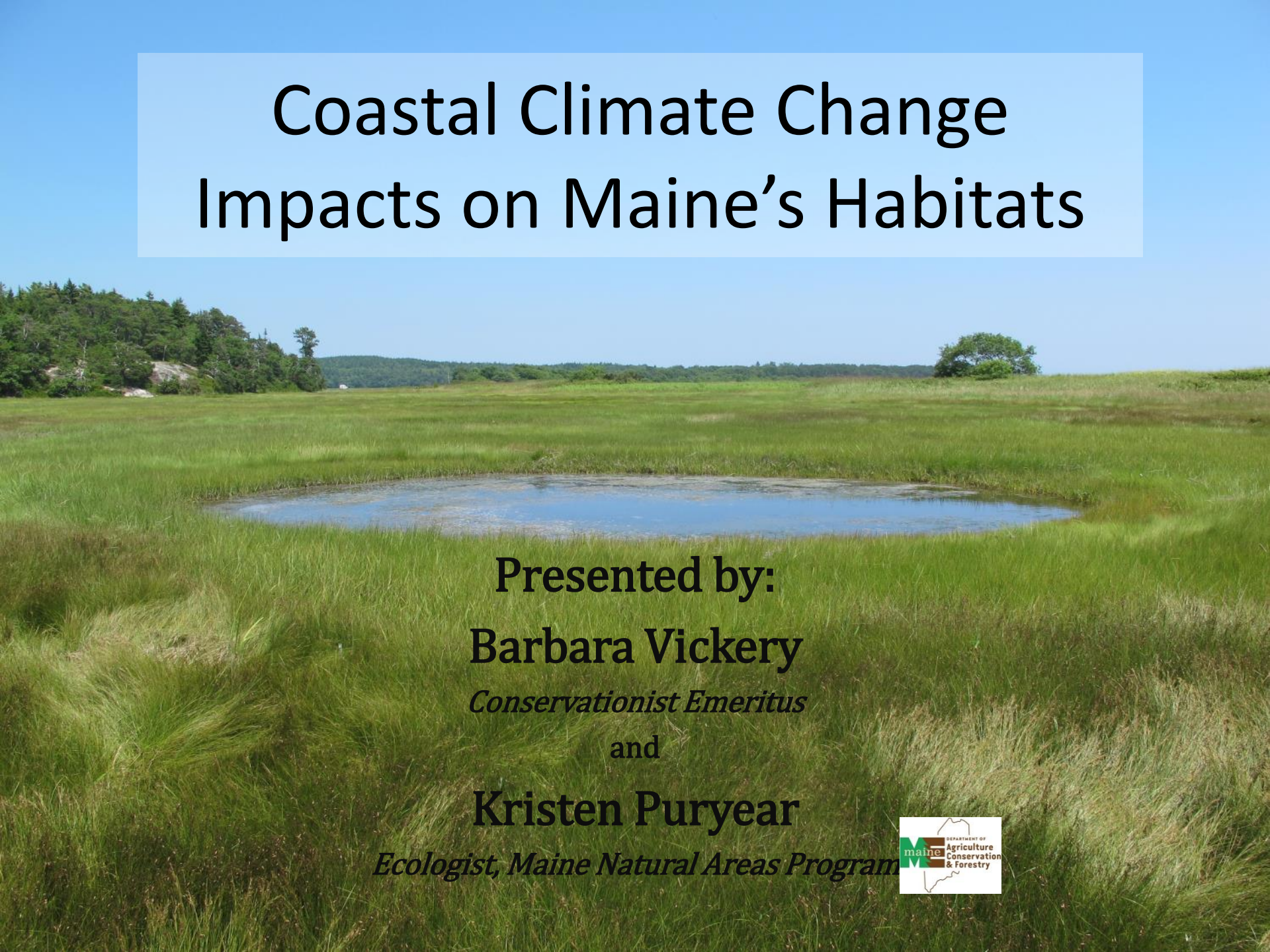
Coastal Climate Change Impacts on Maine's Habitats



Presented by:

Barbara Vickery

Conservationist Emeritus

and

Kristen Puryear

Ecologist, Maine Natural Areas Program

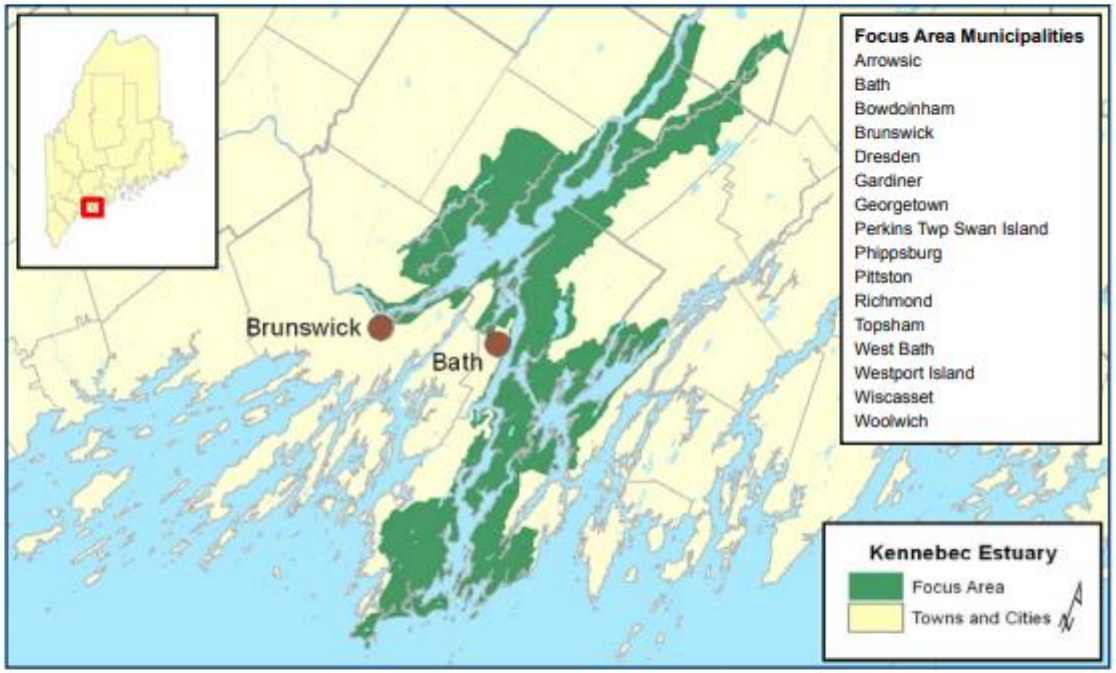
maine DEPARTMENT OF Agriculture Conservation & Forestry

Merrymeeting Bay and Kennebec Estuary

Beginning *with* HABITAT

Focus Areas of Statewide Ecological Significance

Kennebec Estuary



WHY IS THIS AREA SIGNIFICANT?

The Kennebec Estuary Focus Area contains more than 20 percent of Maine's tidal marshes, a significant percentage of Maine's sandy beach and associated dune habitats, and globally rare pitch pine woodland communities. More than two dozen rare plant species inhabit the area's diverse natural communities. Eight imperiled species of animals have been documented in the Focus Area, and it contains some of the state's best habitat for bald eagles.

Rare Animals

Bald Eagle
Spotted Turtle
Harlequin Duck
Tidewater Mucket
Ribbon Snake
Redfin Pickerel
Atlantic Salmon
Piping Plover
Least Tern
Roseate Tern
Arctic Tern
Short-nosed Sturgeon
Saltmarsh Sharp-tailed Sparrow

Rare Plants

Lilaeopsis
Mudwort
Dwarf Bulrush
Marsh Bulrush
Dry Land Sedge
Yellow Pond-lily
Clammy Azalea
Pygmyweed
Eaton's Bur-marigold
Estuary Bur-marigold
Long-leaved Bluet
Estuary Monkeyflower
Smooth Sandwort
Beaked Spikerush
Long's Bitter-cress
Spongy Arrow-head

OPPORTUNITIES FOR CONSERVATION

» Work with willing landowners to permanently

Outline: Climate Change Impacts

- Local observers (you!)
- Changes to come:
  Focusing on streams and rising sea
- What can be done to help nature adapt?

★★

$1.80
Tuesday,
April 24, 2018

Portland Press Herald

pressherald.com

WARM-WATER WARNING

In the once-chilly currents that feed the highly productive Gulf of Maine, Canadian researchers have measured record-high temperatures that could endanger the ecosystem.

What are you noticing?

- In your yard or woodlot?
- On the shore near you?
- Where you paddle or boat?

Changes we can expect on land

- Warmer winters, hotter summers, but not consistent – more anomalous weather events
- May lead to mismatched timing: flowers and pollinators, nesting birds and insect blooms
- Spread of pests e.g. tick-borne disease, hemlock wooly adelgid,
- but more over-wintering birds
- Shift of coastal spruce forests to pine and oak
- More disturbance from wind storms
- Higher CO2 favors Poison Ivy and some vines

Changes we can expect in streams

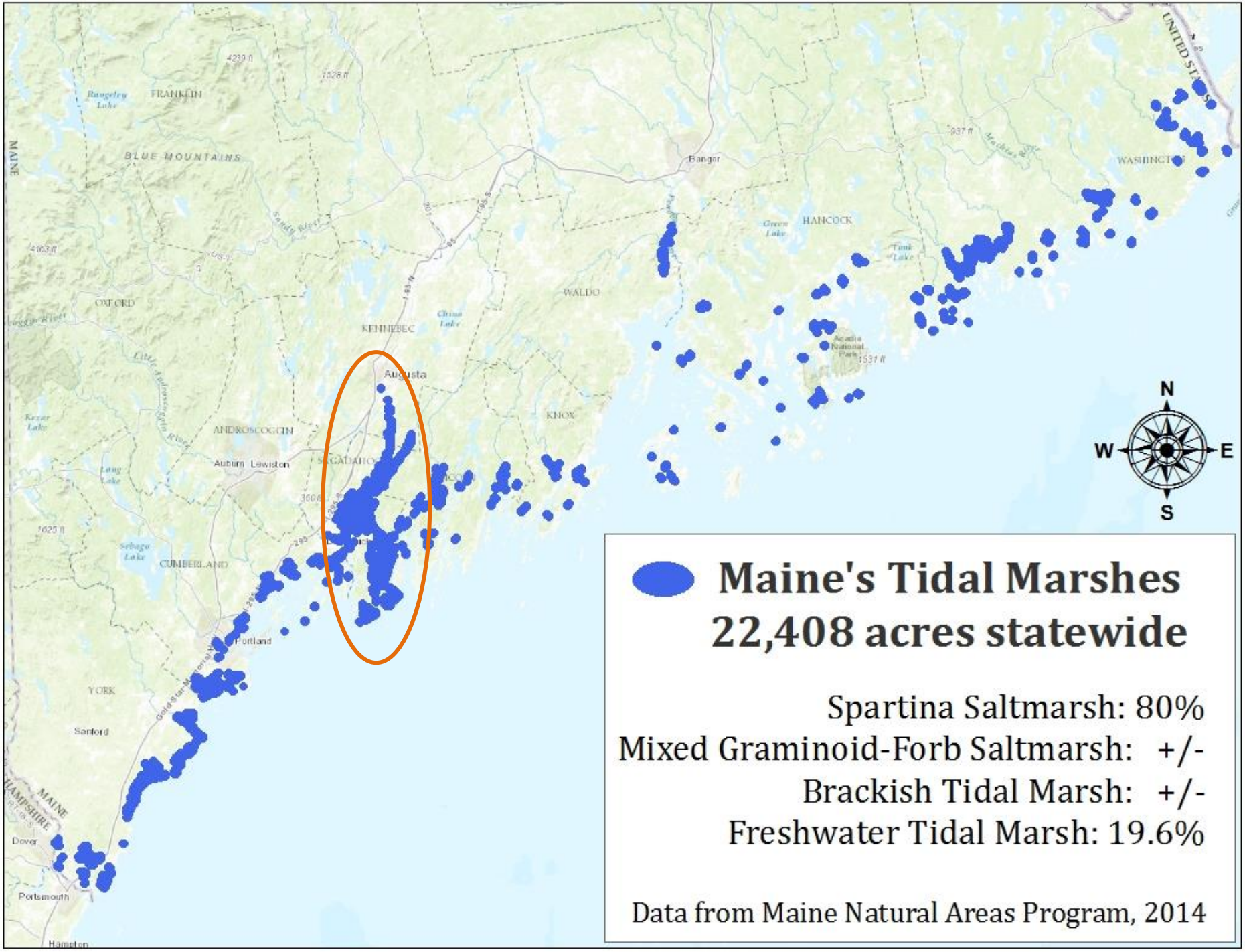
- Flashier – Floods in storms, but drying up with summer droughts
- More erosion – siltation and gullies - hard on stream amphibians
- Warmer water – reduction in coldwater habitat for trout

