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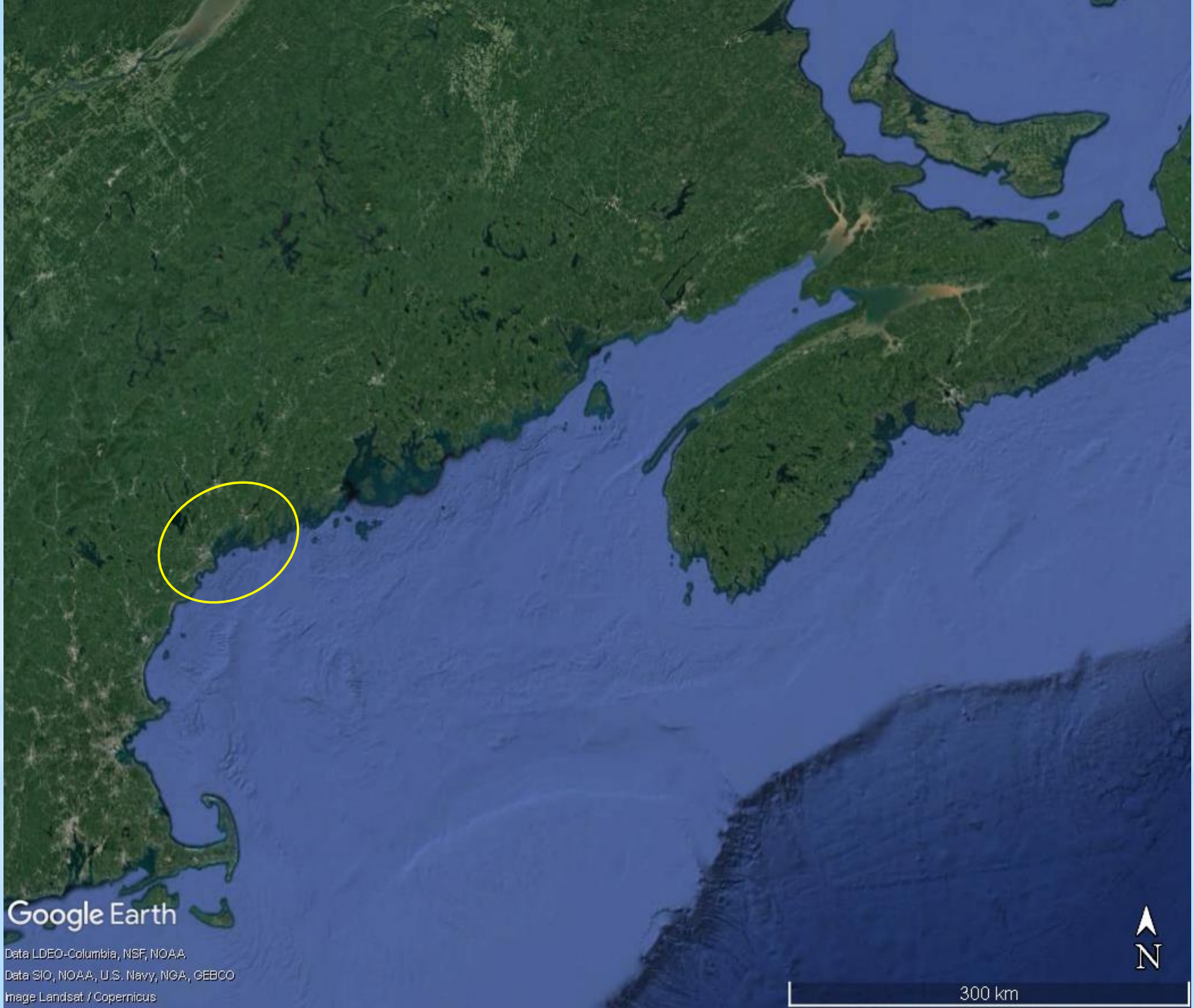
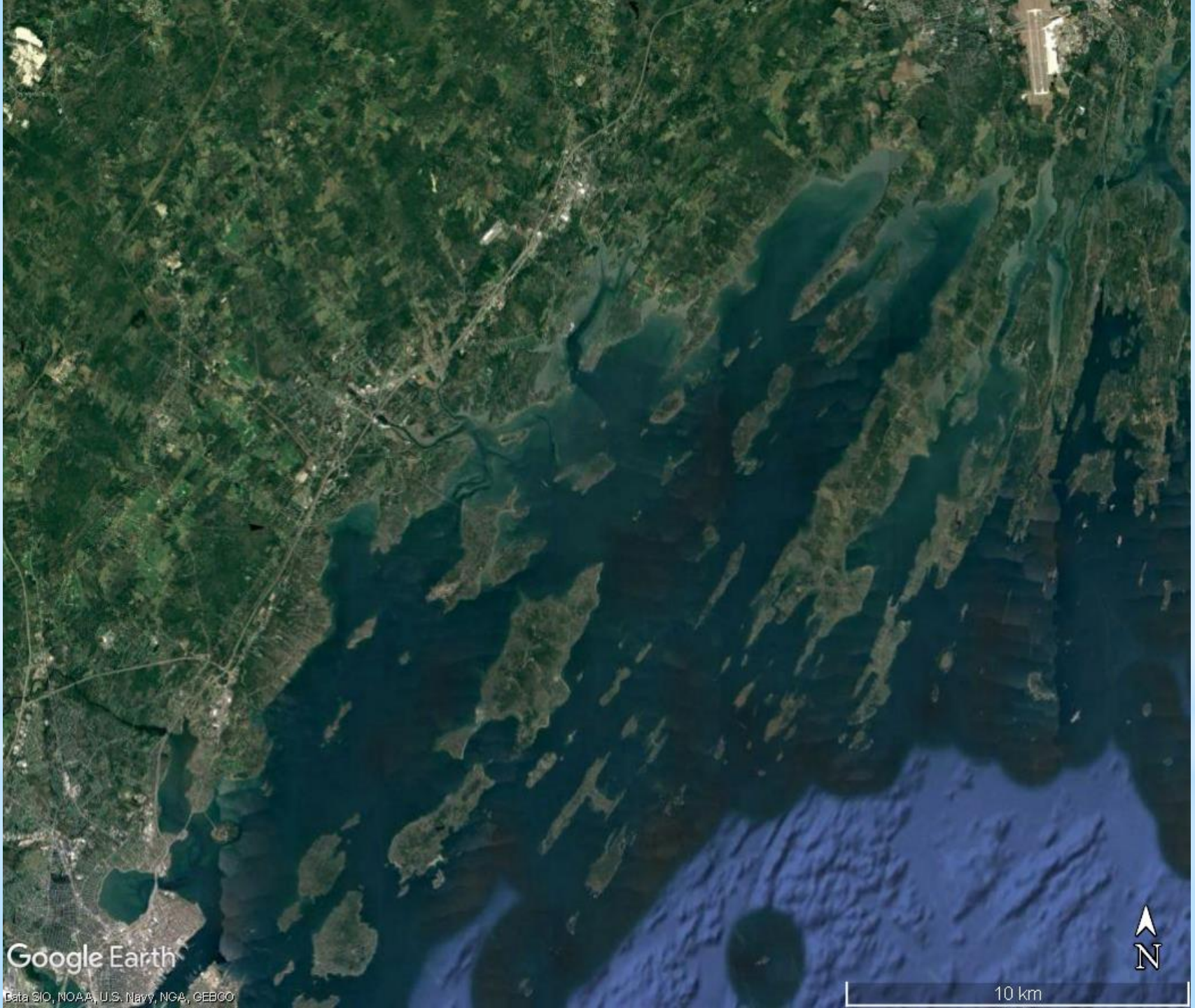
science for a changing world

Impacts of European Green Crabs on Eelgrass

Hilary Neckles
USGS Patuxent Wildlife Research Center
Augusta, ME
hneckles@usgs.gov


Google Earth
Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
N
300 km


Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
N
10 km


oogle Earth
2 km

Intertidal Flats at Head of Bay

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Intertidal Flats at Head of Bay

