Science, Service, Stewardship

NMFS Performance Metrics

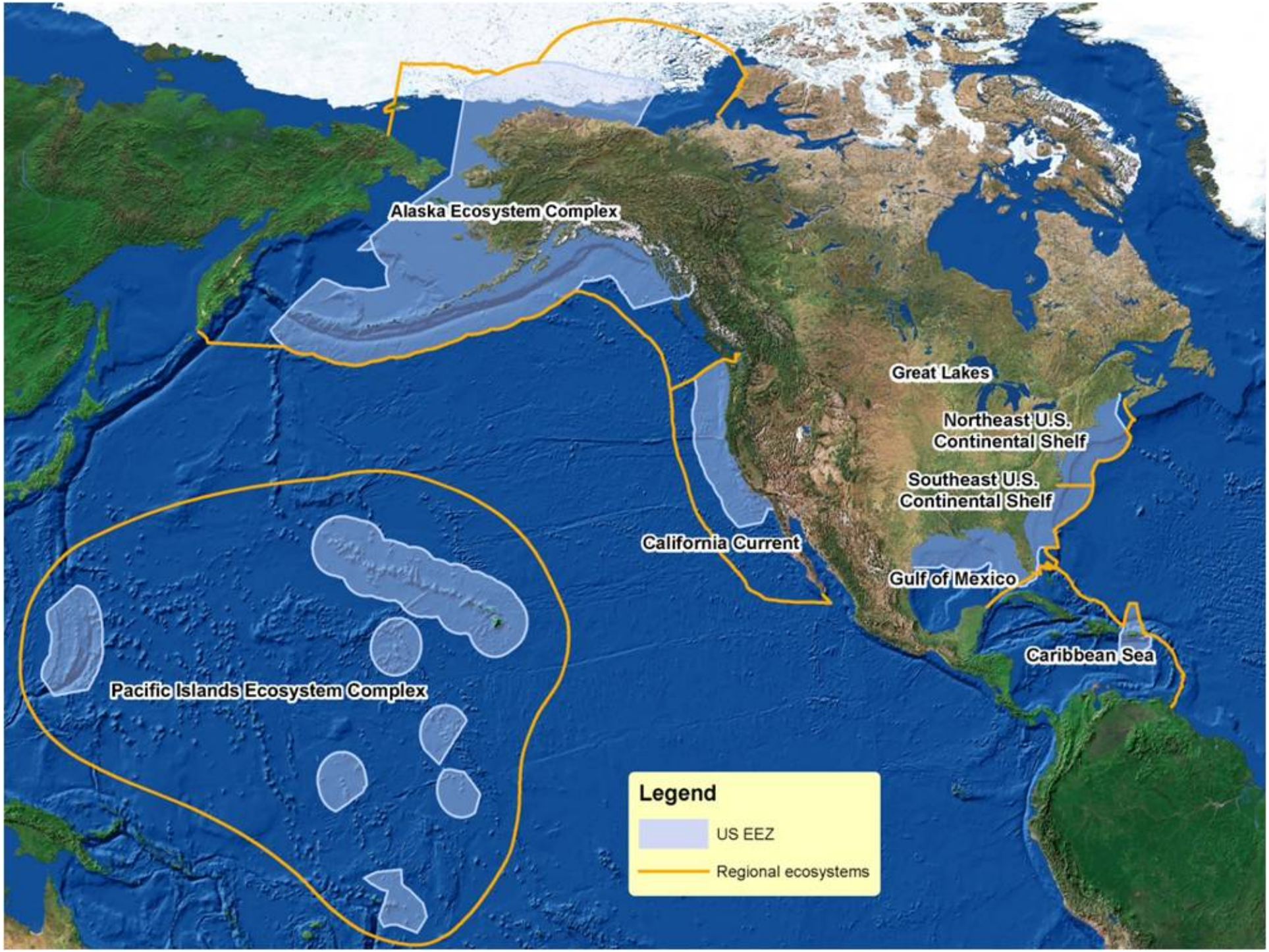
David Detlor
Deputy Director
NMFS Office of Science & Technology

NOAA FISHERIES SERVICE

NOAA
FISHERIES
SERVICE

Presentation Outline

- NOAA Fisheries 101
  - Magnuson-Stevens Act = fish mandate
  - Stock assessments: The science of fisheries
- DOC High Priority Performance and GPRA Measures
  - Fish Stock Sustainability Index
  - % of Stocks with Adequate Assessment
- Lessons Learned


Alaska Ecosystem Complex
Great Lakes
Northeast U.S.
Continental Shelf
Southeast U.S.
Continental Shelf
California Current
Gulf of Mexico
Caribbean Sea
Pacific Islands Ecosystem Complex
Legend
US EEZ
Regional ecosystems

