in Oregon and Washington because of a lack of funds Sampling concentrates on ocean boat modes (PR and PC) in all three states for support of Council management.

"Ruccio pres.", page 1

Science, Service, Stewardship

# Recreational Data Timeliness Case Study: Northeast Region Black Sea Bass

Mike Ruccio, Sustainable Fisheries Division
NOAA Fisheries Service, Northeast Regional Office

Recreational Data Timeliness Workshop
March 15-16, 2011


NOAA FISHERIES SERVICE

"Ruccio pres.", page 2

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# Northern Black Sea Bass Stock (*Centropristis striata*) General Background:

- Cape Hatteras, NC to U.S.-Canada Border
- Structure-oriented, protogynous hermaphrodite
- Temporal and spatial variability in distribution and harvest
- Joint management by the Atlantic States Marine Fisheries Commission (ASMFC) and Mid-Atlantic Fishery Management Council (MAFMC)

"Ruccio pres.", page 3

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# Primary Data Timeliness Issue:

- Inseason fishery performance monitoring:
  - Ability to monitor landings relative to established recreational harvest limit during fishing season
  - Modify measures to slow harvest, as needed, or close fishery when harvest limit is reached

*19" Female Black Sea Bass, Cape Cod Massachusetts*
*Photo courtesy of Mark Terceiro, NEFSC*

"Ruccio pres.", page 4

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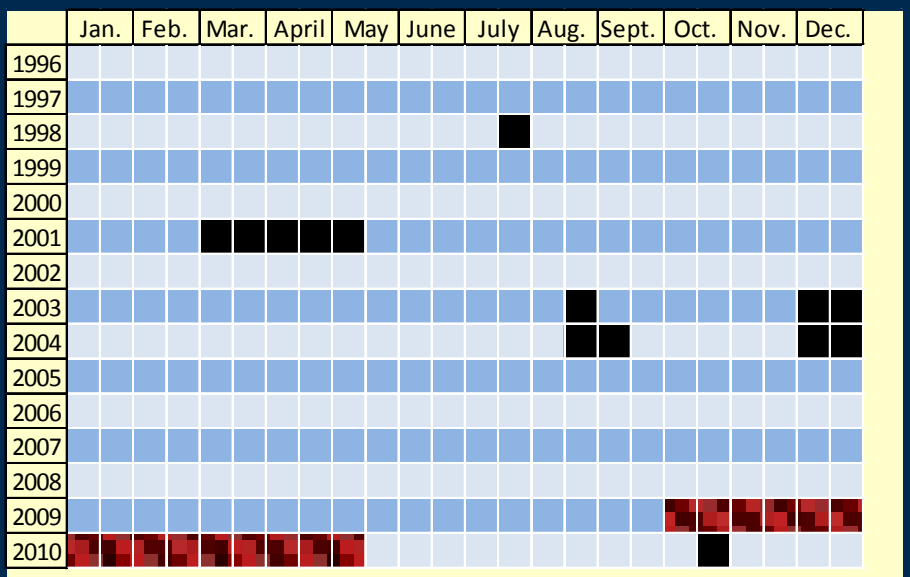
# Inseason Fishery Performance Monitoring

## Recreational fishing seasons, 1996-2010




Legend:

and =Open Periods

= Closed Periods

= Emergency Inseason Closure

*Photo courtesy of Gary Shepherd, NEFSC*

"Ruccio pres.", page 5

Photo courtesy of Gary Shepherd, NEFSC

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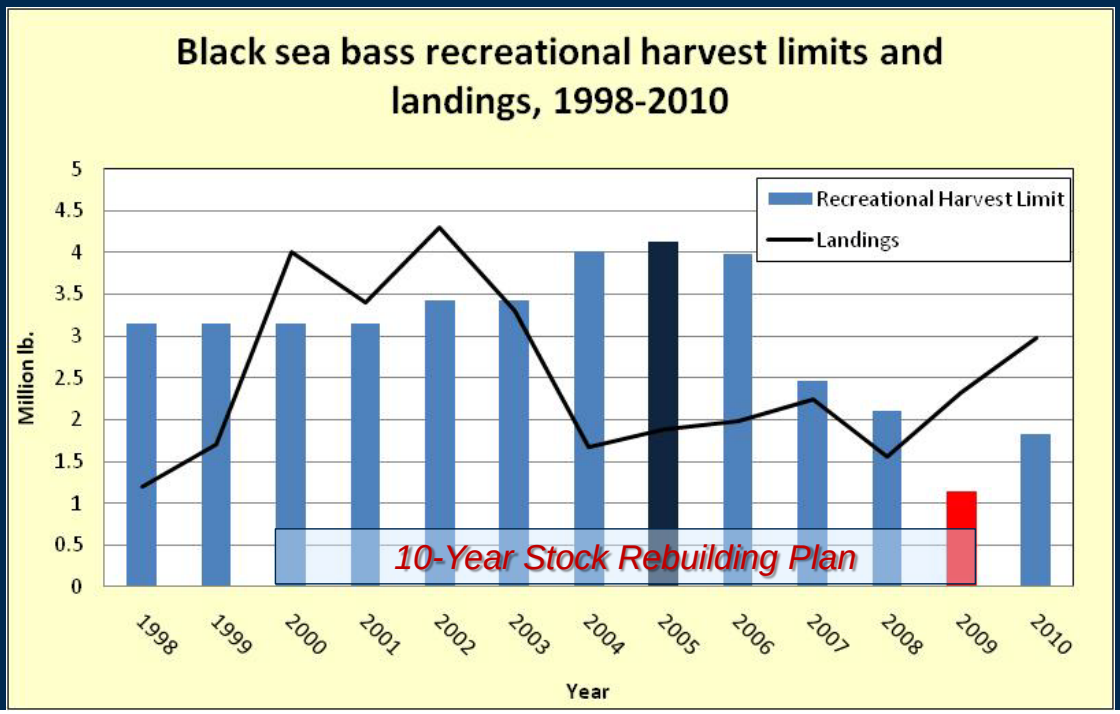
# Inseason Fishery Performance Monitoring



"Ruccio pres.", page 6

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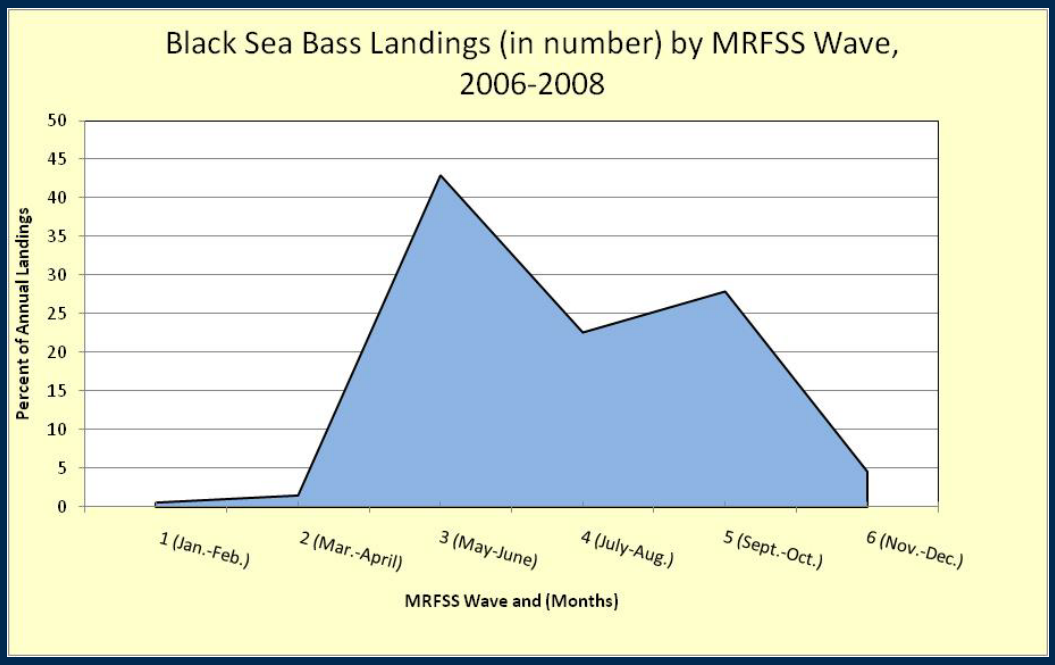
# Inseason Fishery Performance Monitoring




"Ruccio pres.", page 7

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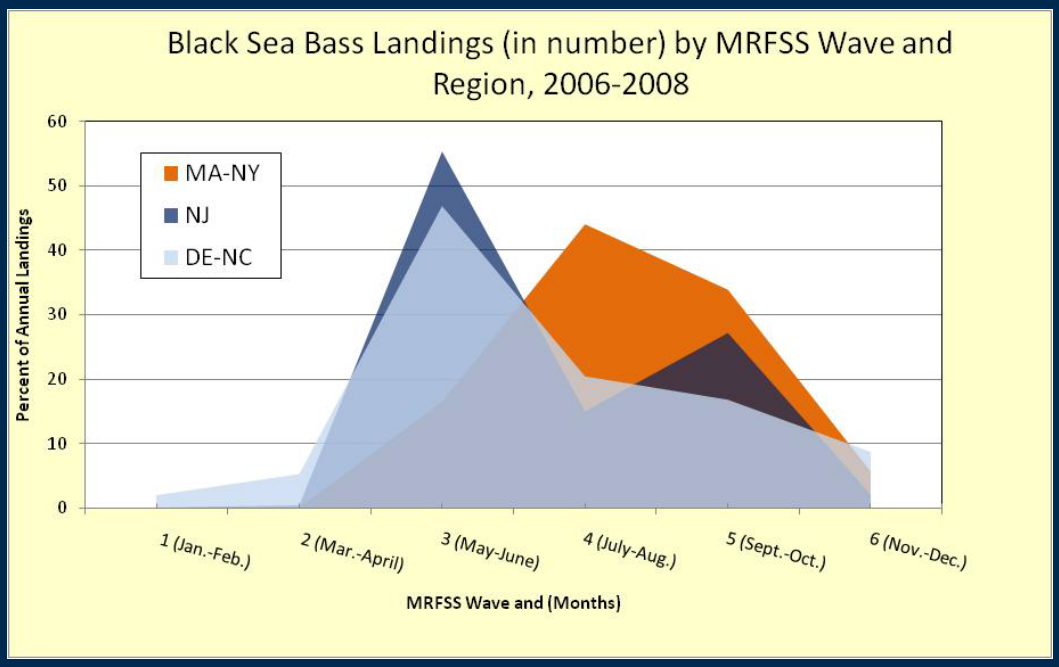
# Inseason Fishery Performance Monitoring




"Ruccio pres.", page 8

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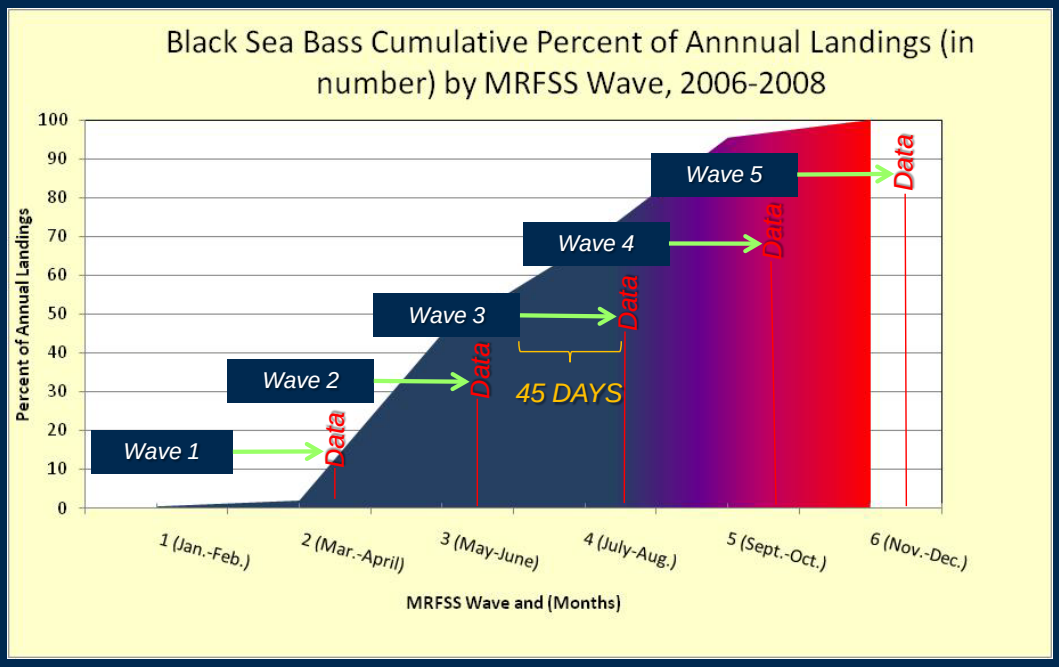
# Inseason Fishery Performance Monitoring




"Ruccio pres.", page 9

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# Inseason Fishery Performance Monitoring—Issues and Challenges

- Current data schedule provides two meaningful but untimely opportunities to assess fishery performance
- Significant pulse of landings in Wave 3 (May-June) but not a reliable predictor of Waves 4-6
- Data schedule (45 day lag from end of waves) makes reactive management difficult for Waves 4 and 5

"Ruccio pres.", page 10

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# Inseason Fishery Performance Monitoring—2009 Emergency Closure

- Wave 3 (May-June) data, available mid-August, indicated 89 percent of the 1.14 million lb recreational harvest limit (quota) had been landed
- Significant landings historically occur in Waves 4-6, averaging 55 percent of annual coastwide harvest
- *Projected* landings for Waves 4-6 utilized, indicating potential overage of double or triple the landing limit
- *Actual* landings for 2009 were double the recreational harvest limit

Photo Courtesy of M. Terceiro, NEFSC

"Ruccio pres.", page 11

NOAA FISHERIES SERVICE

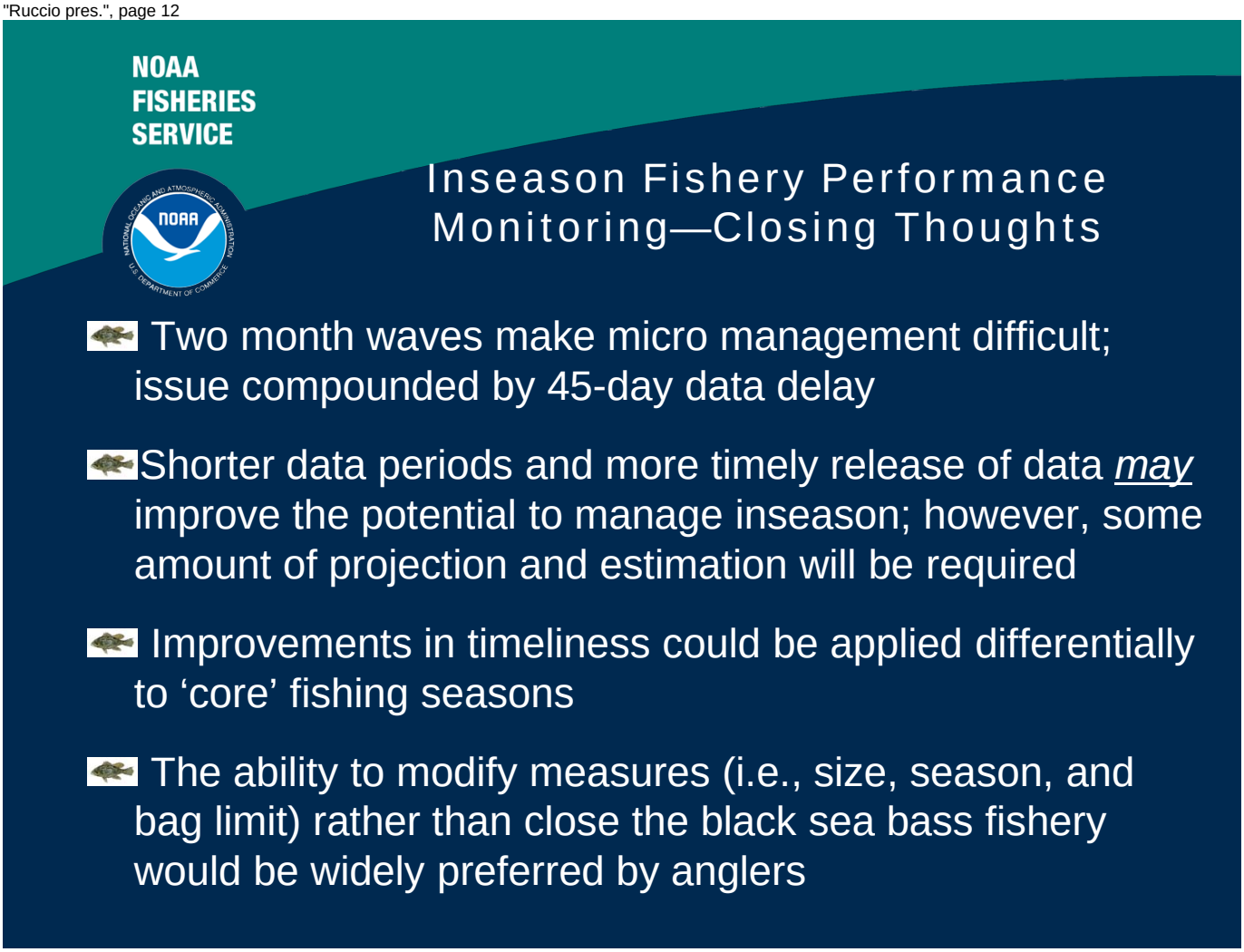
# Inseason Fishery Performance Monitoring—2009 Emergency Closure

- Closure was unprecedented in the Northeast Region
- Highly controversial action; applied to Federal waters only
- Closure challenged in Federal court, recent decision in favor of NMFS

Photo Courtesy of M. Terceiro, NEFSC

Photo Courtesy of M. Terceiro, NEFSC

"Ruccio pres.", page 12



"Ruccio pres.", page 13

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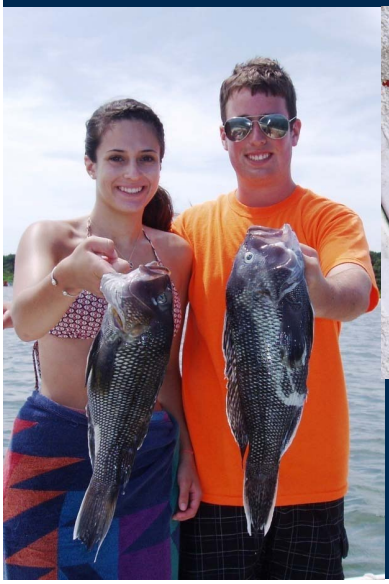
# Questions?



