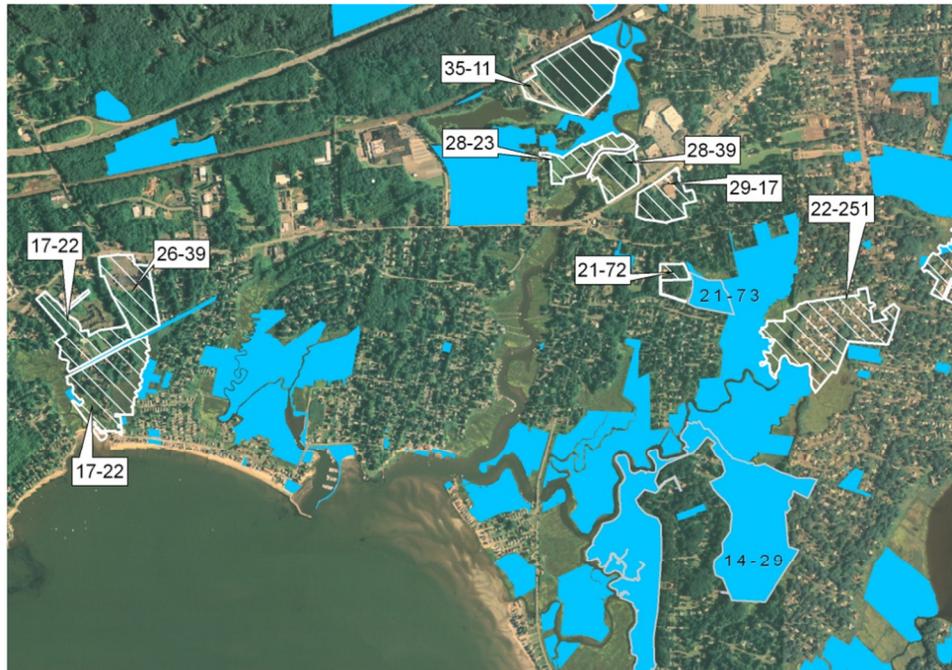


A Salt Marsh Advancement Zone Assessment of Old Saybrook, Connecticut



Front cover image: Protected and unprotected parcels critical to the conservation of marsh advancement corridors in Old Saybrook; from the accompanying Comprehensive Map Book of Old Saybrook, Connecticut.

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RECOMMENDED CITATION:

Pardo, S. and A. W. Whelchel. 2013. A Salt Marsh Advancement Zone Assessment of Old Saybrook, Connecticut. The Nature Conservancy, Coastal Resilience Program. Publication Series #1-A, New Haven, CT.

Introduction

In 2006, The Nature Conservancy established the Coastal Resilience Program (www.coastalresilience.org) that provides tools and a solution framework to support decisions that reduce the ecological and socio-economic risk of coastal hazards and comprehensively improve community resilience. The Program focuses on helping decision-makers explore locally relevant, downscaled, coastal flooding scenarios from sea-level rise and/or storm surge, analyze the potential ecological, social and economic impacts of each scenario at a local, state and regional scale, and facilitate progressive solutions to address these issues. Since that time, The Nature Conservancy has assisted many coastal communities in Connecticut by providing critical information and a comprehensive, community-based, engagement process designed to improve overall resilience and sustainability.

There is a universal recognition by coastal communities in Connecticut that natural infrastructure – wetlands, forests, floodplains - is a cost effective, long-term solution to help make people, infrastructure and natural systems more resilient to extreme weather and climatic change. Fortunately, our state has a remarkable diversity and abundance of natural resources that provide habitat for wildlife and fisheries, enhance the aesthetics and quality of life for residents, and, of course, serve to buffer the shoreline and rivers as natural defenses against hazards such as storm surge, inland flooding, and sea level rise. The presence of natural resources in the state – in particular beaches/dunes, salt marsh, forested headwaters, and river floodplains – is the result of previous recognition and commitment to long-term conservation and the requisite balance with socio-economic growth. In order to maintain these natural resources it will require 1) routine and on-going management activities as well as the restoration of degraded areas, 2) forward-looking planning to accommodate changes in habitat composition and location due to climatic change and 3) enforcement, modification and/or development of new land use policies and growth strategies. There are also opportunities to integrate the services (surface runoff storage and infiltration, wave attenuation, pollutant sorption, etc...) provided by natural infrastructure via new development, redevelopment, or realignment activities. Economically important co-benefits from natural infrastructure include services such as improved filtering of pollutants from runoff, erosion control, and improved aesthetics and desirable public amenities. Taken in total, the immediate and longer-term management of and for natural infrastructure by the State, Towns, private property owners, non-profit organizations, and others will help to reduce the hazard risk and improve the resilience within Connecticut.

While longer-term changes in temperature and precipitation patterns will alter the species composition and type of habitats in a given location, the more immediate implication is the upslope migration or advancement of habitats such as salt marsh in response to continued sea level rise. Sea level rise and the impacts of flooding have and will continue to alter the presence and abundance of natural resources in Connecticut. One of the most noticeable changes is occurring at the shoreline's edge where salt marsh is in the process of advancing upslope with sea levels into areas now considered uplands. In order to clearly identify where this will occur along Old Saybrook's shoreline, The Nature Conservancy presents the following report to assist with future planning for natural resources in the context of overall risk reduction and resiliency improvement for the community. Ultimately, it is our hope that this report will serve to inform the community about future marsh advancement locations, current land use of those

locations and which parcels are critical for securing advancement into suitable sites to ensure the persistence of natural resources in Old Saybrook longer term.

The Salt Marsh Advancement Model used in this analysis was co-developed by The Nature Conservancy and the University of Connecticut's Department of Natural Resources Management and Engineering. A full discussion of the Model and underlying methodology is beyond the scope of this report¹, but a few important details are needed to put the following analysis into context and define how to use the results for planning and implementation.

Suitable vs. Unsuitable Advancement

In the following tables and figures suitable advancement areas are abbreviated as “Yes” and unsuitable areas are abbreviated as “No”. Suitable areas are classified based on the current land cover type - “forest” or “agrigrass” – and are expected to convert to salt marsh as hydrologic conditions change in response to sea level rise. Land cover types currently classified as “urban” (i.e. roads, buildings, parking lots, etc...) are considered to be unsuitable for marsh advancement at this time. Though much of our analysis is grouped by parcel ID and associated characteristics, these classifications – suitable and unsuitable – exist independent of the parcel boundaries. In other words, a given residential parcel can have both suitable (lawn) and unsuitable (building footprint) advancement areas.

Marsh Advancement vs. Wetland Extent

There is a key distinction in this report between the current wetland extent in a municipality and the marsh advancement areas analyzed herein. Marsh advancement areas include only the future projected wetland extent clipped to current upland land cover. Therefore, no assumption should be made about net gain or loss of current wetland extent based on this advancement area analysis. Another key consideration is that in some cases the identified advancement area will include land that converts to wetlands and subsequently to open water over time. This further demonstrates that net change in both existing and future wetland extent should not be inferred from our analysis.

Planning for the Future

The advancement and eventual establishment of coastal marshes will occur over the course of several decades and as such our analysis extends out to the 2080s. The rate of change is slow and decadal, yet at the same time it is inevitable. There is an abundance of existing property, infrastructure and natural resource assets clustered along the Connecticut coast and communities will need to formulate growth and realignment plans well in advance of the 2080s scenario presented here. The following data analysis and associated map book can assist with a resilient transition through the presentation of marsh advancement areas and an accounting of the projected changes to coastal property.

¹ Detailed methods for advancement zone can be found on the Long Island Sound coastal resilience site (lis.coastalresilience.org) and downloaded directly from here: http://lis.coastalresilience.org/xml/Advancement_Zones.pdf

Total Marsh Advancement

The full extent of marsh advancement by the 2080s is projected to be 1,042 acres, with 825 acres (79%) considered to be suitable sites for wetland migration in Old Saybrook. Currently, 217 acres (21% of total) are occupied by built structures and associated infrastructure (“urban”).

