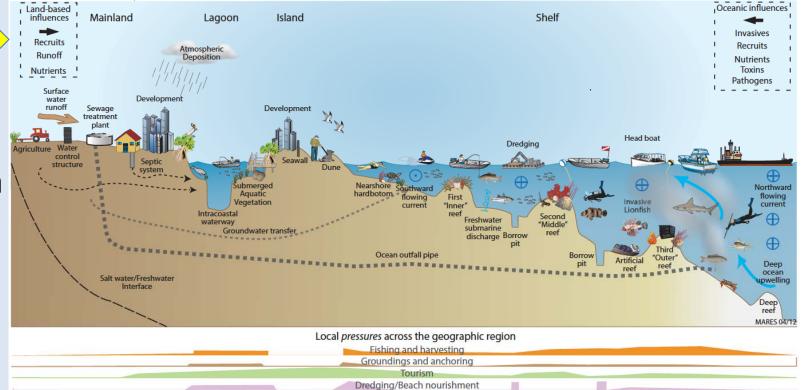


A New Era of Ocean Stewardship



Single Species Management

-Based Mgmt (EBM)



Local responses across the geographic region

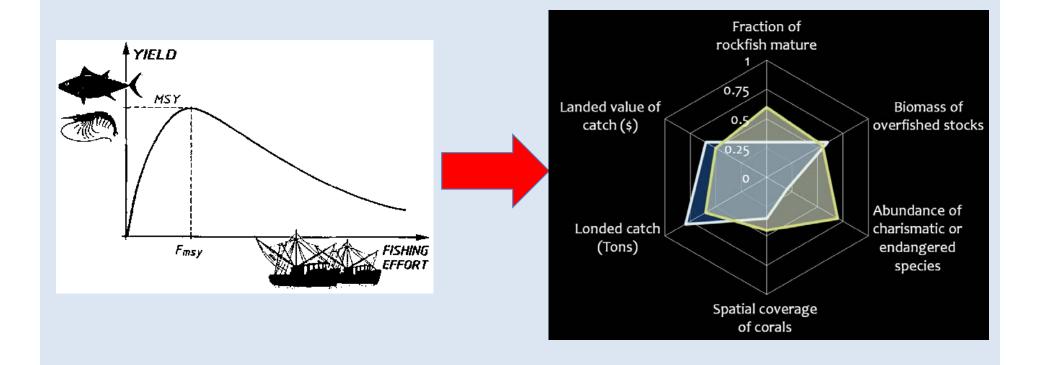
Permitting for dock construction, beach renourishment, artifical reef construction, and dredging

Regulations on fishing and harvesting, anchoring and groundings

IEAs are the Science to Inform EBM

Stock Assessment Process: Single-Species Management

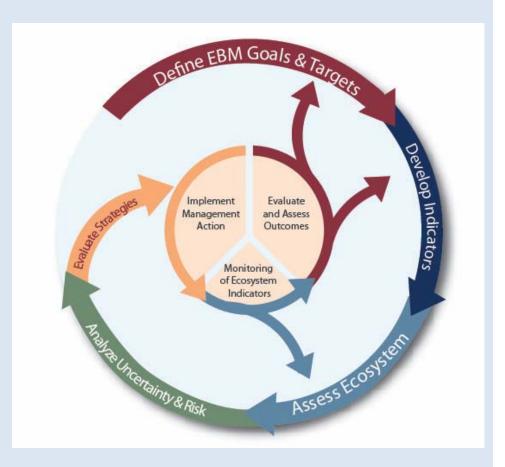
Integrated Ecosystem Assessment: Ecosystem-Based Management



What is an IEA?

A structure to assess ecosystem status relative to societal objectives and evaluate the holistic impact of potential management actions, thus informing management decisions

- A decision-support process that synthesizes and analyzes diverse data and ecosystem model outputs
- It is modular, iterative, scaleable, and adaptable
- It shares a common national framework, yet with regional variation in implementation
- It provides assessments of the ecosystem across and within multiple ocean-use sectors



www.noaa.gov/iea; Levin et al. 2009 and 2014

Initial South Florida IEA = MARES



"reach a science-based consensus about the defining characteristics and fundamental regulating processes of a South Florida coastal marine ecosystem that is both sustainable and capable of providing the diverse ecosystem services upon which our society depend"

1. Define EBM Goals and Targets

- Articulate EBM objectives
- Identify Ecosystem Threats
- Conceptualize the Ecosystem

2. Develop Ecosystem Indicators

- Both Biophysical and Human Dimensions, including Ecosystem Services
- Evaluate Potential Indicators