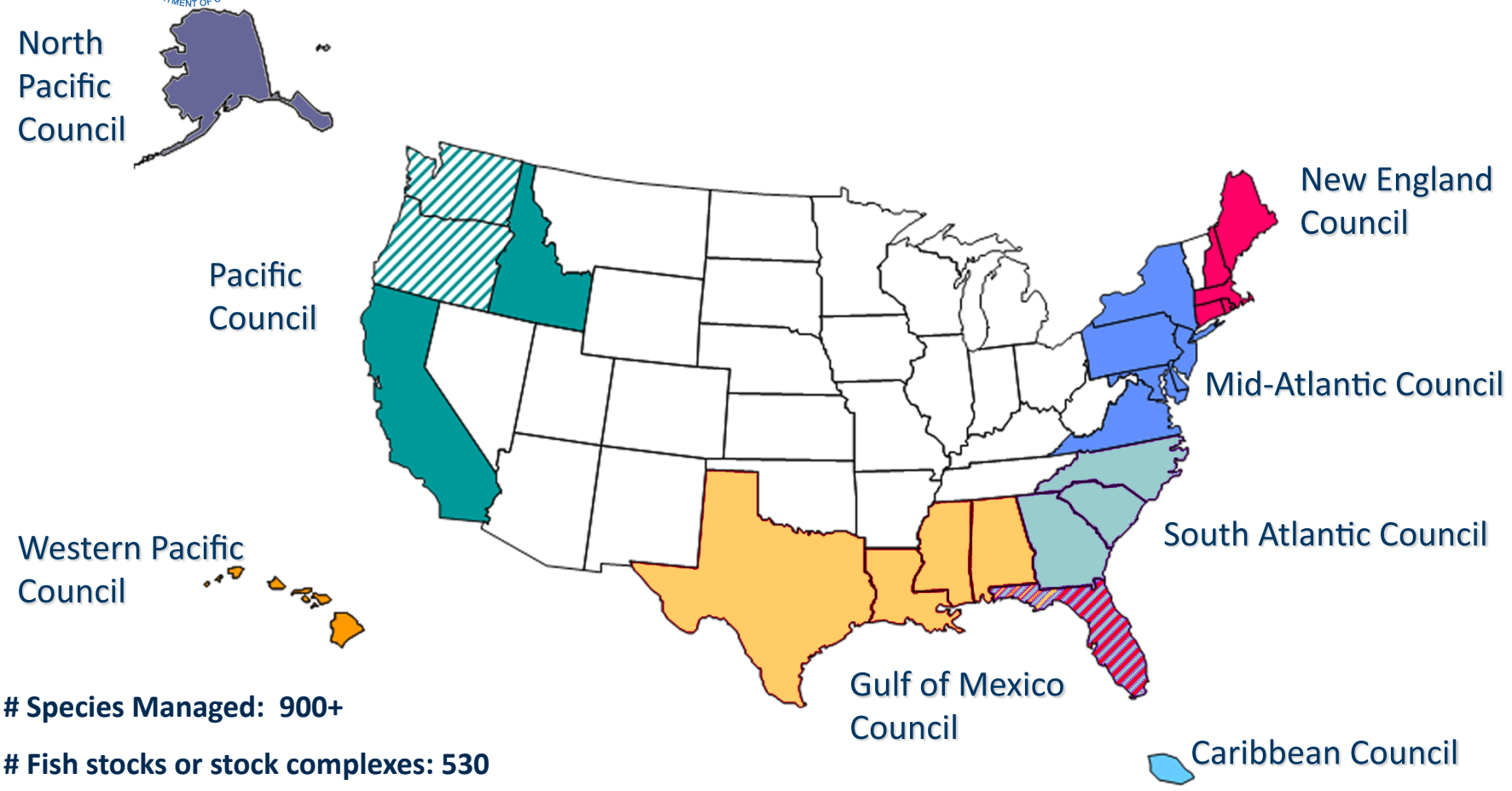
NOAA FISHERIES SERVICE

Mandate from Magnuson-Stevens Act

- National Standard 1
  - Conservation and management measures shall prevent overfishing while achieving the optimum yield of each fishery
- Fishery Management Plans must:
  - Specify objective and measurable criteria for identifying when a fishery is overfished
  - Establish annual catch limits to ensure overfishing does not occur
- Thus, NOAA's stock assessment mandate