Changes in Gulf of Maine

- Warmer water – more black sea bass, green crabs
- but cod, lobster, shrimp migrate north. Changes in forage fish?
- More acidic water – decline of shell-fish, change in plankton, algal blooms, impacts on whales
- Higher sea levels and more frequent intense storms

– threatening marsh and beach habitats

Rising waters…


Maine's Tidal Marshes
22,408 acres statewide
Spartina Saltmarsh: 80%
Mixed Graminoid-Forb Saltmarsh: +/-
Brackish Tidal Marsh: +/-
Freshwater Tidal Marsh: 19.6%
Data from Maine Natural Areas Program, 2014
N
W
E
S
FRANKLIN
BLUE MOUNTAINS
OXFORD
KENNEBEC
WALDO
HANCOCK
KNOX
ANDROSCOGGIN
CUMBERLAND
YORK
Augusta
Auburn
Lewiston
Portland
Sanford
Dover
Portsmouth
Hampton
Bangor
MAINE

Tidal Marshes

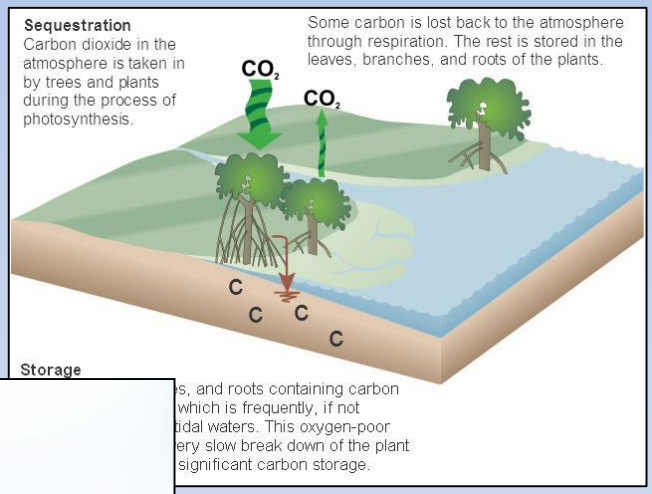
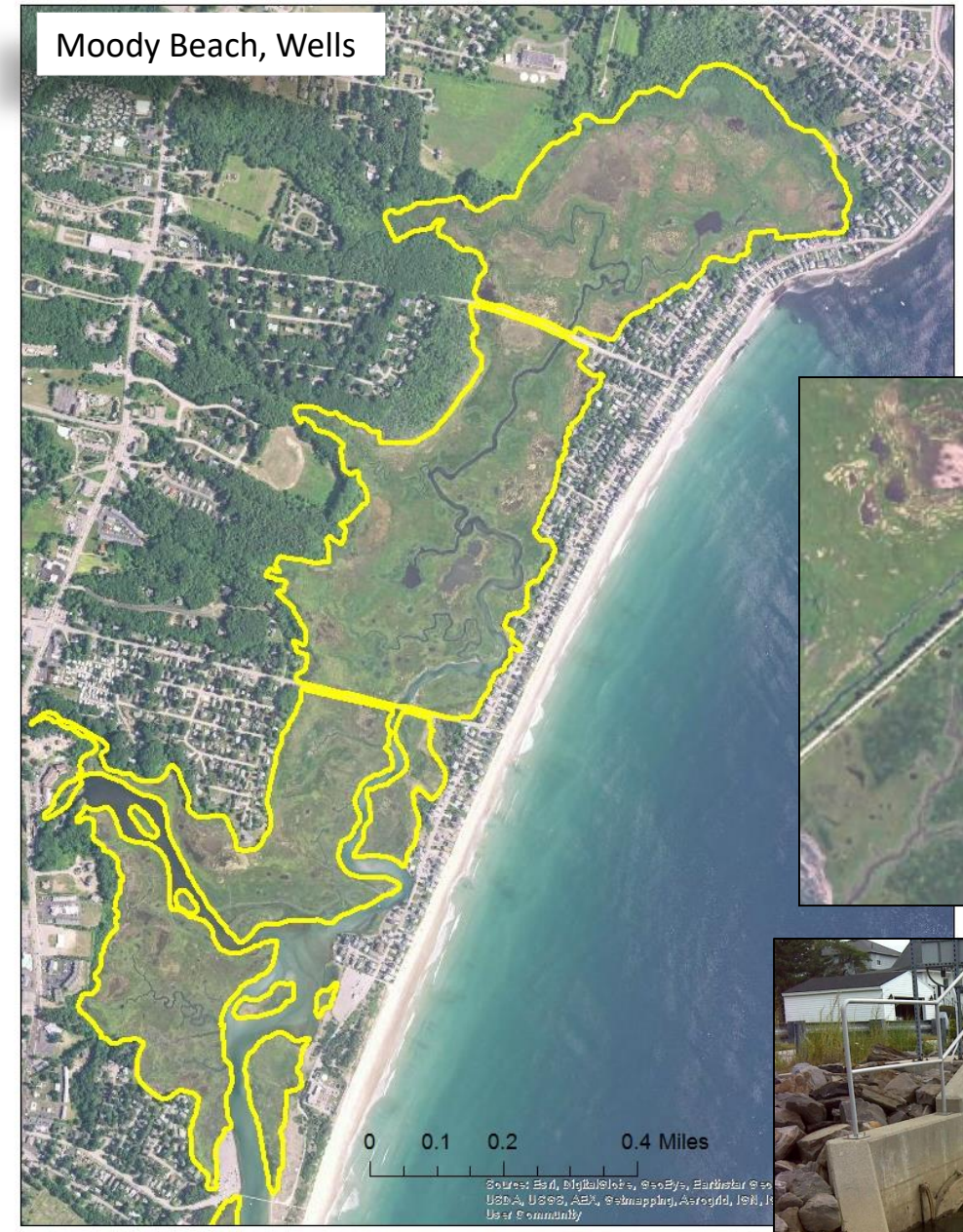
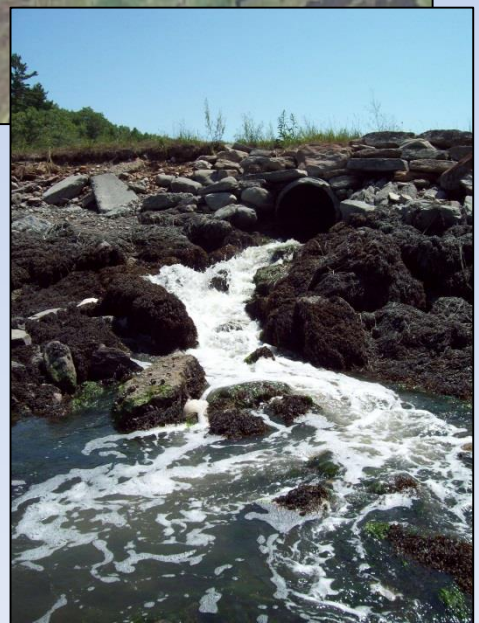


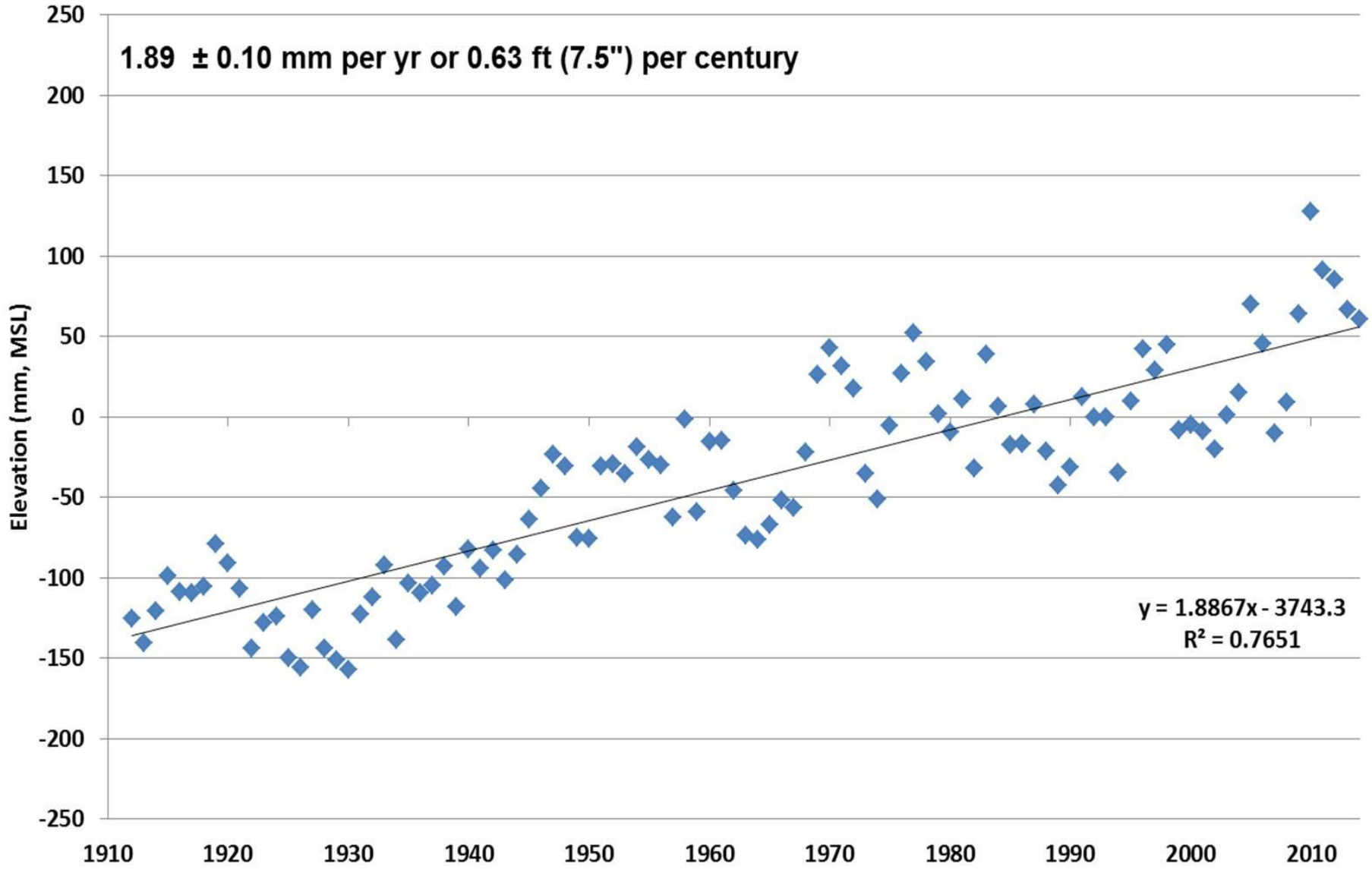
Photo credits: Audubon, Shutterstock, NOAA, MNAP

