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Caribbean Ecosystem Status Report Update

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Caribbean Fishery Management Council
Technical Advisory Panel Meeting
June 1, 2020



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What is an Ecosystem Status Report?

Challenges, Opportunities and Future Directions to Advance NOAA Fisheries Ecosystem Status Reports (ESRs):

Report of the National ESR Workshop

Wencheng L. Slater, Geret DePiper, Jamison M. Gove, Chris J. Harvey, Elliott L. Hazen, Sean M. Lucey, Mandy Karnauskas, Seann D. Regan, Elizabeth C. Siddon, Ellen M. Yasuniishi, Stephani G. Zador, Margaret M. Brady, Michael D. Ford, Roger B. Griffis, Rebecca L. Shuford, Howard M. Townsend, Todd D. O'Brien, Jay O. Peterson, Kenric E. Osgood, and Jason S. Link



U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA Technical Memorandum NMFS-F/SPO-174
September 2017

“Ecosystem Status Reports (ESRs) are synthesized scientific products that provide information on the past and possible future conditions of marine ecosystems based on suites of indicators. This information provides vital context for a range of decisions affecting marine ecosystems and supports an ecosystem approach to marine resource management” (Slater et al. 2017).

What is an Ecosystem Status Report (ESR)?

- ESRs summarize status and trends over time in a suite of vetted indicators, and these reports provide a broad overview of the current state of the integrated social, economic, ecological, and physical components of an marine ecosystem.

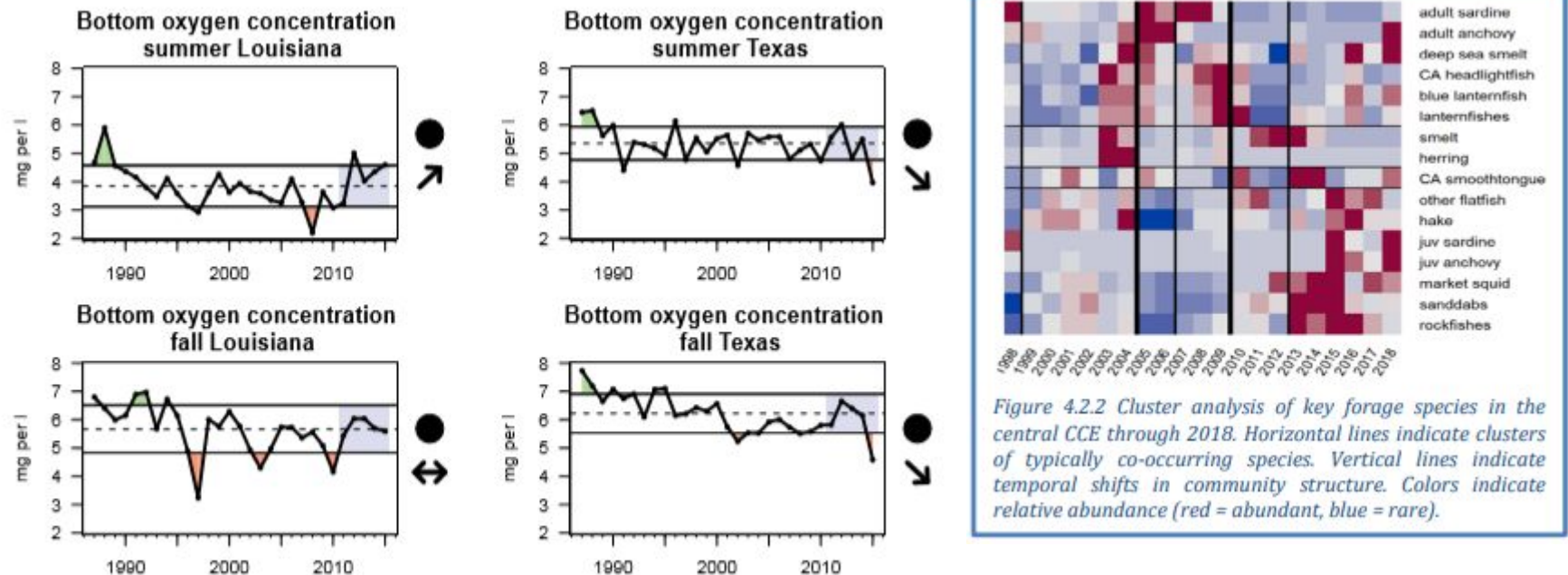
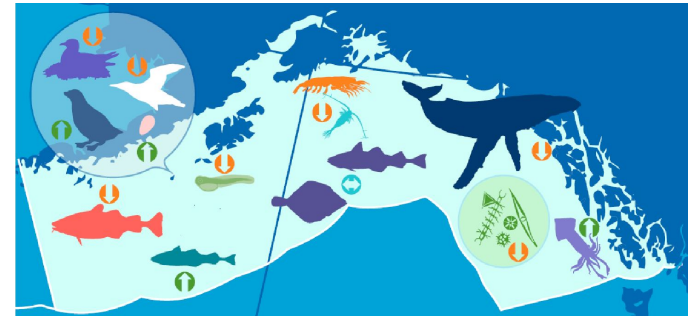


