

Laying a Foundation for Spatial Planning in the Coastal Bays

Assessing Current and Potential Uses in a Dynamic Environment

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Background

Ephemeral habitats

Barrier island wash-over

Drowning marshes

Shifting channels

Accelerated by
climate change

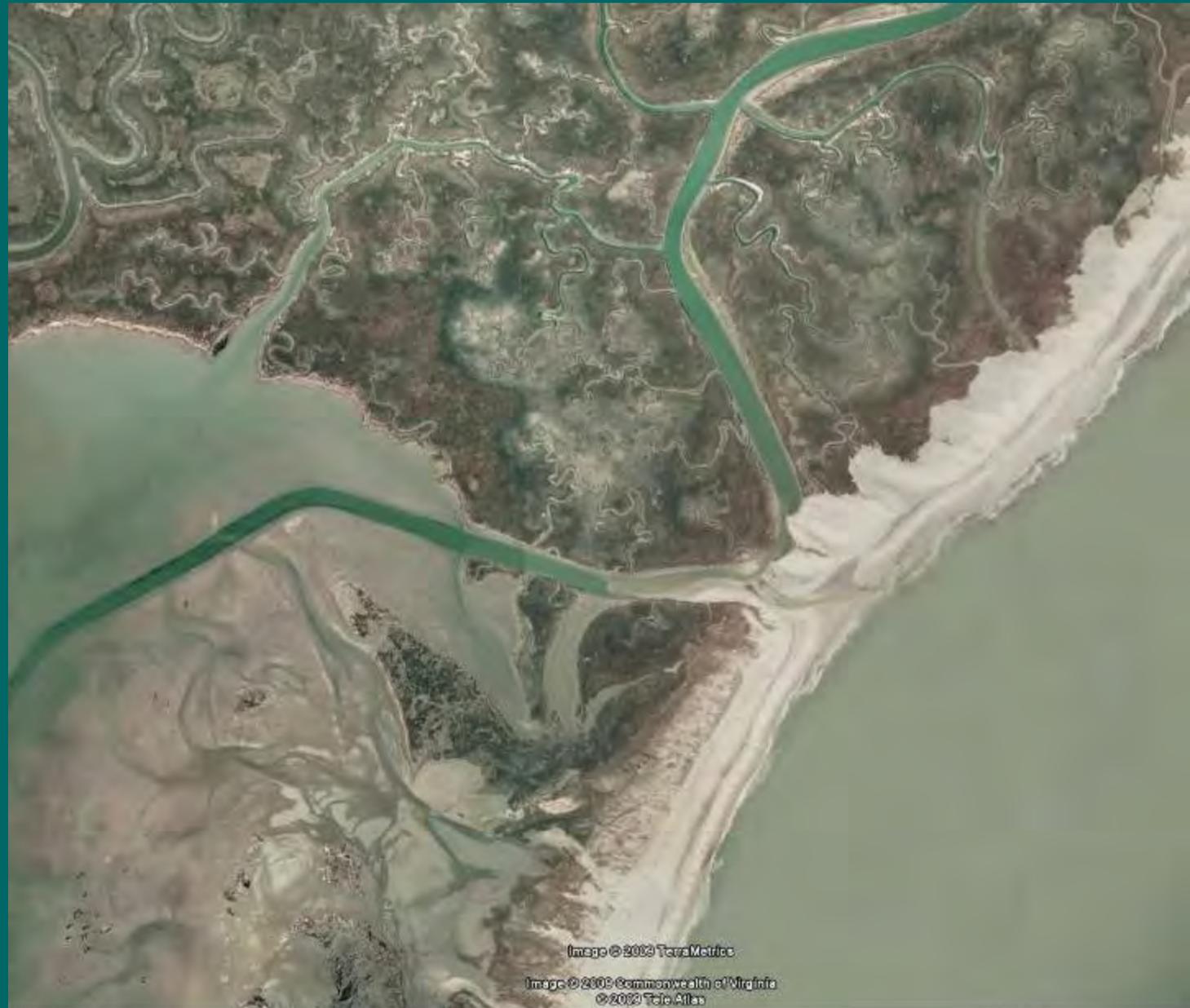


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Current Uses



Supports a very small wild fishery for oysters and clams.



During the past 15 years, extensive oyster restoration efforts.

Current Uses

Extensive areas of clam aquaculture.



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Current Status

Small, but growing, suspended oyster aquaculture

Bottom cage culture



Monitoring - Interactive Map





De facto zoning system largely based upon whether or not Lt. Baylor found shellfish there in 1892.



We need a more rational basis for allocating uses of these shallow-water habitats.

Habitat delineation and oyster population assesment

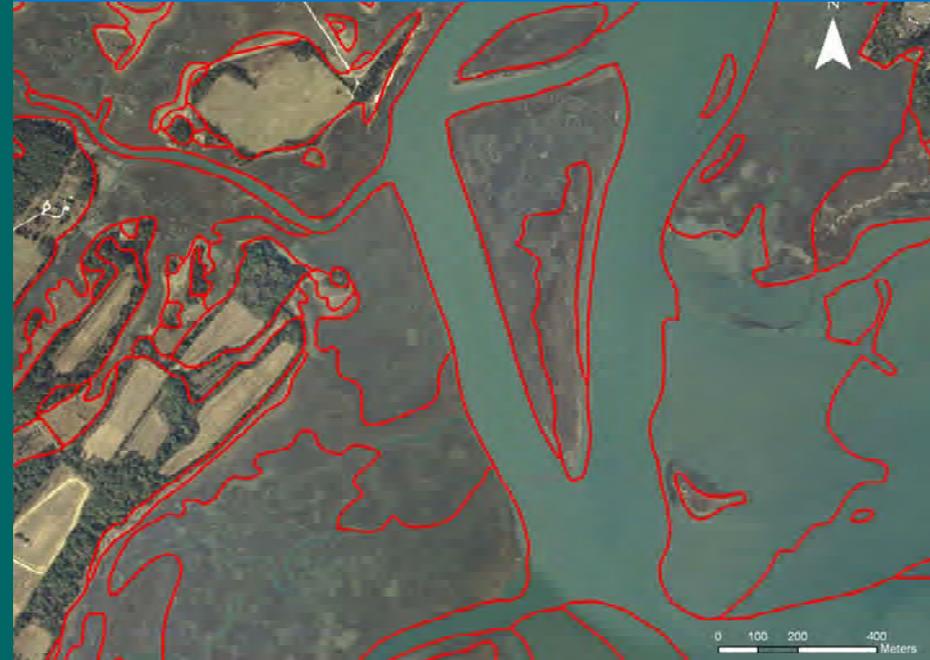
National Wetlands Inventory polygons (<http://www.fws.gov/nwi>) were used as a starting point for habitat classification

We overlaid these GIS polygons on digital 1-m resolution aerial images from the **Virginia Base Mapping Program** that were taken in 2002 and 2007 and manually redrew boundaries as necessary.

