Estuarine biotope mosaics, the BCG, and habitat management goals

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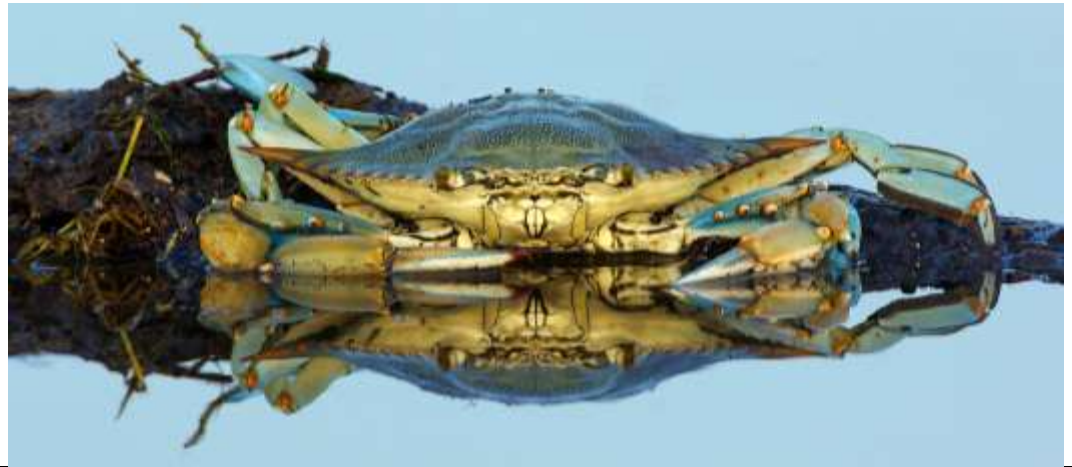
This presentation:

1 - describes estuarine management methods of the Tampa Bay Estuary Program (TBEP), and:

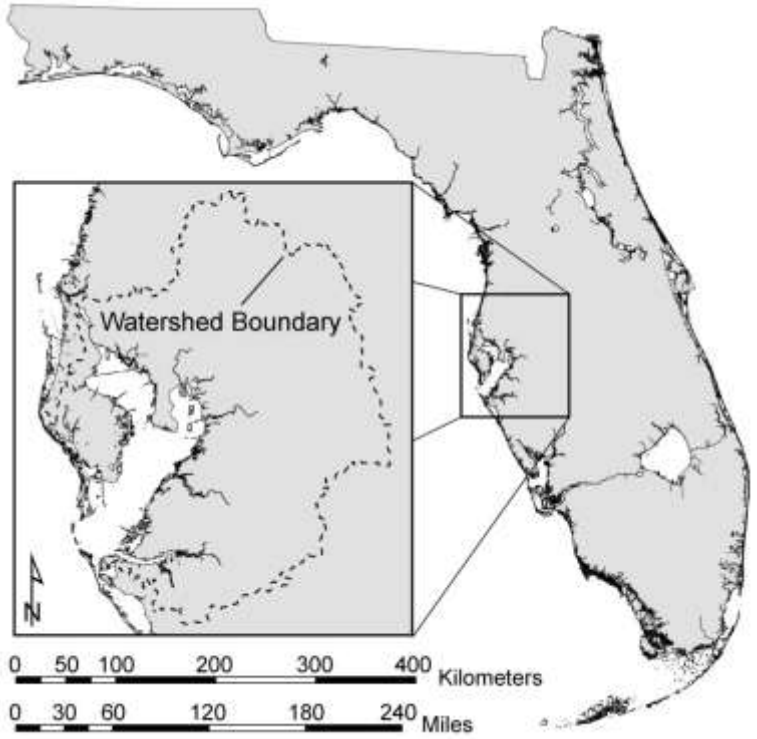
2 – discusses applying these methods to LCRE and other estuaries using the BCG bioassessment framework.



Tampa Bay Estuary Program (TBEP)
A Case Study for biological goal-setting at the whole-estuary scale

The Tampa Bay environment was showing signs of rapid degradation in the 1970s: macroalgal blooms, poor water quality, and decreasing populations of valued species.

TBEP took on a role as convener of scientists and stakeholders to develop goals and a plan for the future of Tampa Bay.



Five Steps of the TBEP approach to setting and meeting agreed-upon habitat-based estuarine goals:

1 – Technical Advisory Committee (TAC) identifies the key estuarine-dependent faunal guilds:

- Open water filter feeders
- Shallow water forage fish
- Recreationally and commercially important fish and shellfish
- Subtidal invertebrates
- Intertidal invertebrates
- Estuarine mollusks
- Estuarine dependent birds
- Estuarine dependent birds requiring freshwater foraging habitat (during nesting season)
- Estuarine reptiles
- Marine mammals

2 – TAC identifies the habitats that are most vital to these faunal guilds:

1. **Seagrass**
2. **Mangrove/ saltmarsh**
3. ***Battis/Salicornia* "salt barren"**
4. ***Acrostichum/Juncus* marsh (<10 ppt)**

(This gradient of habitats provides support for most of the important species in the Bay.)