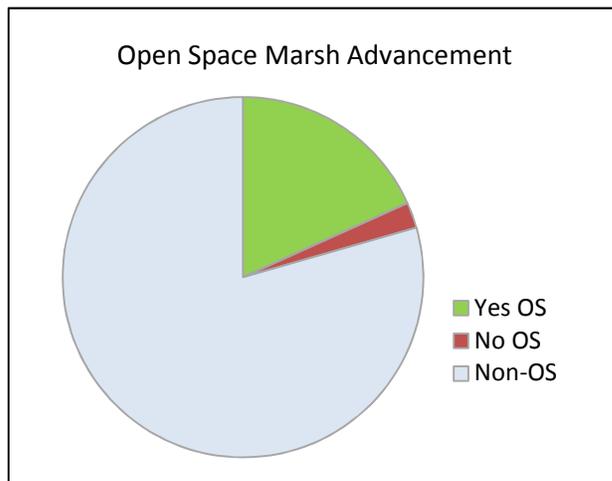
Total Marsh Advancement by 2080s		
Marsh Adv	Acres	Percent (%)
Yes	825.1	79.2
No	216.8	20.8
Total	1,041.9	100

Protected Open Space (OS) Advancement

Existing protected open space (OS) consists of state or municipal parks, conservation easements on private property, or simply properties owned by land trusts. The unifying characteristic of these properties, and what makes them a critical component of long-term community resilience, is that they currently have little to no development and are the most likely areas to remain undeveloped through the 2080s. The recognition of their role in future wetland extent and improved resilience in Old Saybrook is vital information for land management, economic development, and planning.

Total OS Advancement

Protected OS parcels contain 214 acres of marsh advancement area with nearly that entire sum (190 acres) classified as suitable for future wetlands. However, this suitable open space (Yes OS) only accounts for 18% of the overall marsh advancement in Old Saybrook. Further analysis of the much larger proportion of unprotected open space parcels (Non-OS) can be found in the “Unprotected Open Space Advancement” section below.

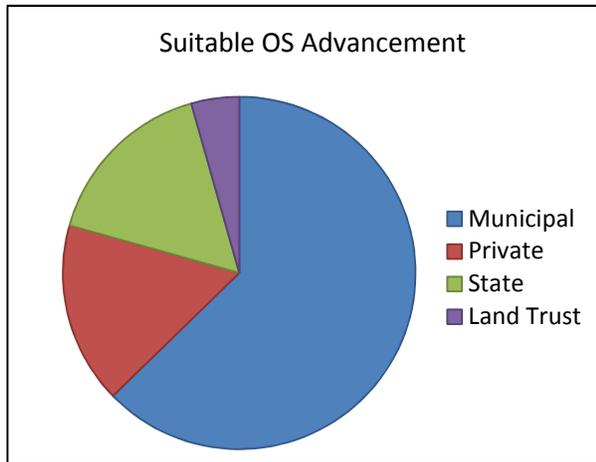


Open Space Marsh Advancement		
OS type	Acres	Percent (%)
Yes OS	190.2	18.3
No OS	23.9	2.3
Non-OS	827.8	79.4
Total	1,041.9	100

(next page)

Suitable OS Advancement by Owner

A closer look at the protected OS advancement (190 acres – 23% of total advancement (1,042 acres)) reveals that nearly two-thirds of this suitable area is projected to occur on municipal-owned parcels (119 acres). This accounts for the largest portion of overall suitable advancement (protected and unprotected) in Old Saybrook at 14.5%. State and privately owned parcels round out the remaining third of suitable OS advancement with 30 and 31 acres, respectively.

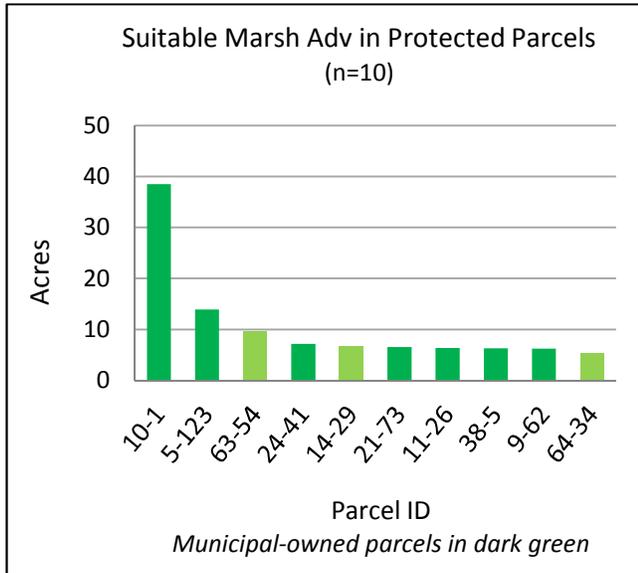


Suitable OS Advancement			
Owner type	Acres	% of total "yes" OS	% of total "yes" adv
Municipal	119.3	62.7	14.5
Private	31.7	16.6	3.8
State	30.9	16.2	3.7
Land Trust	8.4	4.4	1.0
Total	190.2	100	23.1

(next page)

Suitable Advancement by OS Parcel

There are 143 protected OS parcels that contain suitable advancement in Old Saybrook with the Fenwick Golf Course (10-1 and 5-123) accounting for 52 acres, or 27.5% of the total. The top 10 protected OS parcels account for over 50% of the total suitable OS advancement and as the previous section suggested, municipal-owned parcels dominate that list. The specified parcels can be viewed via the corresponding Map Book pages indicated in the table below.



Suitable Marsh Advancement in Protected Parcels			Owner	MapBook Page #
Parcel ID	Acres	% of total "yes" OS		
10-1	38.5	20.2	Muni	13
5-123	13.9	7.3	Muni	13
63-54	9.7	5.1	Private	11
24-41	7.2	3.8	Muni	13
14-29	6.7	3.5	State	12
21-73	6.5	3.4	Muni	12
11-26	6.4	3.3	Muni	13
38-5	6.3	3.3	Muni	12
9-62	6.2	3.3	Muni	13
64-34	5.4	2.8	Private	11
Total	106.8	56.2		

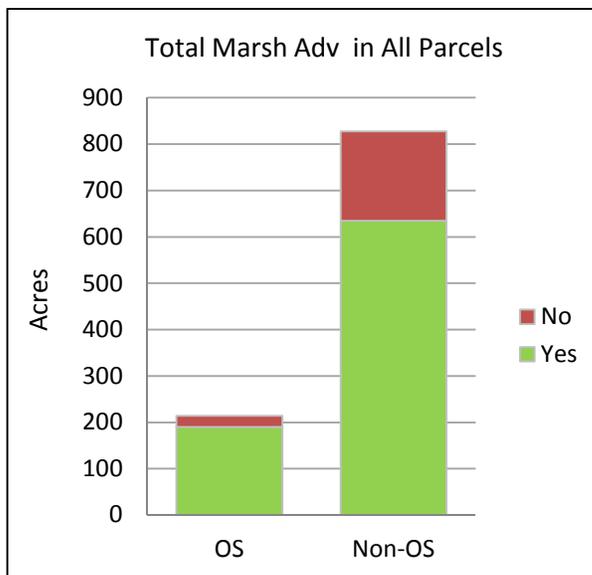
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Unprotected Advancement

This section provides an analysis of suitable marsh advancement in unprotected parcels. The following results help to put the OS analysis into perspective, as well as identify important unprotected private parcels in the marsh advancement landscape of Old Saybrook.

Total Advancement: Protected (OS) vs. Unprotected (Non-OS)

The total advancement found in unprotected parcels (Non-OS) parcels is 828 acres, an amount almost four times greater than total protected (OS) advancement at 214 acres. The discrepancy between the two is slightly less extreme when comparing only the suitable advancement areas, yet unprotected parcels are still expected to receive greater than three times of the marsh advancement. This information has two important implications for future planning; 1) today's unprotected property will play a vital role in maintaining Old Saybrook's wetland resources in the future, and 2) a large amount of critical development (193 acres), namely residences and transportation infrastructure, will be in conflict with rising seas and advancing marshes.

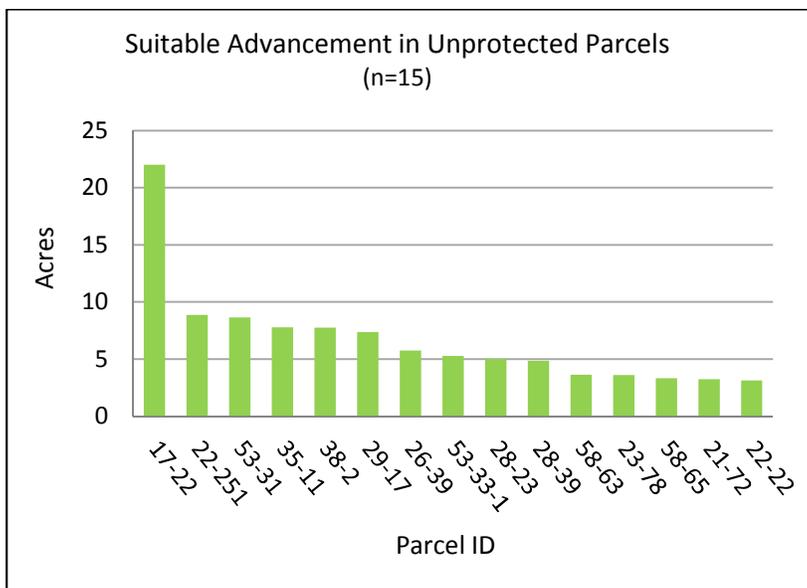


Parcel type	Total Suitable Advancement		Total
	"yes" acres	"no" acres	
OS	190.2	23.9	214.1
Non-OS	634.8	193	827.8
Total	825.1	216.8	1,041.9

(next page)

Suitable Advancement in Unprotected Parcels

There are over 2,000 parcels with suitable marsh advancement areas in Old Saybrook, which is close to a third of all parcels town-wide. Well over 100 of these parcels contain greater than an acre of suitable advancement producing wider distribution of marsh advancement than is typically found in other coastal Connecticut towns. This is due to Old Saybrook's unique estuarine-dominated shoreline situated at the confluence of the Connecticut River and Long Island Sound. The combination of low-lying, residential neighborhoods with medium density interspersed by a network of tidal tributaries results in the distribution of the marsh advancement areas across many parcels. Moreover, the building footprint captures a significant portion of these relatively small parcels, which is why the amount of unsuitable advancement is relatively high in contrast to other parts of the state's coast. The specified parcels can be viewed via the corresponding Map Book pages indicated in the table below.