Aerial surveys – 300 ft, 30 hrs

Groundtruthing – Directed and random surveys with sub-meter accuracy GPS

Quantitative assessment of **oyster abundance**.



Study area

Area: ~ 900 km²

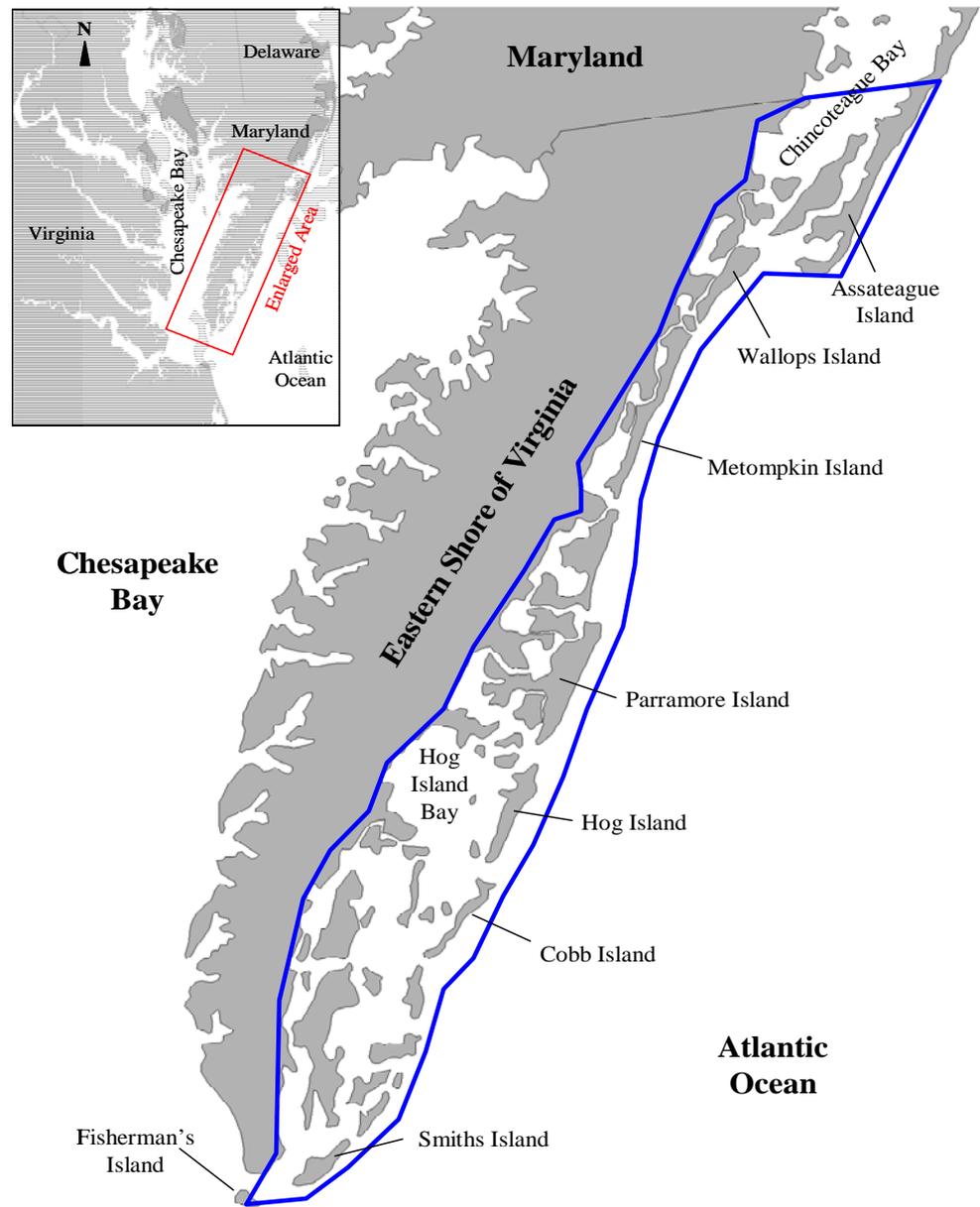
301 km² of Marsh

531 km² of tidal flats and
subtidal bottom

209 km² of Baylor grounds