*Photos courtesy of Gary Shepherd and Mark Terceiro, Northeast Fisheries Science Center*

"Salz & Rossetti pres.", page 1

NOAA FISHERIES SERVICE

# Options for Improving Recreational Data Timeliness: Reducing Lag Time

## NOAA Fisheries Statistics Division

"Salz & Rossetti pres.", page 2

NOAA FISHERIES SERVICE

# Background

- Marine Recreational Fisheries Statistics Survey (MRFSS)
  - covers Atlantic and Gulf Coasts (except TX), PR, HI
  - complementary survey design
    - telephone survey: Coastal Household Telephone Survey
      For-Hire Survey
    - Intercept survey : Access Point Angler Intercept Survey
- Other Programs
  - Large Pelagics Survey
  - Southeast Headboat Survey
  - Texas
  - California
  - Washington
  - Oregon

"Salz & Rossetti pres.", page 3

NOAA FISHERIES SERVICE

# MRFSS/MRIP Catch Estimates

## entities involved

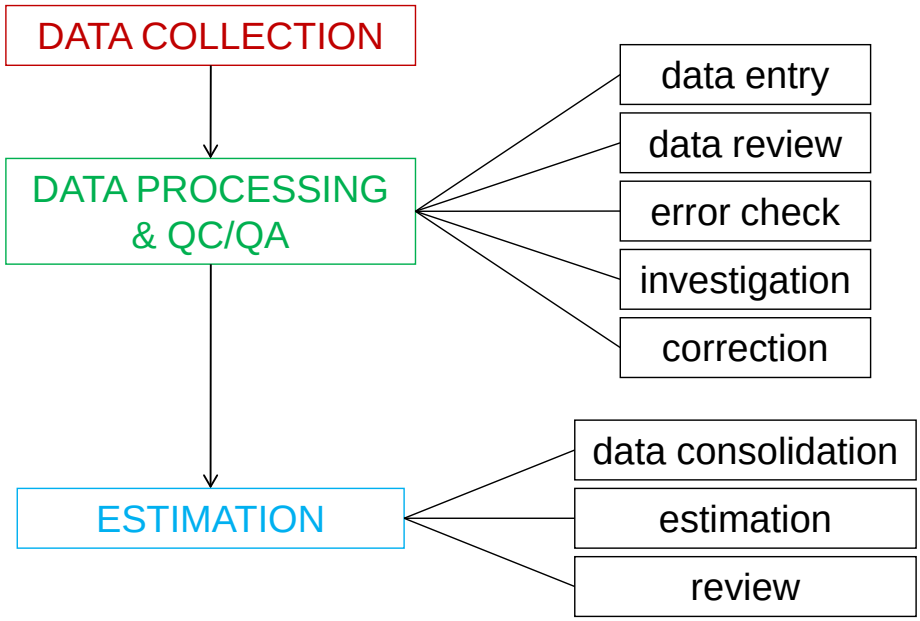
- Contractors
  - o Quantech (For-Hire)
  - o ICF Macro Burlington (Intercept)
  - o ICF Macro New York (Phone)
- State Agencies
  - o For-Hire Phone: ME, NC, GA, FL, AL, MS, LA
  - o For-Hire Logbook: MD
  - o Dockside Intercepts: ME, NH, CT, NC, GA, FL, AL, MS, LA
- GSMFC
- NOAA Fisheries Statistics Division
- Other

"Salz & Rossetti pres.", page 4

NOAA FISHERIES SERVICE

# Basic Process

## from data collection to wave estimates



"Salz & Rossetti pres.", page 5

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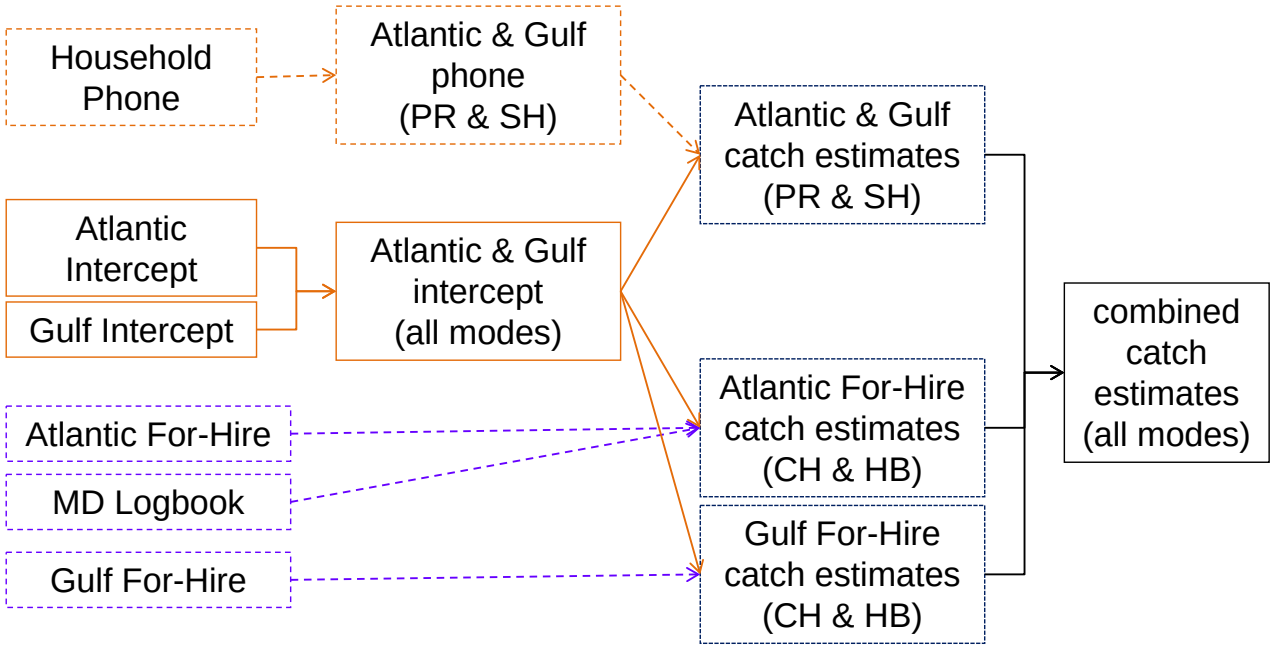
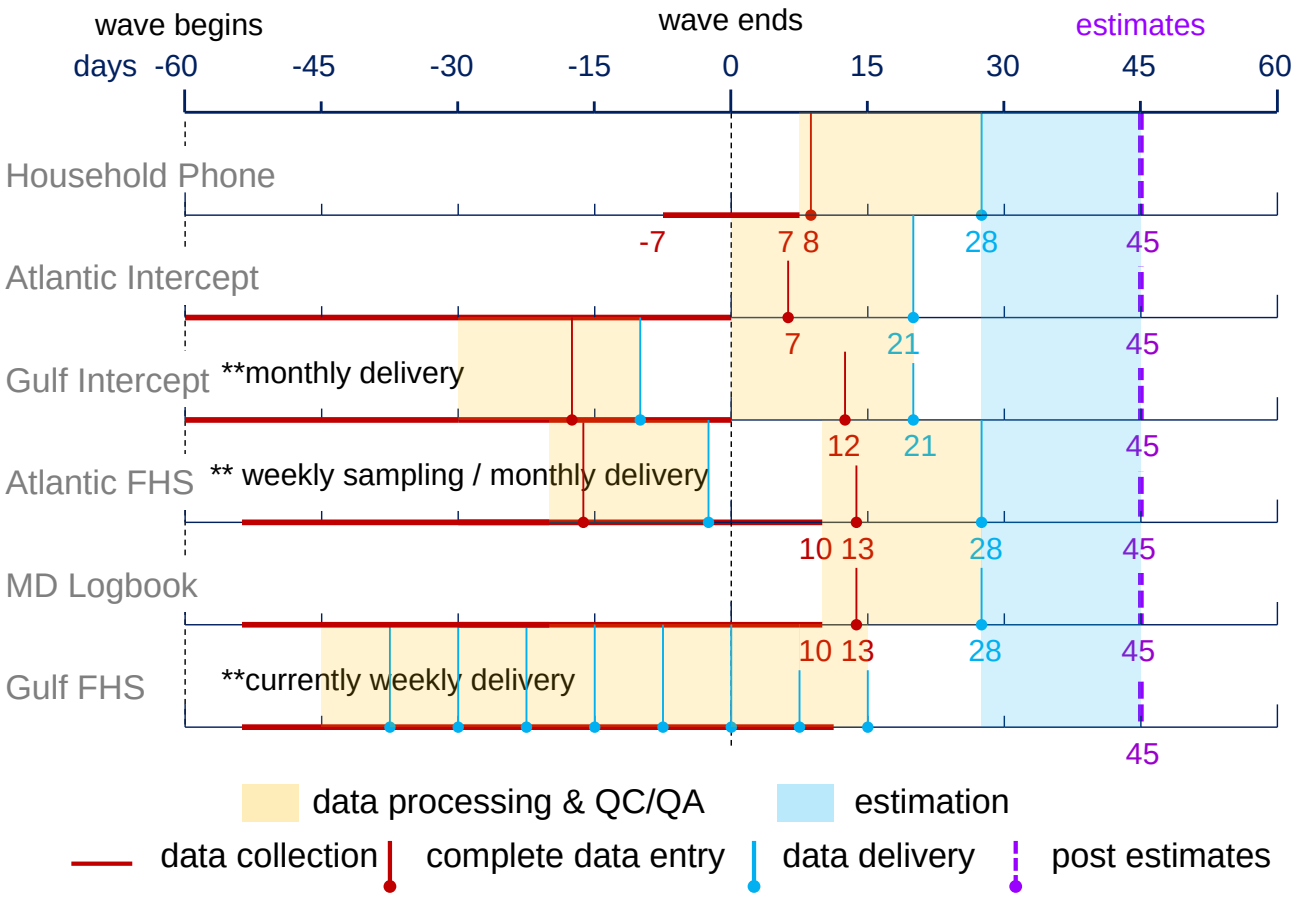
# Basic Components

