Evaluating the success of horseshoe crab and migratory shorebird habitat restoration on Delaware Bay beaches damaged by Superstorm Sandy

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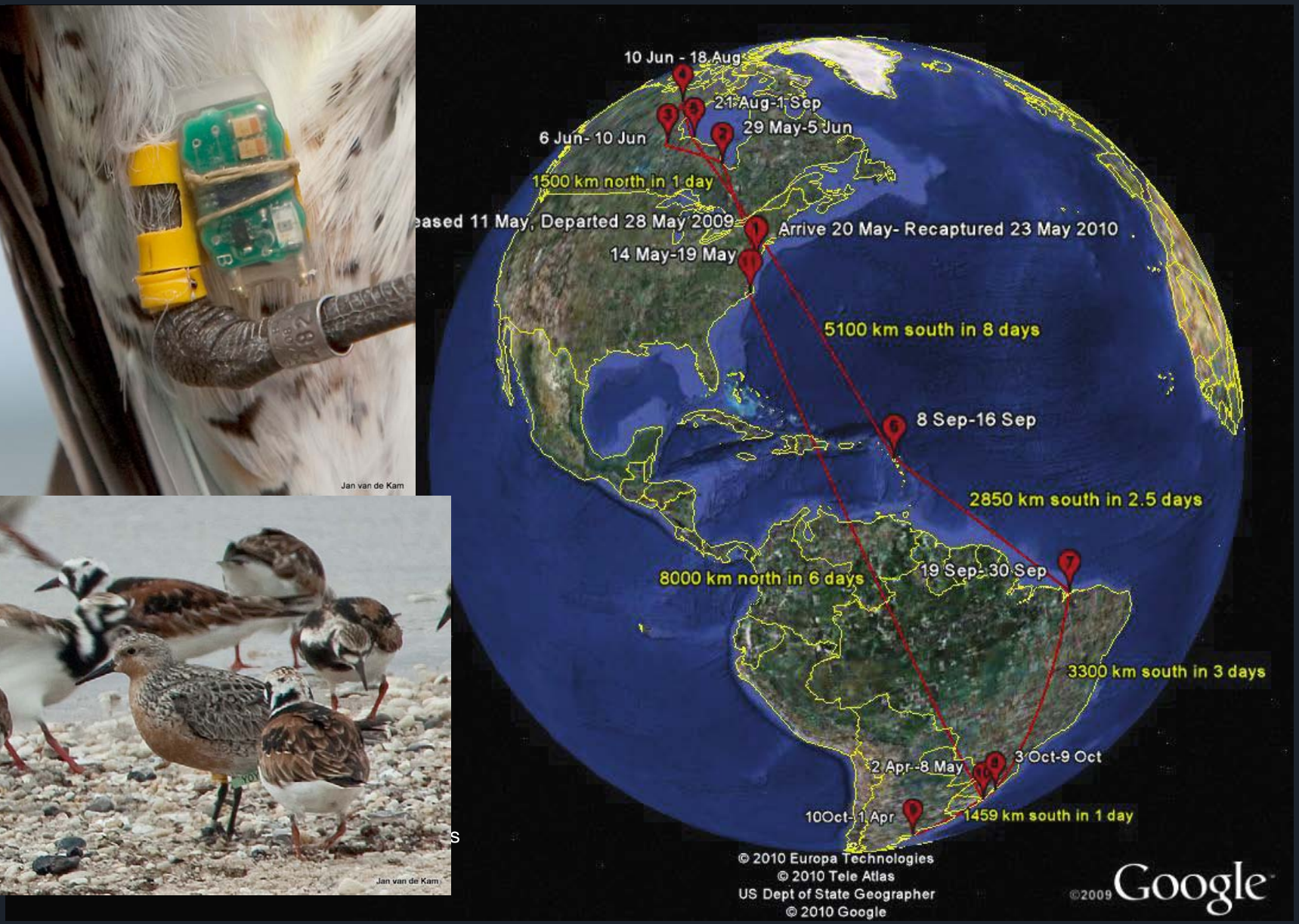
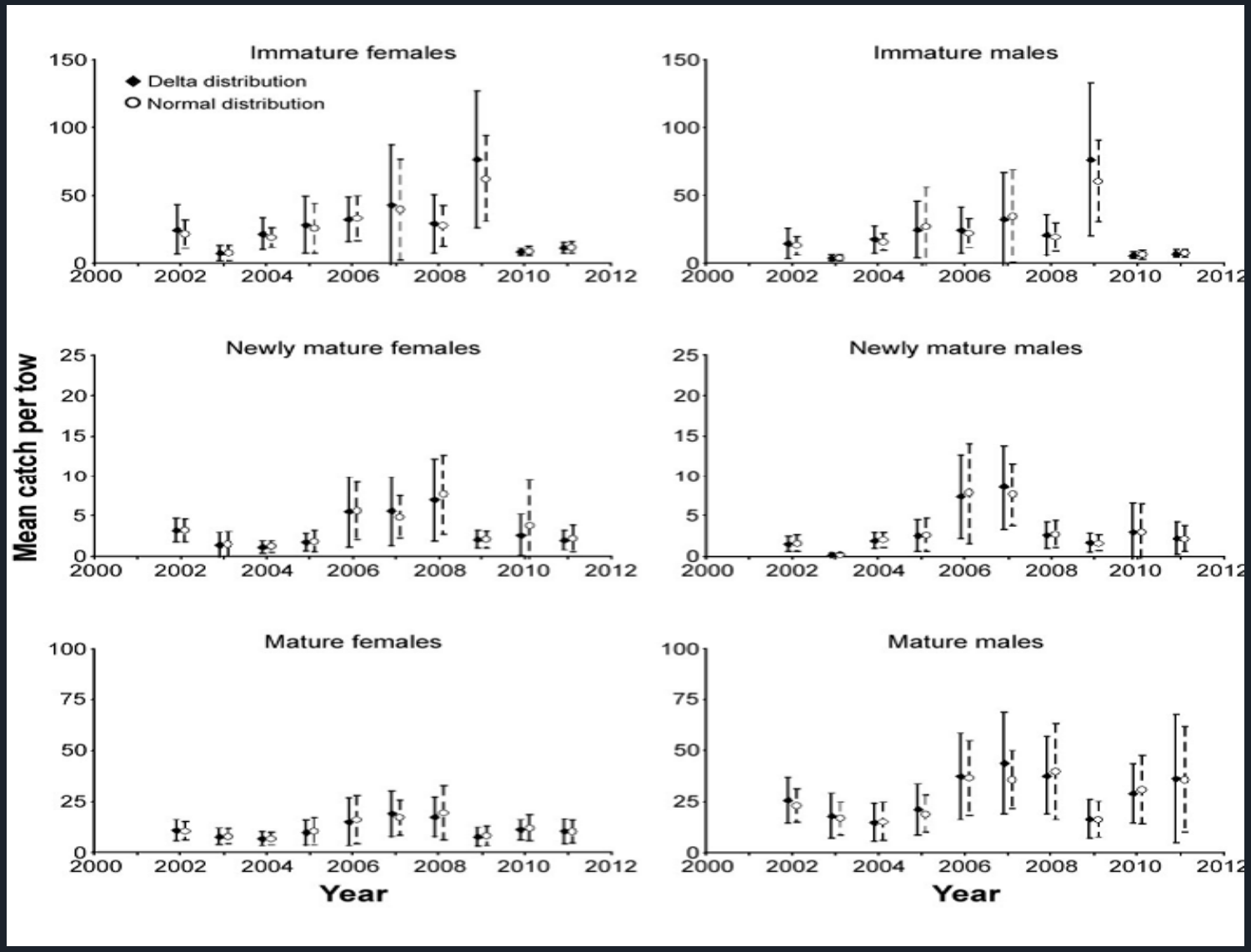
Delaware bay's horseshoe crabs population is the largest in the world

Ruddy Turnstones, Semipalmated Sandpipers, Sanderling, Red Knot rely on Delaware Bay Crabs to breed

Long migrations leave birds emaciated and in need of easily digestible fat- producing horseshoe crab eggs



Bird numbers followed declines in overharvested horseshoe crabs. After 15 years of ineffective regulation, recovery remains elusive. .