Figure 5.2. Average annual dissolved oxygen concentration values for the Louisiana (left) and Texas (right) coastal shelf, in summer (top) and fall (bottom).

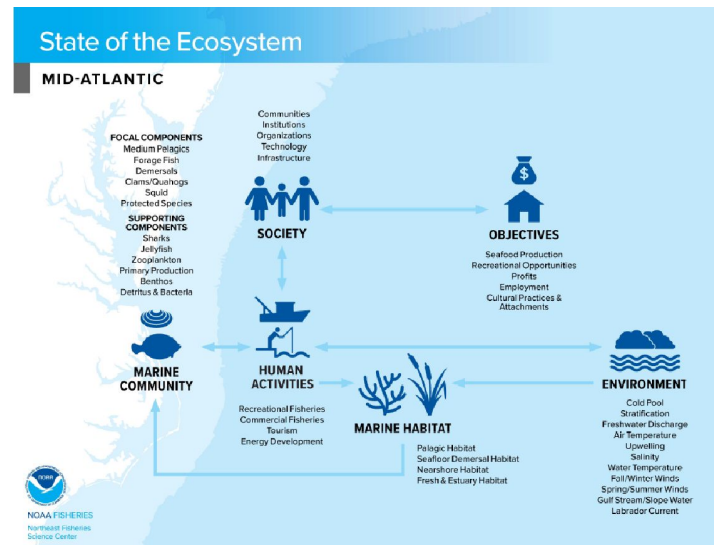
How are they used in management?



