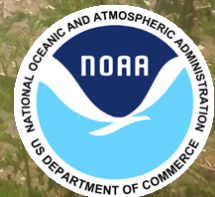


Moving Shorelines: *Opportunities for Coastal Adaptation and Habitat Migration*

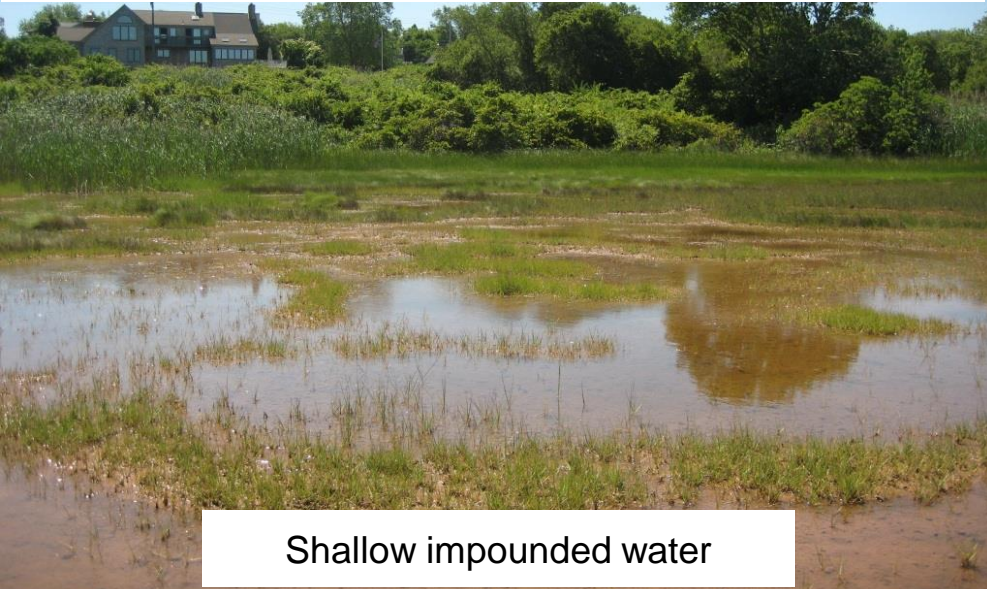


Adaptation Strategies

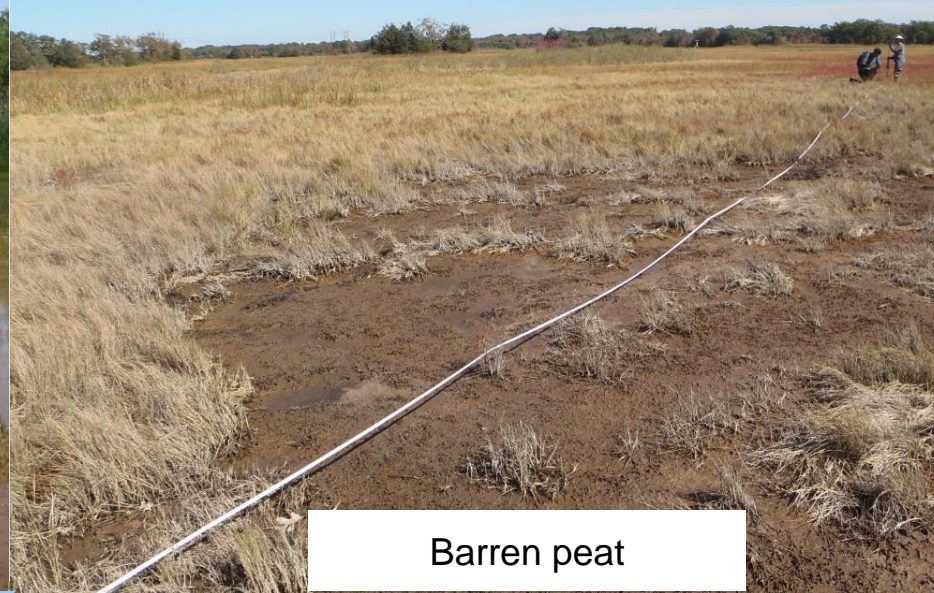
- Remove eroding or flood prone roads and incorporate stormwater treatment
- Regrade banks to create less erosive slopes
- Install non-structural shoreline protection such as coconut fiber “burritos” or coir logs
- Remove physical barriers such as walls, roads or dams
- Protect low lying uplands to create migration corridors
- Restore or create dunes
- Modify activities (i.e. mowing) that prevent migration of coastal habitats



Salt marsh degradation



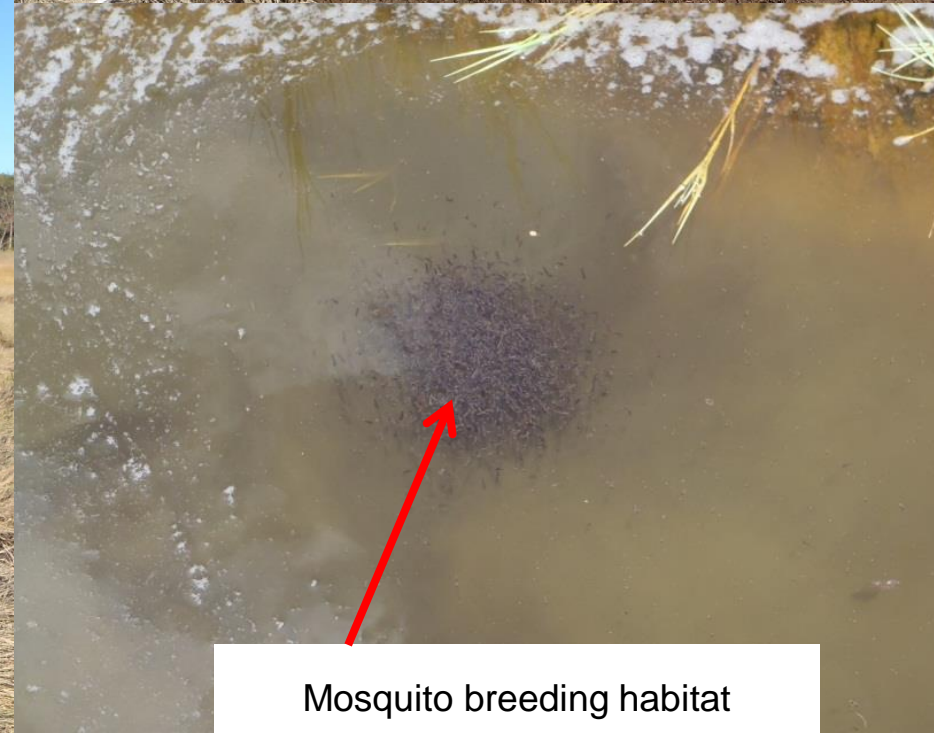
Shallow impounded water



Barren peat



Bank erosion



Mosquito breeding habitat

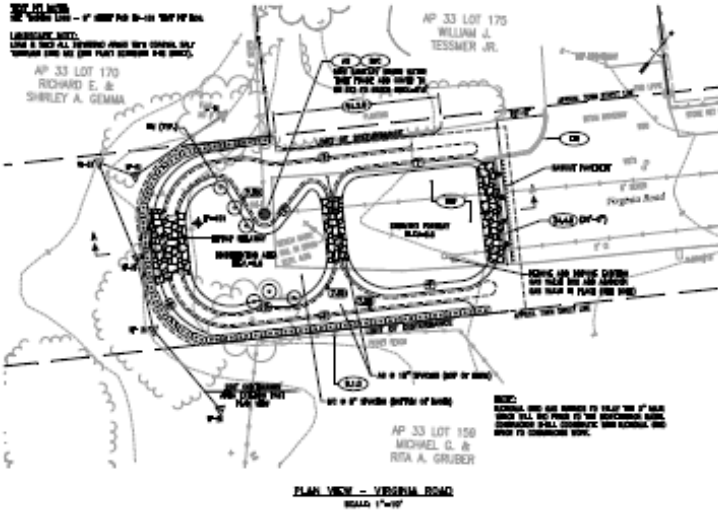
Impediments to coastal habitat migration

