

CLIMATE CHANGE IMPACT

The changing landscape drives public garden programming at the Delaware Botanic Gardens

SITE ANALYSIS

Use predictive models to understand how the site will evolve over time as a result of climate change impact.

PROGRAMMING

Programs for the garden focus on educating the public and professionals on climate change impact and techniques to use nature to increase resilience.



SITE PLANNING

Garden maintenance planning aims to increase resilience and ecological benefit along the waterfront.

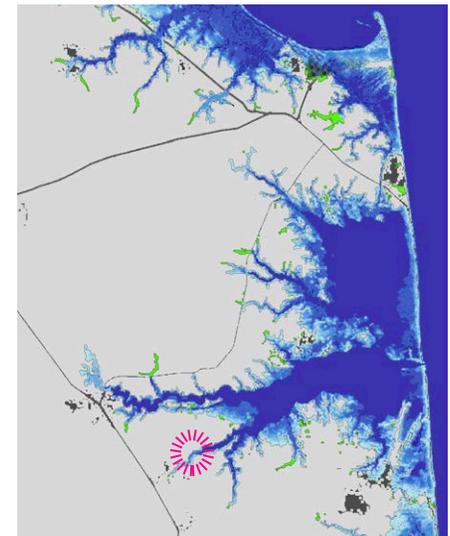
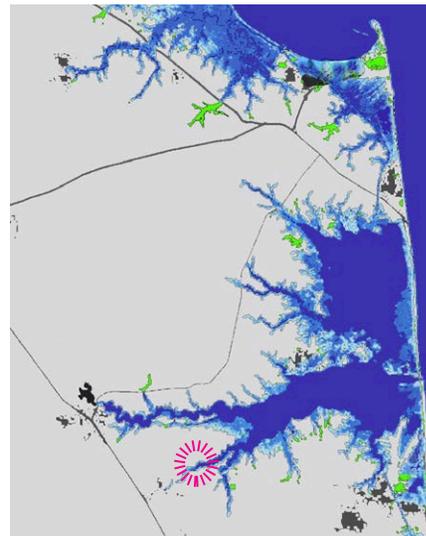
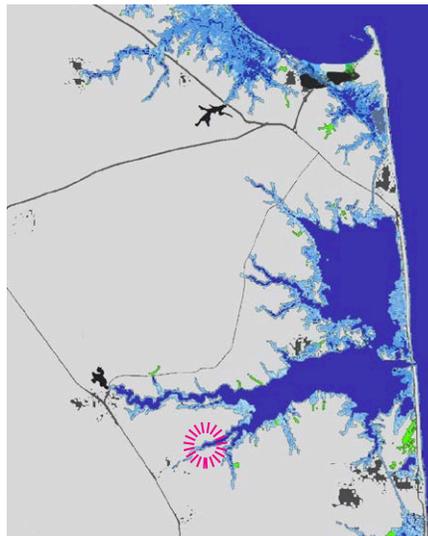
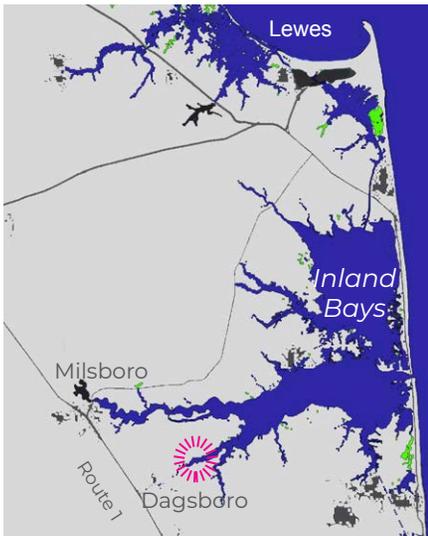