3. TBEP assembles data to establish historic and existing extent of critical habitats/biotopes.

Habitat Type	1900?	1950	1990	1995	1999	2006
Seagrass	~75K	40,420	25,226	26,717	26,916	28,321
Mangrove/Poly-haline Marsh	16,540	15,894	13,846	14,760	14,747	14,644
Oligohaline Marsh	17,210	6,621	4,169	4,343	4,452	4,386
Battis/Salicornia "salt barrens"	**Unknown**	1,371	887	445	387	493
Totals	108,750 +	64,306	44,128	46,265	46,502	47,844

4 - TAC defines "minimally disturbed" conditions (1900). Stakeholders determine a desired ecological state (1950); and set quantifiable goals: "Restore the Historic Balance of habitat acreages to 1950's ratios to support estuarine-dependent species".

Habitat Type	1900?	1950	1990	1995	1999	2006	GOAL
Seagrass	~75K	40,420	25,226	26,717	26,916	28,321	37,291
Mangrove/Poly-haline Marsh	16,540	15,894	13,846	14,760	14,747	14,644	14,644
Oligohaline Marsh	17,210	6,621	4,169	4,343	4,452	4,386	6,107
Battis/Salicornia "salt barrens"	**Unknown**	1,371	887	445	387	493	1,245
Totals	108,750 +	64,306	44,128	46,265	46,502	47,844	59,287

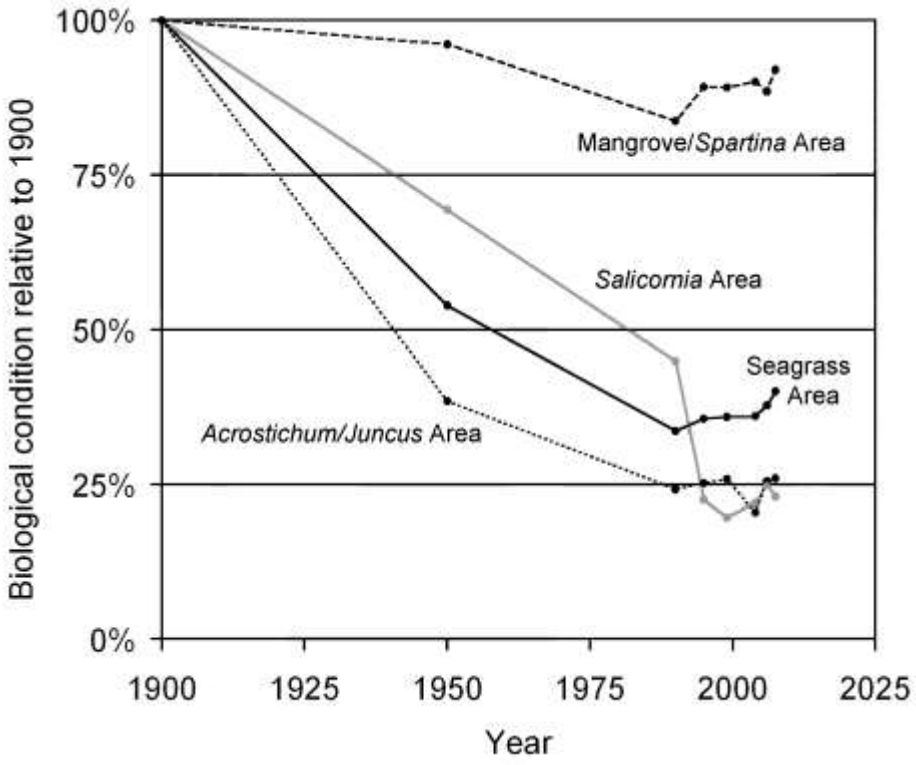
5 – TBEP and partners coordinate management actions, evaluate progress, and adapt management actions as needed. Actions: protect and restore intertidal habitats, and decrease nutrient inputs to improve water clarity and increase seagrass.