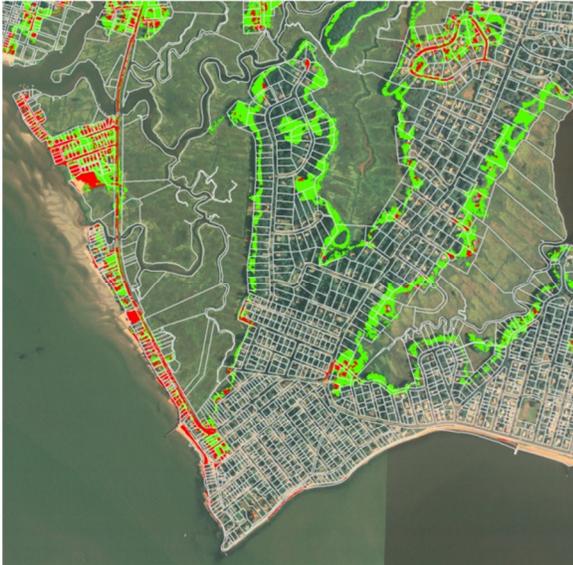


Suitable Marsh Adv in Unprotected Parcels			MapBook Page #
Parcel ID	Acres	% of total yes adv	
17-22	22.0	2.7	8,12,20,34
22-251	8.9	1.1	8,12,21,35
53-31	8.6	1.0	7,11,19,33
35-11	7.8	0.9	8,12,21,35
38-2	7.8	0.9	8,12,18,32
29-17	7.3	0.9	8,12,21,35
26-39	5.7	0.7	8,12,20,34
53-33-1	5.3	0.6	7,11,19,33
28-23	5.0	0.6	8,12,21,35
28-39	4.9	0.6	8,12,21,35
58-63	3.6	0.4	7,11,16,30
23-78	3.6	0.4	9,13,22,36
58-65	3.3	0.4	7,11,16,30
21-72	3.2	0.4	8,12,21,35
22-22	3.1	0.4	9,13,22,36
Total	100.1	12.1	

Appendix

Please consult your Marsh Advancement Resource Disc for the complete list of suitable and unsuitable advancement per parcel.

Comprehensive Map Book of Old Saybrook, Connecticut



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Inset Maps

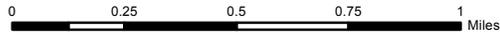
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Advancement per Parcel	28

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Marsh Advancement by the 2080s

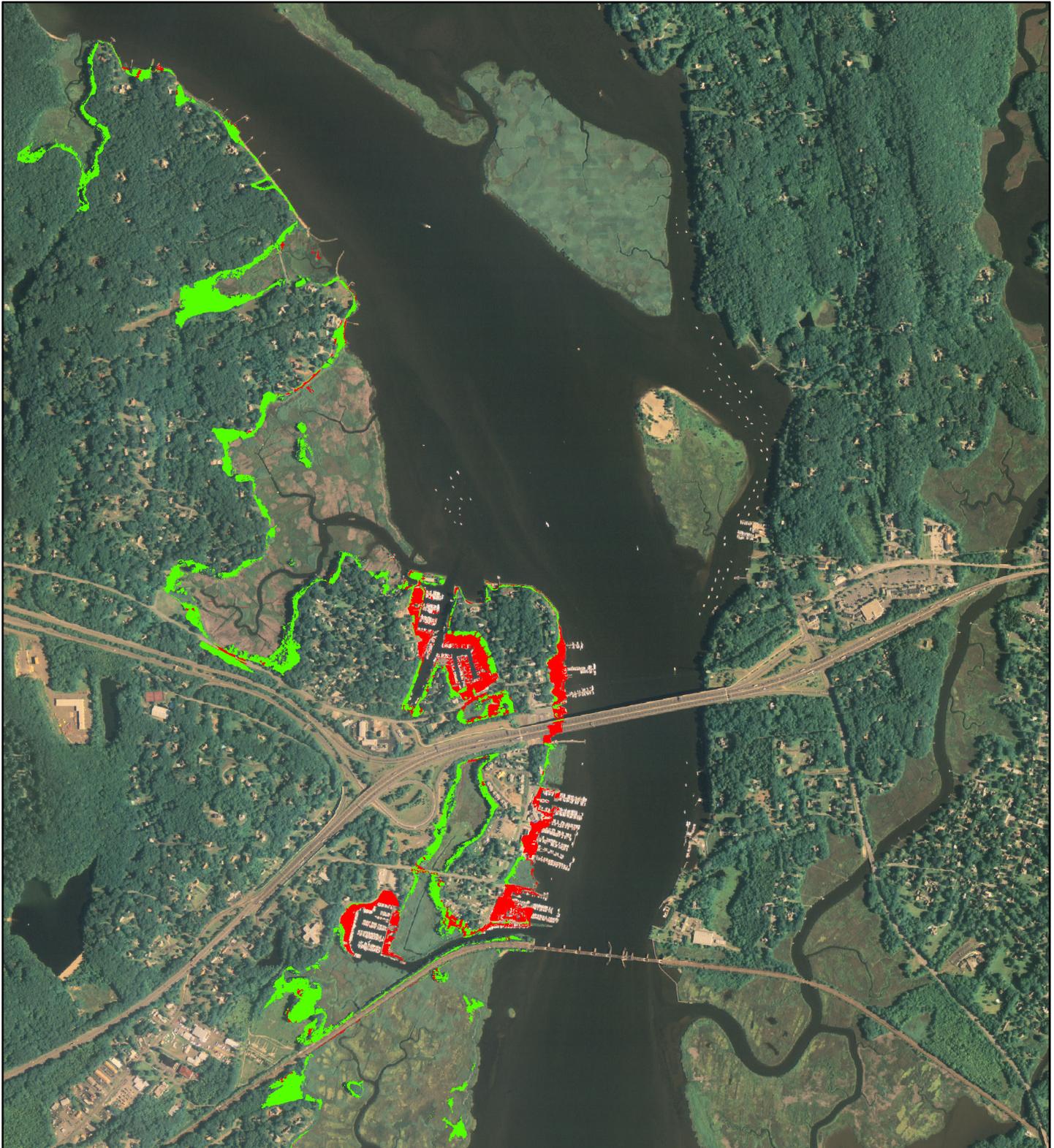
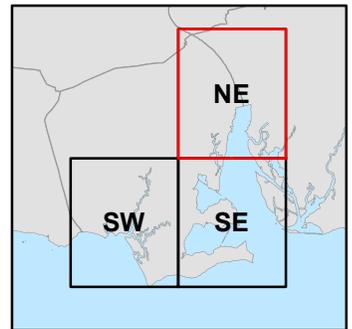
Town of Old Saybrook, CT

Marsh Advancement - NE



Marsh Advancement

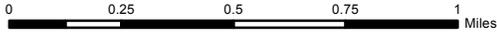
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Marsh Advancement by the 2080s

