

Seed Addition Facilitates Seagrass Recovery In a Coastal Lagoon System (USA)

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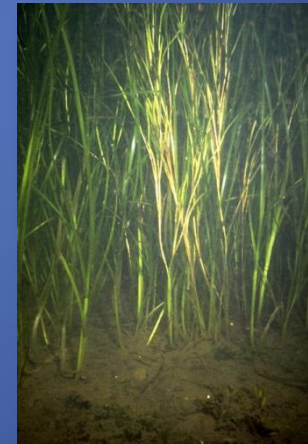
Barry Truitt, Bo Lusk
The Nature Conservancy

The Genesis of this Project

PRE-1930'S

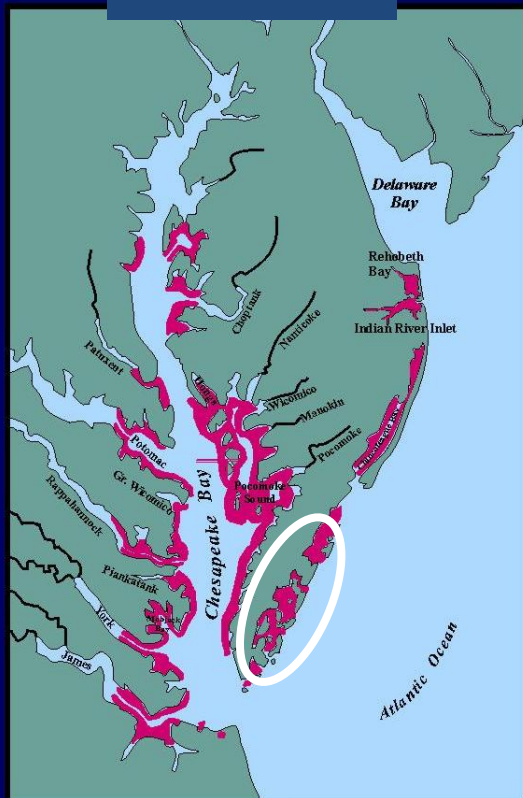


Eelgrass Widely Distributed in Chesapeake Bay and Coastal Bays in the early 1900s



Major Changes in 1930s Due to Pandemic Disease

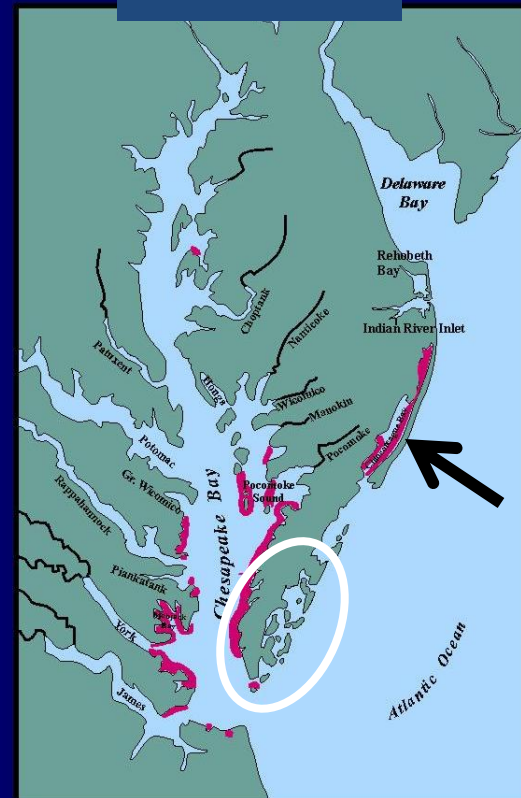
PRE-1930'S



1960'S



MID-1990's



Why didn't eelgrass
re-colonize these
coastal bays?

MID-1990's



The Mystery Begins to Unravel



*Several natural patches discovered in 1997 with flowering shoots.

- Studies on dispersal characteristics – eelgrass flowering shoots with seeds capable of Long Distance Dispersal, bays within colonization envelop of existing beds in Chesapeake and Chincoteague bays (Harwell & Orth 2002)