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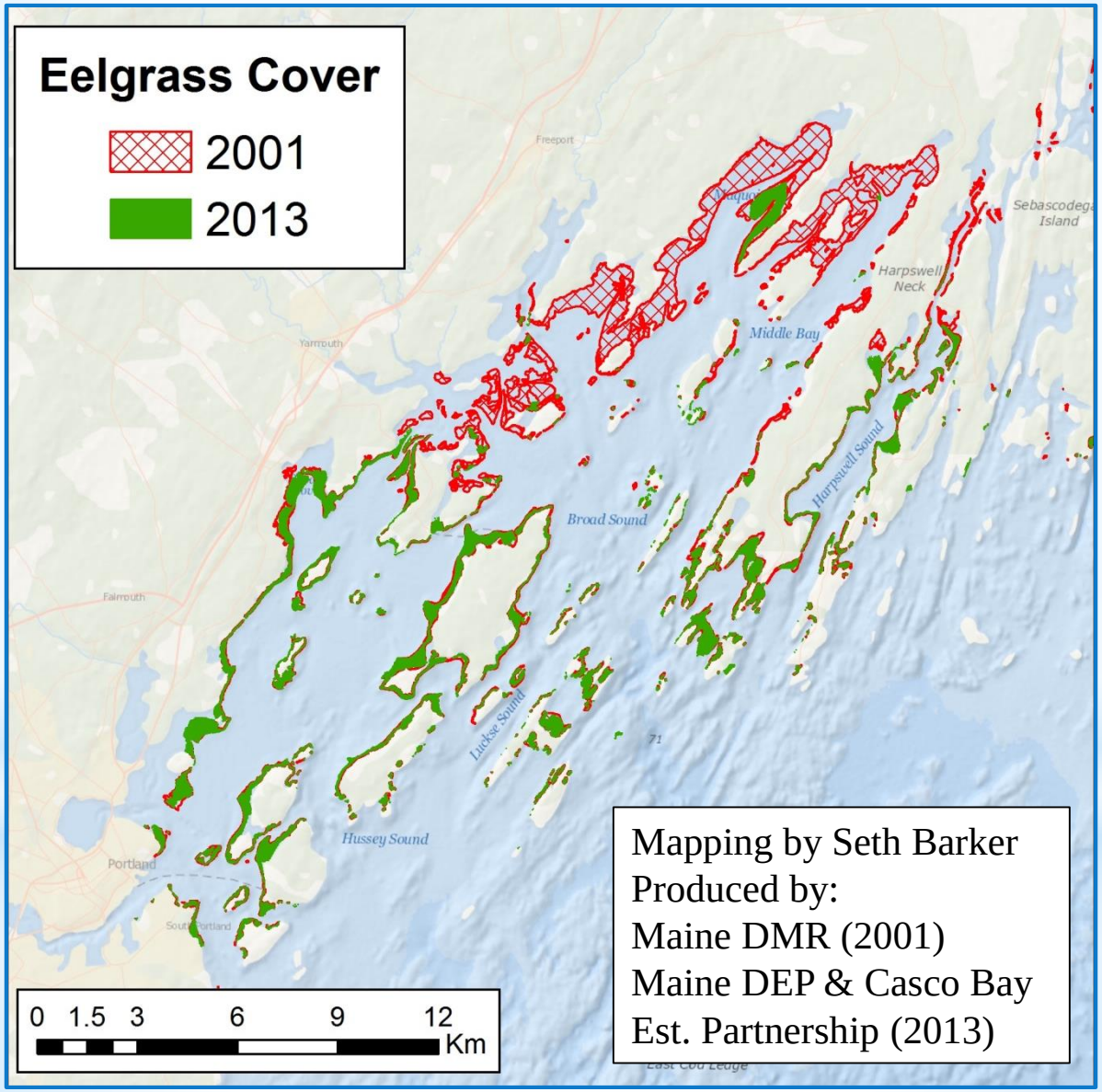
Eelgrass Change in Casco Bay



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The Forecaster 12/11/2012

Explosion of predator green crabs could spell the end of Maine's soft-shell clams

Bangor Daily News 11/18/2013

Scientists zero in on 'exploding' green crab population in Maine

Troy R. Bennett | BDN

Kennebec Journal 8/29/2013

August 29, 2013

Green crabs overtaking Maine's clam flats

February 28

Portland Press Herald 2/28/2014

Gov. LePage orders action against invasive green crabs

A task force will study the impact of the European species that has taken a bite out of Maine's bivalve fishery and develop controls.

Crab-Damaged Shoots From Casco Bay Shoreline

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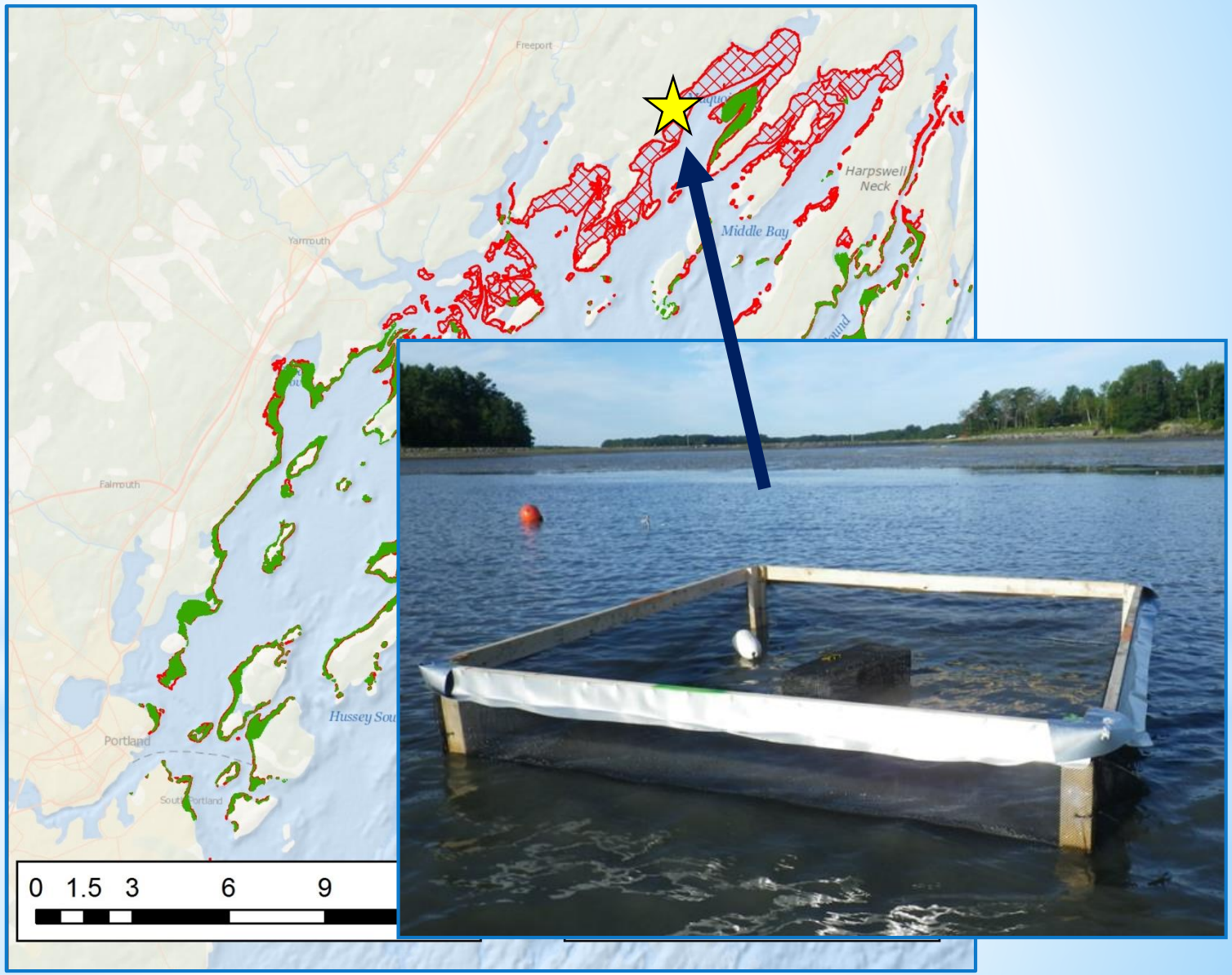
Exclosure Experiment - 2013



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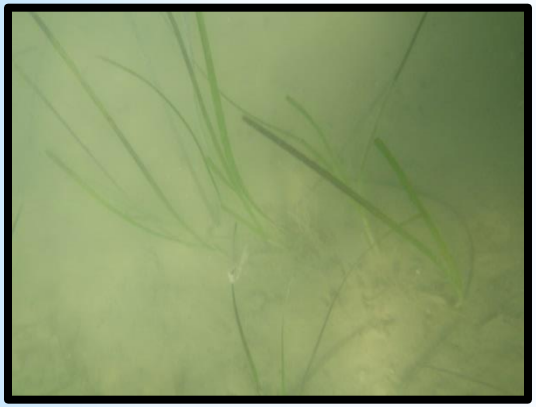
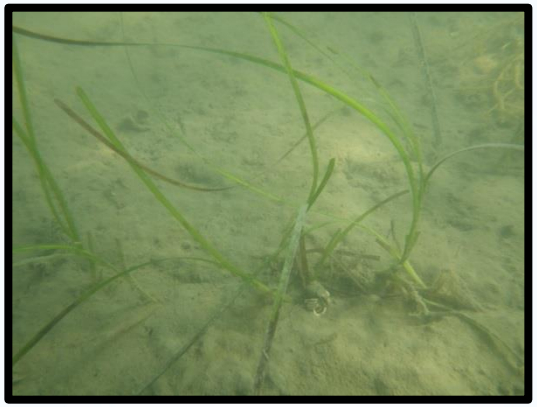
Exclosure Experiment