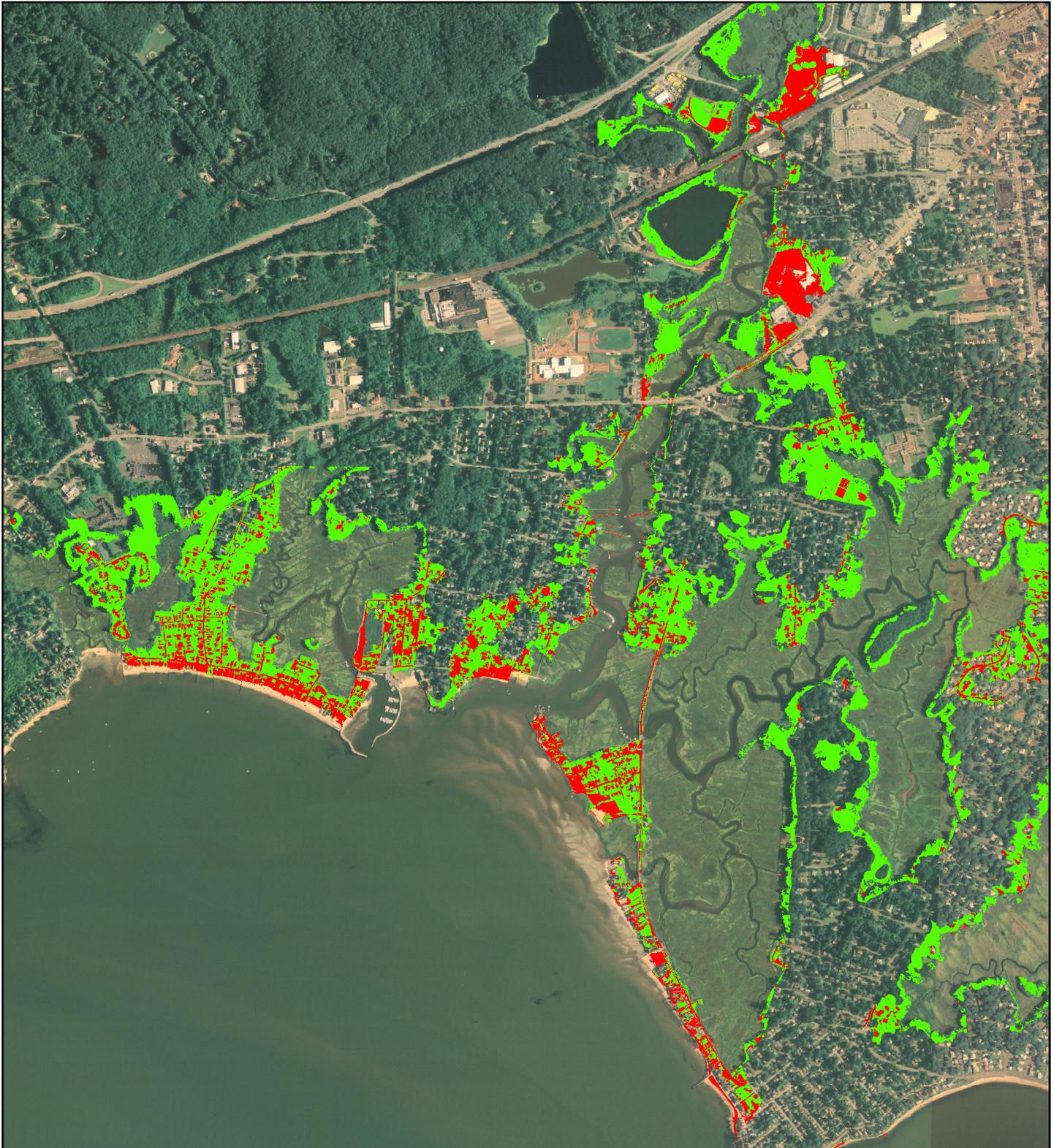
Town of Old Saybrook, CT

Marsh Advancement - SW



Marsh Advancement

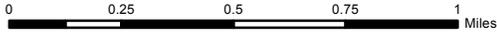
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Marsh Advancement by the 2080s

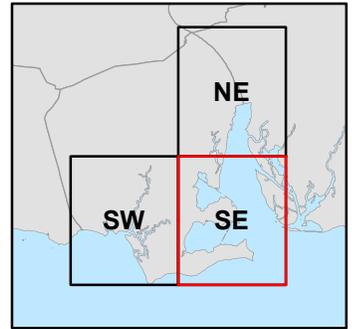
Town of Old Saybrook, CT

Marsh Advancement - SE



Marsh Advancement

- Developed Land Cover
- Forest, Grass, Ag Land Cover

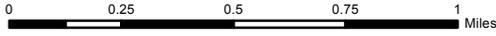
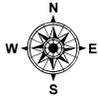


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Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Unprotected Parcels - NE



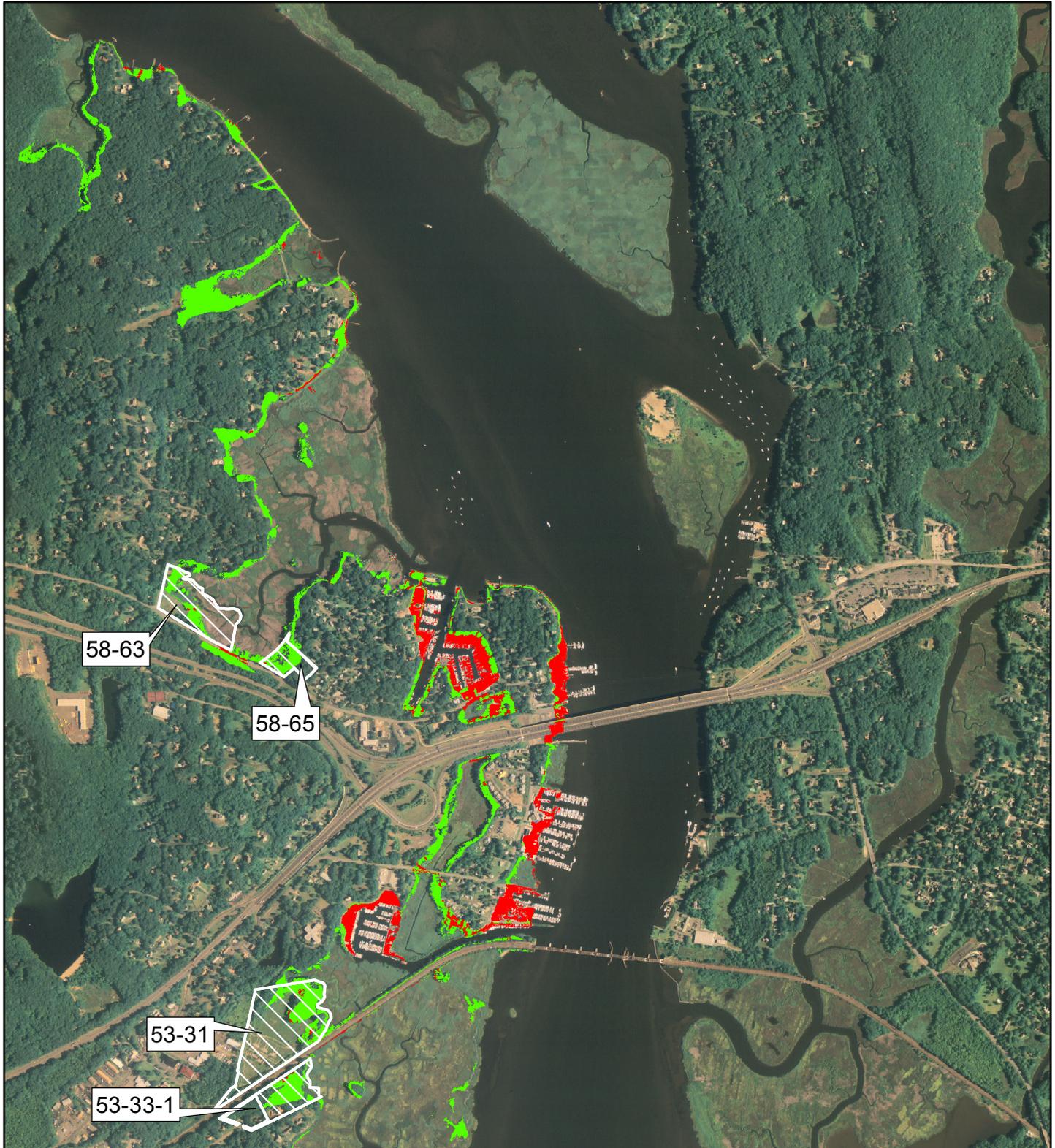
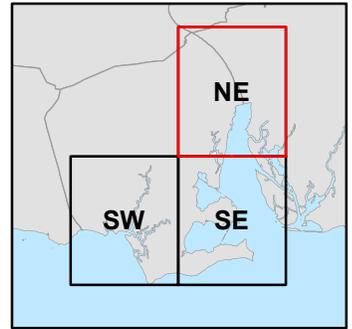
Parcels

- Unprotected Parcels

Marsh Advancement

- Developed Land Cover
- Forest, Grass, Ag Land Cover

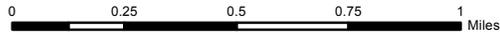
Note: Only the top 15 unprotected parcels are outlined and labeled.



Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Unprotected Parcels - SW



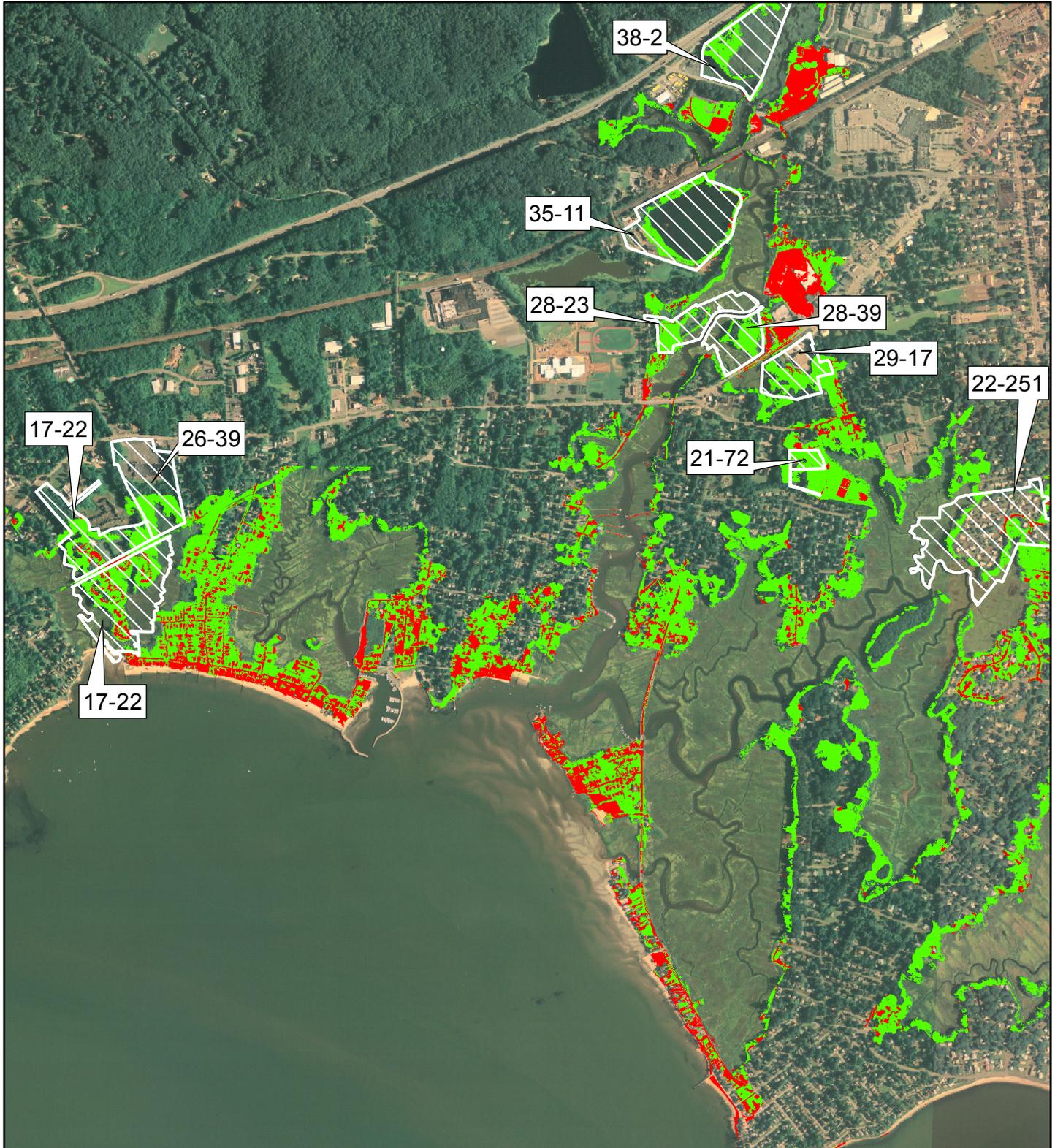
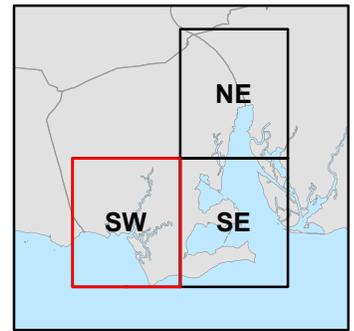
Parcels

- Unprotected Parcels

Marsh Advancement

- Developed Land Cover
- Forest, Grass, Ag Land Cover

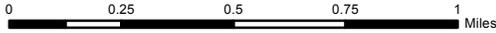
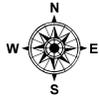
Note: Only the top 15 unprotected parcels are outlined and labeled.



Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Unprotected Parcels - SE



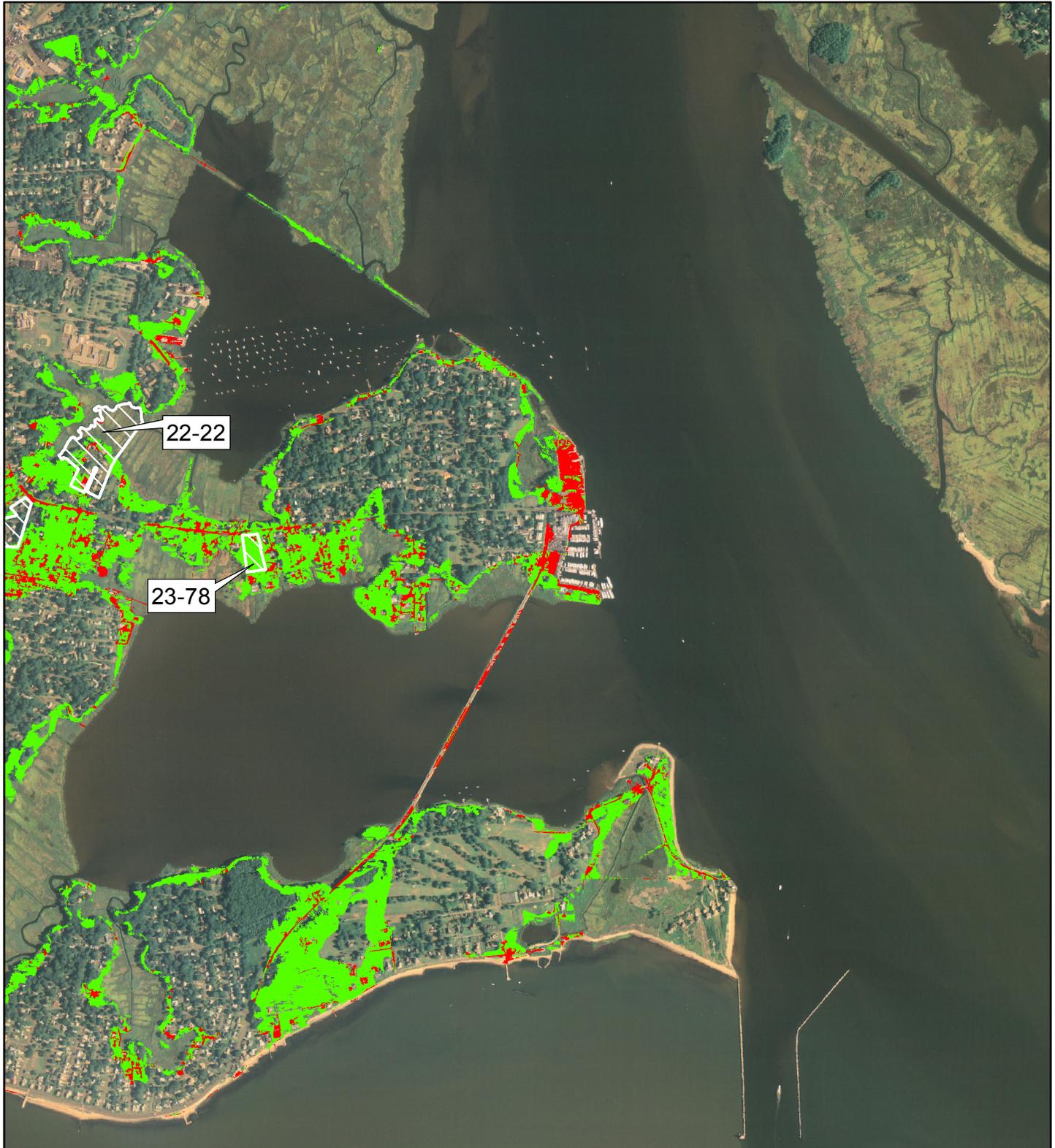
Parcels

- Unprotected Parcels

Marsh Advancement

- Developed Land Cover
- Forest, Grass, Ag Land Cover

Note: Only the top 15 unprotected parcels are outlined and labeled.