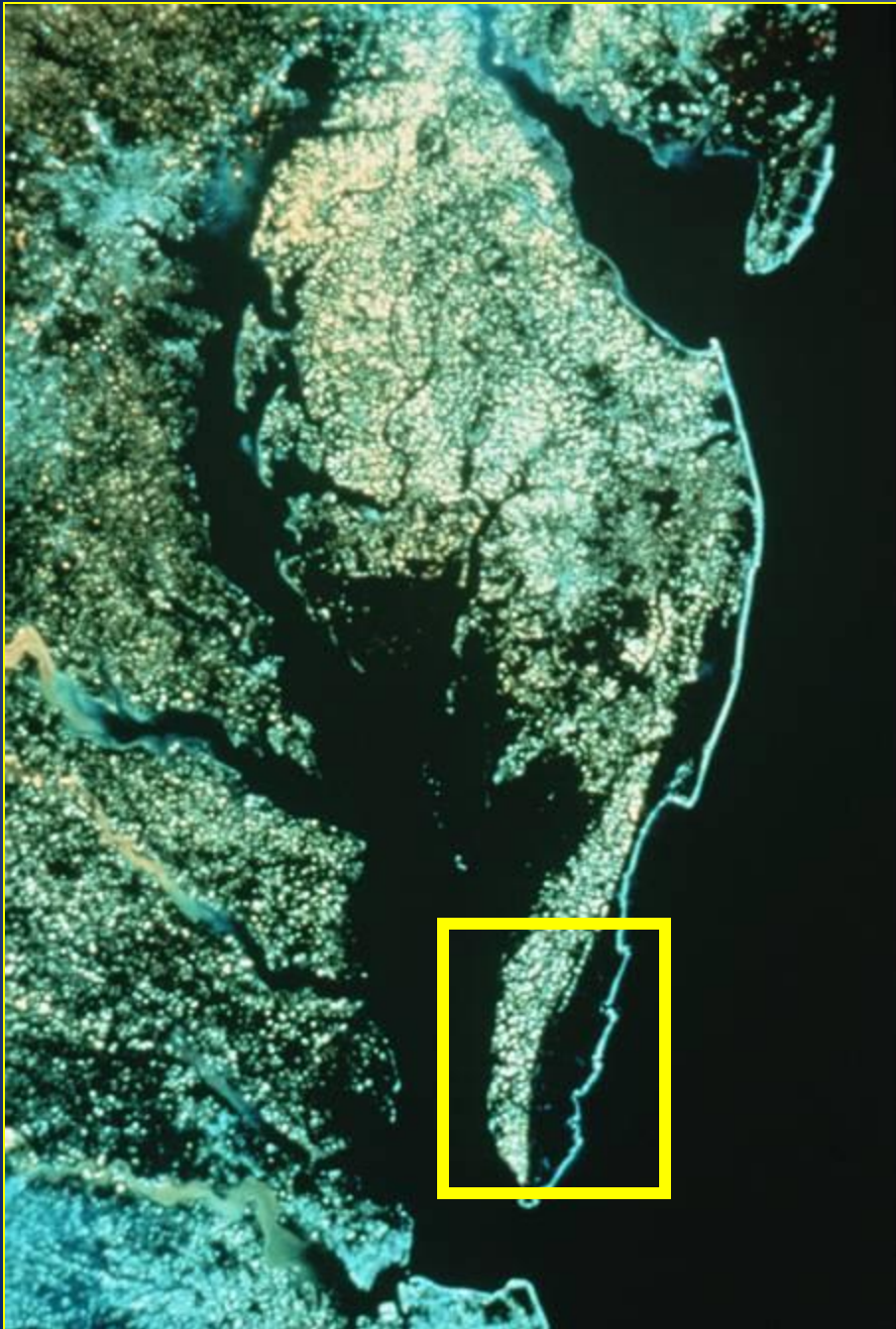
- Was recovery simply a seed supply issue? Were these bays seed limited?