Moody Beach, Wells





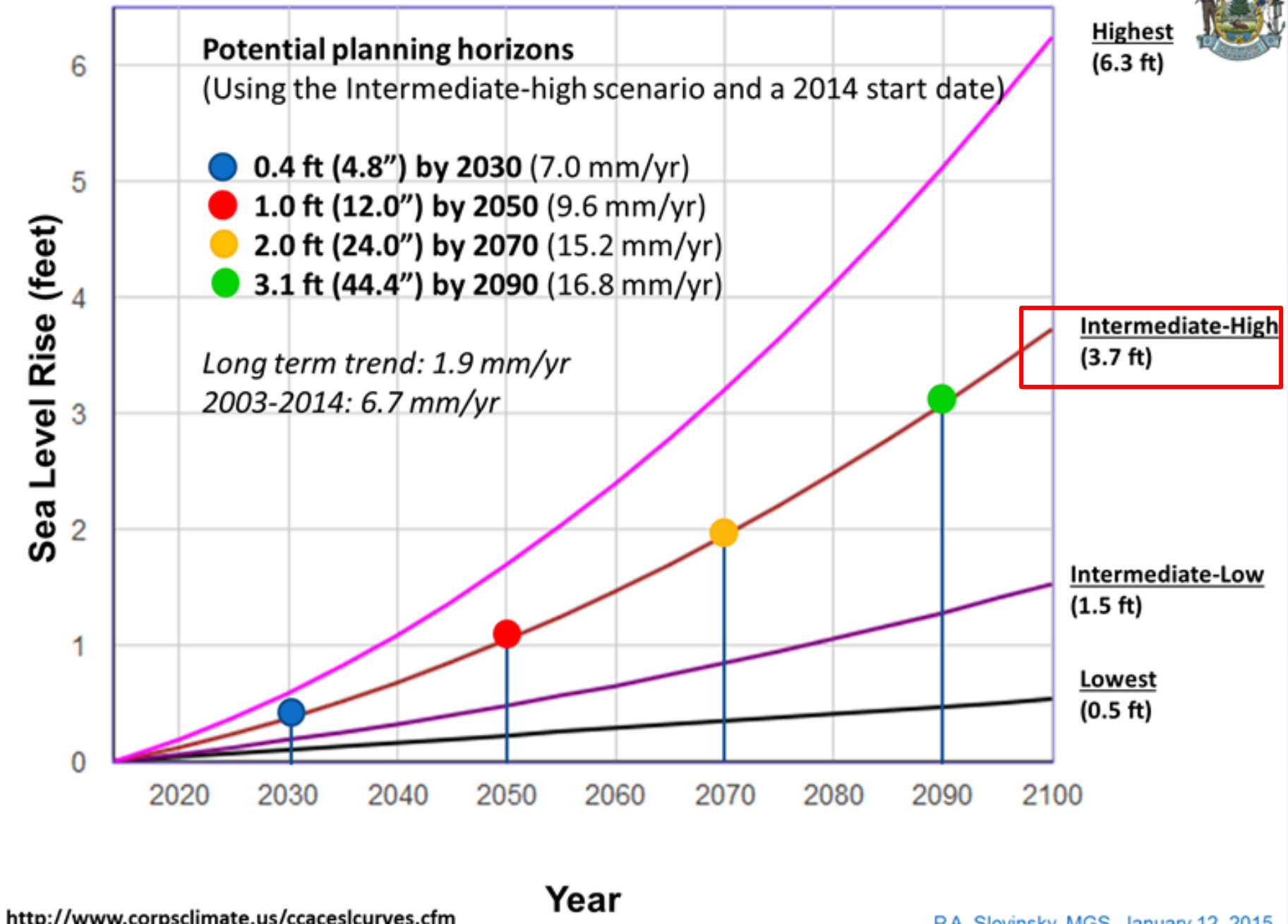
Sea Level, Portland, Maine
1912-2014 (through December 31, 2014)



Data courtesy of NOAA CO-OPS, www.tidesandcurrents.nooa.gov

Peter Slovinsky, Maine Geological Survey, January 12, 2015

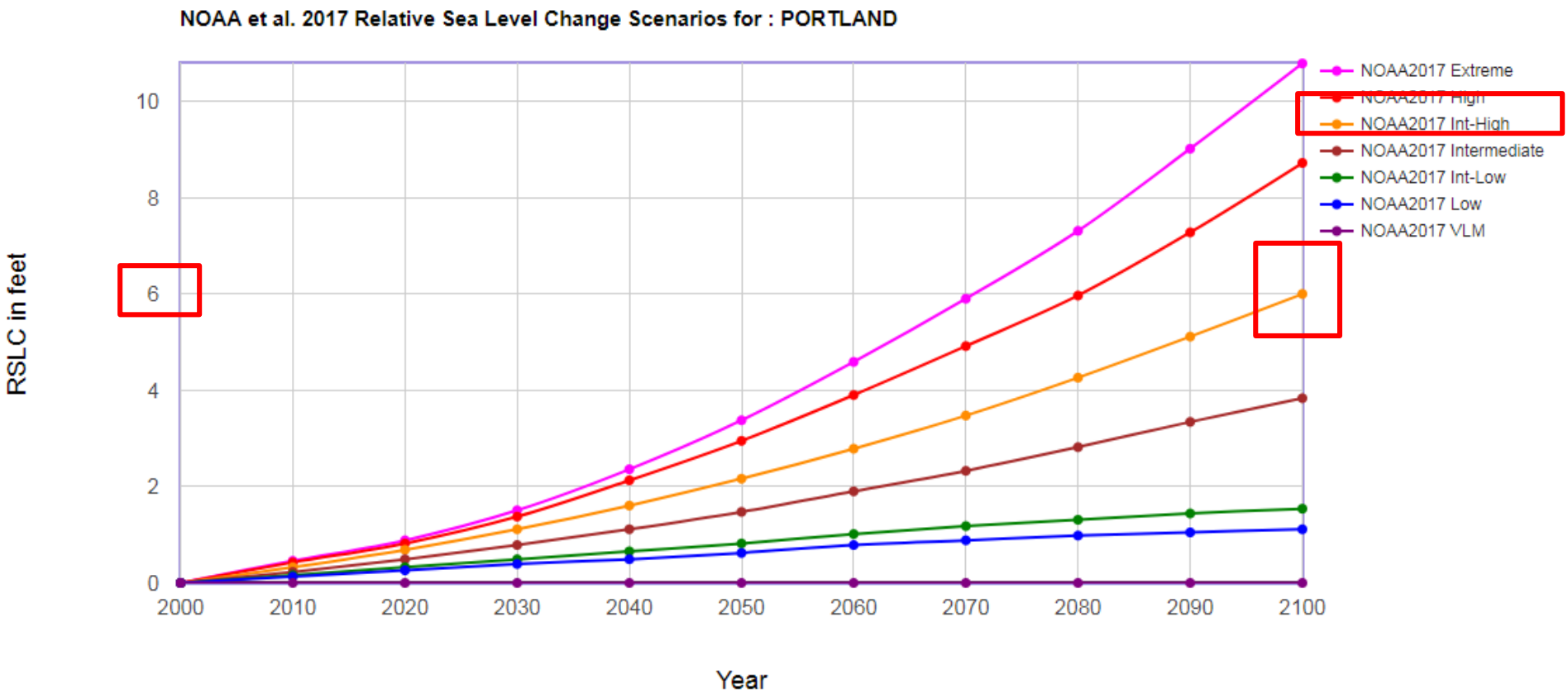
2014 Sea Level Rise Projections for Portland, ME



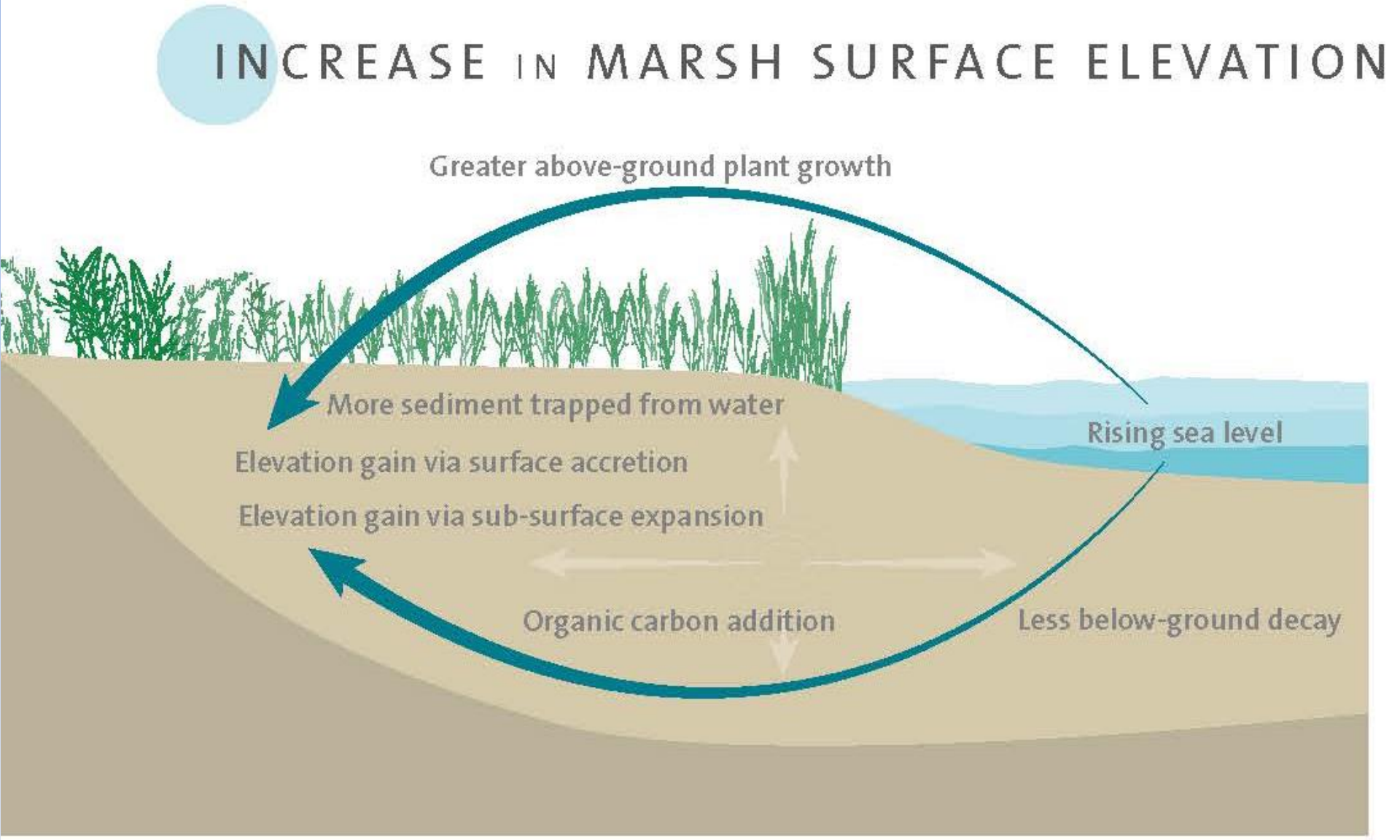
http://www.corpsclimate.us/ccaceslcurves.cfm

