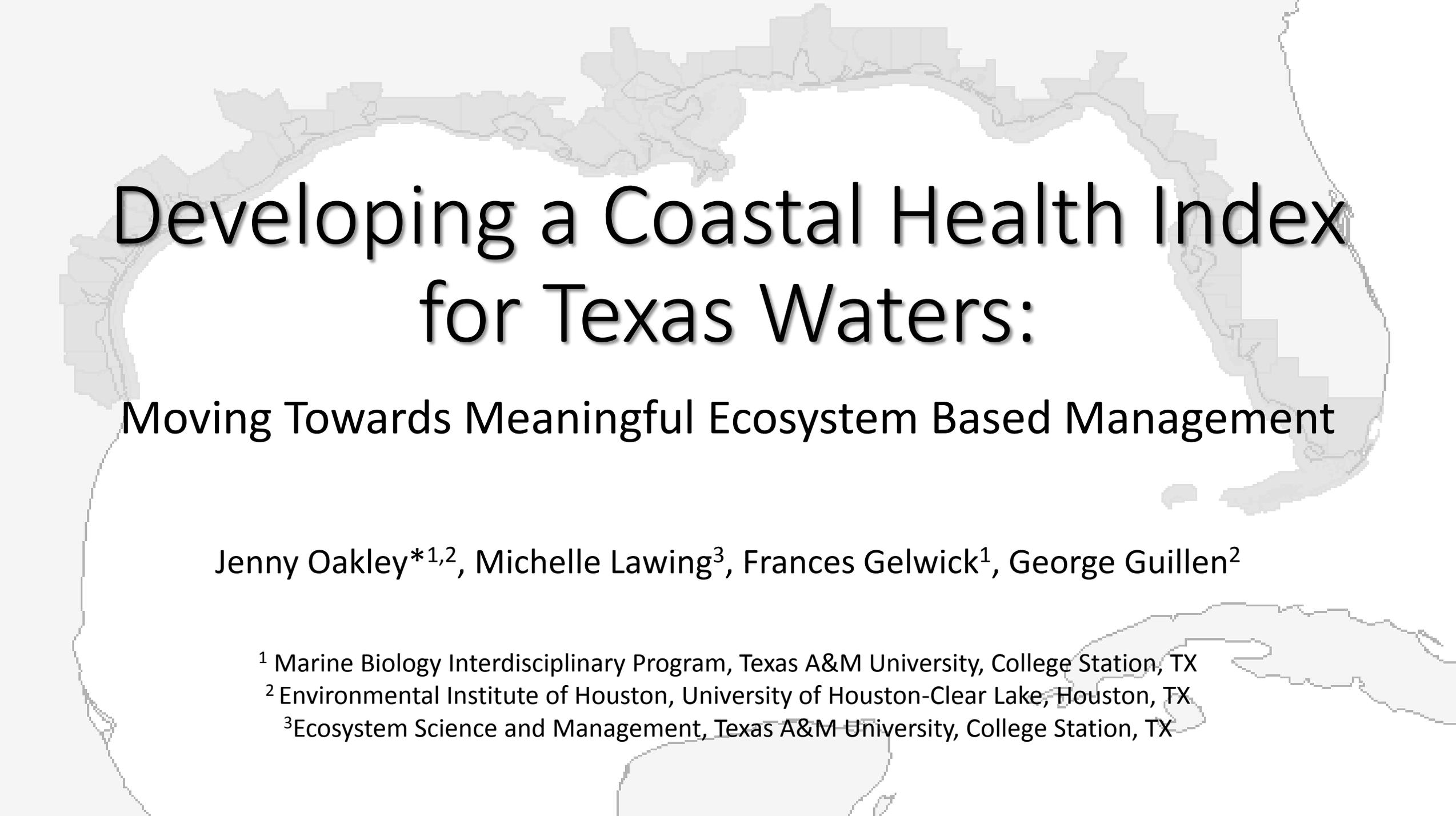


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Developing a Coastal Health Index for Texas Waters:

Moving Towards Meaningful Ecosystem Based Management

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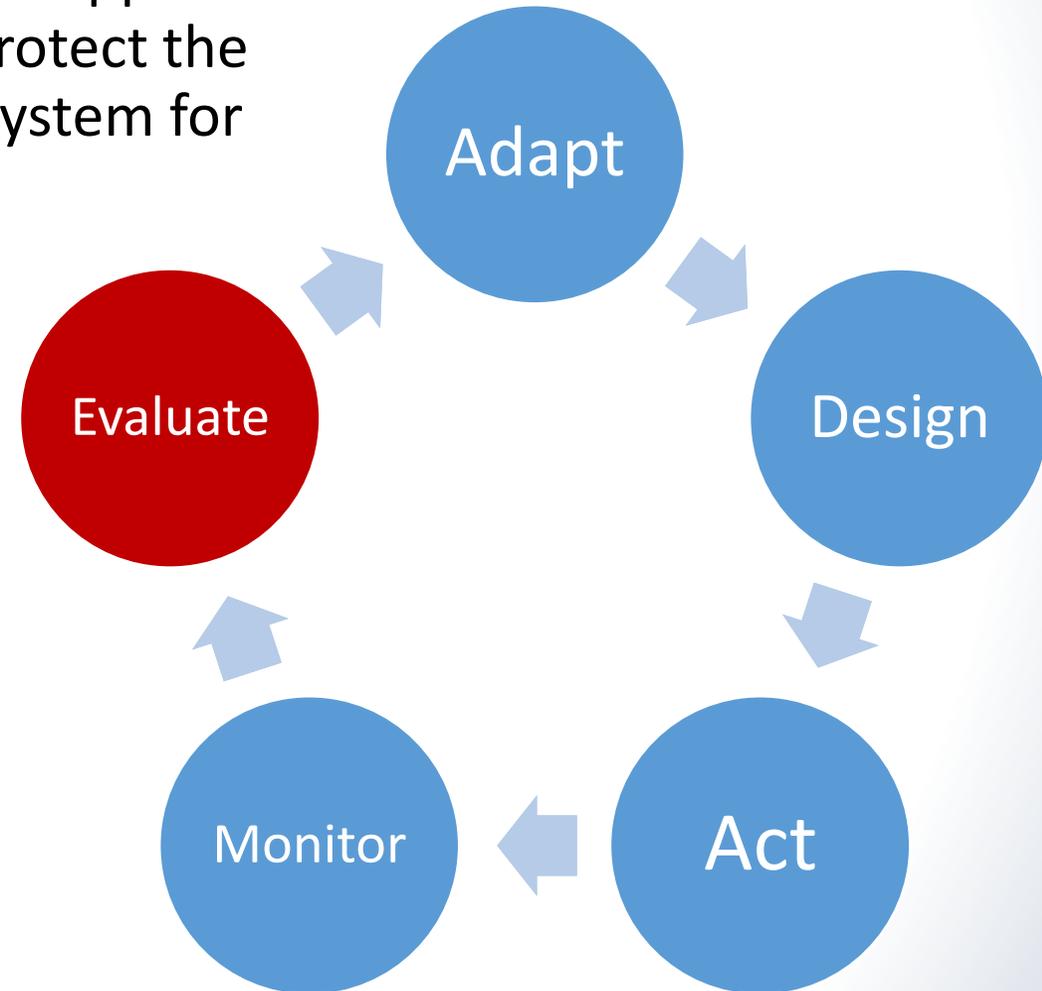
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Background

- Ecosystem Based Management: site specific approach to natural resource management that aims to protect the health, function and resilience of an entire ecosystem for the benefit of all organisms.
- Integrate Metrics:
 - Biological
 - Chemical
 - Remotely Sensed
 - Economic
 - Societal