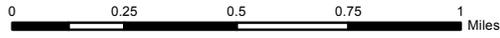


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Marsh Advancement by the 2080s

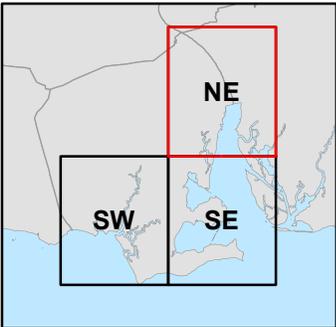
Town of Old Saybrook, CT

Critical Parcels - NE

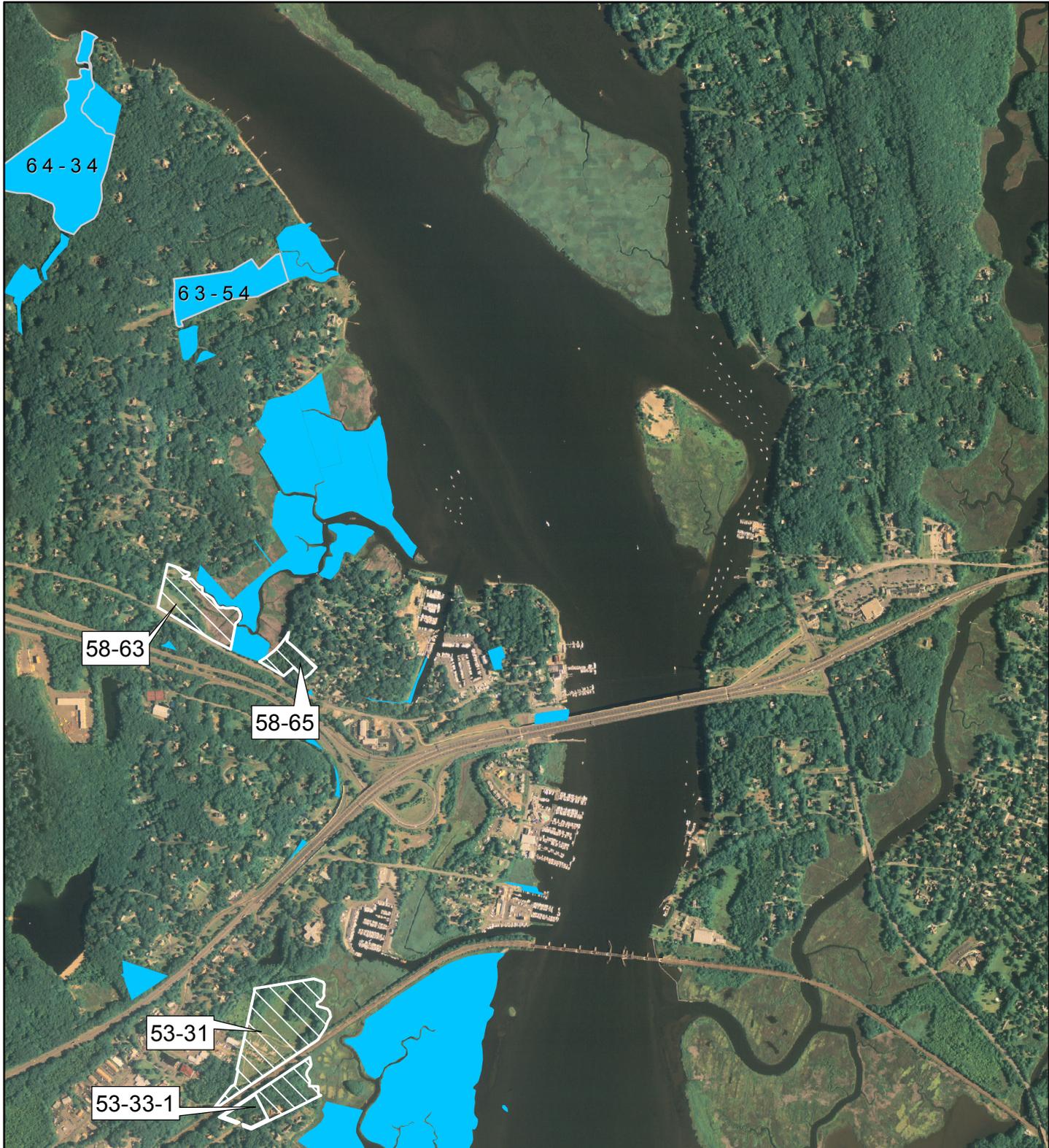


Parcels

- Protected Parcels
- Unprotected Parcels



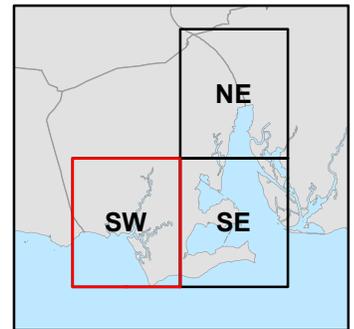
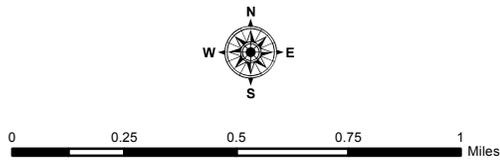
Note: Only the top 15 unprotected parcels are shown and labeled. All protected property is shown but only the top 10 are labeled.



Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Critical Parcels - SW



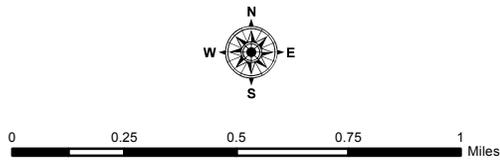
Note: Only the top 15 unprotected parcels are shown and labeled. All protected property is shown but only the top 10 are labeled.



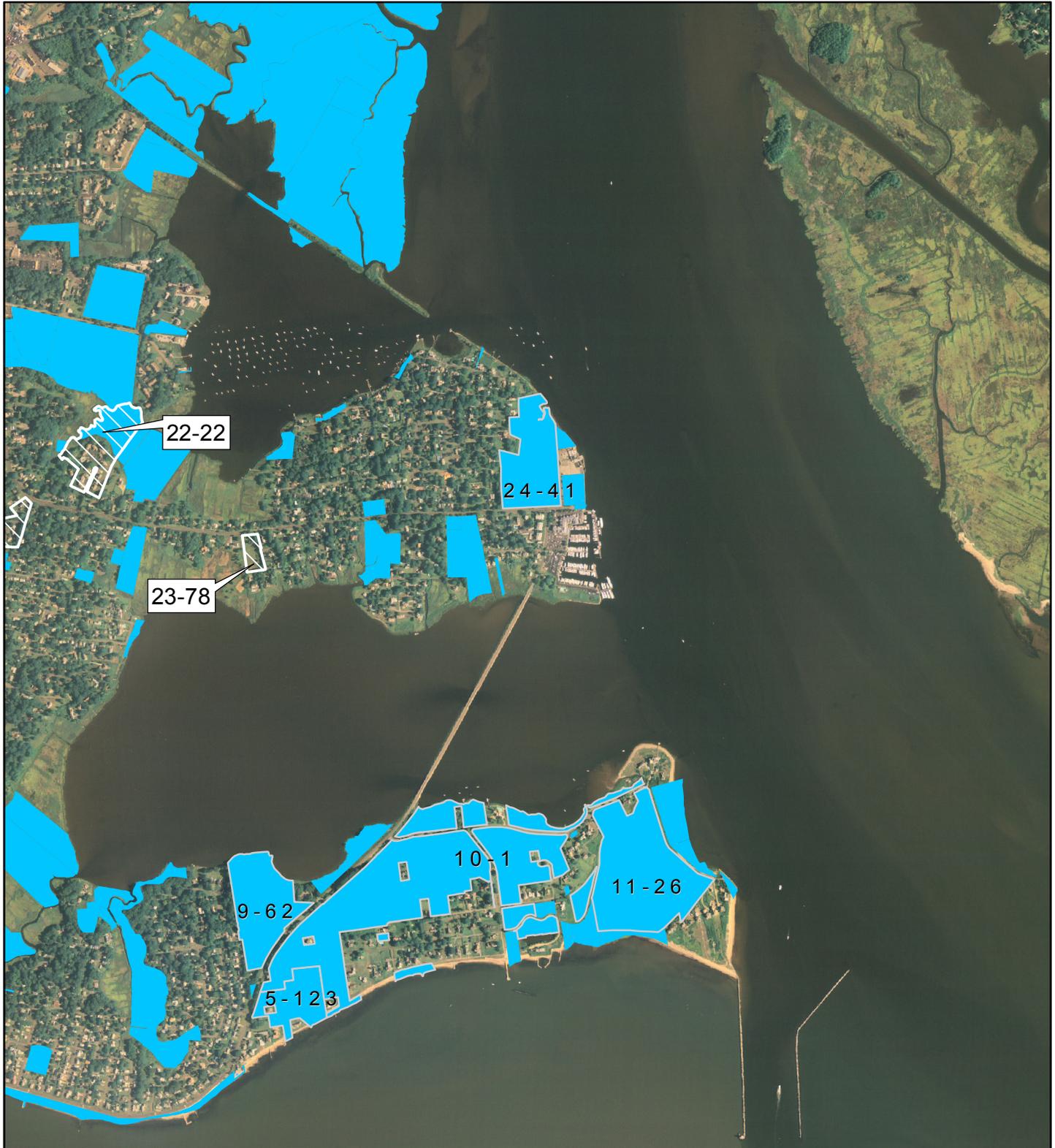
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Critical Parcels - SE

