



***Each One Teach One:
Steps towards a “Train the Trainers” Program for a
Holistic Science Approach to Coastal Ecosystem Restoration
for Malibu Bay, Boston Harbor, Massachusetts***

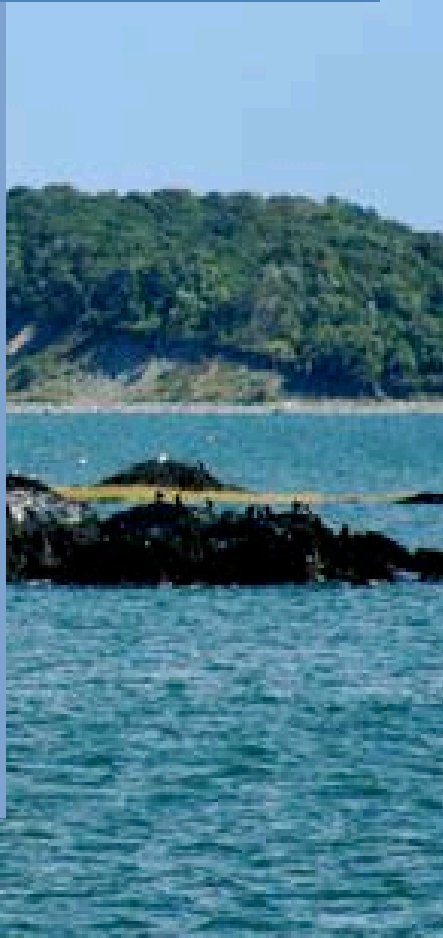
**Lisa Greber
Anamarija Frankic
University of Massachusetts Boston
Restore America’s Estuaries; Nov. 17, 2010**

- introduction: *ahupua'a* in boston harbor
- methods: 'holistic spectra' tool
- results: tools to bridge communities
- future work
- conclusions
- acknowledgements



Bufflehead (*Bucephala albeola*)