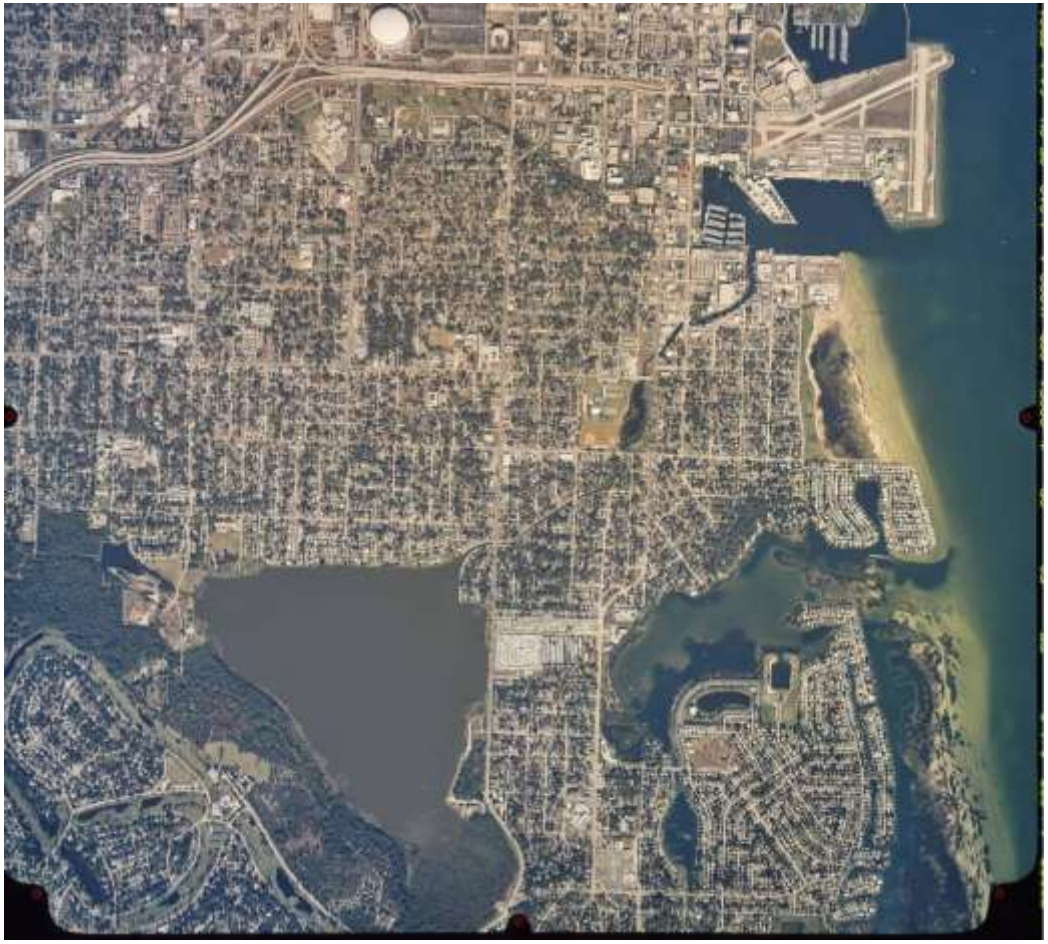
Restoration Strategy: Increase seagrass, oligohaline marsh and salt barrens acreage when ecologically appropriate. Use a habitat mosaic approach in designing restoration plans.

Results:

"Restore the Historic Balance" has resonated with the public of Tampa Bay, providing a simple and unifying goal with quantitative targets for many management actions.

Tampa Bay's ecological health over the last two decades has very noticeably improved. Over 3,700 acres of high-value estuarine habitat have been regained since Tampa Bay adopted their vision and goals.





Reality check: some areas are not restorable. But restoring the balance of habitat to 1950s levels in Tampa Bay may reduce "bottlenecks" for habitat-specific species.

Reality check: some estuaries are not restorable. But moving closer to a desired state is a valid goal, as is "holding the line".