NOAA FISHERIES SERVICE

Regional Fishery Management Councils



 # Species Managed: 900+

 # Fish stocks or stock complexes: 530

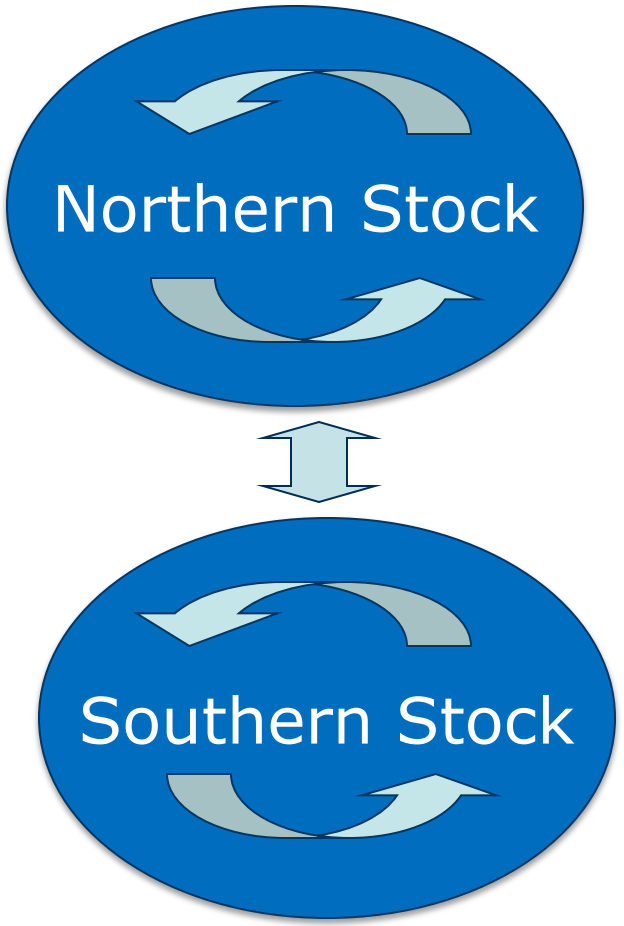
 # Fishery Management Plans: 47

NOAA FISHERIES SERVICE

Stock Assessment Defined

- Stock
  - Subpopulation of a species of fish that inhabit the same geographic region and interbreed when mature
  - Multi-species complex ≠ true biological stock

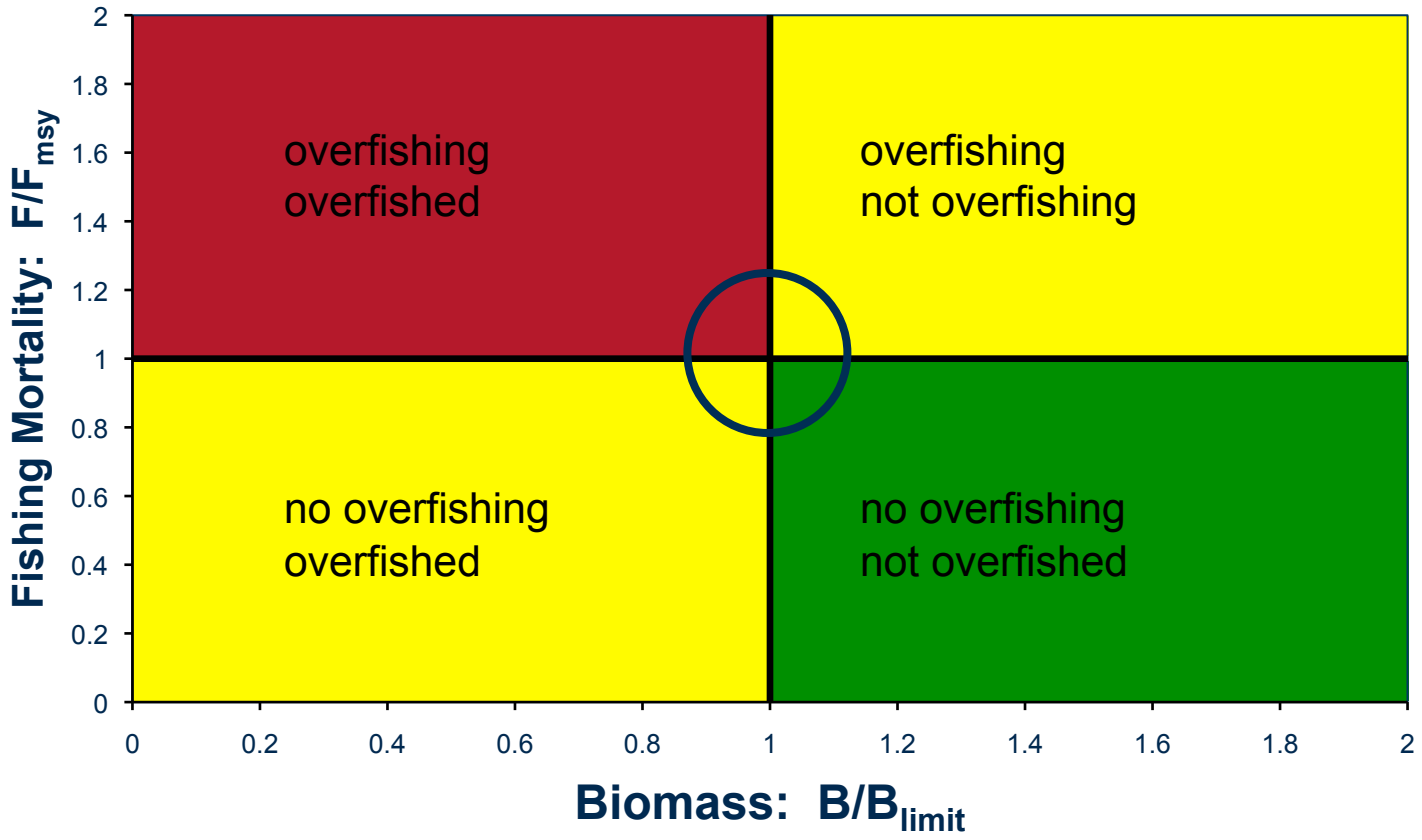
- Stock Assessment
  - The process of collecting and analyzing biological and statistical information to determine the effects of fishing on fish populations and, to the extent possible, predict future trends



