Applying SEEA EEA to Marine and Coastal Areas: Long Island Bays Case Study

Anthony Dvarskas
Stony Brook University

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Stony Brook University
School of Marine and Atmospheric Sciences

Overview

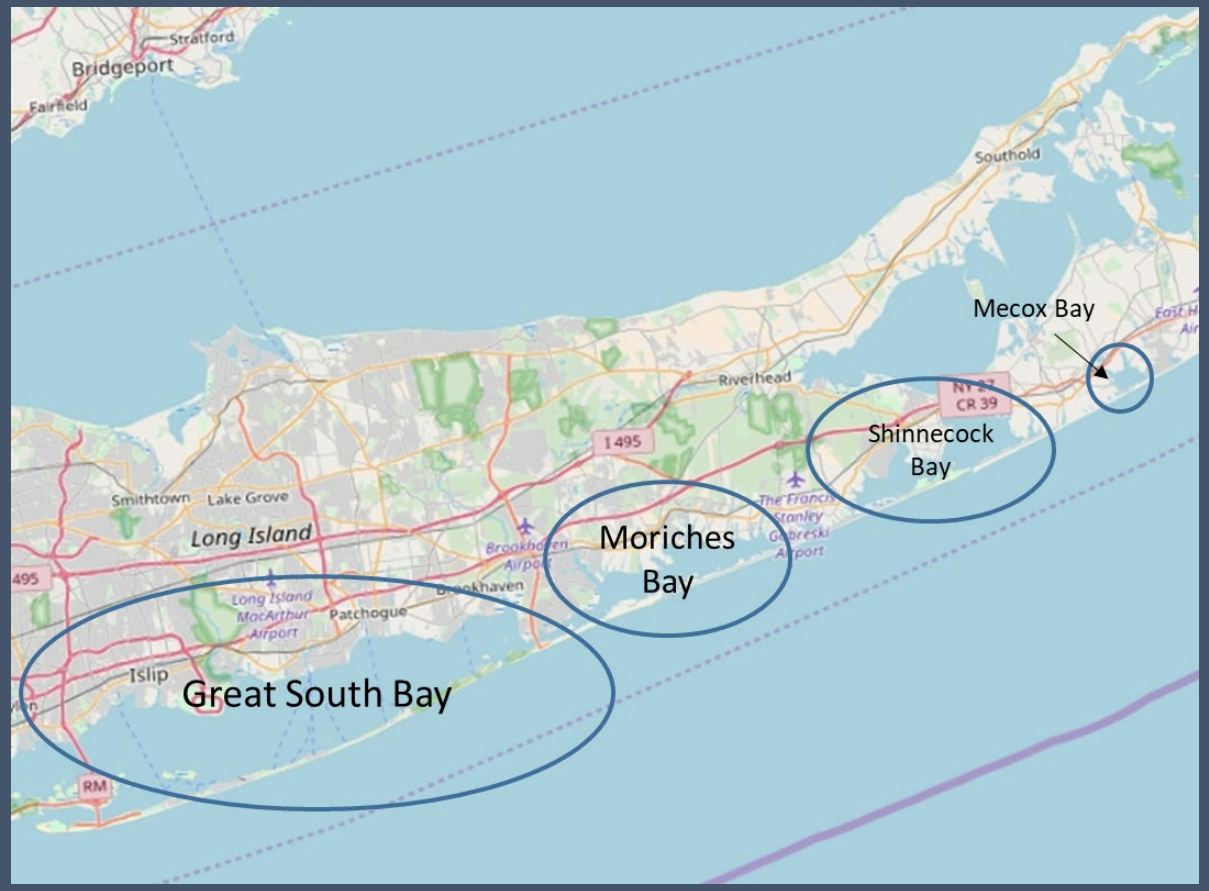
- EEA and marine context
- Application to Long Island bays
- Future research directions

Challenges of Coastal/Marine Context

- How to define EAU?
  - Administrative/watershed boundaries for terrestrial
  - Use policy-relevant areas? Bioregions?
- Interconnections across EAUs
  - Mobility of species and tracking of species
  - Nursery habitat vs where feed vs where harvested
- Mapping/data limitations for LCEUs
  - Aquatic habitats not as well mapped as terrestrial