current

2020-2025
1 foot sea level rise

2060-2065
3 feet sea level rise

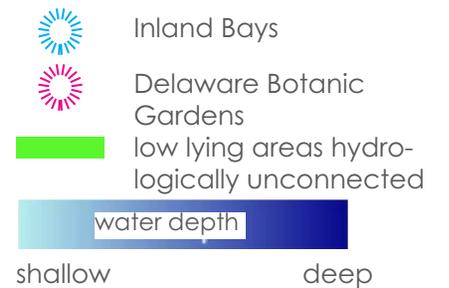
2090-2095
6 feet sea level rise



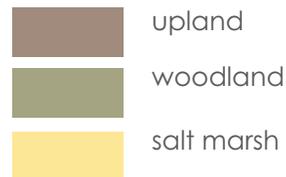
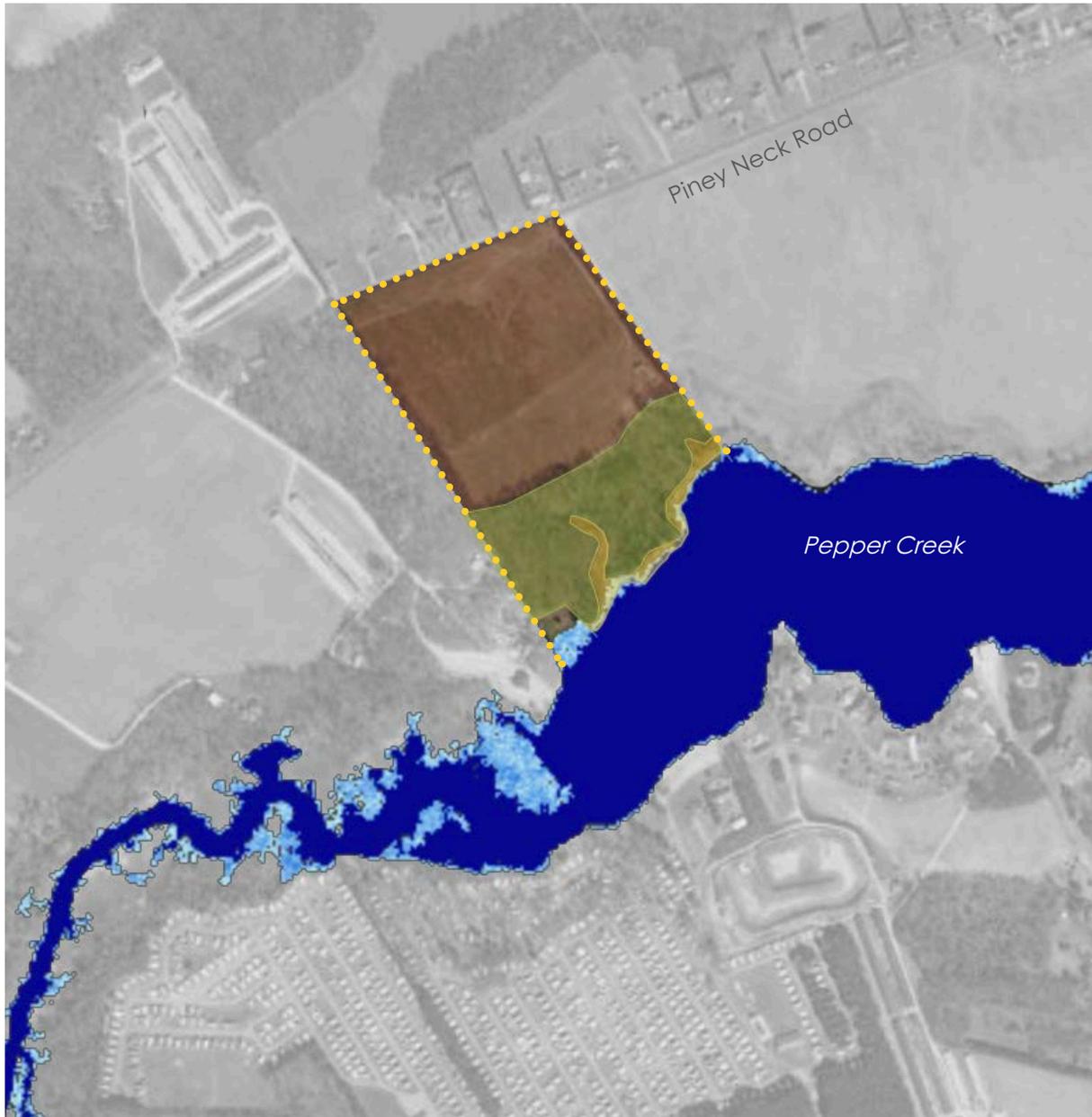
The sea level rise modeling used an intermediate high emission scenario.
source: NOAA sea level rise viewer. <https://coast.noaa.gov/slr/>