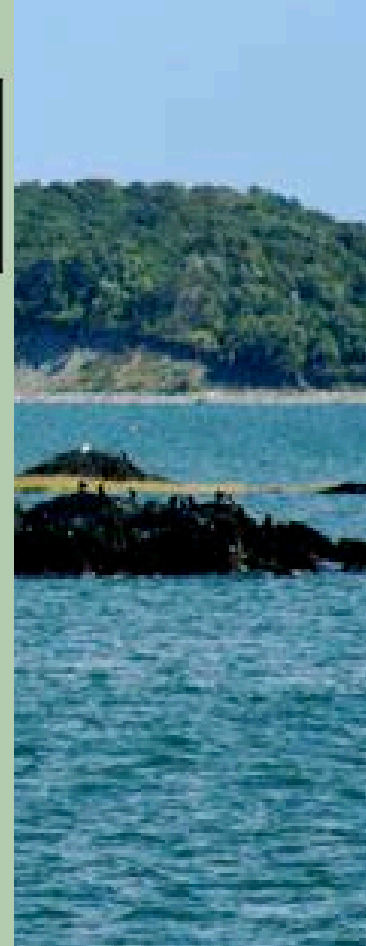
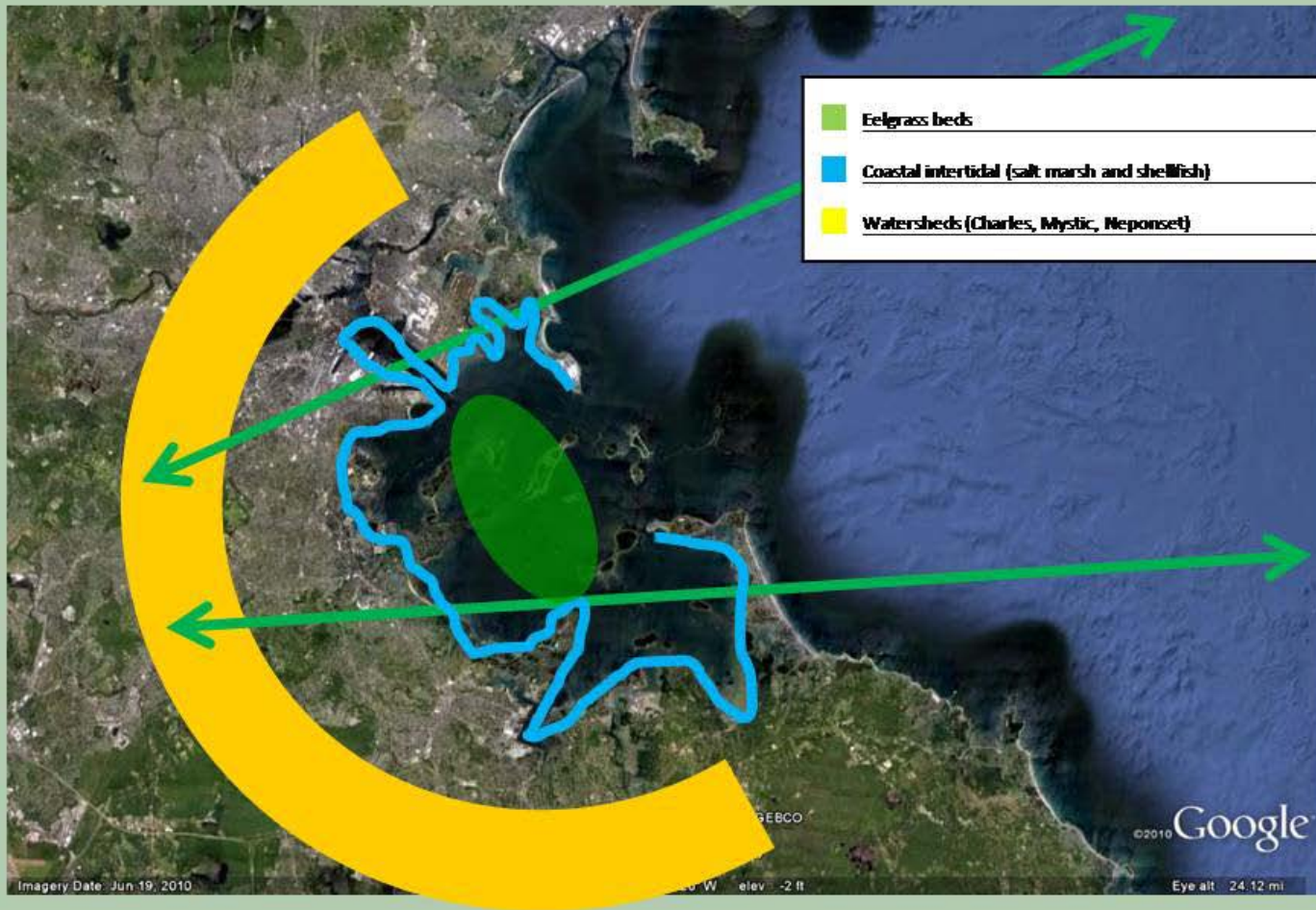
Ahupua'a:
from the top of the
mountains to the coral
reefs...



“From Boston’s green roofs to Stellwagen bank”

– Anamarija Frankic, Green Boston Harbor Project (GBH)

GBH Ahupua'a Vision



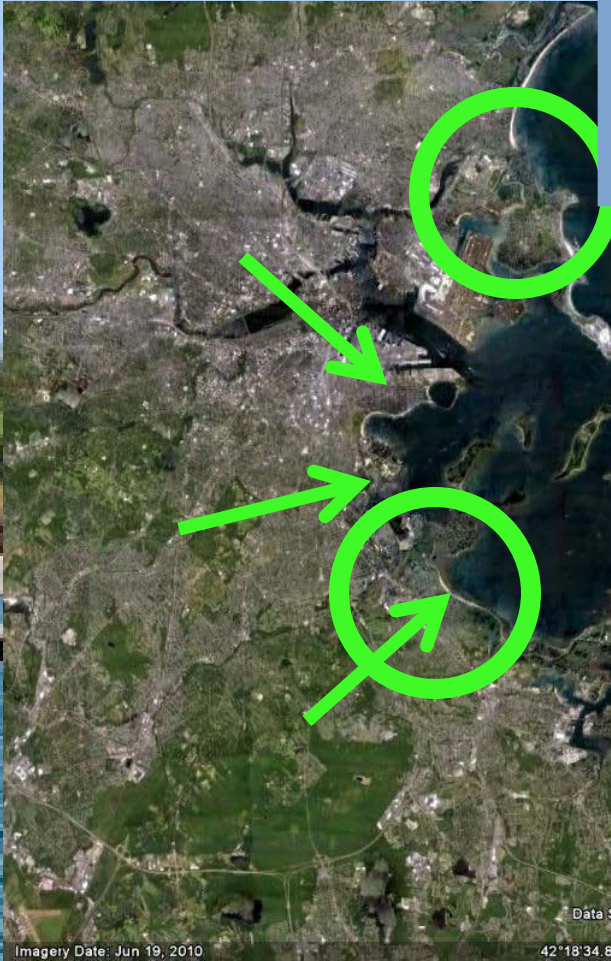


Double-crested Cormorant (*Phalacrocorax auritus*)