132 separate parcels

86 km² of leased bottom
796 separate leases

3.2 Billion oysters

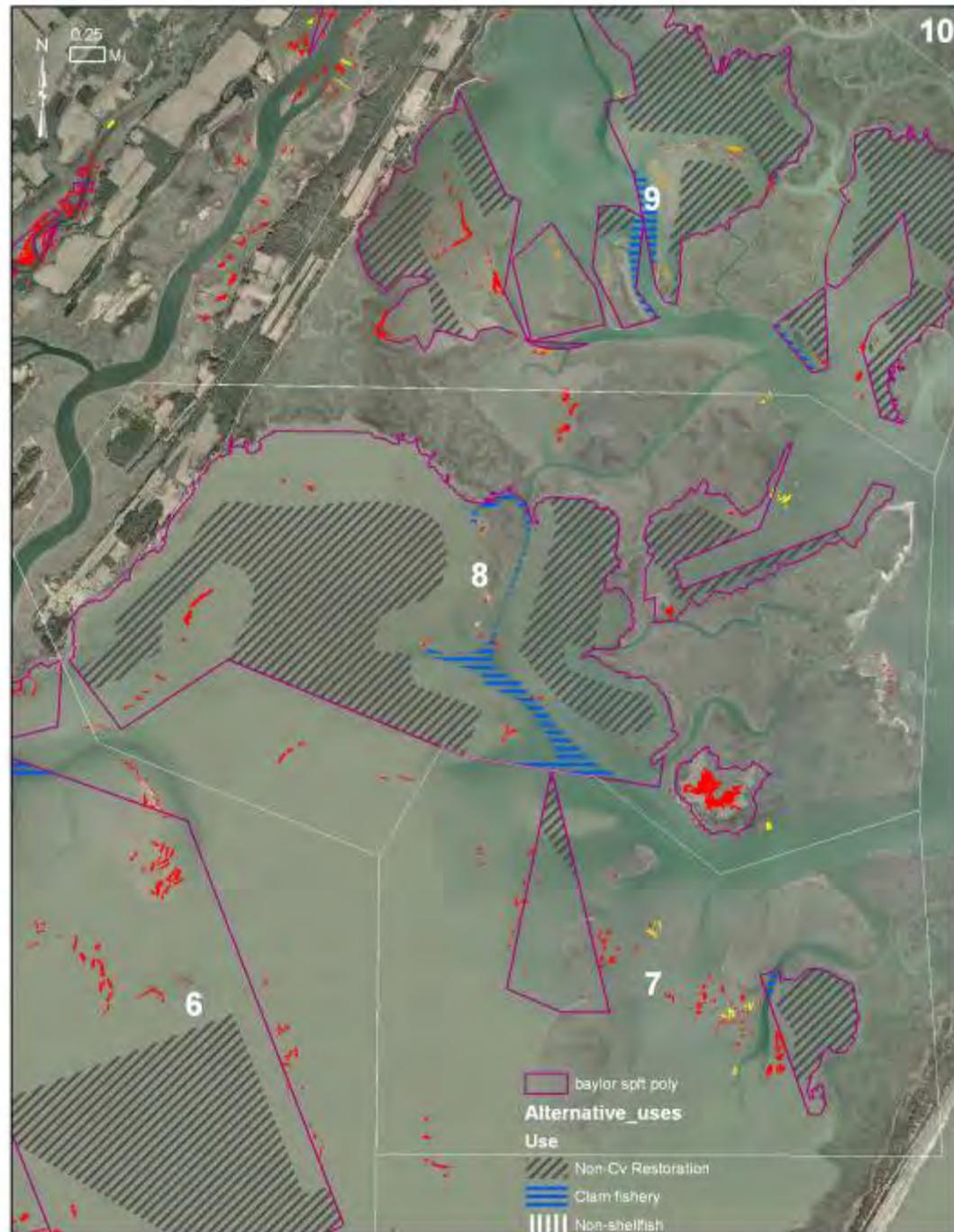


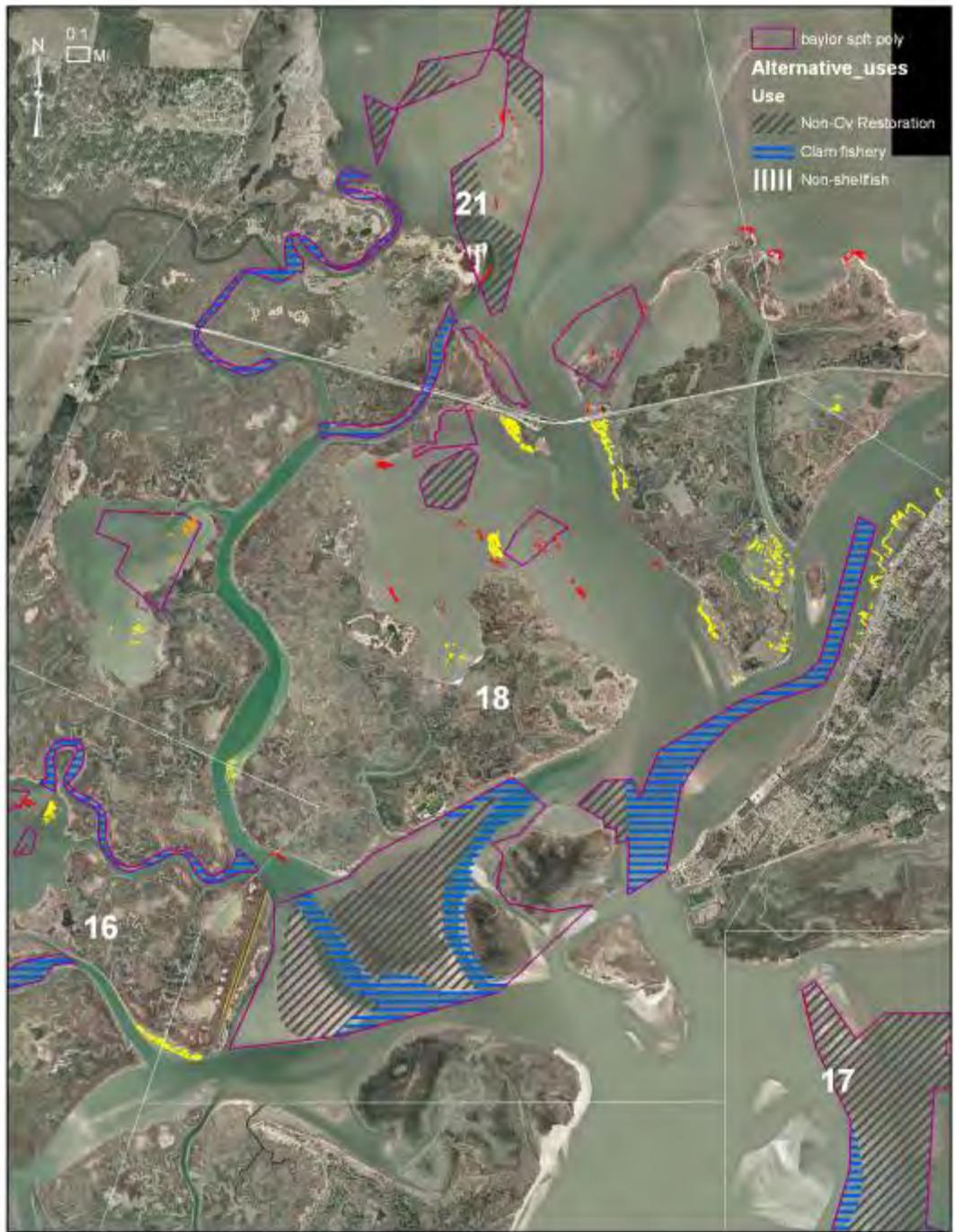
Reef delineation – Example Hog Island Bay



Re-assessment of Baylor polygons based upon depth criteria and a little local area knowledge.