## of wave estimates



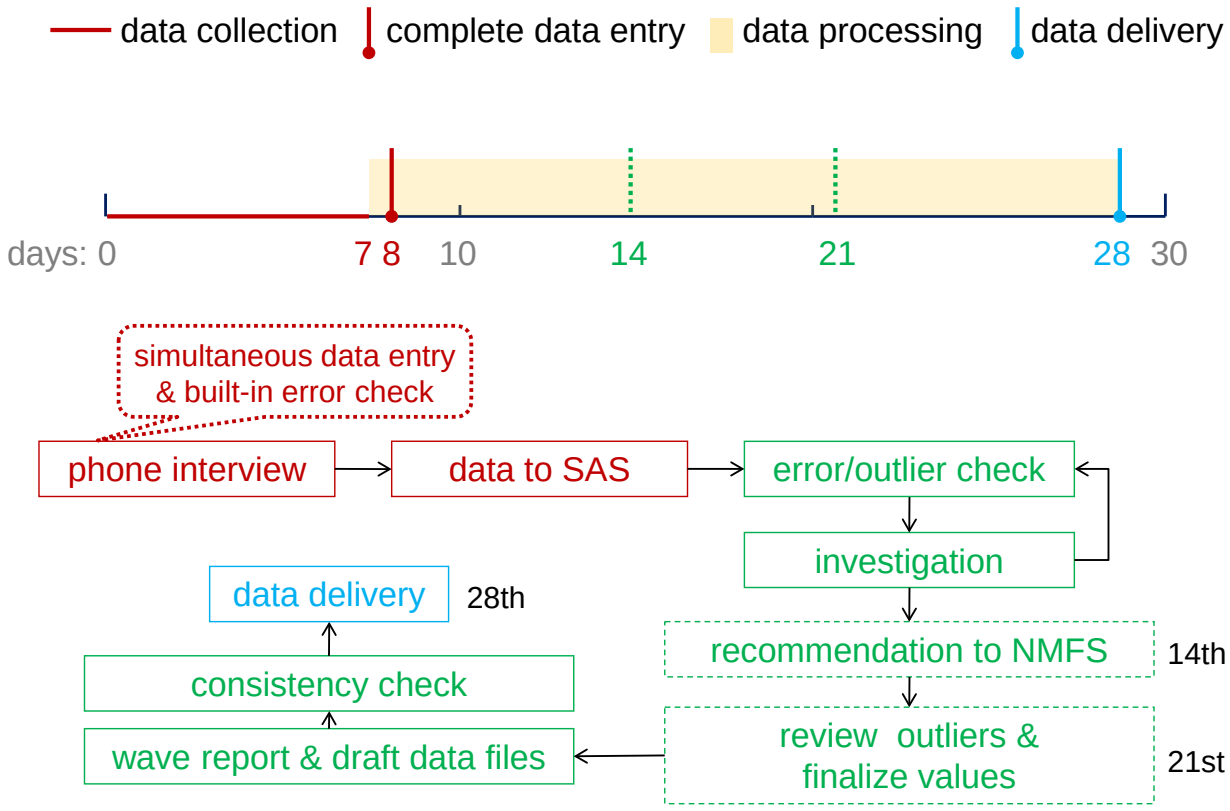
"Salz & Rossetti pres.", page 6

# MRFSS timelines…



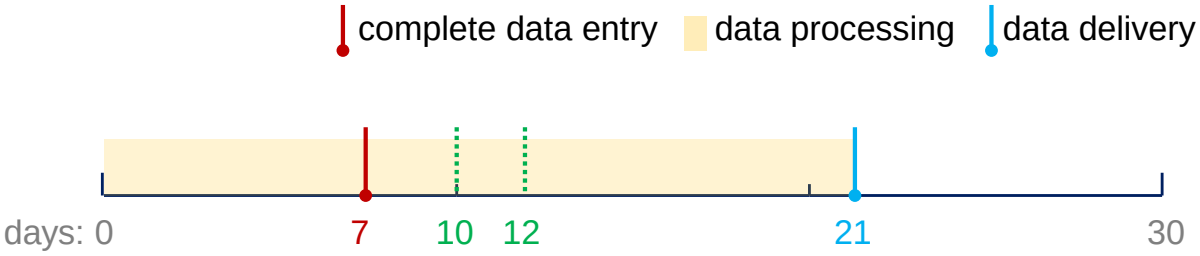
"Salz & Rossetti pres.", page 7

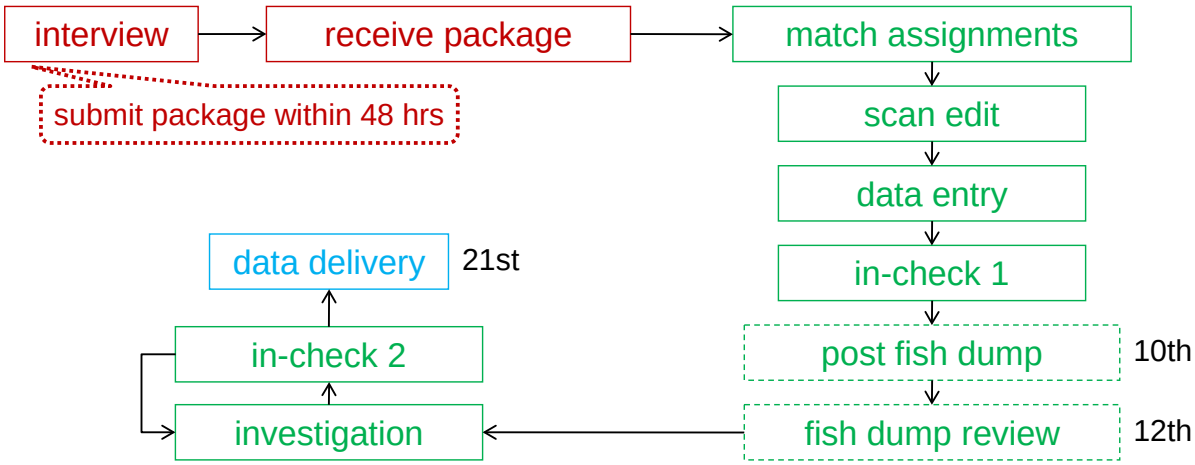
# Household Telephone Survey Data



"Salz & Rossetti pres.", page 8

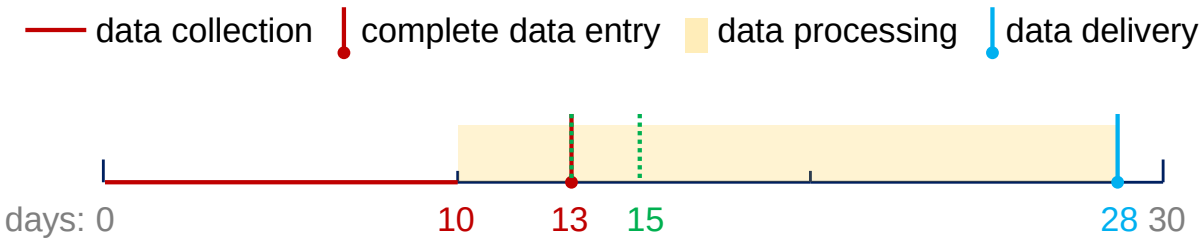
# Atlantic Intercept Data

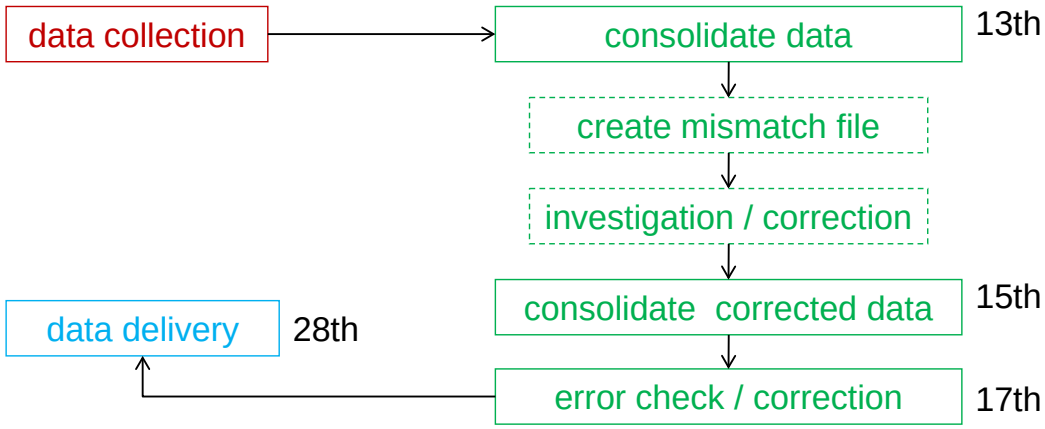


"Salz & Rossetti pres.", page 9

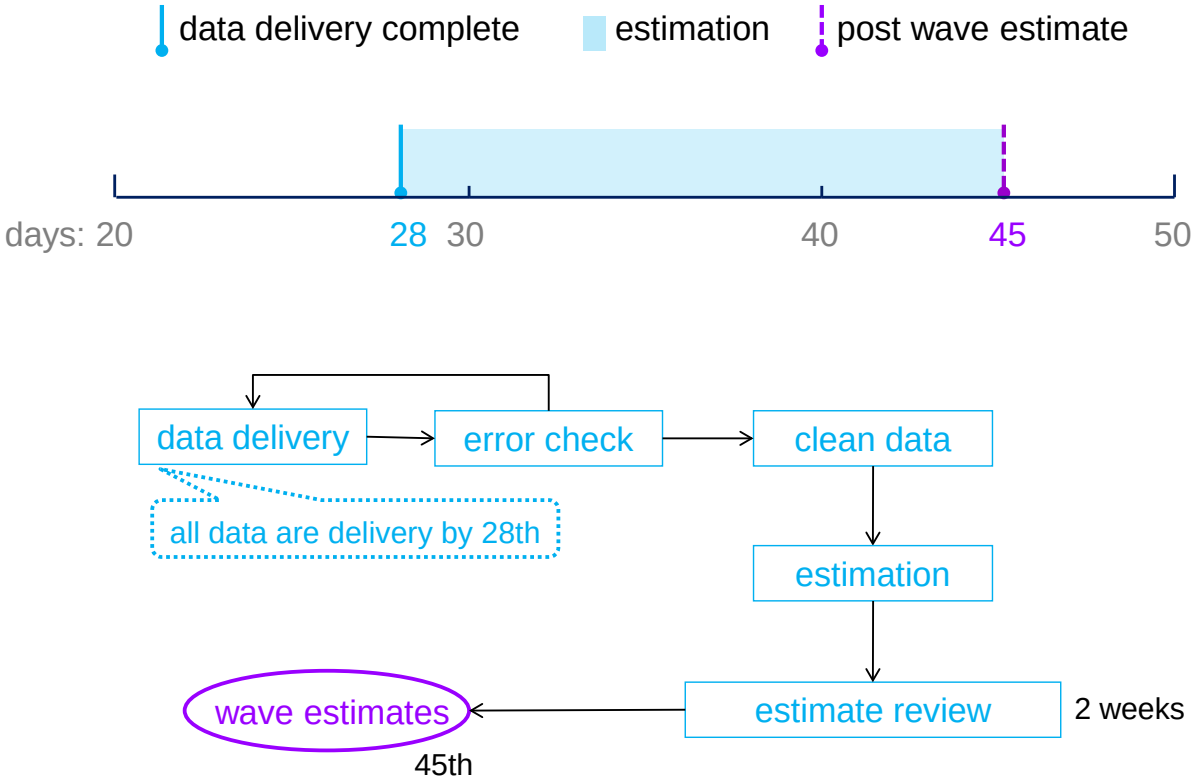
# Atlantic For Hire Survey Data



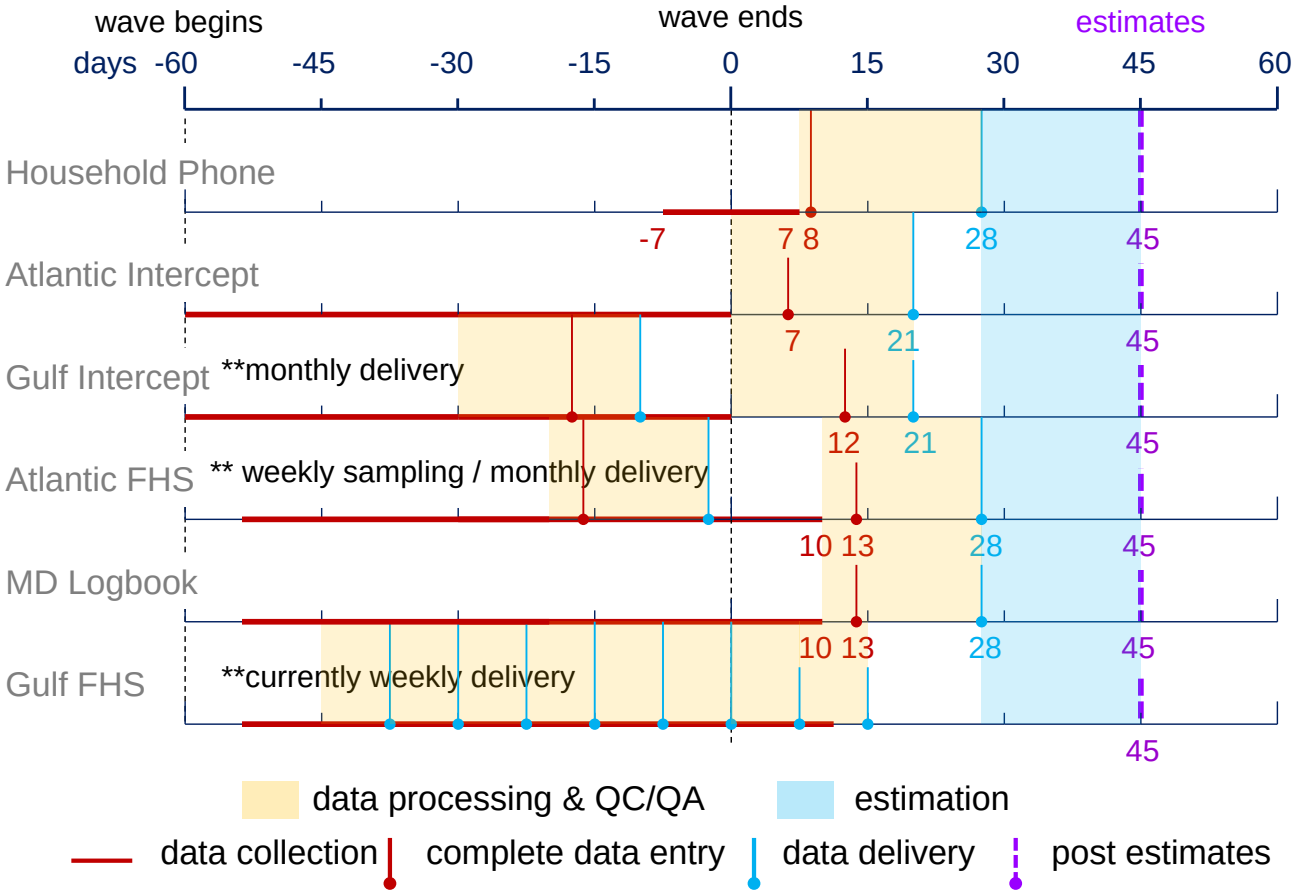
"Salz & Rossetti pres.", page 10

# Estimation



"Salz & Rossetti pres.", page 11

# MRFSS timelines…



"Salz & Rossetti pres.", page 12

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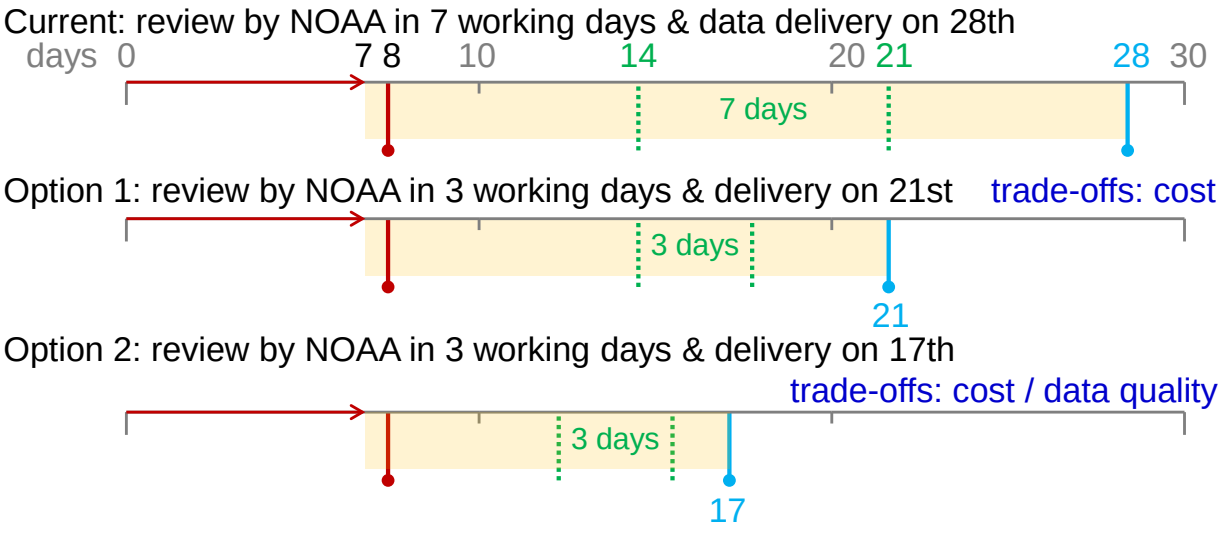
# Household Telephone Survey

## reducing data processing & QC/QA time?




data collection | complete data entry | data delivery | data processing & QC/QA

"Salz & Rossetti pres.", page 13

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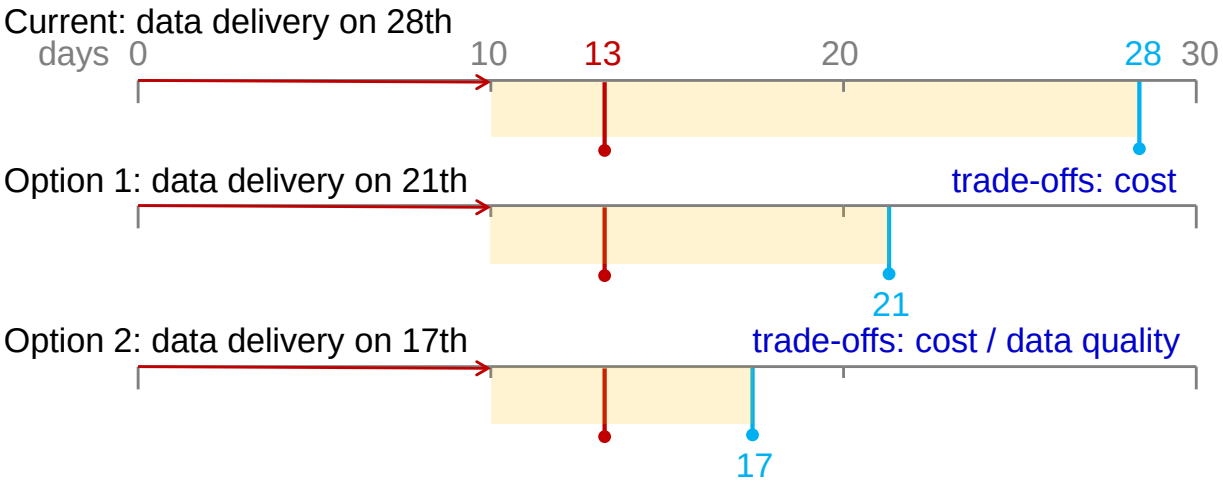
# Atlantic For-Hire Survey

## reducing data processing & QC/QA time?




data collection | complete data entry | data delivery | data processing & QC/QA

"Salz & Rossetti pres.", page 14

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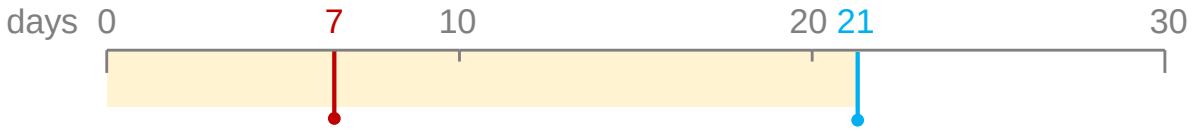
# Atlantic Intercept Survey

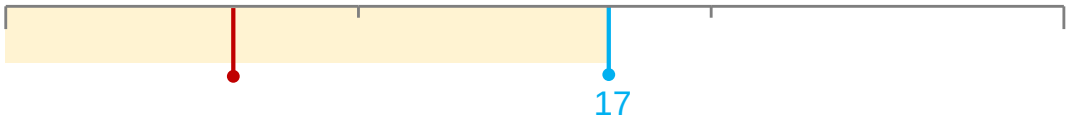
## reducing data processing & QC/QA time?

Current: data delivery on 21th




Option 1: delivery on 17th

trade-offs: Cost




Possible Options

- o Shorten time required for interviewers to submit data
- o Increase staffing for data entry and review
- o Electronic data collection

complete data entry | data delivery | data processing & QC/QA

"Salz & Rossetti pres.", page 15

NOAA FISHERIES SERVICE

# Electronic Data Collection

## Atlantic and Gulf Coasts

- Computer Assisted Telephone Interviewing (CATI)
  - For-Hire Survey
  - Coastal Household Telephone Survey
- Web Tool Reporting Option
  - For-Hire Survey
  - Southeast Headboat Survey
  - Gulf For-Hire Mandatory Logbook Pilot
- Computer Assisted Personal Interviewing (CAPI)
  - ICF Macro Pilot Testing iPAD
  - Gulf States Pilot Testing Digital Pen
  - NOAA Fisheries Statistics Pilot Tested Hand-held device of LPS

"Salz & Rossetti pres.", page 16

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# Electronic Data Collection

## potential benefits

- ❖ Eliminates time required to mail paper forms
- ❖ Eliminates time required for data entry
- ❖ Eliminate scanning/reviewing paper forms
- ❖ Built-in error checks and identify errors at point of interview
- ❖ May reduce respondent burden for self-reported data

"Salz & Rossetti pres.", page 17

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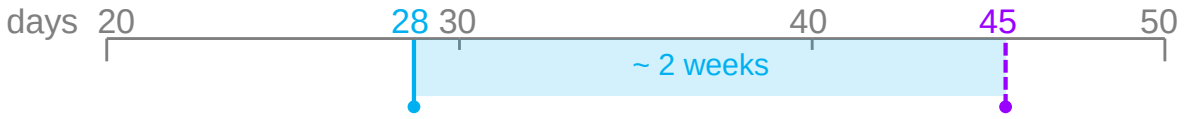
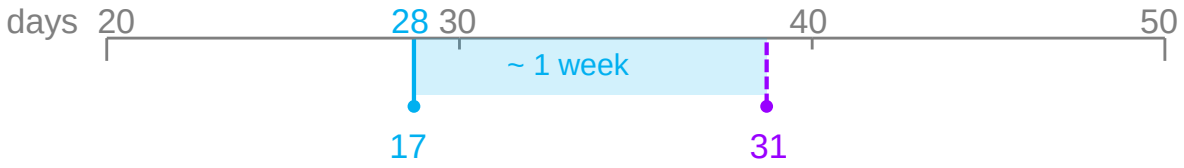
# Reducing Estimation Time?

Current: two weeks for review of estimates

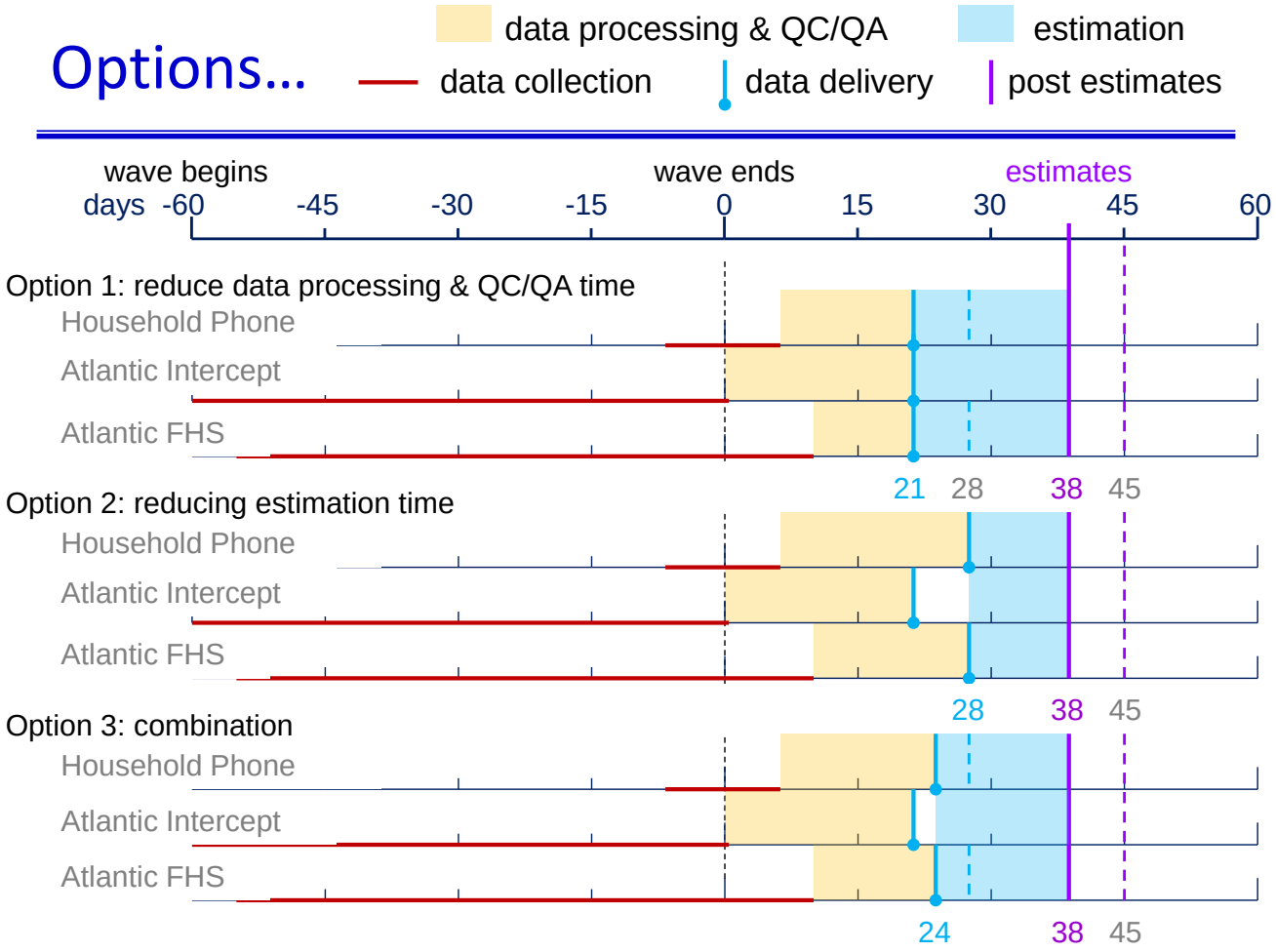



Option 1: one week for review of estimates



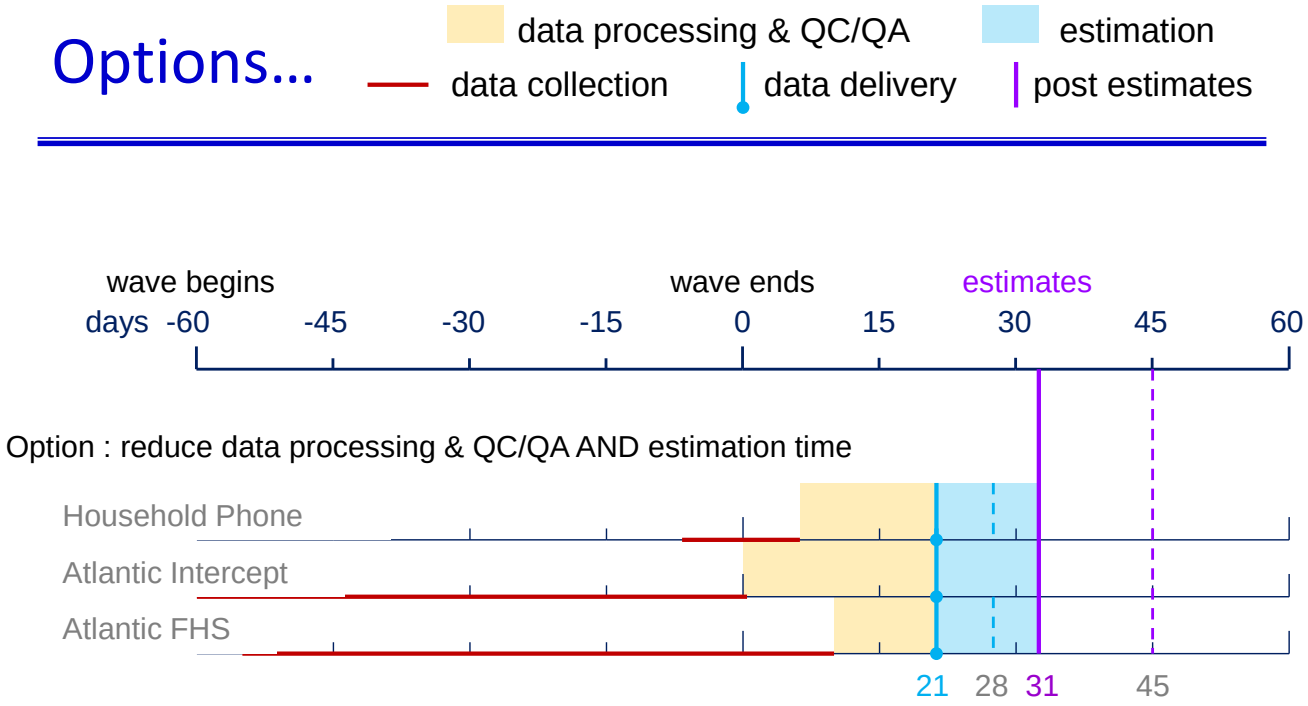

data delivery  estimation  post wave estimates

"Salz & Rossetti pres.", page 18



"Salz & Rossetti pres.", page 19

# Options…



"Salz & Rossetti pres.", page 20

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# Other Programs

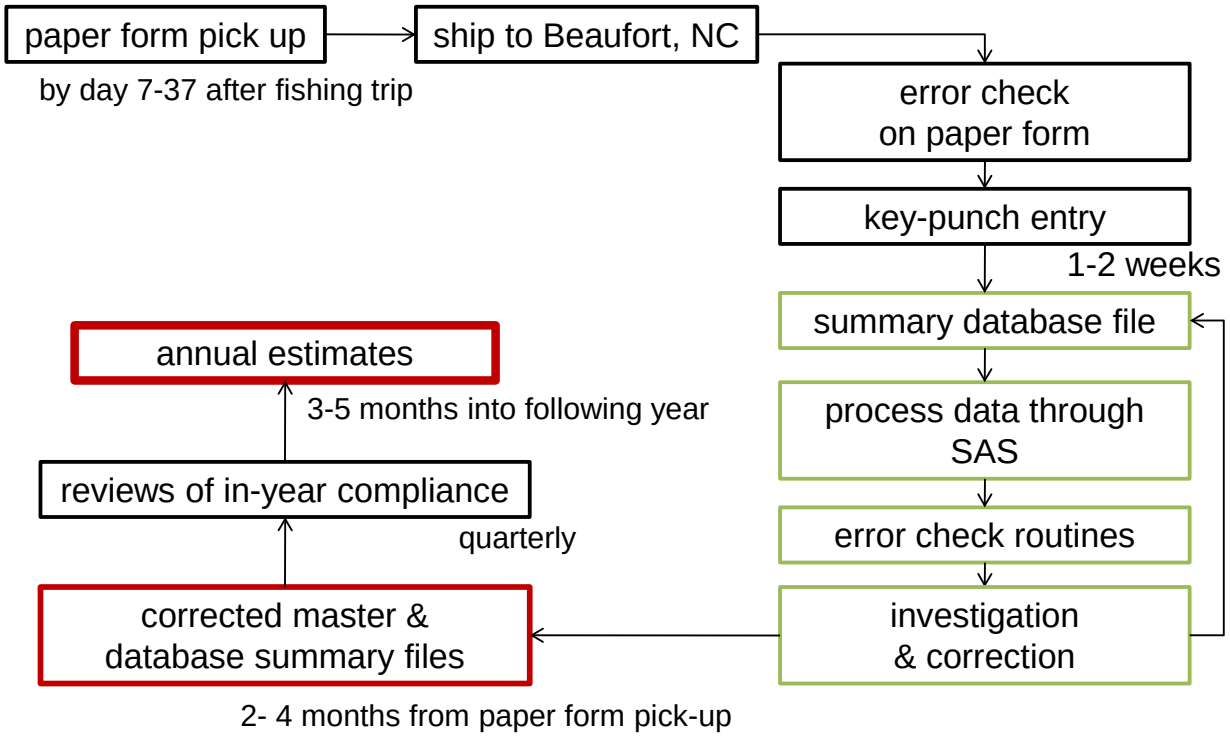
## in South Atlantic and Gulf Coasts

- TEXAS
  - o estimates by season: high-use (May 15 – Nov. 20)
    low-use (Nov. 21-May 14)
  - o lag time of 3-4 months

- Southeast Headboat Survey
  - o annual estimates
  - o lag time of 3-5 months into following year

"Salz & Rossetti pres.", page 21

# Southeast Headboat Survey



"Kerns pres. ", page 1

# Summer Flounder Recreational Fishery

## Recreational Timeliness Workshop

## March 2011

"Kerns pres. ", page 2

# Summer Flounder General Overview

- Jointly Managed by ASMFC and MAFMC

- Quota fishery
- Annual specification process
  - Coastwide share or
  - State-by-state shares