P.A. Slovinsky, MGS, January 12, 2015

2017 NOAA Sea Level Projections for Portland Maine

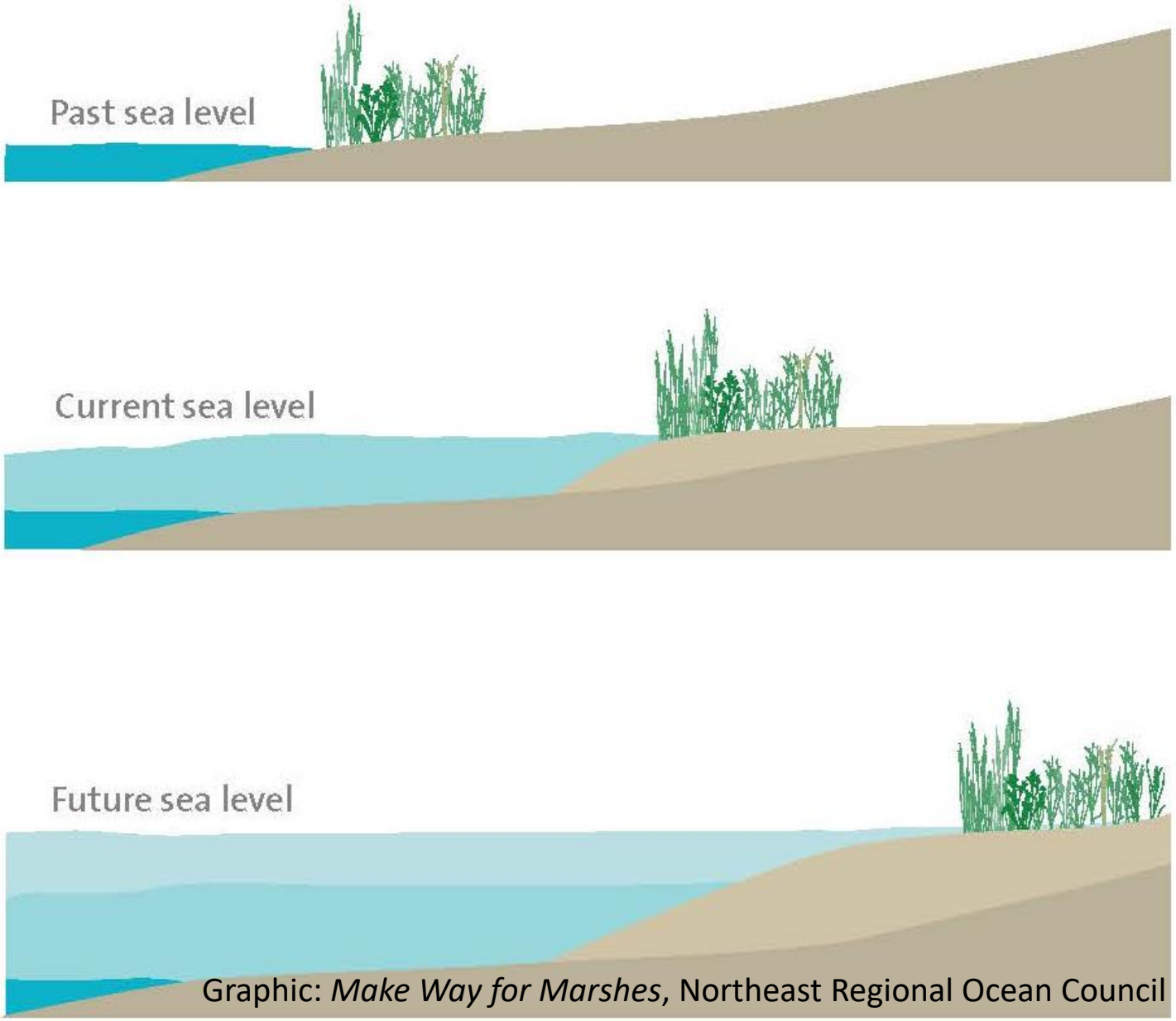


Source: www.corpsclimate.us/ccaceslcurves.cfm



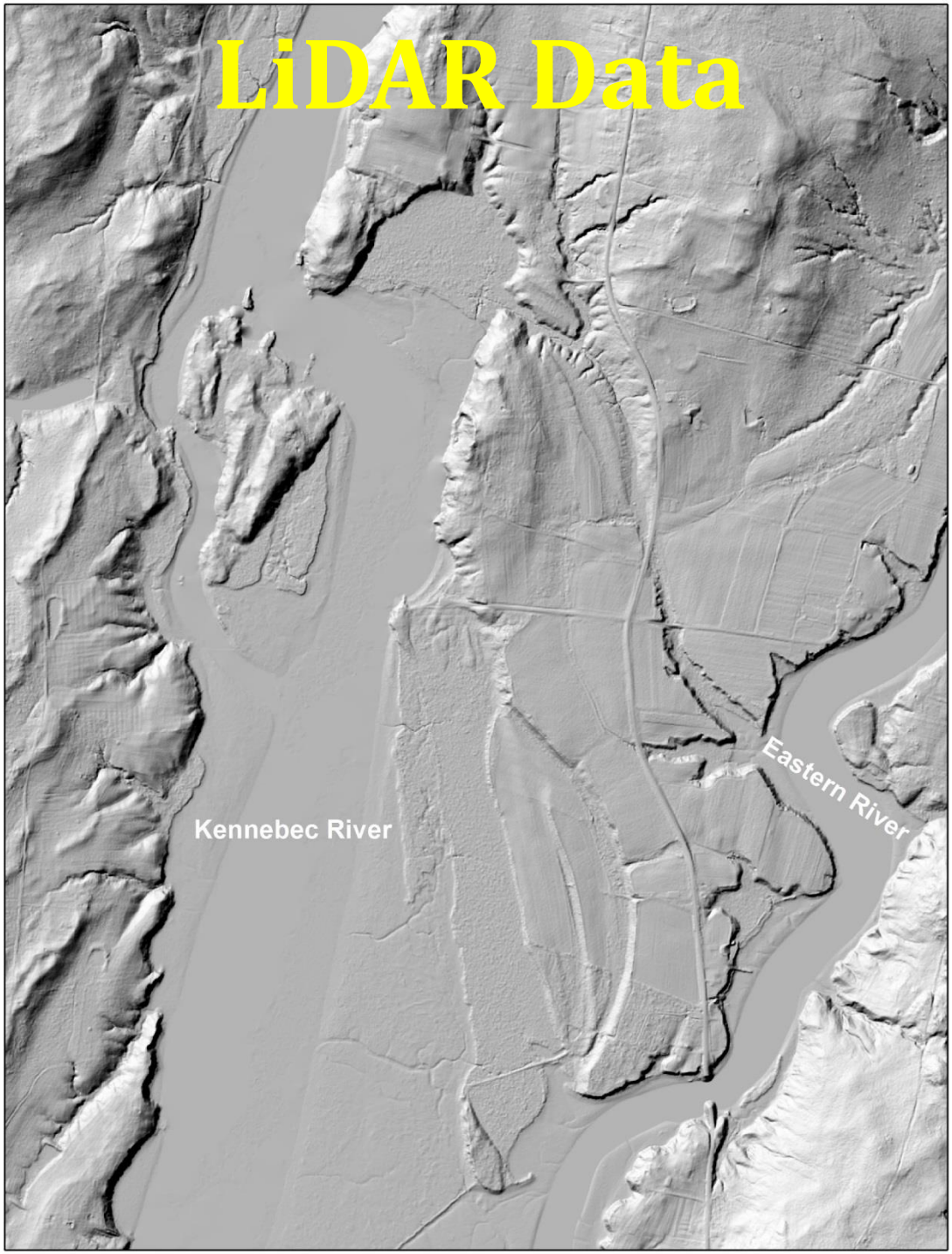
Graphic: *Make Way for Marshes*, Northeast Regional Ocean Council