- Wild oysters (extant or restored)
- Wild clam harvest
- SAV restoration
- Clam aquaculture
- Oyster aquaculture



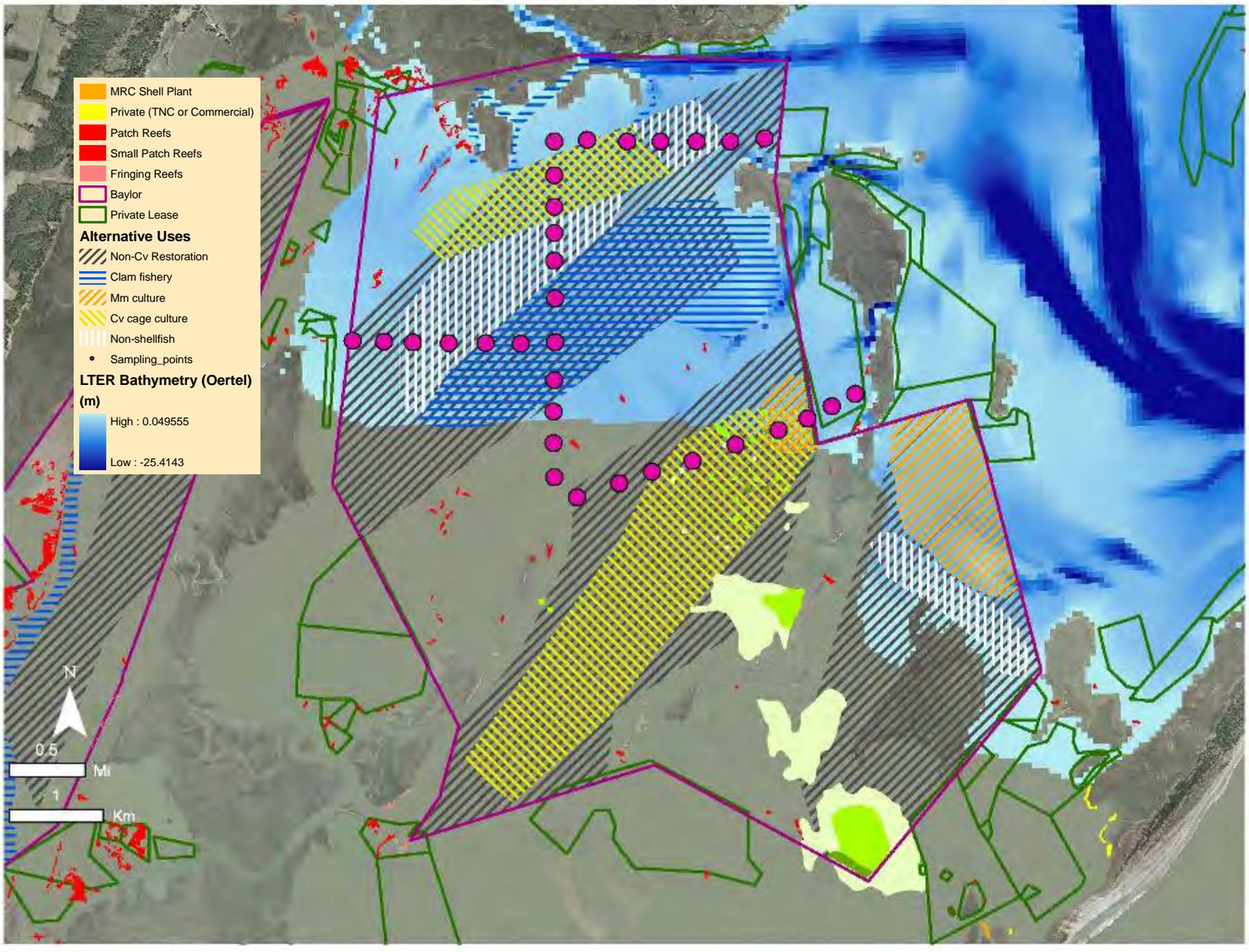


Summary data from GIS-based analysis of potential uses of Baylor grounds on the Seaside. All 132 areas representing 209 km² designated as Baylor Grounds were analyzed.

Potential Use Designation	Area (km ²)	% of Current Baylor
Oyster reefs (wild fishery, conservation or restoration)	120	57
Wild clam fishery	13	6
Clam aquaculture*	2	1
Oyster aquaculture*	7	3
Not appropriate for shellfish	10	5
SAV habitat	66	32

*These potential uses were not fully mapped in this phase of the project. Phase II will map the potential for these activities in greater detail in three sub-regions of the Seaside.

This was a broad-brushed assessment. To better evaluate potential uses, we are focusing on three areas: South Bay/Magothy Bay, central Hog Island Bay and Chincoteague Bay south.



- MRC Shell Plant
- Private (TNC or Commercial)
- Patch Reefs
- Small Patch Reefs
- Fringing Reefs
- Baylor
- Private Lease
- Alternative Uses**
- Non-Cv Restoration
- Clam fishery
- Mm culture
- Cv cage culture
- Non-shellfish
- Sampling_points
- LTER Bathymetry (Oertel)**
- (m)
- High : 0.049555
- Low : -25.4143