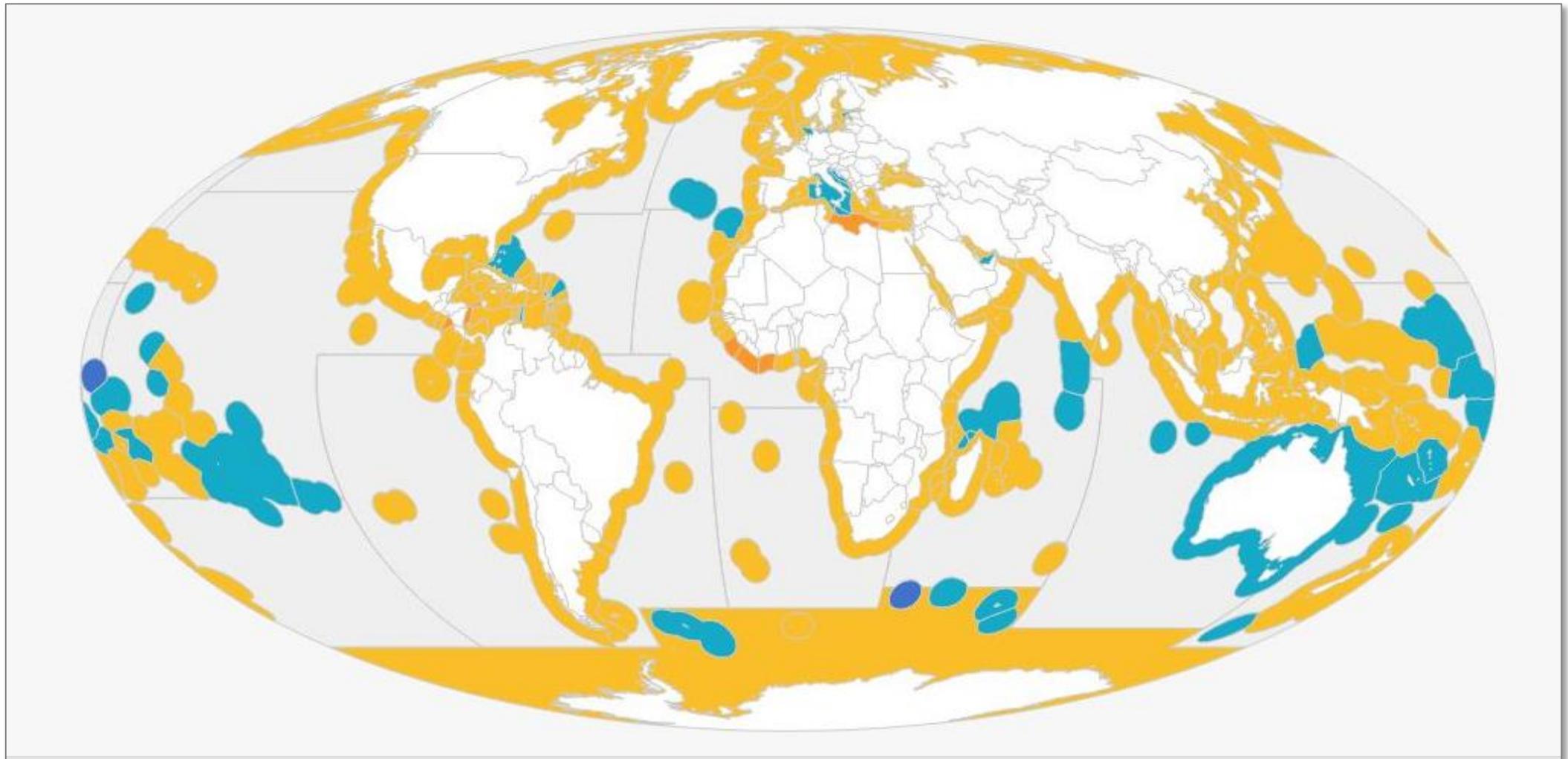
How to Define “Health”

A healthy coast provides ecosystem services for humans and wildlife in a sustainable manner



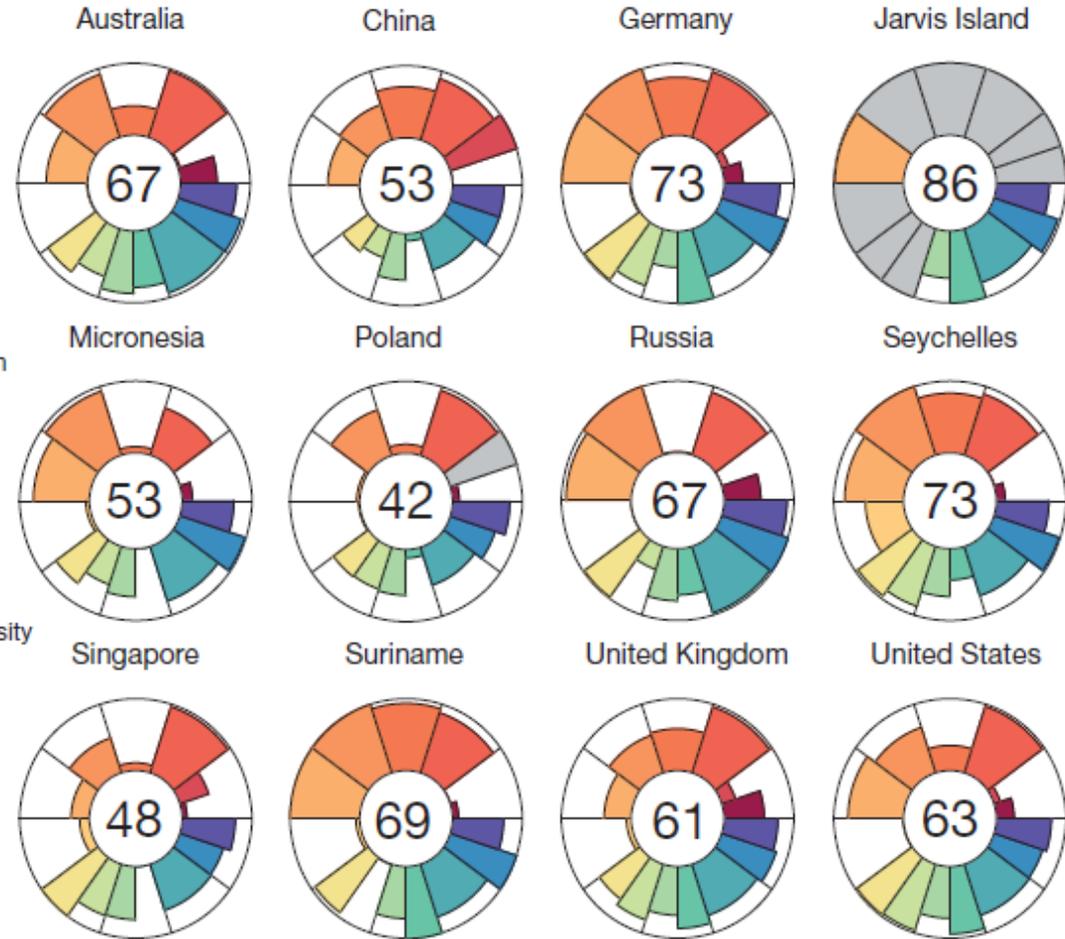
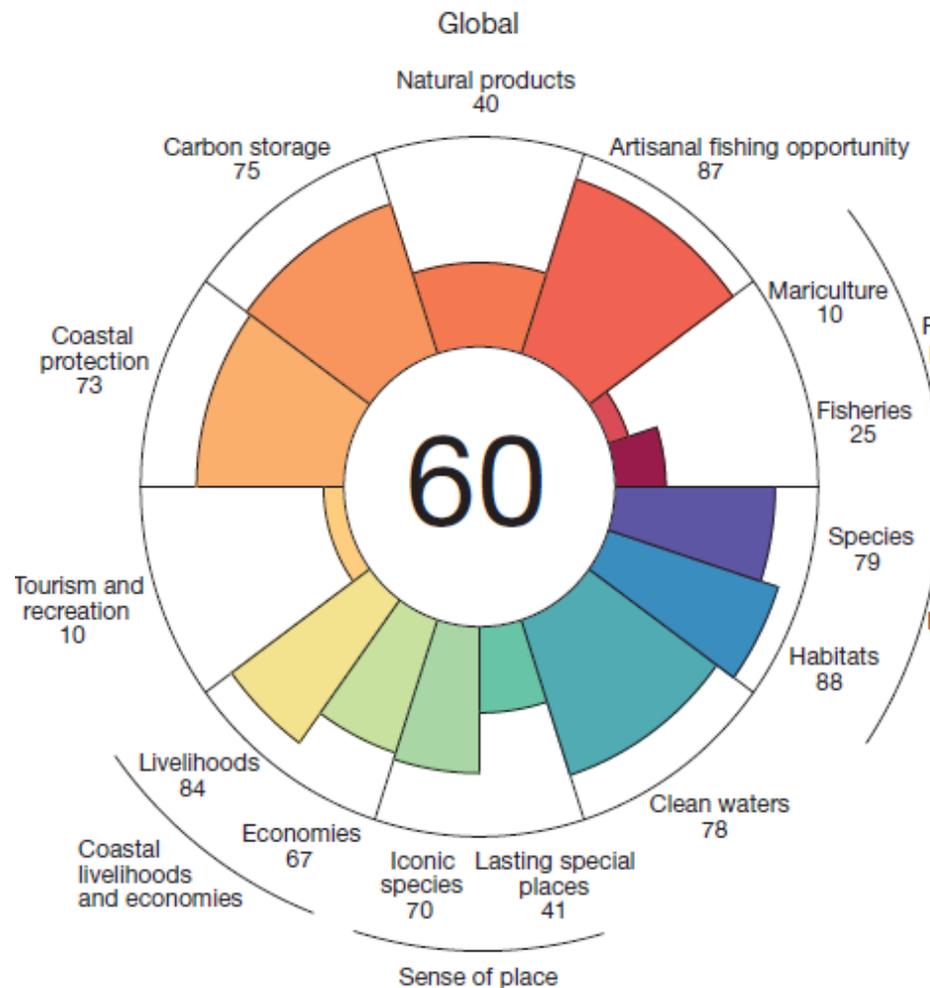
Goal	Sub-goal	Definition
Food Provision (FP)	Fisheries (FIS)	Harvest of sustainably caught wild seafood
	Mariculture (MAR)	Production of sustainably cultured seafood
Artisanal Fishing (AO)		Opportunity to engage in artisanal-scale fishing for subsistence or and/or recreation
Natural Products (NP)		Sustainable harvest of ssustainable and renewable natural products other than food provision
Carbon Storage (CS)		Status of natural habitats affording long-lasting carbon storage
Coastal Protection (CP)		Status of natural habitats affording protection of the coast
Tourism and Recreation (TR)		Opportunity to enjoy coastal areas for recreation and tourism
$CHI = a_1V_1 + a_2V_2 + \dots + a_{10}V_{10} = \sum_{i=1}^{10} a_iV_i,$		
Sense of place (SP)	Lasting Special Places (LSP)	Cultural, or aesthetic connection to the environmental afforded by coastal and marine places of significance
	Iconic Species (ICO)	Cultural or aesthetic connection to the environmental afforded by iconic species
Clean Waters (CW)		Clean waters that are free of nutrient and chemical pollution
Biodiversity (BD)	Habitats (HAB)	The existence of value of biodiversity measured through the conservation status of habitats
	Species (SPP)	The existence value of biodiversity measured through the conservation status of marine-associated species