Application to Long Island Coastal Bays

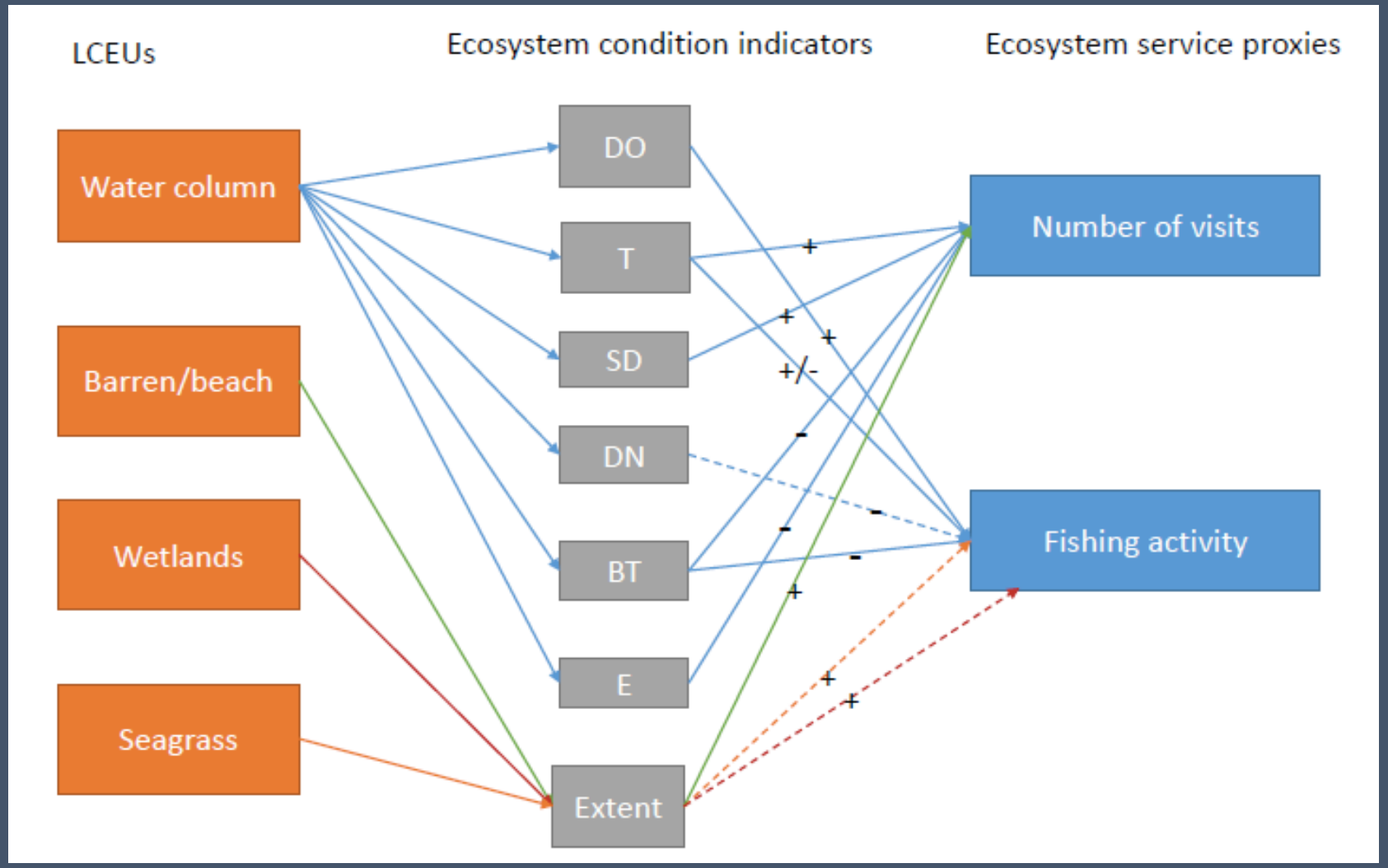
- Focus on prioritized ecosystem services and associated benefits