Areas for suitable for salt marsh migration are limited due to topography, shoreline hardening and coastal development

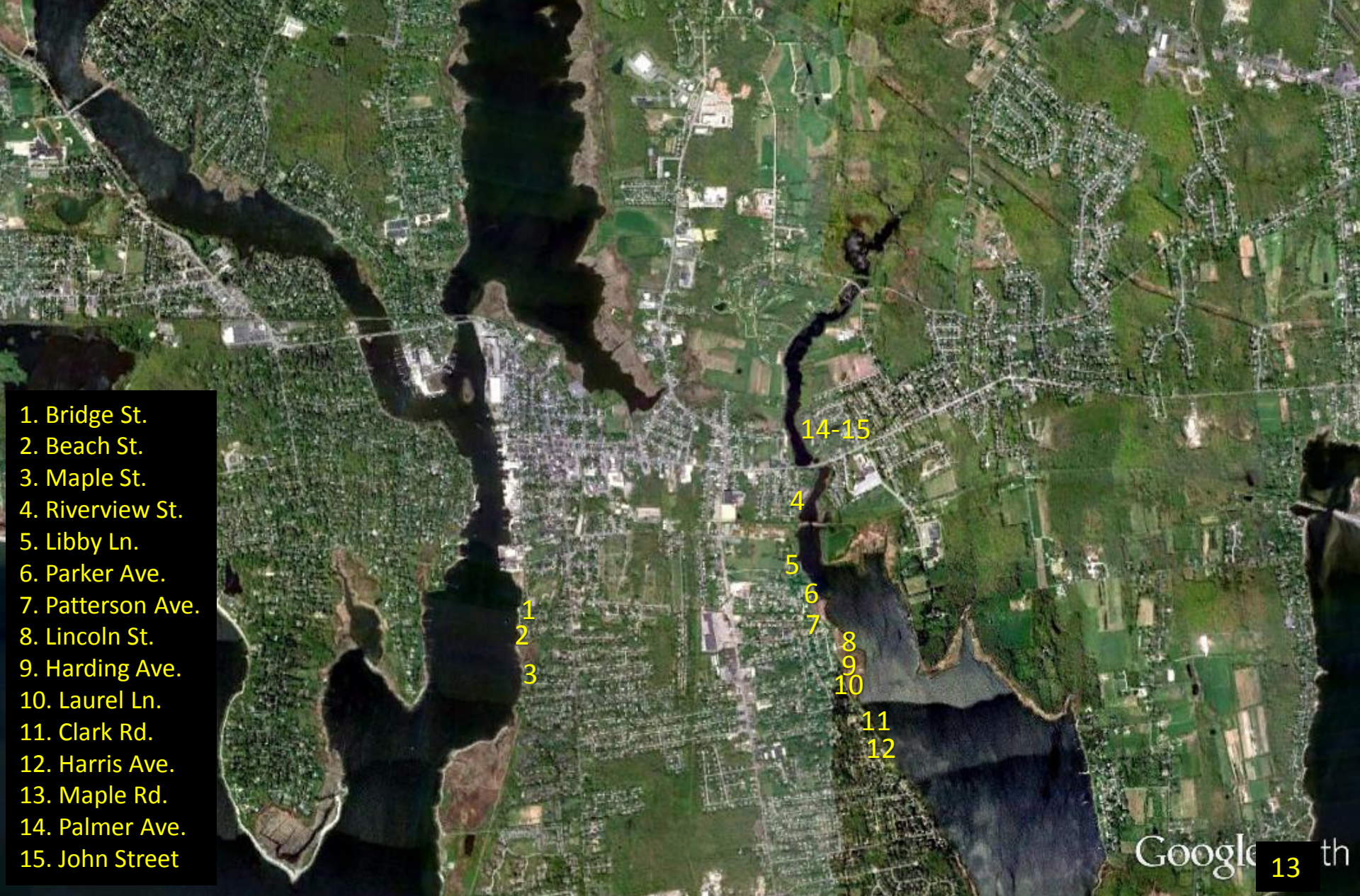


End of Road Retrofits

Proposed end of road retrofit to remove pavement and infiltrate stormwater before entering marsh along 100 Acre Cove



Save The Bay Coastal Adaptation Project Warren End of Road Assessment



- 1. Bridge St.
- 2. Beach St.
- 3. Maple St.
- 4. Riverview St.
- 5. Libby Ln.
- 6. Parker Ave.
- 7. Patterson Ave.
- 8. Lincoln St.
- 9. Harding Ave.
- 10. Laurel Ln.
- 11. Clark Rd.
- 12. Harris Ave.
- 13. Maple Rd.
- 14. Palmer Ave.
- 15. John Street

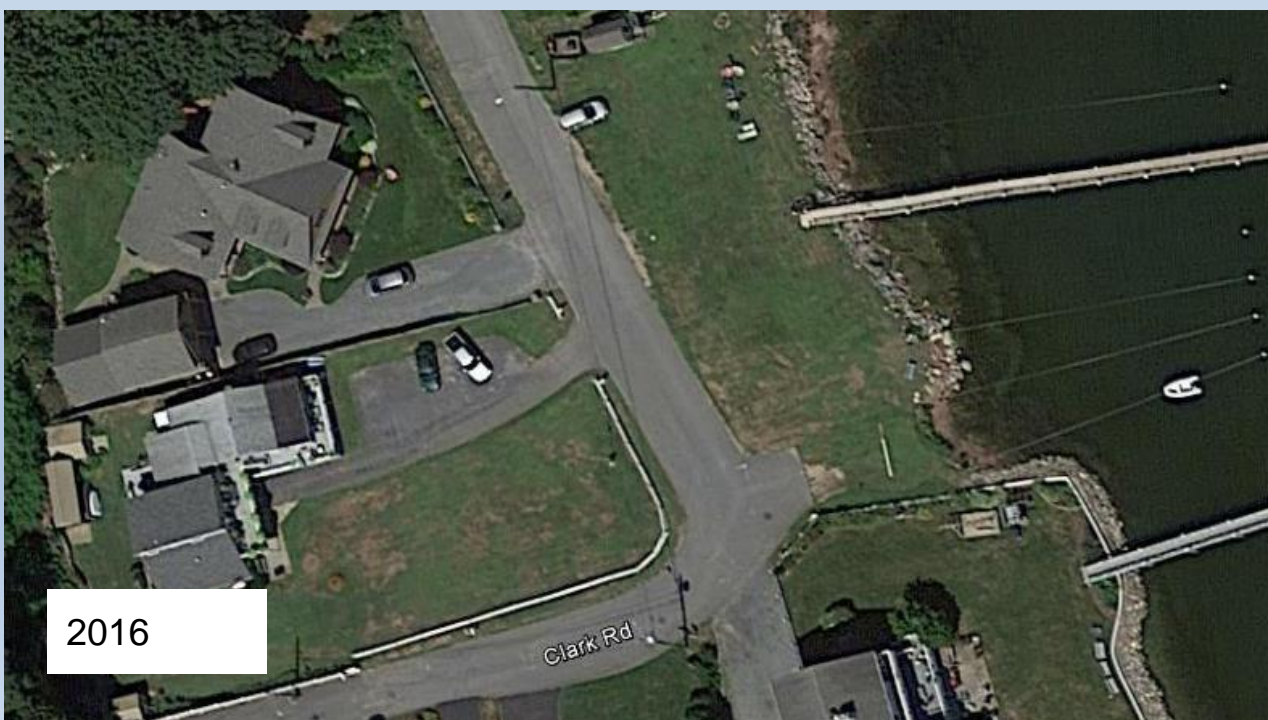
Clark Road, Warren: end of road retrofit and filter strip installation