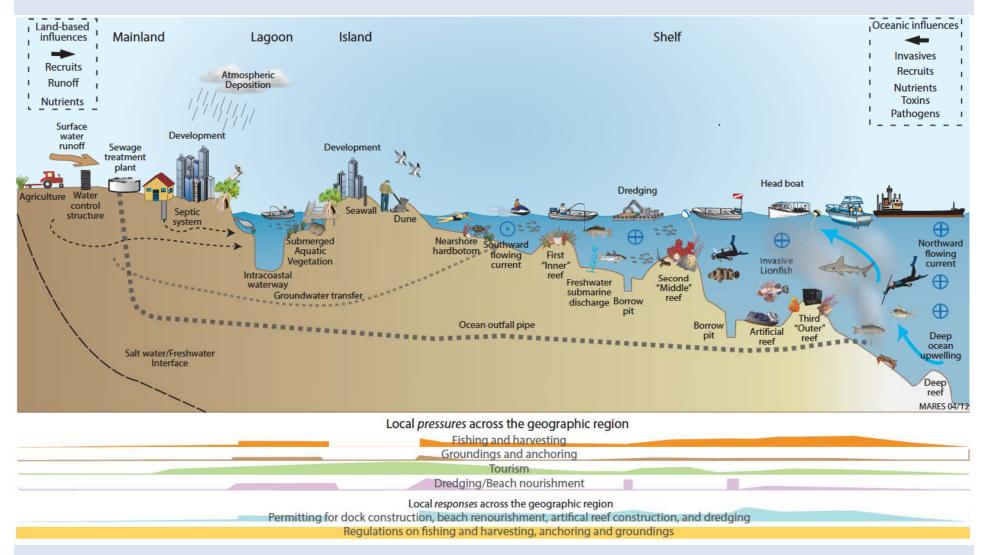
4. Analyze Risk and Uncertainty

 Semi-quantitative risk assessment for ecosystem states and services



Conceptualizing The Ecosystem





EBM-DPSER Model



Identifies Focal Ecosystem Components Merges ecosystem services with DPSIR

Ecosystem Services

Aesthetics & Existence, Recreation, Science & Education, Cultural Amenity, Food/ Fisheries, Ornamental Resources, Medicinal/Biotechnology Resources, Hazard Moderation, Waste Treatment, Climate Regulation, Atmospheric Regulation, Biological Interactions

State

Fish & Shellfish, Marine Birds, Water Column, Mangroves, Seagrasses, Corals & hardbottom

Pressures

Far-Field – Ocean Acidification, Sea-level Rise, Increasing Air & Water Temperature, Altered Rainfall & Evaporation Patterns, Changes in Tropical Storm Intensity and/or frequency, Fishing, Marine Debris, Contaminant Releases, Changes in Freshwater Inflow

Near-Field – Fishing, Groundings, Dredging, Marine Debris, Noise, Invasive Species, Contaminant Releases, Shoreline Alteration, Changes in Freshwater Inflow

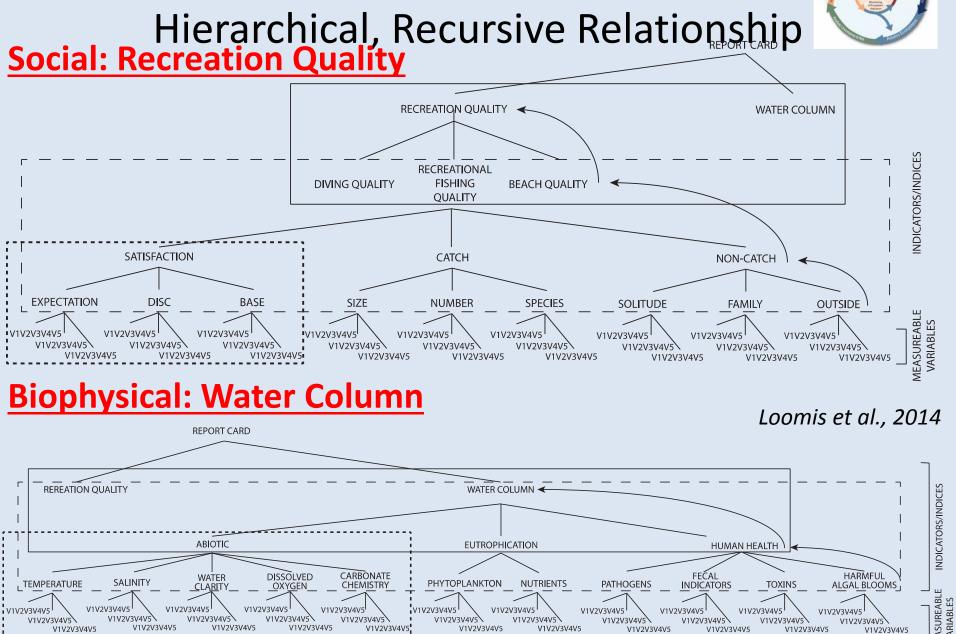
Drivers

Far-Field – Climate Change, Land-Based Activities, Water-Based Activities **Near-Field** – Land-Based Activities, Water-Based Activities