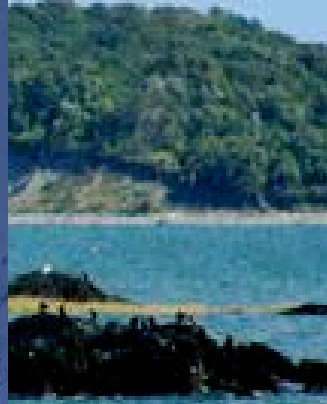


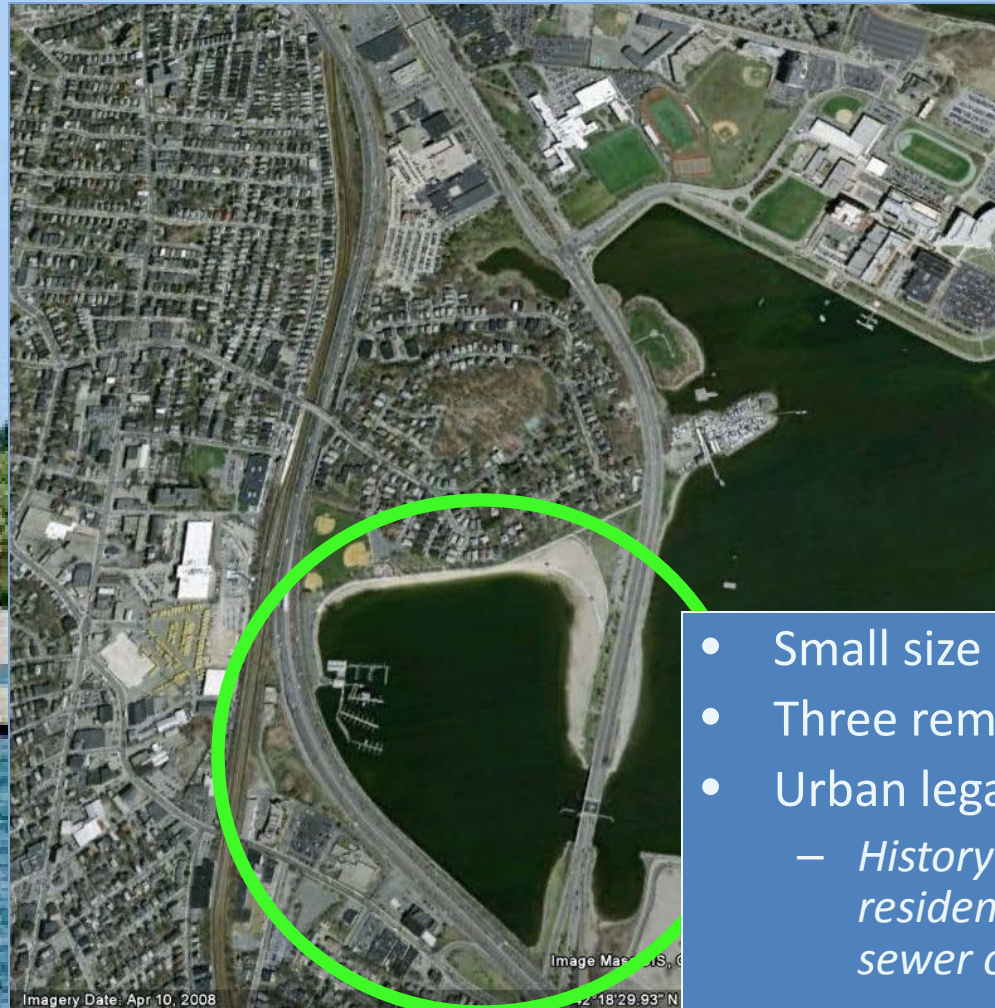


Belle Isle Salt Marsh



Neponset Salt Marsh





- Small size (1/4 sq. km)
- Three remaining salt marsh (*Spartina sp.*) patches
- Urban legacy
 - History of development challenges (including residential, boat deconstruction, highway, combined sewer overflow (CSO) outlets)
 - Water quality concerns
 - “Muck” (muddy anoxic sediments)