2013



Before: Road removal area, eroding and coastal flooding



2016



After: filter strip to slow and filter runoff

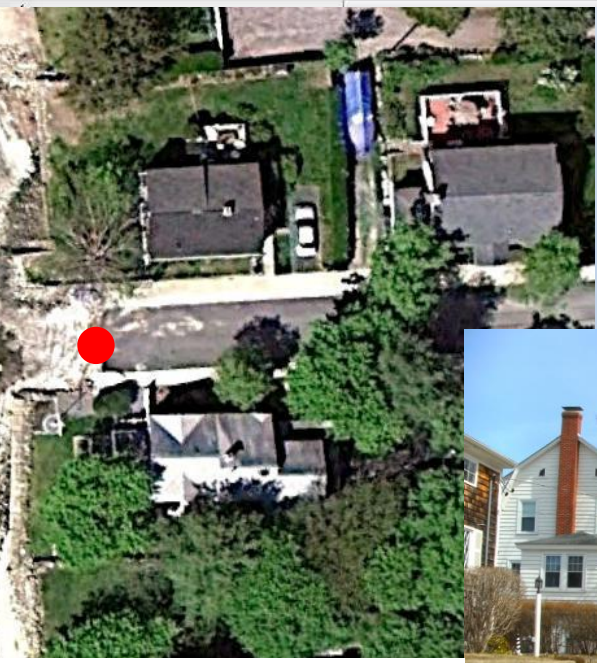
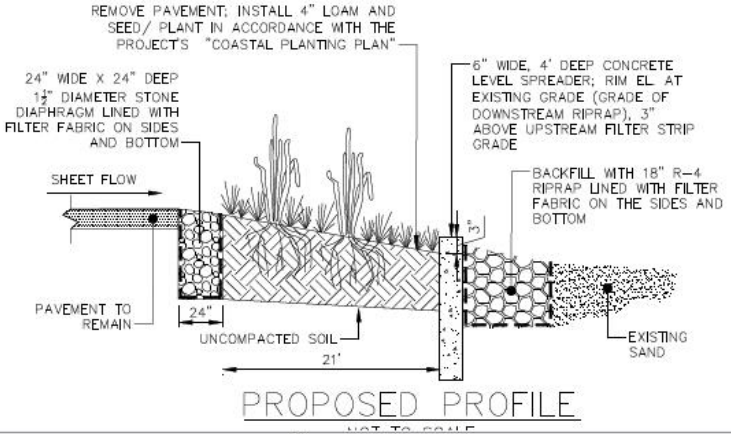


Bridge Street end of road retrofit potential

IDEAL ELEVATION DATA FOR MEASURED ONSITE REFERENCED TO ELEVATIONS ARE APPROXIMATE TION DATA POINTS.

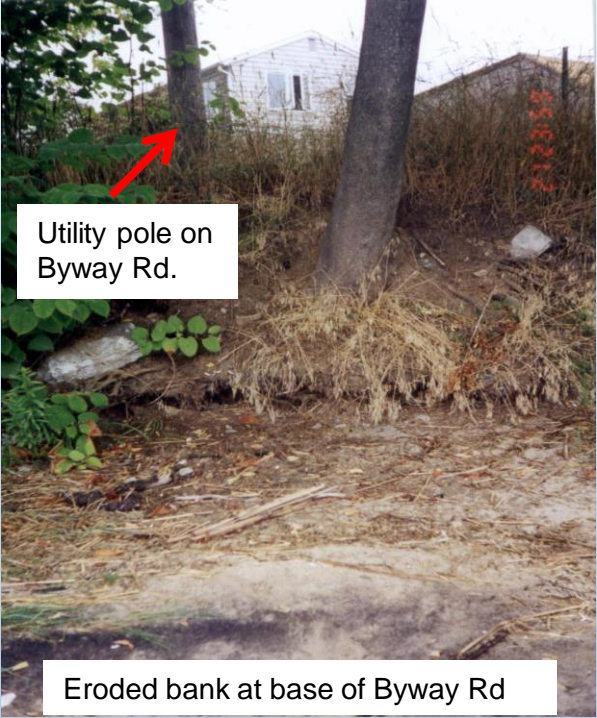


PROPOSED STREET VIEW



Evidence of stormwater runoff/erosion of pavement and fringe marsh; hardened to north and south; 60 feet to first driveway; high tide line during moon and storm tides