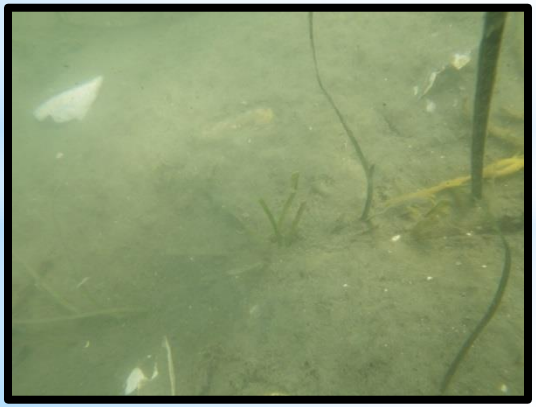
Results: Eelgrass Survival

Exclosures





Outside



Day 10 Day 19 Day 26

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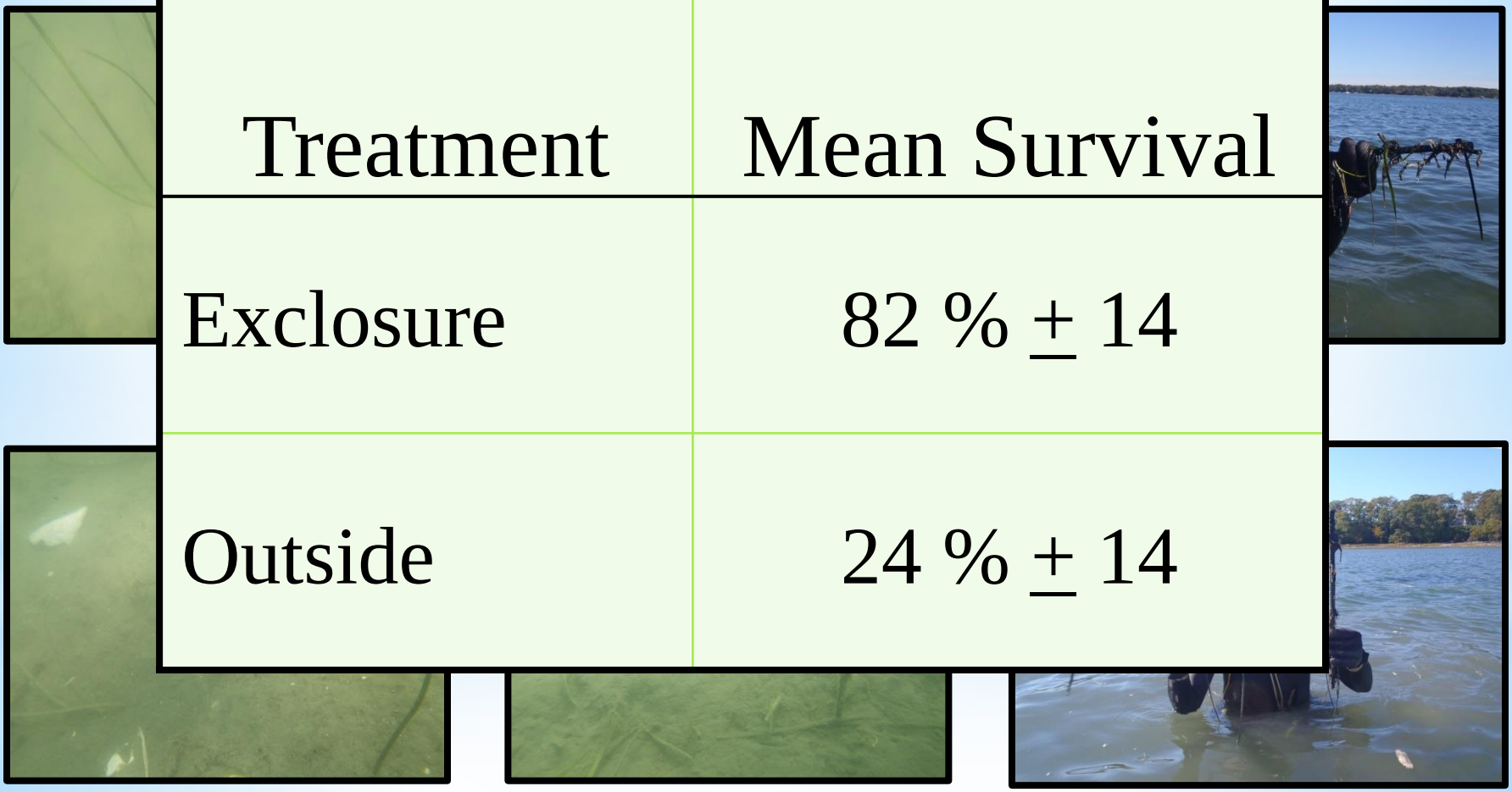
Exclosure Experiment

Results: Eelgrass Survival

Treatment	Mean Survival
Exclosure	82 % ± 14
Outside	24 % ± 14



Day 10 Day 19 Day 26

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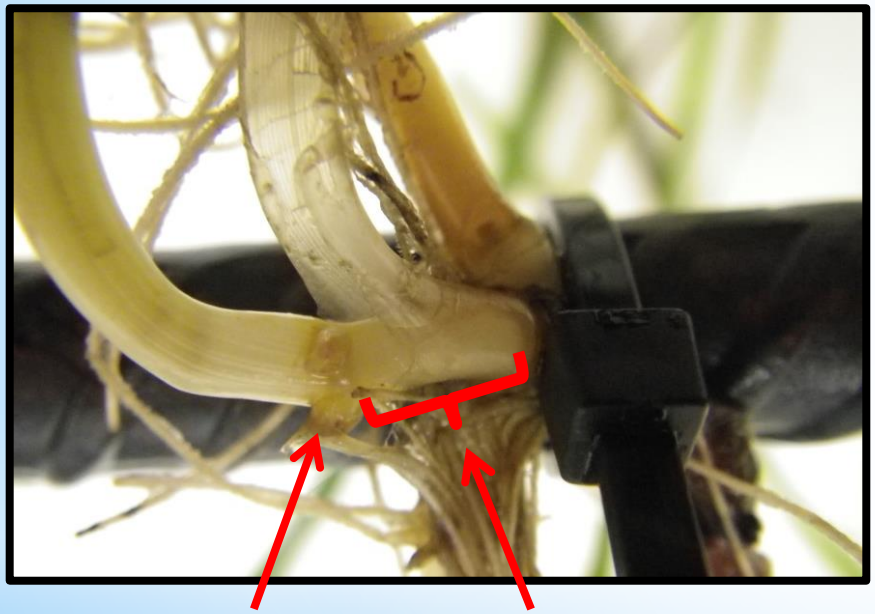
Exclosure Experiment

Results: Eelgrass Growth



Days Between Formation Of Successive Leaves In September		
Maquoit Bay, ME	8 - 14	This study
Fishing Island, NH/ME	12 - 15	Gaeckle and Short (2002)
Waquoit Bay, MA	12 - 15	Hauxwell et al. (2006)

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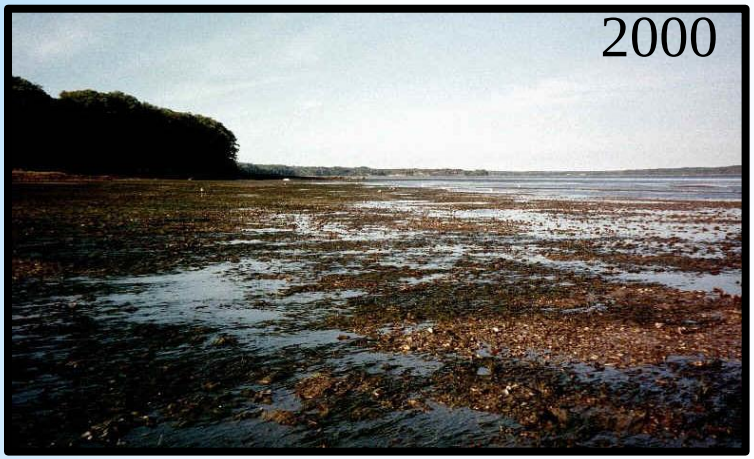

Results implicated green crabs as the primary cause of eelgrass loss from Casco Bay

Details:

Neckles, H. A. 2015.

Northeastern Naturalist 22:478-500

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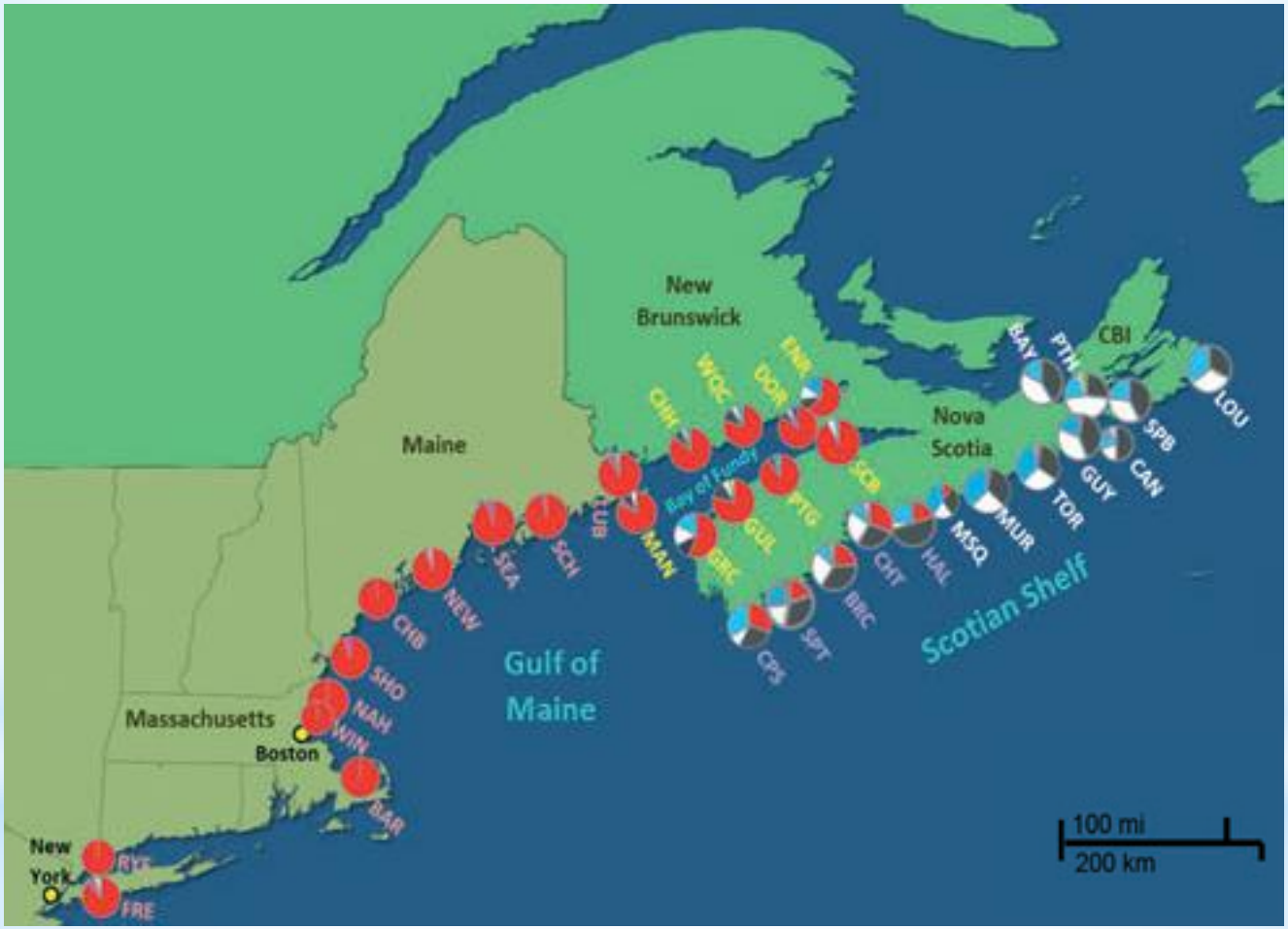
Loss of eelgrass in Casco Bay was first documented damage to **natural** eelgrass beds by **historical** green crab lineage

Green Crab Genetic Diversity

1999 - 2002



Source: Blakeslee et al. Diversity and Distributions (2010) 1 – 13.