Eelgrass Restoration In Virginia's Coastal Bays

Initiated 1998

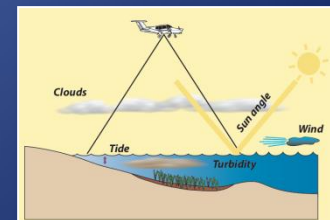
GOAL

**Re-establishment of eelgrass to the
Virginia's coastal bays and the
ecosystem services this community
once provided**



The Approach

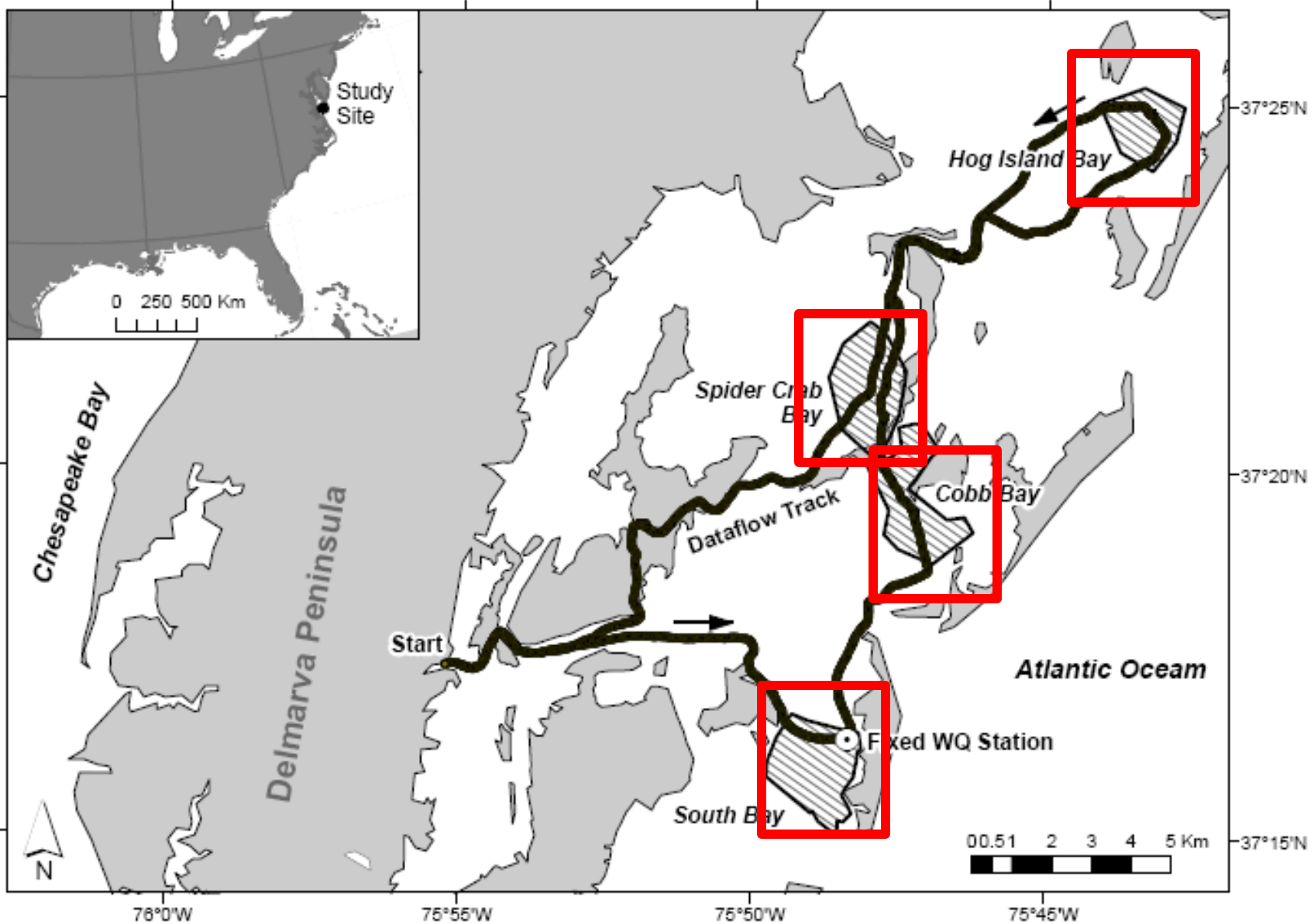
- Test Plots – success determines large scale approach to 4 contiguous sub-basins
- Seeds broadcast into plots ranging from 0.01 – 2.0 ha (most 0.2-0.4 ha), mimics large scale recruitment.
- Seed density – 25, 37, 50 seeds m⁻²
- 38 million seeds into 369 plots over 11 years (1999-2010). Total seeded area - 126 ha.
- Assessed seedling establishment rates.
- Monitored spread with aerial photographs.
- Transects & fixed stations for biotic components, sediments, genetics