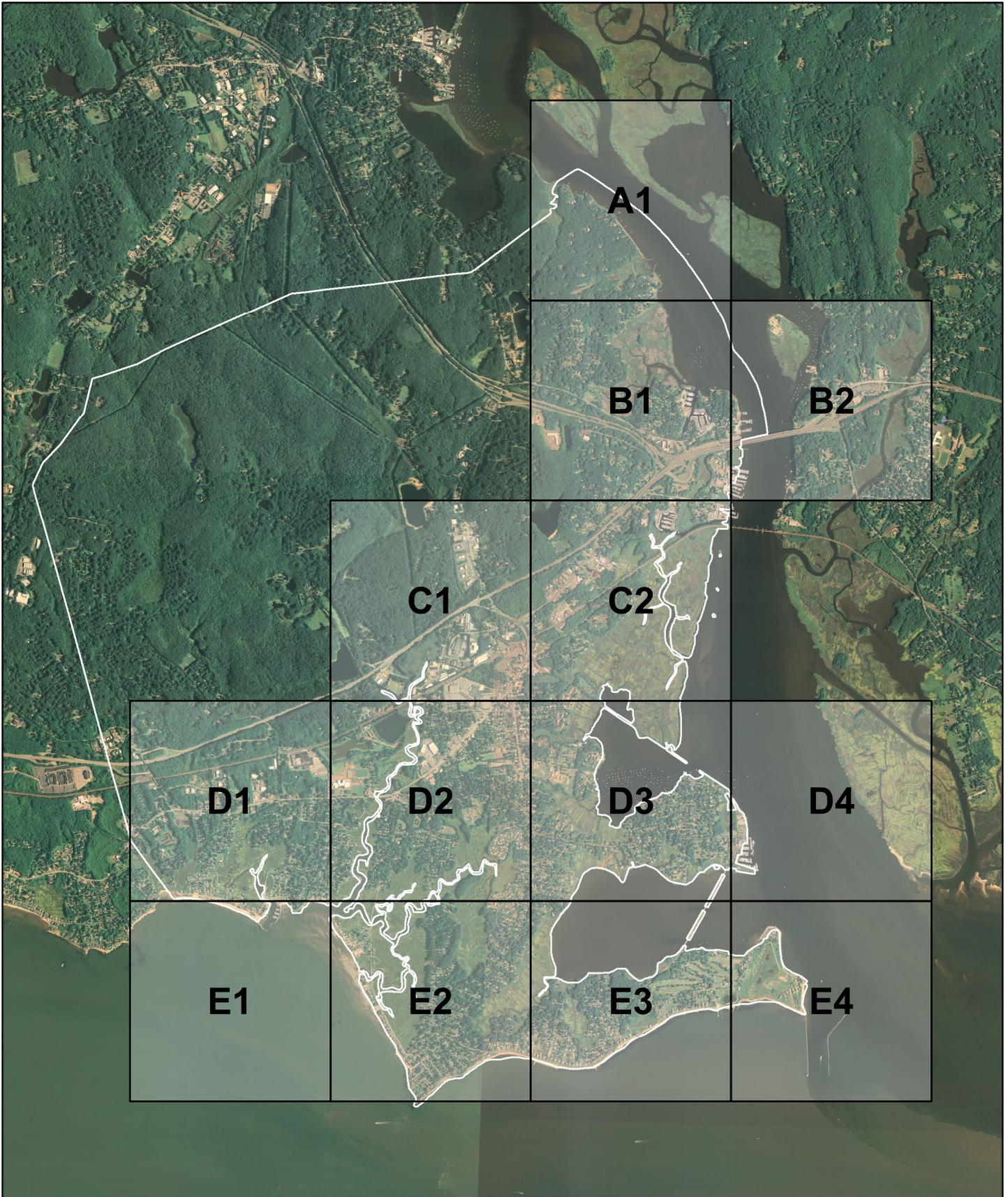


Note: Only the top 15 unprotected parcels are shown and labeled. All protected property is shown but only the top 10 are labeled.



Marsh Advancement by the 2080s

Town of Old Saybrook, CT
Map Index - Unprotected Parcels





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Marsh Advancement by the 2080s

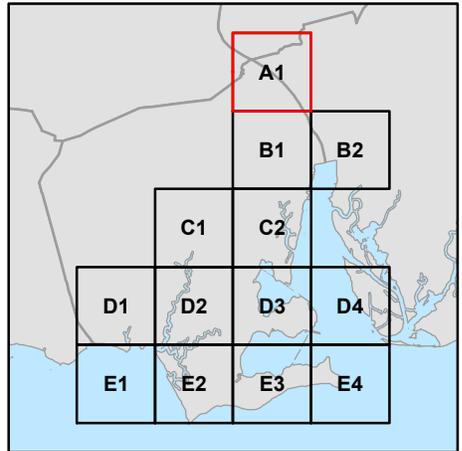
Town of Old Saybrook, CT

Unprotected Parcels - Map A1

Parcels	
	Unprotected Parcels
Marsh Advancement	
	Developed Land Cover
	Forest, Grass, Ag Land Cover



Note: Only the top 15 unprotected parcels are outlined and labeled.





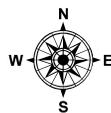
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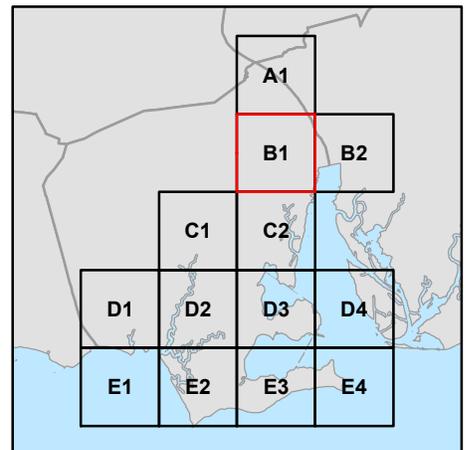
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Marsh Advancement by the 2080s

Town of Old Saybrook, CT Unprotected Parcels - Map B1



Note: Only the top 15 unprotected parcels are outlined and labeled.



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Marsh Advancement by the 2080s

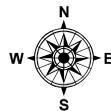
Town of Old Saybrook, CT
 Unprotected Parcels - Map B2