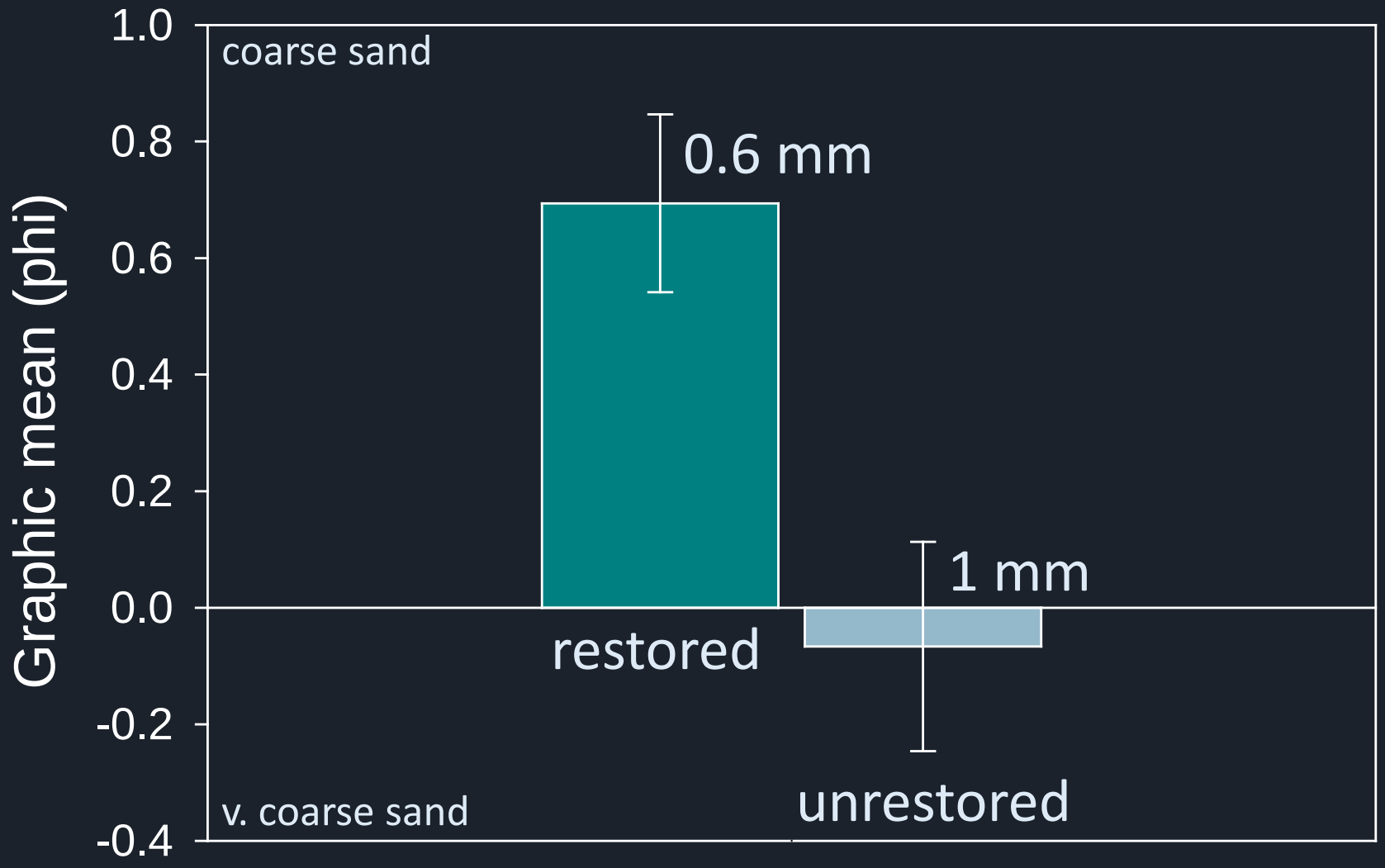


Then hurricane sandy devastated delaware bay beaches in 2012, threatening another catastrophic loss of shorebirds

Our restoration began within months of Sandy and continues this year. The following slides describe the key aspects of the beaches and the response of both crabs and birds