The Approach

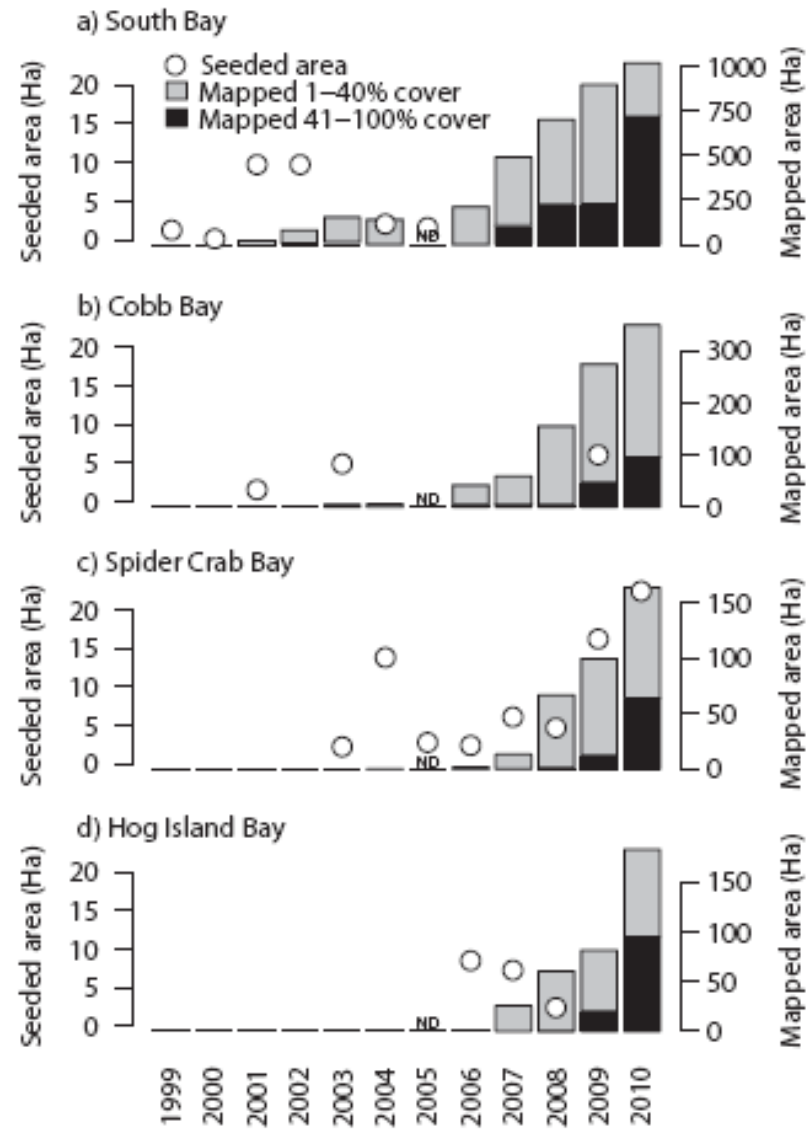
- Water quality monitoring over 7 years (2003-2010):
 - continuously-monitored data at one fixed station site, 15 min intervals, bi-weekly, March-Nov.
 - Dataflow - cruise track record of water quality variables, 2-3 sec – monthly, March-Nov.
 - turbidity (NTU), chlorophyll, salinity, temperature, DO, pH
 - HEAPS of data!!