By the end of the 21st century
a 6 foot rise may inundate
8% of the land in Delaware.



SEA LEVEL RISE PREDICTIONS IN DELAWARE'S INLAND BAYS



**CURRENT TO 1 FOOT
SEA LEVEL RISE**



SHORELINE EROSION



Rising water levels cause bank erosion undercutting existing vegetation.

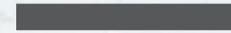
SALT WATER INTRUSION



Salt tolerant species will replace the existing freshwater plant communities in the woodland.



CURRENT TO 1 FOOT
SEA LEVEL RISE



**INCREASE SHORELINE
RESILIENCE**

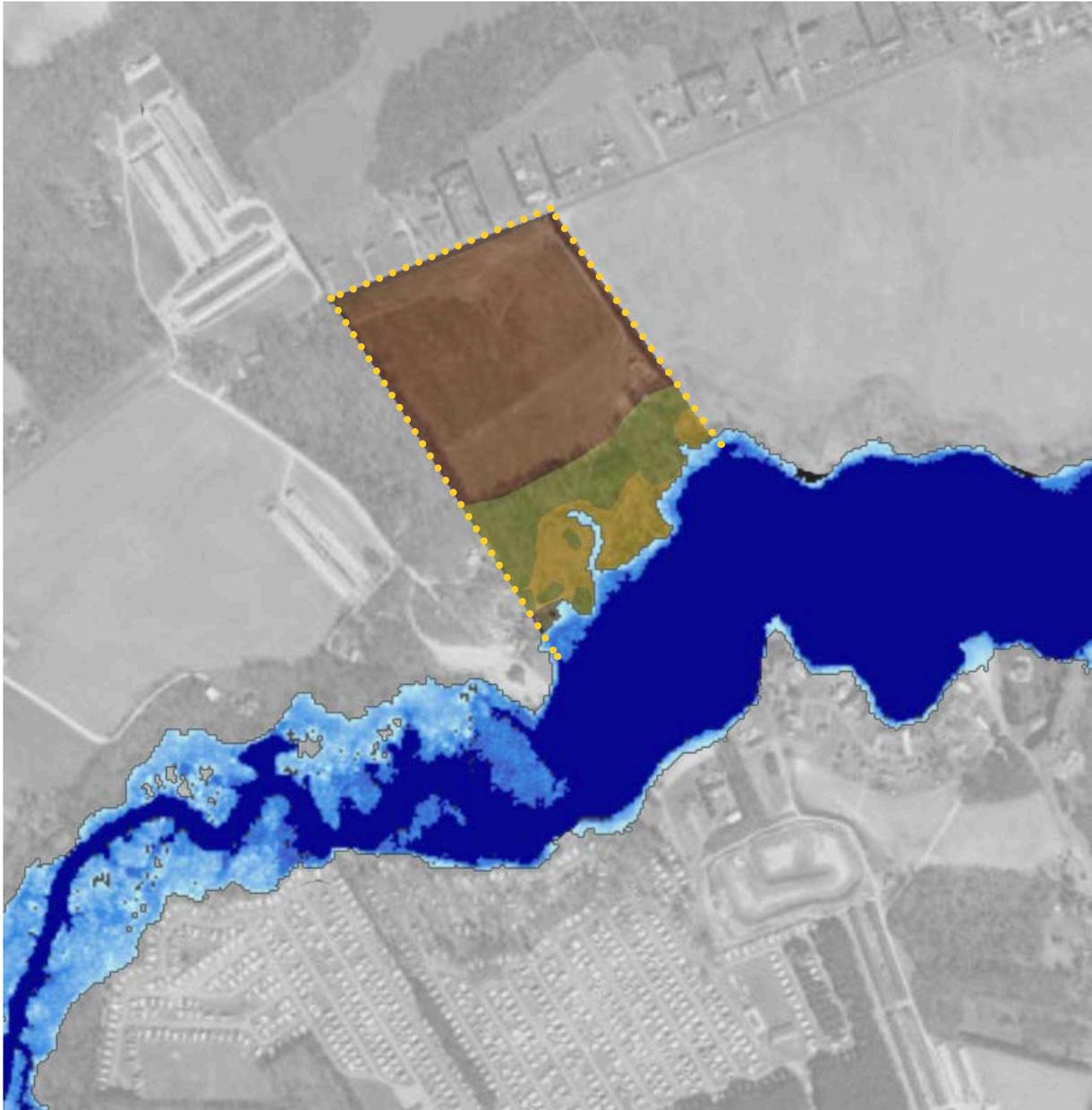


The construction of a living shoreline will increase marsh surface area and decrease erosion.

The addition of floating wetlands along the shoreline will improve water quality.

BUILD RESILIENCE

PLANNING - PROGRAMMING



●●●●● Delaware Botanic Gardens property line



3 FEET
SEA LEVEL RISE



WOODLAND INUNDATION



Areas below 6 ft in elevation are transitioning to salt water marsh.

Trees die in the woodland and a stumped landscape remains.