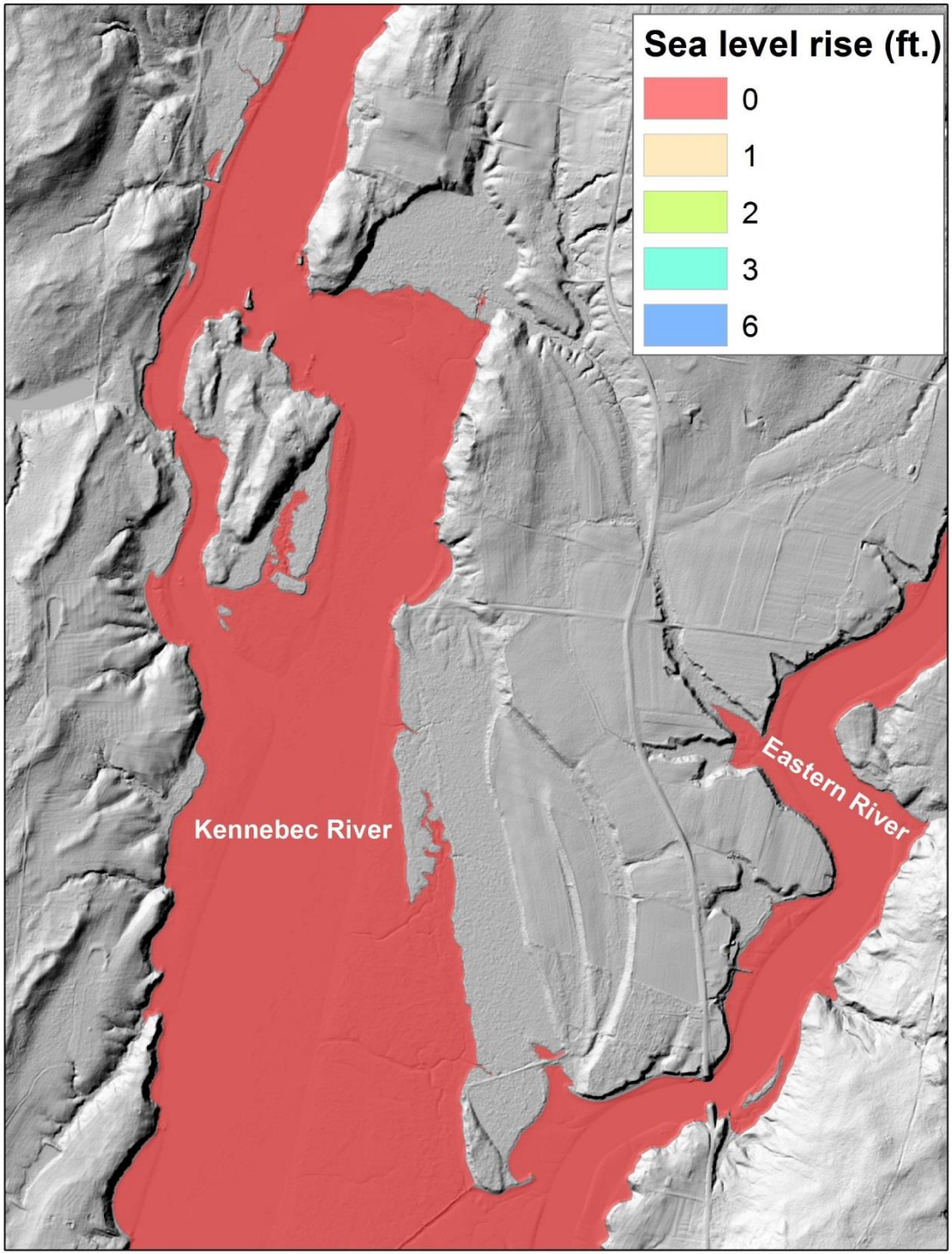
MIGRATION TO HIGHER GROUND

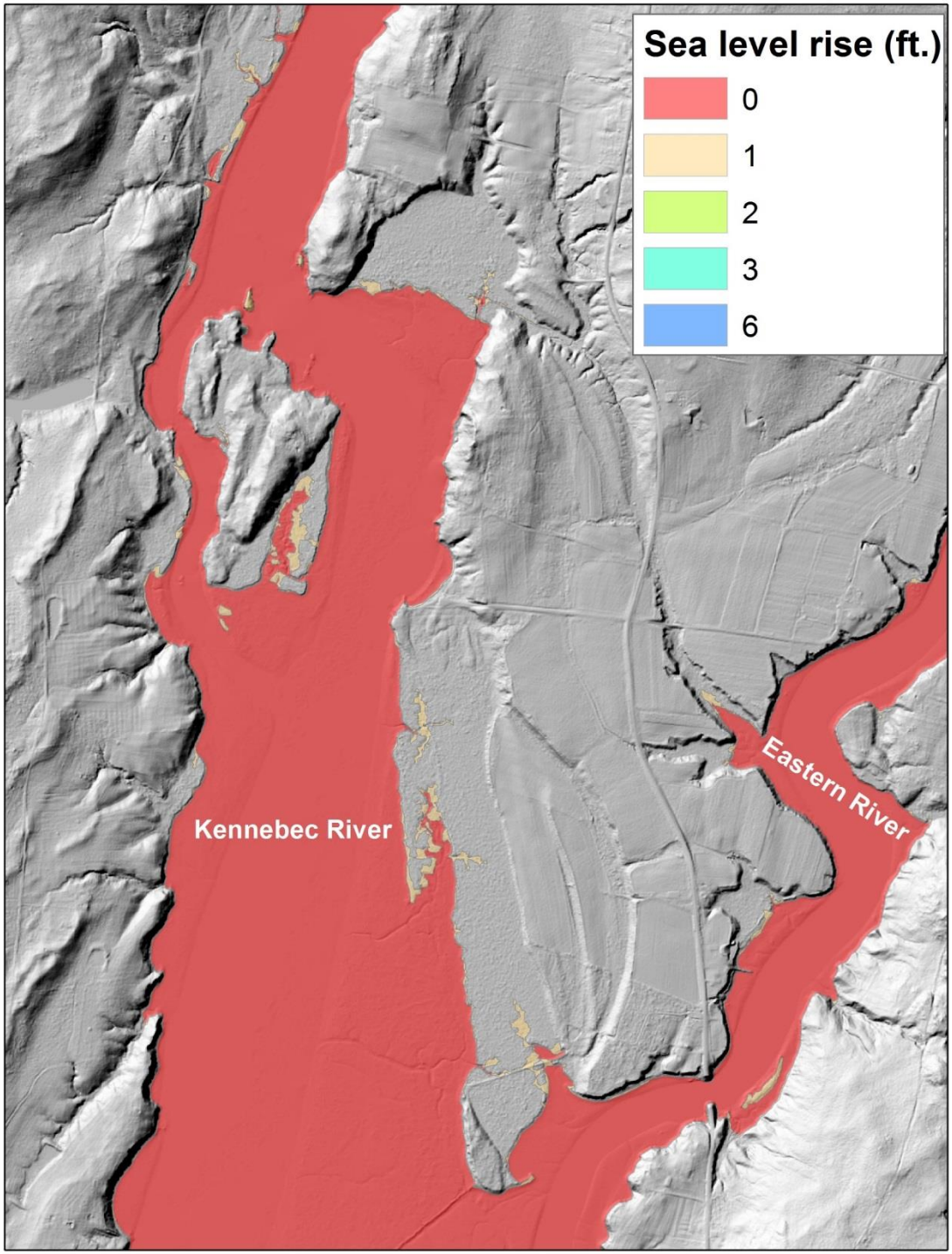


Graphic: *Make Way for Marshes*, Northeast Regional Ocean Council

LiDAR Data




Sea level rise (ft.)
0
1
2
3
6
Kennebec River
Eastern River