NOAA FISHERIES SERVICE

Status Determination

- ***Did overfishing occur last year?***
- ***Is abundance below the overfished limit?***



Managing at the margins makes changes in stock status likely, given expected variation in assessments.

In this instance, 75% of the outcomes are bad.

NOAA FISHERIES SERVICE

Assessment Summary

- Assessments are designed to answer management questions
  - What level of catch next year would correspond to the target harvest policy?
  - What level of catch next year has a 50% chance, or less, of causing overfishing?
- Variety of methods tuned to data availability scenarios
- Assessments produce estimates of stock abundance, mortality, and productivity
- Forecasts provide probability distribution of future stock conditions and yield under alternative harvest scenarios

NOAA FISHERIES SERVICE

Government Performance and Reporting Act (GPRA) Performance Measures

- In 2005, NOAA developed and began tracking two measures, based on 230 stocks
  - Fish Stock Sustainability Index (FSSI)
  - Percent of FSSI stocks with adequate assessments

- Adequate means:
  - Assessment capable of providing minimal status determination and ABC forecasting needs
  - Assessment has passed review process
  - Assessment has been updated within past 5 years

NOAA FISHERIES SERVICE

Fish Stock Sustainability Index

- **Outcome measure reported quarterly since 2005**

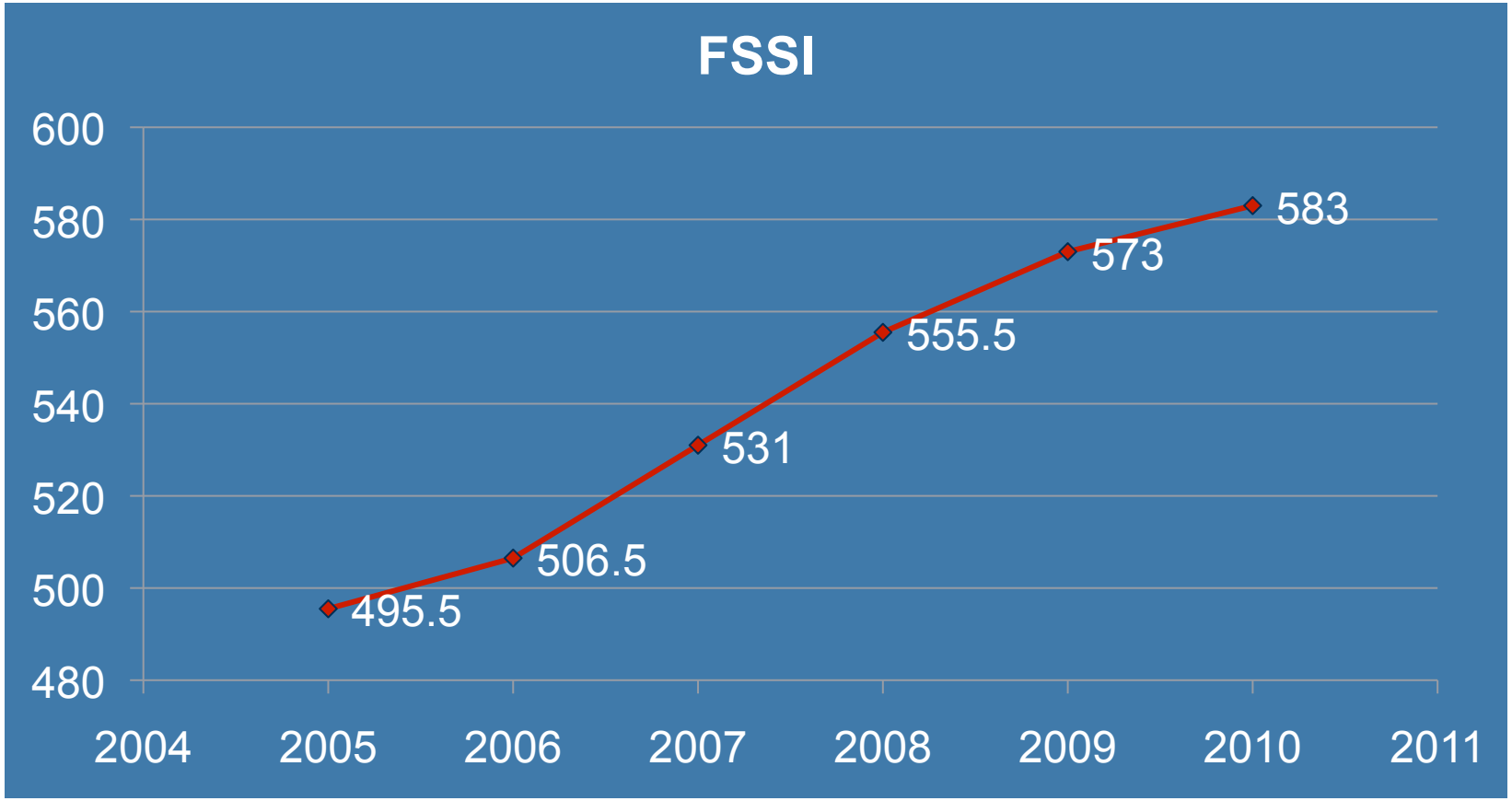
- **Measure Progress:** The FSSI will increase as stock status becomes known, overfishing is ended, and stocks increase to the level that provides maximum sustainable yield.