Conceptual questions/visions and values

Math/patterns

Comparative studies/Stories

Maps/Images

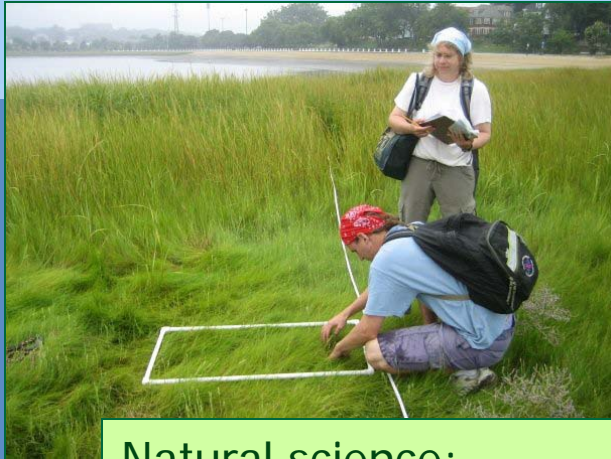
Experimental research

“Hands-on” exploration

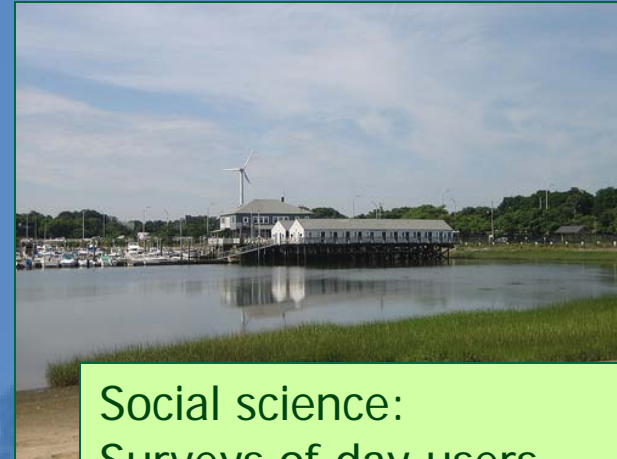
Encounter

Double-crested Cormorant (*Phalacrocorax auritus*)

Dave Baynham 2004



Natural science:
Salt marsh transects



Social science:
Surveys of day users



Community knowledge:
Festivals, community meetings, bonfires...

(Berkes et al. 2000, Garibaldi 2004)

Natural science:
Salt marsh transects

Social science:
Surveys of day users

Conceptual formulations	Values, ethics, vision
Math/mathematical models	Music/patterns
Comparative studies	Stories
Graphs	Images
Experimental research (curiosity-driven)	Experimental research (relationally-driven)
Hands on exploration (curiosity-driven)	Hands on exploration (relationally-driven)
Direct encounter (curiosity-driven)	Direct encounter (relationally-driven)

Community knowledge:
Festivals, community meetings, bonfires...

(Berkes et al. 2000, Garibaldi 2004, Harding 2006)

- 3 substrates, 3 distinct salt marshes
 - differences in average densities of *Spartina alterniflora*
 - differences in average heights of tallest *Spartina alterniflora* plants
 - differences in species occurrence and abundance among marshes
- Reducing our marsh footprint



(*Spartina patens*) and Sea lavender (*Limonium nashii*)



- Of those surveyed:
 - ~1/3 long-term beach community (>20 years)
 - Fewer than half swim (most citing “poor water quality” (15) or “muck” (8))
 - Few fish (5/40; 2 will eat their catch)