NPFMC: single-species quotas set in context of ecosystem information

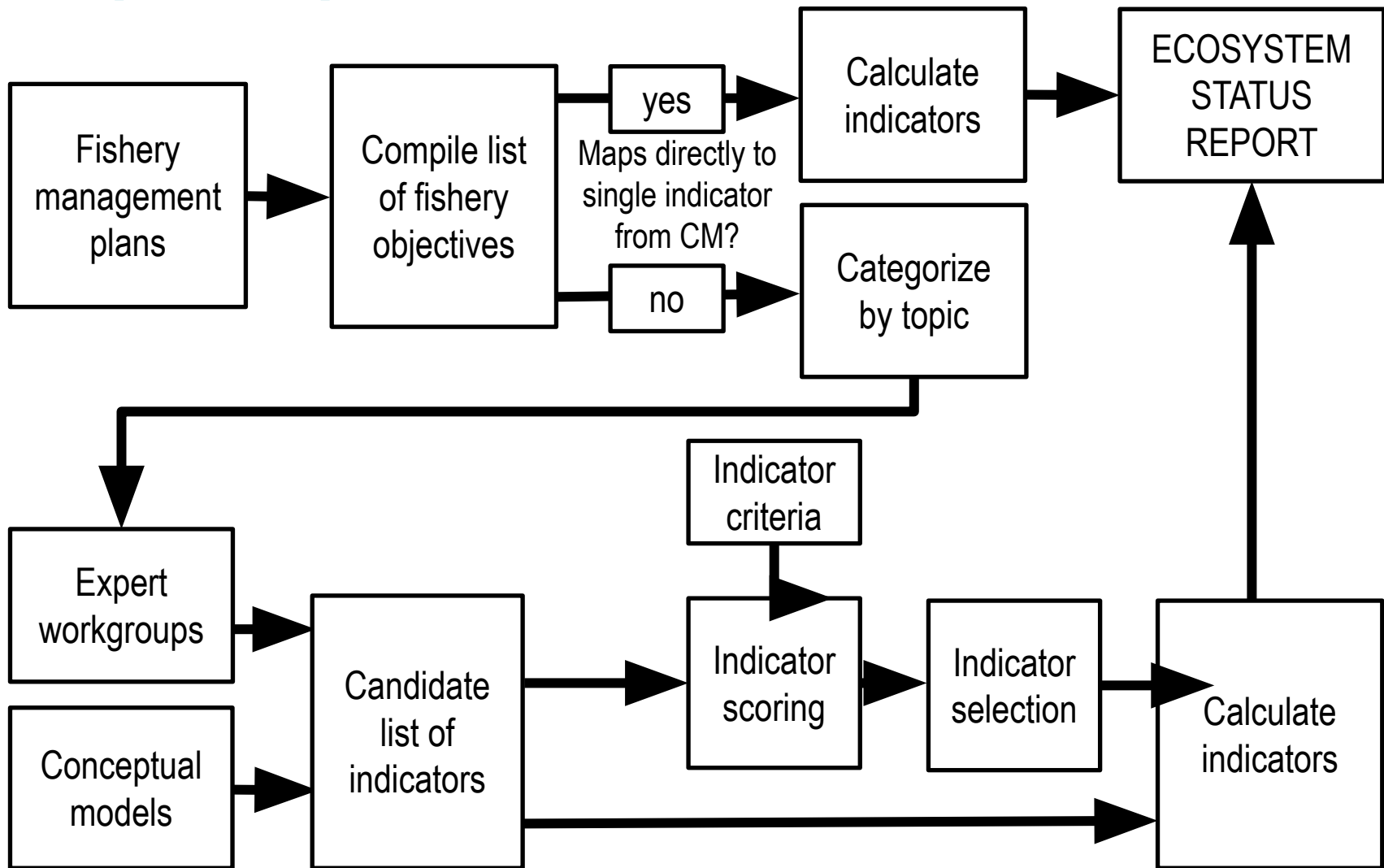


PFMC: Fishery Ecosystem Plan requires a yearly ESR describing status and trends, as context for decision-making