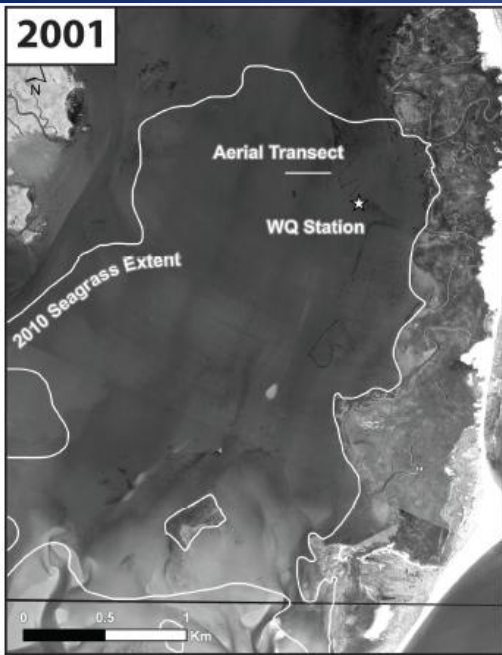


RESULTS

Hectares seeded and mapped each year in each of the four coastal bays



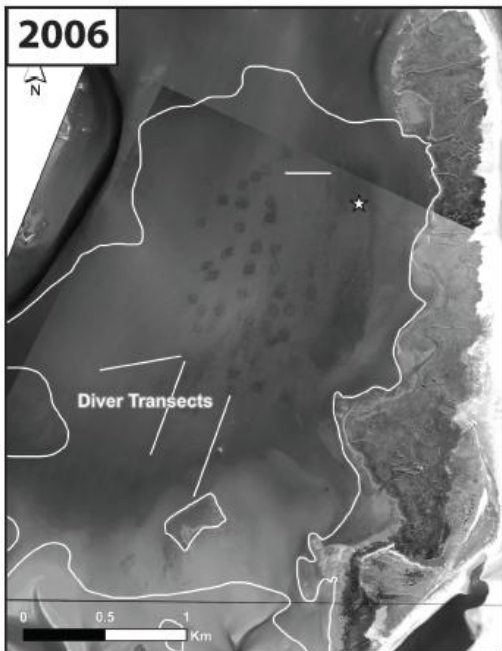
Seedling establishment rates <10%



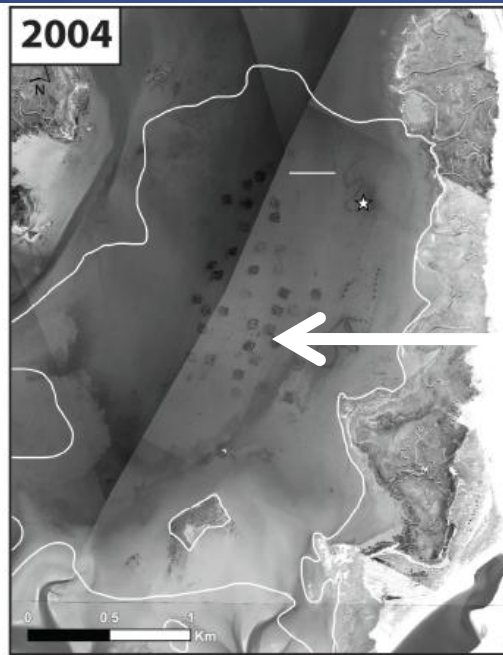
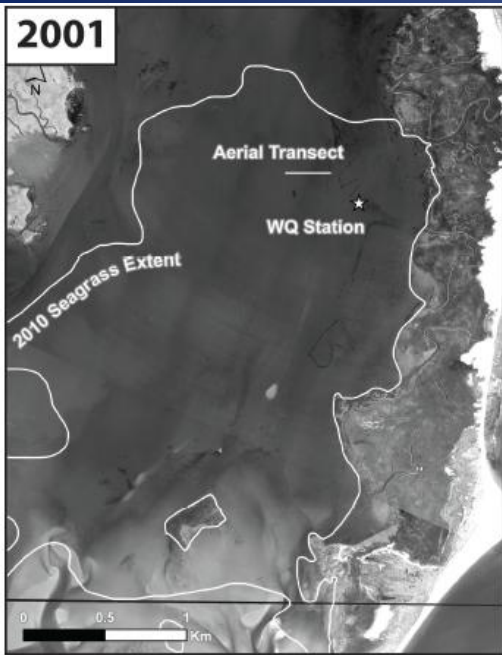
Aerial photographs showing development of the South Bay eelgrass bed from 2001 – 2010.

Large scale seeding: 1999, 2001, 2002

0.4 ha plots of eelgrass

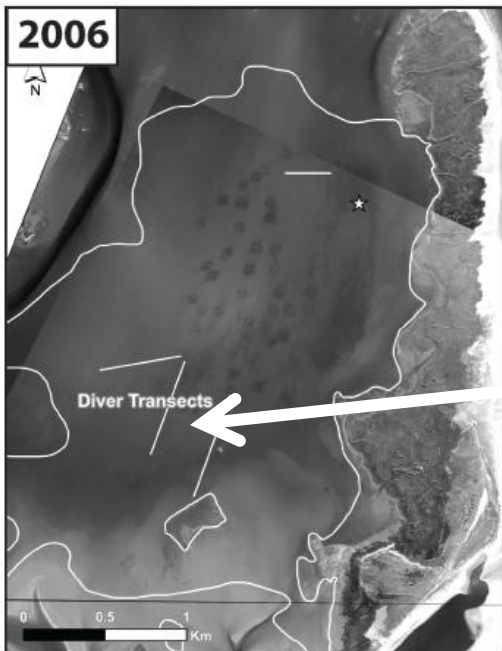


Continuous eelgrass



Aerial photographs of South Bay showing development of eelgrass bed from 2001 – 2010.