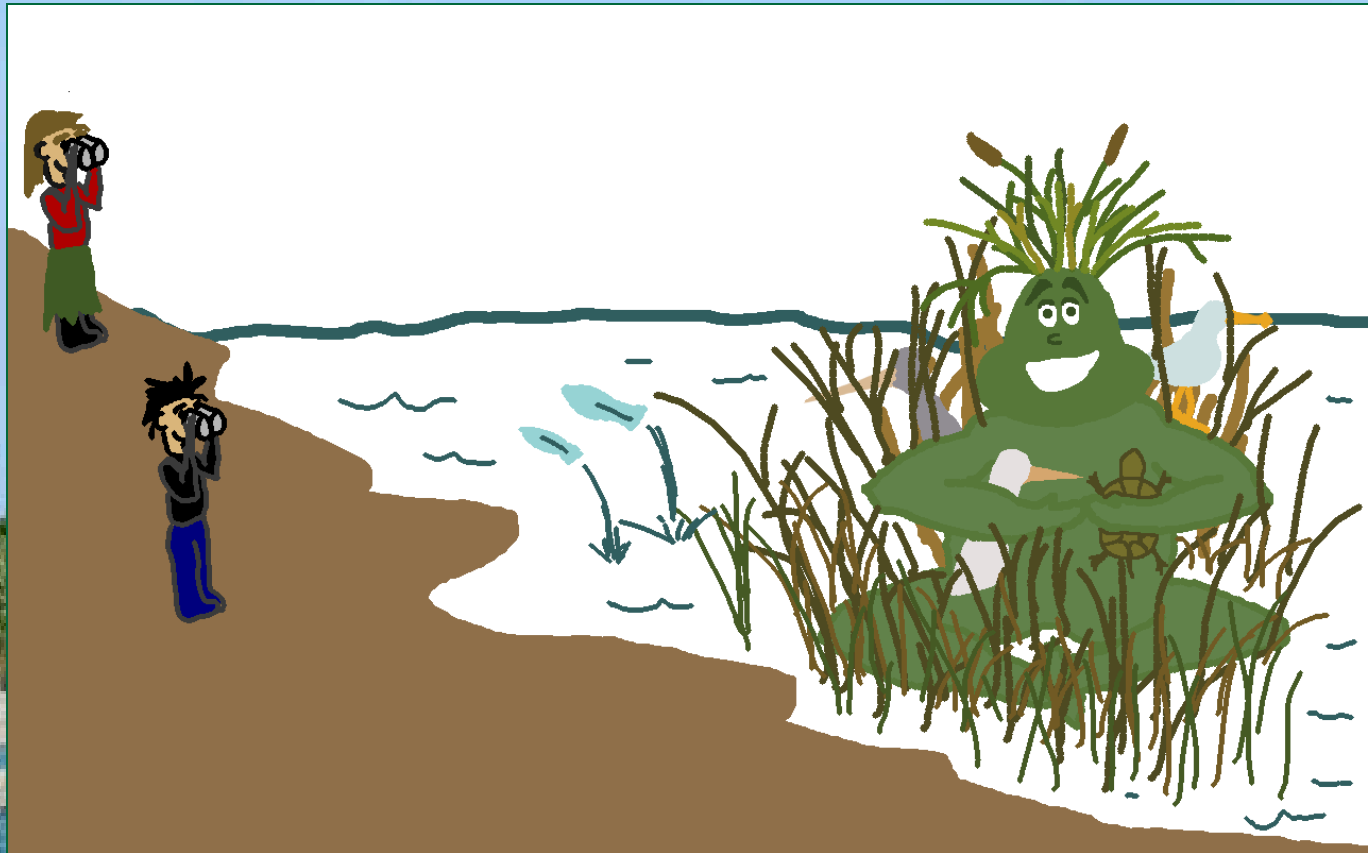


Common periwinkle *Littorina littorea*; mud snail *Nassarius obsoletus*

- Of those answering:
 - Most (28/34) supported the presence of salt marshes
 - Some strong vocal opposition not fully represented in these numbers (social as well as ecological concerns)

“It is very nice to watch [the marsh] change with the seasons.”

“I can see you love the grass....
though / do not!!”





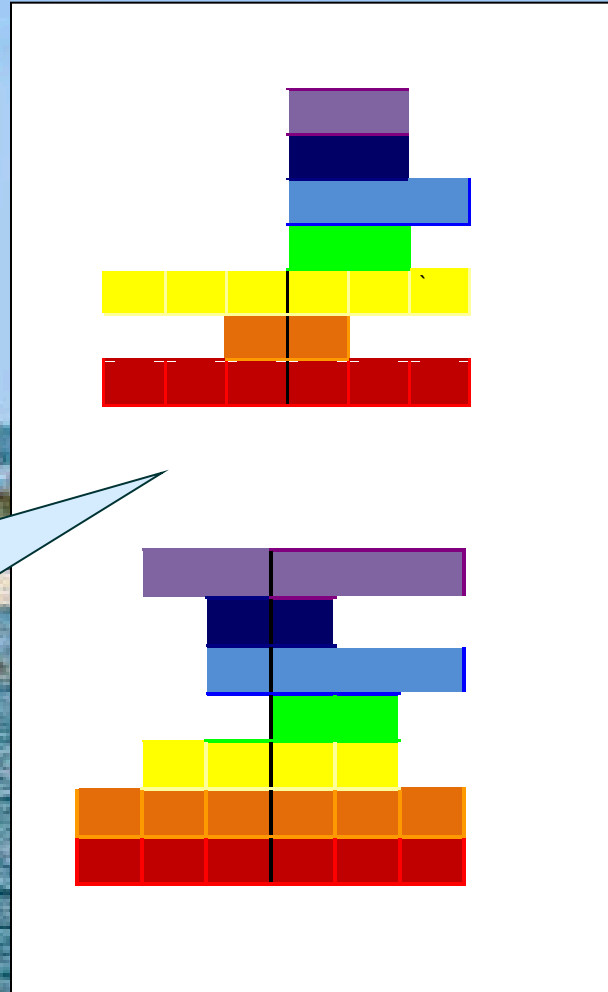
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Holistic approach