"Kerns pres. ", page 3

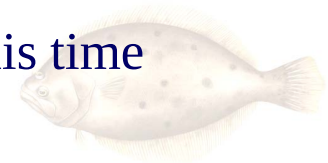
# Management Tools

| State | Minimum Size (inches) | Possession Limit | Open Season |
|---|---|---|---|
| **Massachusetts** | **18.5** | **5 fish** | **May 22-September 6** |
| **Rhode Island** | **19.5** | **6 fish** | **May 1-December 31** |
| **Connecticut** | **19.5** | **3 fish** | **May 15-August 25** |
| **New York** | **21** | **2 fish** | **May 15-September 6** |
| **New Jersey** | **18** | **6 fish** | **May 29-September 6** |
| **Delaware** | **18.5** | **4 fish** | **January 1-October 13** |
| **Maryland** | **19** | **3 fish** | **April 17-November 22** |
| **PRFC** | **18.5** | **4 fish** | **All year** |
| **Virginia** | **18.5** | **4 fish** | **All year** |
| **North Carolina** | **15 in all waters except the following: 14 in Pamlico Sound[A], Albemarle Sound[B], and Browns Inlet South[C] (lat/log are listed below)** | **8 fish** | **All Year** |

"Kerns pres. ", page 4

# Recreational Specification Process

- November
  - Technical and Industry Advisors Review current year data
    - →based on up to wave 4 data, project wave 5 and 6 from previous years harvest
  - Provide advice to mangers for next years regulations
- December
  - Managers choose Coastwide or State-by-State regulations
  - May have wave 5 harvest estimates at this time



"Kerns pres. ", page 5

# Specification Process

- January – if choose state-by-state
  - Base state share on 1998 harvest
  - Propose regulations for upcoming year based on harvest through wave 5 of previous year and projected wave 6 harvest
  - Assume harvest would be the same if regulations do not change

"Kerns pres. ", page 6

# Measuring Performance

| Year | Needed Reduction | Size Limit (inches) | Bag Limit | Open Season | # days open | Numbers of Fish | | %O/U |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Landings | Target | |
| 2000 | | 15.5 | 8 | May 6 - Oct 20 | 168 | | | |
| 2001 | 34% | 16 | 8 | May 12 - Sept 11 | 123 | 2,070,234 | 1,555,000 | 33% |
| 2002 | 17% | 16.5 | 8 | May 18 - Sept 24 | 130 | 988,878 | 1,719,000 | -42% |
| 2003 | -63% | 16.5 | 8 | May 3 - Oct 13 | 164 | 1,784,356 | 1,612,000 | 11% |
| 2004 | 3% | 16.5 | 8 | May 8 - Oct 11 | 157 | 1,887,193 | 1,736,000 | 9% |
| 2005 | 1% | 16.5 | 8 | May 7 - Oct 10 | 157 | 1,395,626 | 1,873,000 | -25% |
| 2006 | -3% | 16.5 | 8 | May 6 - Oct 9 | 157 | 1,560,505 | 1,443,000 | 8% |
| 2007 | 39% | 17 | 8 | May 26 - Sept 10 | 108 | 1,327,567 | 954,000 | 39% |
| 2008 | 40% | 18 | 8 | May 24 - Sept 7 | 107 | 851,447 | 801,433 | 6% |
| 2009 | 5% | 18 | 6 | May 23 - Sept 4 | 105 | 1,012,806 | 809,000 | 25% |
| 2010 | 2% | 18 | 6 | May 29 - Sept 6 | 101 | 593,677 | 997,000 | -40% |

"Kerns pres. ", page 7

# Data Analysis

- Seasonal Impacts by State
  - Lack a complete picture of year because do not have wave 6 harvest
  - Daily Harvest Rate by wave
  - Large difference from wave to wave
    - →NJ: 5,000 fish/day in w3 to 10,200 fish/day in w4
    - →CT: 1,200 fish/day in w4 to 157 fish/day in w5

"Kerns pres. ", page 8

# Data Analysis

## Effectiveness of Previous Year's Regulations

- Size Impact by state
  - Annual (not by wave)
- Bag Limit Impacts
  - Annual (not by wave)

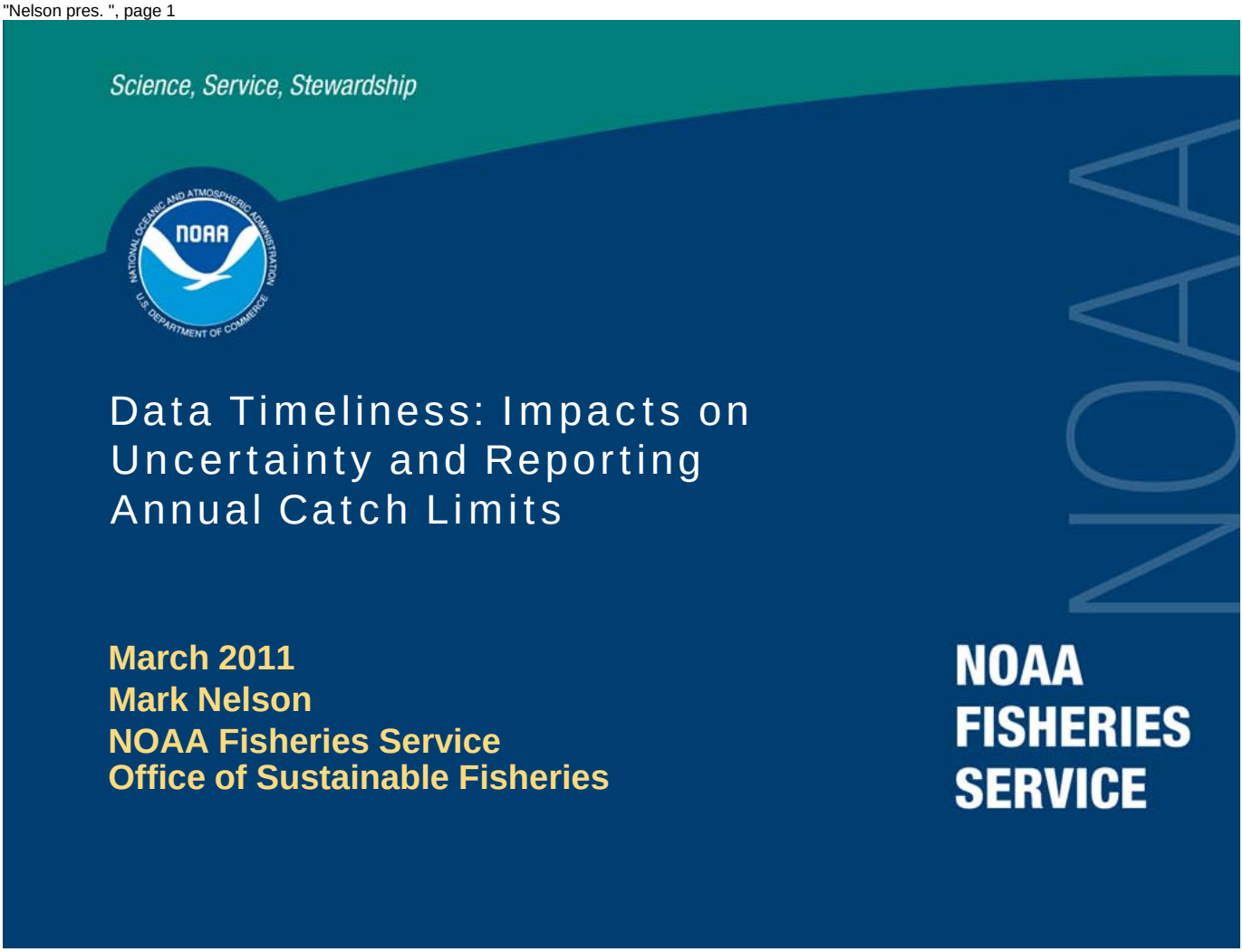
"Kerns pres. ", page 9

# Possible In-season Adjustments

More Timely Data might allow for possible in-season adjustments

- NY 2005 Harvest Target: 845,000
  - Wave 3 harvest: 352,301
  - Wave 4 harvest: 638,468
  - Wave 5 harvest: 51,022
- Exceeded target prior to wave

"Nelson pres. ", page 1



"Nelson pres. ", page 2

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# MSA and National Standard 1 Guidelines

Fishery management plans shall “establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.” MSA 303(a)(15)

ACLs “may not exceed the fishing level recommendations of its scientific and statistical committee” MSA 302(h)(6)

National Standard 1 (NS1) guidelines were revised to include guidance on these new requirements

2

"Nelson pres. ", page 3

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# Annual Catch Limit Framework


ABC may not exceed OFL. The distance between the OFL and ABC depends on how scientific uncertainty is accounted for in the ABC control rule.

AMs prevent the ACL from being exceeded and correct or mitigate overages of the ACL if they occur. ACTs are recommended in the system of accountability measures so that ACL is not exceeded.

3

"Nelson pres. ", page 4

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# Sector ACLs - Optional

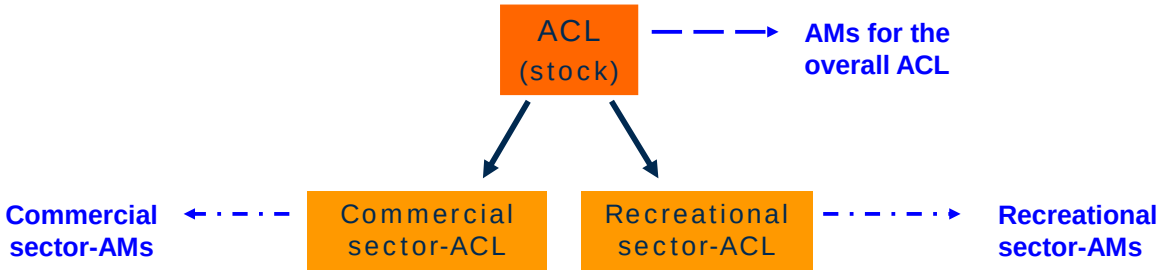
**Optional** to sub-divide a stock's ACL into "sector-ACLs".

If the management measures for different sectors differ in the degree of management uncertainty, then sector ACLs may be necessary so that appropriate AMs can be developed for each sector.

The sum of sector-ACLs must not exceed the overall ACL.

For each sector-ACL, "sector-AMs" should be established.

AMs at the stock level may be necessary.

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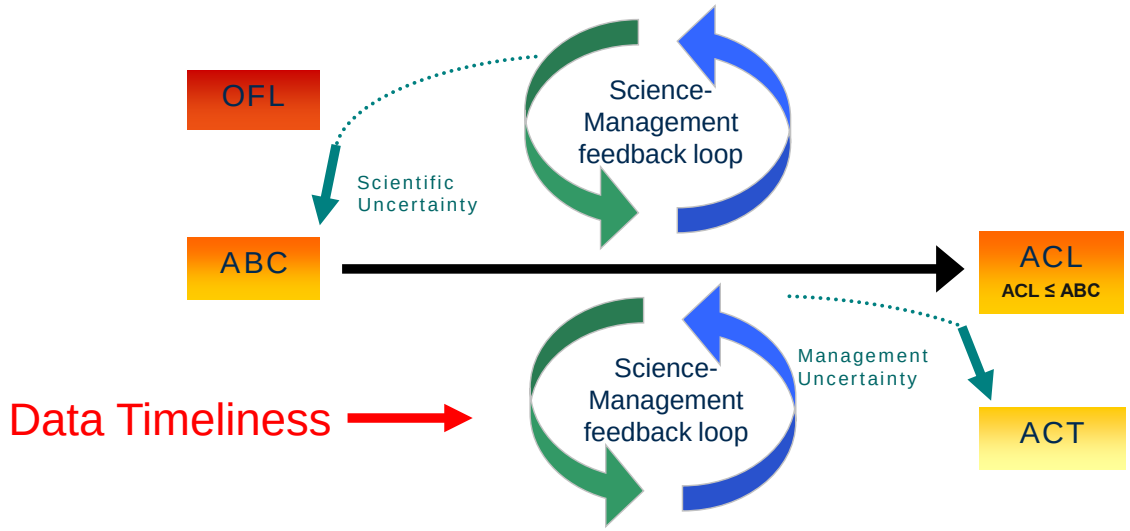
"Nelson pres. ", page 5

NOAA FISHERIES SERVICE

# Sources of Uncertainty

## SSC Role

## Council Role

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"Nelson pres. ", page 6

NOAA FISHERIES SERVICE

# Chief Sources of Management Uncertainty

Management uncertainty is the difference between what you plan to catch and what you actually catch. Sources include:

- Inadequate, incomplete catch data--results from misreporting, under reporting or late reporting of catches
- Catch data that are not available to managers in time to affect decision making
- Method and/or quality of fishery data used to forecast catch results in poor estimate of actual catch

6

"Nelson pres. ", page 7

NOAA FISHERIES SERVICE

# Accountability Measures (AMs)

AMs are management controls to prevent ACLs from being exceeded and to mitigate for overages if they occur.

**Inseason AMs**

- "Whenever possible, FMPs should include inseason monitoring and management measures to prevent catch from exceeding ACLs."
- Increased wave frequency/turnaround

**Postseason AMs**

- "On an annual basis, the Council must determine as soon as possible after the fishing year if an ACL was exceeded."
- How soon can the final catch numbers become available?

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"Nelson pres. ", page 8

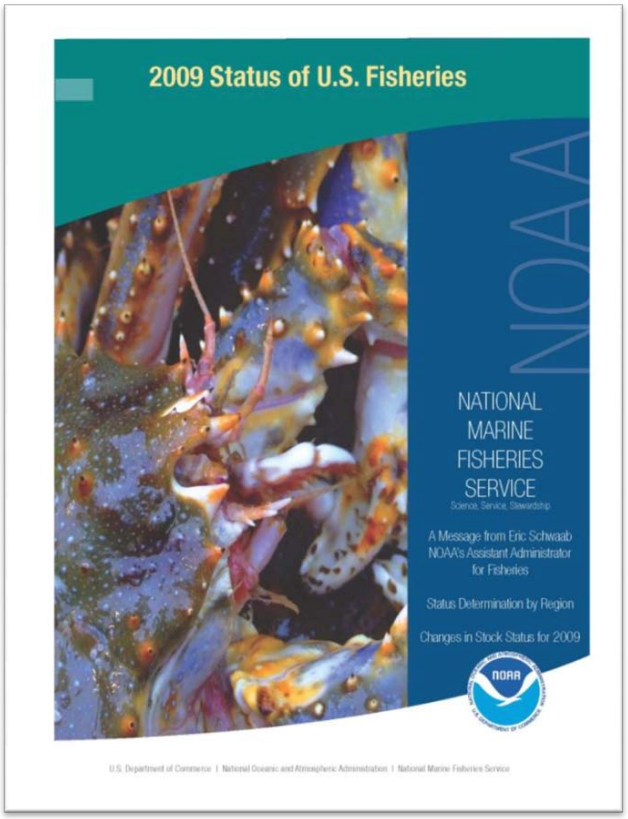
NOAA FISHERIES SERVICE

## ACL Reporting

### Yearly Report to Council

### Status of US Fisheries Report to Congress

MSA 304(e)(1)

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"Niles & Mattes pres.", page 1

# Timeliness of Recreational Data in Washington/Oregon Marine Recreational Fisheries

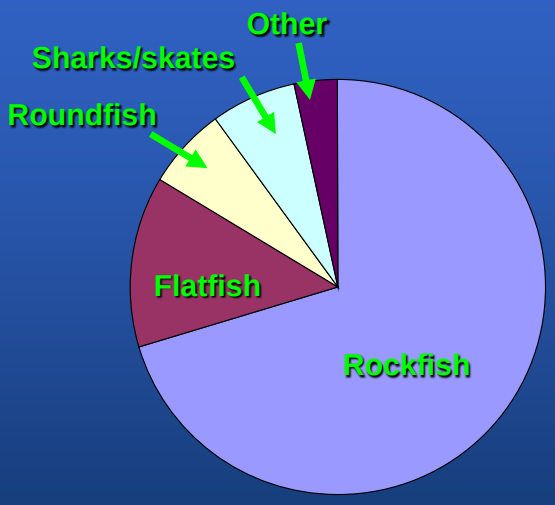
Corey Niles (WDFW)
Lynn Mattes (ODFW)

MRIP Data Timeliness Workshop
March 15-16, 2011
St. Petersburg, FL

"Niles & Mattes pres.", page 2

# WA/OR Recreational Finfish Fisheries

- Groundfish (90+ species in FMP)
  - Black, blue, quillback, China, copper, brown, and grass RF
  - Cabezon
  - Kelp and rock greenling
  - Canary and yelloweye RF*
- Pacific halibut (not a groundfish)
- Salmon
  - Coho and Chinook
- Tuna
  - Albacore



"Niles & Mattes pres.", page 3

# Examples from Three Fisheries

- Pacific halibut
  - Central Oregon spring all-depth fishery
- Salmon
  - Washington Salmon
- Bottomfish
  - WA/OR year-round fishery

"Niles & Mattes pres.", page 4

# WA/OR Sport Halibut

- Managed via a Catch Sharing Plan
  - Each sector (commercial, Tribal, recreational) given a percentage of the quota
  - Each sector has to stay within it's share of the quota
  - Management Tools
    - Limit days of the week open
    - Limit weeks with openings
    - Daily bag limit (yearly landing limit)
    - Depth restrictions (primarily to limit OFS impacts)

"Niles & Mattes pres.", page 5

# Central OR Spring All-Depth Halibut

- Data Needs
  - After last “fixed date” (a Saturday) need data before the following Thursday or Friday (5-6 days)
    - See if enough quota remains to open again
    - Give anglers 1 week notice of opening
    - Need after each subsequent opening

"Niles & Mattes pres.", page 6

# Central OR Spring All-Depth Halibut

- Data Collected
  - Boat exit counts
  - Upon Returnir
    - Number of an
    - Trip target
    - Location
    - Halibut lande
    - Size of lande
    - Number and s OFS)

"Niles & Mattes pres.", page 7

# Central OR Spring All-Depth Halibut

- Data flow
  - Fishery occurs Thurs – Sat
  - Sampler crew chiefs collect data on Monday
    - Deliver to ODFW MRP office in Newport
  - Data shop enters, error checks and edits data Tuesday-Thursday
  - Managers get *preliminary* data Thursday
    - Occasionally as early as Wednesday afternoon (if only halibut going on, no salmon)
  - Managers make decisions, and announcements on Friday for fishery the following Thursday

"Niles & Mattes pres.", page 8

# Ocean Salmon Management

- Ocean salmon fisheries  are managed by the PFMC
- Ocean management areas between Cape Falcon, OR and the U.S.-Canada border are managed in-season to stay within chinook and coho quotas assigned preseason
- Commercial troll fishery is usually managed as one area; recreational fishery is managed under sub-quotas for four management areas within the Cape Falcon – U.S.-Canada border area.
- State managers are responsible for monitoring catch, updating PFMC and other parties weekly, and calling for action when catch approaches quotas

"Niles & Mattes pres.", page 9

# Puget Sound

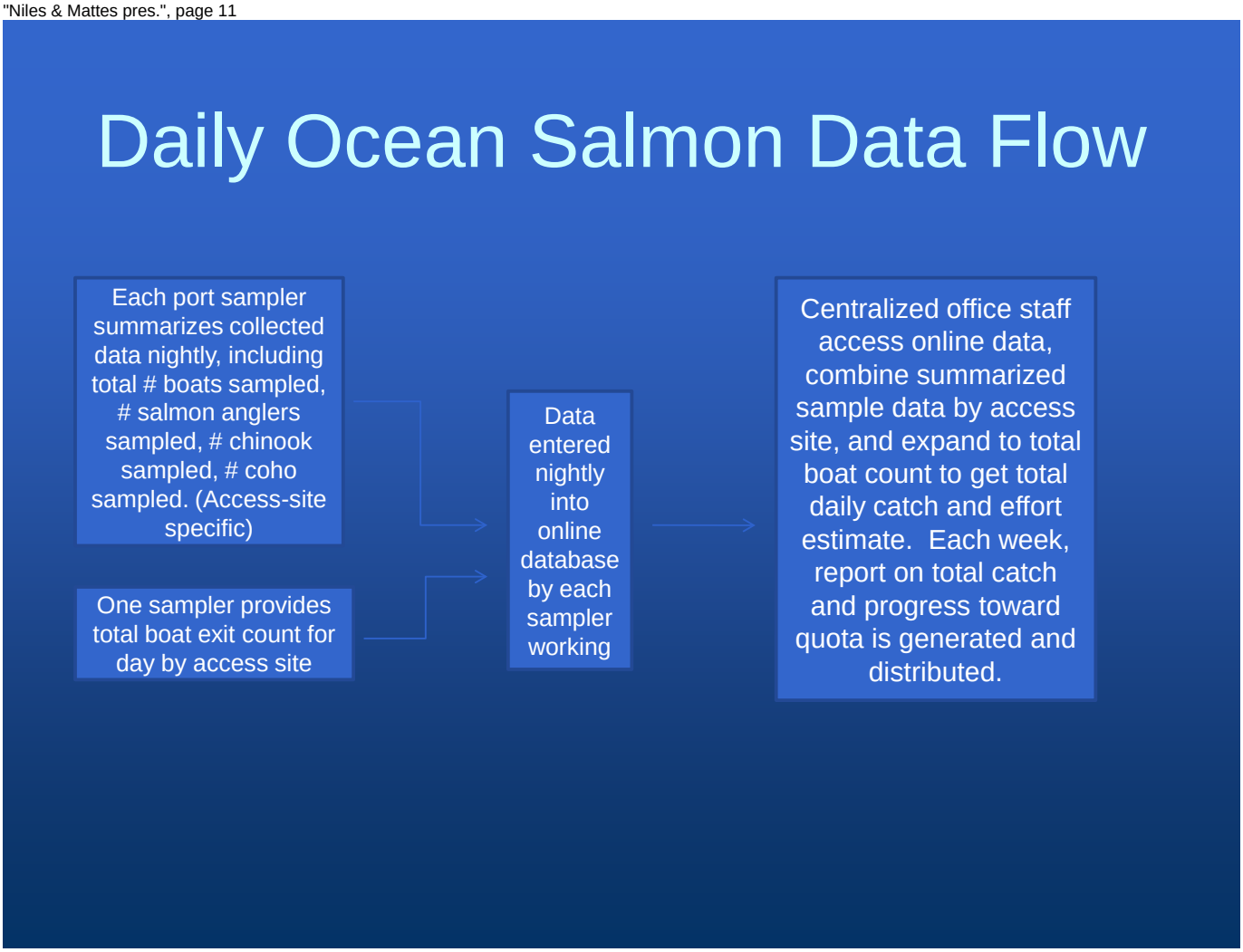
- Even more complicated!
- [more to come]

"Niles & Mattes pres.", page 10

# Ocean Salmon Data Needs

- Weekly (or more frequent) estimates of effort (angler trips) and catch (numbers of fish) by species and management area for in-season quota management. Estimates are generated from access-site creel data and boat effort counts.
- Coded wire tag recoveries for stock composition analysis by management area.
- Scale samples from chinook for age composition analysis by management area.
- DNA data collection for stock composition analysis by management area.