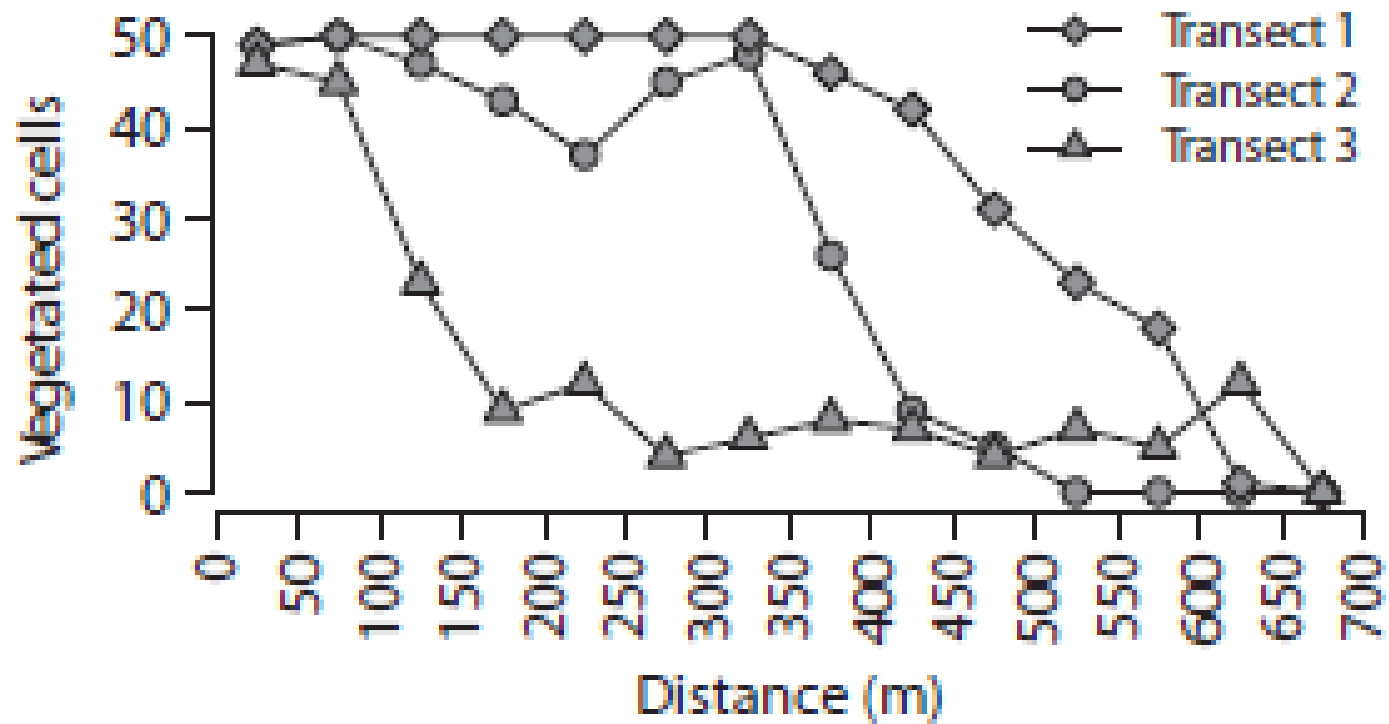
0.4 ha plots of eelgrass



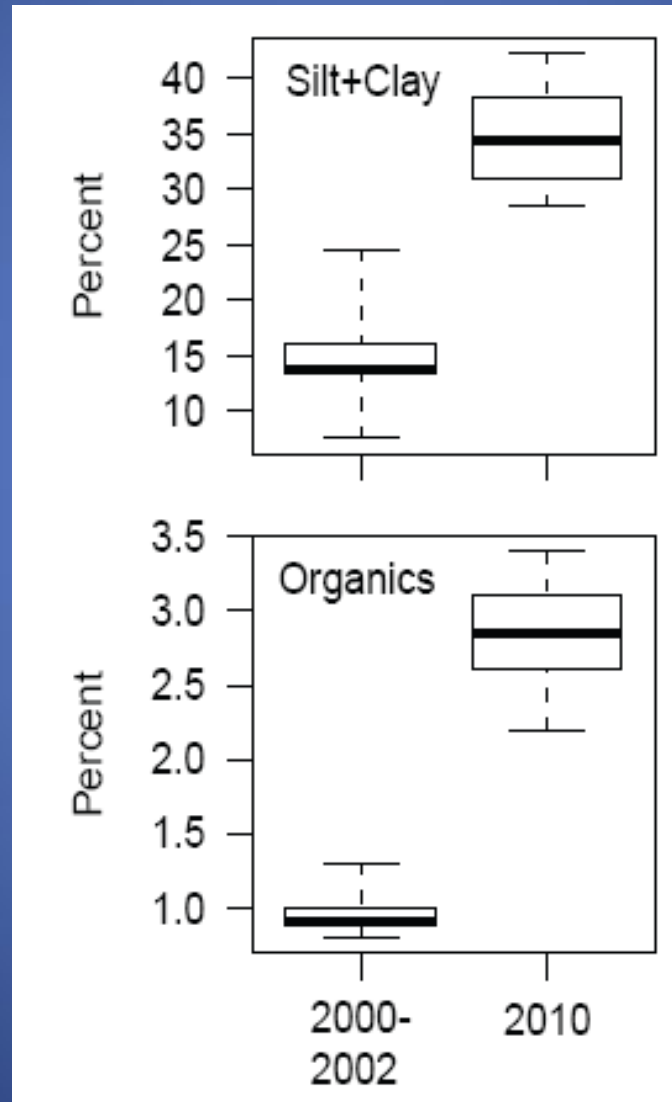
No eelgrass mapped in 2006 but...