SITE ANALYSIS



3 FEET
SEA LEVEL RISE



BUILD MARSH

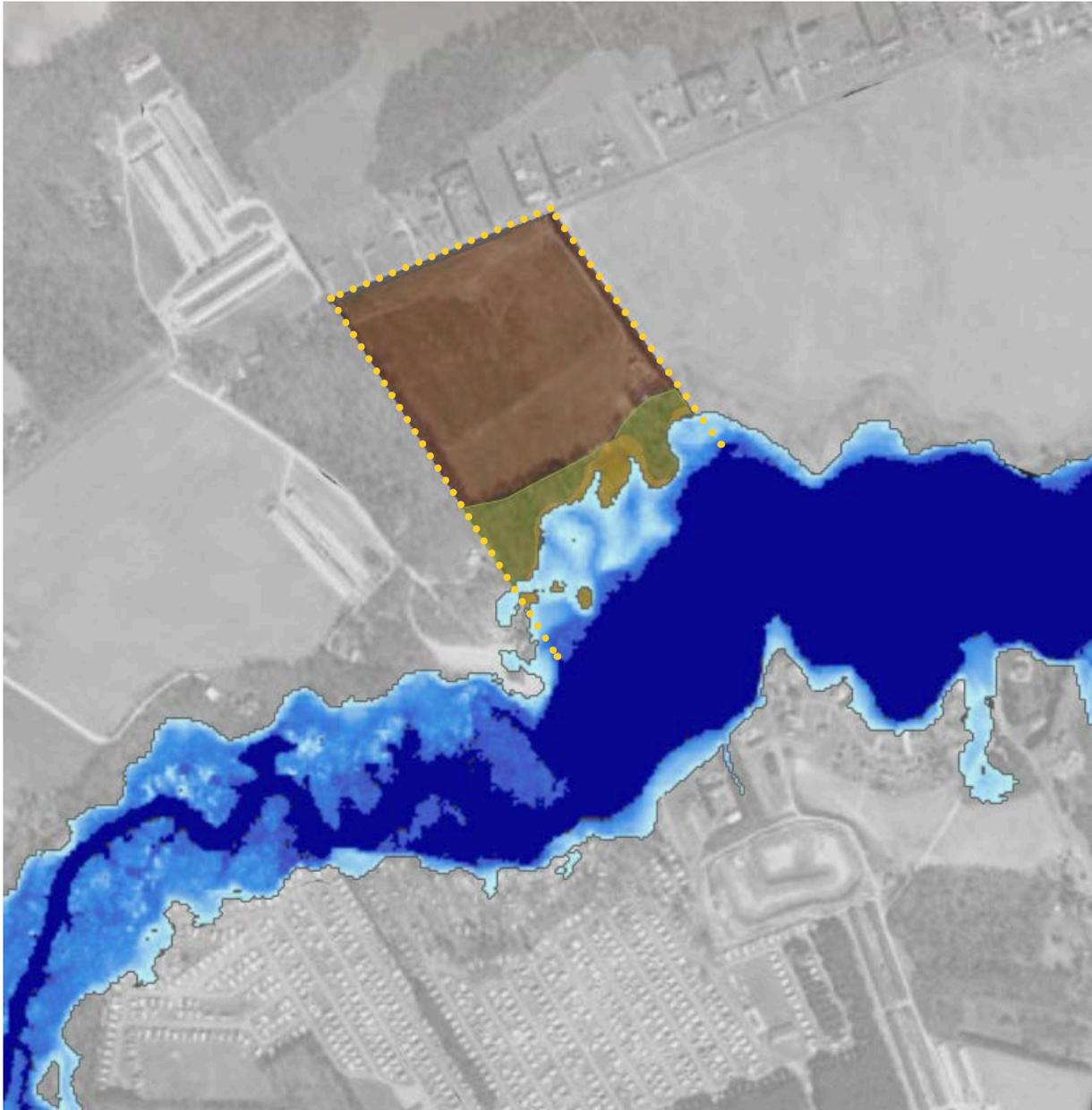


Enhance marsh vegetation to increase biomass formation.

Use on-site debris from fallen trees to stabilize eroding banks.

GHOST FOREST

PLANNING - PROGRAMMING



6 FEET
SEA LEVEL RISE