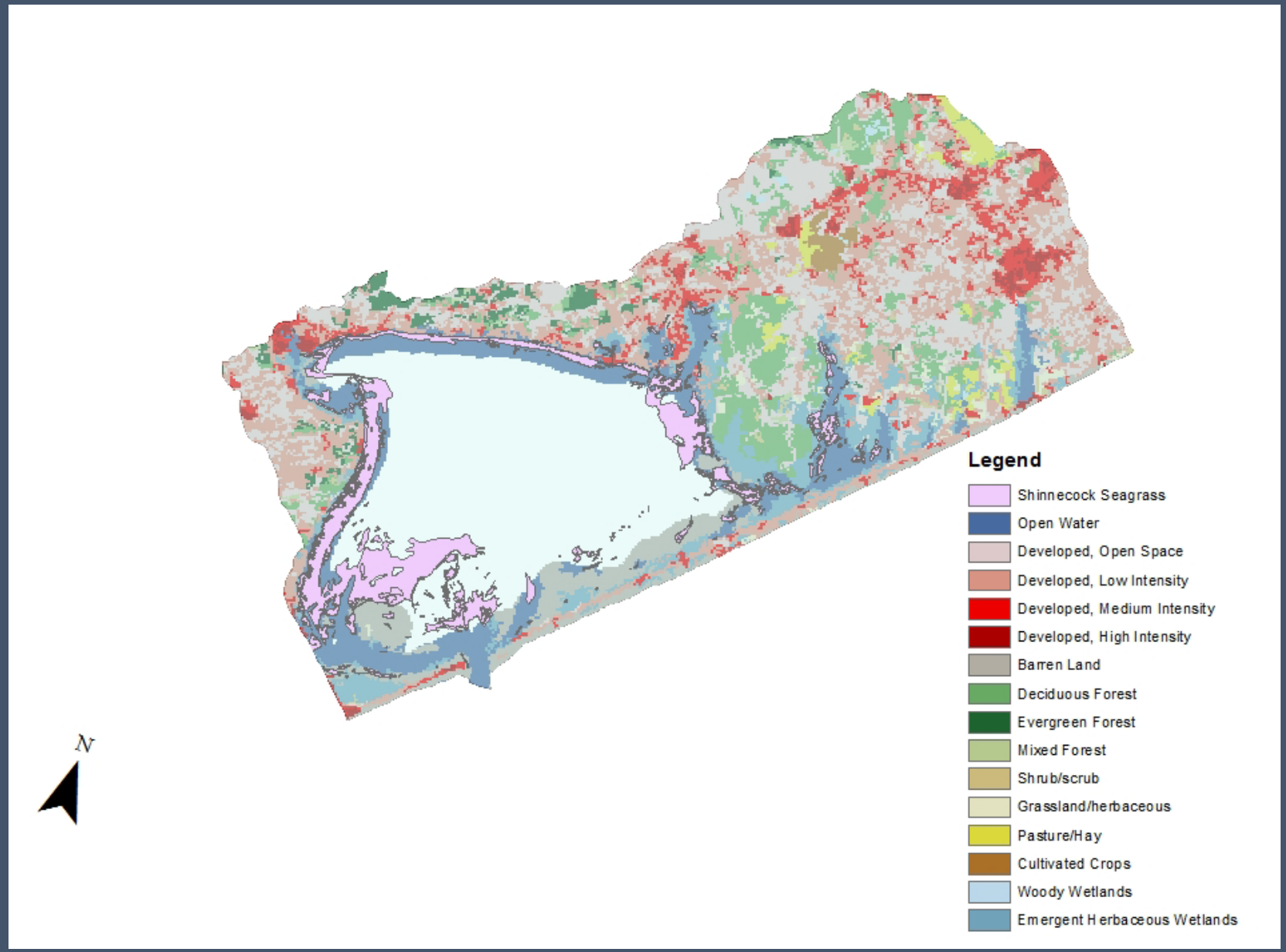
Ecosystem Accounting Units

- Joint consideration of terrestrial and marine assets as EAU
  - 12-digit HUCs incorporate watershed and waterbody
  - Provide boundary for delineating imports to/exports from system
- Mapping data sources
  - Land cover – NLCD USGS
  - Wetland – National Wetland Inventory
  - Seagrass – Nature Conservancy
  - Water column data – Suffolk County Department of Health

Conceptual Map



Shinnecock Bay – Land and Aquatic Cover



Condition Indicators within EAU by Identified Habitat Areas

LCEU	Extent (km2)	Characteristics of ecosystem condition					
Year: 2006		Physical/Chemical				Biological	
		DO (mg/l)	T (°C)	S (ft)	DN (mg/l)	BT (cells/ml)	E** (MPN/100 ml)
Water column	310	9.8	9.4	5.2	.33	1,945	29
Barren land (Beach)	23.8	N/A	N/A	N/A	N/A	N/A	N/A
Wetlands	50	U	U	U	U	U	U
Seagrass*	67.4	U	U	U	U	U	U

Ecosystem Condition Across Time Periods

	Characteristics of Ecosystem Condition				
	DO (mg/l)	T (°C)	S (ft)	BT (cells/ml)	E (MPN/100 ml)
Opening condition	9.8	9.4	5.2	1,945	29
Improvements in condition			.5		8
Improvements due to natural activity			?		?
Improvements due to human activity			?		?
Reductions in condition	1.3			82,329	
Reductions due to extraction and harvest	?			?	
Reductions due to ongoing human activity	?			?	
Catastrophic losses due to human activity	?			?	
Catastrophic losses due to natural activity	?			?	
Closing condition	8.5	14*	5.7	84,274	21

- What is driving the condition changes? Management actions?