Sand characteristics

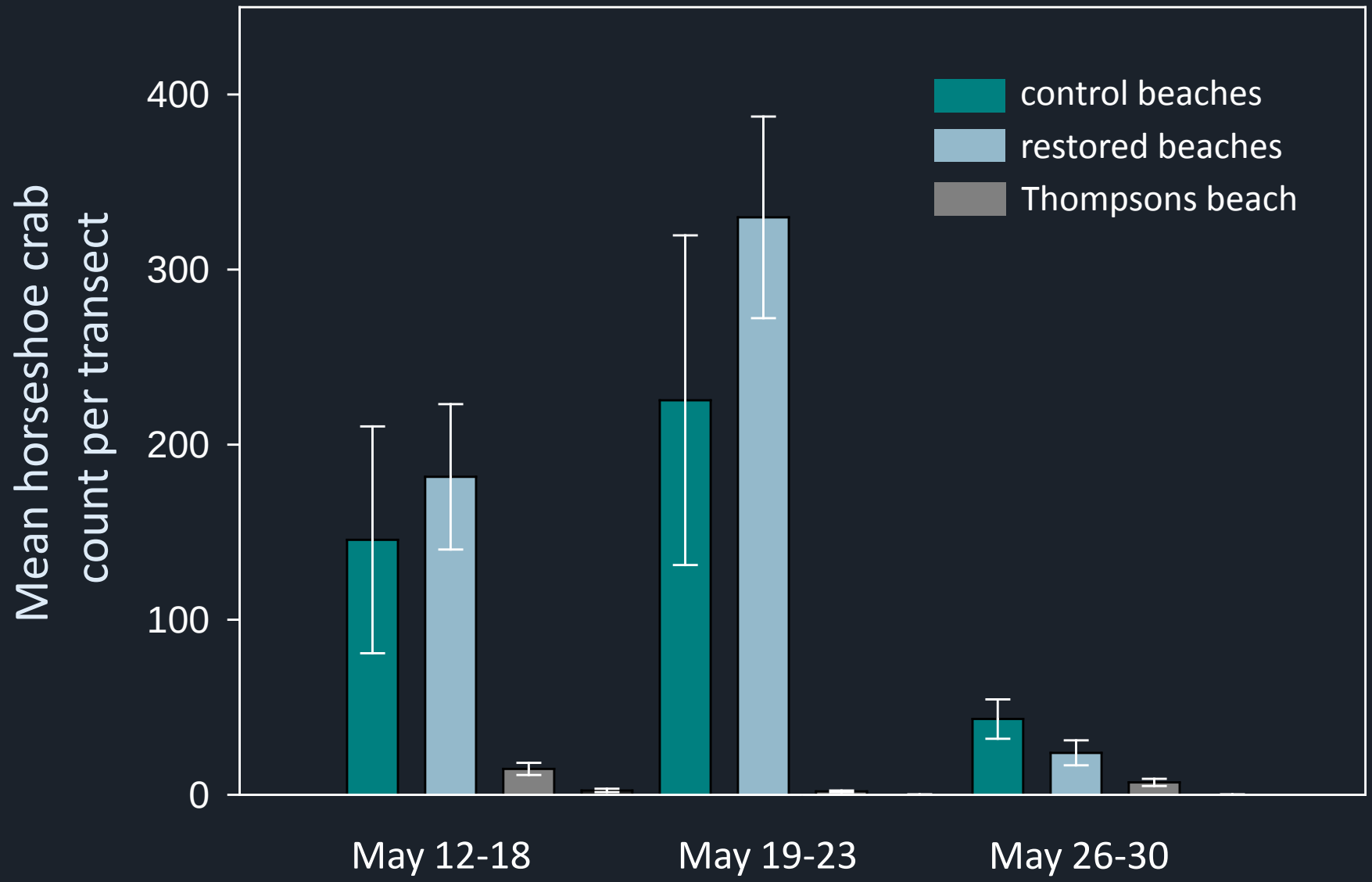
Sand grain size



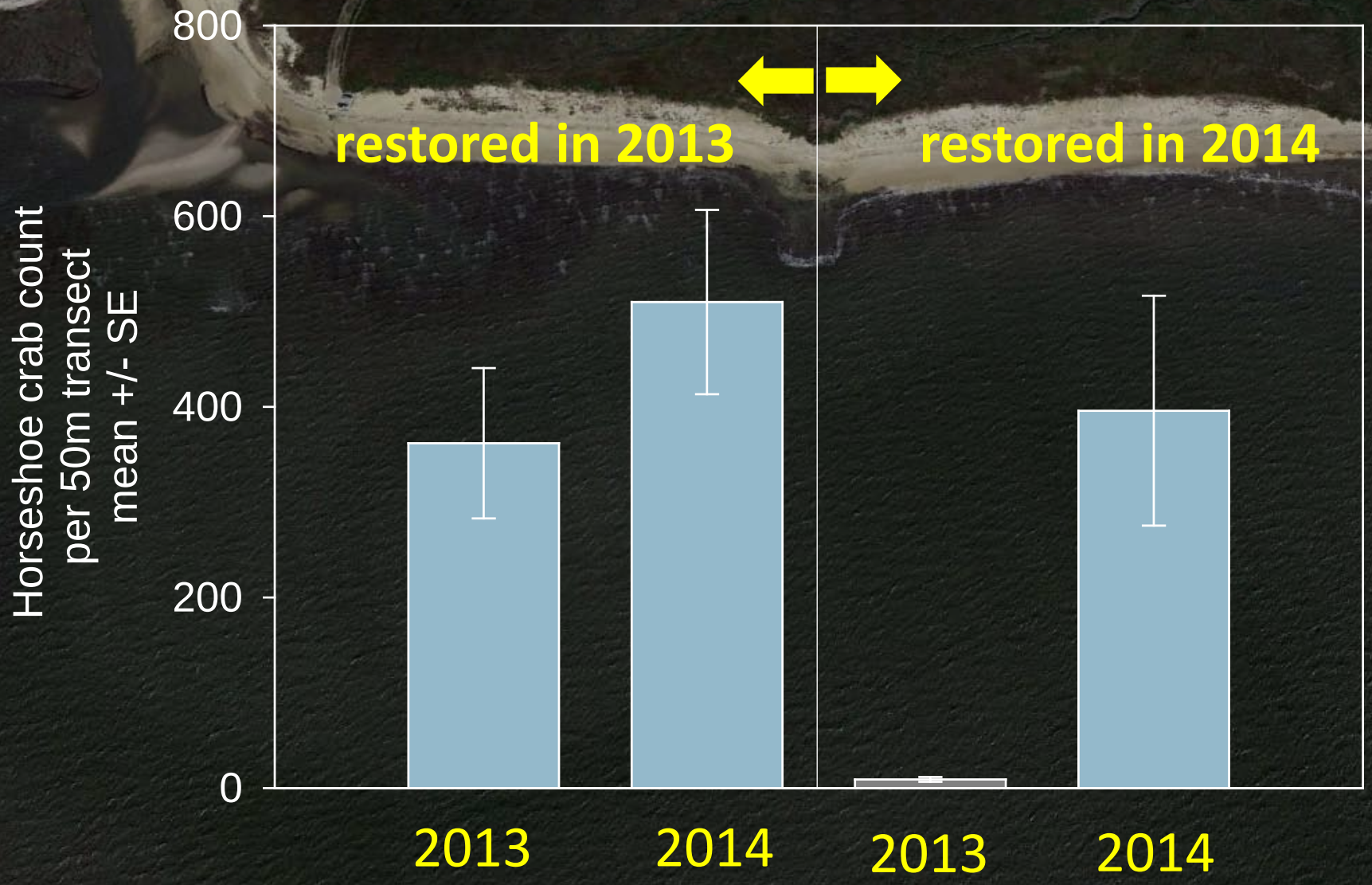
Sand moisture


Horseshoe Crab numbers

Horseshoe crab abundance

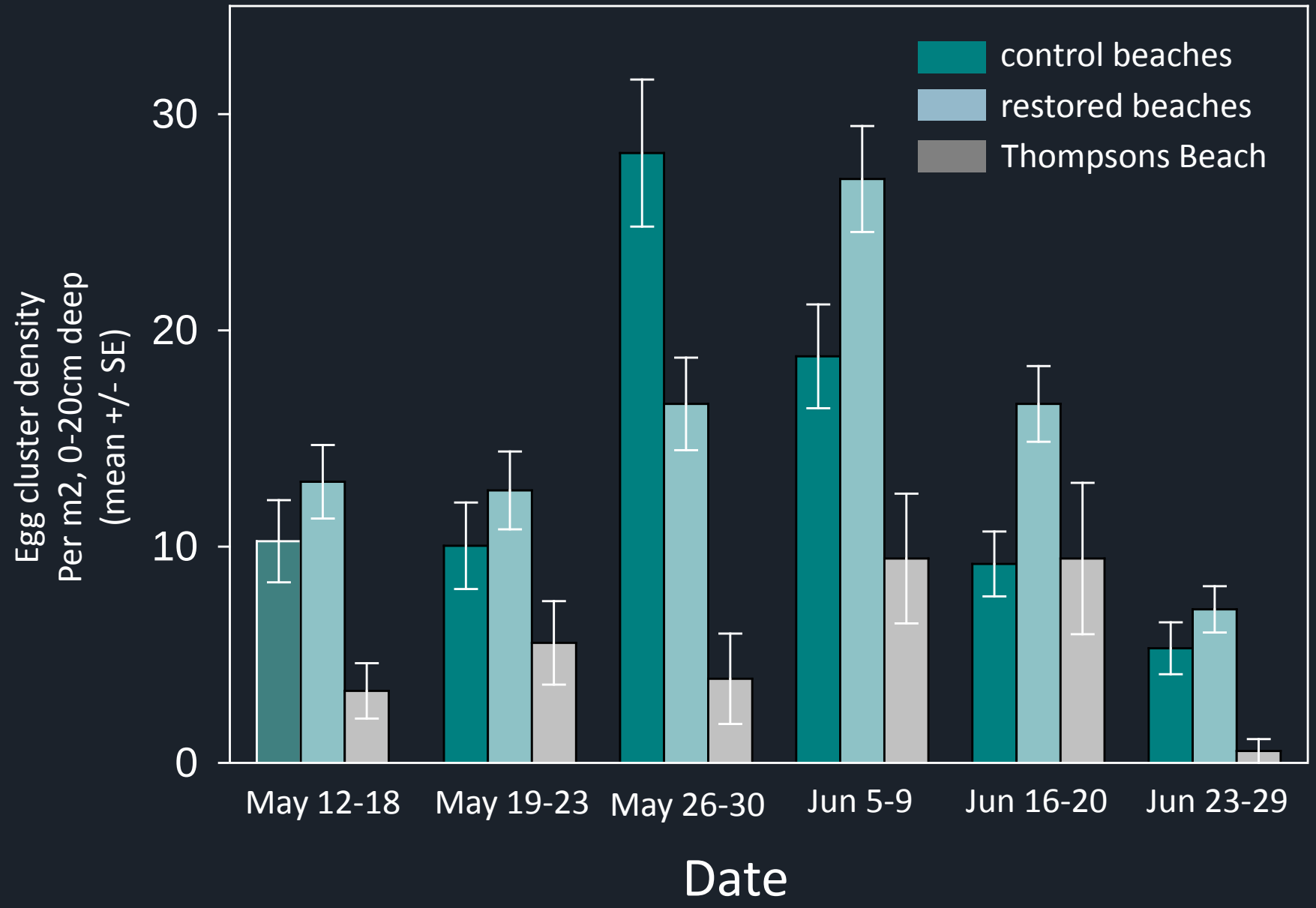


Moores Beach: restoration increases spawning crabs