Sea level rise (ft.)
0
1
2
3
6
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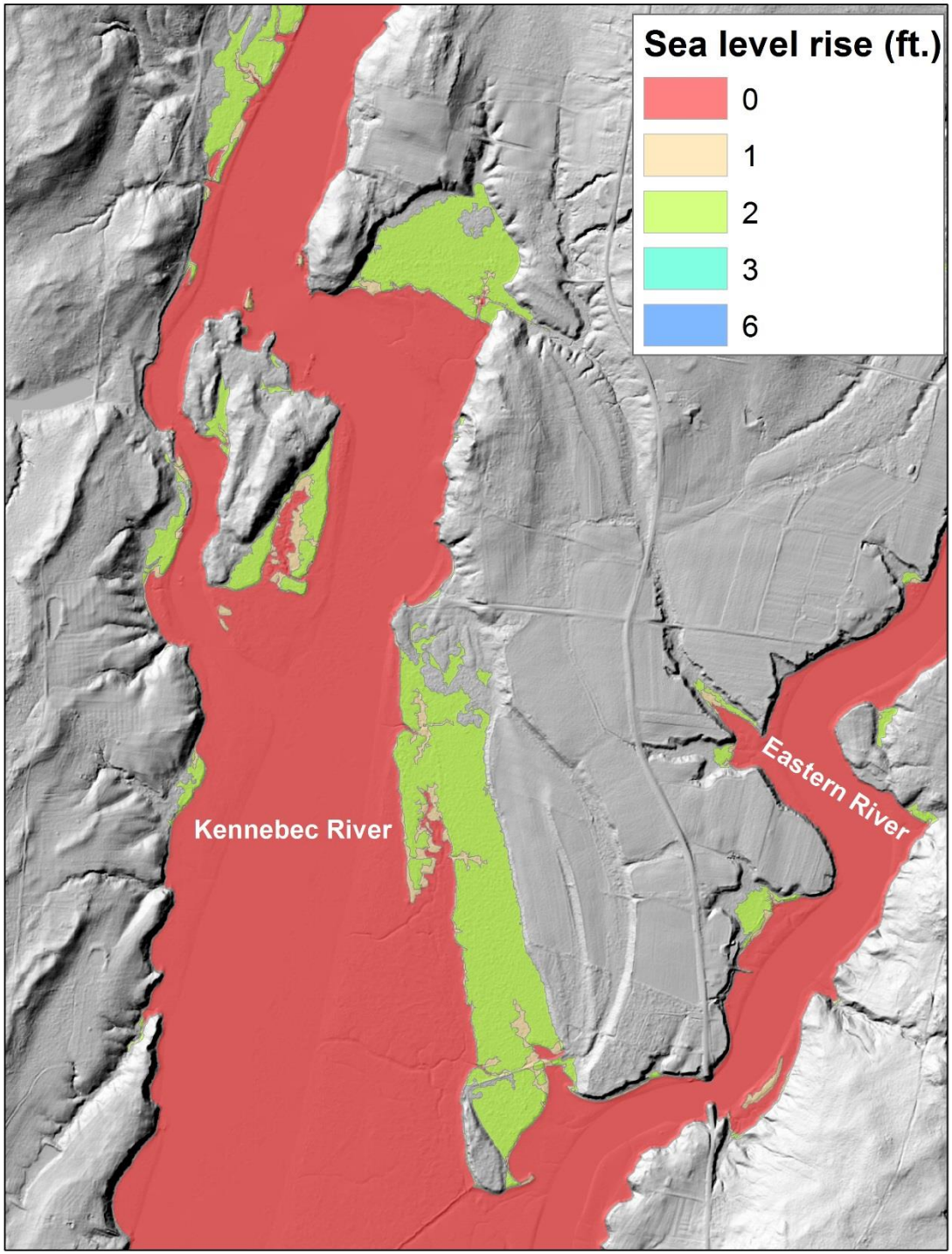
Sea level rise (ft.)
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3
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