Linking to Economic Production Accounts: Recreation and Fisheries Benefits

- Consumption of recreation often directed toward discrete space by infrastructure investments
  - Estimate flows to economic units/sectors within defined terrestrial EAU
- Much data where landings occur not necessarily where fish caught
  - VTR, SHAs in NY

Type of service	End of 2006 Accounting Period	End of 2011 Accounting Period
Provisioning services		
Shellfishing (bushels landed)*	12,169	21,501
Cultural Services		
Beach visitation (number of visits)**	772,803	1,125,800

*Totals across all study bays
**Represents data from a single park

Connection to NAICS Codes?

	NESCS–S		NESCS–D	
Group	**Environment**	**End-Product**	**Direct Use/Non-Use**	**Direct User**
Definition	Spatial units with similar biophysical characteristics that are located on or near the Earth's surface and that contain or produce "end-products"	Biophysical components of nature that are directly used or appreciated by humans	Different ways in which end-products are used or appreciated by humans	Entities that directly use or appreciate the end-products
Hierarchy and Coding System **NESCS Code for FFES*: WW.XX.YYYY.ZZZZZZZ**				
Class	**W**	**WW.X**	**WW.XX.Y**	**WW.XX.YYYY.Z**
Subclass	**WW**	**WW.XX**	**WW.XX.YY**	**WW.XX.YYYY.ZZZ**
Detail			**WW.XX.YYYY**	**WW.XX.YYYY.ZZZZZZZ**
Example 1: Water in the ocean being used as a medium for freight transportation NESCS Code for FFES: 15.12.1202.1483111				
Class	Aquatic: **1**	Water: **1**	Direct Use: **1**	Industry: **1**
Subclass	Open Ocean and Seas: **15**	Liquid Water: **12**	In-Situ Use: **12**	Transportation and Warehousing: **148**
Detail			Transportation medium: **1202**	Deep Sea Freight Transportation: **1483111**
Example 2: Water in rivers being extracted for household gardening purposes NESCS Code for FFES: 11.12.1105.201				
Class	Aquatic: **1**	Water: **1**	Direct Use: **1**	Households: **2**
Subclass	Rivers and Streams: **11**	Liquid Water: **12**	Extractive Use: **11**	Households: **201**
Detail			Support of plant or animal cultivation: **1105**	

USEPA, 2015.