MAFMC: Indicators linked to specific management objectives

Proposed process for Caribbean ESR

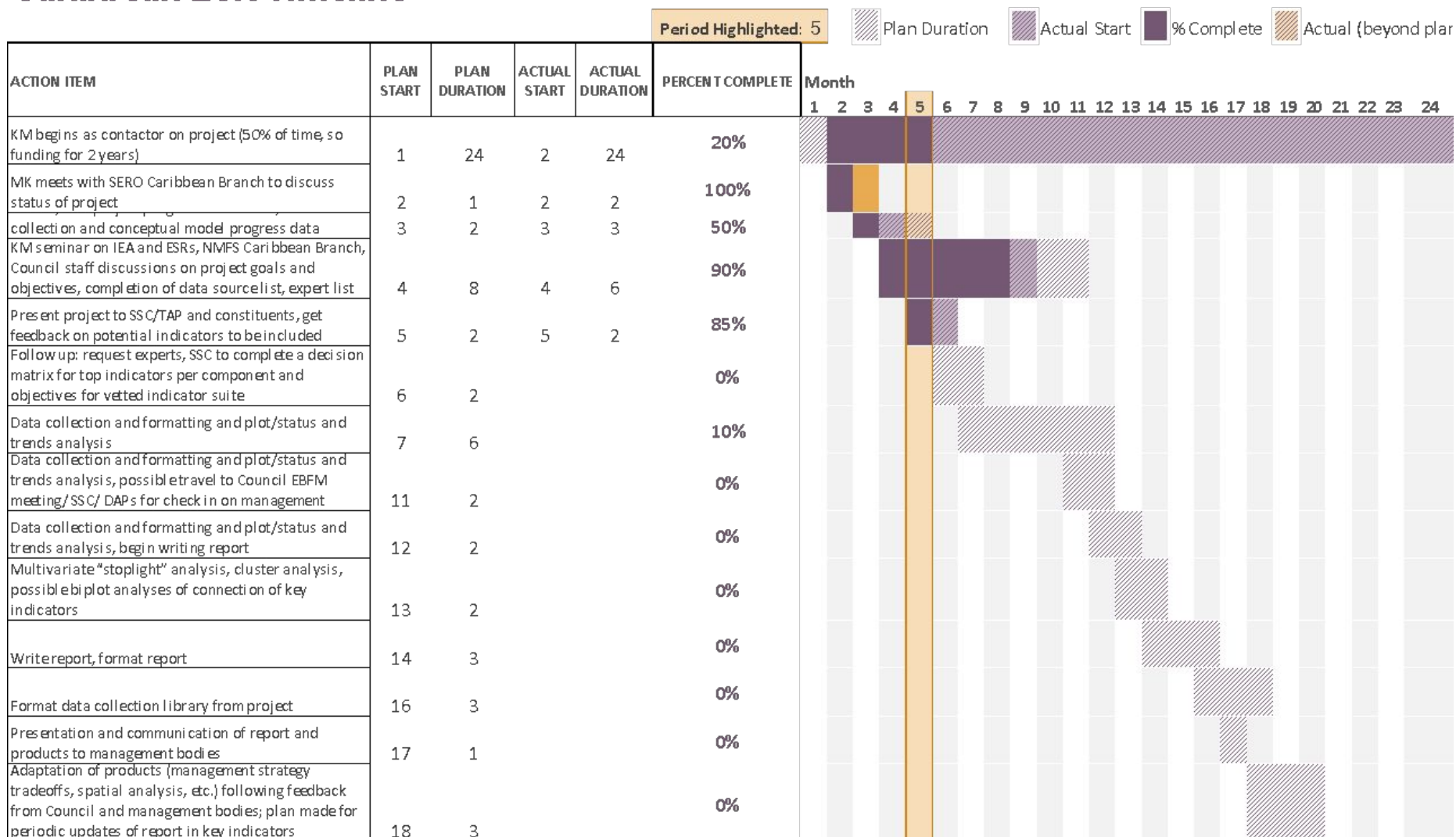


Indicator criteria

- Long term data availability
- Measurability
- Sensitivity to environmental changes
- Specificity
- Spatial and temporal scalability
- Relevance to FMP objectives
- Responsiveness to management actions

Timeline

Caribbean ESR Timeline



Linkages to other ongoing efforts

- Conceptual models highlight key components of system; guide indicator selection
- ESR is synthesis/visualization of data that have already compiled through other efforts
 - EBFM working group data compilation
 - SEDAR data compilation
 - SEFSC data
 - Academic groups
 - Lenfest cooperation and qualitative draft conceptual models as starting point
- Our ESR project will identify indicators matched with management objectives and analyze status and trends in a timeline sense, and will produce a report within the 2 year project time, Lenfest is working on modeling of relationships. Can result in spin off projects for continued evaluation and management applications. Both Lenfest project and ESR plan to build on previous efforts for EBM.

How we envision ESR being used

- Allow managers to understand whether management objectives are being met
- Give broader ecosystem context (including physical, biological, social, economic) for decision-making
- Understand impacts of major acute stressors (e.g., coral bleaching events, hurricanes, COVID-19)

Questions

- Feedback on use of FMP objectives and conceptual models?
- Feedback on process- SSC and TAP may be tapped to provide potential indicators and use decision matrix to select
- Volunteers for expert working groups: physical/environmental, ecological/biological, social, economic
- Feedback on useful variables to measure impacts of events? (fish market sales, landings value, trip tickets?)