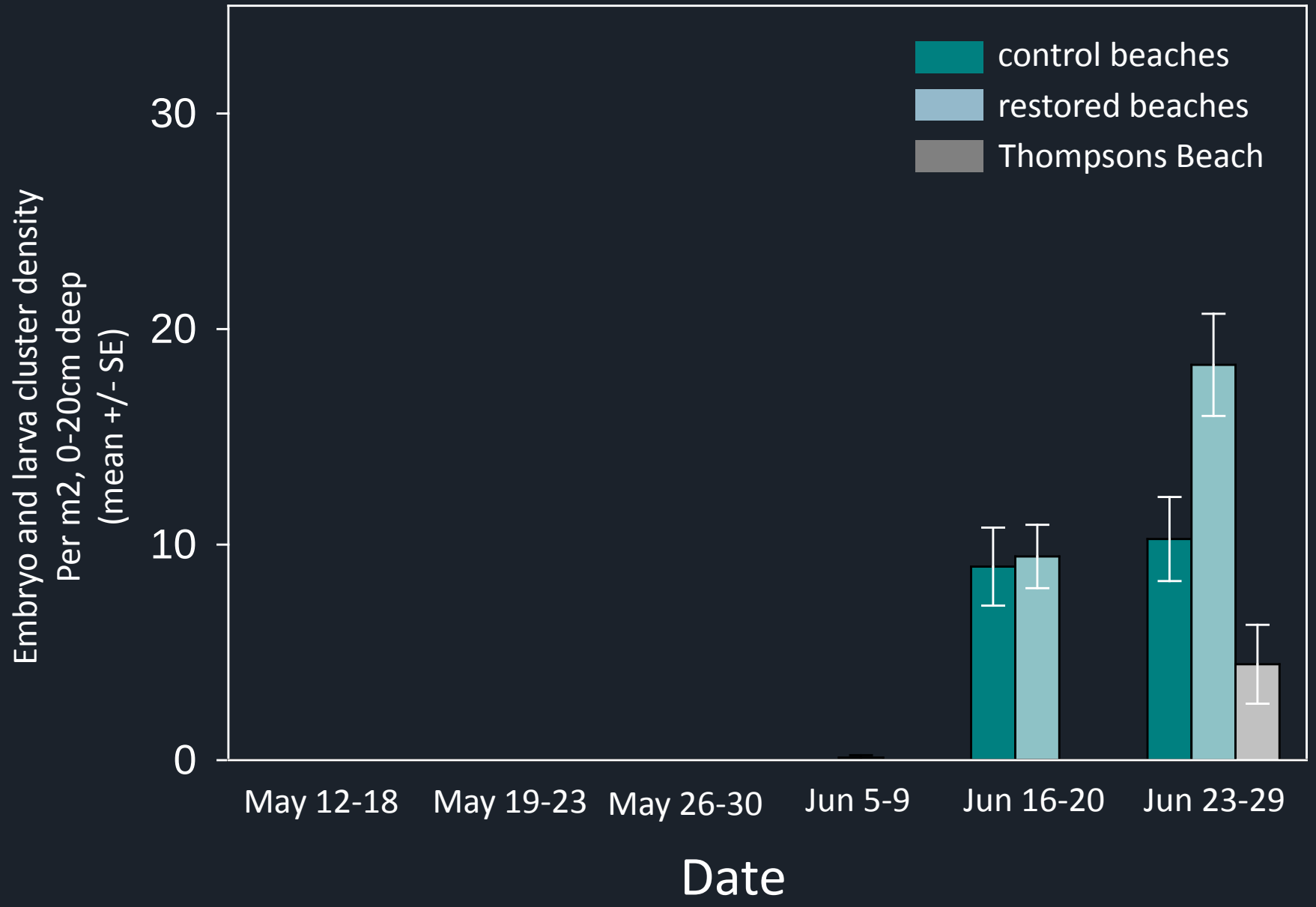


Horseshoe Crab Eggs

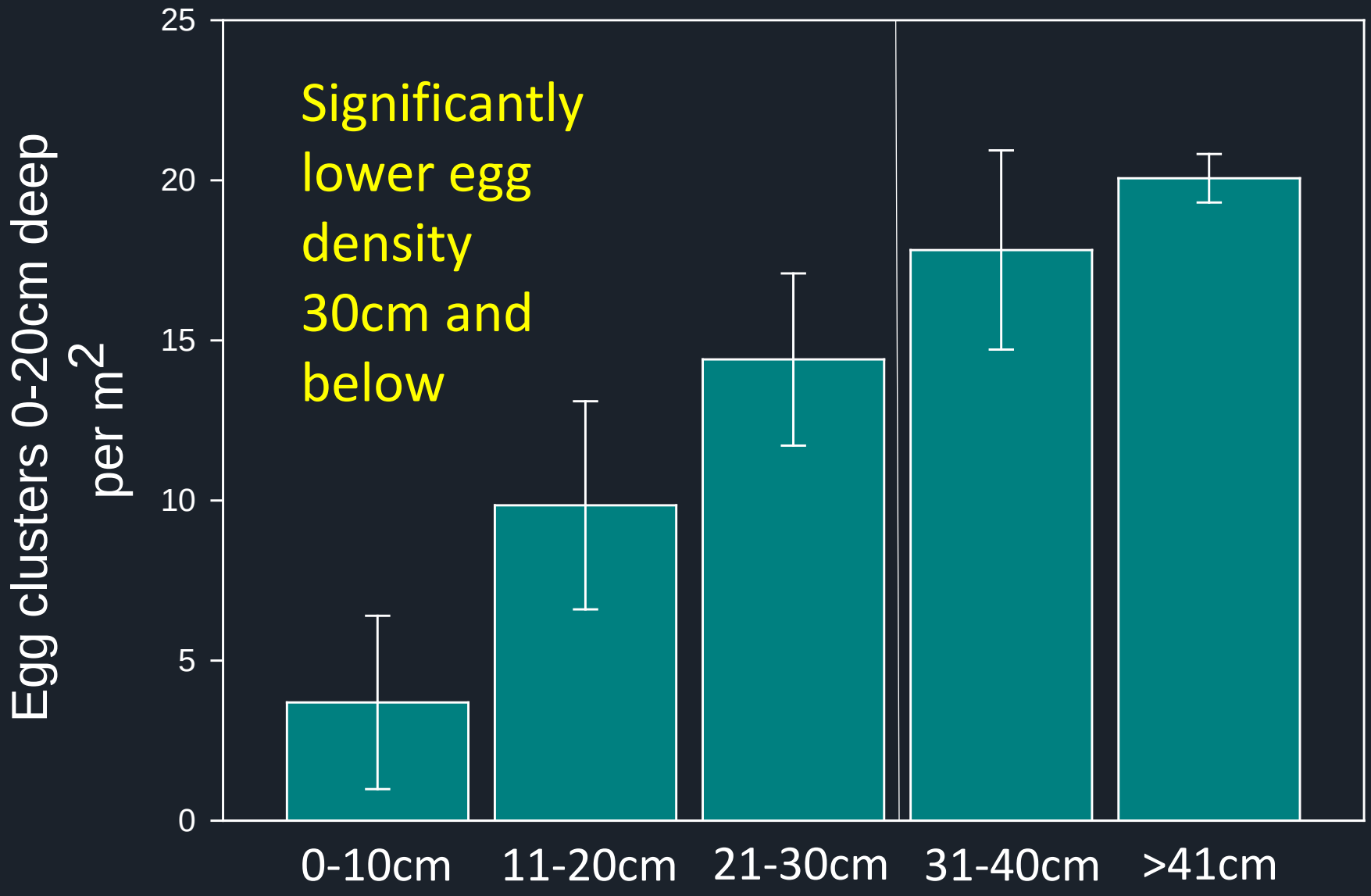
Egg cluster density



Embryo and larva cluster density

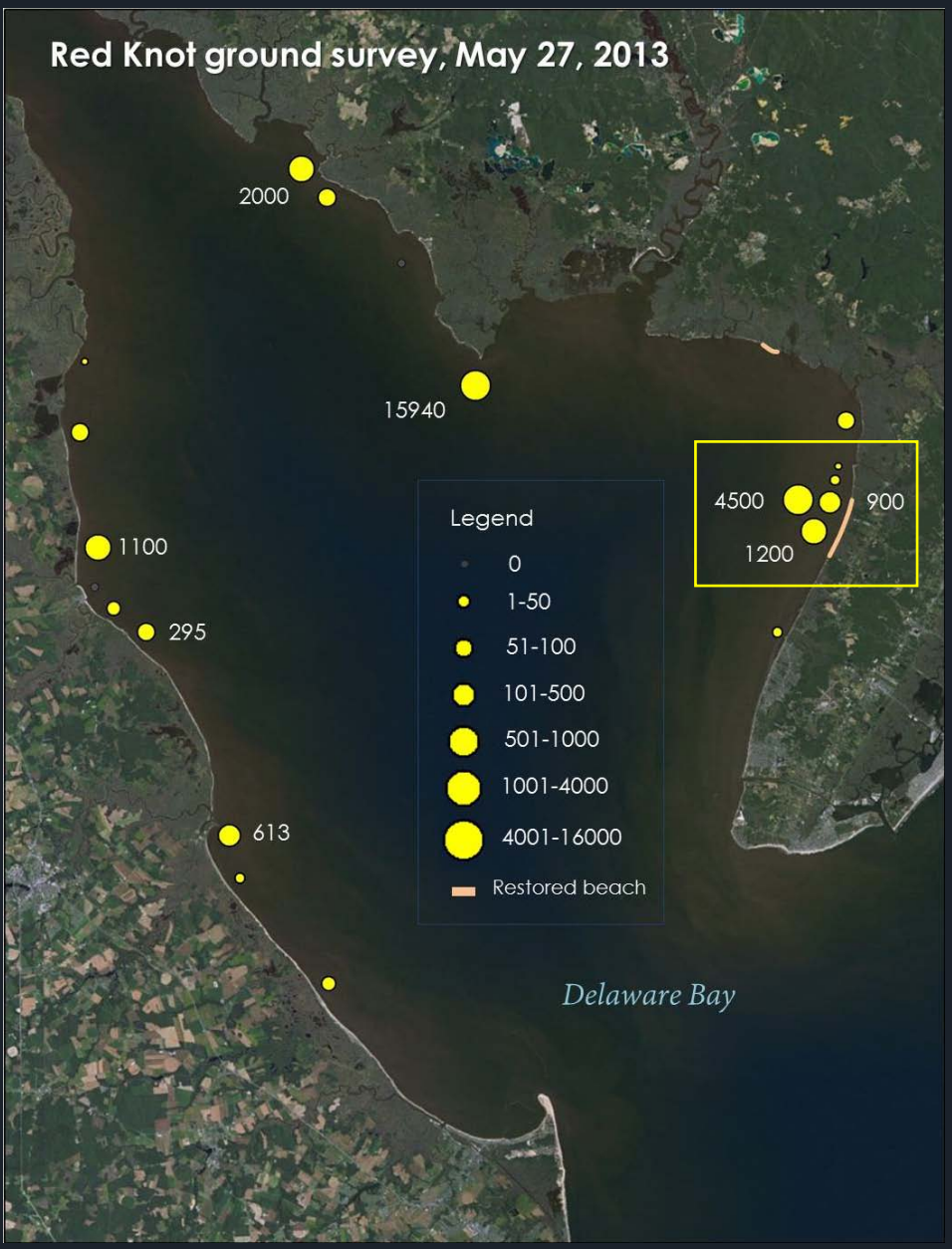


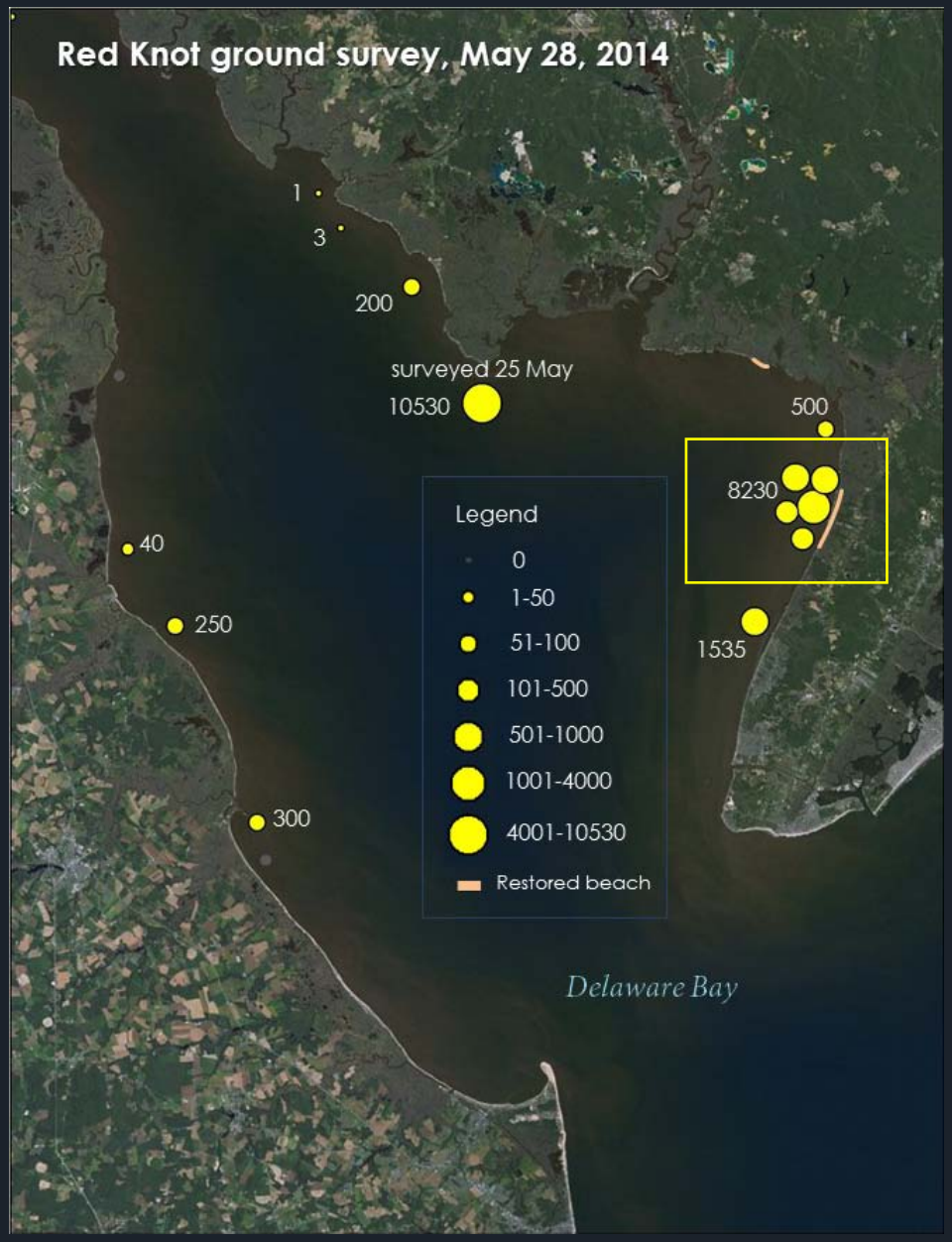
Less egg clusters at shallower sand depths