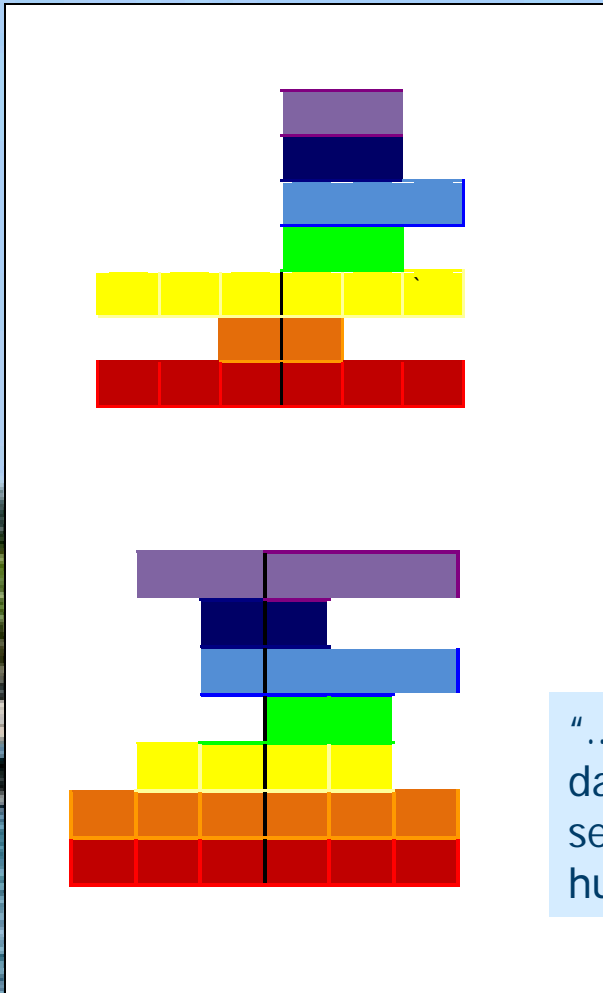
Research activities distributed into categories of holistic approach

Choice of research methods; drawing; listening to stories	Drawing; salt marsh caricatures (planned); community meetings; beach festival; closing "thank you" ritual
Establishing salt marsh transects; data analysis; models integrating salt marsh extent and human activities (planned)	Music at beach clean-up and beach festival
Researching other SAV restoration sites	Listening to stories of residents, yacht club members, and other beach users
Maps; model visualization (planned)	Photographs; drawing; salt marsh caricatures (planned)
Day user surveys; plant ID; invasive species monitoring; salt marsh transects; fishing	Plant ID; invasive species monitoring; salt marsh transects
Plant ID; invasive species monitoring; salt marsh transects	Plant ID; invasive species monitoring; salt marsh transects; changing research methods to do less damage to the salt marsh grass; the taste of salicornia
Plant ID; invasive species monitoring; salt marsh transects, fishing	Plant ID; invasive species monitoring; salt marsh transects; fishing; closing "thank you" ritual