Ocean Health Index (OHI)



NO DATA

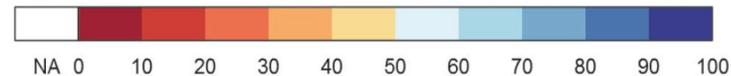
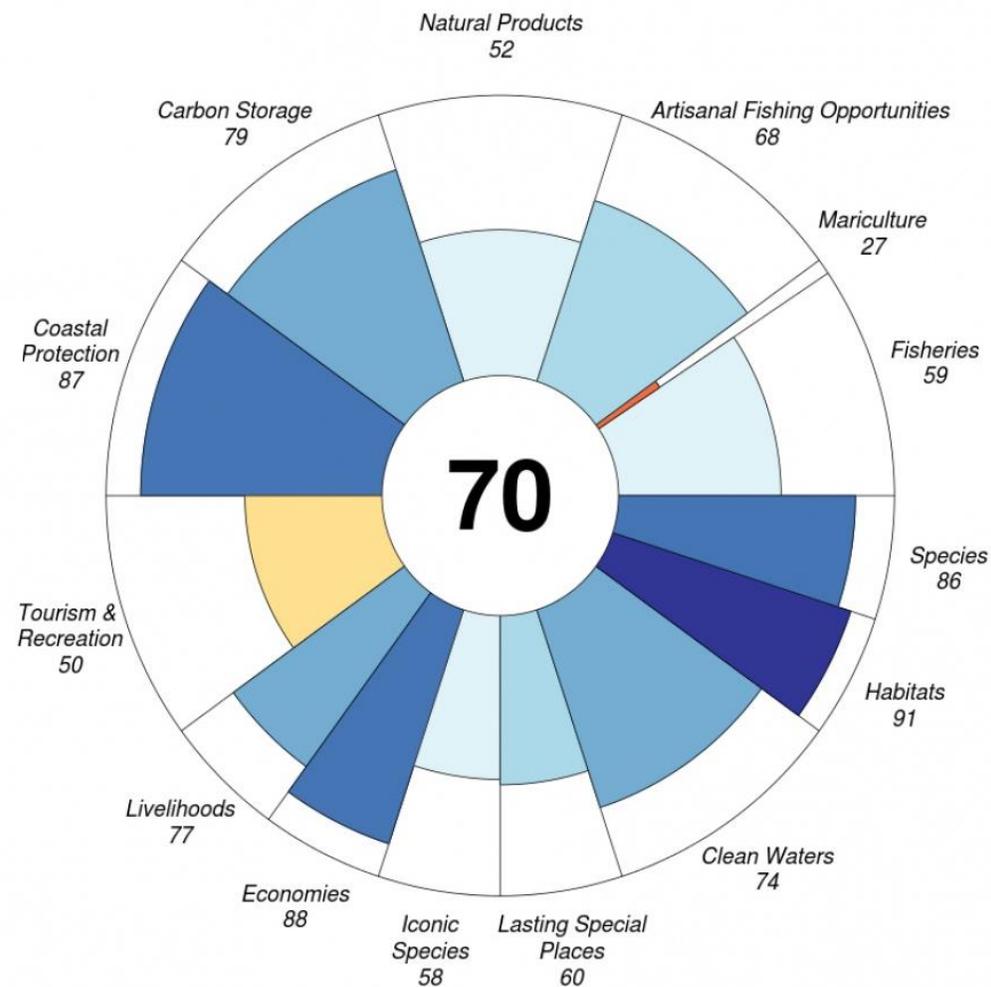
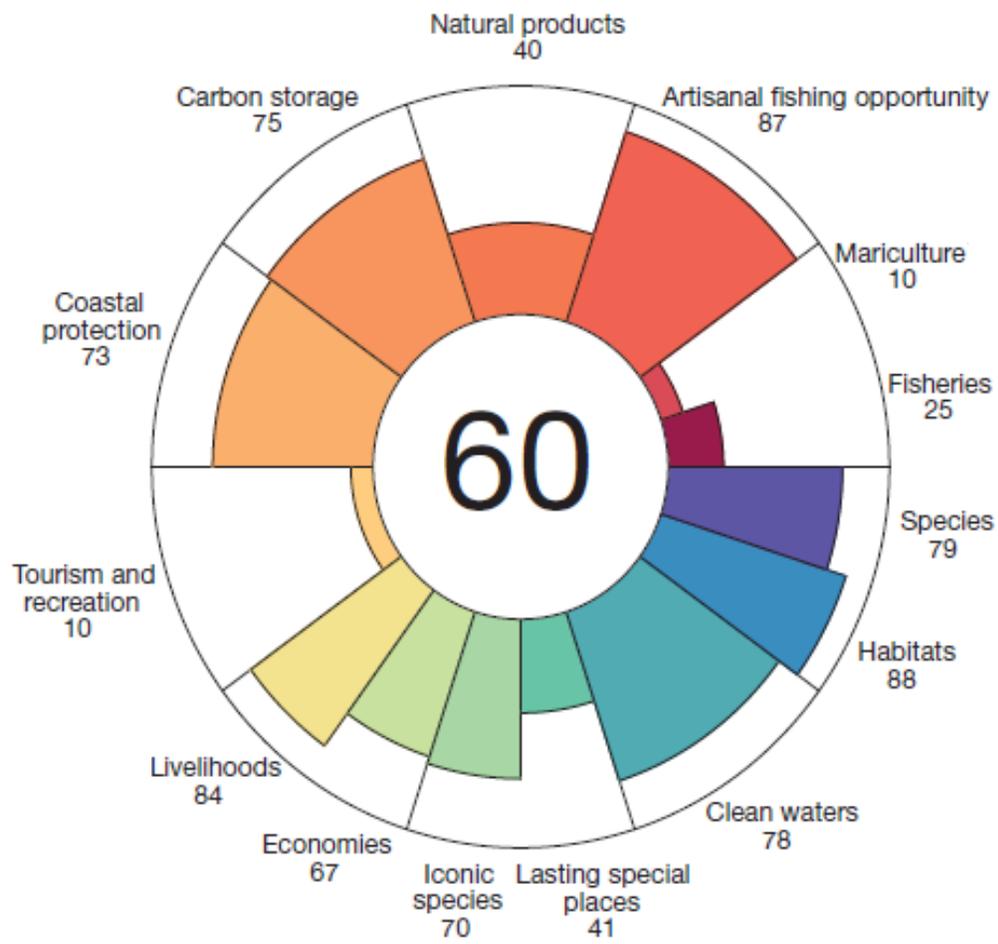
Spatial Global Scores 2012