Diver transects

number of vegetated 1 meter cells in each 50 m segment

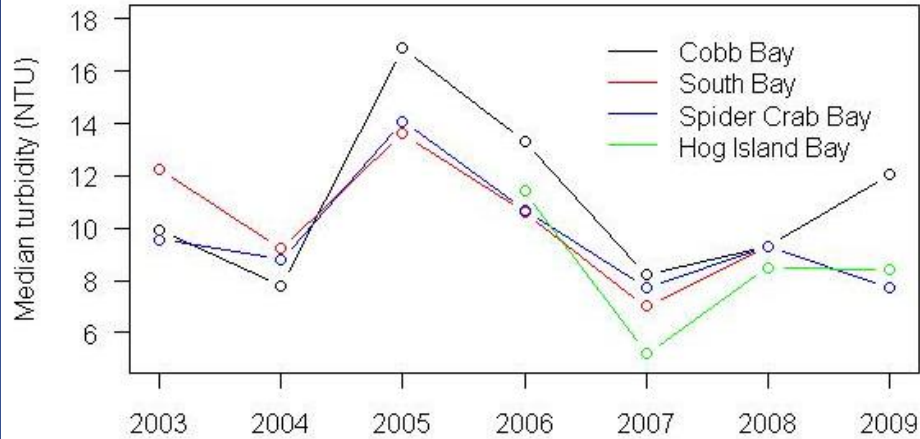


Sediment characteristics from South Bay (Box Plots)