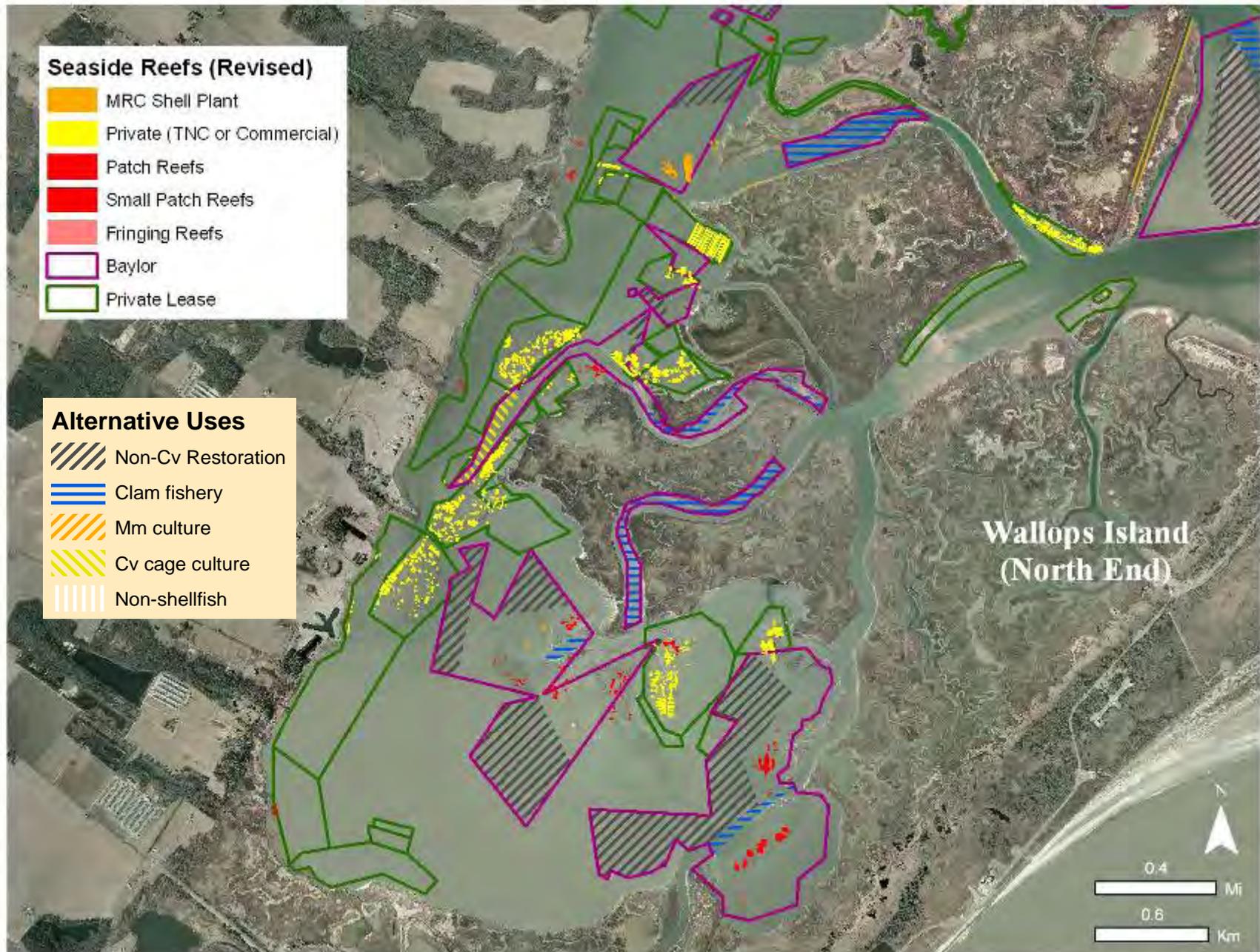


Seaside Reefs (Revised)

- MRC Shell Plant
- Private (TNC or Commercial)
- Patch Reefs
- Small Patch Reefs
- Fringing Reefs
- Baylor
- Private Lease

Alternative Uses

- Non-Cv Restoration
- Clam fishery
- Mm culture
- Cv cage culture
- Non-shellfish



More detailed assessment by region for current habitat suitability*

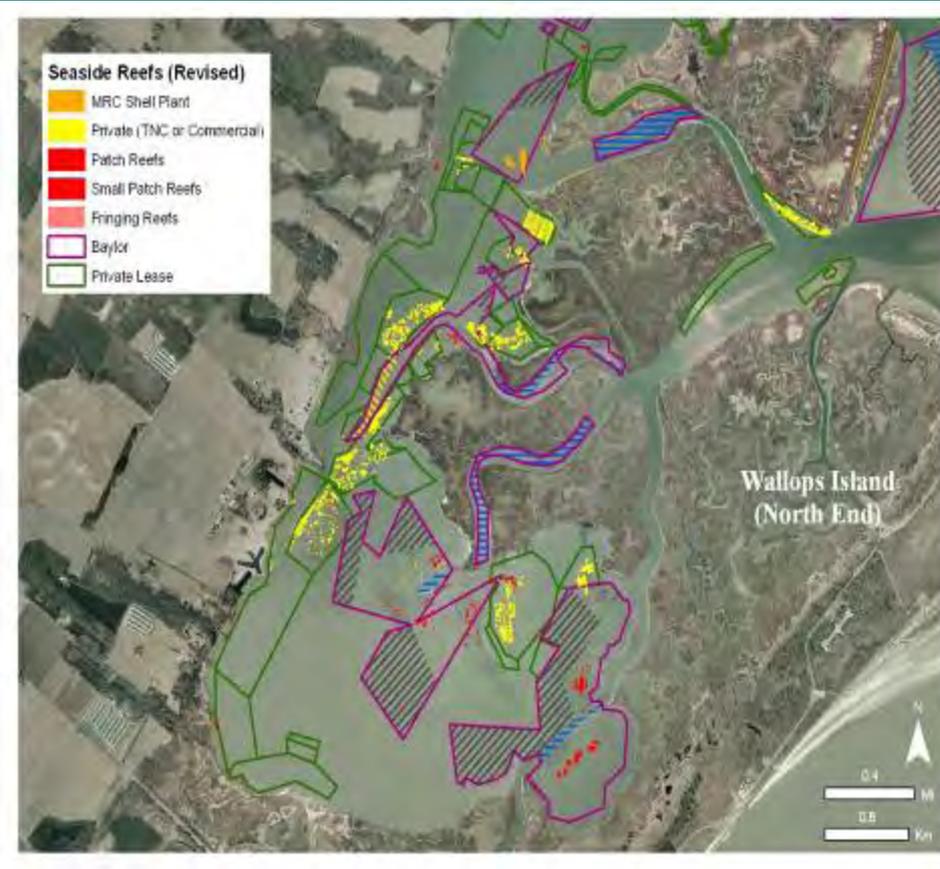
Region	Area (km ²)					
	Baylor	Non-suitable Baylor	Currently Leased	Existing SAV	Potential SAV	Total Non-marsh Area
South Bay/ Magothy Bay	39.7	14.7	18.1	7.0	26.1	133
Central Hog Island Bay	95.2	51.8	43.8	2.8	53.2	228
Chincoteague Bay south	10.3	5.4	6.7	0	0	44

*Habitat suitability designations are a work in progress. Values represent current area assessments and will change as more data are integrated into the analyses.