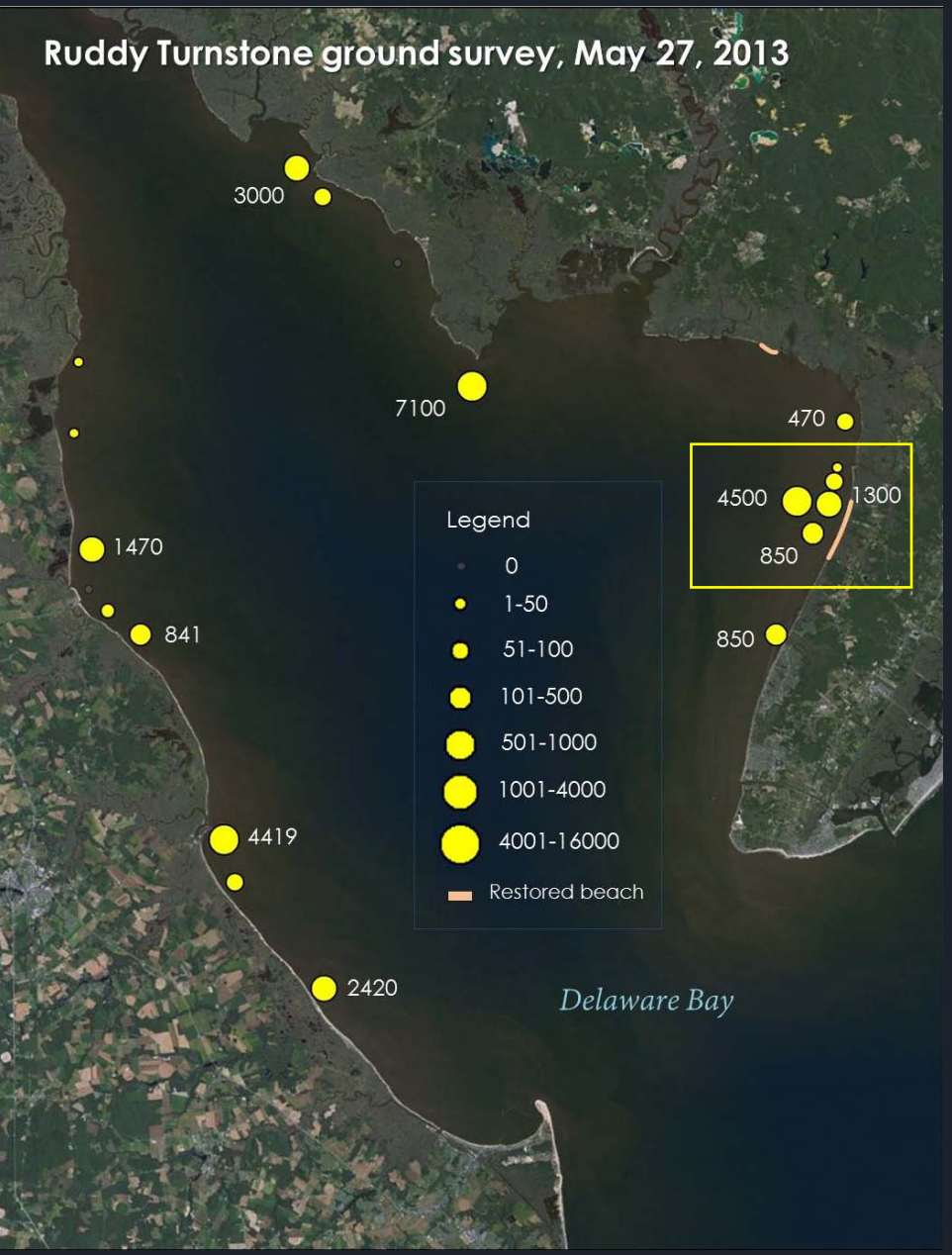
Shorebird numbers

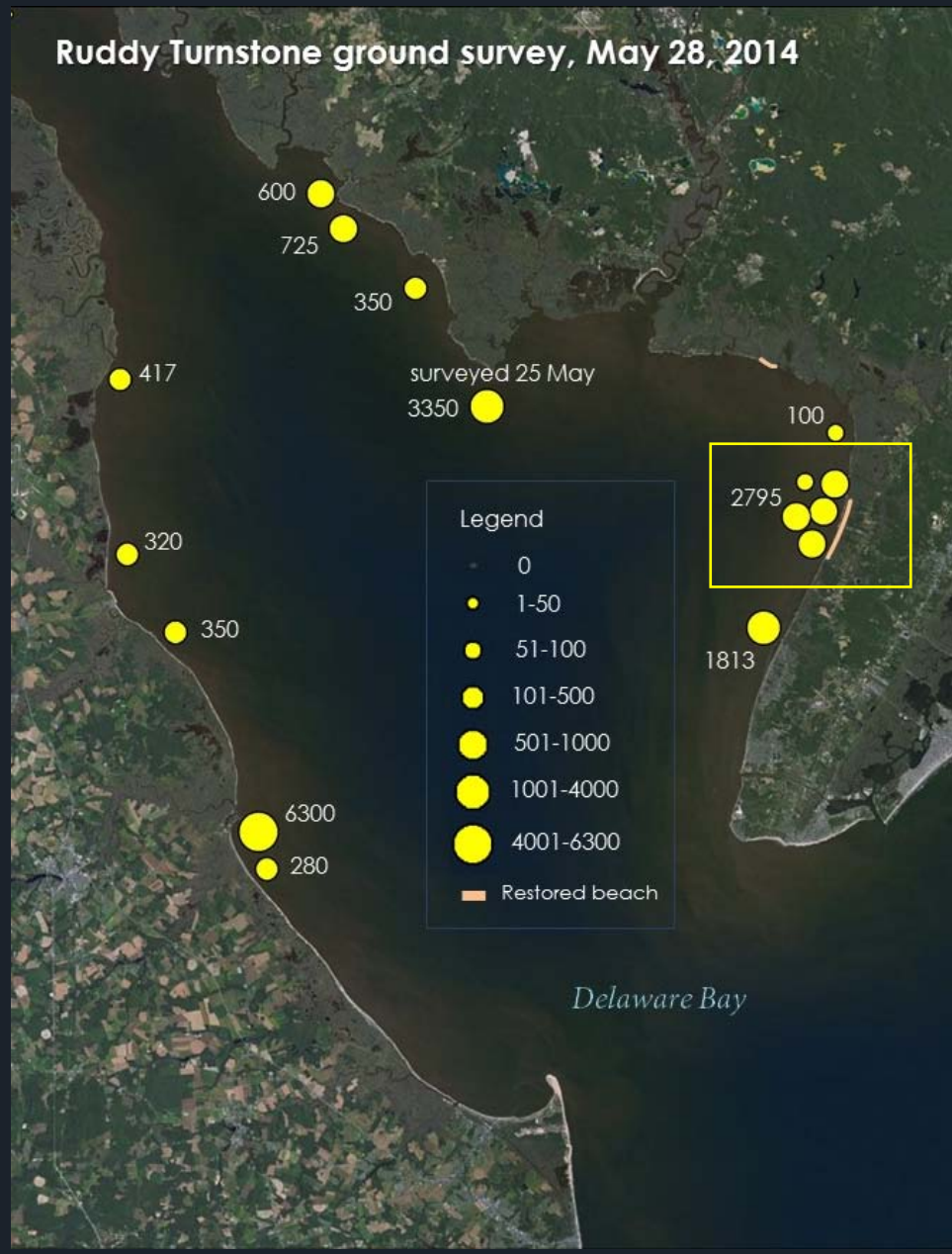
Red Knot


Red Knot ground survey, May 27, 2013
2000
15940
1100
295
613
4500
900
1200
Legend
0
1-50
51-100
101-500
501-1000
1001-4000
4001-16000
Restored beach
Delaware Bay

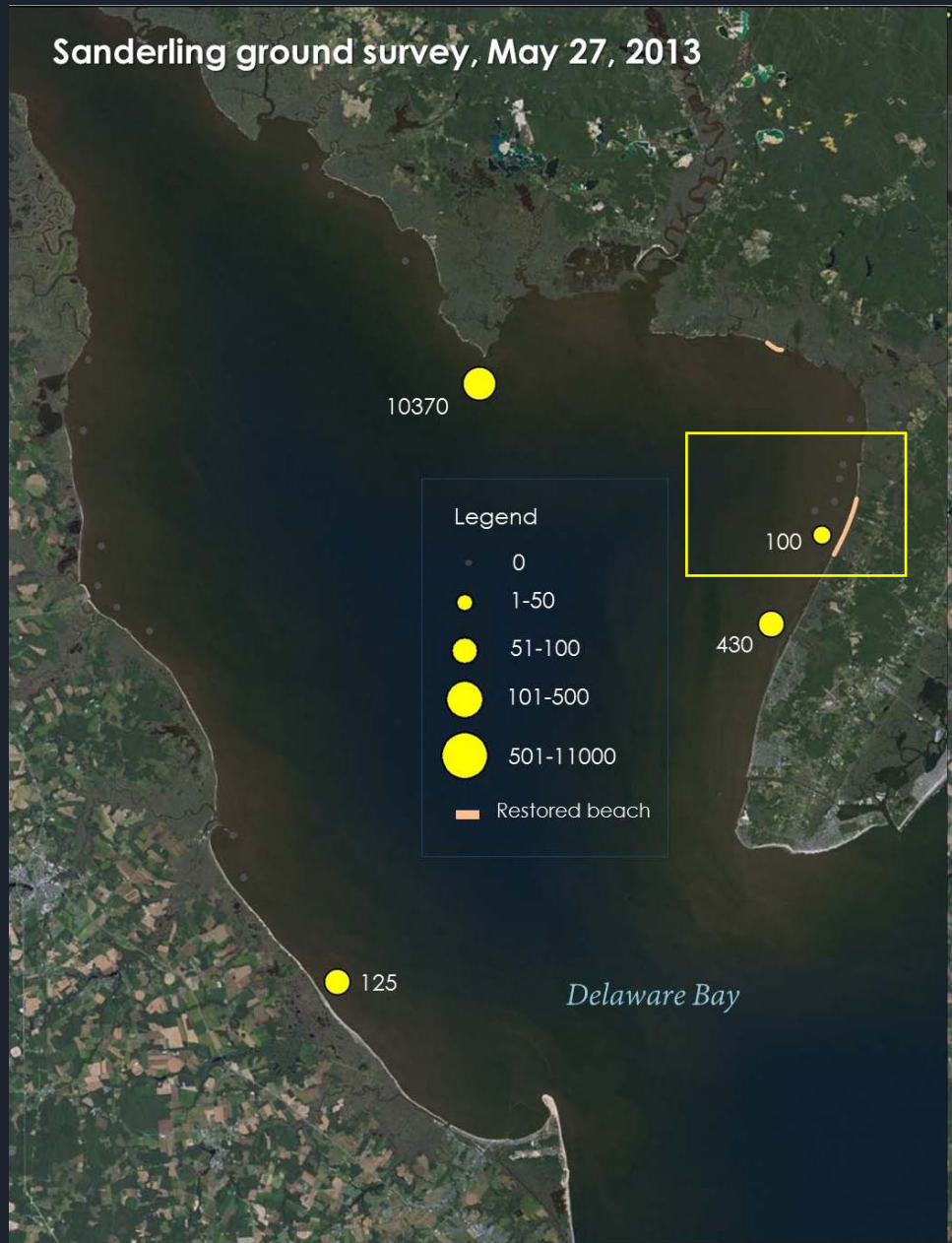

Red Knot ground survey, May 28, 2014
1
3
200
surveyed 25 May
10530
500
8230
40
250
300
1535
Legend
0
1-50
51-100
101-500
501-1000
1001-4000
4001-10530
Restored beach
Delaware Bay