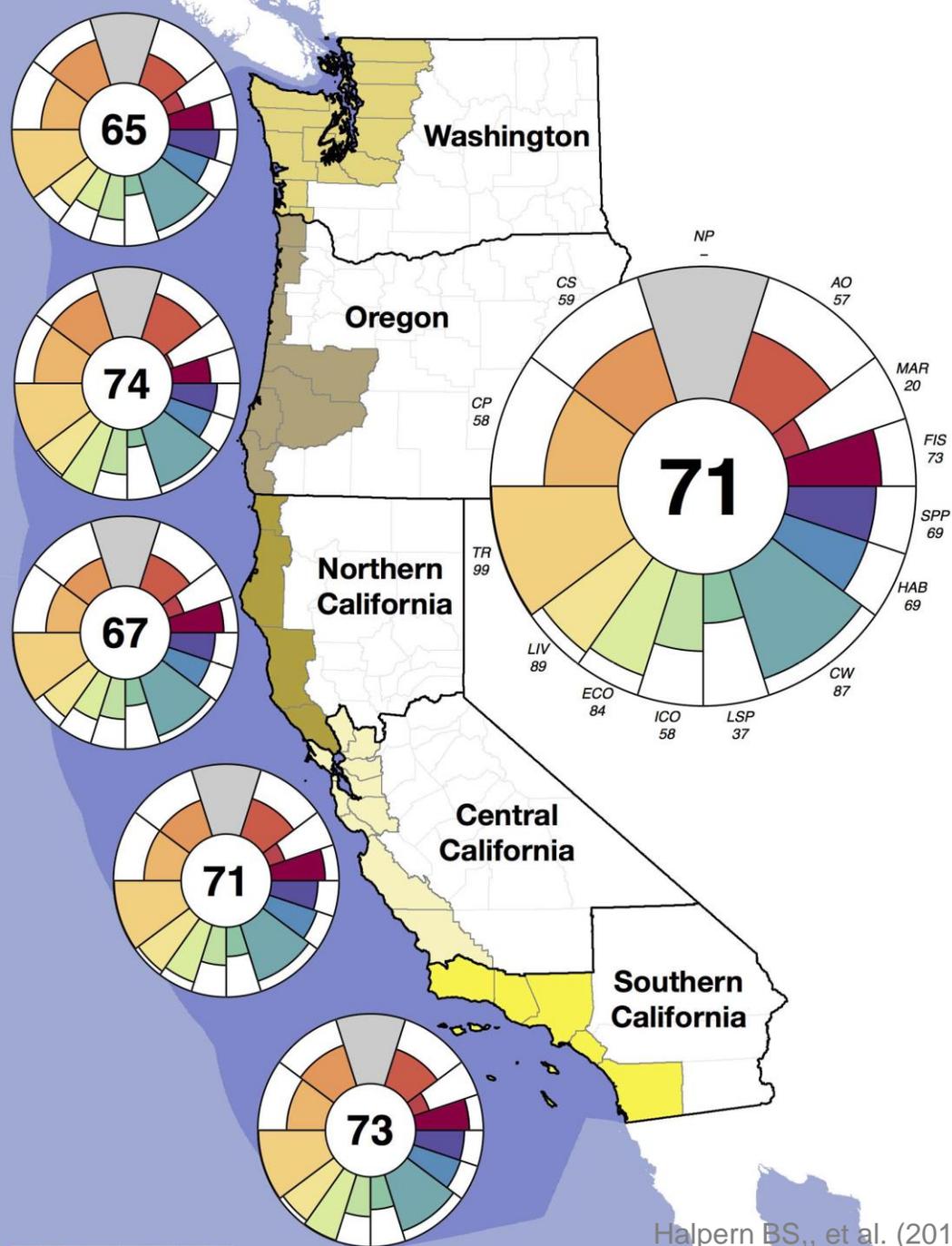
Temporal Global Scores

2012

2015



Regional Health Indices



- Ecosystem-based management
- Model management scenarios
- Identify knowledge gaps
- Identify management focus areas

Model Variables

Goal	Sub-goal	Definition
Food Provision (FP)	Fisheries (FIS)	Harvest of sustainably caught wild seafood
	Mariculture (MAR)	Production of sustainably cultured seafood
Artisanal Fishing (AO)		Opportunity to engage in artisanal-scale fishing for subsistence or and/or recreation
Natural Products (NP)		Sustainable harvest of sustainable and renewable natural products other than food provision
Carbon Storage (CS)		Status of natural habitats affording long-lasting carbon storage

Coastal Protection (CP)