Next steps

Collect additional detailed data from the three focus regions and refine our potential use designations.

Integrate these uses (wild shellfish, aquaculture & SAV) with other uses (bird nesting sites, recreational use) .



Develop consensus recommendations for a process that re-evaluates use designations based on habitat suitability in a changing environment.

Legend

Alternative_uses

Use



Non-Cv Restoration



Clam fishery



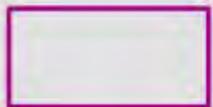
Mm culture



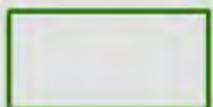
Cv cage culture



Non-shellfish



baylor spft poly



priv_leasespftline_FeatureT



Habitat delineation

9,319 habitat polygons
covering 877 km² mapped.

Extent (hectares or km) and relative proportion for major oyster habitats mapped.

Habitat Category	Total Area (Hectares)	Relative Proportion (%)
<i>High Marsh</i>	18,294	20.9
<i>Low Marsh</i>	11,862	13.5
<i>Flats-Marsh</i>	1,347	1.5
<i>High Tidal Flats</i>	2,698	3.1
<i>Low Tidal Flats</i>	34,961	39.9
<i>Subtidal Bottom</i>	18,180	20.7
<i>All Reefs</i> ^a	377	0.4
<i>All Manmade Shoreline</i>	37.9 ^b	n/a

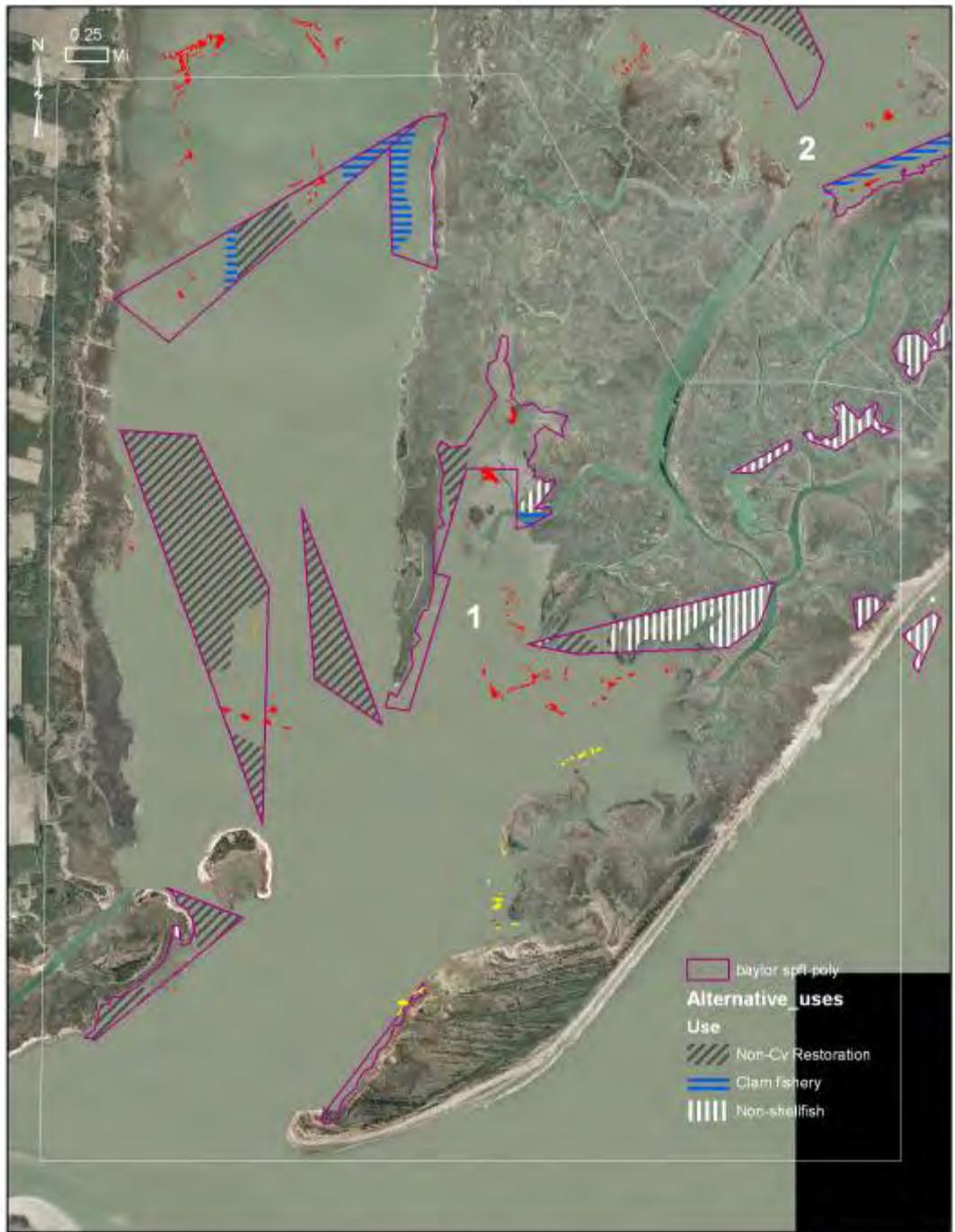
^a This includes *Patch, Small Patch, Fringing, State Restoration* and *Privately Managed* reefs (see Table 3 for details)