Allins Cove, Barrington: bank stabilization using non-structural materials



Bank stabilization using coir envelopes



Jamiel Park: sunny day flooding

- flood tide 10.17.12: 5.2' tide observed



Storm drain on Market St. flooded with salt water

Jamiel Park adaptation potential



Salt marsh grasses in swale

Warren Town Beach: opportunity to extend beach area inland and regrade bank



© 2012 Google

41°43'22.40" N 71°17'06.74" W elev 3 ft

1. Erosion and Flood tide in lawn area



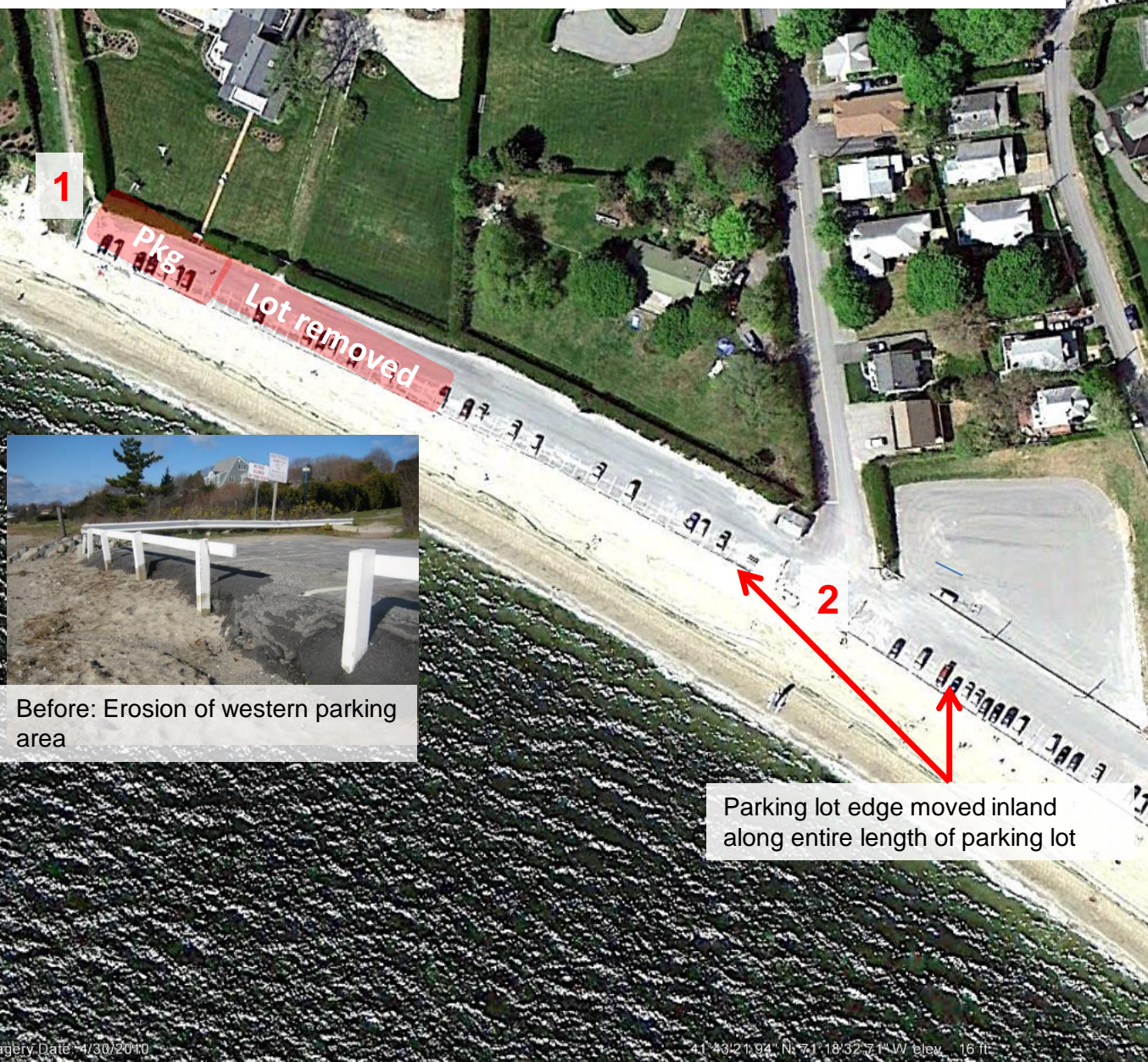
2. Erosion and flooding of playground



3. Stormwater infiltration



Barrington Beach: parking lot removal and stormwater infiltration



1

pkg
Lot removed

2

Parking lot edge moved inland along entire length of parking lot

3



Before: Erosion of western parking area



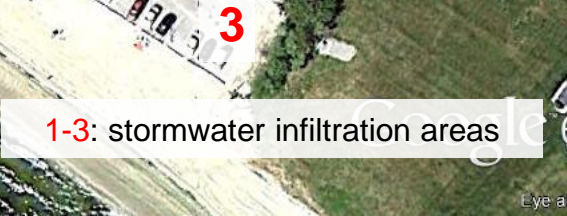
Asphalt being removed



Dune grass planting in former parking

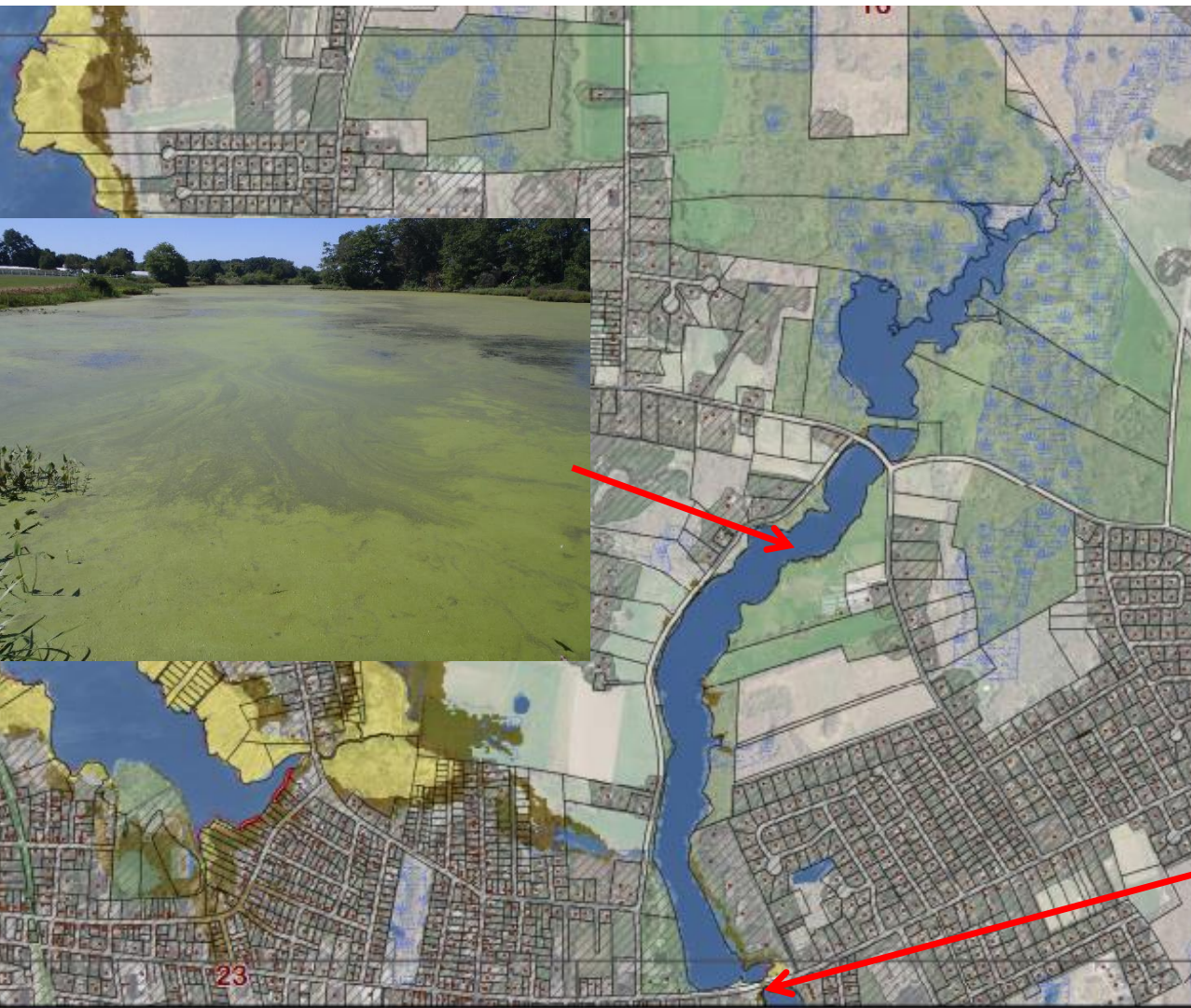


After: Parking lot carve back area after 2 growing seasons



1-3: stormwater infiltration areas

Bristol County Water Supply vulnerability Palmer/Kickemuit River 1 foot of sea level rise



Salt marsh along edge of dam



Moon tide flowing into Kickemuit Reservoir:
11.15.16

1:10,000
0 500 1,000 1,500 2,000 Feet

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- Potential Marsh Zone
- Persistent Marsh Zone
- Potential Marsh Loss
- Open Water and Tidal Flat
- Current Fresh Wetlands
- Hardened Shores
- Buildings
- Parcel Boundaries
- Developed Land

Tidal Marsh Vulnerability Analysis: One Foot Sea Level Rise Model



Bristol County Water Supply vulnerability Palmer/Kickemuit River 3 feet of sea level rise