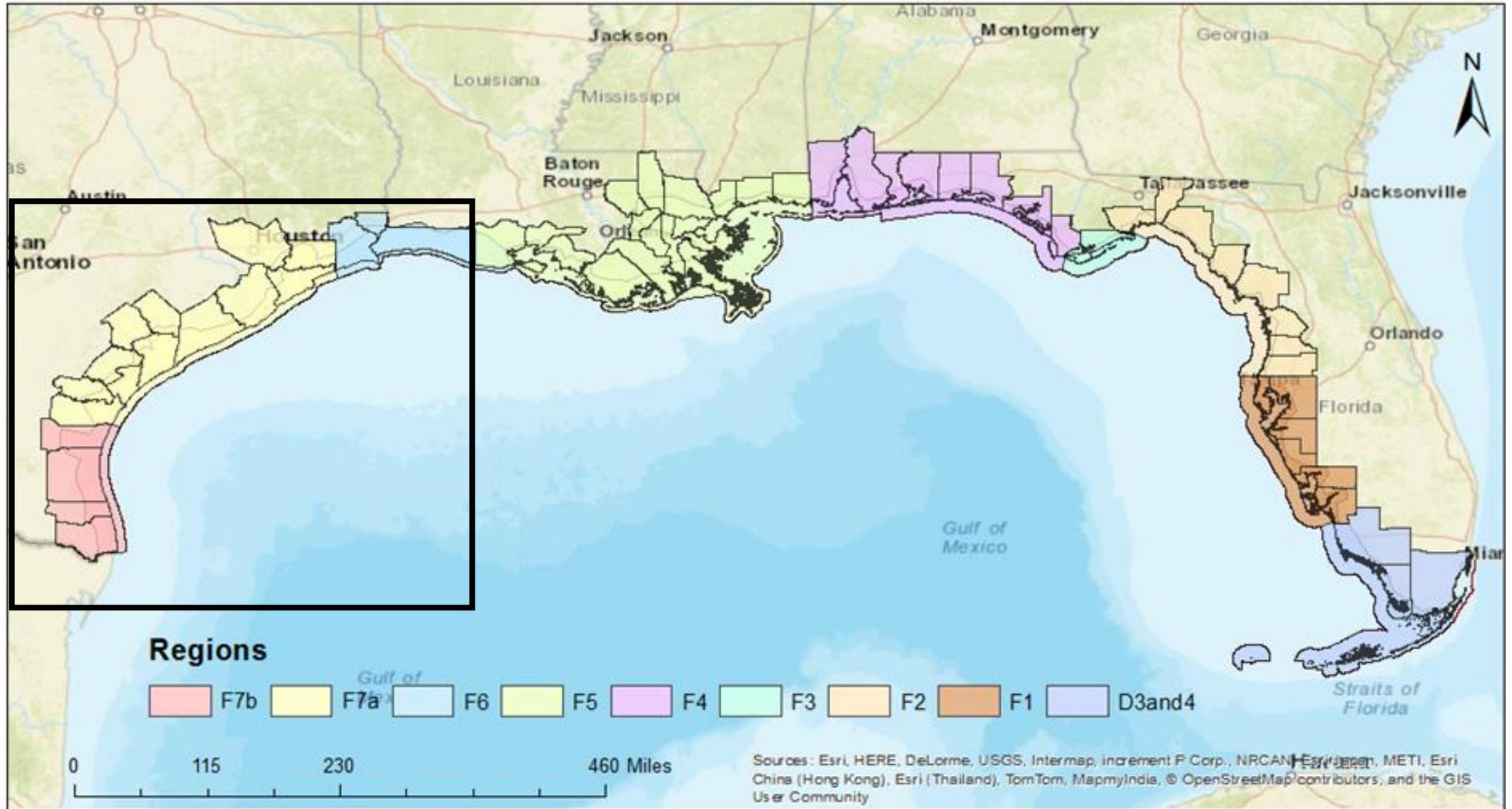
Status of natural habitats affording protection of the coast

Tourism and Recreation (TR)		tourism
Coastal Livelihoods and Economies (LE)	Coastal Livelihoods (LV)	Jobs and wages from marine-related sectors
	Coastal Economies (ECO)	Revenues from marine-related sectors
Sense of place (SP)	Lasting Special Places (LSP)	Cultural, or aesthetic connection to the environmental afforded by coastal and marine places of significance
	Iconic Species (ICO)	Cultural or aesthetic connection to the environmental afforded by iconic species
Clean Waters (CW)		Clean waters that are free of nutrient and chemical pollution
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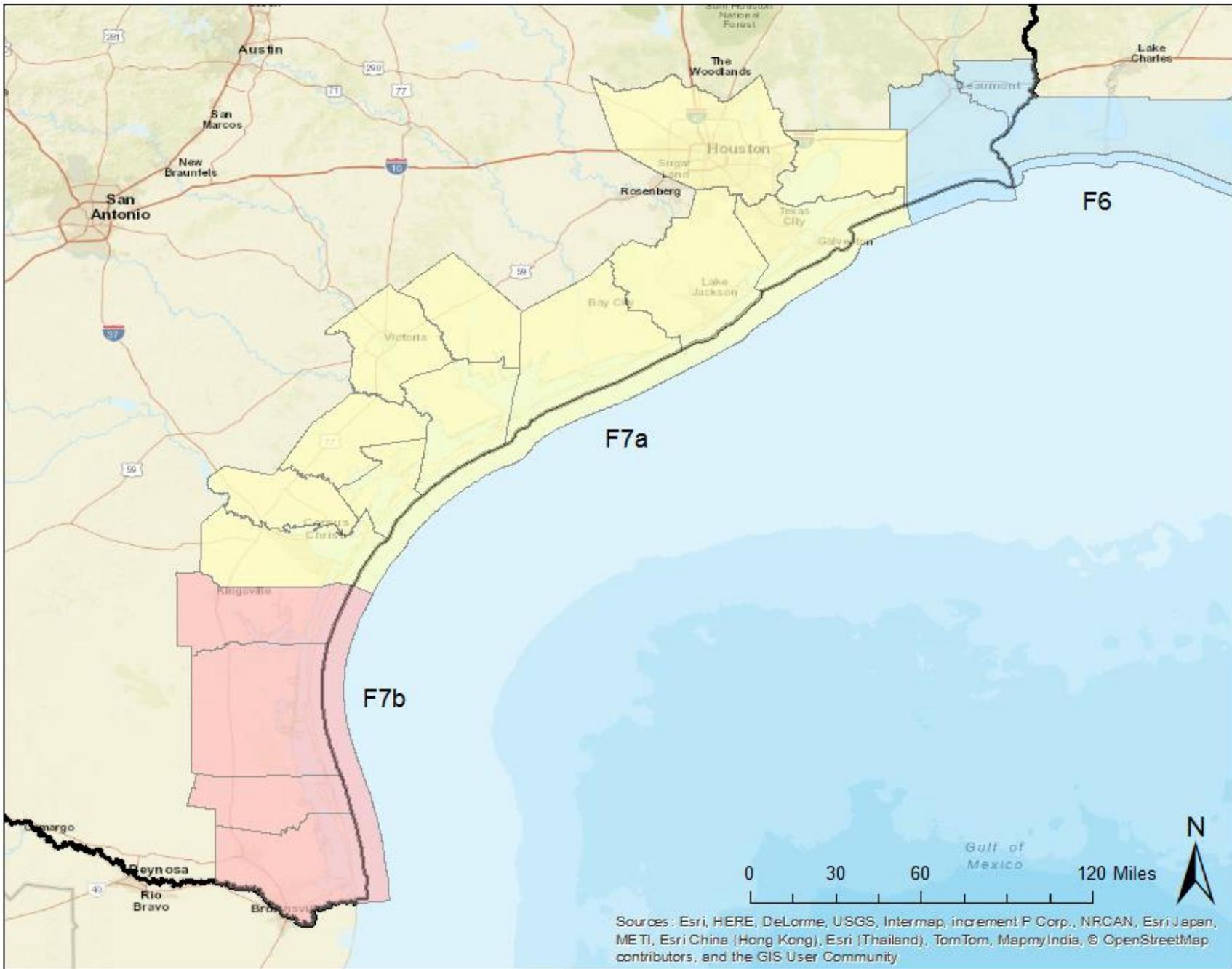
Metric for Coastal Protection

- Coastal Wetland Cover
 - Flood Protection
 - Erosion Control
 - Storm Protection Services (Costanza et al. 2008)
 - \$8,240/ha/year
 - \$23.2 Billion/year
- Data Source: NOAA C-CAP Land Cover Atlas
- Reference Point: Established Target
 - Wetland Potential (NOAA C-CAP)
- Goal = 50% cover (Halpern 2014)