SHALLOW OPEN WATER



Over 50% of the woodland has transitioned to open water.

The marsh buffer has significantly decreased in size.





6 FEET
SEA LEVEL RISE



SHALLOW OPEN WATERS



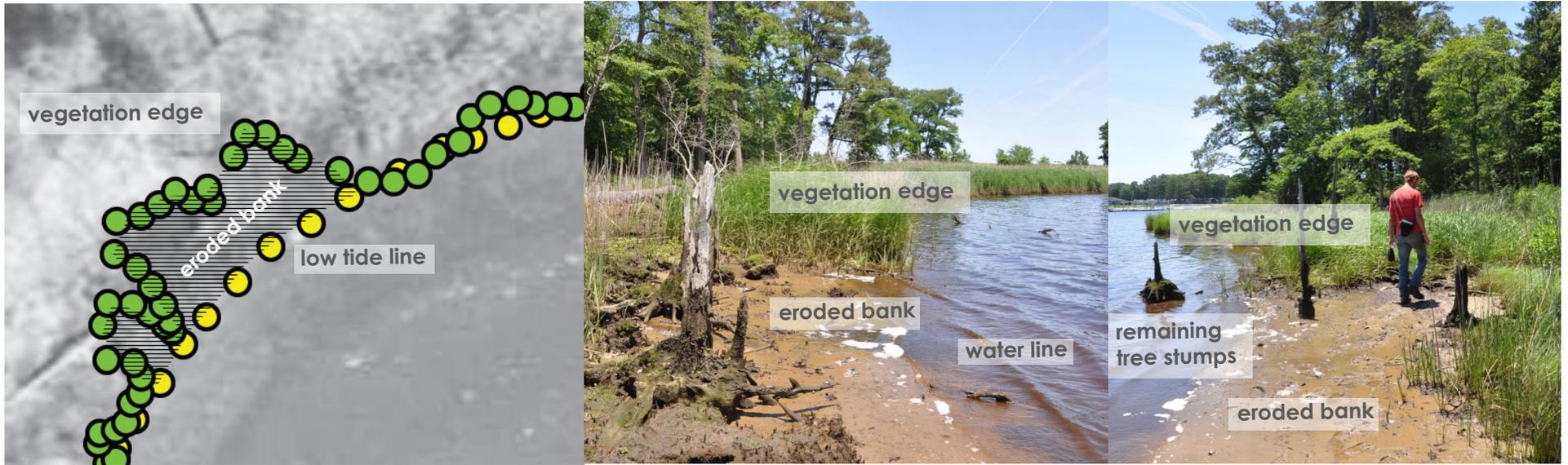
Increase biodiversity by creating marsh islands.