1:10,000

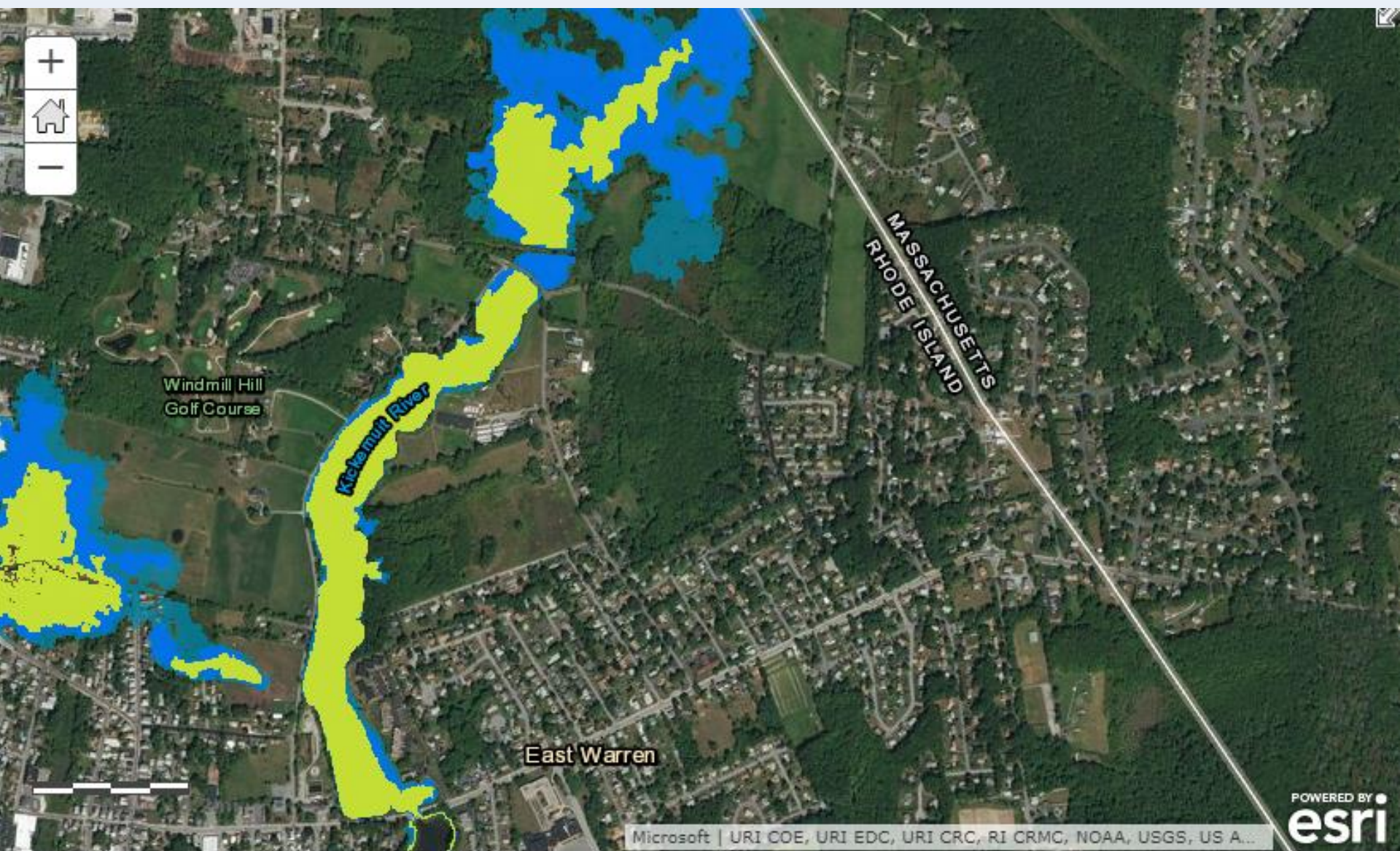
0 500 1,000 1,500 2,000 Feet

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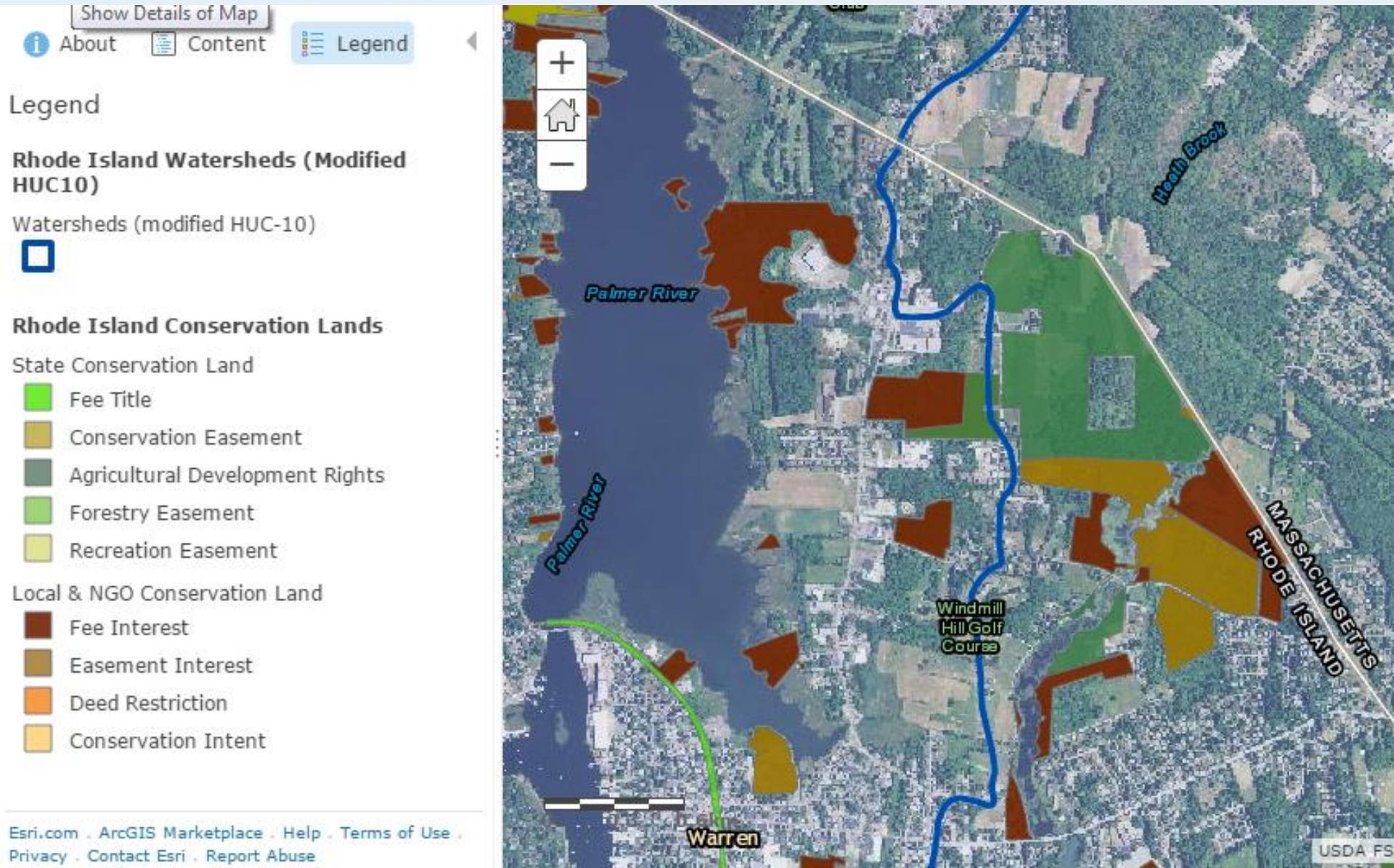
	Potential Marsh Zone		Hardened Shores
	Persistent Marsh Zone		Buildings
	Potential Marsh Loss		Parcel Boundaries
	Open Water and Tidal Flat		Developed Land
	Current Fresh Wetlands		CRMC Coastal Barriers
	Protected Open Space		