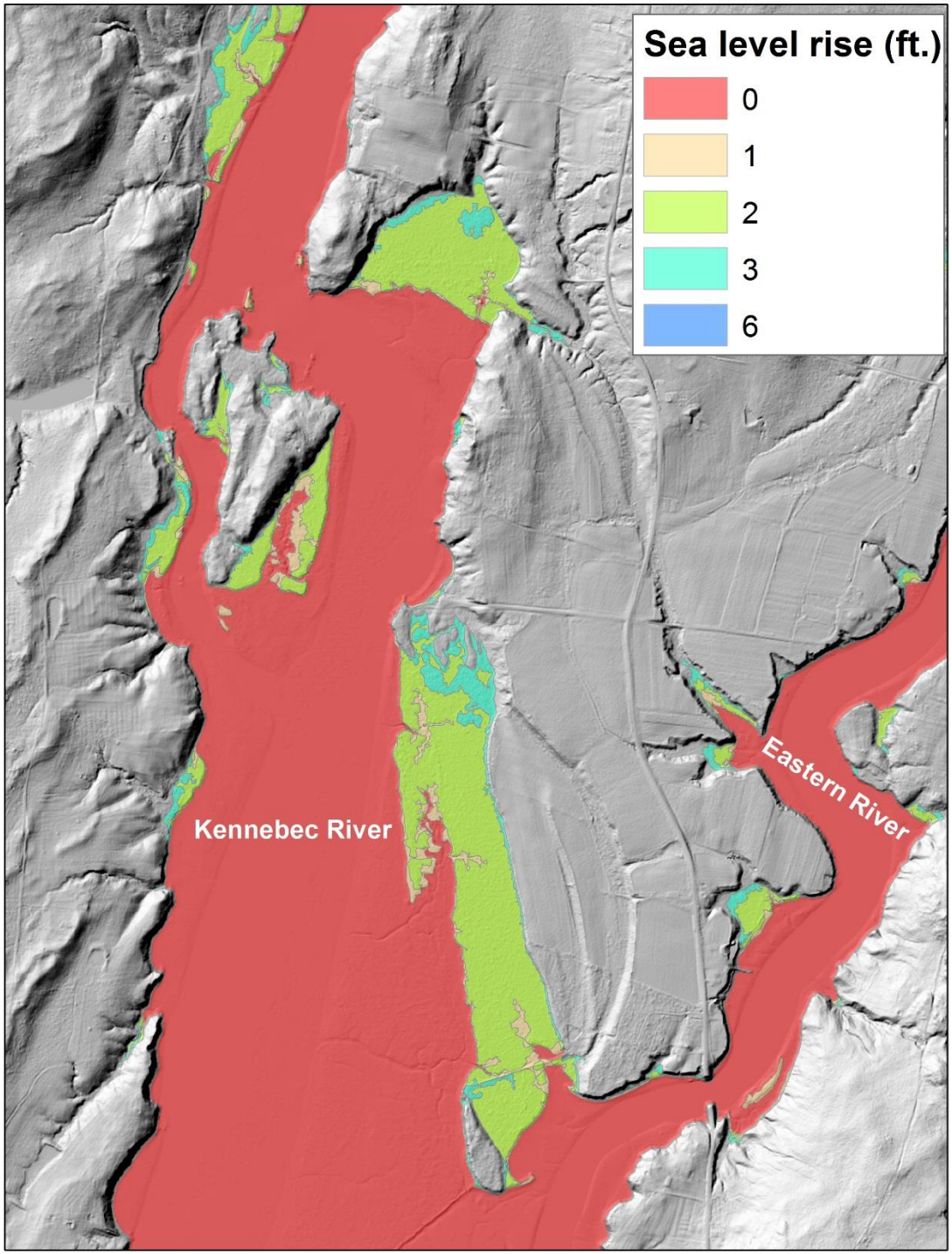
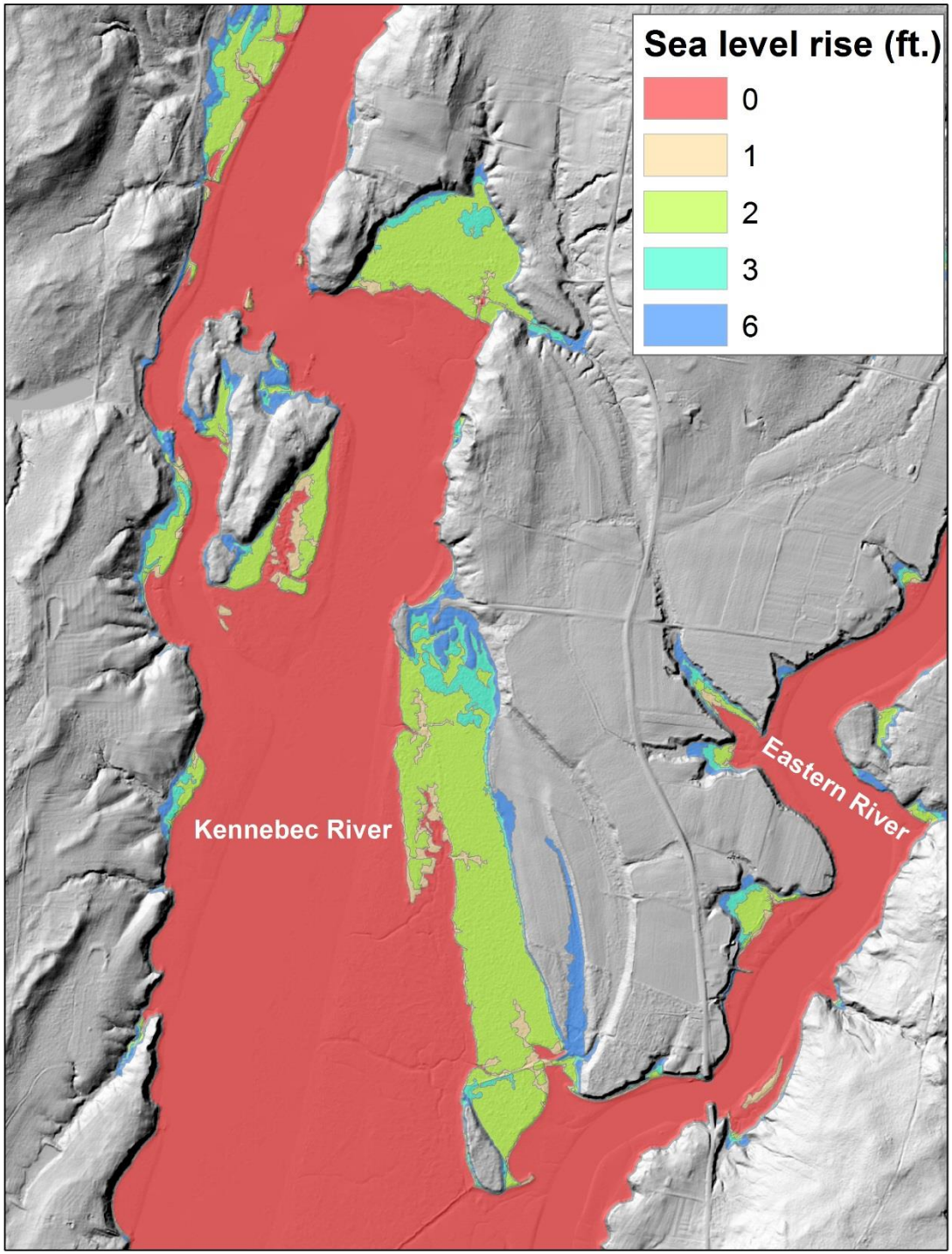
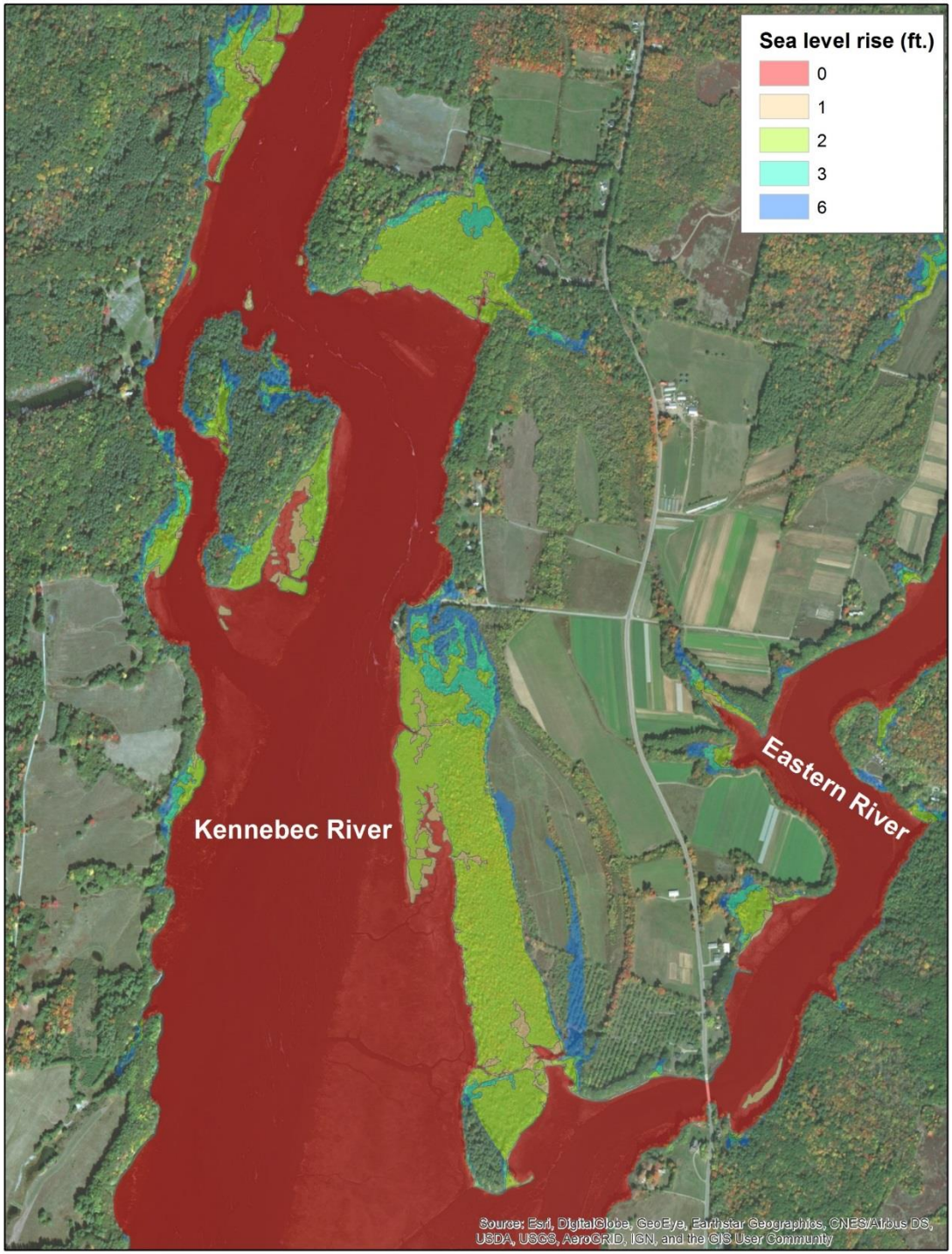
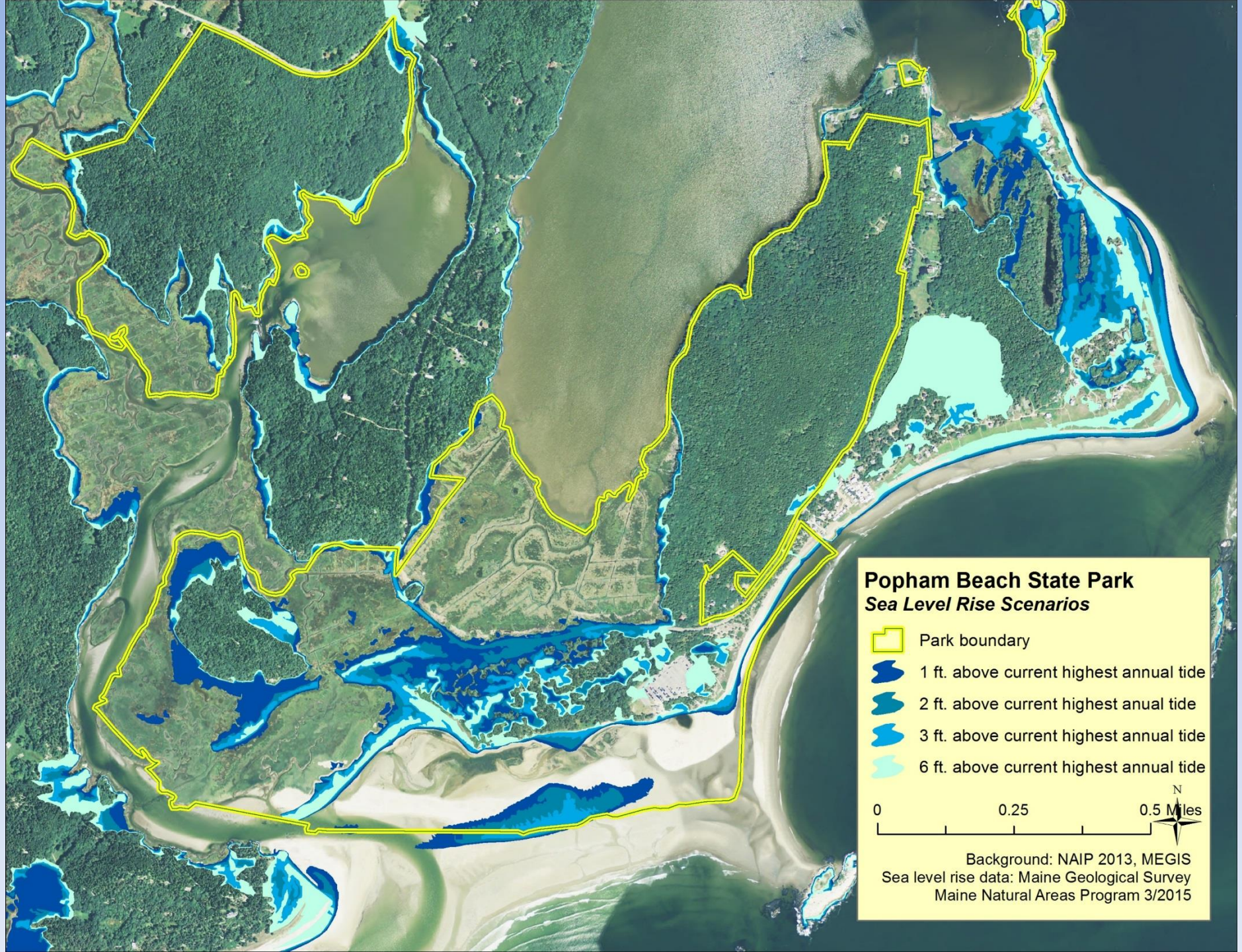
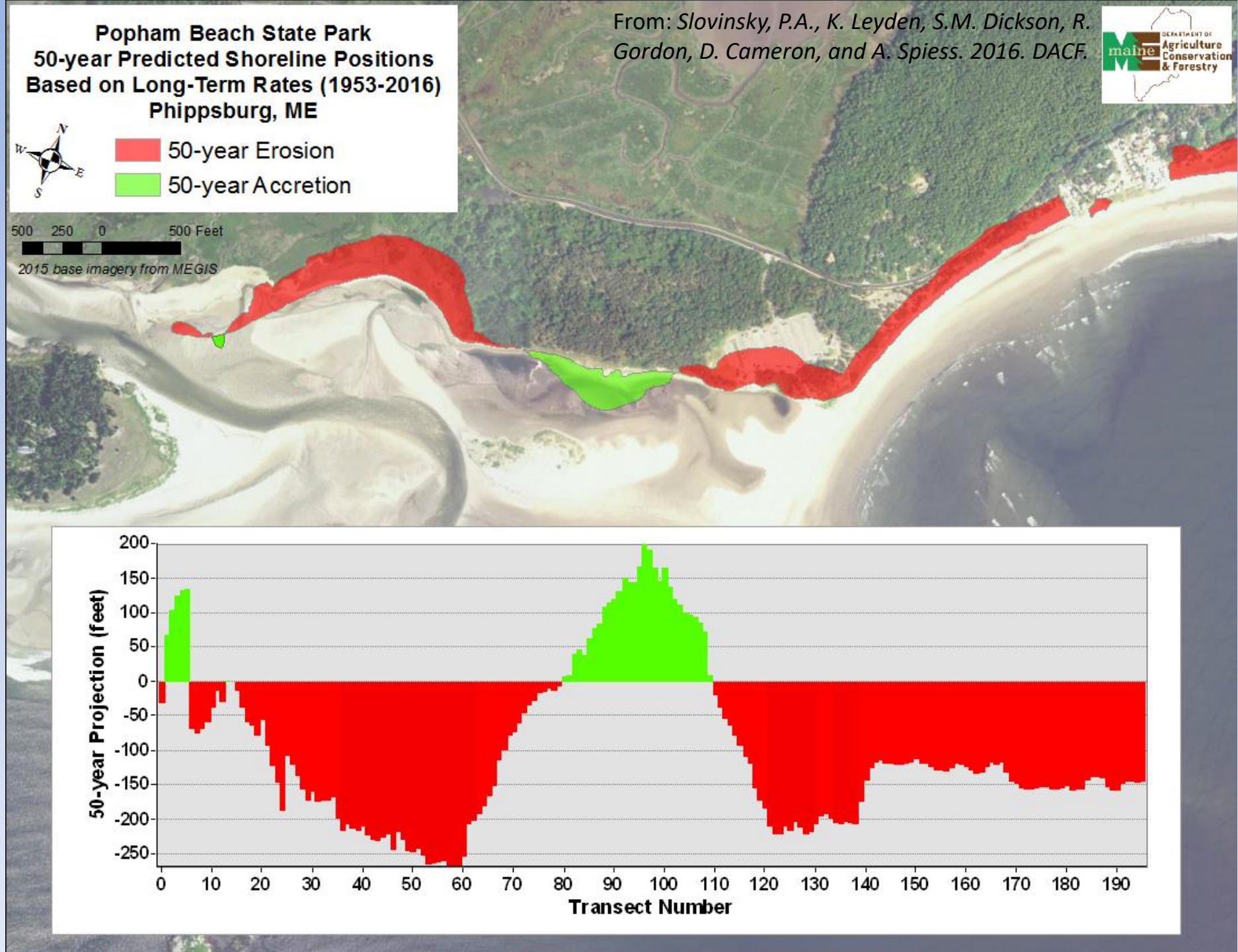
Kennebec River
Eastern River