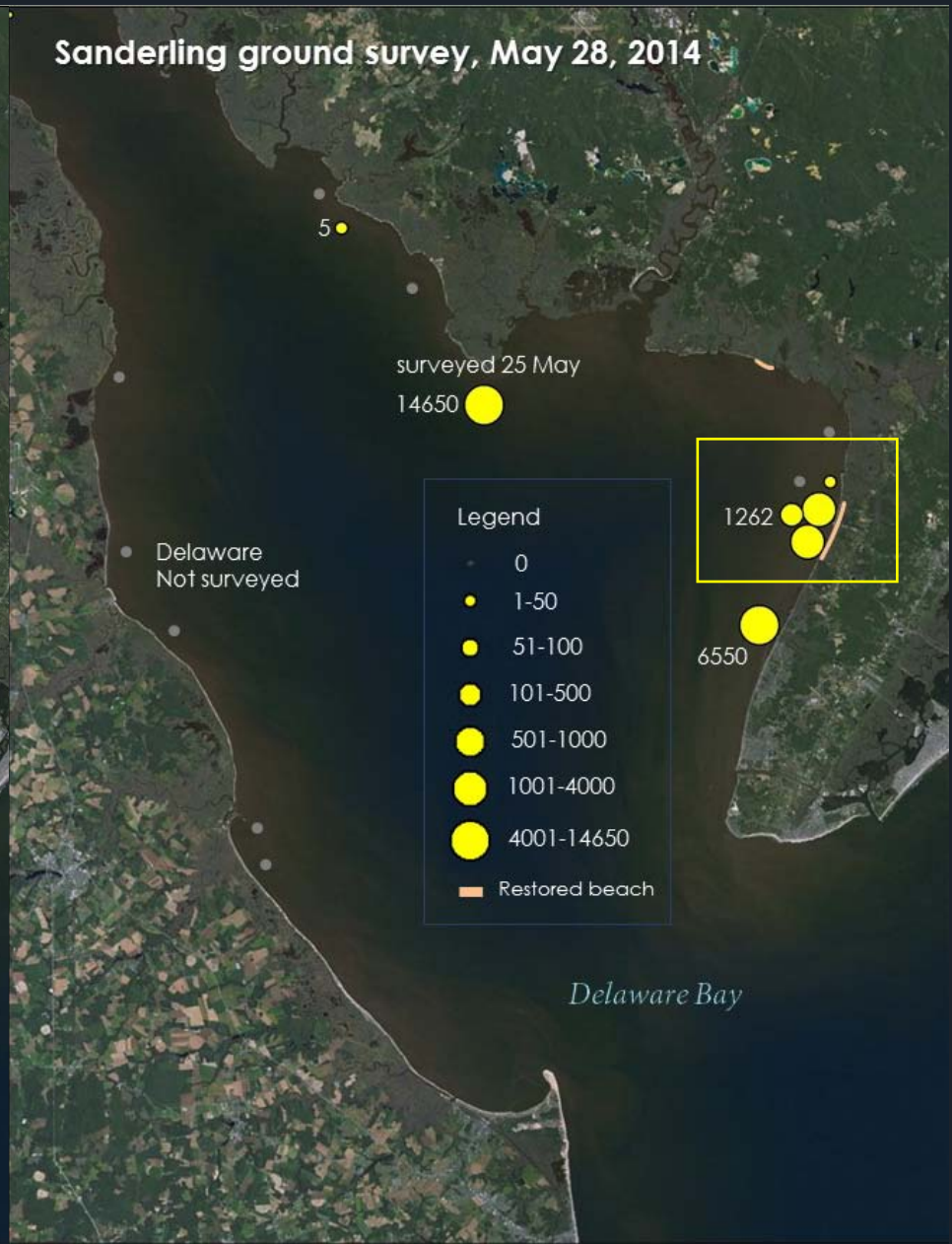
Ruddy Turnstone



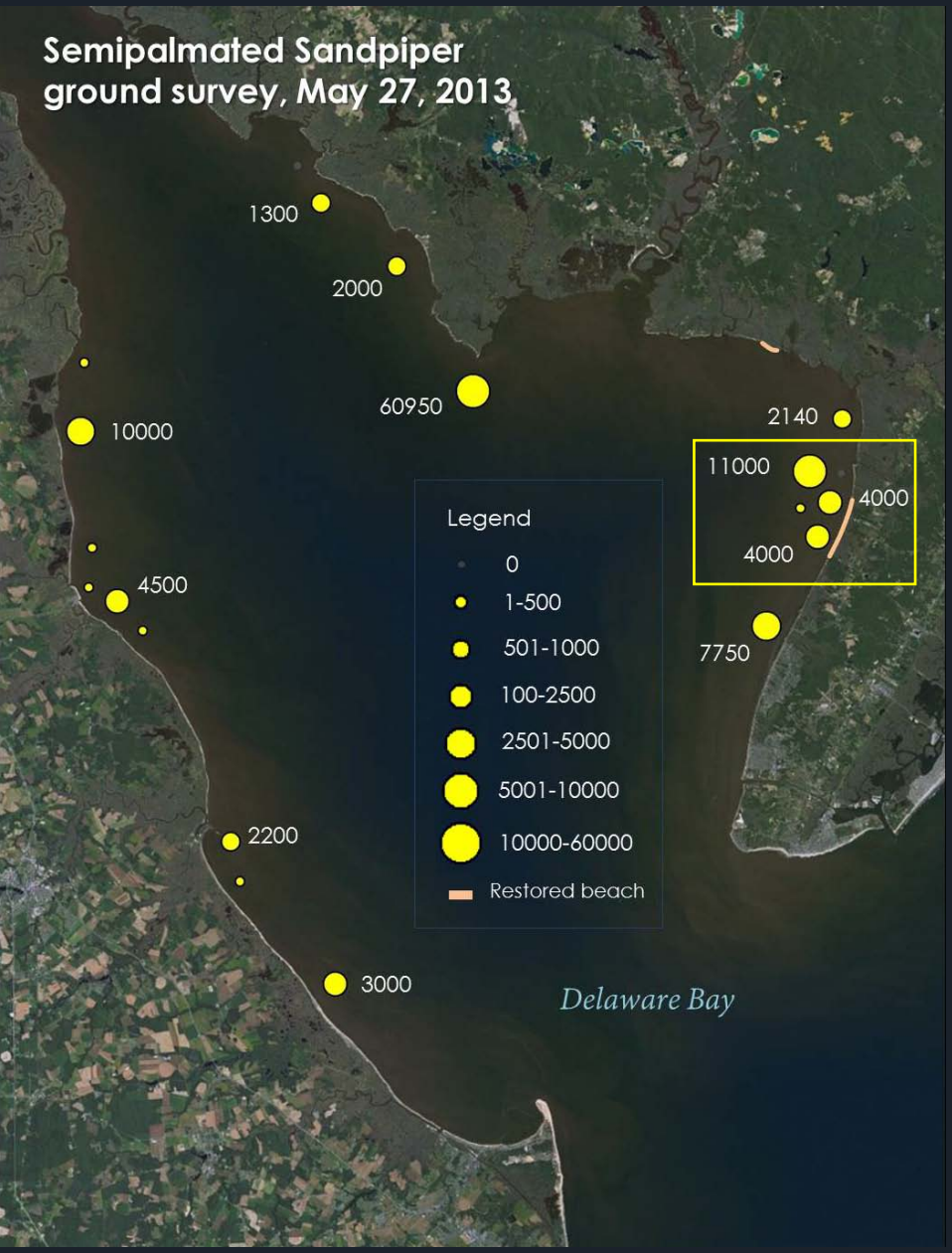


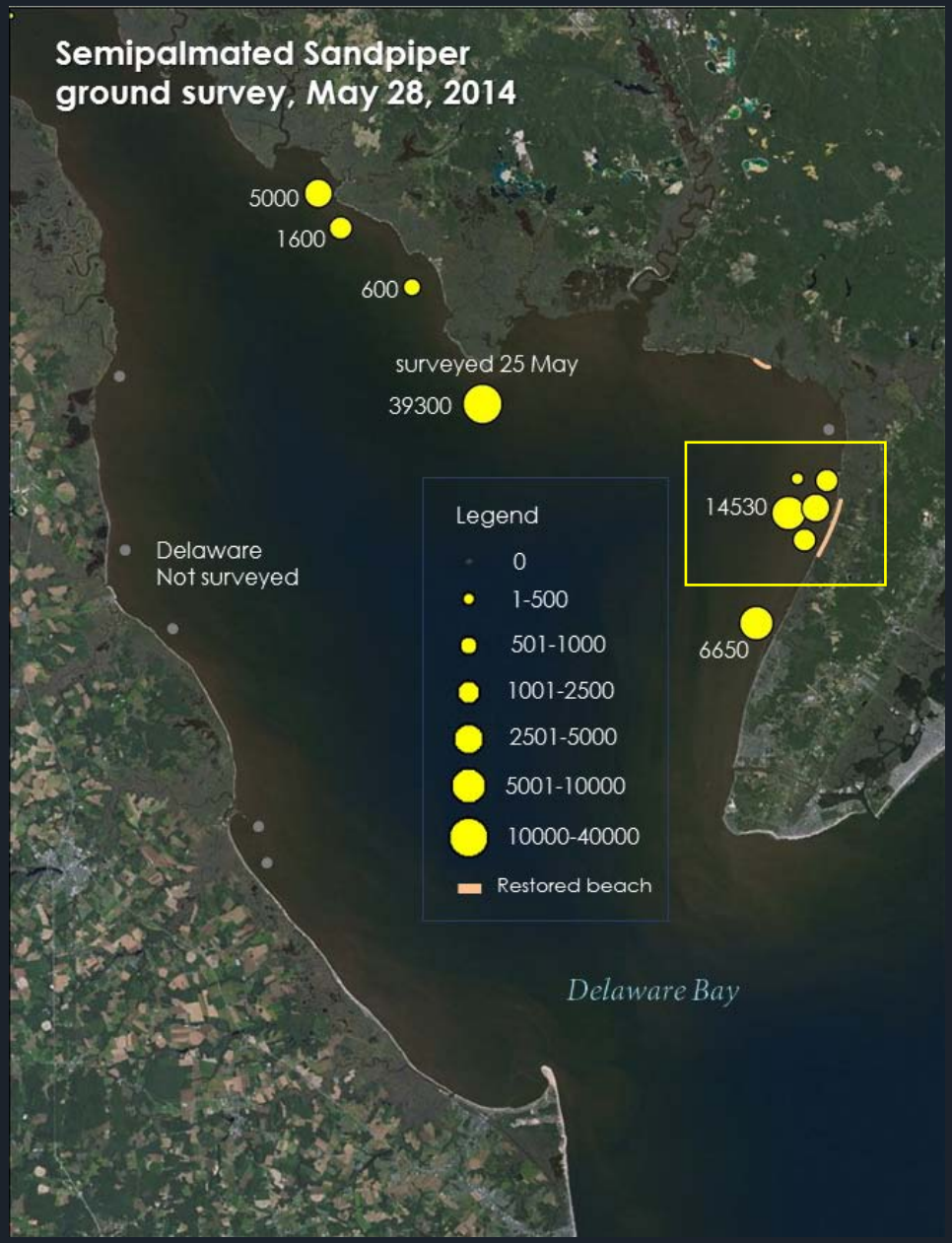
Sanderling


Sanderling ground survey, May 27, 2013
10370
100
430
125
Legend
0
1-50
51-100
101-500
501-11000
Restored beach
Delaware Bay


Sanderling ground survey, May 28, 2014
5
surveyed 25 May