"Niles & Mattes pres.", page 11



"Niles & Mattes pres.", page 12

# WA/OR Bottomfish

- Harvest specifications and management measures via biennial cycle through the PFMC
- Formal and informal allocations depending on the species
- Management measures designed to keep each sector within its allocation
  - Bag limits, size limits, season length, depth closures, gear restrictions, day-of-week closures, area: Hot spot closures (such as Stonewall Bank) or cold spot open,

"Niles & Mattes pres.", page 13

# Have to keep track through the Council Process, via our "scorecard"

**Attachment 2. Projected mortality impacts (mt) of overfished groundfish species for 2011 after Council action in November 2010. Bolded numbers represent the difference between the FPA in the DEIS and November action.**

| Fishery | Bocaccio b/ | Canary | Cowcod | Dkbl | Petrale | POP | Widow | Yelloweye |
|---|---|---|---|---|---|---|---|---|
| **Limited Entry Trawl - Non-whiting a/** | 60.0 | 20.0 | 1.8 | 240.3 | 871.0 | 107.0 | 235.5 | **0.3** |
| **Limited Entry Trawl - Whiting a/** | | | | | | | | |
| At-sea whiting motherships | | 3.4 | | 6.0 | | 7.2 | 61.2 | 0.0 |
| At-sea whiting cat-proc | | 4.8 | | 8.5 | | 10.2 | 86.7 | 0.0 |
| Shoreside whiting | | 5.9 | | 10.5 | | 12.6 | 107.1 | 0.0 |
| Tribal whiting | | 4.3 | | 0.1 | | 7.2 | 5.0 | 0.0 |
| **Tribal** | | | | | | | | |
| Midwater Trawl | | 3.6 | | 0.0 | | 0.0 | 40.0 | 0.0 |
| Bottom Trawl | | 0.8 | | 0.0 | 45.4 | 3.7 | 0.0 | 0.0 |
| Troll | | 0.5 | | 0.0 | | 0.0 | | 0.0 |
| Fixed gear | | 0.3 | | 0.0 | | 0.0 | 0.0 | 2.3 |
| **Non-nearshore c/** | | | | | | | | |
| LE FG | 0.0 | 1.9 | | 3.5 | | 0.3 | 0.1 | 0.8 |
| OA FG | 0.0 | 0.3 | | 0.8 | | 0.1 | 0.0 | 0.1 |
| **Directed OA: Nearshore c/** | 0.3 | 3.0 | | | | | 0.3 | 1.1 |
| **Incidental OA d/** | 0.7 | 2.0 | | 15.0 | 1.0 | 0.1 | 3.3 | 0.3 |
| **Recreational Groundfish e/** | | | | | | | | |
| WA | | 2.0 | | | | | | 2.6 |
| OR | | 7.0 | | | | | 1.0 | **2.3** |
| CA | 55.4 | 14.5 | 0.2 | | | | 8.7 | **2.7** |
| **EFPs** | 11.0 | 1.3 | 0.2 | 1.5 | 2.0 | 0.1 | 11.0 | 0.1 |
| **Research f/** | 1.7 | 7.2 | 0.1 | 2.1 | 17.0 | 1.8 | 1.6 | **1.3** |
| **TOTAL** | 129.1 | 82.8 | 2.3 | 288.3 | 936.4 | 150.3 | 561.5 | **13.9** |
| **2011 ACL/ACT g/** | 263 | 102 | 4.0 | 298 | 976 | 157 | 600 | **14** |
| **Difference** | 133.9 | 19.2 | 1.7 | 9.7 | 39.6 | 6.7 | 38.5 | 0.1 |
| **Percent of OY** | 49.1% | 81.2% | 57.5% | 96.7% | 95.9% | 95.7% | 93.6% | 99.3% |
| Key | | = either not applicable; trace amount (<0.01 mt); or not reported in available data sources. | | | | | | |

a/ Values for dkbl, POP, and widow reflect Amendment 21 allocations. Bocaccio, canary, cowcod, and yelloweye represent 11-12 allocations.
The allocation to the shoreside whiting sector is only for the Amendment 20 initial allocation. In future years only one allocation will be made to the shoreside sector (whiting and non-whiting).

b/ South of 40°10' N. lat.

c/ Values represent projected impacts under the Council's Final Preferred Alternative for 2011-2012

d/ Mortality estimates are not hard numbers; based on the GMT's best professional judgment.

e/ Values in scorecard represent projected impacts for all species except canary and yelloweye rockfish, which are the prescribed harvest guidelines.

f/ Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.

g/ Values for POP and yelloweye represent ACTs, which is a value less than the ACL to account for management uncertainty.

"Niles & Mattes pres.", page 14

# WA/OR Bottomfish

- Data Needs
  - Progress towards target species caps
  - Progress towards overfished species caps
  - Effort

"Niles & Mattes pres.", page 15

## Oregon Ocean Fishery Access Points

"Niles & Mattes pres.", page 16

# WA/OR Bottomfish

- Data Collected
  - Boat exit counts
  - Upon Returning
    - Number of anglers per boat
    - Trip target
    - Location
    - Number and species of landed fish
    - Average weight of landed fish
    - Number and species of releases (important for OFS)
    - Depth of released species

"Niles & Mattes pres.", page 17

# WA/OR Bottomfish

- Data flow
  - Fishery occurs seven days per week
    - Statistical week is Monday through Sunday
  - Sampler crew chiefs collect data on Mondays
    - Deliver to ODFW MRP office in Newport
  - Data shop enters, error checks and edits data
  - Final data on a one month time lag
    - Example--Get March data the first week in May
    - Uploaded to Pacific RecFIN website and state websites

"Niles & Mattes pres.", page 18

# WA/OR Bottomfish

- Data flow cont.
  - Can get preliminary data one week after end of month
    - Get March data the first week in April
    - Used to inform management decisions inseason
  - Can get *very rough estimates* of effort and catch composition on a week delay
    - Examine raw interview data, not totals
    - Occasionally used to make management decisions inseason, especially if close to cap for an overfished species
  - Managers examine available data and make decisions
    - Need ~ 48 hours to deal with regulatory paperwork in both states
    - Like to give as much notice to anglers as possible of changes

"Niles & Mattes pres.", page 19

predicted based on management measures.

## RecFIN Tables - Tables for Groundfish Management (01MAR11:15:47:07)

### GMT Scorecard Species 2010

### 1. Metric Tons of Recreational Impacts 2010 GMT Scorecard Species

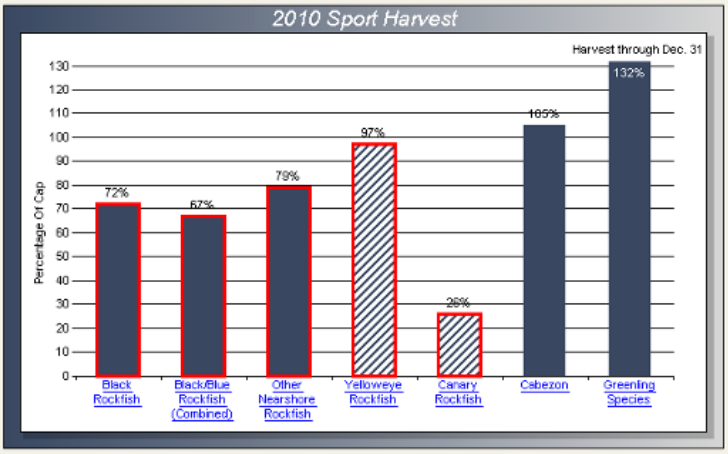
**Washington has not yet reported estimates for month 12 of 2010**

| 2010 (mt) for N. Calif. Oregon S. Calif. Through month 12 of 2010. | | | Month | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Cumulative Total | Harvest Guideline (HG) | % of HG or PI | Projected Impact (PI) |
| bocaccio | Calif. | N. Calif. | 0.00 | 0.00 | 0.00 | 0.03 | 0.66 | 1.05 | 3.09 | 1.21 | 0.29 | 0.16 | 0.03 | 0.00 | 6.52 | . | . | . |
| | | S. Calif. | 0.08 | 0.04 | 4.32 | 11.70 | 3.57 | 8.03 | 2.53 | 4.27 | 4.49 | 3.78 | 3.62 | 3.75 | 50.18 | . | . | . |
| | | All Calif. | 0.08 | 0.04 | 4.32 | 11.73 | 4.24 | 9.07 | 5.61 | 5.48 | 4.78 | 3.93 | 3.65 | 3.75 | 56.70 | 66.3 | 85.5% | 67.3 |
| canary rockfish | Calif. | N. Calif. | 0.00 | 0.00 | 0.00 | 0.01 | 0.89 | 2.24 | 2.27 | 2.37 | 2.53 | 0.85 | 0.20 | 0.00 | 11.36 | . | . | . |
| | | S. Calif. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.02 | 1.30 | 0.00 | 0.00 | 0.00 | 1.36 | . | . | . |
| | | All Calif. | 0.00 | 0.00 | 0.00 | 0.01 | 0.89 | 2.24 | 2.31 | 2.39 | 3.83 | 0.85 | 0.20 | 0.00 | 12.72 | 22.9 | 55.5% | 22.9 |
| | OR-WA | Oregon | 0.01 | 0.14 | 0.11 | 0.13 | 0.55 | 0.56 | 0.77 | 0.74 | 0.15 | 0.02 | 0.01 | 0.01 | 3.20 | 16.0 | 20.0% | 2.5 |
| | | Washington | 0.00 | 0.00 | 0.00 | 0.03 | 0.23 | 0.16 | 0.20 | 0.26 | 0.07 | 0.02 | 0.00 | 0.00 | 0.97 | 4.9 | 19.8% | 1.2 |
| | | All OR-WA | 0.01 | 0.14 | 0.11 | 0.16 | 0.78 | 0.72 | 0.97 | 1.00 | 0.22 | 0.04 | 0.01 | 0.01 | 4.17 | 20.9 | 20.0% | 3.7 |
| cowcod | Calif. | N. Calif. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | . | . | . |
| | | S. Calif. | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | . | . | . |
| | | All Calif. | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | . | 27.3% | 0.1 |
| widow rockfish | Calif. | N. Calif. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.26 | 0.02 | 0.02 | 0.04 | 0.01 | 0.00 | 0.38 | . | . | . |
| | | S. Calif. | 0.00 | 0.03 | 0.08 | 0.02 | 0.00 | 0.00 | 0.00 | 0.08 | 0.06 | 0.00 | 0.03 | 0.00 | 0.29 | . | . | . |
| | | All Calif. | 0.00 | 0.03 | 0.08 | 0.02 | 0.00 | 0.02 | 0.26 | 0.10 | 0.08 | 0.04 | 0.04 | 0.00 | 0.67 | 6.2 | 10.8% | 6.2 |
| | OR-WA | Oregon | 0.00 | 0.01 | 0.02 | 0.01 | 0.03 | 0.10 | 0.04 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.22 | 1.0 | 22.2% | 1.0 |
| | | All OR-WA | 0.00 | 0.01 | 0.02 | 0.01 | 0.03 | 0.10 | 0.04 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.22 | 1.0 | 22.2% | 1.0 |
| yelloweye rockfish | Calif. | N. Calif. | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.18 | 0.43 | 0.28 | 0.16 | 0.05 | 0.00 | 0.00 | 1.31 | . | . | . |
| | | S. Calif. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.02 | 0.00 | 0.00 | 0.05 | . | . | . |
| | | All Calif. | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.18 | 0.43 | 0.28 | 0.19 | 0.07 | 0.00 | 0.00 | 1.36 | 2.8 | 48.6% | 2.8 |
| | OR-WA | Oregon | 0.02 | 0.04 | 0.07 | 0.03 | 0.47 | 0.48 | 0.36 | 0.53 | 0.07 | 0.01 | 0.00 | 0.01 | 2.09 | 2.4 | 86.9% | 2.4 |
| | | Washington | 0.00 | 0.00 | 0.00 | 0.05 | 0.70 | 0.68 | 0.21 | 0.15 | 0.16 | 0.02 | 0.00 | 0.00 | 1.97 | 2.7 | 73.1% | 2.5 |
| | | All OR-WA | 0.02 | 0.04 | 0.07 | 0.08 | 1.18 | 1.16 | 0.57 | 0.68 | 0.22 | 0.03 | 0.00 | 0.01 | 4.06 | 5.1 | 79.6% | 4.9 |

"Niles & Mattes pres.", page 20

# ODFW Inseason Tracking

*Harvest estimates for each month are posted at the end of the following month.*




***Attention!***
Reaching the cap on one of these species or species groups may affect fishing for other species.

The Oregon recreational harvest guideline for yelloweye rockfish was reduced to 2.3 mt at the June 2010 Council meeting to comply with a court order to reduce total yelloweye impacts, coastwide, from 17 mt to 14 mt. The updated Federal Register can be found at:

http://frwebgate3.access.gpo.gov/cgi-bin/PDFgate.cgi?WAISdocID=Upj9dM/7/2/0&WAISaction=retrieve

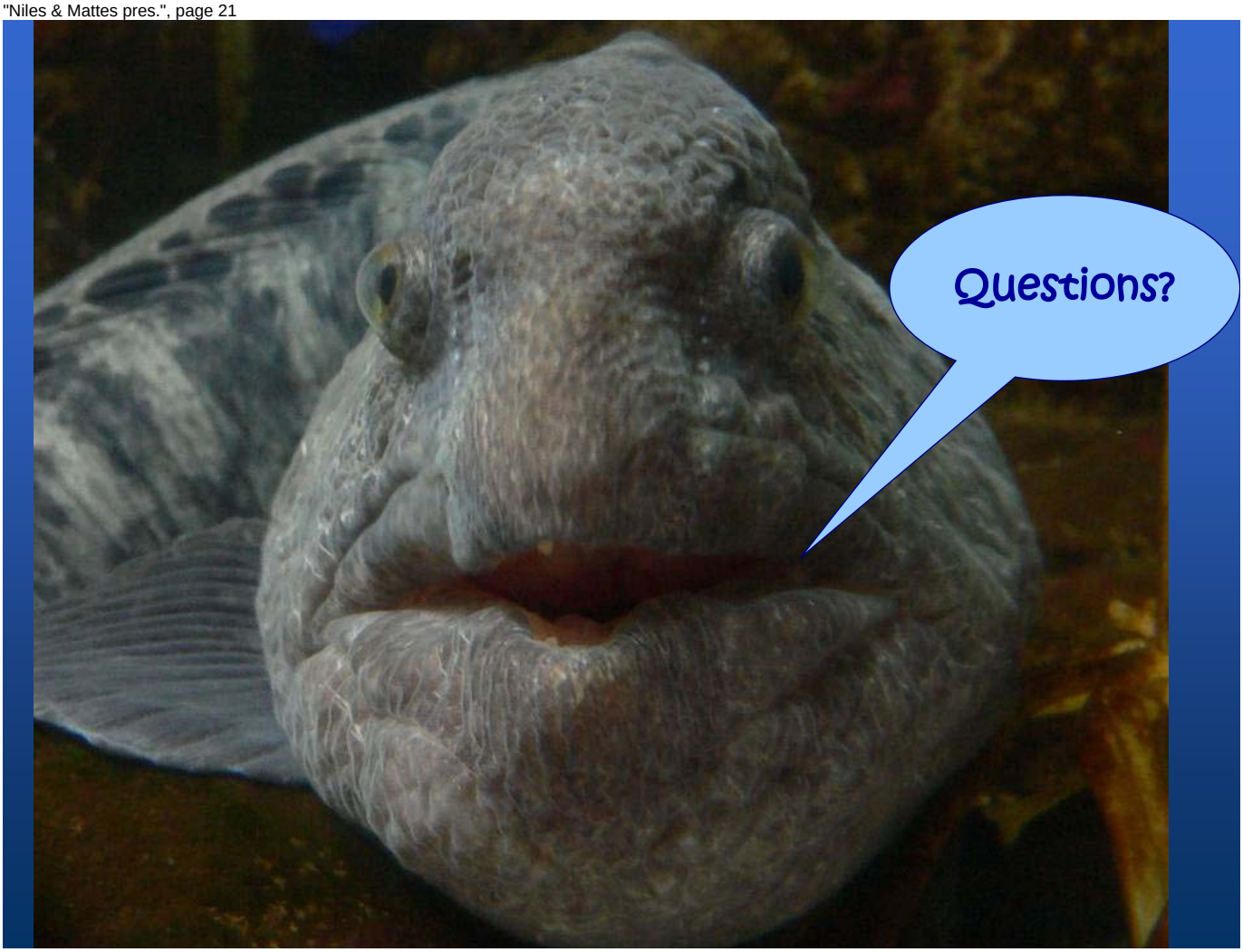
***Prohibited!***
Retention of yelloweye rockfish and canary rockfish is prohibited.

| Species | 2010 Harvest (metric tons) | 2010 Harvest Limit (metric tons) | Percentage Of Limit Harvested |
|---|---|---|---|
| Black Rockfish | 316.5 | 440.8 | 72 % |
| Black Rockfish and Blue Rockfish (Combined):<br>• Black Rockfish<br>• Blue Rockfish | 321.1 | 481.8 | 67 % |
| Other Nearshore Rockfish | 10.7 | 13.6 | 79 % |
| Yelloweye Rockfish | 2.8 | 2.9 | 97 % |
| Canary Rockfish | 4.2 | 16.0 | 26 % |
| Cabezon | 16.5 | 15.8 | 105 % |
| Greenling Species (Combined):<br>• Kelp Greenling<br>• Rock Greenling | 6.9 | 5.2 | 132 % |