Sea level rise (ft.)
0
1
2
3
6
Kennebec River
Eastern River


Sea level rise (ft.)
0
1
2
3
6
Kennebec River
Eastern River


Sea level rise (ft.)
0
1
2
3
6
Kennebec River
Eastern River
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Popham Beach State Park
Sea Level Rise Scenarios
Park boundary
1 ft. above current highest annual tide
2 ft. above current highest anual tide
3 ft. above current highest annual tide
6 ft. above current highest annual tide
N
0
0.25
0.5 Miles
Background: NAIP 2013, MEGIS
Sea level rise data: Maine Geological Survey
Maine Natural Areas Program 3/2015


Popham Beach State Park
50-year Predicted Shoreline Positions
Based on Long-Term Rates (1953-2016)
Phippsburg, ME
50-year Erosion
50-year Accretion
500 250 0 500 Feet
2015 base imagery from MEGIS
From: Slovinsky, P.A., K. Leyden, S.M. Dickson, R. Gordon, D. Cameron, and A. Spiess. 2016. DACF.
maine Department of Agriculture Conservation & Forestry
50-year Projection (feet)
200
150
100
50
0
-50
-100
-150
-200
-250
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190
Transect Number

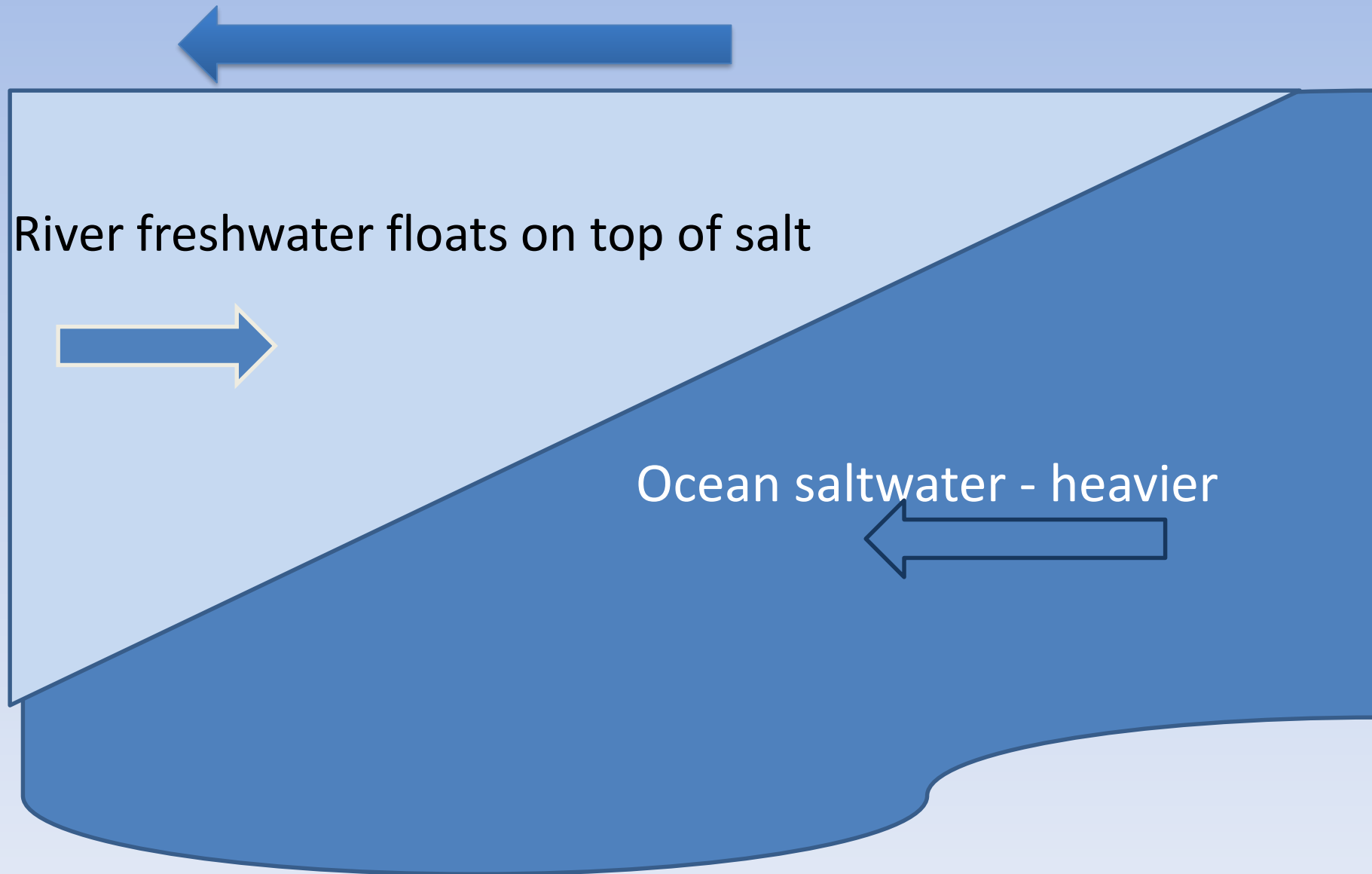
MIGRATION TO HIGHER GROUND

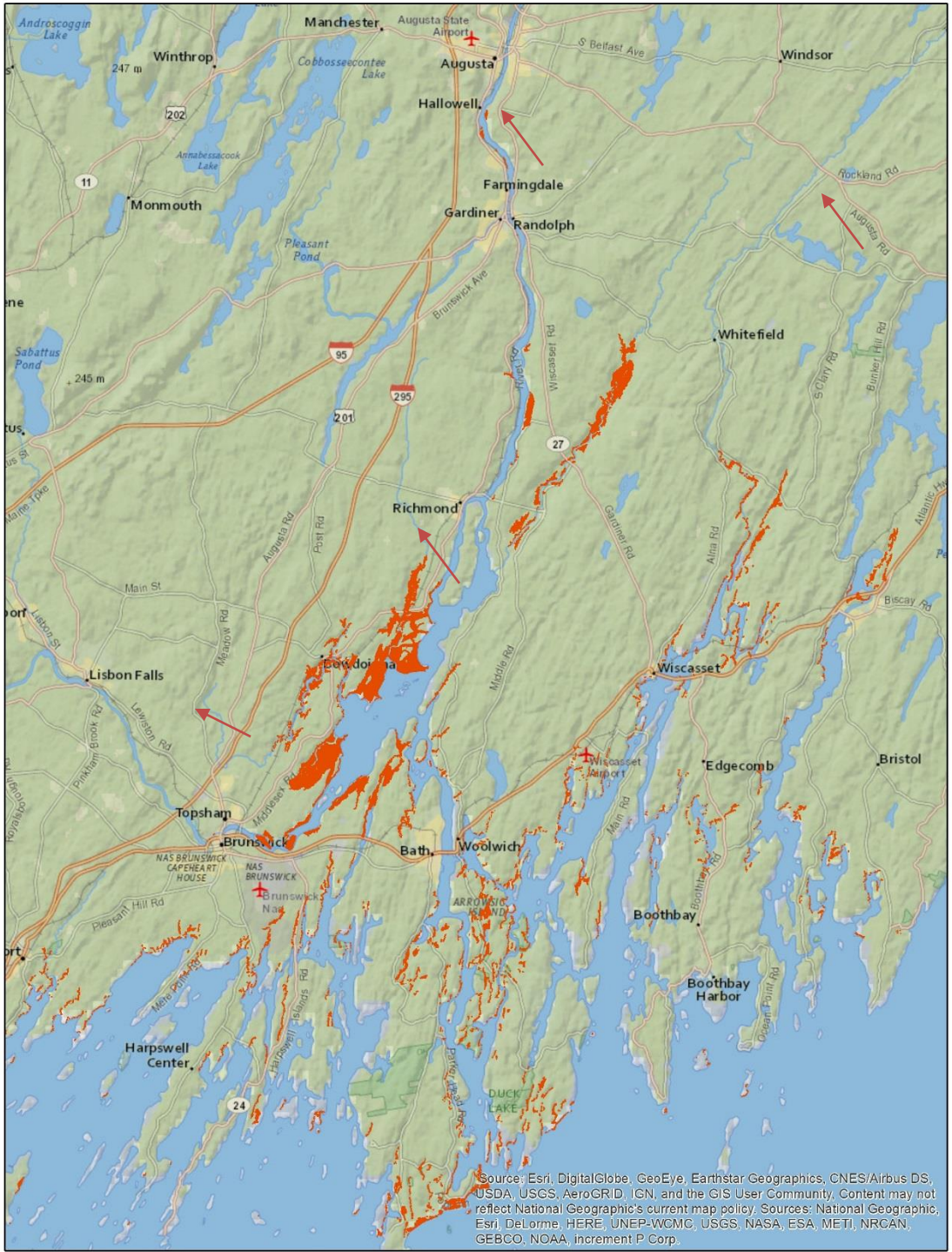
SLR Simulation	% Marsh Replacement
1 ft	17%
2 ft	30%
3.3 ft (1m)	46%
6 ft	77%
Maine Natural Areas Program, 2014	

Graphic: *Make Way for Marshes*, Northeast Regional Ocean Council

Changes we see now

Salt wedge will move upstream



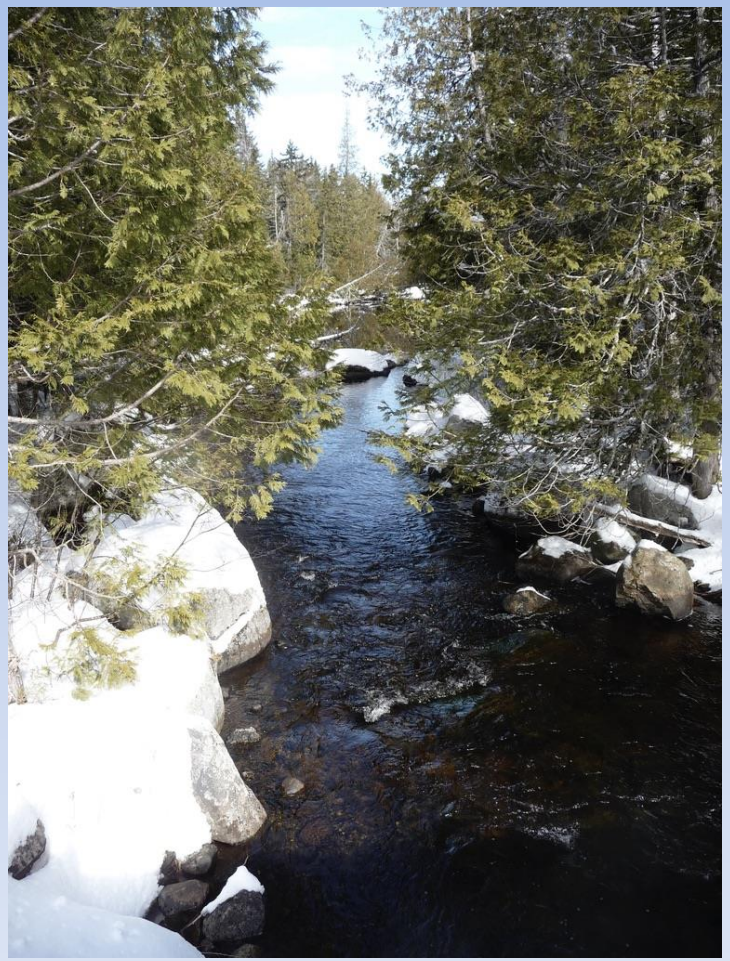

Androscoggin Lake
Manchester
Augusta State Airport
Winthrop
247 m
Cobbosseecontee Lake
Augusta
S Belfast Ave
Windsor
Hallowell
202
Annabessacook Lake
11
Monmouth
Farmingdale
Gardiner
Randolph
Rockland Rd
Augusta Rd
Pleasant Pond
Brunswick Ave
Whitefield
Sabattus Pond
245 m
95
295
201
27
Richmond
Augusta Rd
Post Rd
Main St
Lisbon Falls
Meadow Rd
Lewiston Rd
Pinkham Brook Rd
Middle Rd
Gardiner Rd
Alna Rd
Wiscasset
Biscay Rd
Wiscasset Airport
Edgecomb
Bristol
Topsham
Brunswick
Bath
Woolwich
NAS BRUNSWICK CAPEHEART HOUSE
NAS BRUNSWICK
Brunswick Nas
Pleasant Hill Rd
Main Rd
Boothbay
Boothbay Harbor
Harpswell Center
Harpswell Islands Rd
24
DUCK LAKE
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

What we can do to help

- **Conserve habitat**
- **Protect or restore the quality** of that habitat
- **Connect habitats**
- **Reduce <u>other</u> stressors**
- **Leave room for change** - for marshes to migrate upslope and upstream, beaches to move
- **Work with town; educate** yourself and your neighbors; **advocate** for anticipating changes
- **Get involved as a citizen scientist**

Conserve habitat

Protect the quality of that habitat



Restore habitat

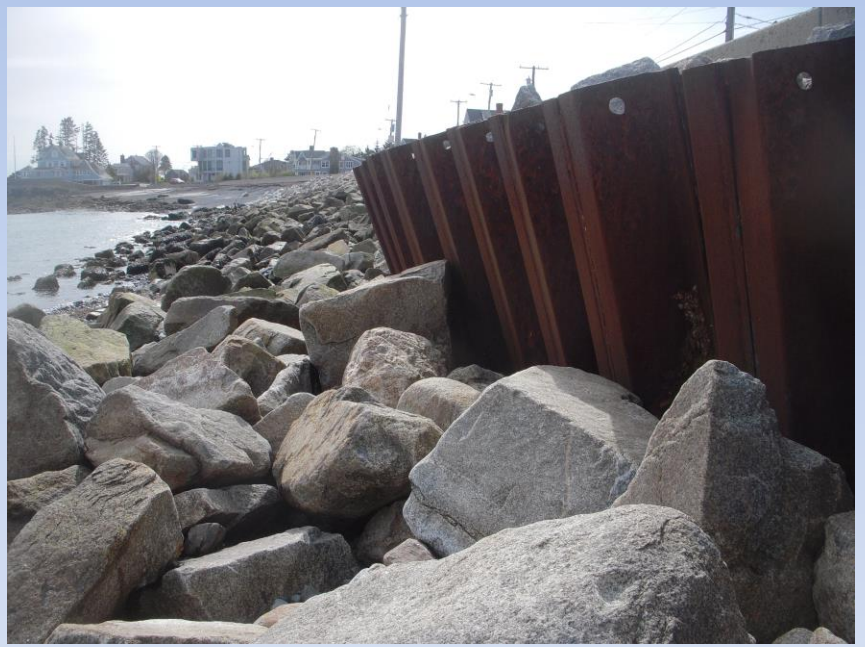
KELT – Georgetown project

Connect habitats

Reduce OTHER stressors – e.g.

- Prevent siltation and gullying of streams
- Prevent human disturbance to shorebirds on narrowing beaches
- Keep people from trampling dunes
- Reduce non-point source pollution to bays- the added nutrients may exacerbate effects of warming and acidification

LEAVE ROOM FOR RISING SEAS AND BIGGER STORM SURGES



Leave **plenty** of room for rising seas

PLAN AHEAD !

Retreat is better than rip-rap

Work with your community

Become a citizen scientist

- Signs of the Seasons: https://extension.umaine.edu/signs-of-the-seasons/
- Help MDIFW track changing status of animals

https://www.maine.gov/ifw/fish-wildlife/citizen-science-projects.html

- Help Schoodic Institute look at future of red spruce on our outer headlands

SchoodicSpruce@SchoodicInstitute.org

- Schoodic Institute also offers workshops in starting your own citizen science project
- https://naturegroupie.org/citizen-science

Your ideas? and your questions?

Thank you!

Special thanks to:

Justin Schlawin, Don Cameron (MNAP)
Pete Slovinsky (MGS)

Financial support from: USEPA, Maine Outdoor Heritage Fund

Kristen.Puryear@maine.gov / 287-8043

Sea level rise data and viewer available at:
http://www.maine.gov/dacf/mnap/

The Nature Conservancy's Future Habitats Explorer available at:
http://coastalresilience.org/project/maine/