14650
Delaware
Not surveyed
1262
6550
Legend
0
1-50
51-100
101-500
501-1000
1001-4000
4001-14650
Restored beach
Delaware Bay

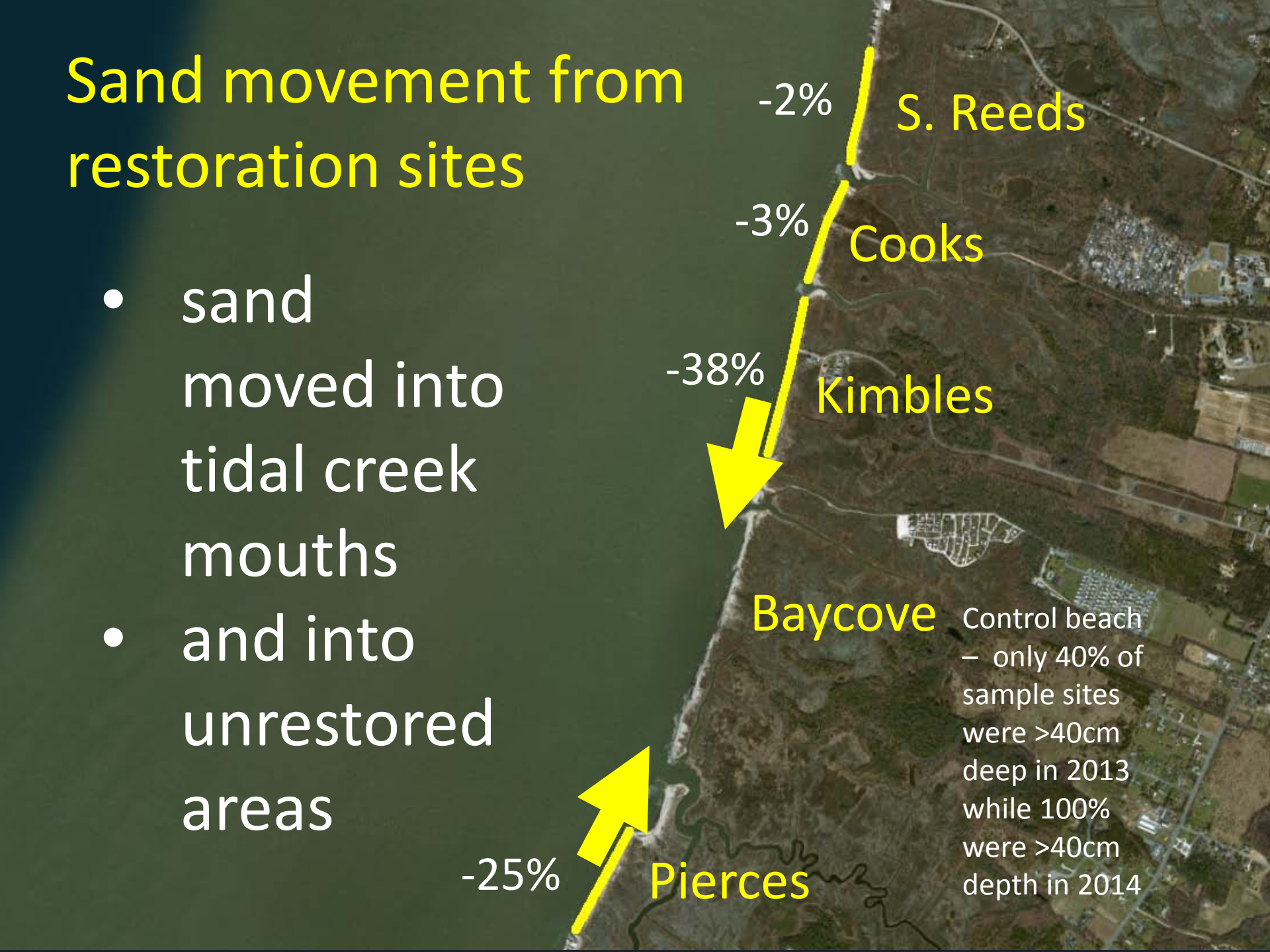
Semipalmated Sandpiper





Sand movement from restoration sites

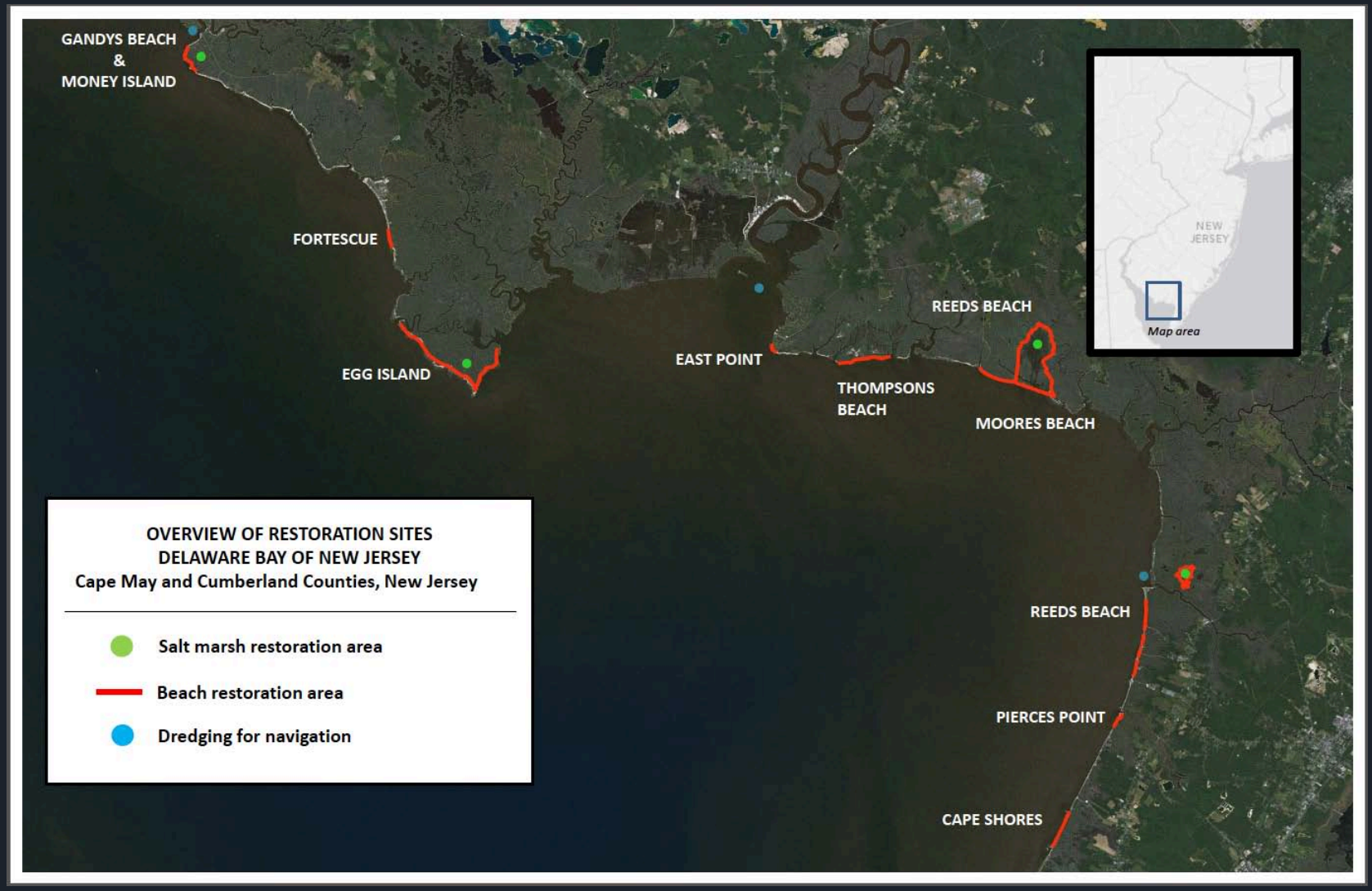
- sand moved into tidal creek mouths
- and into unrestored areas