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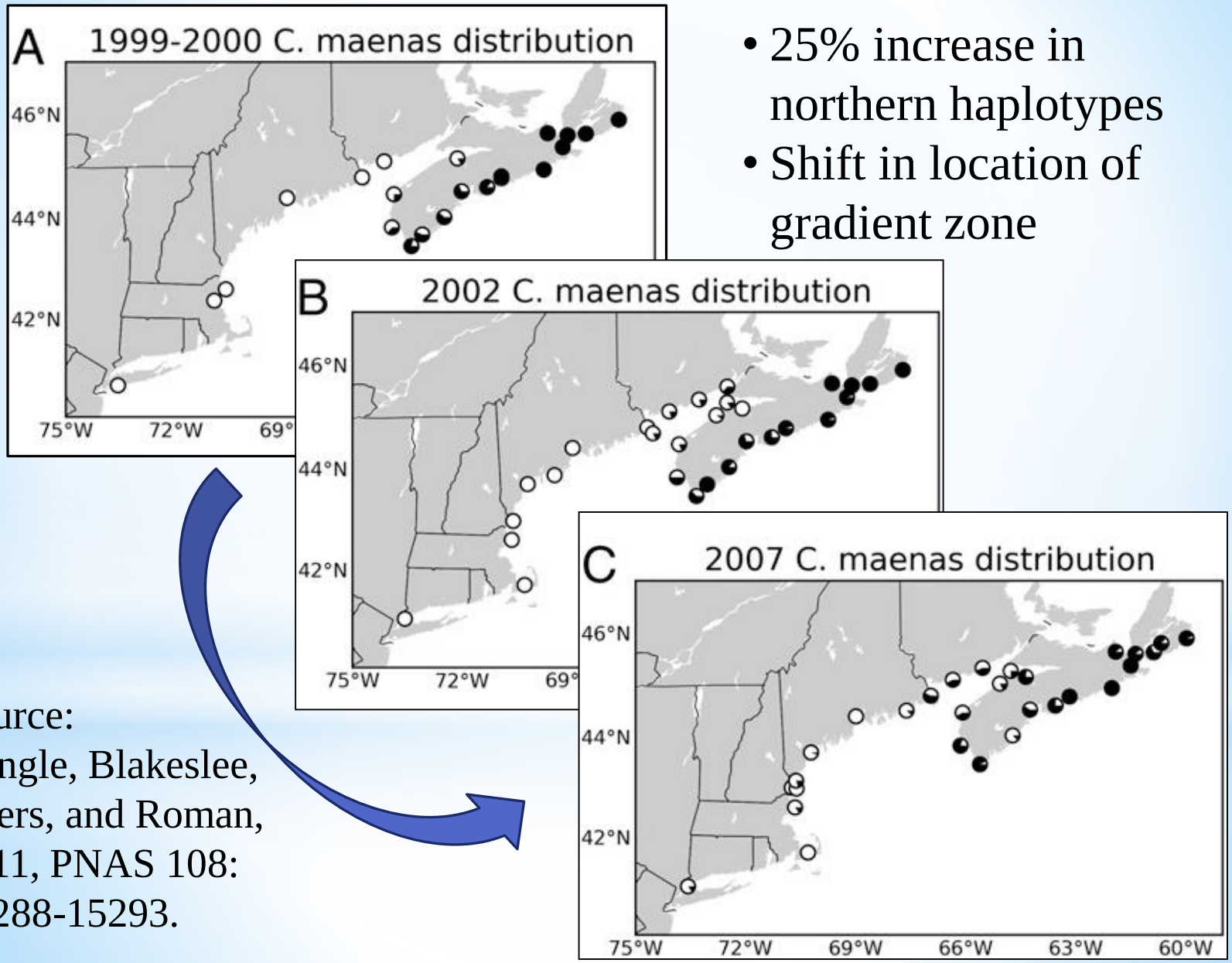
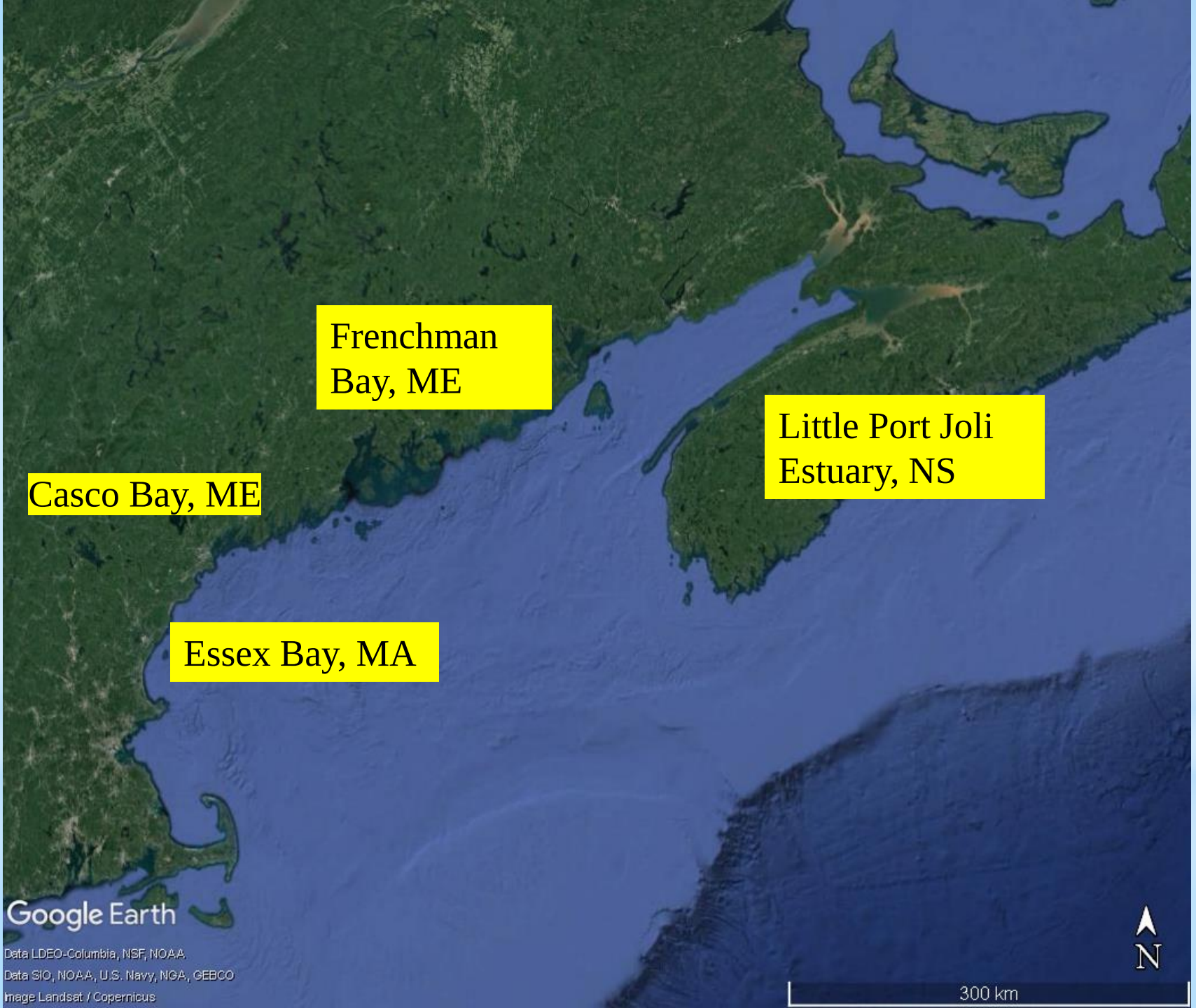
Northern Lineages Moving Downstream



- 25% increase in northern haplotypes
- Shift in location of gradient zone

Source:
Pringle, Blakeslee, Byers, and Roman, 2011, PNAS 108: 15288-15293.