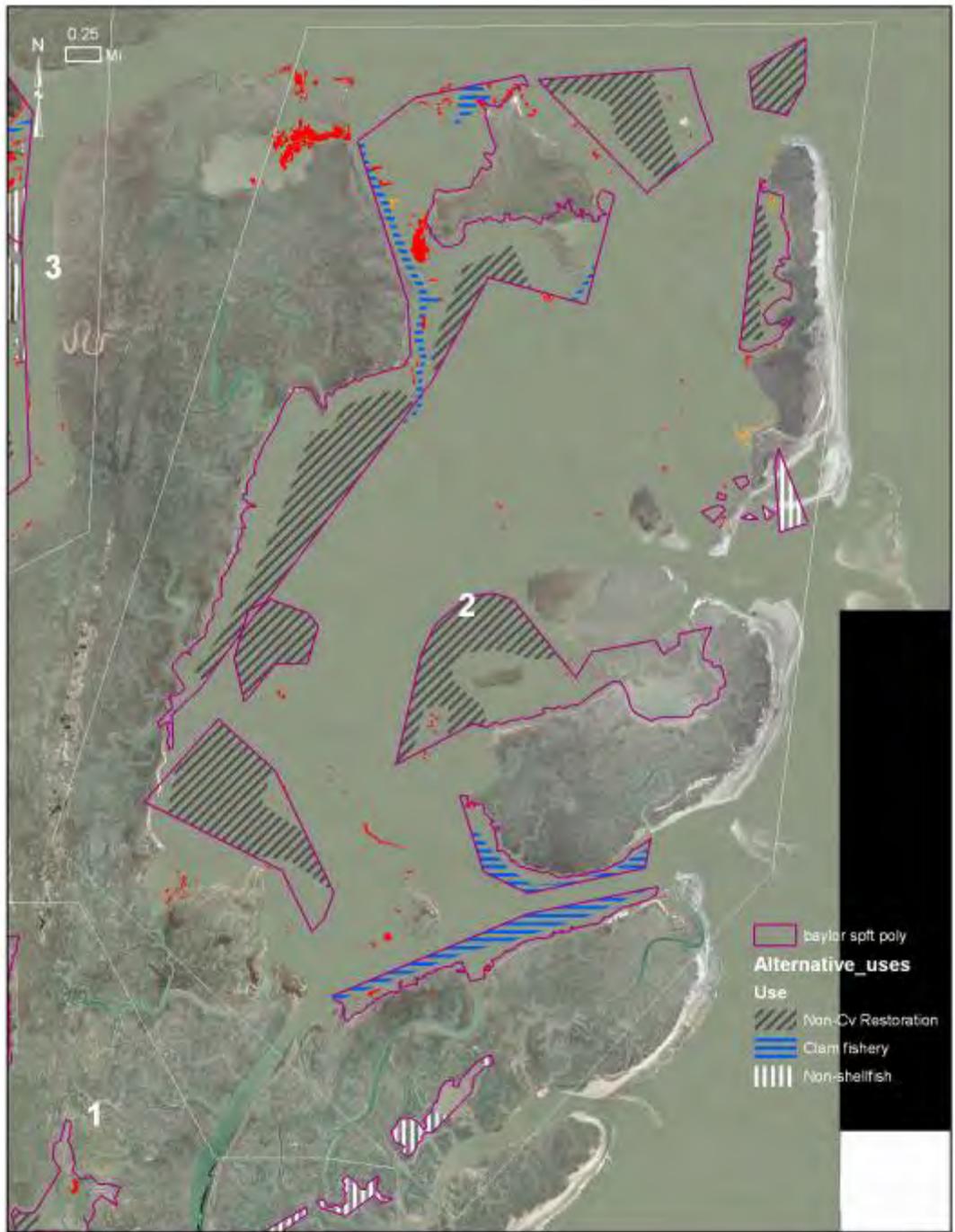
^b In linear units of km, not hectares (see Table 4 for details)

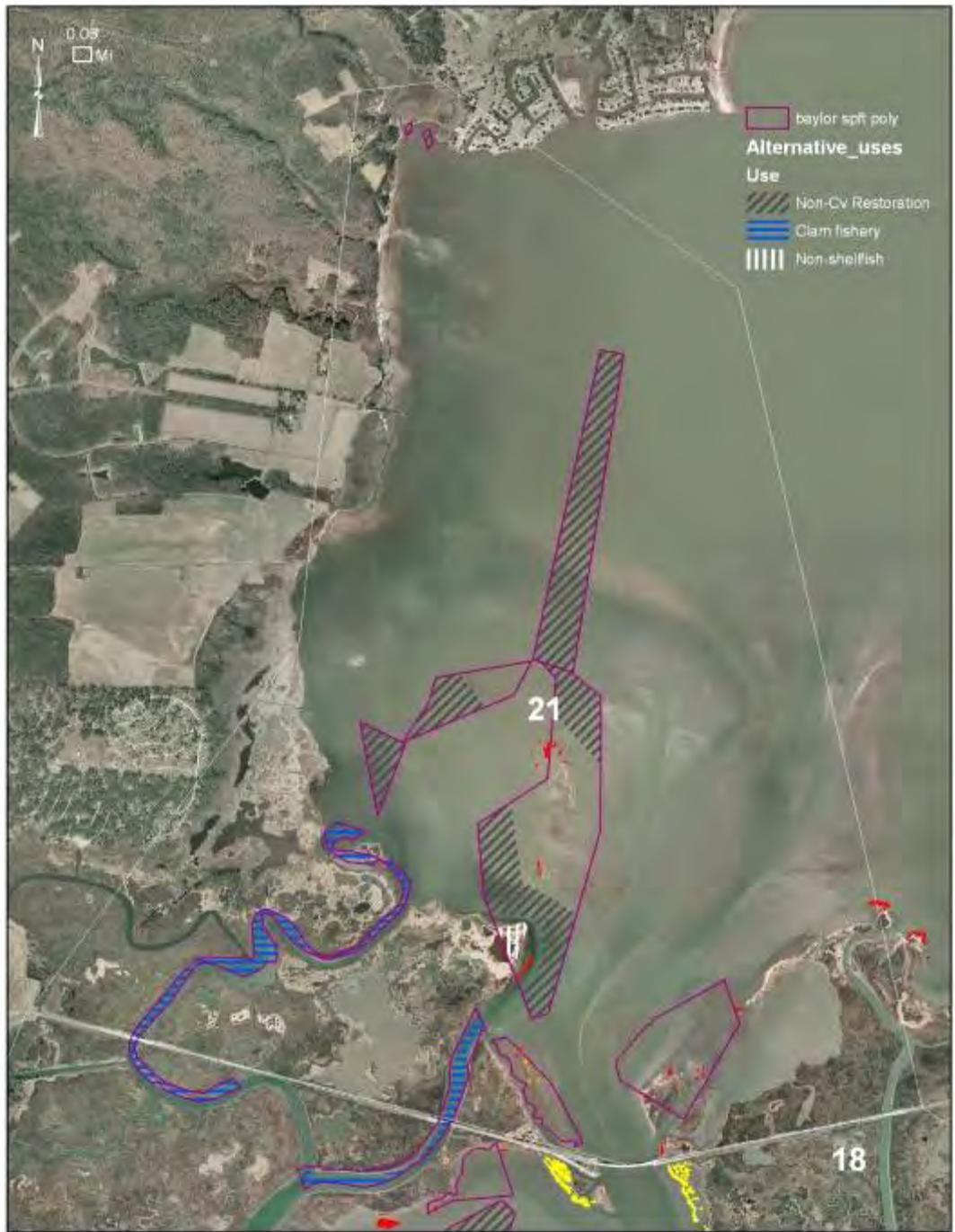
Total live oyster abundance (#) and relative proportion of population (%) for major oyster habitats mapped in this study.