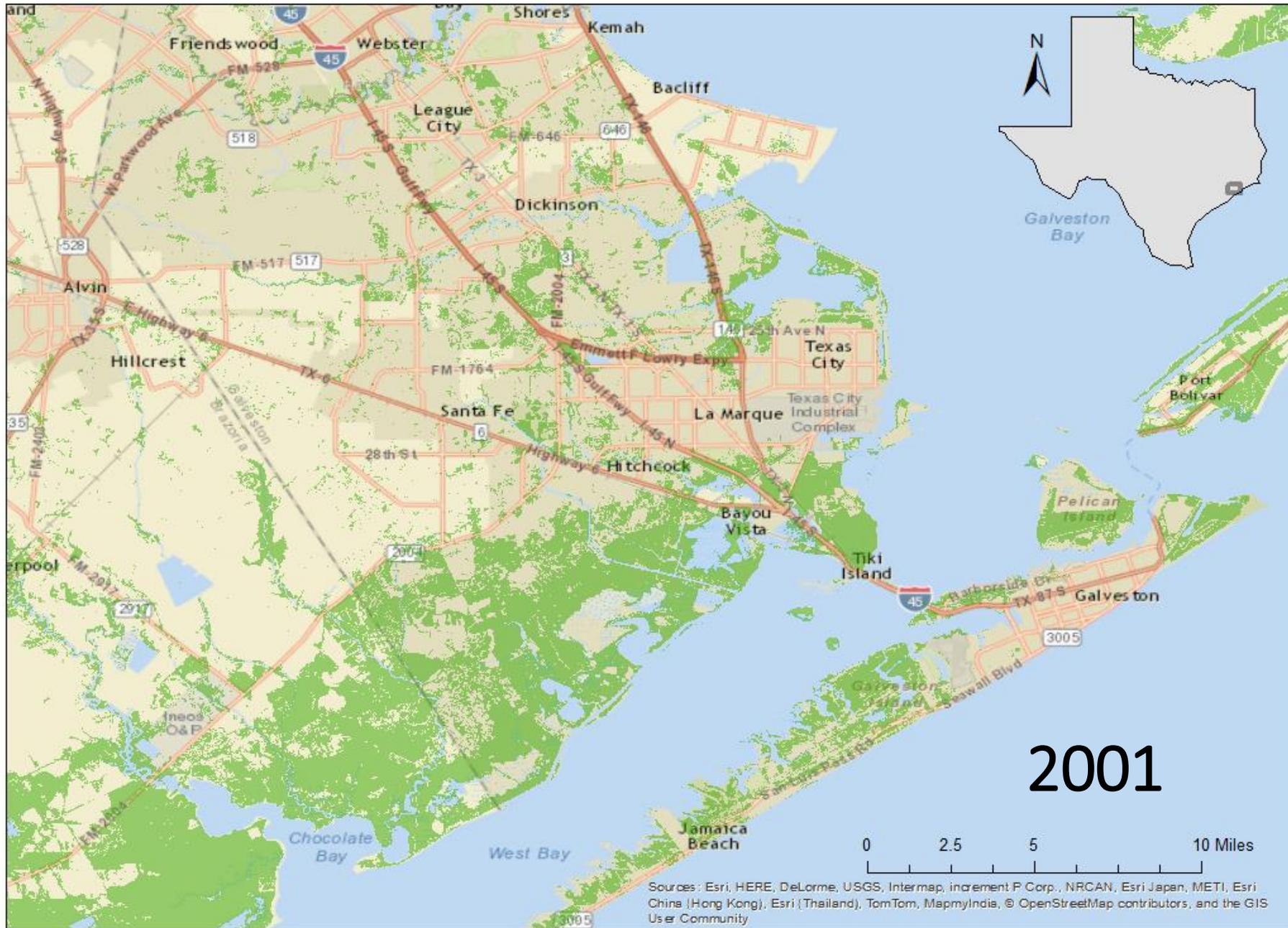
Study Area

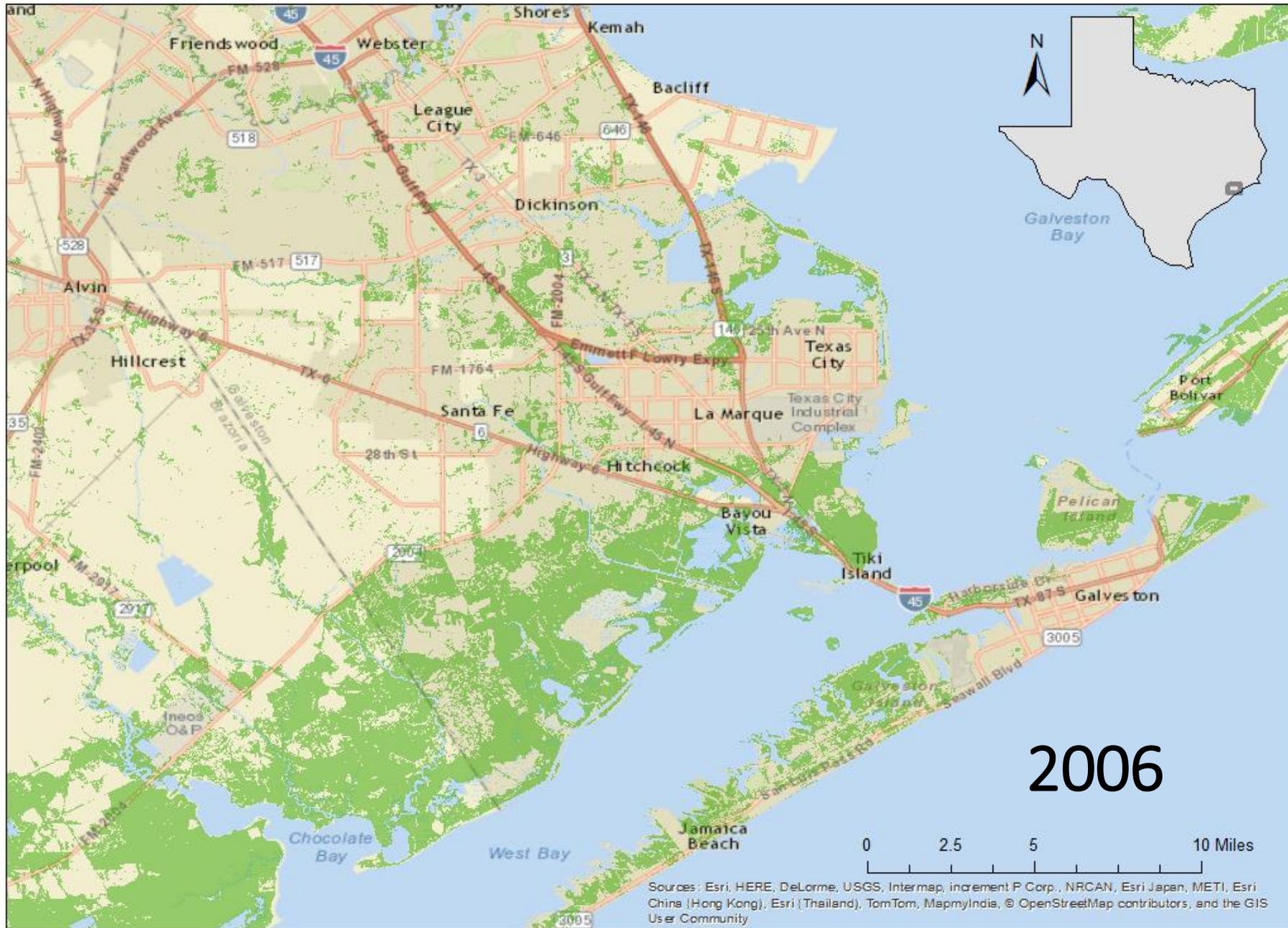


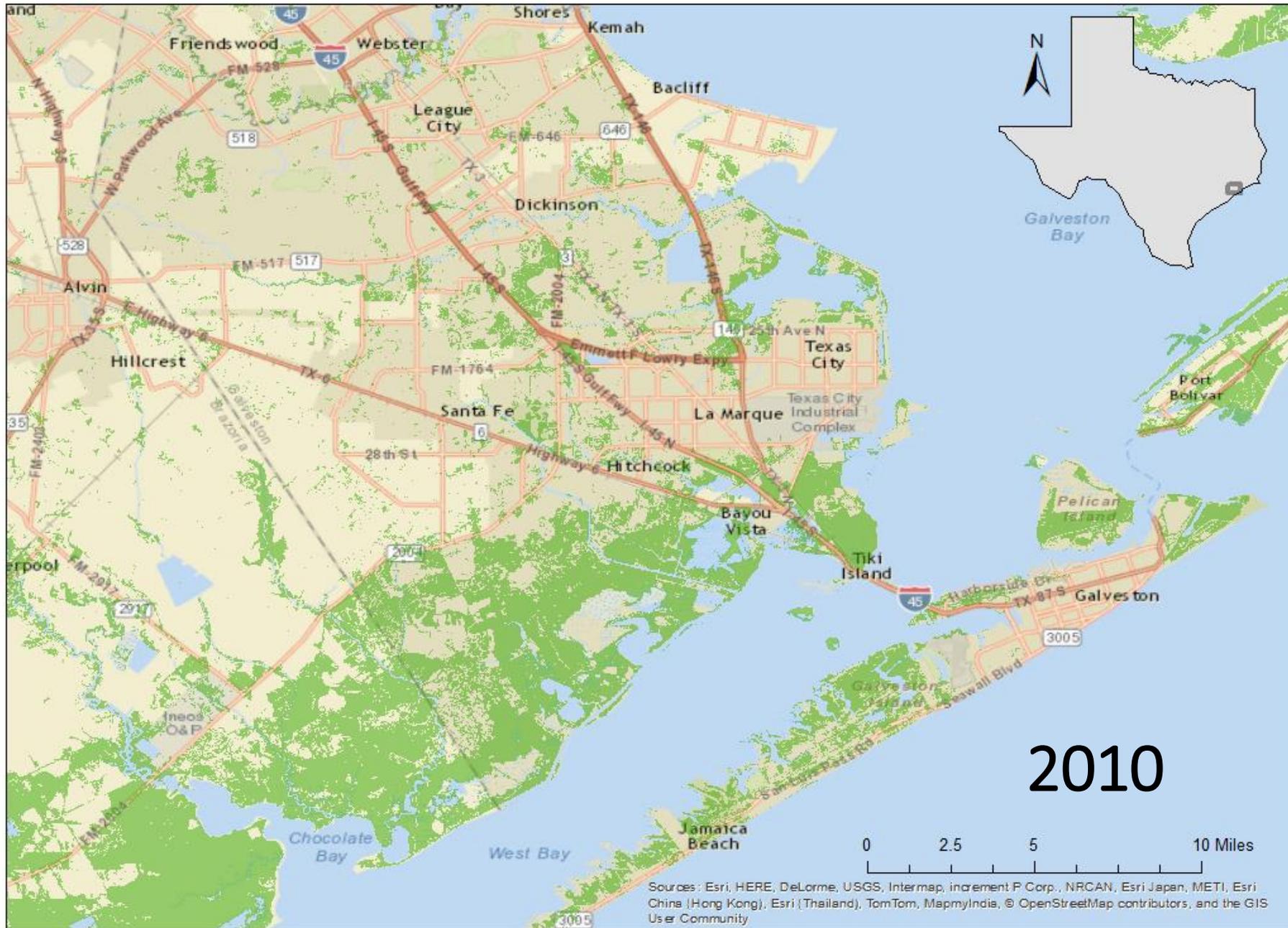
Terrell, T. (1979) Physical Regionalization of Coastal Ecosystems of the United States and its Territories. U.S. Department of the Interior, U.S. Fish and Wildlife Service FWS/OBS-78/80