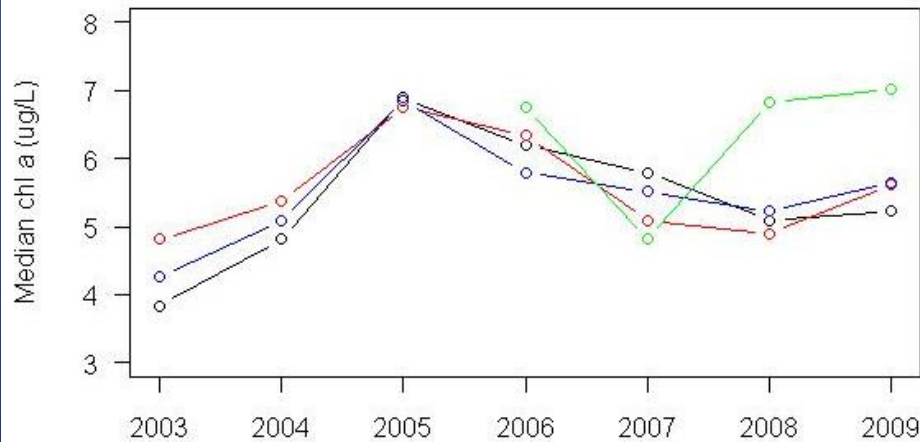


Water Quality

medians - March-November, dataflow

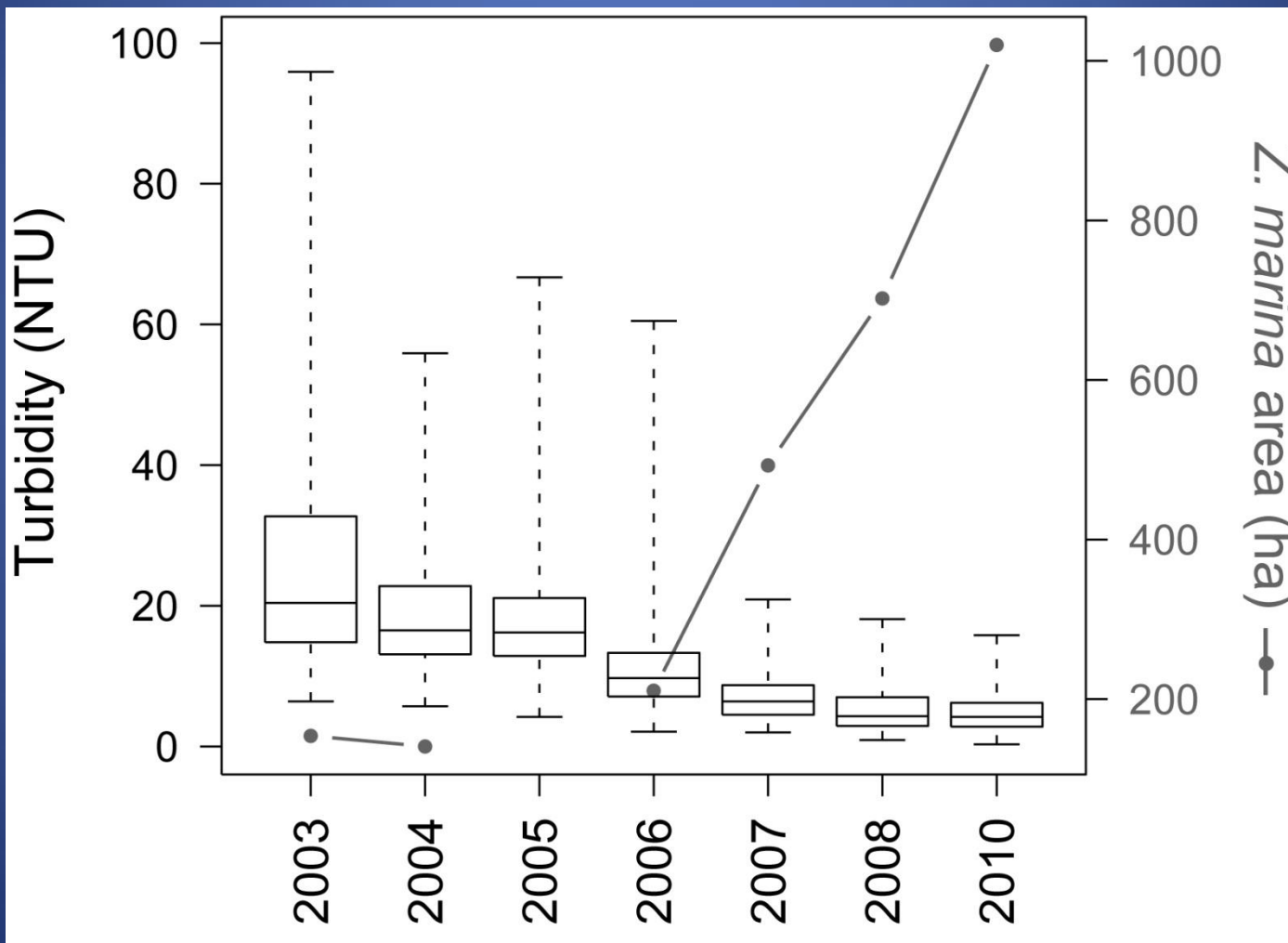


Turbidity



Chlorophyll

Turbidity at the fixed station in South Bay (Box Plots - June-July time period only for 2003-2010)

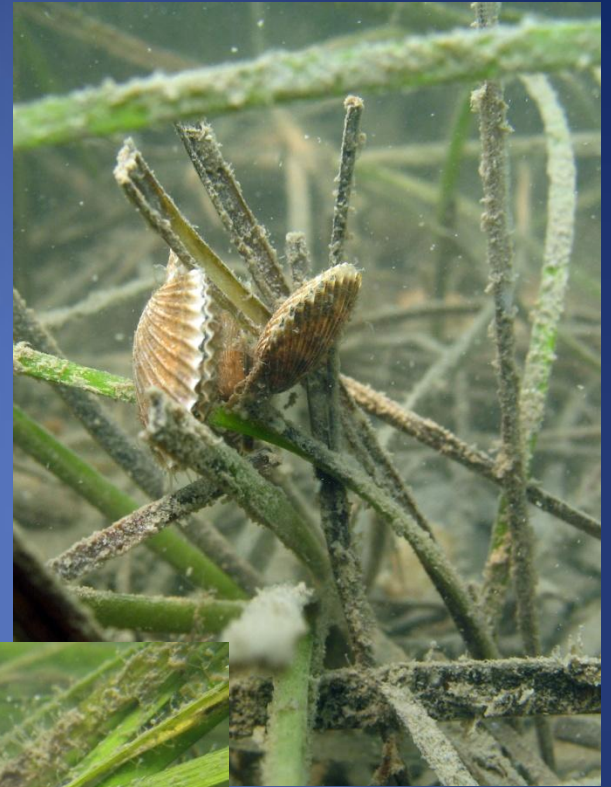


Summary

- Rapid rate of recovery (1700 ha in a decade from 126 ha seeded!)
- Expansion primarily due to multiple generations of seedlings dispersed from original seeded plots.
- Water quality adequate to support growth and spread of eelgrass
- Rapid response of several key ecosystem services (sediments, water clarity)

The Next Steps

Bay Scallops Next?



Acknowledgements – Funding Sources



NOAA

50m

Oblique aerial imagery acquired in May, 2009 over Spider Crab Bay on the seaside of Virginia's Eastern Shore. The four letters "NOAA" were formed by eelgrass plants that grew from 50,000 seeds distributed by the VIMS SAV Restoration Program on 10/16/07 as part of a 6 year effort by the Virginia CZM Program's Seaside Heritage Program. Funding was provided by NOAA. (Photo by B. Watts)