Responses

- 1. Individuals
 behavioral changes,
 technological
 advancements
- 2. Local permitting, clean-up, education, infrastructure improvements
- **3. State**regulations, permits, fishing, MPAs, monitoring, research, information gathering
- 4. Federal regulations, fishing, habitat protection, MPAs, monitoring, information gathering, research
- NGOs social marketing, public outreach, education

Indicators:



Setting Indicator Targets

Vision Cor eptua Sustainable, producing desired levels of ecosystem services; Enhance ecological, economic values, & Human Well-Being

Objectives

Improve Habitat & Functional Quality, Provide Recreational Opportunities, Protect Cultural & Social Activities

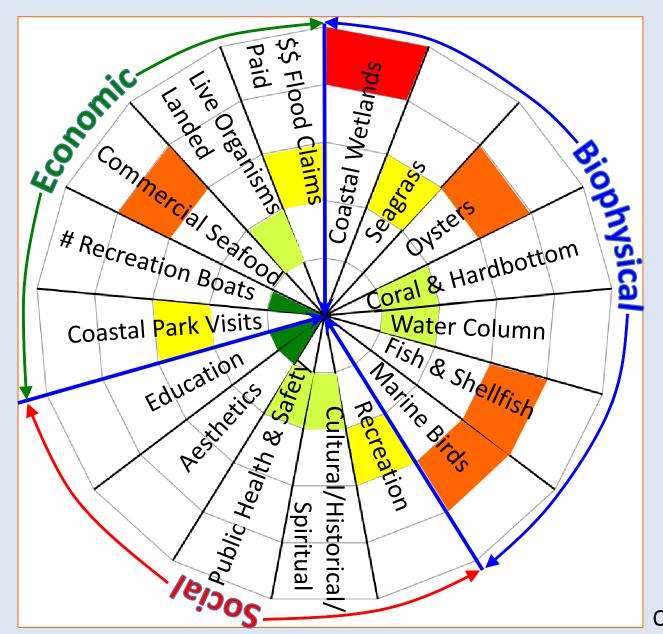
Objectives

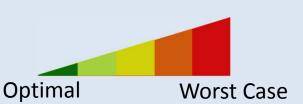
Operational Minimize the magnitude, duration, and spatial extent of algal blooms in Florida Bay

<u>Targets</u>	Optimal:	<u>Chlorophyll a concentration:</u> Below Baseline
	Good:	Equal to baseline
	Fair:	Significantly above baseline, but trend is
		improving
	Poor:	Significantly above baseline, with no trend
	Critical:	Significantly elevated from baseline with
		degrading trend Kelble et al., In Prep

Ecosystem Assessment







South Florida Coastal Ecosystem Services

Cultural

Aesthetic and Existence—Provide aesthetic quality of aquatic and terrestrial environments (visual, olfactory, and auditory), therapeutic benefits, pristine wilderness for future generations.

Recreation—Provide suitable environment/setting for beach activities and other marine activities such as fishing, diving, snorkeling, motor and non-motor boating.

Science and Education—Provide a living laboratory for formal and informal education and for scientific research.

Cultural Amenity—Support a maritime way of life, sense of place, maritime tradition, spiritual experience.

Provisioning

Food/Fisheries—Provide safe-to-eat seafood.

Ornamental Resources—Provide materials for jewelry, fashion, aquaria, etc.

Medicinal/Biotechnology Resources—Provide natural materials and substances for inventions and cures.

Regulating

Hazard Moderation—Moderate to extreme environmental events (i.e., mitigation of waves and storm surge in the case of hurricanes).

Waste Treatment—Retain storm water, remove nutrients, contaminants, and sediment from water, and dampen noise. etc.

Climate Regulation—Moderate temperature and influence/control other processes such as wind, precipitation, and evaporation.

Atmospheric Regulation—Exchange carbon dioxide, oxygen, mercury, etc.

Biological Interactions—Regulate species interactions to maintain beneficial functions such as seed dispersal, pest/invasive control, herbivory, etc.

Next Steps

 Evaluate ecosystem services under different Management and Climate Scenarios

 Connect Biophysical Ecosystem State to Service Production (Ecosystem Service Production Functions)

 Develop model frameworks that include prediction of ecosystem services

Acknowledgements





national ocean service