Moores Beach
Elevation change
3 months after
restoration, 2014
1-2’
0-1’
0
-0-1’
-1-2’
-2-3’
Direction of sand movement

Creek shoals, the most important crab and shorebird habitat on the bay

Our project goals for the next 2 years of restoration

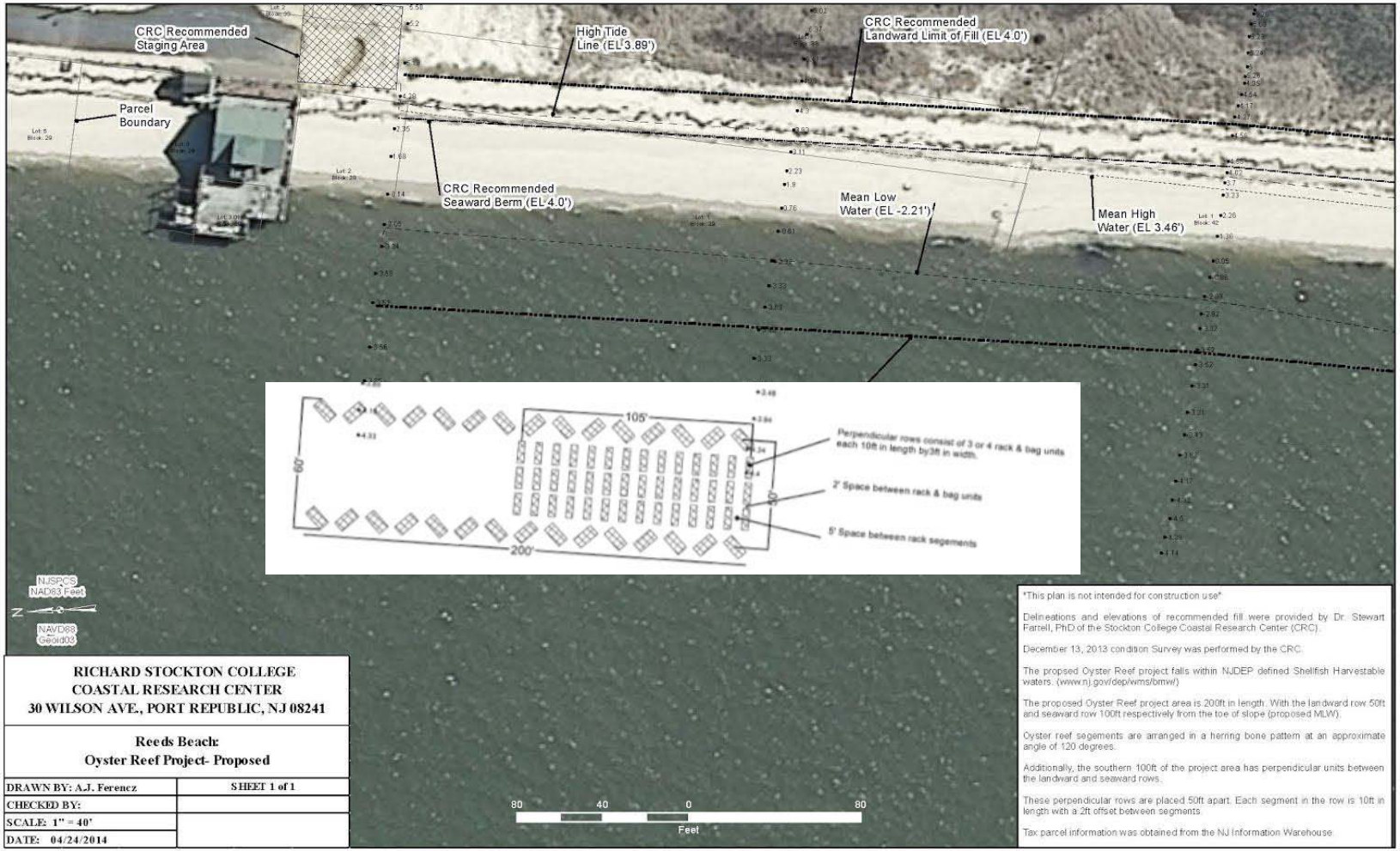


South Fortescue

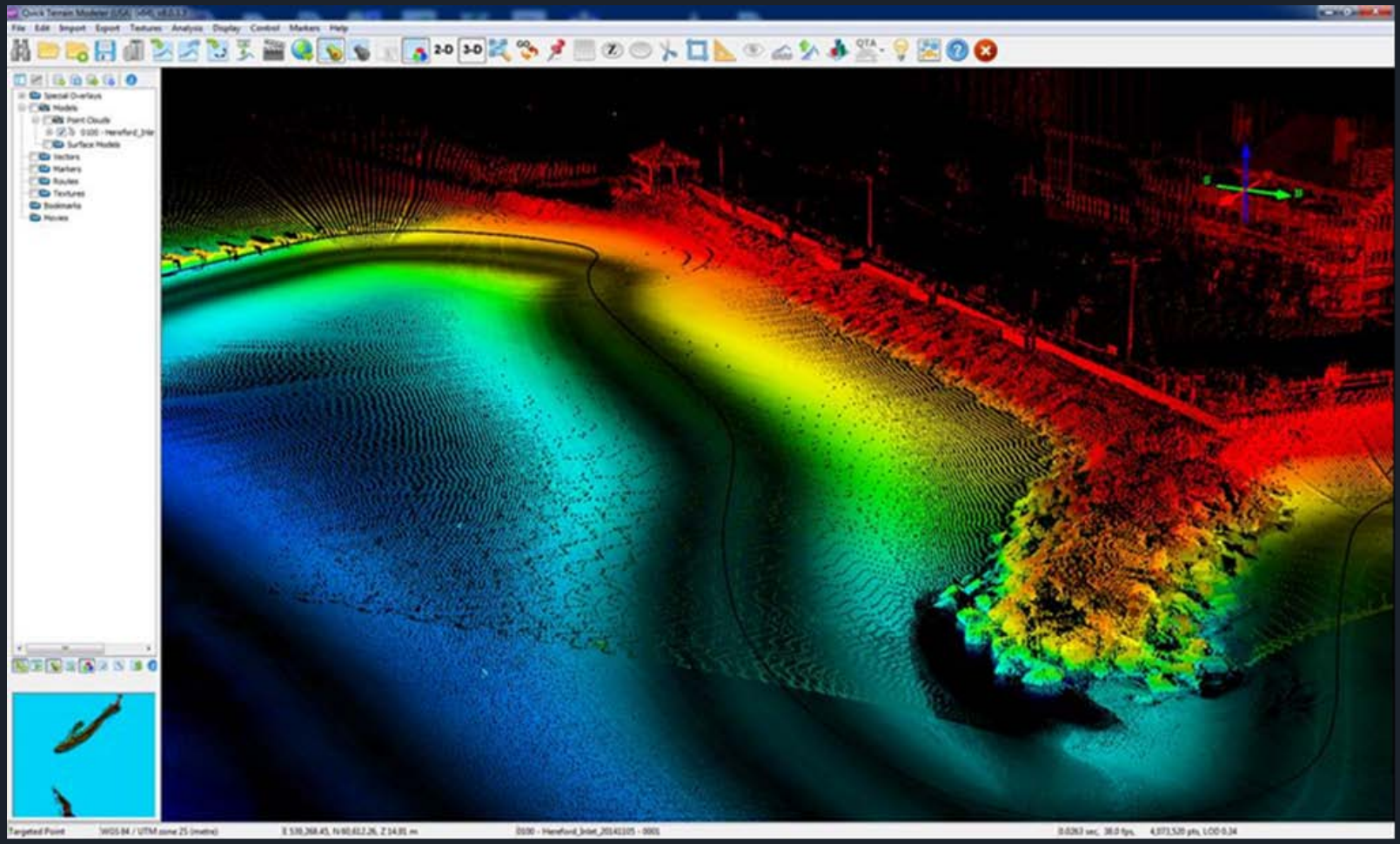
Restoring Thompsons Beach

We will re-create natural oyster reefs to improve beach resiliency

Oyster Reef Experiment on B. Hollinger shellfish lease will test impact of reefs and aquaculture racks on horseshoe crabs



Stockton Center for Coastal Resources will conduct a NJ bay-wide sentiment transport study to determine best path to long-term resiliency



American Littoral Society and Conserve Wildlife Foundation of NJ thanks:

- US Fish and Wildlife Foundation
- Community Foundation of NJ
- NJ Natural Lands Trust
- Partnership for Delaware Bay Estuary Inc.
- US Fish and Wildlife Service –Department of Interior
- Corporate Wetlands Restoration Partnership
- Downe, Maurice River, Middle Townships
- Cape May County
- NJ Division of Fish and Wildlife –NJ Dept of Environmental Protection

And volunteers from NJ and all over the world