Example from Finland

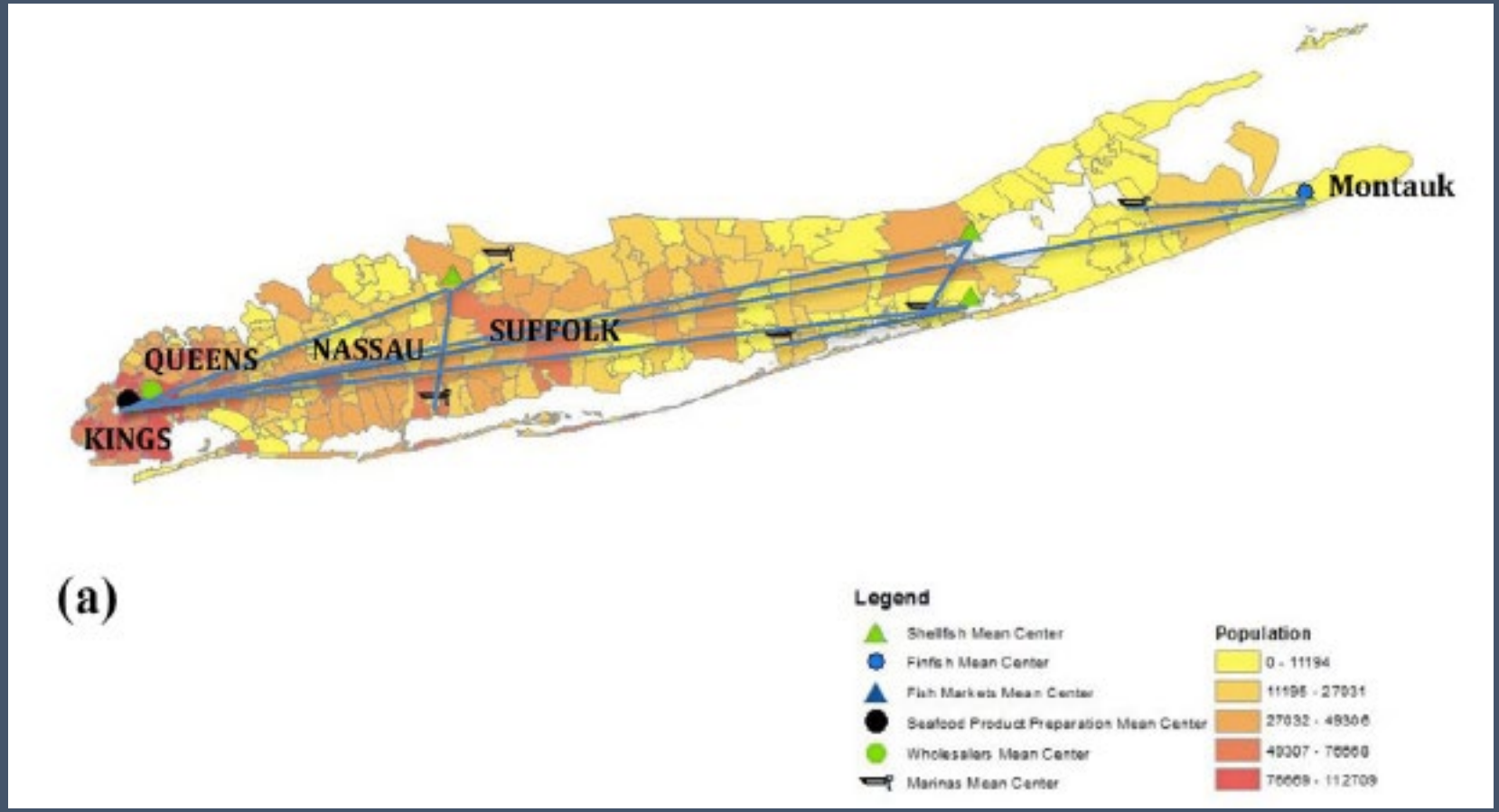
NACE	031	93
Sectors that use fish provisioning ES	Fishing (herring/ sprat/cod)	Sports and leisure activities (herring/ sprat/cod)
Actual supply of fish provided from marine ecosystem	128 (thousand tons) (117/8.96/ 1.67)[a]	735 (tons) (720/13/3)[b]
Monetary value of the ES	3.6 (million EUR)	Value as recreational services

[a] ICES (2015a), total Finnish commercial catch including other species is 133 thousand tons (LUKE, 2016).

[b] LUKE (2014), total Finnish recreational catch including other species is 5.9 thousand tons.

From Lai et al (2018)

And Link to Resilience Through Supply Chains???



Dvarskas 2018. Ecosystem Services.

Conclusions

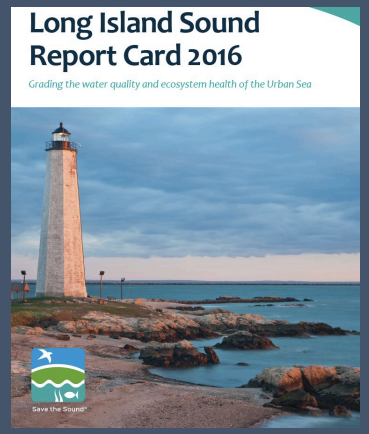
- Data limitations impede fine-scale analysis and population of tables
  - Lack (at least within the US) of regularly scheduled mapping of many marine habitats
- Attempting to populate tables beneficial in and of itself
- Monitor shifts in ecosystem-associated economic accounts
  - Tourism accounts
  - Fisheries accounts

Future Research Questions

- What are relevant time steps for analysis given indicator of interest?
  - Condition measures vary on different time scales
  - Levels during a given season or max/min may be more relevant than beginning/end of time period
  - Lagged condition indicators
- What is level of detail needed for policy decisions?
  - Who are the end users?
  - GDP estimates become awkward at small scales but many ecosystem decisions are made on a small and project scale
  - What to we lose as we scale up?
- Role for ecological marine units approach? Species associations?

Role of EEA and Other Assessment Approaches

- Report cards
- Integrated assessment plans
- How to supplement/complement/synergize?



Questions?

- Contact information

Anthony Dvarskas
School of Marine and Atmospheric Sciences
Stony Brook University
Tel: 631-632-9674
E-mail: Anthony.Dvarskas@stonybrook.edu