Tidal Marsh Vulnerability Analysis: Three Foot Sea Level Rise Model

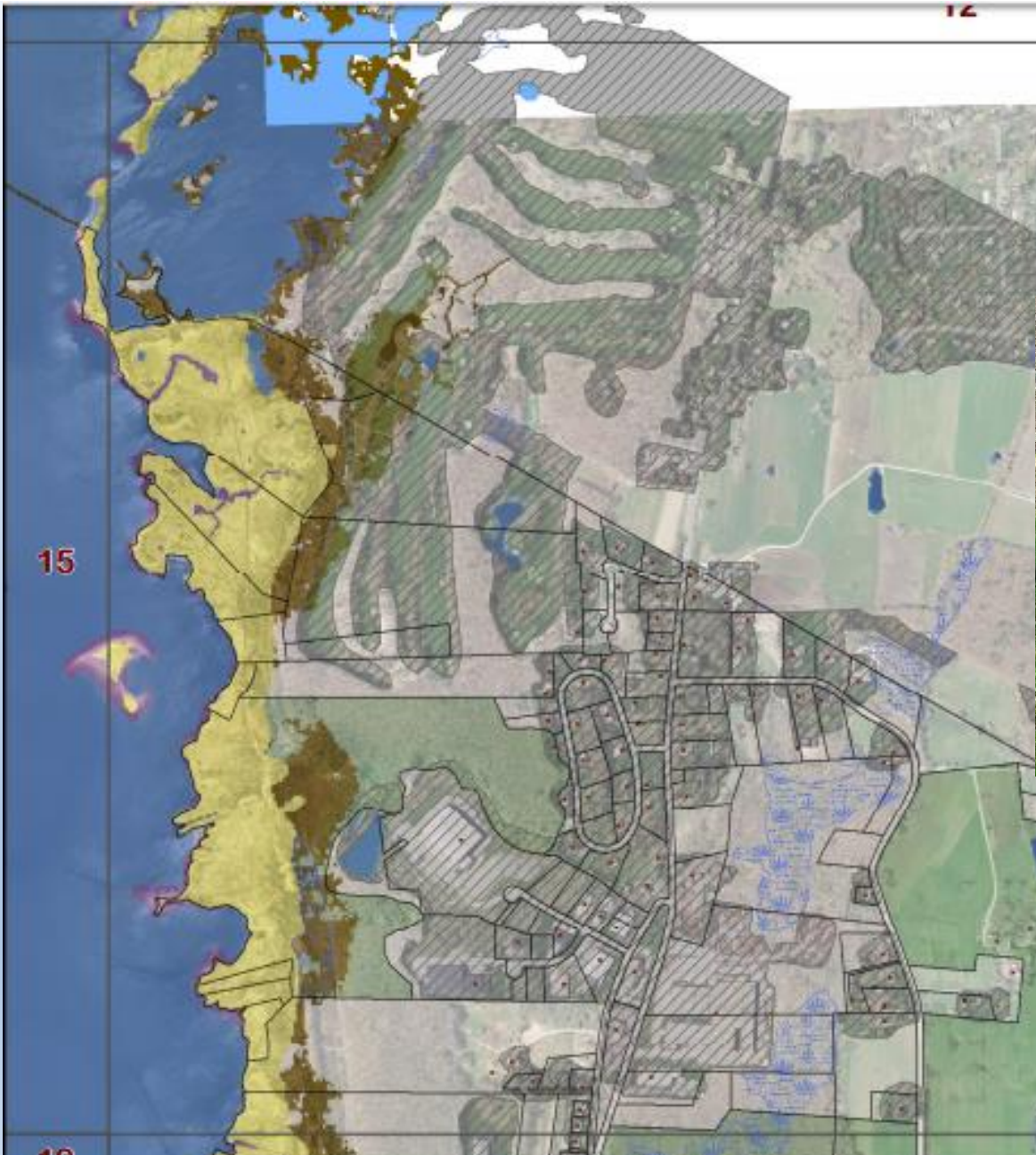
Kickemuit River: 1, 2 & 3 feet sea level rise scenarios: Stormtools site



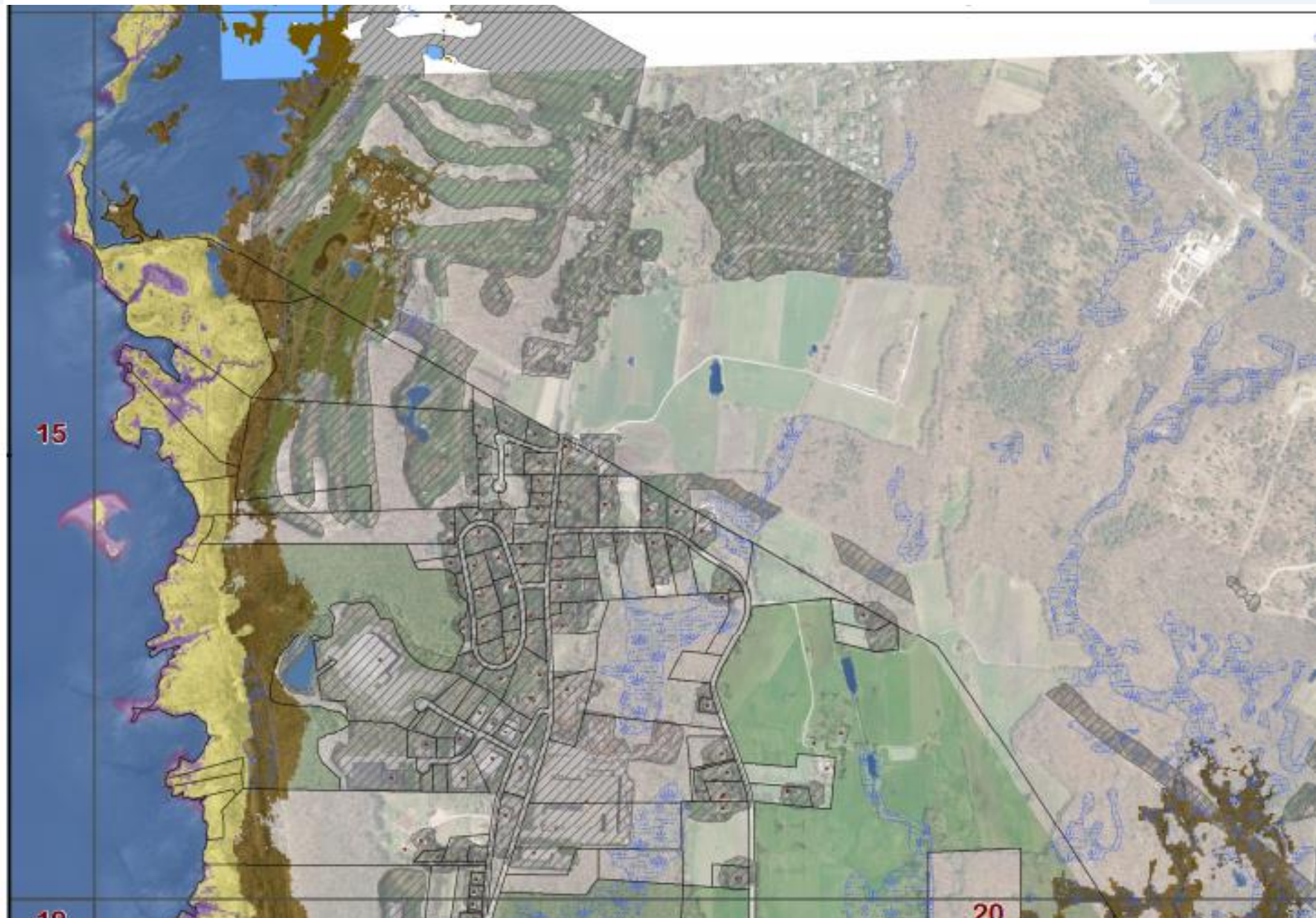
Land Protection of migration corridors: -Palmer River Watershed Conservation Lands