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Thanks!

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Extra slides- example decision matrix

- Used this method in the Florida Keys to quantify expert opinion

FKNMS Ecosystem Indicators Workshop Decision Matrix										
Developed by Kelly Montenero and Chris Kelble										
Decision Criteria										
Decision Criteria	Importance to Ecosystem & Culture (keystone, architect, poster-child)		Responsiveness to Environmental changes		Relevance to Sanctuary condition report Question 9- are other stressors affecting water quality?		Responsiveness to management actions		Criteria Weights Menu	Indicator Options Score Menu
	Long term data availability			Measurable-ness						
Set Criteria Weight	5	4	3	2	4	4	Total	1	less important criteria	0
Proposed Indicator 1							0	2		3
Proposed Indicator 2							0	3		6
Proposed Indicator 3							0	4		9
Proposed Indicator 4							0	5	important criteria	
Proposed Indicator 5							0			

Project Weighting -
Project weights for each
criteria should be 0 (Not
suitable), 1 (Low), 3
(Mid), 9 (High)

Extra slides: initial potential indicators from CMs matching island FMPS

Components of Ecosystem that impact fisheries related to FMP objectives (objectives with black bullets, proposed indicators with circle bullets):

- Physical/Environmental

- Larval connectivity
 - Number of protected spawning aggregations in region
 - Connectivity matrix of reef locations in region for strength of connectivity
- Hydrodynamics
 - Water quality on reef tracts- DIN and DIP, chlorophyll a blooms (ocean color tool from Coral Reef Watch)?
 - National Water Quality Monitoring Council's Water Quality Portal
 - USGS national water information system, LBSP
 - SECOORA for WQ
 - Shoreline erosion- changes in beach profile?
 - Shifts in ecological range of species due to changing conditions?
 - Changes in current locations and proximity/? CariCOOS buoys pressure and temperature; SECOORA
 - Salinity-CariCOOS buoys
 -
- Pollution
 - Runoff from land/suspended sediments
 - Oil refinery pollution status
 - Ballast water pollution from tankers; number of tankers in ports
 - Amount of pollutants from bottom paint- measured copper levels along coastline?
 - Level of landfill overfill
 - Cruise ship passenger visits
 - Number of cruise ship port days
 - Amount of marine debris- on shoreline? By NOAA marine debris program measure?
 - Oil spills
 - Rum distilleries- wastewater of lead, copper and oil?
 - Coastal development- number of permits? Rate of development projects? Mitigation projects?
 - Point source discharge
 - Nonpoint source discharge
 - Number of marinas
 - Number of moorings
 - Wastewater treatment plants-
 - household sewer connections,
 - Ratio of # of households to # of wastewater treatment plants?
 - Number of accidents/ accidental wastewater releases
 - Sargassum increase and impacts- beach cleaning, documented blocked fishing fleets?



Ecological

- Protection of marine ecosystems
 - Status of coral reefs
 - RVC coral cover, reef fish presence and abundance, also DNER visual census survey
 - Status of native marine plants and algae habitats
 - NCRMP calcareous green algae presence
 - Status of endangered/threatened species
 - Status of invasive species
 - Lionfish via RVC surveys
 - Amount of damage done by fishing/fishing impacts
 - Vessel groundings
 - Anchor damage
 - Derelict vessels
 - Oil/fuel leaks from fishing fleet
- Promotion and establishment of effective marine spatial planning
 - Number/status of MPAs/closed areas/marine parks
 - Number of marine managed areas managed and established by PR DNER
 - Number of spatial regulations
 - Spatial closures of spawning aggregation locations
 - Area closures
 - Spatial closures
 - Compliance to area and seasonal closures via enforcement actions
- Identification of essential fish habitats and adverse impacts to them, leading to designation of specific habitats of concern
 - Number/status of EFHs- number of new EFHs identified and established
 - Effective, visible marking of EFHs
 - Illegal activity within EFHs
 - EFHs identified and established for newly managed stocks
- Ecological relationships and functional trophic roles of species in the fishery that contribute to a healthy ecosystem, such as grazers, forage fish, habitat-builders, and top predators
 - Population of *Diadema antillarum* and parrotfish- DNER PR coral fellow work?
 - Population of invertebrates?
 - Coral habitat changes
 - Mangrove cover changes
 - Population of bait fish
 - Population of top predators