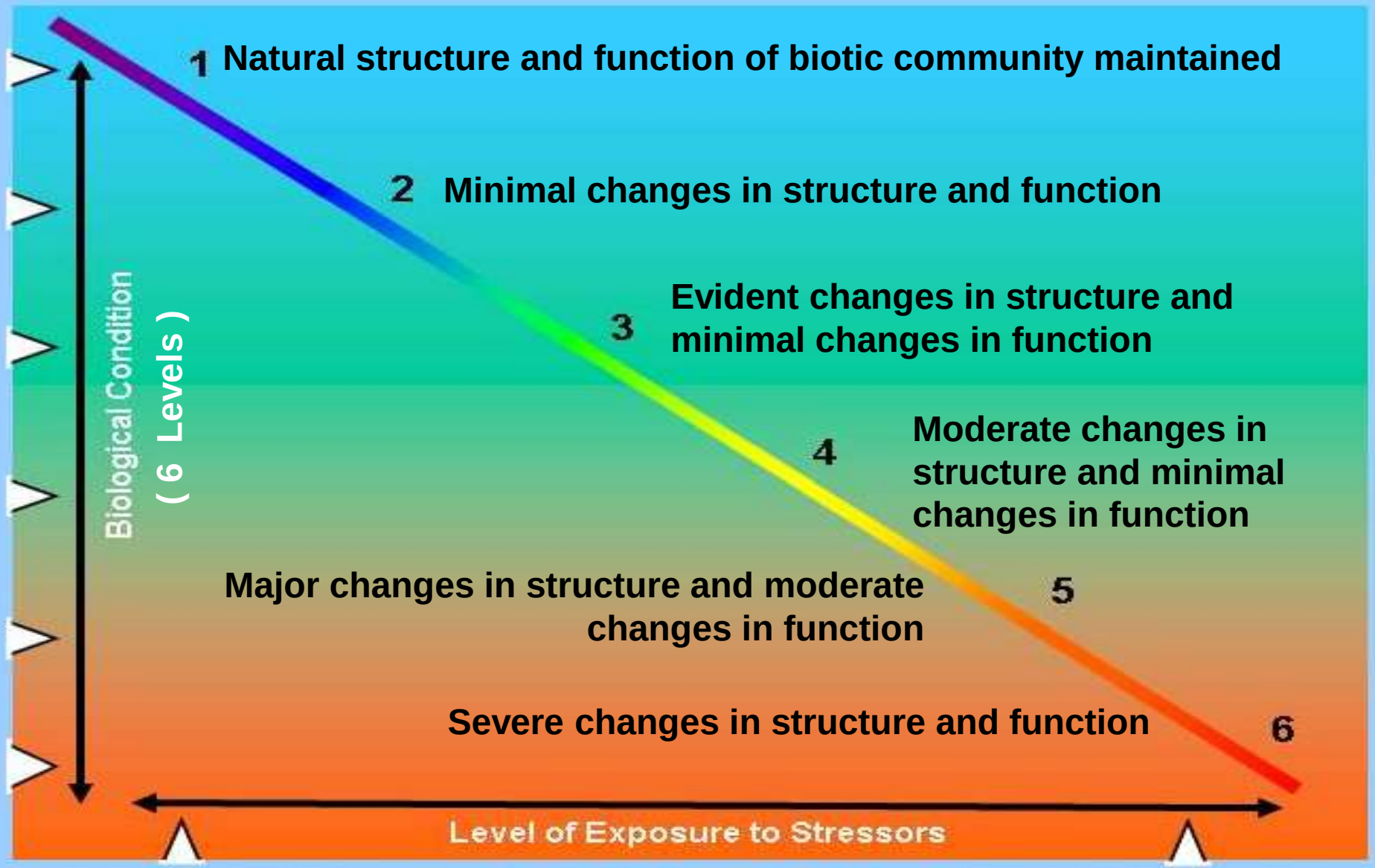
Reality check: climate change and sea-level rise must be taken into account.

Lessons:

Find a “hook” to engage the public, then set and apply easily communicated and motivating management goals.

The BCG (Biological Condition Gradient) is a science/management framework that organizes different bioassessments around the concept of Biological Integrity.

BCG: Standardized Biological Response to Increasing Levels of Stress



● The BCG is a scientific framework for consistent bioassessment, goal-setting, and coordinated management.

● Levels of a BCG can be used to interpret and help set Designated Uses for Aquatic Life in a management approach with State 305b/303d, or can be used as non-regulatory targets for protection and restoration, as by National Estuary Programs.

● The BCG provides a common language for comparing different biological metrics.

After successes in streams, the BCG is now being tested for application to estuaries at two levels:

1) **single-habitat measures (e.g., habitat-specific IBIs, soft-sediment benthic fauna)**
2) **biotope mosaics.**


Biological Integrity includes using distributions of biotopes (“living habitats”) as bioassessment.
head of an estuary on Martha’s Vineyard, MA
head of the estuary, Black Rock Harbor, CT

TBEP efforts (and the proposed estuarine BCG approach) rely on:

Habitat, biotope, or biological metrics that are ecologically meaningful and easily communicated to the public.

The historic baseline of “minimally disturbed”, to serve as an anchor, and to show what we have already lost.

Goals based on moving the estuary closer to a more desirable state that may have occurred in the past.

Use of scientific workshops to achieve consensus on science issues.

Use of public and stakeholder workshops to arrive at a “vision” for the estuary together with consensus quantitative goals.

Achieving the consensus goals through a wide variety of management actions together with results monitoring.

Conclusions…

Habitat- or biotope- based tools comparing past estuarine state to existing estuarine state can successfully be used to manage future estuarine state.

Goals to “Restore the Historic Balance” are based on ecology, and have resonated with the public of Tampa Bay.

BCG approaches could add comparability and management options to the Tampa Bay procedures.