Frenchman Bay, ME
Little Port Joli Estuary, NS
Casco Bay, ME
Essex Bay, MA
Google Earth
Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
N
300 km

Little Port Joli Estuary
Kejimkujik Seaside

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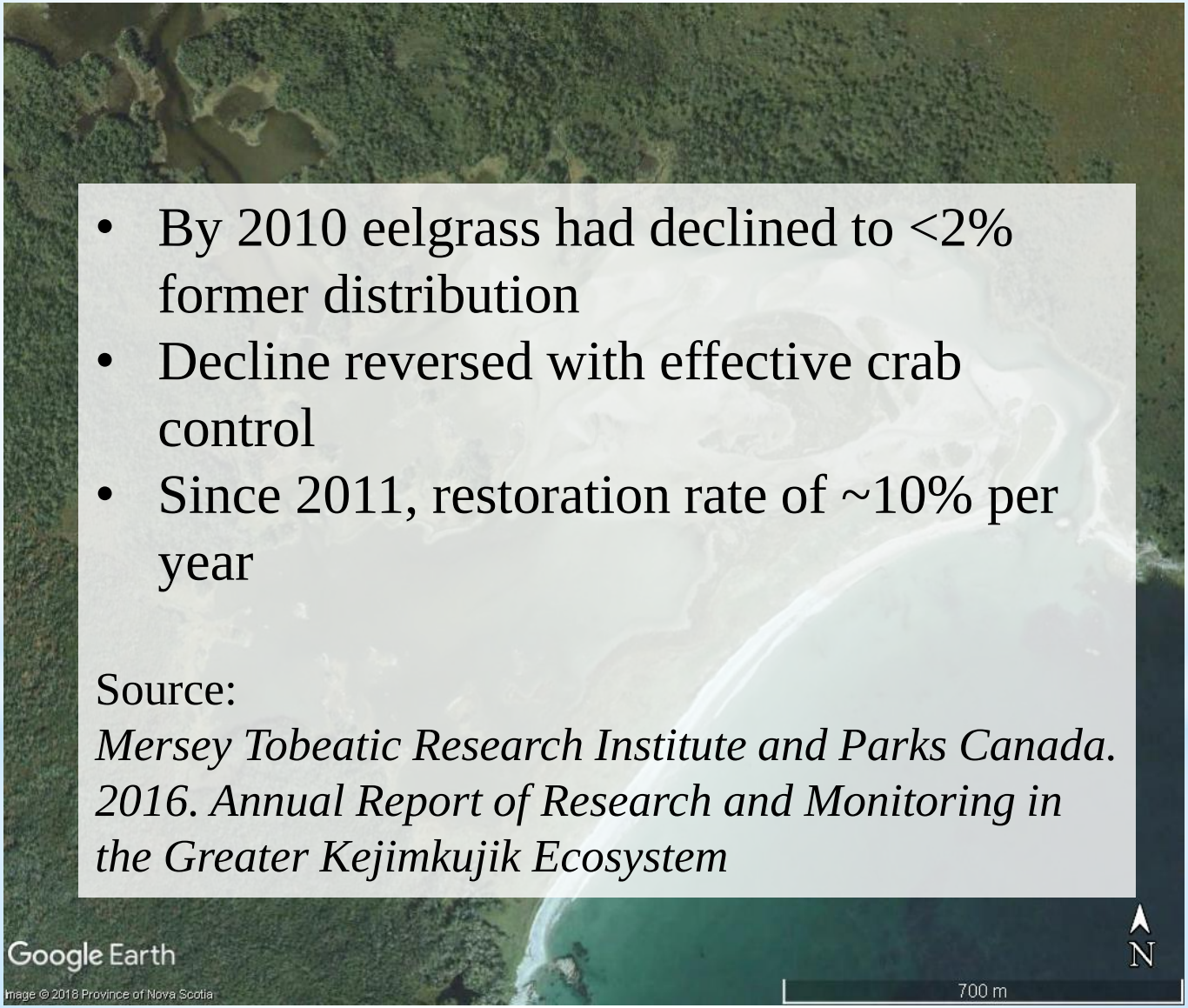
Little Port Joli Estuary
Kejimkujik Seaside



- By 2010 eelgrass had declined to <2% former distribution
- Decline reversed with effective crab control
- Since 2011, restoration rate of ~10% per year

Source:
Mersey Tobeatic Research Institute and Parks Canada. 2016. Annual Report of Research and Monitoring in the Greater Kejimkujik Ecosystem

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https://www.pc.gc.ca/en/pn-np/ns/kejimkujik/activ/expedi-crabes-gone-crabbin

Home → National Parks → Kejimkujik National Park and National Historic Site → Things to do → Gone Crabbin' (Kejikmkujik Seaside)

Kejimkujik National Park and National Historic Site

Things to do

- Schedule - Guided activities
- Special events
- Connect with Mi'kmaw culture
- Canoeing and kayaking
- Explore the dark sky
- Backcountry
- Camping
- Biking
- BioBlitz
- Bird watching
- Fishing
- Geocaching
- Gone Crabbin' (Kejimkujik Seaside)
- Hiking
- The Perfect Picnic (Kejimkujik Seaside)

Gone Crabbin': Citizen science seaside adventure at Kejimkujik Seaside

Up for a salty adventure in a pristine and protected coastal estuary? Take part in this exclusive maritime experience and help protect native species from the invasive European Green Crab.

Start your journey on a side-by-side all-terrain vehicle and enjoy the ride to a protected and secluded lagoon destination. At the field station you'll learn about trapping techniques and data collection then it's off to the rowboats. Be prepared to get your hands wet and have fun as you weave your rowboat between the stunning granite islands pulling traps from the water and handling fish and crabs alike. Take advantage of this rare opportunity to help save a fragile ecosystem and enjoy an idyllic landscape.

Contact: Gabrielle Beaulieu, Parks Canada
gabrielle.beaulieu@jpc.gc.ca

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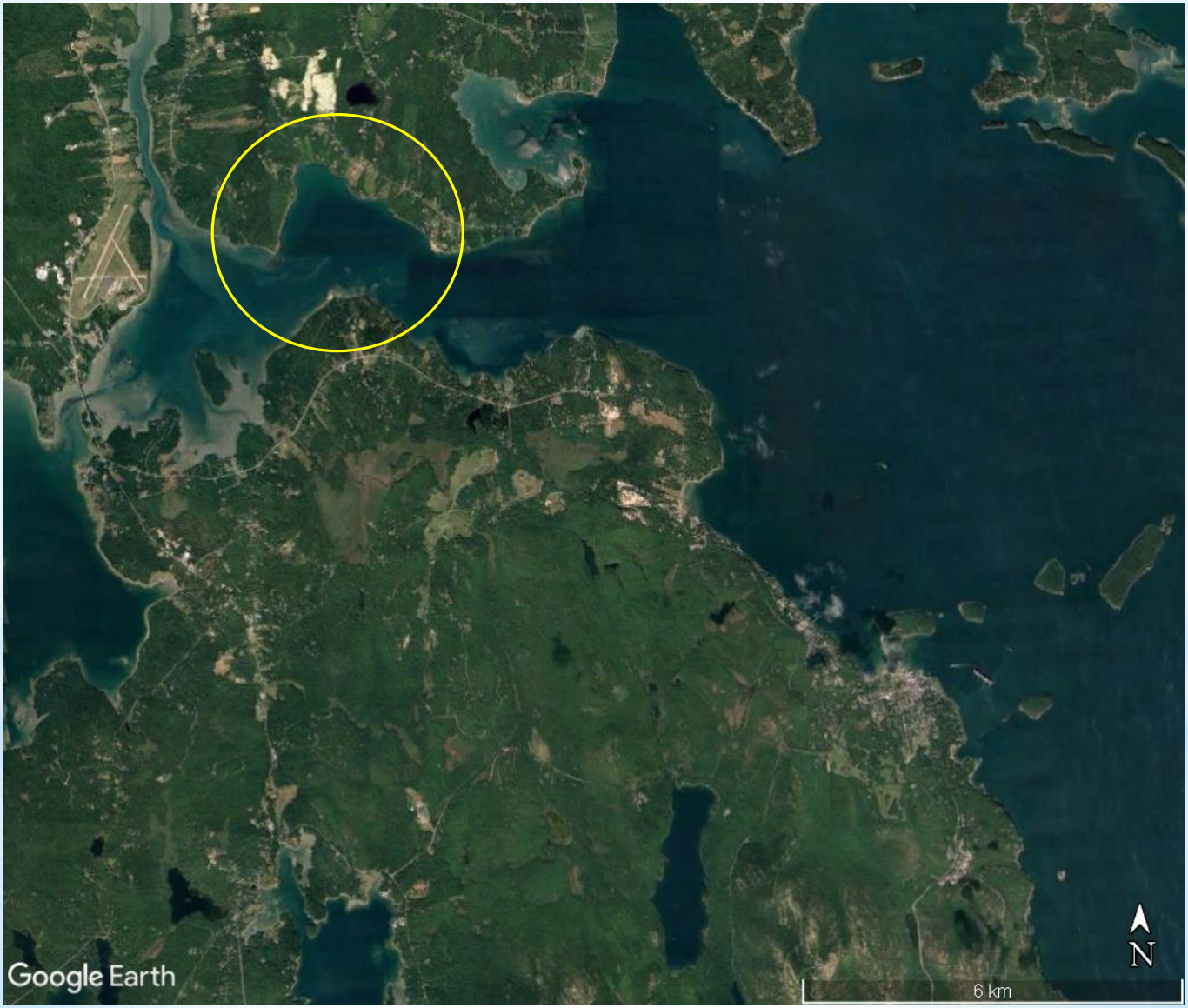
Frenchman Bay, Mt. Desert Island, ME