Land Protection of migration corridors: Northern Palmer River 1 foot of Sea level rise



Northern Palmer River 3 feet of Sea level rise



Sapowet Point, Tiverton: marsh migration corridor restoration

Before: Low lying field flooded



After: Former potato field planted with warm season grasses

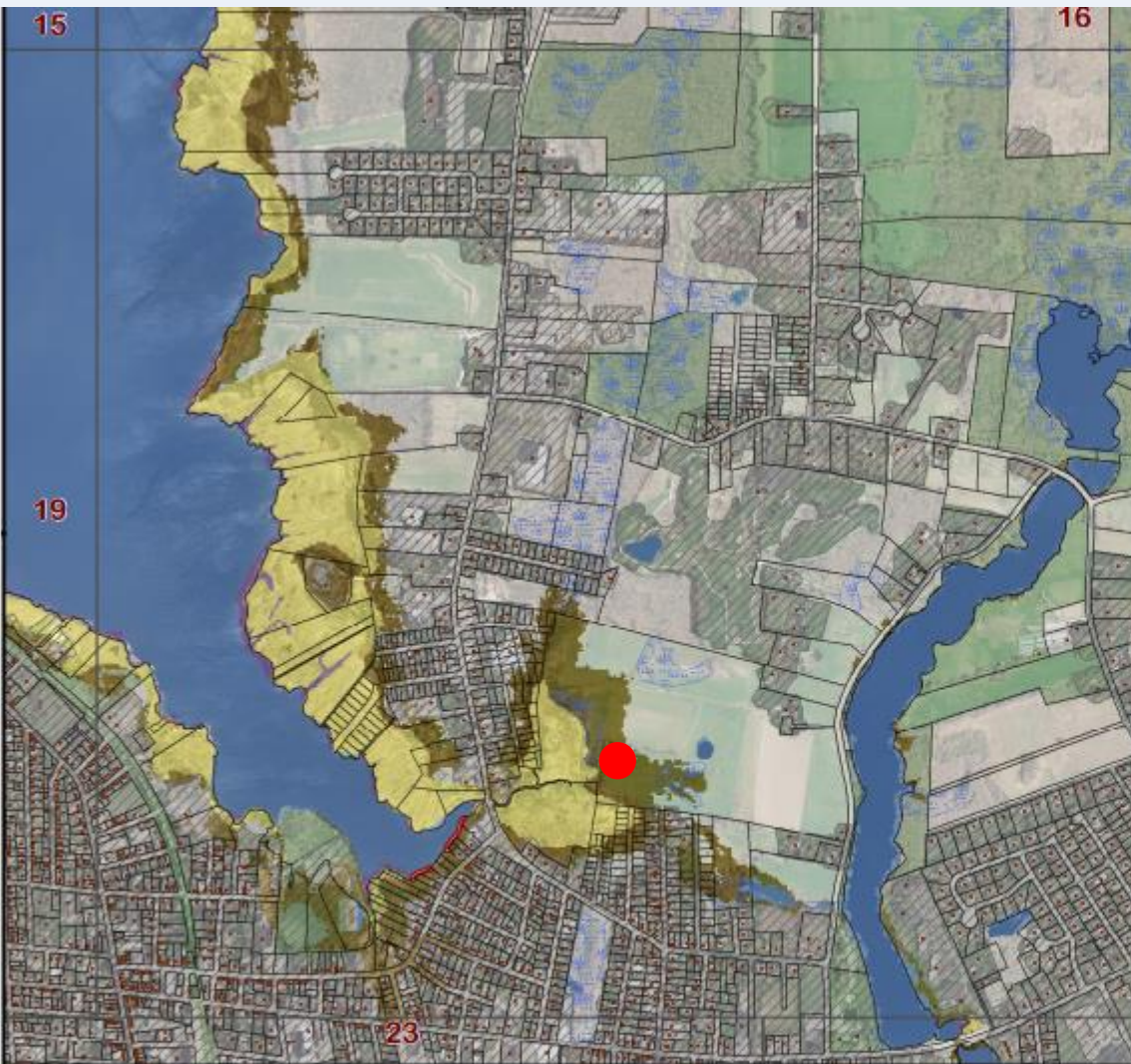


© 2013 Google

Google

41°34'57.43" N 71°12'39.53" W elev 1 ft

Southern Palmer River 1 foot of Sea level rise



Map
20

1:10,000

0 500 1,000 1,500 2,000 Feet

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Potential Marsh Zone	Hardened Shores
Persistent Marsh Zone	Buildings
Potential Marsh Loss	Parcel Boundaries
Open Water and Tidal Flat	Developed Land
Current Fresh Wetlands	