Create shallow protected zones where small fish can thrive.

Add surface areas (e.g. logs) that function as substrate for bivalves.

LOST MARSHLAND

PLANNING - PROGRAMMING



The marsh is degraded where the vegetated edge is recessed from the low tide line. Those areas are identified as priority zones for shoreline stabilization.

USING NATURE TO INCREASE SHORELINE RESILIENCE



viewing deck

floating wetland

living shoreline

enhanced marsh
vegetation

rootwads to create
micro-habitats

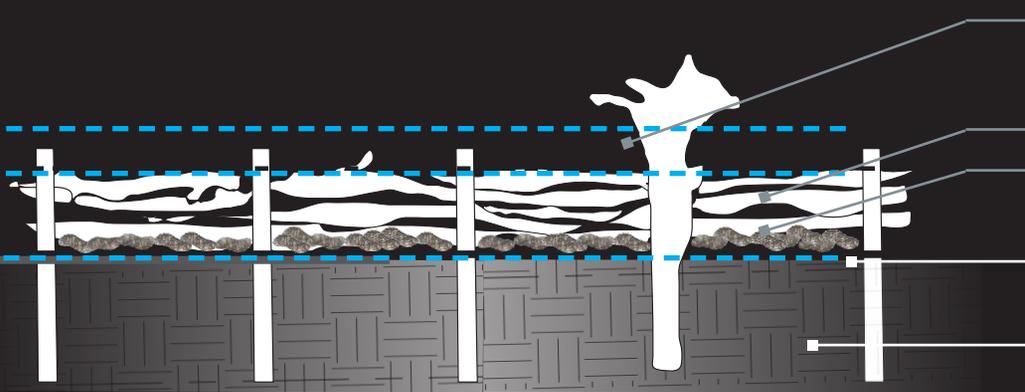
LIVING SHORELINE - toe stabilization with stakes and log debris