Conceptual formulations	Values, ethics, vision
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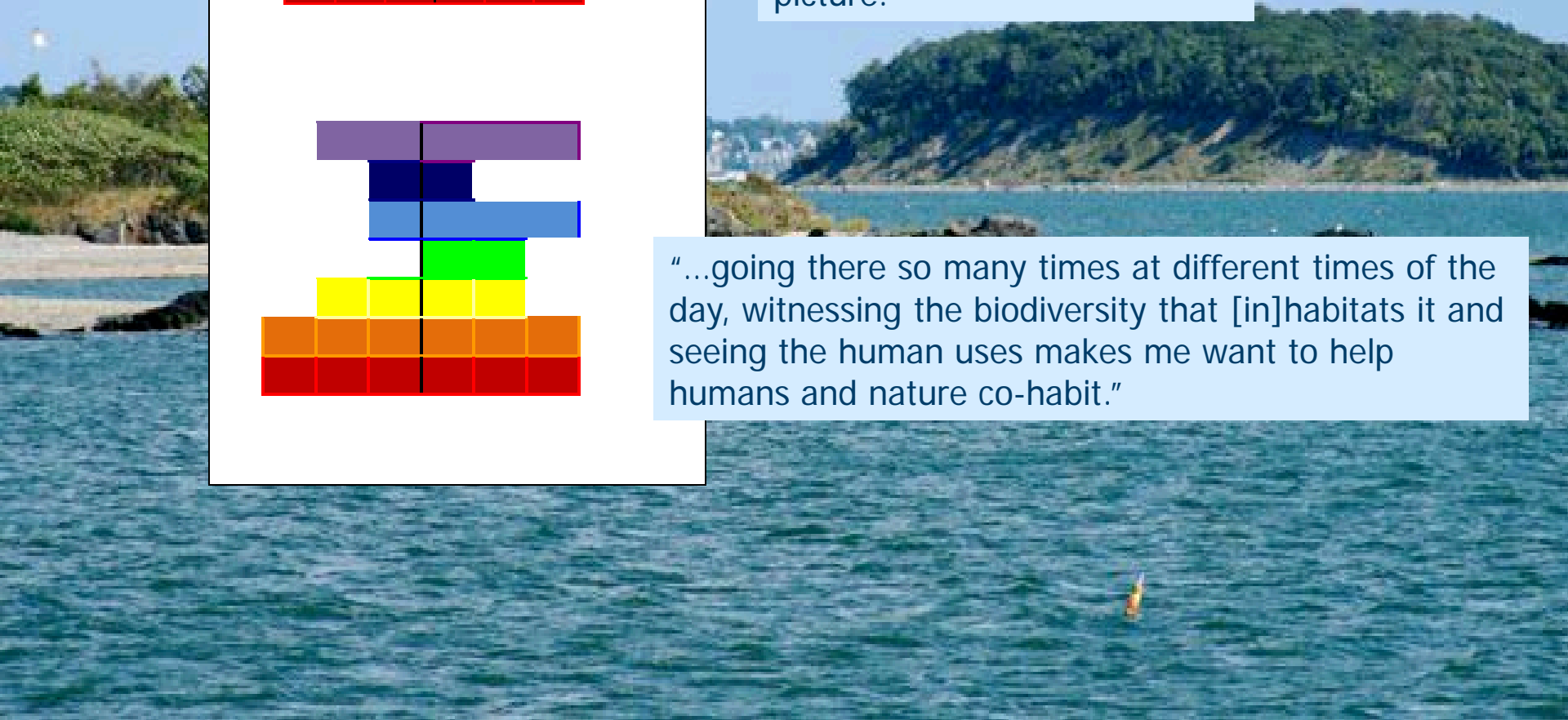


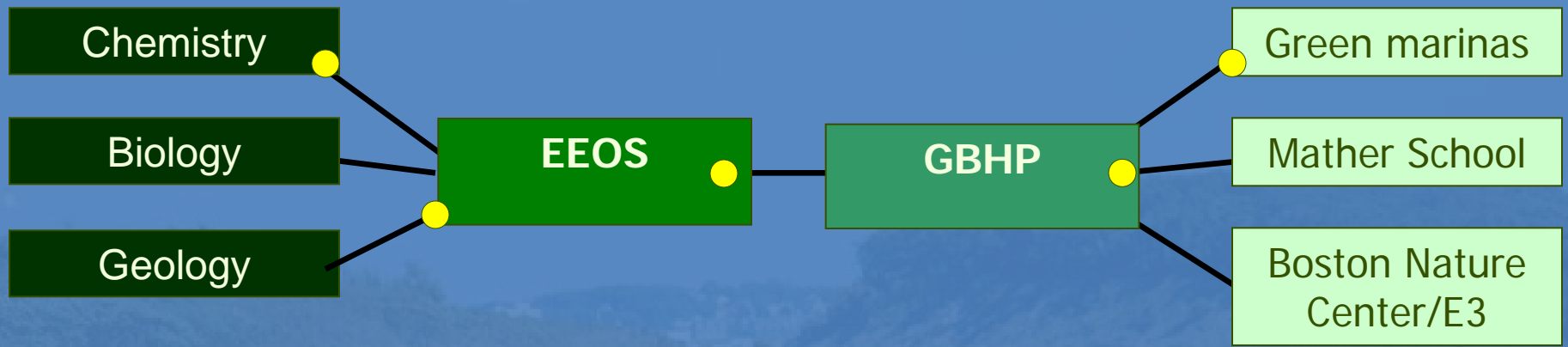
To make these spectra, students were asked: about how much time (a little, half the time, almost all the time) did you spend on activities in each category?