Jane Disney and Ashley Taylor, MDI Bio Lab



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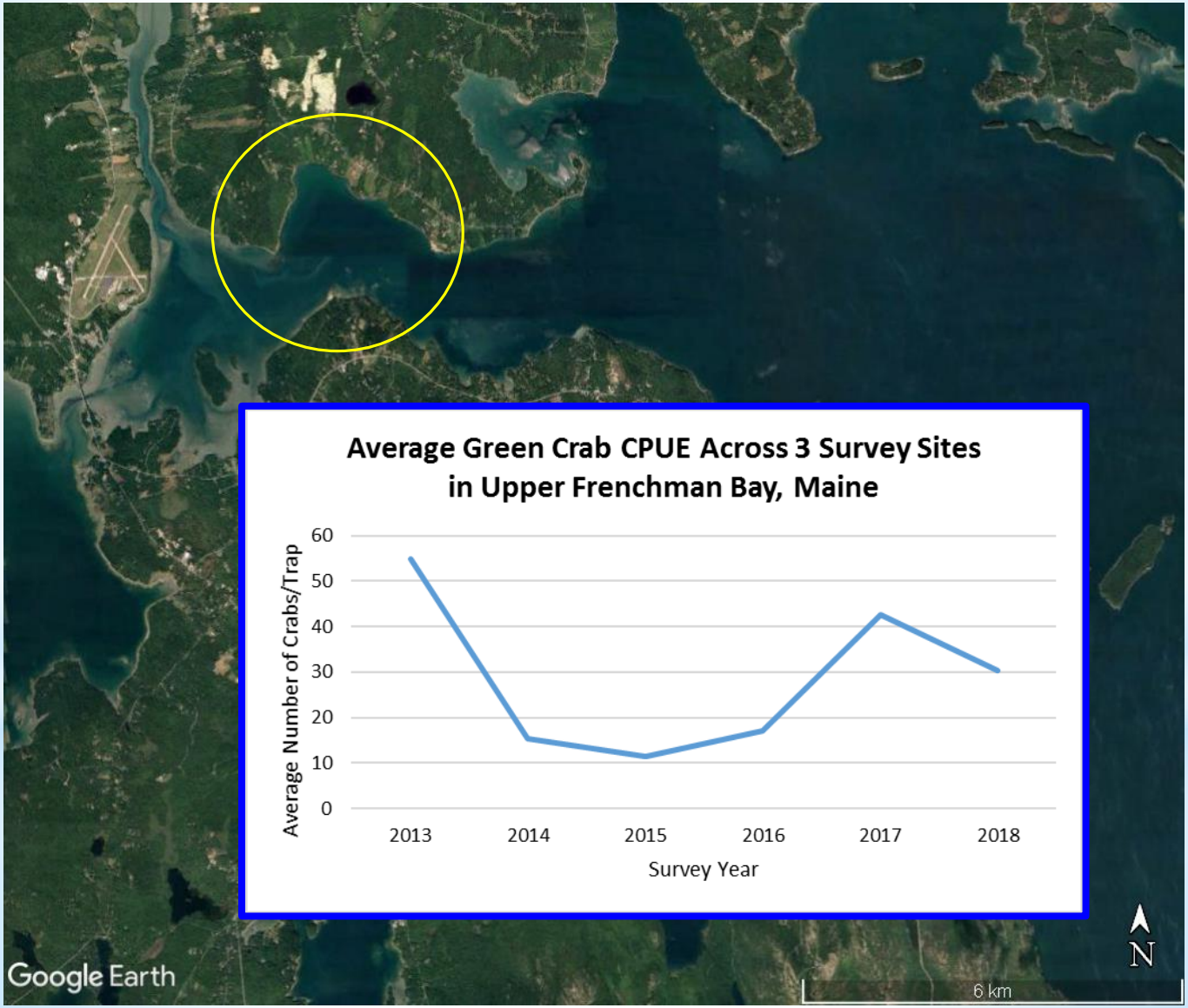
Frenchman Bay, Mt. Desert Island, ME

Jane Disney and Ashley Taylor, MDI Bio Lab



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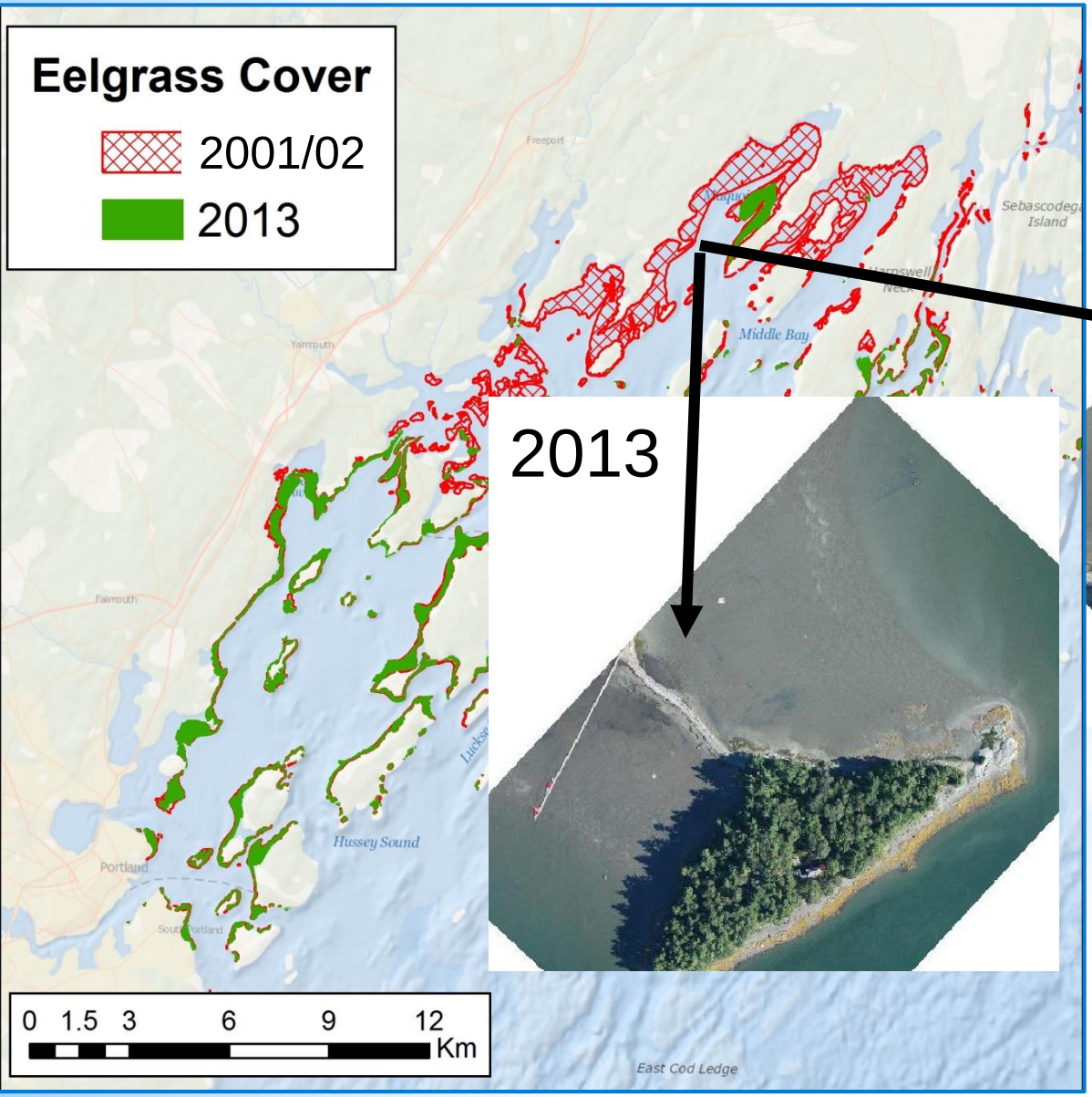
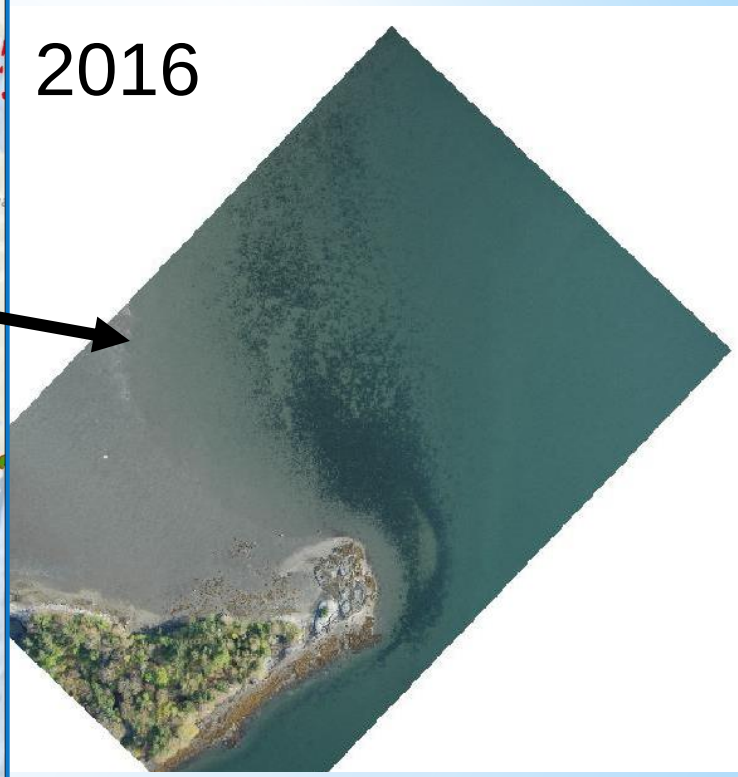
Casco Bay, ME Recovery is Occurring