construction drawings

section view - frontal

high water
mean high water

mean low

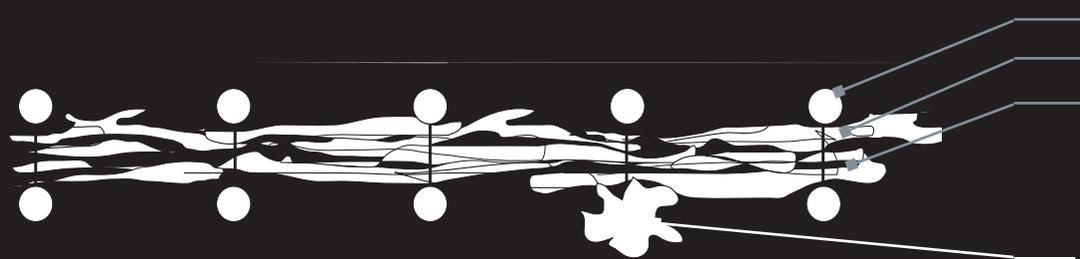


rootwad

logs and
oyster shell bags

ground surface at
mean low tide
4"-8" diam log
stakes

plan view

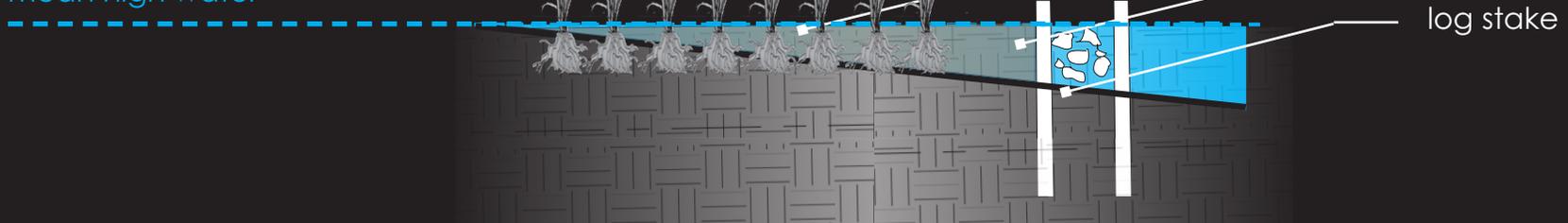


log stake
waxed hemp
logs and
branches

rootwad

section view - across

high water
mean high water



vegetation

natural in-fill -
siltation

logs and branches

log stake

VEGETATION ENHANCEMENT - increase species diversity and seasonal interest

high marsh



Iva frutescens



Kosteletzkya pentacarpos



Baccharis halimifolia



Pluchea odorata



Limonium carolinianum



Spartina patens

low marsh



Spartina alterniflora

ADDING COLOR TO THE MARSH

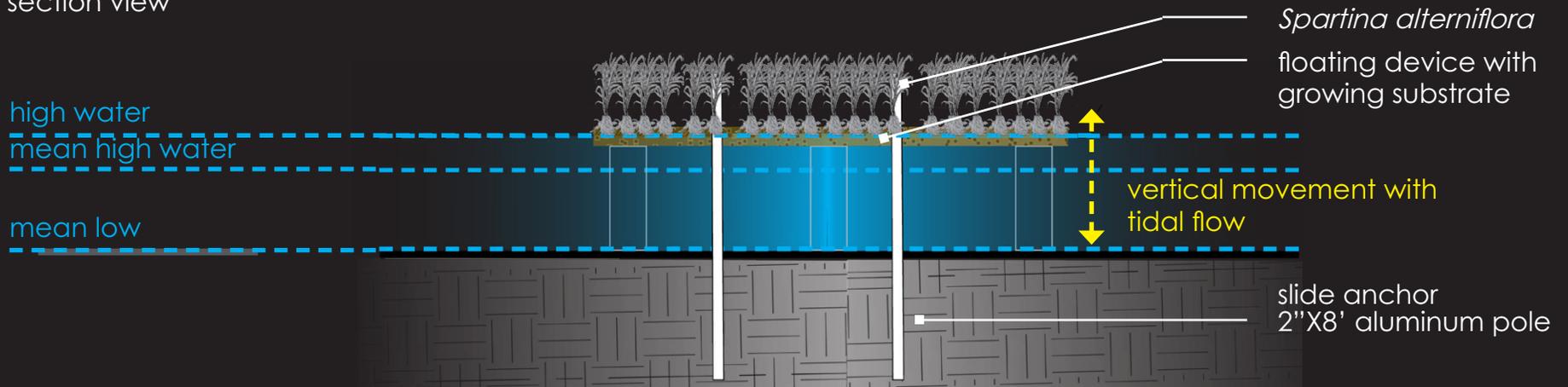
Increase the seasonal interest and add flowering plants to the typical marsh grasses by using three native species in the plant palette:

Pluchea odorata,
Kosteletzkya pentacarpos and,
Limonium carolinianum.

FLOATING WETLAND - vegetated floating substrate to improve water quality

construction drawings

section view



plan view