“By engaging different parts of my brain and abilities, approaching science from varied perspectives, one gets a better idea of the big picture.”

“...going there so many times at different times of the day, witnessing the biodiversity that [in]habitats it and seeing the human uses makes me want to help humans and nature co-habit.”





Purple	White
Dark Blue	White
Blue	White
White	White
White	White
White	White

Purple	Purple
Dark Blue	White
Blue	White
Green	White
Yellow	White
Orange	White
White	White

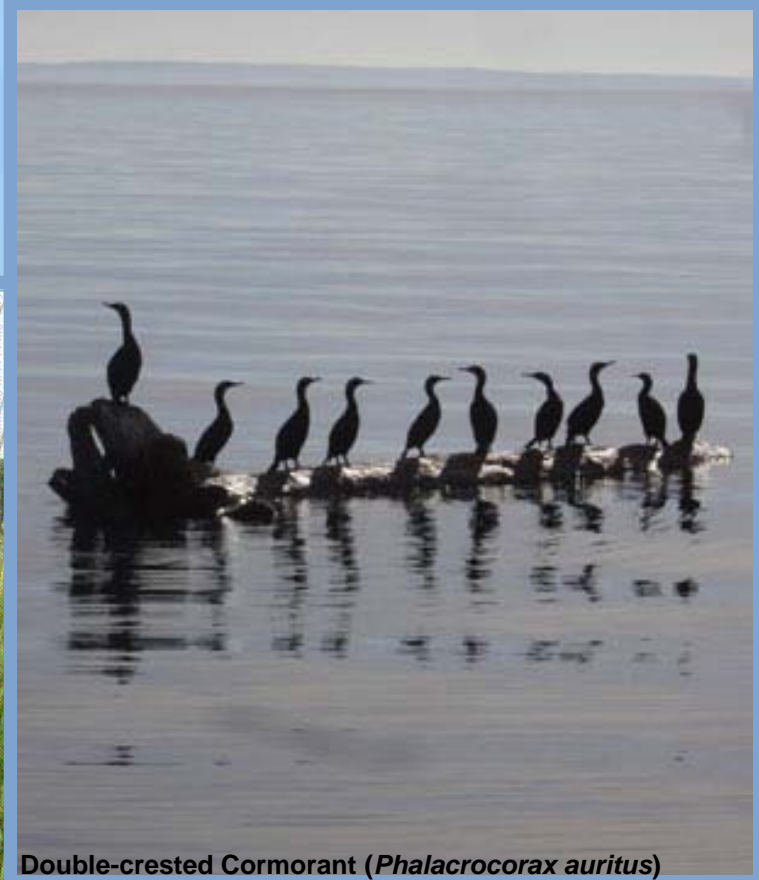
Purple	Purple
Dark Blue	Dark Blue
Blue	Blue
Green	Green
Yellow	Yellow
Orange	Orange
Red	Red

White	Purple
White	Dark Blue
White	Blue
White	Green
Yellow	Yellow
Orange	Orange
Red	Red

- permits for shellfish placements for multi-habitat restoration in Malibu Bay
- ecopsychological aspects of re-connecting communities and nature
- further refining the holistic spectra tool

- “ahupua’a”
- “ahimsa”
- “shalom,” “shochenet”
- “communion”
- “interdependent web of life”
- for boston harbor?

- Malibu summer field crew, particularly Alex Etkind and Meredith Eustis, and our friends at the Dorchester Yacht Club and Savin Hill Neighborhood Association
- For Author Greber: committee members Bob Bowen, Bob Chen, Ester Shapiro, and Rob Stevenson
- NOAA/NERR Waquoit Bay National Estuarine Research Reserve (WBNERR), particularly Joan Muller, Erica Seiden, and the social science fellows
- EEOS community, particularly GBH (Green Boston Harbor Project), the EEOS Association and Robyn Hannigan



Double-crested Cormorant (*Phalacrocorax auritus*)