Photographs by John Sowles



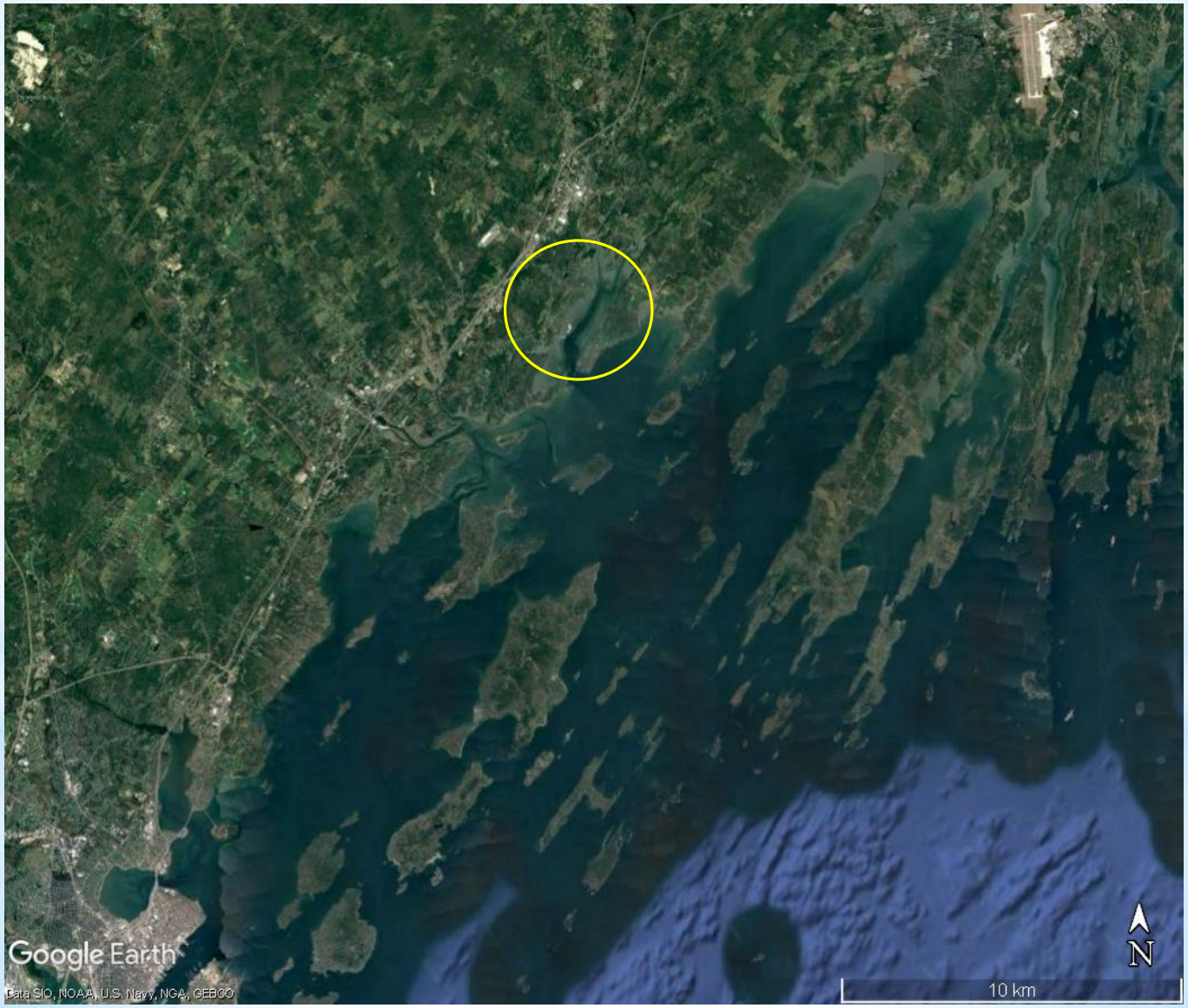
2013

2016



Upper Casco Bay

Brian Beal, U Maine Machias – Downeast Institute



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Upper Casco Bay

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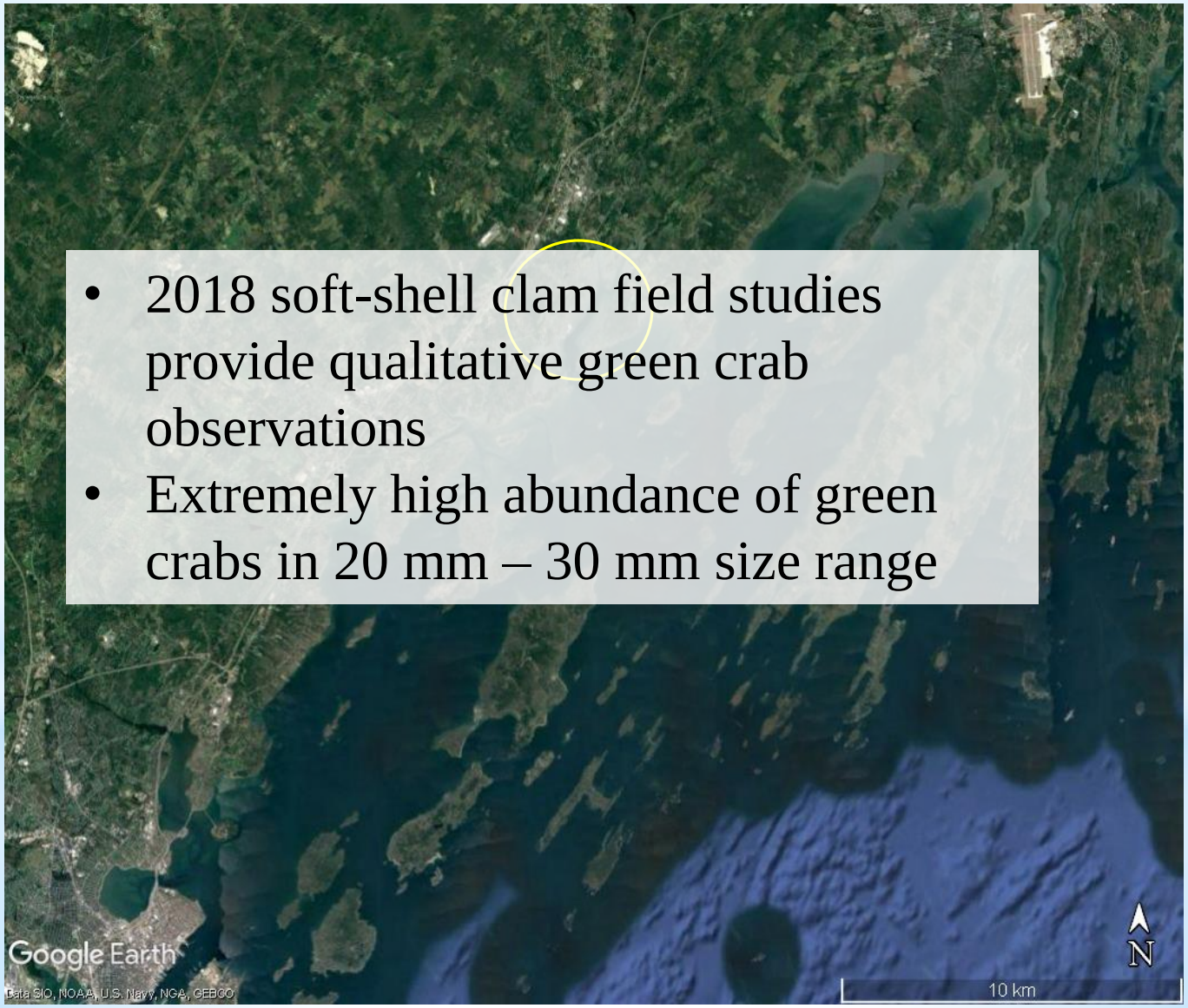

- 2018 soft-shell clam field studies provide qualitative green crab observations
- Extremely high abundance of green crabs in 20 mm – 30 mm size range

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Lower Casco Bay

Angie Dubois Brewer, ME DEP Marine Unit

Lower Casco Bay

Angie Dubois Brewer, ME DEP Marine Unit

- Summer 2018 green crabs were evident during eelgrass monitoring
- Presence of characteristic crab damage to eelgrass shoots

Plum Island Sound & Essex Bay, MA

Alyssa Novak, Boston University

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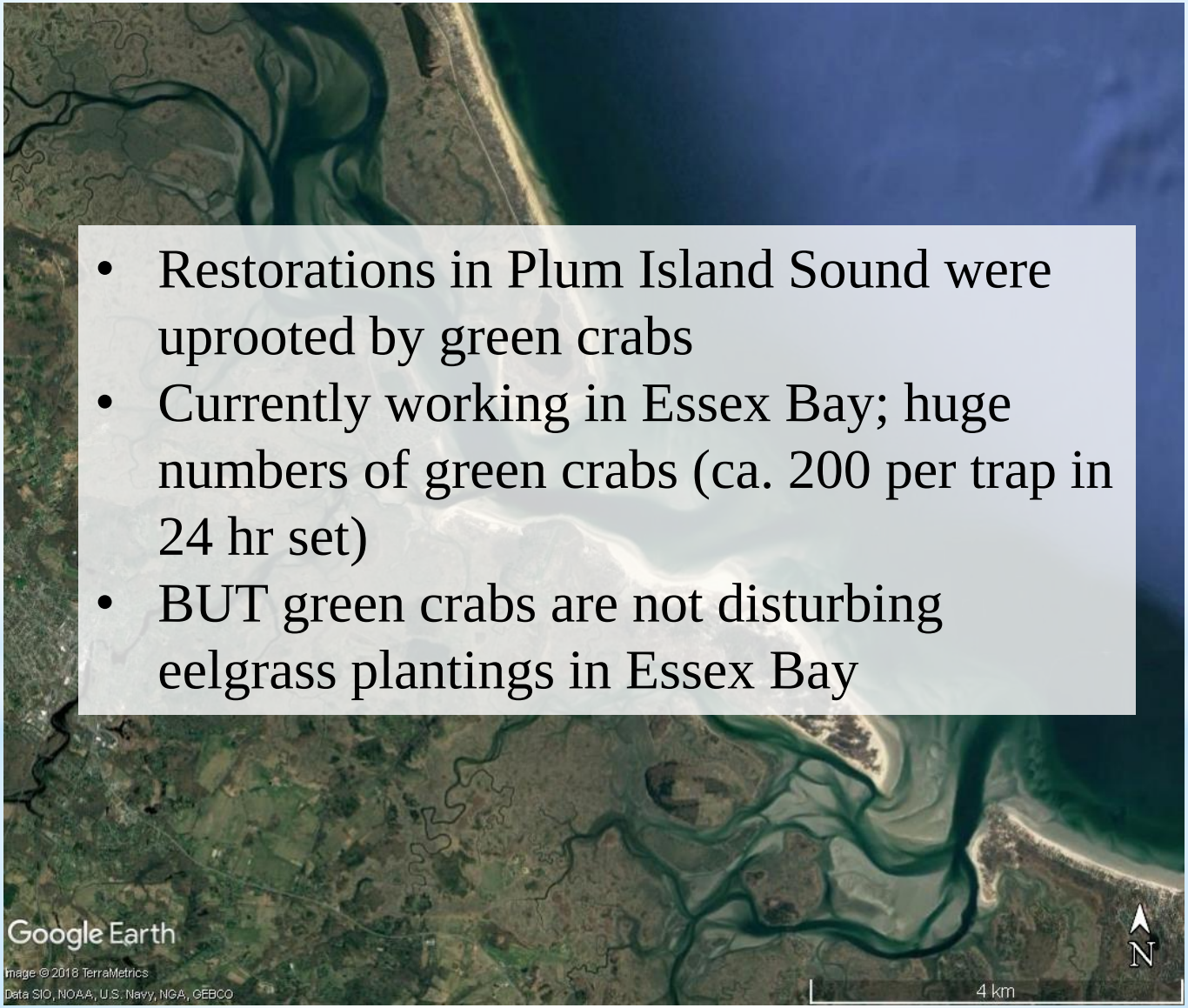
Plum Island Sound & Essex Bay, MA