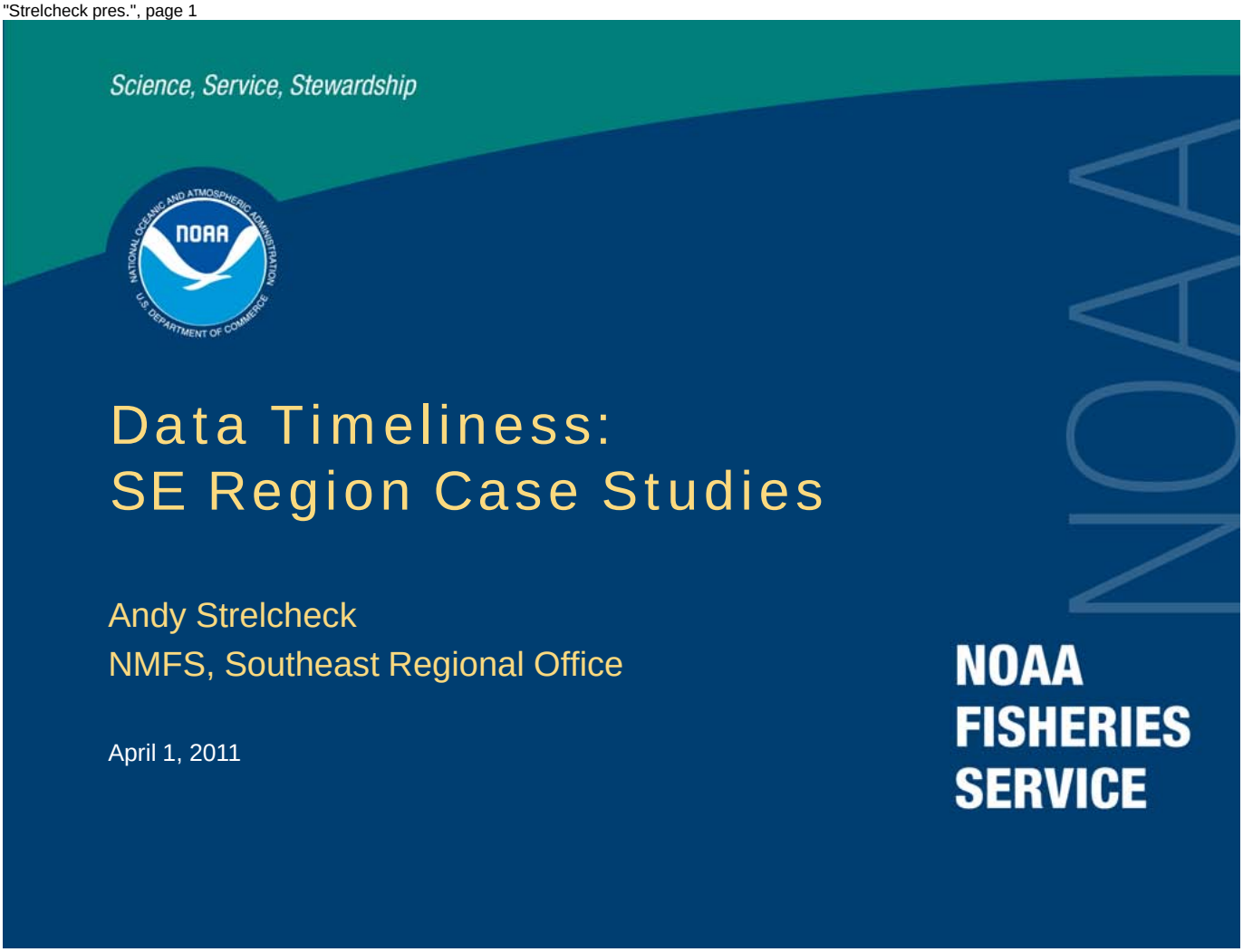
Data updated 2/28/2011

*One metric ton = 2,204.6 pounds

"Niles & Mattes pres.", page 21



"Strelcheck pres.", page 1



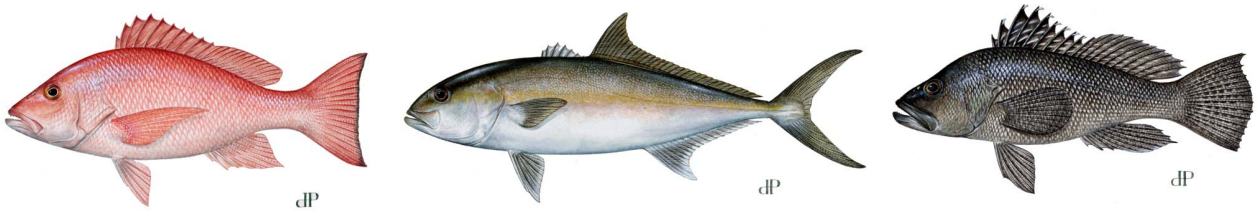
"Strelcheck pres.", page 2

NOAA FISHERIES SERVICE

# Quota Monitored Species

| Species | Quota/ACL | Season |
|---|---|---|
| Gulf Red Snapper | 3,403,000 lbs ww | 2009: Jun 1-Aug 15<br>2010: Jun 1-Jul 23 + 24 fall weekend days |
| Gulf Greater Amberjack | 1,368,000 lbs ww | 2009: Jan 1-Oct 24<br>2010: Jan 1-Dec 31 |
| South Atlantic Black Sea Bass | 409,000 lbs gw | 2010/11: Jun 1-Feb 12 |

* All stocks are overfished; greater amberjack and black sea bass are undergoing overfishing



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"Strelcheck pres.", page 3

NOAA FISHERIES SERVICE

MARINE RECREATIONAL INFORMATION PROGRAM

# Data Availability

NOAA Southeast Fisheries Science Center

## MRFSS

- by wave, 45 day lag-time

TEXAS PARKS & WILDLIFE

## Headboat

- logbook, estimates available at end of calendar year; can receive preliminary monthly estimates in-season

## Texas Parks and Wildlife

- high (May 15-Nov 20) and low-use (Nov 21-May 14) waves; 3+ month lag time

3

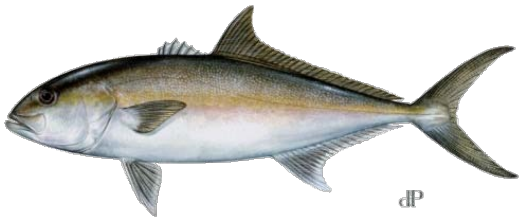
"Strelcheck pres.", page 4

NOAA FISHERIES SERVICE

# Case Study #1: Gulf Greater Amberjack

- Stock is overfished, undergoing overfishing
- In year 8 of 10 year rebuilding plan
- 73% of ACL is allocated to recreational sector

- **Accountability Measure**
  - Overage payback
  - In-season quota closure



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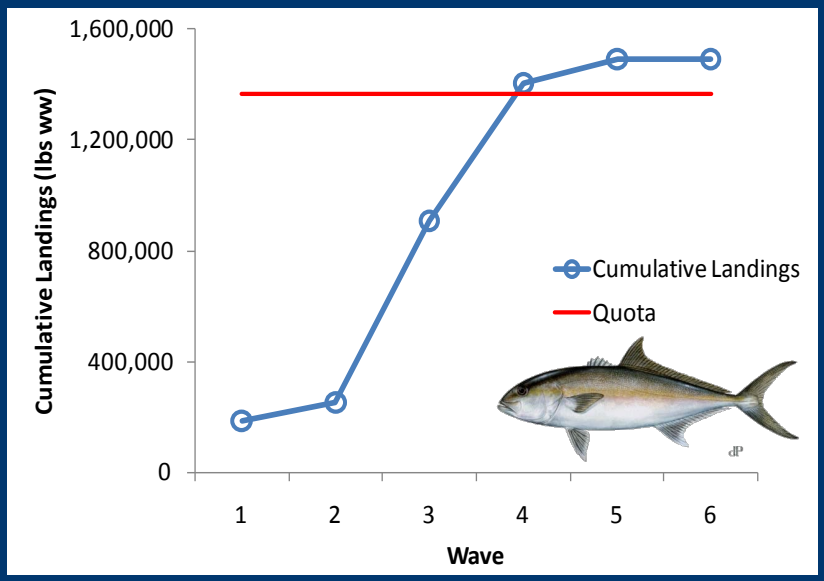
"Strelcheck pres.", page 5

# Case Study #1: Gulf Greater Amberjack Projections (2009)

- Higher than expected landings during Jul-Aug 2009; overage not known until mid-Oct.
- Quota closure in late Oct. 2009;
- 2010 quota reduced by 124,816 lbs; no seasonal closure due to DWH oil spill

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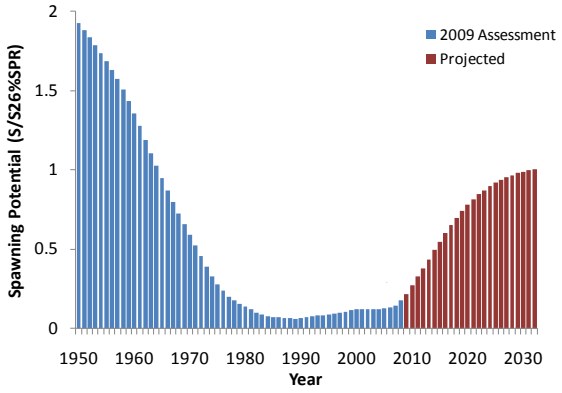
"Strelcheck pres.", page 6

NOAA FISHERIES SERVICE

# Case Study #2: Gulf Red Snapper

- Stock is overfished, overfishing ended in 2009
- In year 11 of 32 year rebuilding plan



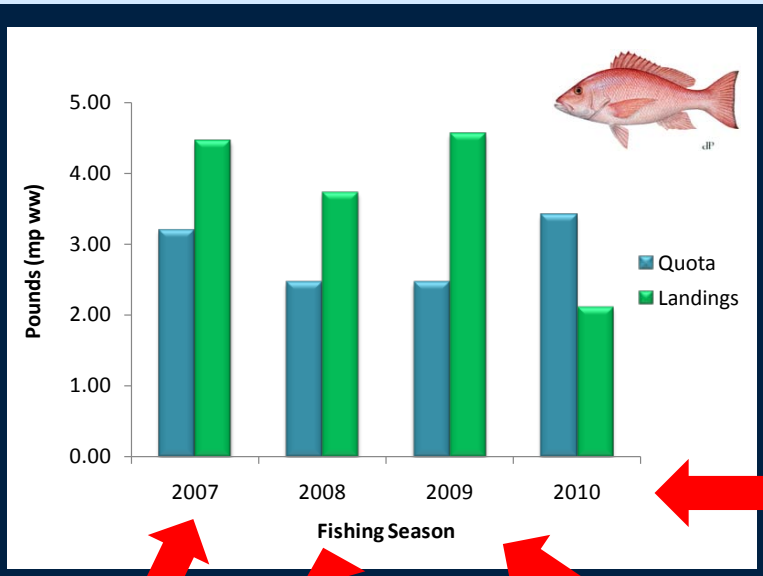

## Accountability Measure

- o No quota overage payback
- o Quota closure date announced prior to season
- o MSA Sec. 407 prohibits recreational harvest once quota met or projected to be met

6

"Strelcheck pres.", page 7

## Case Study #2: Gulf Red Snapper Projections




**Quota increased; DWH oil spill**

**53 days + 24 weekend openings**

**Quota/bag limit reduced;**

**194 days**

**Incompatible state regulations**

**65 days**

**State adopts compatible regulations**

**75 days**

"Strelcheck pres.", page 8

NOAA FISHERIES SERVICE

# Case Study #3: SA Black Sea Bass

- Stock is overfished and undergoing overfishing
- Large portion of catch from headboats (34% in 2009)
- Fishing season starts June 1

## Accountability Measure

- Fishery closed when quota met or projected to be met
- Quota overage payback

8

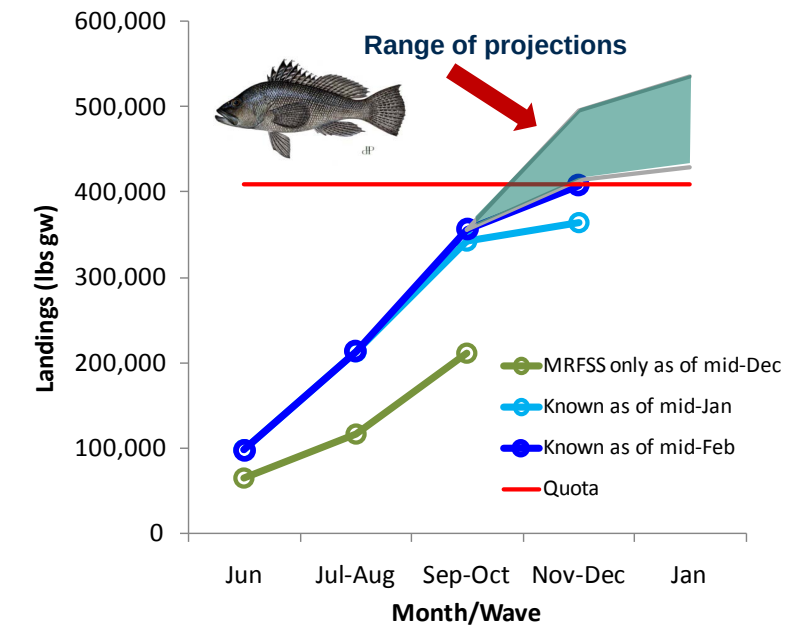
"Strelcheck pres.", page 9

# Case Study #3: SA Black Sea Bass Projections (2010/2011)

- Only at 50% of quota based on MRFSS through Oct 2010

- Lag in obtaining headboat data

- Projections highly variable and dependent on historic catch rates




**Fishery closed on February 12, 2011**

"Strelcheck pres.", page 10

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# Conclusions

- Poor track record monitoring recreational quotas
- Increasing data timeliness will:
  - Reduce potential for quota overages
  - Provide more timely notice of closures
  - Result in less reliance on historical data and projections
  - Allow for in-season management adjustments
- Many challenges, including but not limited to data timeliness

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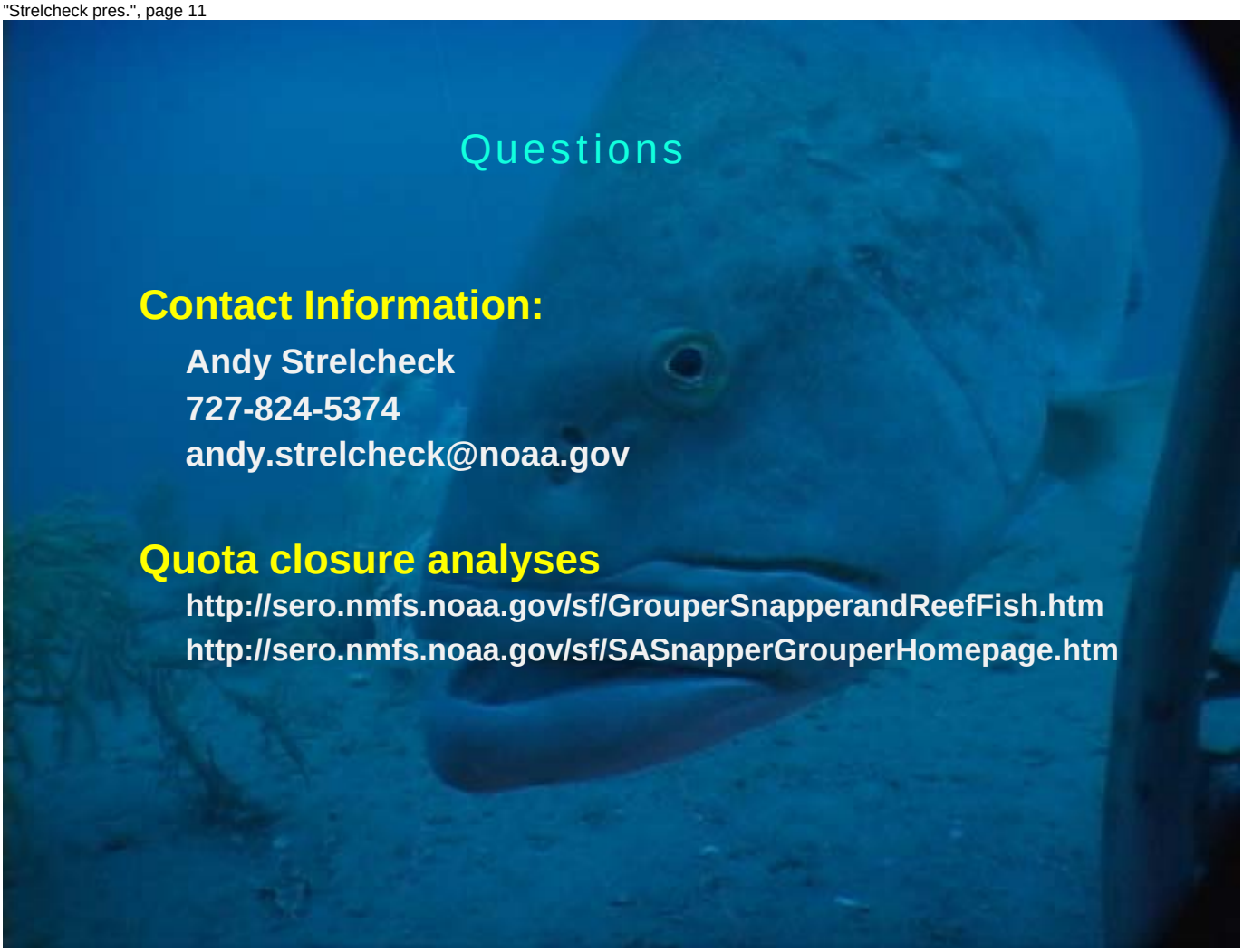
"Strelcheck pres.", page 11



"Van Voorhees pres.", page 1

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# Options for Improving Timeliness:
## Increasing the Frequency of Estimation

MRIP Timeliness Workshop
March 16, 2011

Dave Van Voorhees
Fisheries Statistics Division
Office of Science and Technology

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"Van Voorhees pres.", page 2

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# Purpose of Monitoring

- Determine total catch with respect to a set Quota or ACL
- Detect changes in fishing activity or catch rate as early as possible
- Avoid invoking Accountability Measures

2

"Van Voorhees pres.", page 3

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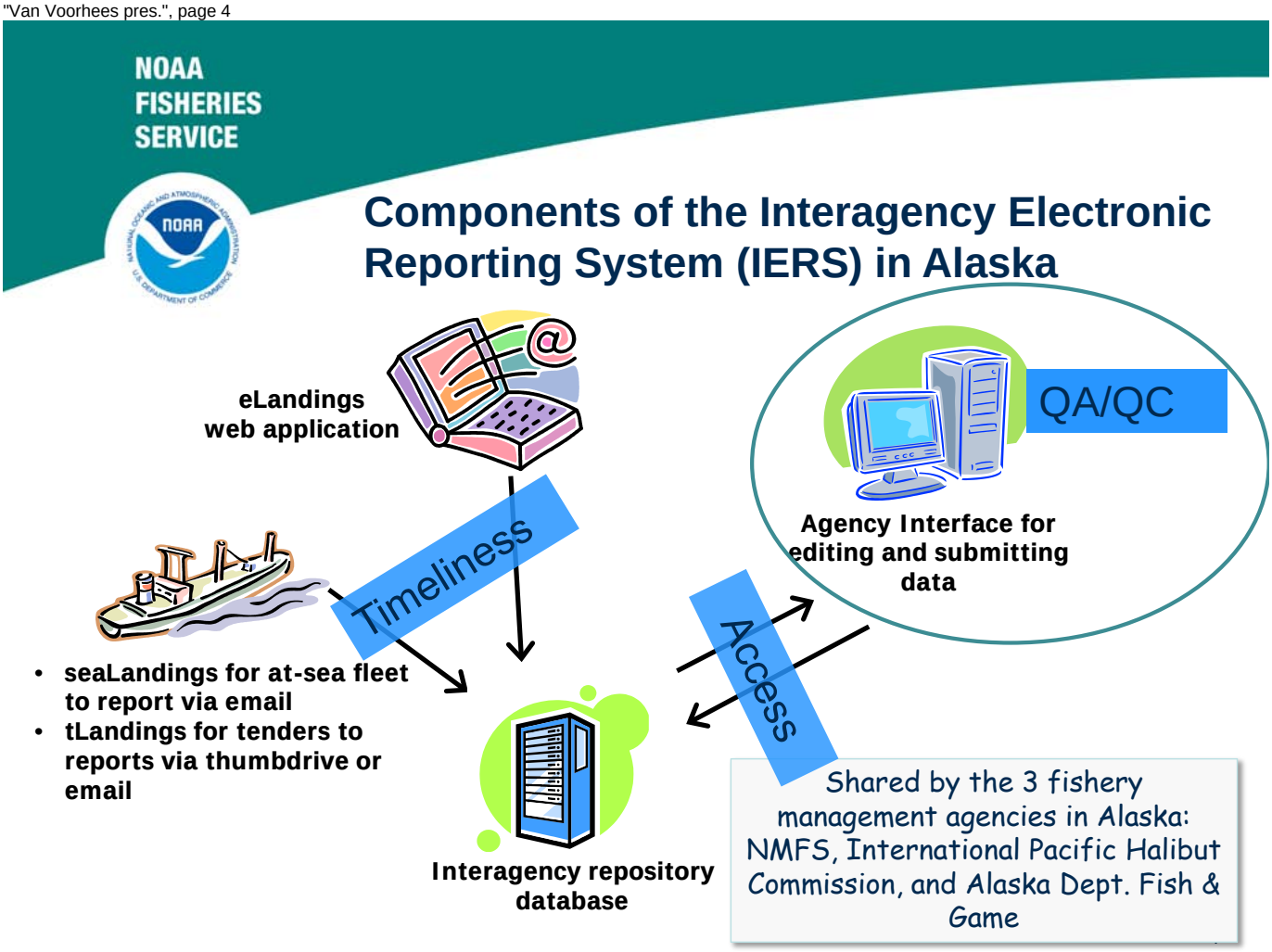
# What is needed for monitoring?