	Criteria	Points Awarded
1	Overfished status is known	0.5
2	Overfishing status is known	0.5
3	Overfishing is not occurring (for known stocks)	1.0
4	Stock biomass is above overfished level	1.0
5	Stock biomass is ≥ 80% of maximum sustainable biomass (B_{MSY})	1.0

The maximum score each stock may receive is 4. The value of the FSSI is the sum of all 230 stocks (i.e., 920 maximum points).

NOAA
FISHERIES
SERVICE

FSSI progress since 2005



NOAA FISHERIES SERVICE

Percentage of Fish Stocks with Adequate Population Assessments and Forecasts

- **Outcome measure reported quarterly since 2005**

- **Measure Progress:** An assessment is considered to be completed when it has completed its regional technical review and has been judged to be the best available science. Extensive external peer reviews may be used for new or controversial assessments, and internal panels may serve for routine updates of previously reviewed assessments.

- **Definition of Adequate:** An assessment is "Adequate" if it achieves an assessment level of 3 or higher and it has been done or updated within the past 5 years. Level 3 assessments employ dynamic population models capable of estimating stock abundance and fishing mortality.

	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16
Target	51.7%	52.2%	55.7%	56.1%	59.1%	57.4%	60.4%	60.4%	63.0%	65.7%	69.1%	72.6%
Actual	51.7%	52.2%	55.7%	56.1%	59.1%	57.4%	-	-	-	-	-	-