Alyssa Novak, Boston University



- Restorations in Plum Island Sound were uprooted by green crabs
- Currently working in Essex Bay; huge numbers of green crabs (ca. 200 per trap in 24 hr set)
- BUT green crabs are not disturbing eelgrass plantings in Essex Bay

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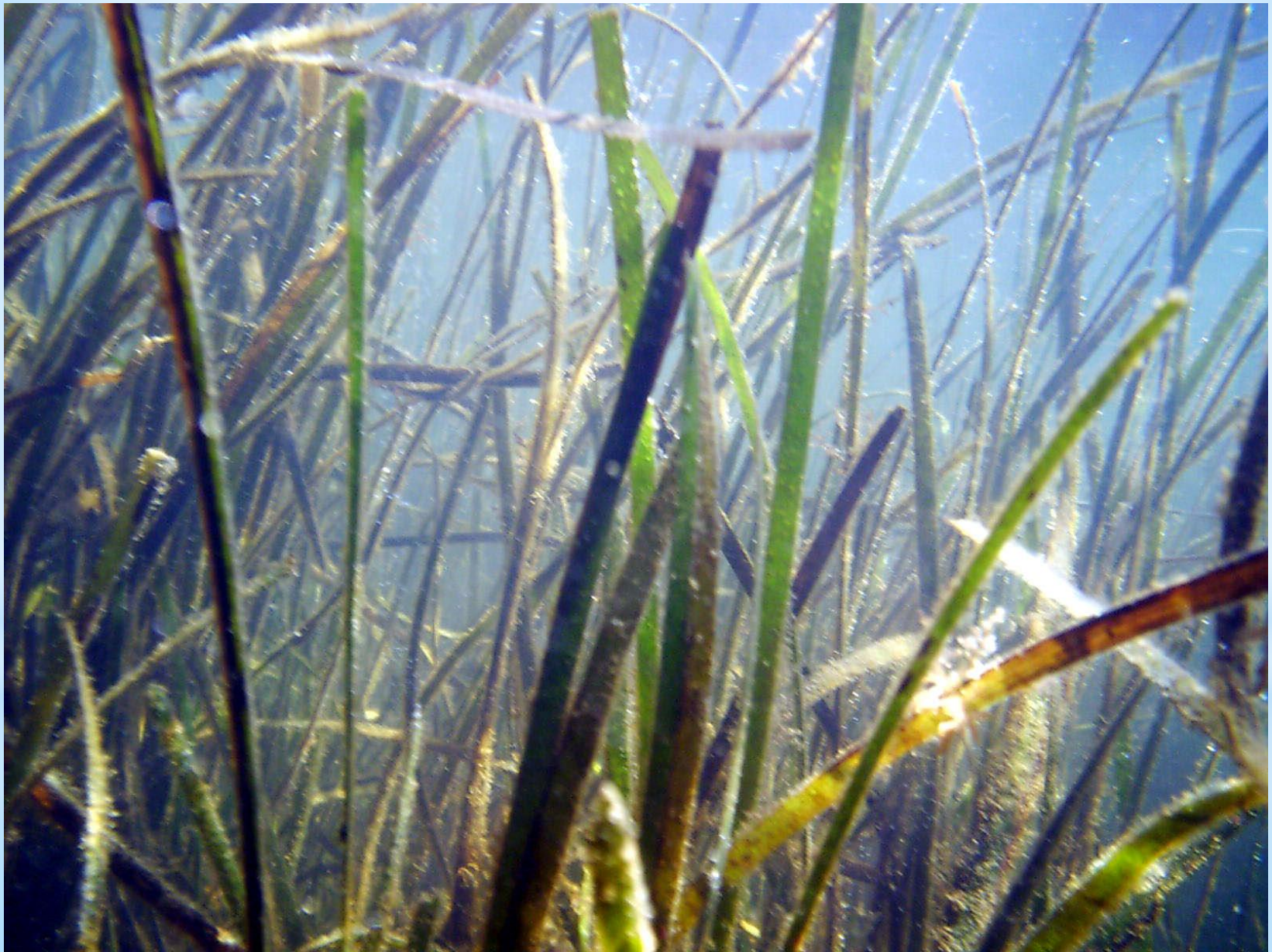
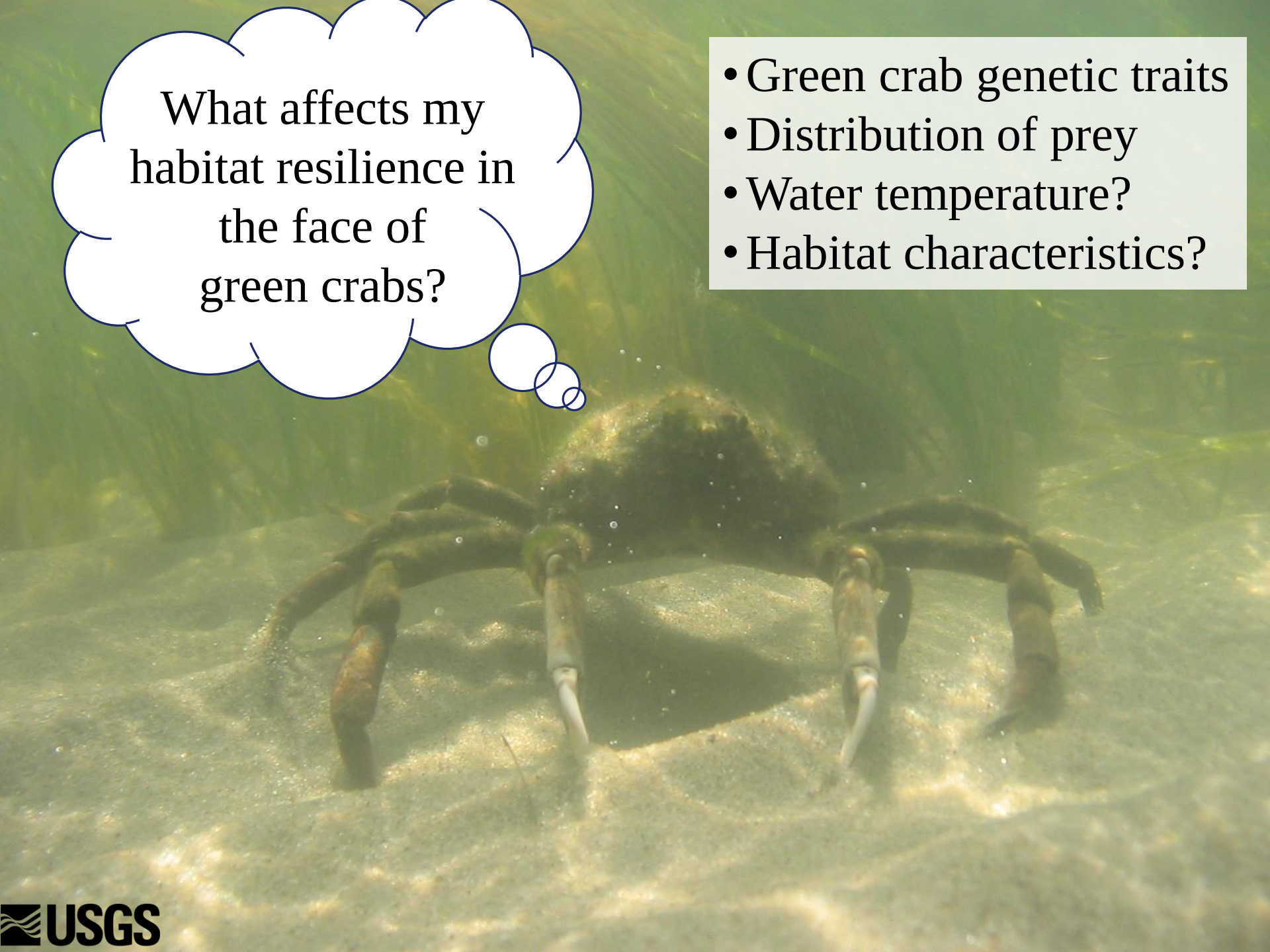
Eelgrass beds are among the most productive plant communities on the planet



Green crabs have the capacity to destroy eelgrass beds. Persistent loss can lead to decreased fish and wildlife populations, degraded water quality, increased shoreline erosion, and reduced capacity to remove anthropogenic carbon dioxide emissions.


What affects my habitat resilience in the face of green crabs?


What affects my habitat resilience in the face of green crabs?
• Green crab genetic traits
• Distribution of prey
• Water temperature?
• Habitat characteristics?
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As served at
Henry and Marty Restaurant
Brunswick, ME

USGS


Thank you!