- Timeliness
  - Frequent updates of data and statistics
- Quality Data and Statistics
  - Error-free data ➔ unbiased catch statistics
  - Sufficient sampling ➔ precise catch statistics
- Access to Data and Statistics
  - As immediate as possible
- Reliable Forecasting
  - Accounting for known changes in fishery

3

"Van Voorhees pres.", page 4



"Van Voorhees pres.", page 5

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# Monitoring Factors

- Monitoring requirements should map to existing data collection capabilities
- Resolution of data collections and monitoring should match
- Collection capabilities and data resolution should be set to avoid Accountability Measures
- There is a desire to “get the last fish” and not leave any fish on the table

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"Van Voorhees pres.", page 6

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# Recreational Fishery Monitoring

- Managers want more frequent updates to catch statistics
  - Current frequency varies by region and fishery:
    - Bimonthly – Atlantic, Gulf, Puerto Rico, Hawaii,
    - Monthly – Pacific ocean groundfish, Atlantic HMS
    - Weekly or daily – Pacific salmon and halibut
  - Desired improvements in survey designs:
    - Scalability for finer temporal resolution
    - Scalability for finer spatial resolution
    - Sufficient QA/QC to assure error-free data
    - Sufficient sampling to provide desired statistical precision

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"Van Voorhees pres.", page 7

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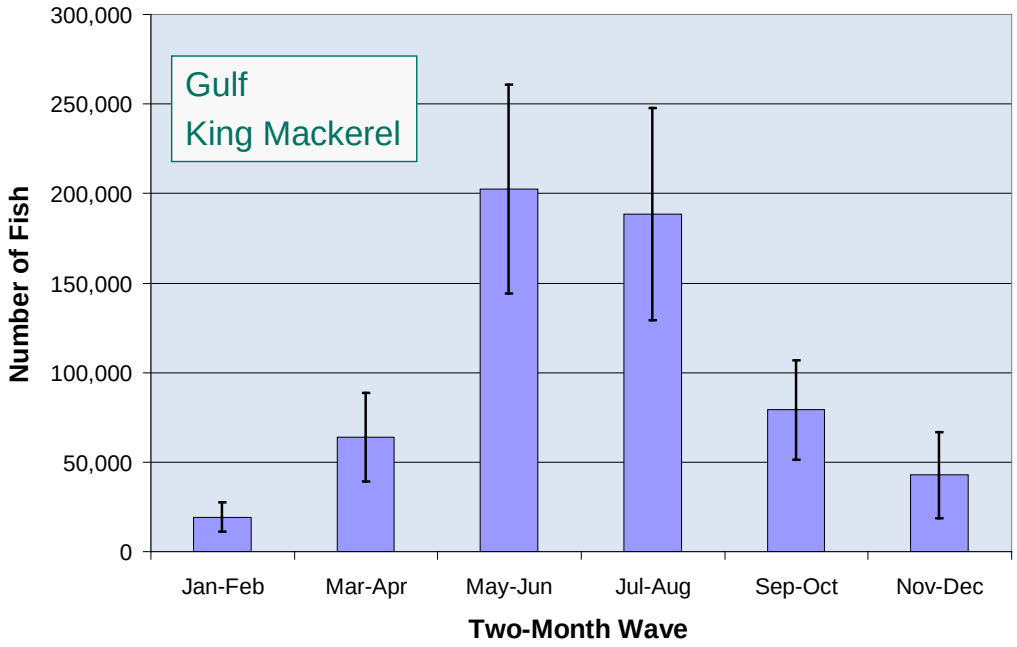
# Atlantic and Gulf of Mexico
## Bimonthly Catch Statistics

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"Van Voorhees pres.", page 8

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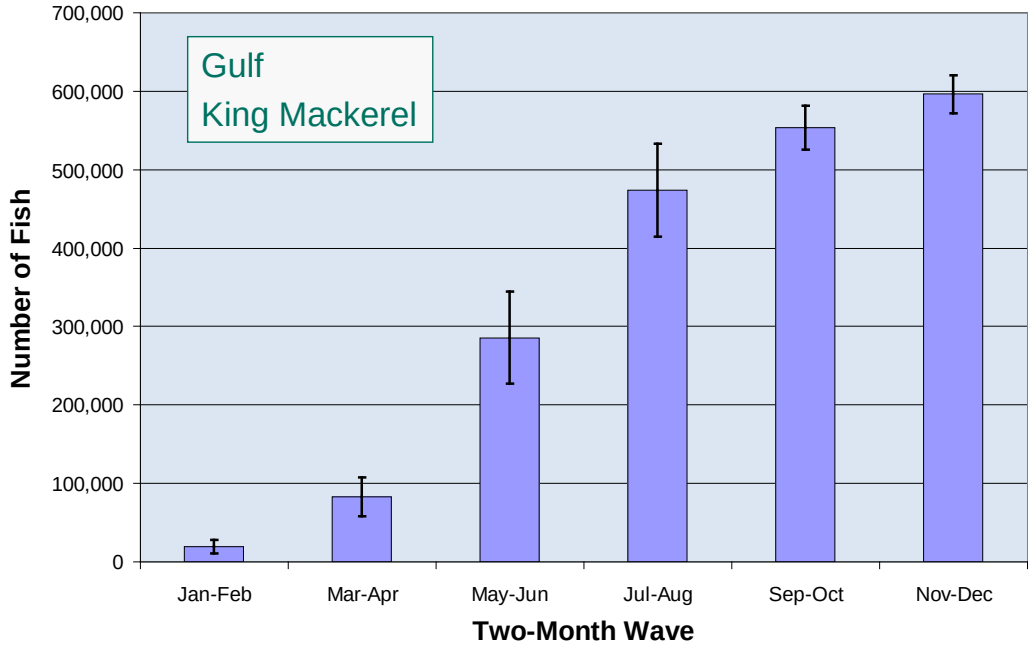
# Bimonthly Updates of Total Catch




8

"Van Voorhees pres.", page 9

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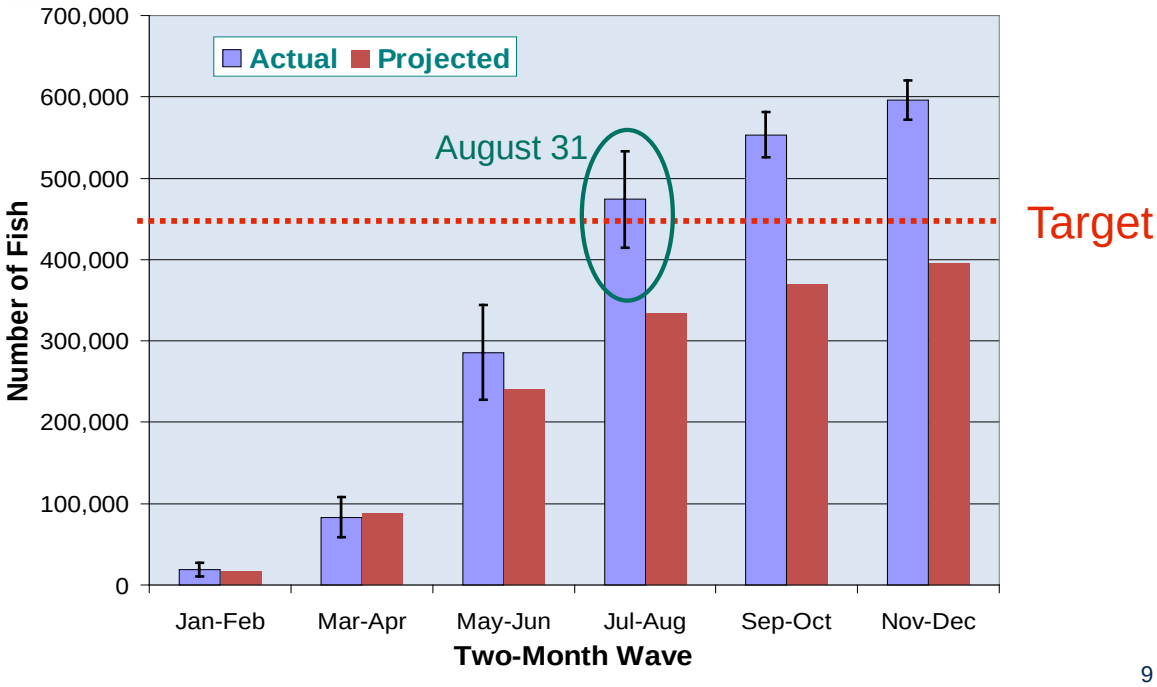
# Bimonthly Monitoring of Total Catch

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"Van Voorhees pres.", page 10

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# Can We Get Monthly Updates?

- We can change temporal stratification of fishing effort surveys to monthly
  - Phone calls made each month with one-month recall of trips
  - Effort estimates could be produced monthly
- We already stratify intercept survey sampling by month.
  - Mean catch rate and catch estimates could be produced monthly

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"Van Voorhees pres.", page 11

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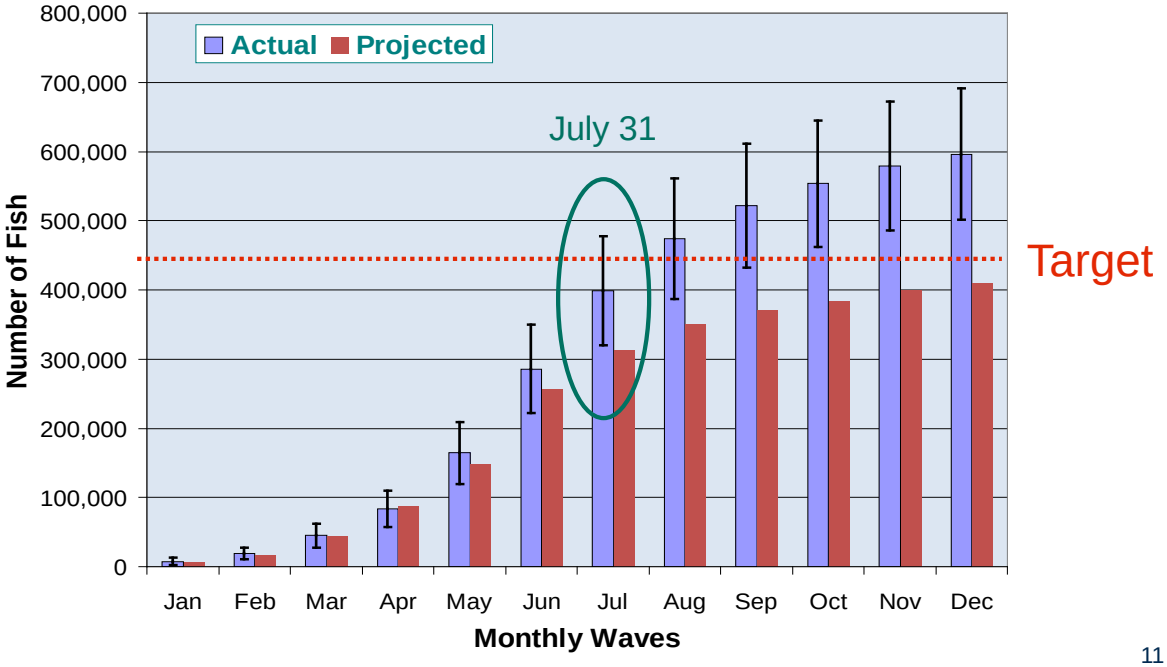
# Monthly Monitoring of Total Catch

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"Van Voorhees pres.", page 12

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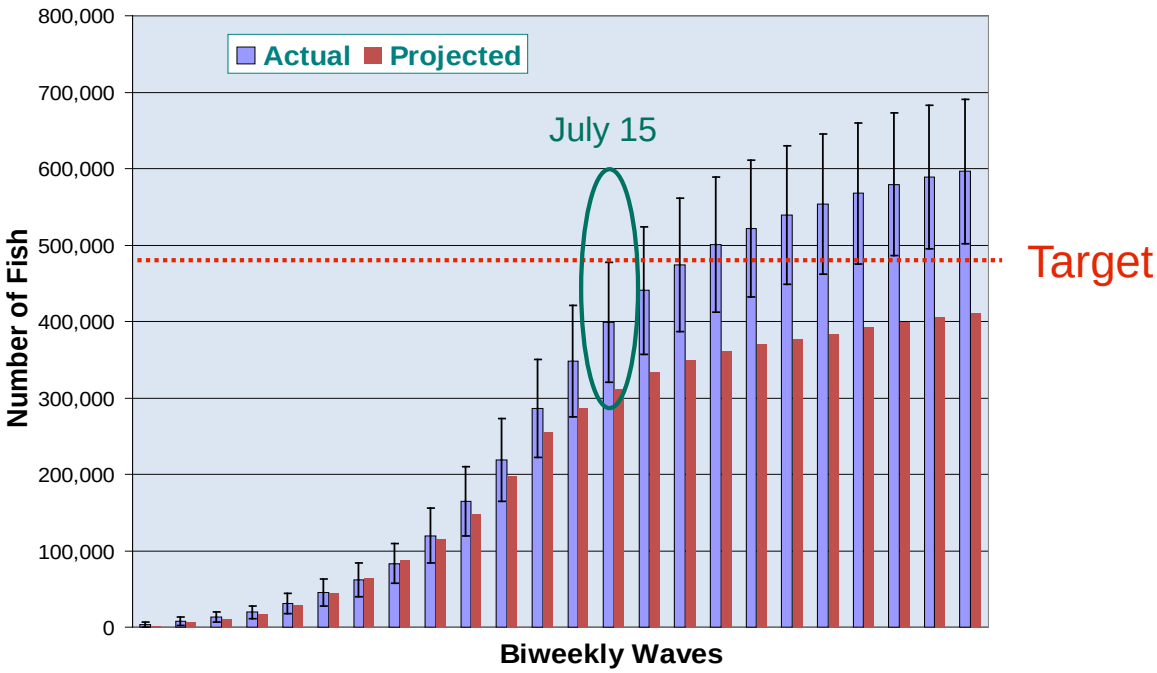
# Biweekly Monitoring?

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"Van Voorhees pres.", page 13

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# Sample Sizes and Costs?

- What sample sizes would be needed to get desired precision?
  - Can we just split bimonthly phone samples into 2 monthly samples?
  - Will standard intercept survey sample sizes be sufficient for monthly catch estimates?

- What would it cost?
  - Depends on the level of precision desired

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"Van Voorhees pres.", page 14

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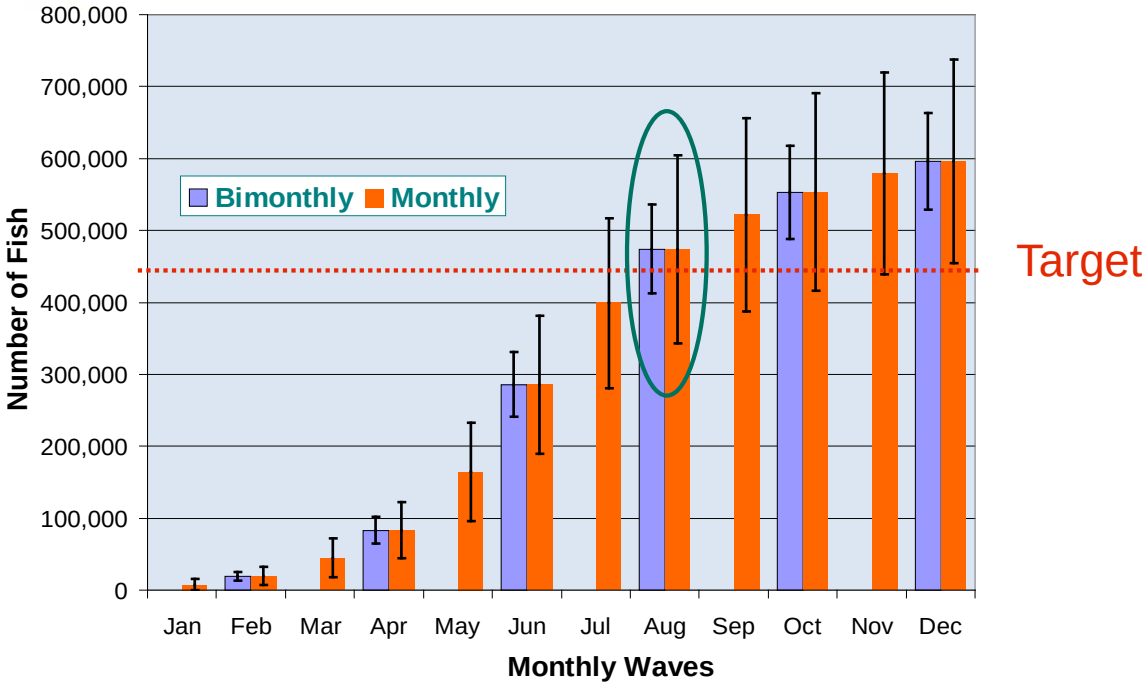
# Monthly vs. Bimonthly

## Simple Splitting of the Bimonthly Samples?

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"Van Voorhees pres.", page 15

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# How do we achieve desired precision?

- Monthly phone survey sample sizes must be greater than half of the standard bimonthly samples
  - —How much? ~40-50% greater
    - If bimonthly sample is 2,000, monthly sample should be 1,400-1,500
- Monthly intercept survey sample sizes must be greater than standards for bimonthly catch estimates
  - —How much? ~40-50% greater
    - Standard monthly sample of 1,000 should be increased to 1,400-1,500

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"Van Voorhees pres.", page 16

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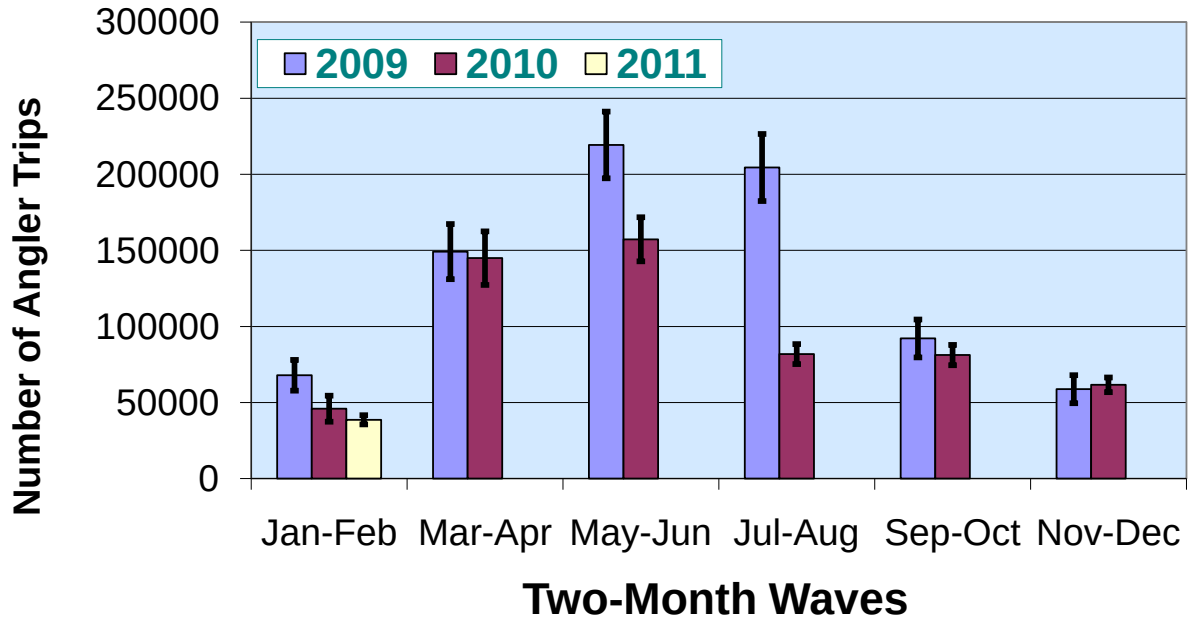
# Gulf For-Hire Telephone Survey

## Precision Effects of Increased Sampling

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"Van Voorhees pres.", page 17

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# How much would it cost?

- A monthly survey design would cost about 40-50% more than a standard bimonthly survey design
- A new MRIP bimonthly survey design may cost as much as 30-50% more to implement than the current MRFSS bimonthly design
- Therefore, a monthly MRIP design could cost as much as 70-100% more than what we currently spend on MRFSS designs

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"Van Voorhees pres.", page 18

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# What are the trade-offs to consider?

- Estimation frequency vs. Precision
  - Sampling levels must be increased to maintain same precision in total catch estimates at 2-month intervals.
- Optimizing sample allocations among monthly waves?
  - Should we front-load or target the sampling?
    - Could improve precision for species monitored in season.
    - May decrease precision for other species with late season patterns.