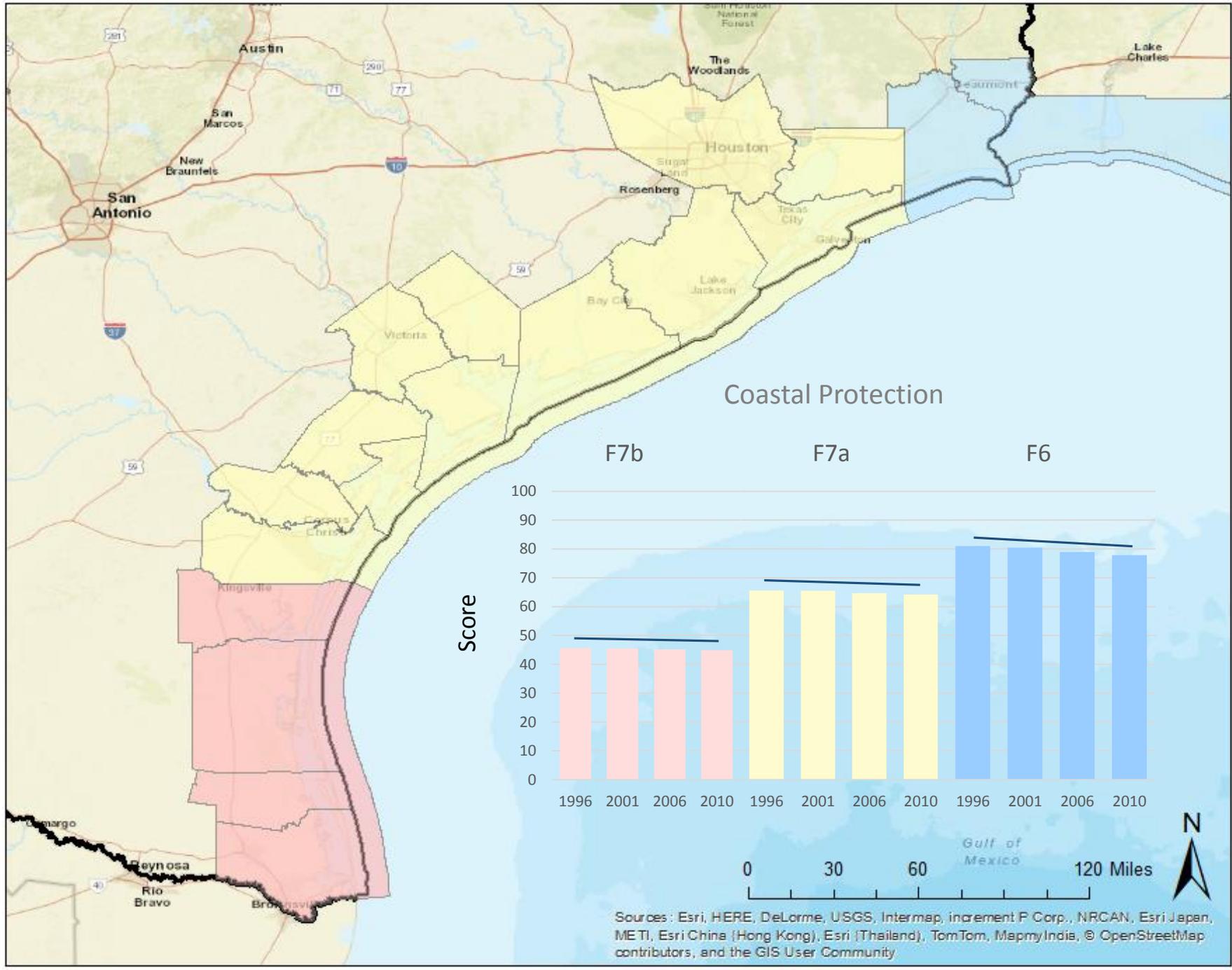


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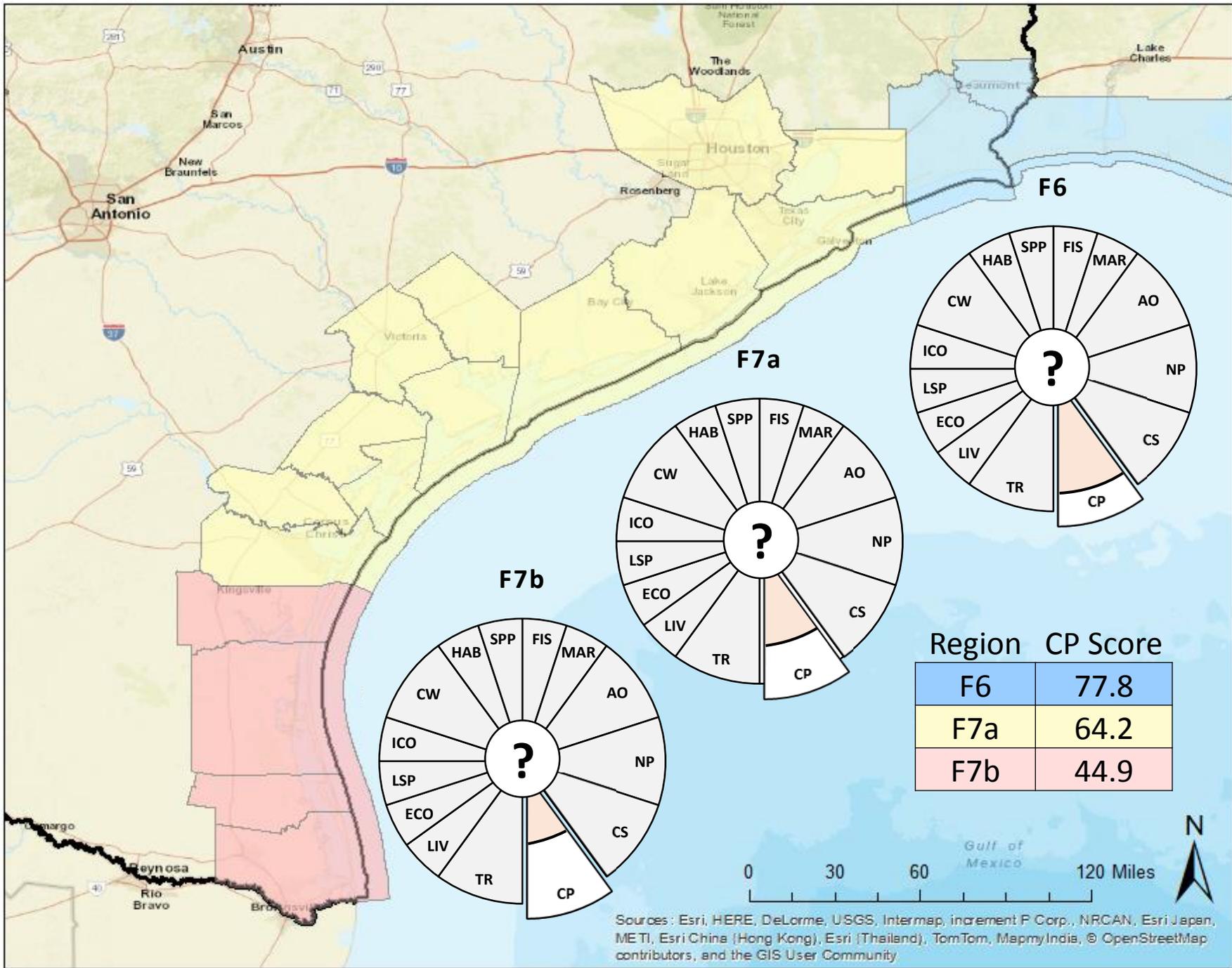








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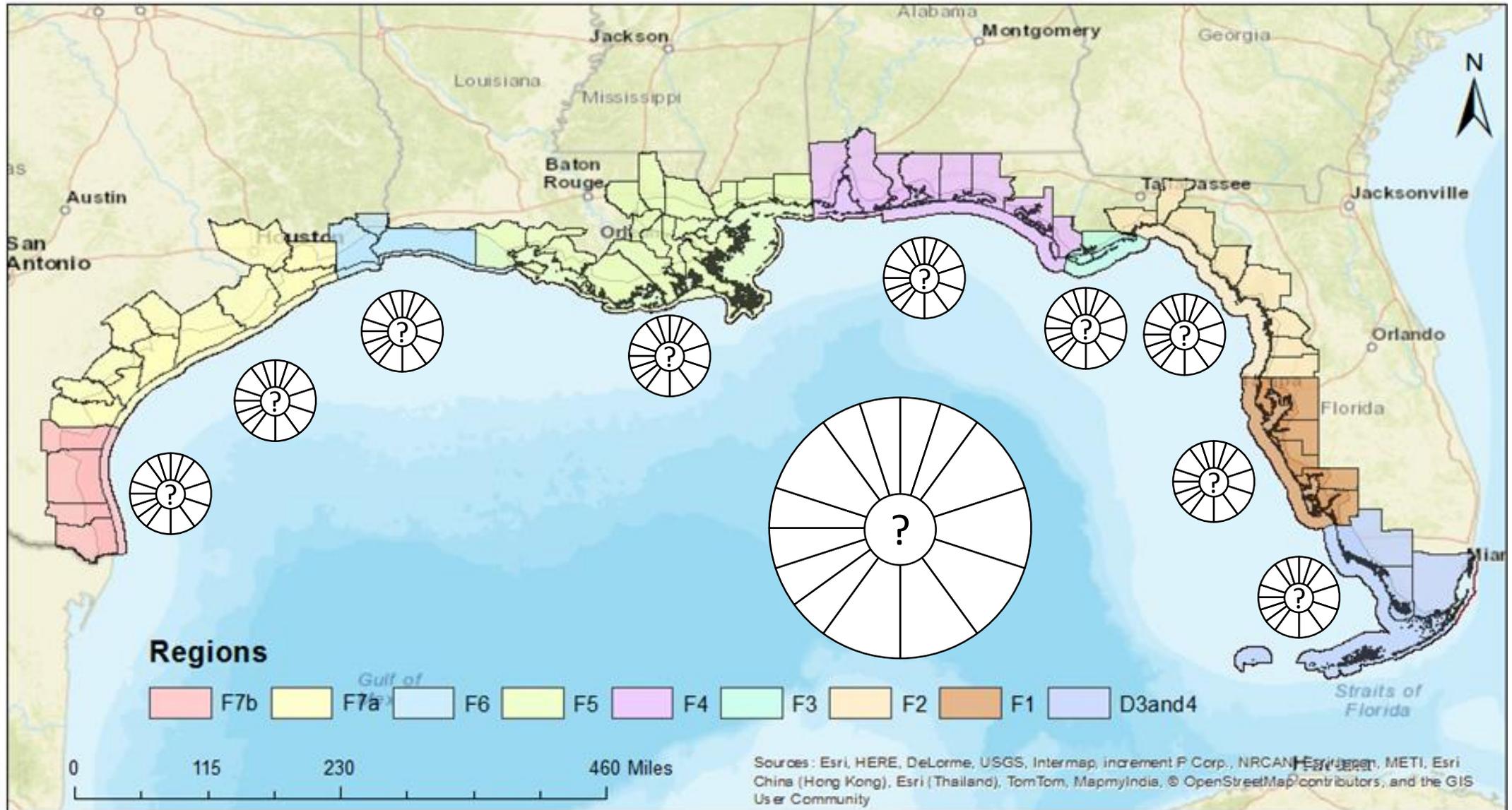


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Coastal Protection Discussion

- Pressures
 - Habitat Destruction
 - Sea Level Rise
- Resilience
 - Conservation Easements
 - State or Federally Protected Areas

Future Work



A serene sunset scene over a marina. The sky is a gradient of orange and yellow, with the sun low on the horizon. Silhouettes of numerous boat masts and rigging are visible against the bright sky. In the foreground, the dark silhouette of a boat is partially visible on the left. The water in the foreground is calm, reflecting the warm colors of the sunset.

Thank You

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