Tidal Marsh Vulnerability Analysis One Foot Sea Level Rise

Colt State Park, Bristol: infrastructure removal for marsh migration



Bike path relocated in late 1990s and "mow line" moved inland

1996: marsh mowed



Marsh after path moved

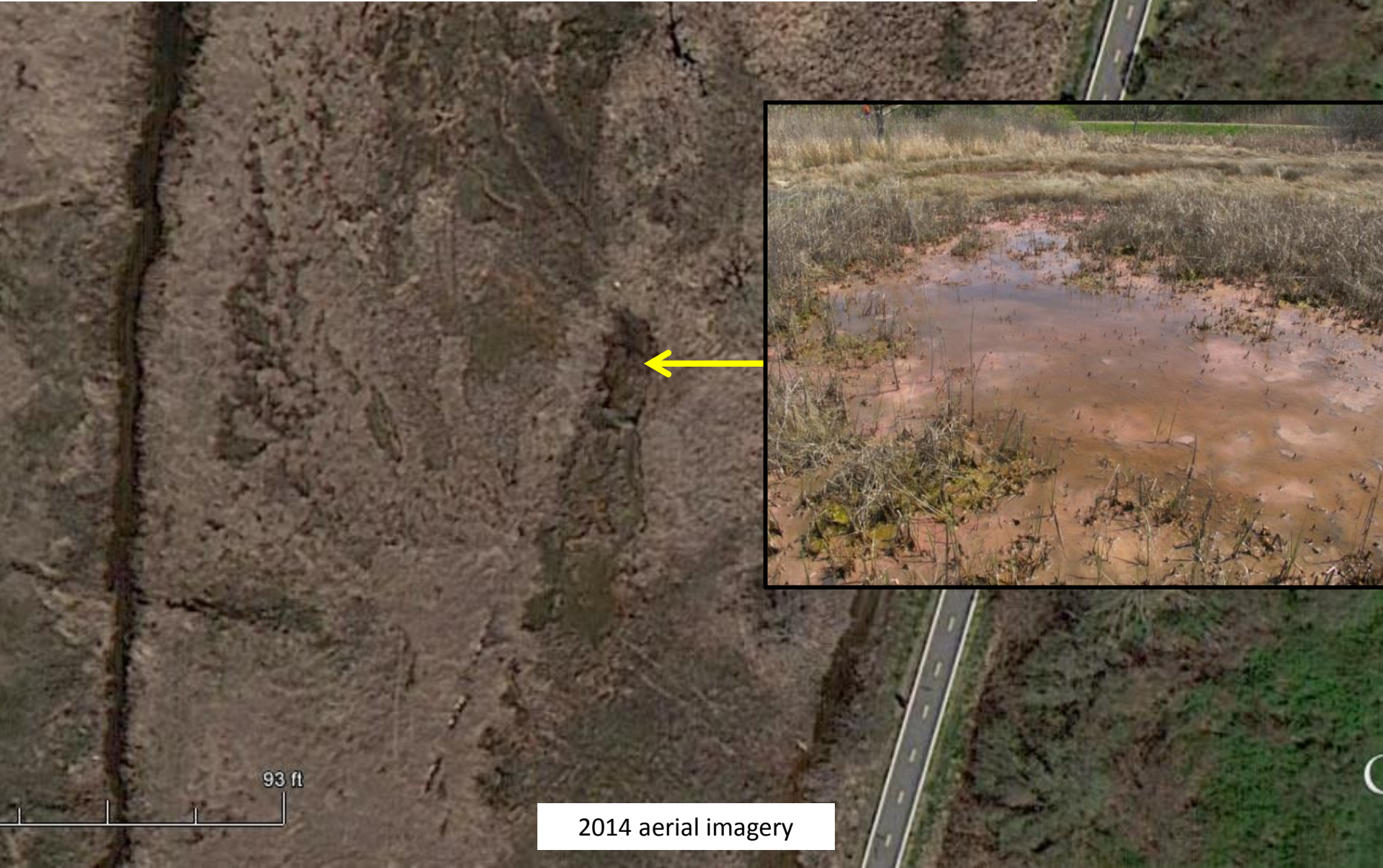


Narrow River, Narragansett: moving mow line inland



Jacobs Point adaptation project

- Conducted 2015 and 2016
- Shallow ponded water, recent vegetation die-off



93 ft

2014 aerial imagery

Jacobs Point adaptation post runnel excavation

- Revegetation of bare and impounded water areas
- Degradation not extensive prior to runnel excavation



Runnels dug in 2015 and 2016 allowed for revegetation

2016 aerial imagery

Jacobs Point Salt marsh restoration

- Conducted 2010
- Pre restoration conditions impounded water on marsh surface



Post 2010 restoration: revegetation of
formerly flooded areas



1972 aerial Jacobs Point watershed



Impervious surface coverage in 2011



1972 – 1.3%
2011 – 34.2%

1972 – 0.6%
2011 – 22.7%

1972 aerial photo

Phragmites expansion post watershed development



2008 aerial photo

© 2011 Google

Google earth

Imagery Date: 7/28/2007

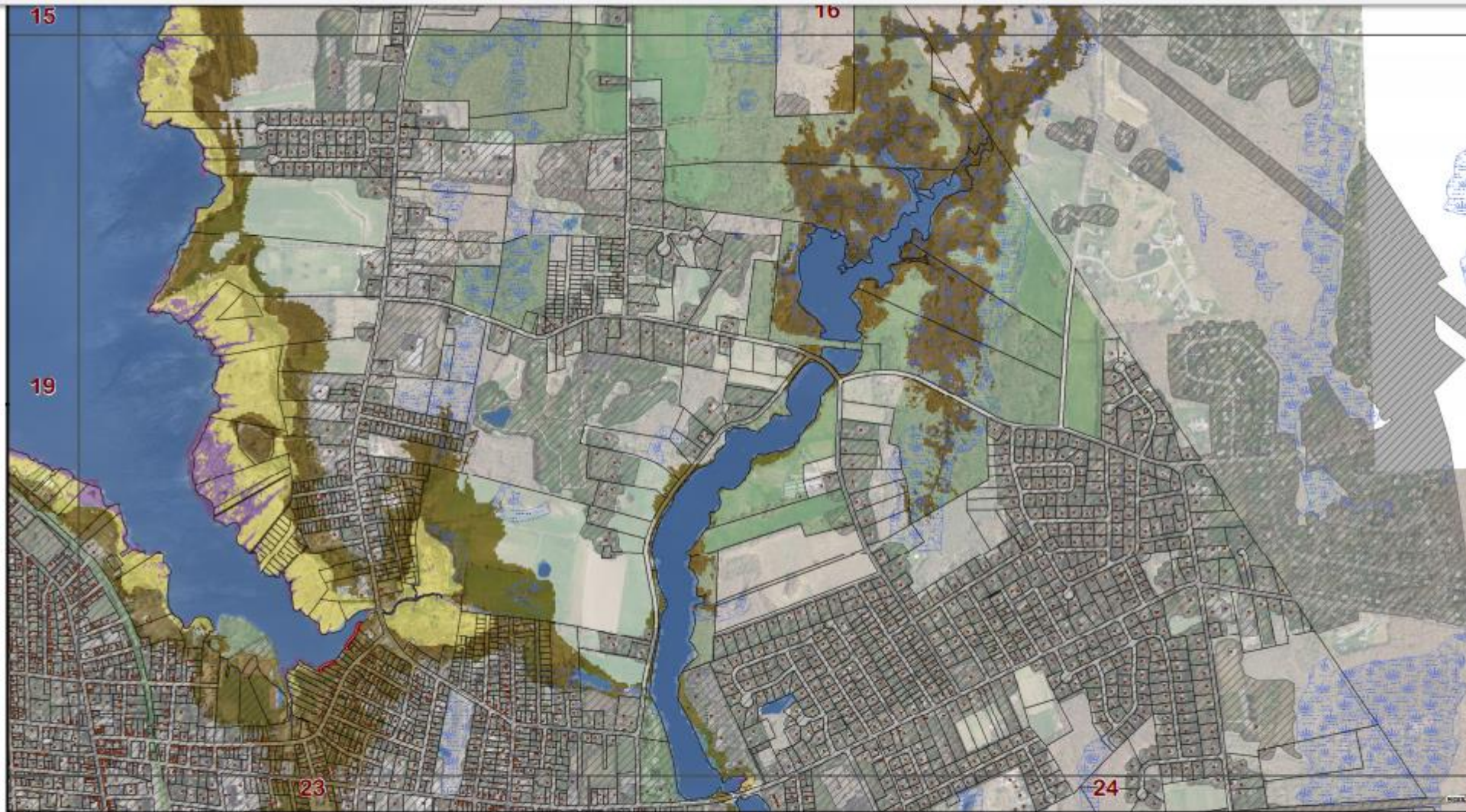
41°42'46.91" N 71°17'14.32" W elev 5 ft

Eye alt 2268 ft

Thank You



Palmer River 3 feet of Sea level rise



Map
20



1:10,000



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- Parcel Boundaries
- Developed Land
- CRMC Coastal Barriers

Tidal Marsh Vulnerability Analysis Three Foot Sea Level Rise



provided by: William A Dalpe
need Aerial photography call 800-830-8848