NOAA FISHERIES SERVICE

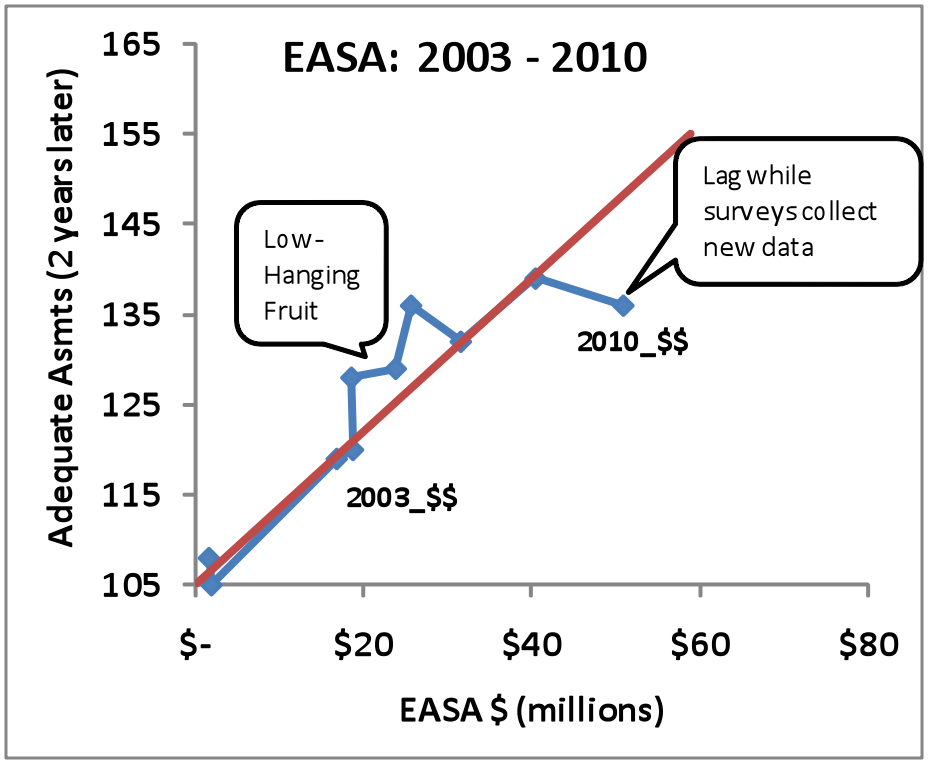
Five Levels of Assessment

1. **Index**: a simple index tracks trends, but no information on fishery mortality (F)
2. **Equilibrium**: A snapshot of the stock's demographics provides information on average F
3. **Dynamic**: Analyzes trends and catch to inform on abundance and F; minimally adequate
4. **Age-structured**: adds age and/or size data to provide more detail and better forecasts; where most full assessments are today
5. **Ecosystem**: Adds spatial structure and/or linkages to ecosystem/environmental/habitat to provide more accurate information

NOAA FISHERIES SERVICE

How are we doing for the 230 FSSI stocks?

Year	Assess-ments Done	Stocks with Adeq. Asmt.
2000	37	106
2001	53	111
2002	64	106
2003	60	107
2004	63	108
2005	104	121
2006	71	121
2007	78	129
2008	76	131
2009	84	137
2010	TBD	132
2011	TBD	139
2012	TBD	136



NOAA FISHERIES SERVICE

Performance Measure Considerations

- Elegance in simplicity
- Data supporting measure must be consistently available, reliable, and based on best available science
- Outyear targets should be clearly defined and ambitious
- Measure should be sensitive to budget changes
- Be mindful of time lags

NOAA
FISHERIES
SERVICE

BACKUP SLIDES

NOAA
FISHERIES
SERVICE

DOC High Priority Performance Goals

Coastal and Ocean Resource Management: Ensure environmentally and economically resilient oceans, coasts, and Great Lakes communities, with healthy and productive ecosystems.

- Ensure that all 46 Federal fishery management plans have required catch limits to end overfishing in place by the end of 2011.
- Reduce the number of stocks subject to overfishing to zero by the end of 2011.
- Improve the Fish Stock Sustainability Index (FSSI) to 586 (4% increase) by the end of 2011.
  - The FSSI is a measure of stock assessments and overfishing.

NOAA FISHERIES SERVICE

Percentage of Protected Species Stocks with Adequate Population Assessments and Forecasts

- **Outcome measure reported quarterly since 2005**
- **Measure Progress:** Achieved when stock assessment document is published for management use in recovery and conservation decisions.
- **Definition of Adequate:** An assessment is "Adequate" if it achieves specified information levels in terms of abundance, mortality, life history, assessment frequency and quality, anthropogenic impacts, and stock/population structure based on the 2004 SAIP and 2009 working group revisions.

	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16
Target	24.8%	26.1%	26.6%	25.2%	29.8%	20.1%	18.6%	21.9%	23.7%	26.0%	27.6%	28.3%
Actual	24.8%	26.1%	26.6%	25.2%	29.8%	20.1%	-	-	-	-	-	-

NOAA FISHERIES SERVICE

Prioritization of PR Assessments

- Currently 390 stocks
- Stock level has changed over the life of this measure
  - Started at 260 stocks in 2003
- Stock # determined by science; new listings; stock splits recommended by Centers
- Assessments are prioritized by age of assessment (they expire); status of stock (Depleted, ESA Endangered, newly listed); litigation needs; Congressional interest; petitions