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"Van Voorhees pres.", page 19

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# Monthly estimates or monthly updates?

- Will we scrutinize estimates for each month or focus on the relative precision of cumulative catch estimates?

- The temporal stratification should be employed to get a more precise cumulative estimate over several time periods.

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"Van Voorhees pres.", page 20

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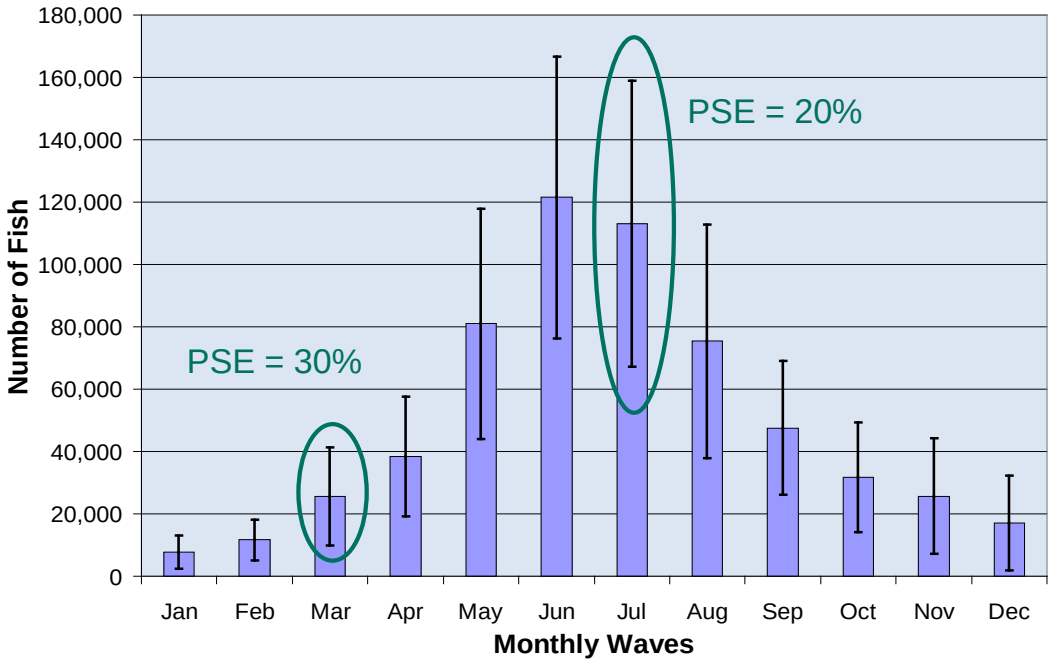
# Monthly Catch Estimates

## How precise must each of these be?

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"Van Voorhees pres.", page 21

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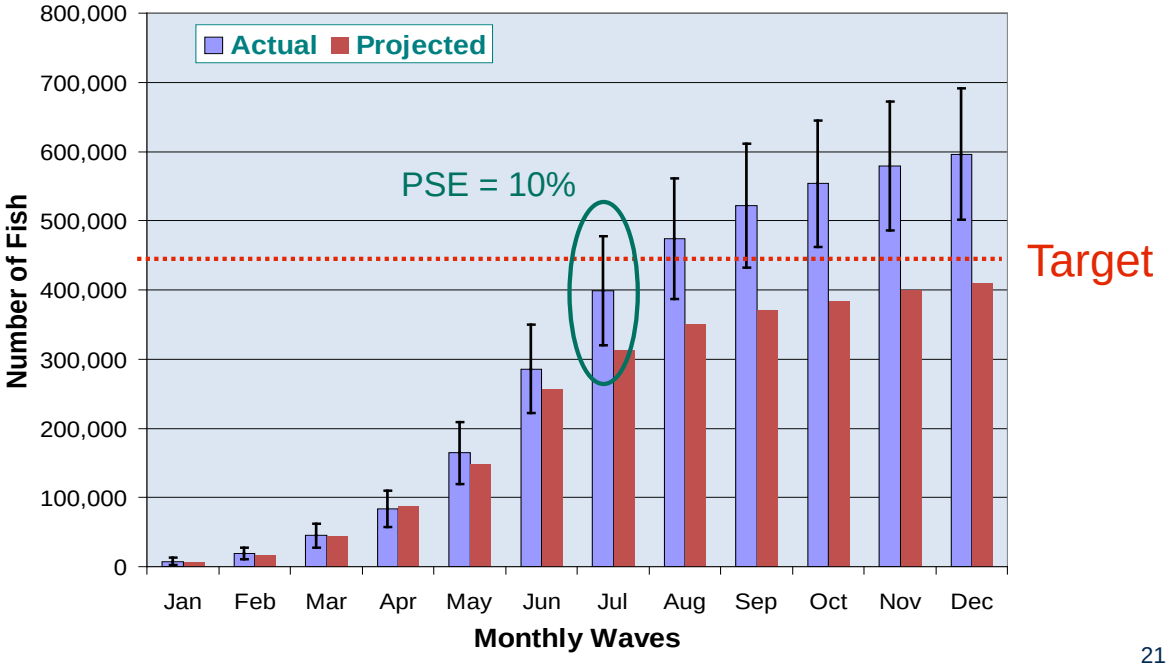
# Monthly Catch Updates

## Aren't these estimates the most important ones?

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"Van Voorhees pres.", page 22

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# Important Issues

- The individual monthly estimates will not be as precise as standard individual bimonthly estimates.
  - —Unless sample sizes are doubled across the board
- However, monthly estimates could be combined to produce cumulative estimates that are as precise as those based on standard bimonthly estimates
  - —As long as sample sizes are increased by 40-50%

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"Van Voorhees pres.", page 23

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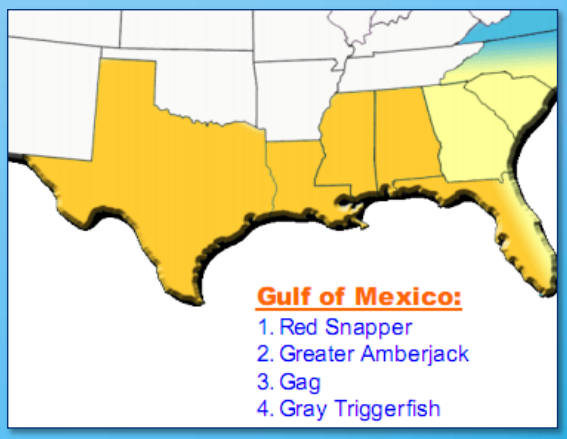
# Questions?

"Froeschke pres. ", page 1

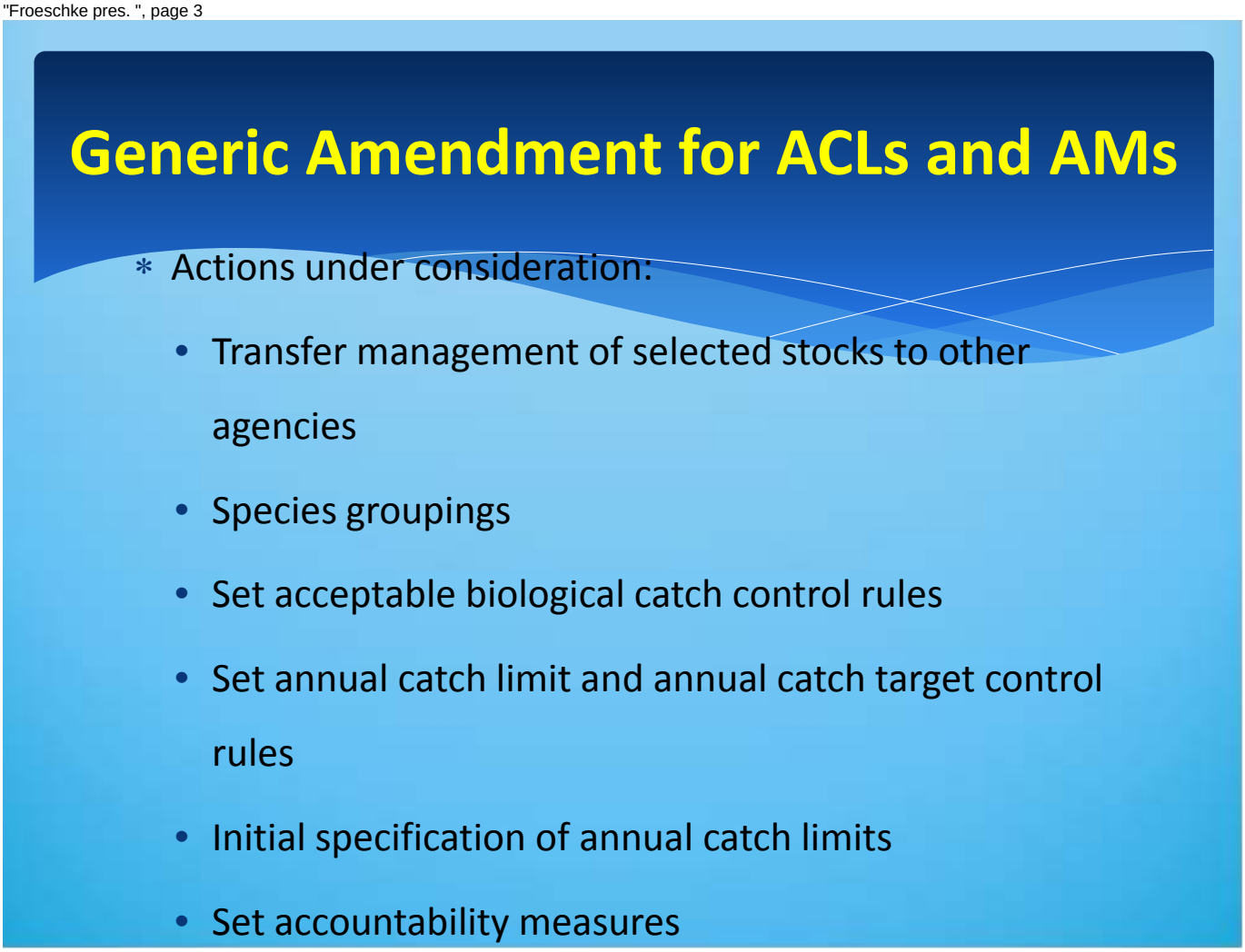
"Froeschke pres. ", page 2

# Annual Catch Limits and Accountability Measures not yet Established

* The Gulf Council is currently developing annual catch limits and accountability measures for:
  - 50 Stocks
    - 4: Overfished
    - 9: Overfished and overfishing
    - 5: Neither overfished or overfishing
    - 32: Stock status unknown
      - Generally data poor
      - Many only have landings history

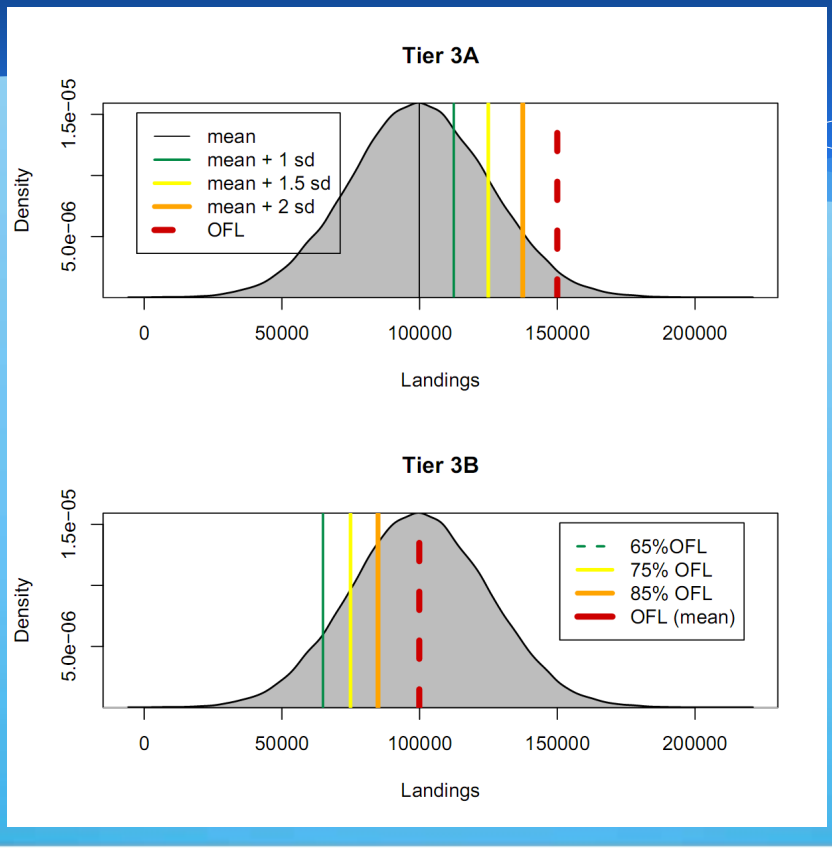


"Froeschke pres. ", page 3

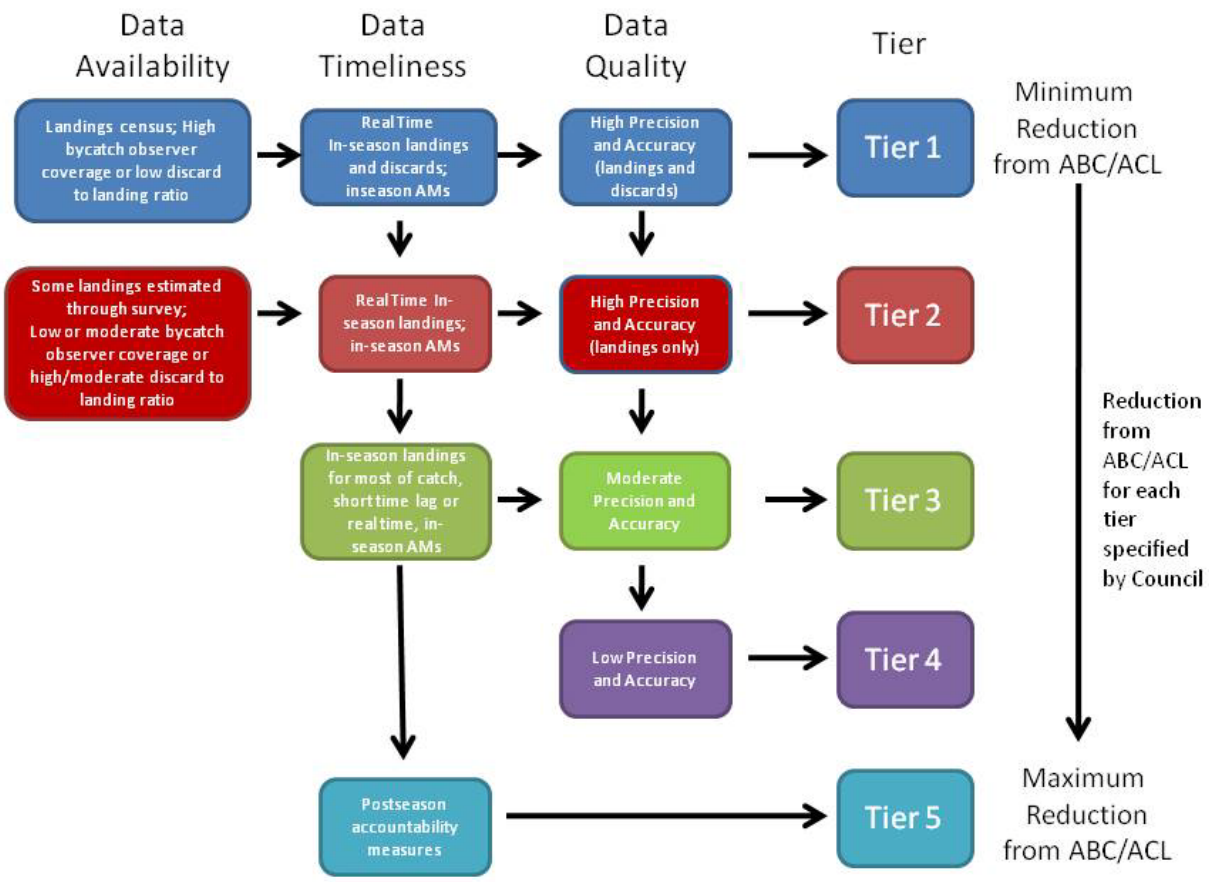


"Froeschke pres. ", page 4

# Tier 3 ABC Control Rule



"Froeschke pres. ", page 5



"Froeschke pres. ", page 6

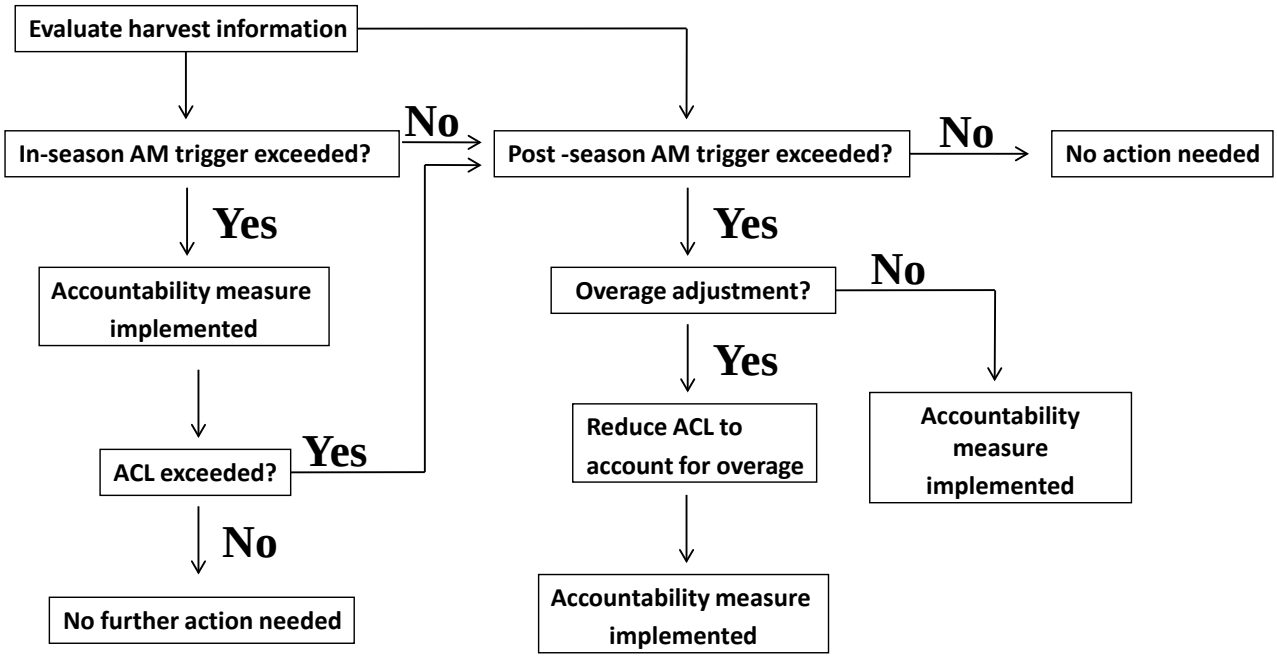
| Alternative Tiered Buffers Under Consideration | | |
|---|---|---|
| **a: 0% - 35%** | **b: 0% - 25%** | **c: 0% - 15%** |
| **Tier 1 – 0% buffer** | 0% buffer | 0% buffer |
| **Tier 2 – 5% buffer** | 3.6% buffer | 2.1% buffer |
| **Tier 3 – 15% buffer** | 10.7% buffer | 6.4% buffer |
| **Tier 4 – 25% buffer** | 17.9% buffer | 10.7% buffer |
| **Tier 5 – 35% buffer** | 25% buffer | 15% buffer |

Factors affecting buffer selection

- Timeliness
- Quality
- Availability

"Froeschke pres. ", page 7

# Accountability Measures



"Froeschke pres. ", page 8

# Accountability Measures

| Species | In-season | Post-season |
|---|---|---|
| Greater amberjack | If projected to exceed ACL, close fishery | If exceed ACL, shorten the next season to recover from overage |
| Gray triggerfish | | If 3-year average landings exceed ACL, reduce season length in next year |
| Gag | | If 3-year average landings exceed ACL, reduce season length in next year so as to not exceed annual catch target |
| Red grouper | | If 3-year average landings exceed ACL, reduce season length in next year so as to not exceed annual catch target |
| Red snapper | If projected to exceed ACL, close fishery | Limit the season length to that needed to harvest the quota |

"Froeschke pres. ", page 9

# Conclusions

- At least 18 stocks or stock complexes require ACLs
- Harvest not allocated for most
- Variety of accountability measures being considered
  - Post-season only
  - In-season based on projected landings
- Moving forward
  - Estimate effort to develop CPUE indices
  - Consider smoothing to reduce spurious single-year effects of landings

"Froeschke pres. ", page 10