Biological

- Protection of spawning aggregations and habitats
 - Coral disease- UVI surveys?
 - Coral bleaching
 - Thermal stress and DHW from Coral Watch
- Mapping and defining coral reef habitat
 - Caribbean Science Atlas, TNC
 - NCCOS benthic habitat shapefiles
- Abundance of forage resources fishery is dependent on
 - Shifts in species distribution due to global warming
 - Fisheries independent population estimates for fish species
 - Fisheries dependent population estimates for fish species
 -

Social

- Reduce bycatch and waste in fishery and minimize impact to non-target species
 - Amount of estimated bycatch by fisheries observers
 - Changes in targeted species
 - Changes in fishing gear preference
- International and domestic cooperation in the management of pan-Caribbean stocks.
 - Estimated amount of illegal/unregulated/unreported fishing activity
 - UN FAO Western Atlantic
 - Secretary and Council response/action to international overfishing
- Identification and inclusion of economically/ ecologically important species in federal management plans and actions
- Effectiveness of enforcement across jurisdictional boundaries
 - Enforcement issues
 - Amount of illegal dumping
 - Number of coordinated enforcement actions under MSA: by NOAA OLE, USCG, DoD, DOI-USFWS, PR agencies
 - Increasing number of consistent regulations between federal and territorial waters for less confusion for fishers
- Awareness of laws and regulations governing marine resource management
 - Attendance of education and outreach events
 - Number of education and outreach events related to fisheries
 - Human impacts of uninformed people
 - NCRMP socio attitudes and perceptions of coral reef value

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 - Social vulnerability indices NMFS SERO Mike Jepson
 - Gross product value of fishery
 - Community preferences/ aesthetics
 - Fish lengths in different regions most sold
 - Number of commercial fishers employed
 - Number of people employed in markets and processing plants- USVI Bureau of economic research (from Juan)



Economic

- Food production
 - Pelagic landings
 - Conch harvest
 - Bait fish harvest
 - Commercial
 - Recreational (should have these in CFMC SSC CRCP project from Graciela)
 - Reef fish harvest
 - Commercial
 - recreational
 - Lobster landings and value
 - Commercial
 - recreational
 - Commercial landings and value of:
 - Trap
 - Hook and line
 - Net
 - Diving gear types
- Recreational opportunities
 - Marine resource dependent tourism TTV or estimated employment
 - Amount of recreational fishing- MRIP?
 - Recreational use? By public access via public beaches or moorings?
 - Number of recreational licenses
 - Human use via NCRMP socio surveys
 - Fishing engagement and reliance via Mike Jepson SERO NOAA
- Rebuild stocks
 - Number of times landings exceeded annual catch limits per year
 - Ability to achieve optimal yield- MSY status?
- Socioeconomic health of fishing communities
 - Market drivers
 - Number of fish dealers
 - Number of fish markets
 - Dealrtd permits
 - Amount of imports
 - Number of commercial licenses
 - Product availability



Impacts of events

- Hurricanes
 - Number of named storms making landfall in region per year
 - SECOORA historical hurricane tracks
 - AOML
- Earthquakes
 - Number of major earthquakes in region per year
- Droughts
 - Existence of drought conditions
- Disruption of market demand due to pandemic
 - Days of market/store closure due to events (hurricanes, no power, earthquake damage, protests, pandemic) per year in region
 - Days of no access to vessels/ marinas due to events (AIS, VMS, trip tickets?)