NOAA FISHERIES SERVICE

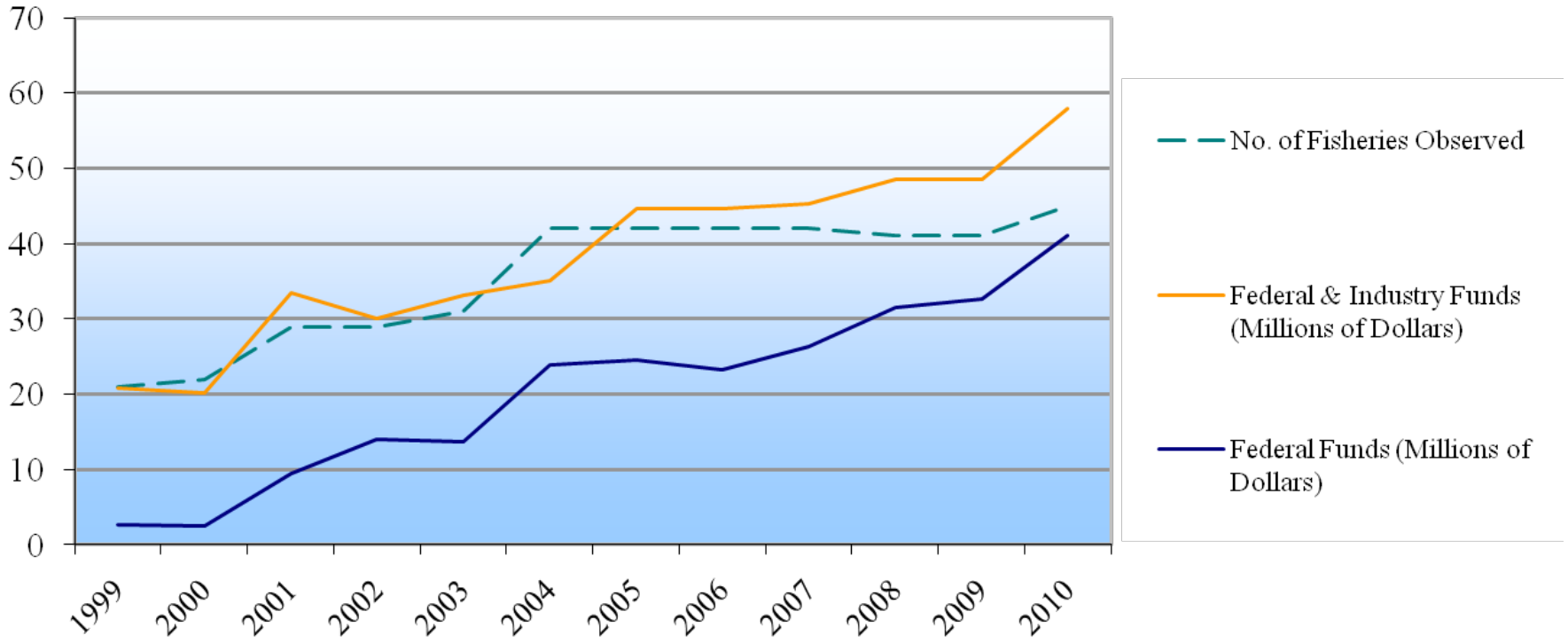
Number of Fisheries Observed at Adequate Levels of Coverage

- **Output measure reported annually since 1999**
- **Measure Progress:** Each fishery observer program reports on the number of fisheries observed at adequate observer coverage levels at the end of the year.
- **Adequate Coverage:** Adequate coverage is defined as a sampling scheme that minimizes total error in the catch and bycatch estimates for the target fleet, and is representative of fishing effort.

	FY10	FY11	FY12	FY13	FY14	FY15	FY16
Target	23	23	23	23	23	23	23
Actual	27	-	-	-	-	-	-