Habitat Category	Live Oyster Abundance (millions)	Relative Proportion (%)
<i>High Marsh</i>	38.4	1.2
<i>Low Marsh</i>	265.7	8.3
<i>Flats-Marsh</i>	74.9	2.3
<i>High Tidal Flats</i>	0.8	<0.1
<i>Low Tidal Flats</i>	14.0	0.4
<i>Subtidal Bottom</i>	0	0
<i>All Reefs</i> ^a	2,799.7	87.0
<i>All Manmade Shorelines</i>	23.8	0.7
Total	3,217.4	

^a Includes *Patch, Small Patch, Fringing, State Restoration* and *Privately Managed* reefs







0.05
MI

baylor spft poly

Alternative_uses

Use

Non-CV Restoration

Clam fishery

Non-shellfish

21

18



Fringing reefs



What does the future hold?

Reassessment of public (Baylor) oyster grounds is needed.

Much of what is designated in the Baylor ground never was oyster habitat.

211 km² of Baylor grounds

86 km² of leased bottom



	<u>km²</u>		
Total Seaside	~900		
Seaside Baylor	209	<u>% Baylor</u>	<u>Phase I Mapping Complete (use addressed in each Baylor polygon n=132)</u>
Total Alternative Mapped**	123	59	<i>partial</i>
Non-Cv Resoration (MRC)	89	43	<i>yes</i>
2008 SAV	12	6	<i>partial (only 2008 actual footprints mapped thus far)</i>
Wild Clam Fishery	13	6	<i>partial</i>

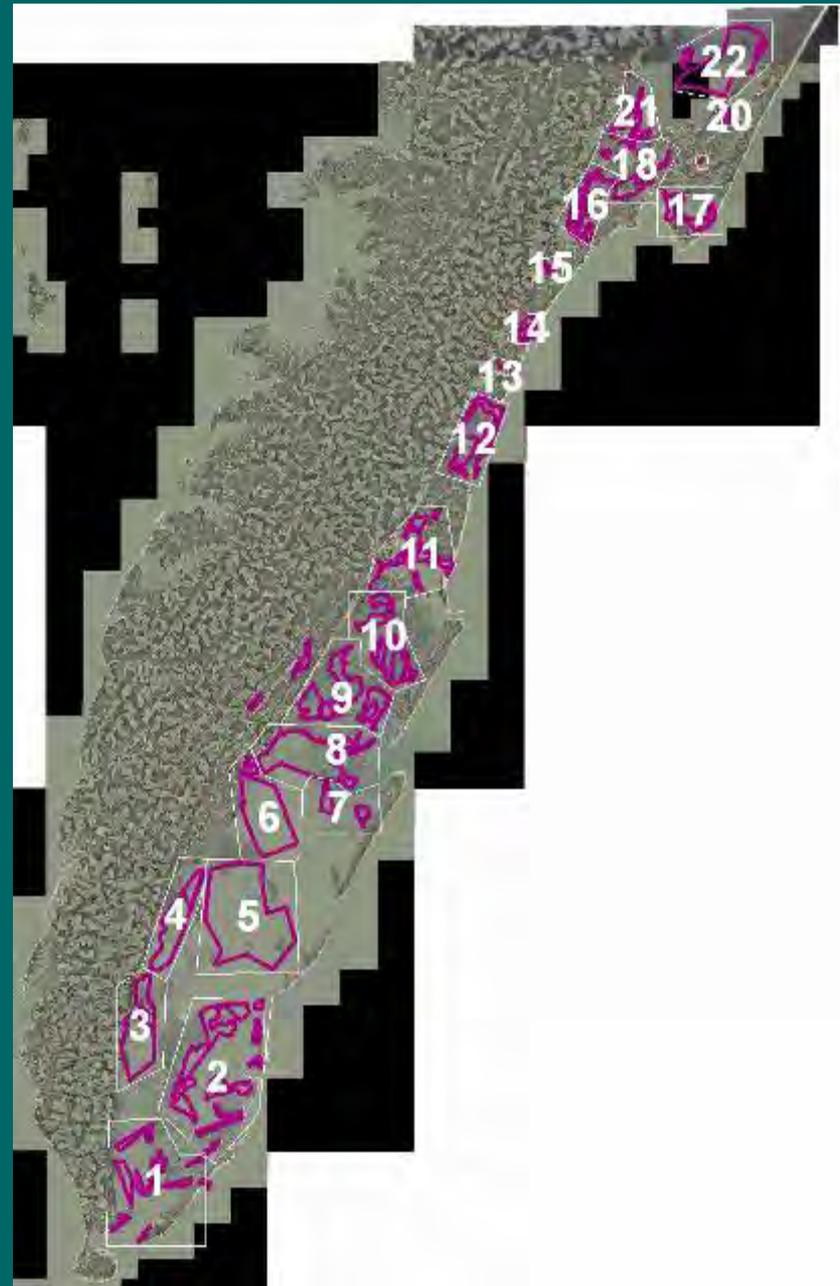
**Some alternative uses overlap, so this is an overestimate at this point...we'll eventually tease these overlaps out

SAV	m ²	km ²
Total Seaside SAV area	20,187,407	20
Total w/in Baylor	11,774,420	12
% of SAV in Baylor	-	58



132 Baylor polygons organized
into 22 geographic regions

Total area of Baylor = 209 km²



Reef delineation – Ramshorn Bay