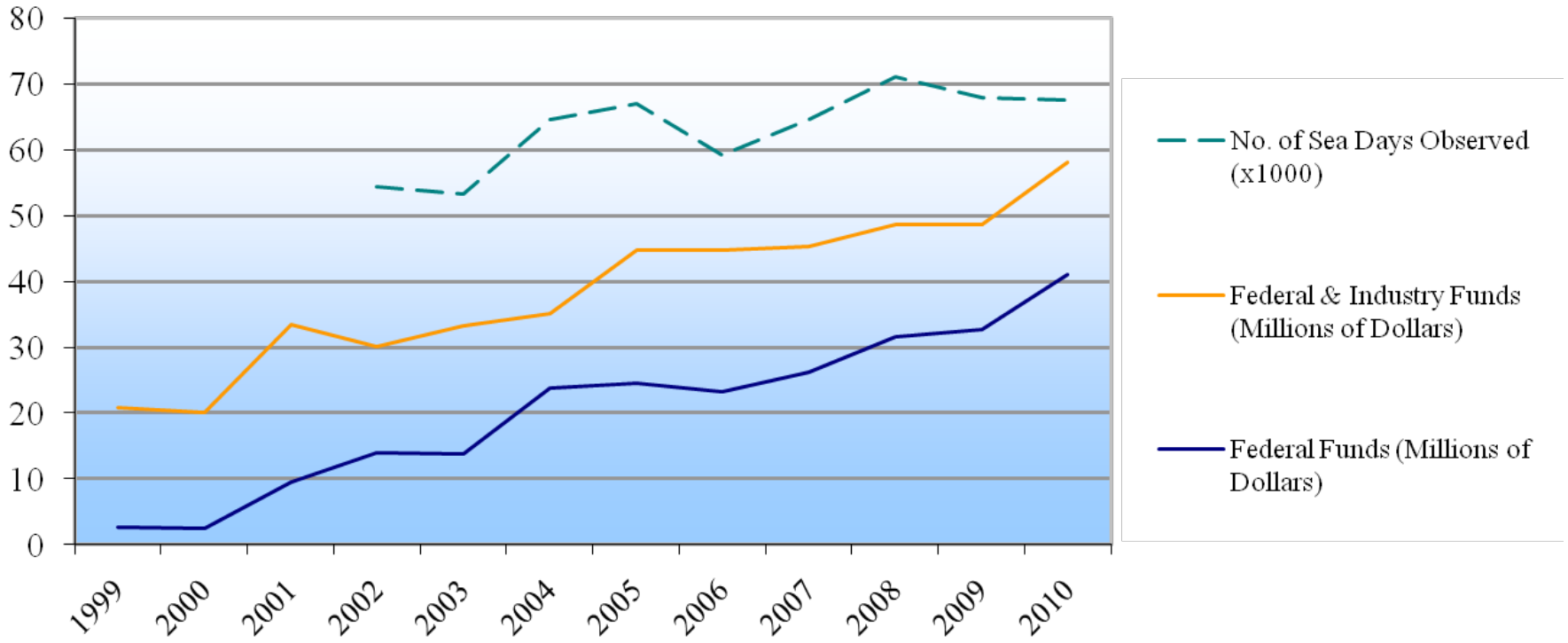
NOAA FISHERIES SERVICE

Fisheries Observed



NOAA
FISHERIES
SERVICE

Sea Days Observed



NOAA
FISHERIES
SERVICE

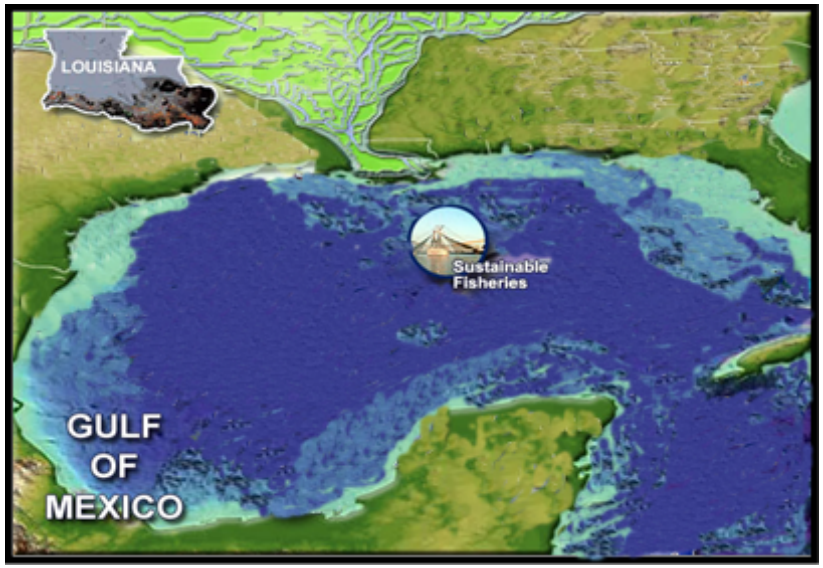
Observer Performance Perspective

- Authorization for NMFS Fisheries Observers
  - Magnuson-Stevens Act
  - Marine Mammal Protection Act
  - Endangered Species Act
- Funding Sources
  - Federal, Industry
- Statistics (2010)
  - 45 fisheries observed
  - Approx. 70,000 sea days observed
  - Annual deployment of ~700 observers

NOAA FISHERIES SERVICE

Single Sector Assessment versus Integrated Ecosystem Assessment

Single Sector Assessment



- Assesses individual species.
- Narrow perspective and spatial scale.
- Short-term perspective.
- Humans are independent of ecosystem.
- Conservative resource management.
- Single use observations.

Integrated Ecosystem Assessment (IEA)

- Provides a “big picture” of an ecosystem.
- Broad perspective and scale.
- Long-term perspective.
- Human impacts considered in models.
- Adaptive and integrated management.
- Shared and standardized observations.

NOAA FISHERIES SERVICE

Number of defined management needs, identified though the Integrated Ecosystem Assessment (IEA) process, met by Management Strategy Evaluations (MSEs)

- **Outcome measure reported annually starting in 2012**

- **Measure Progress:** When the MSEs are provided to managers, allowing them to make informed decisions based on the best available science, then the defined management need is considered to have been met

- **MSE:** Are a formal approach using models and forecast scenarios based on the best available science, to evaluate the benefits and risks (tradeoffs) of proposed management actions on ecosystems (including human activities) and to inform management decisions

	FY10	FY11	FY12	FY13	FY14	FY15	FY16
Target	0	0	4	6	8	10	16
Actual	0	0	-	-	-	-	-

NOAA FISHERIES SERVICE

California Current IEA Performance Measures

- The California Current IEA region is developing explicit management questions for these four broad items of interest:
  - Green Sturgeon (and Essential Fish Habitat) - as an example of a protected resource, including biogenic and abiotic habitats both on the seafloor and in the water column
  - Pacific Salmon recovery planning - a group of species that is of interest as a protected resource, fisheries target, and an aspect of ecosystem health
  - Sustainable California Current groundfish fisheries - as an example of the wild fishery EBM component
  - Maintenance of Ecosystem Health – ecosystem health refers to the structure and function of marine and coastal ecosystems and ecological communities.