Parcels

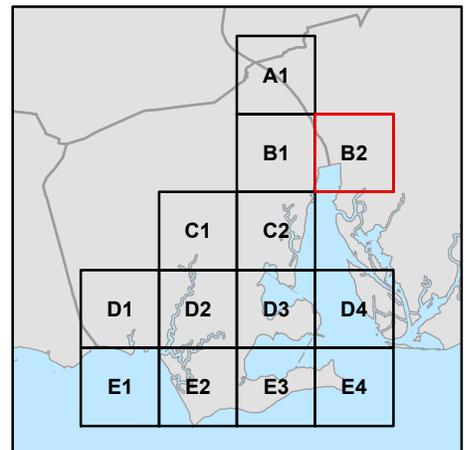
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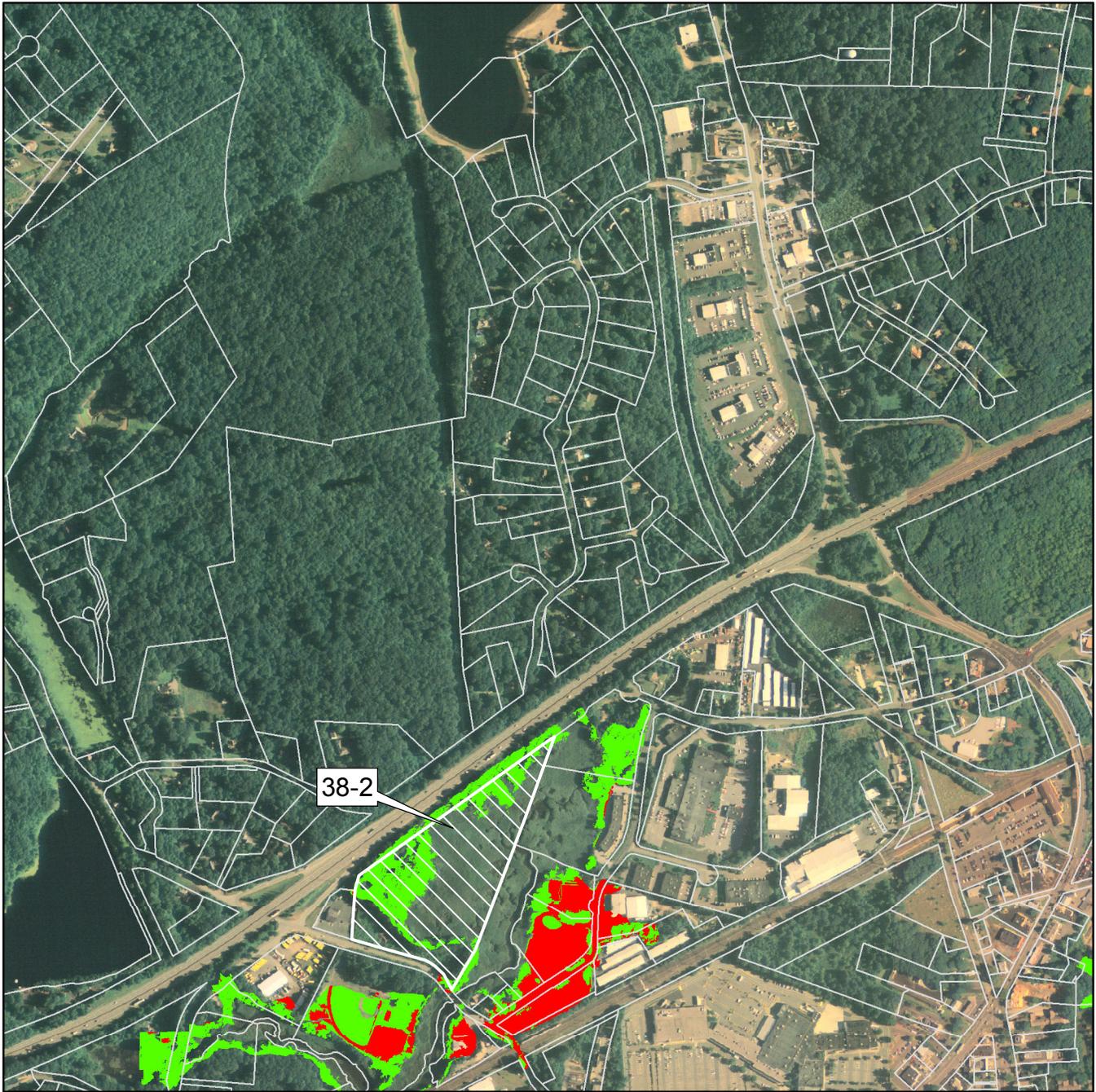
Marsh Advancement

- Developed Land Cover
- Forest, Grass, Ag Land Cover



Note: Only the top 15 unprotected parcels are outlined and labeled.

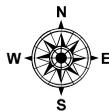




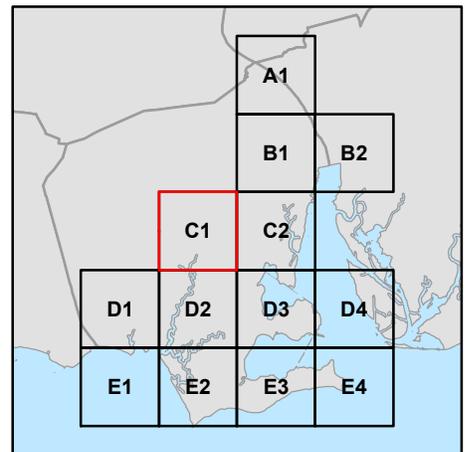
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Marsh Advancement by the 2080s

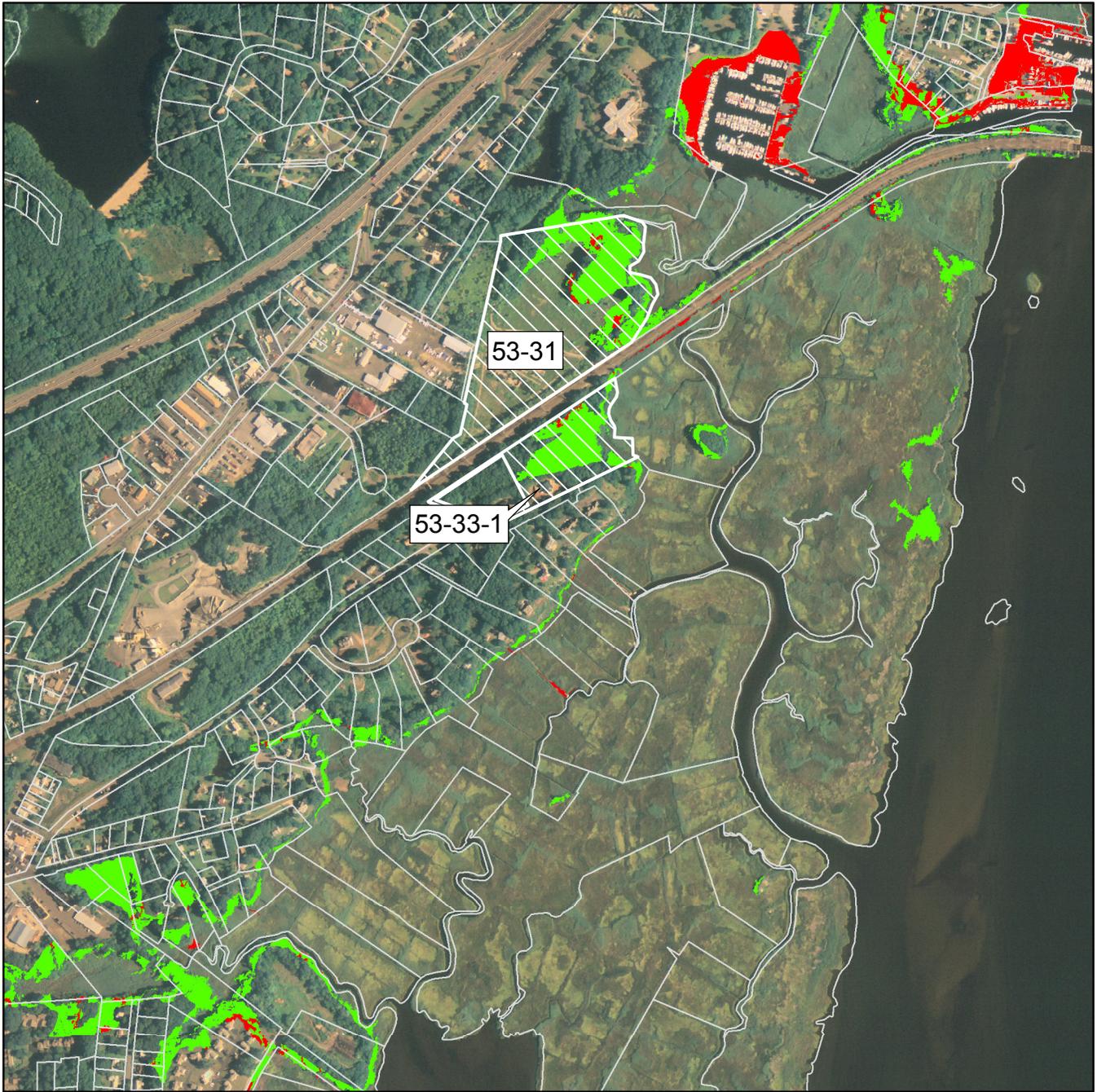
Town of Old Saybrook, CT Unprotected Parcels - Map C1



Note: Only the top 15 unprotected parcels are outlined and labeled.



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0 500 1,000 2,000 3,000 Feet

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Marsh Advancement by the 2080s

Town of Old Saybrook, CT

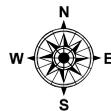
Unprotected Parcels - Map C2

Parcels

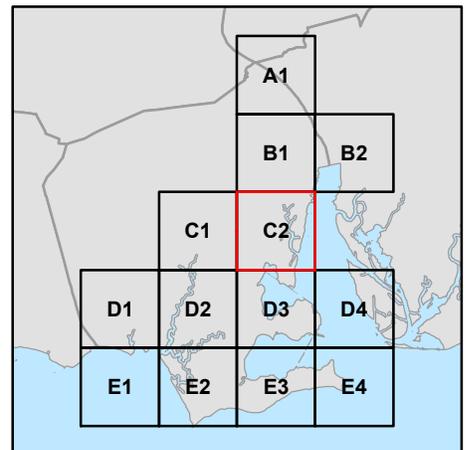
- Unprotected Parcels

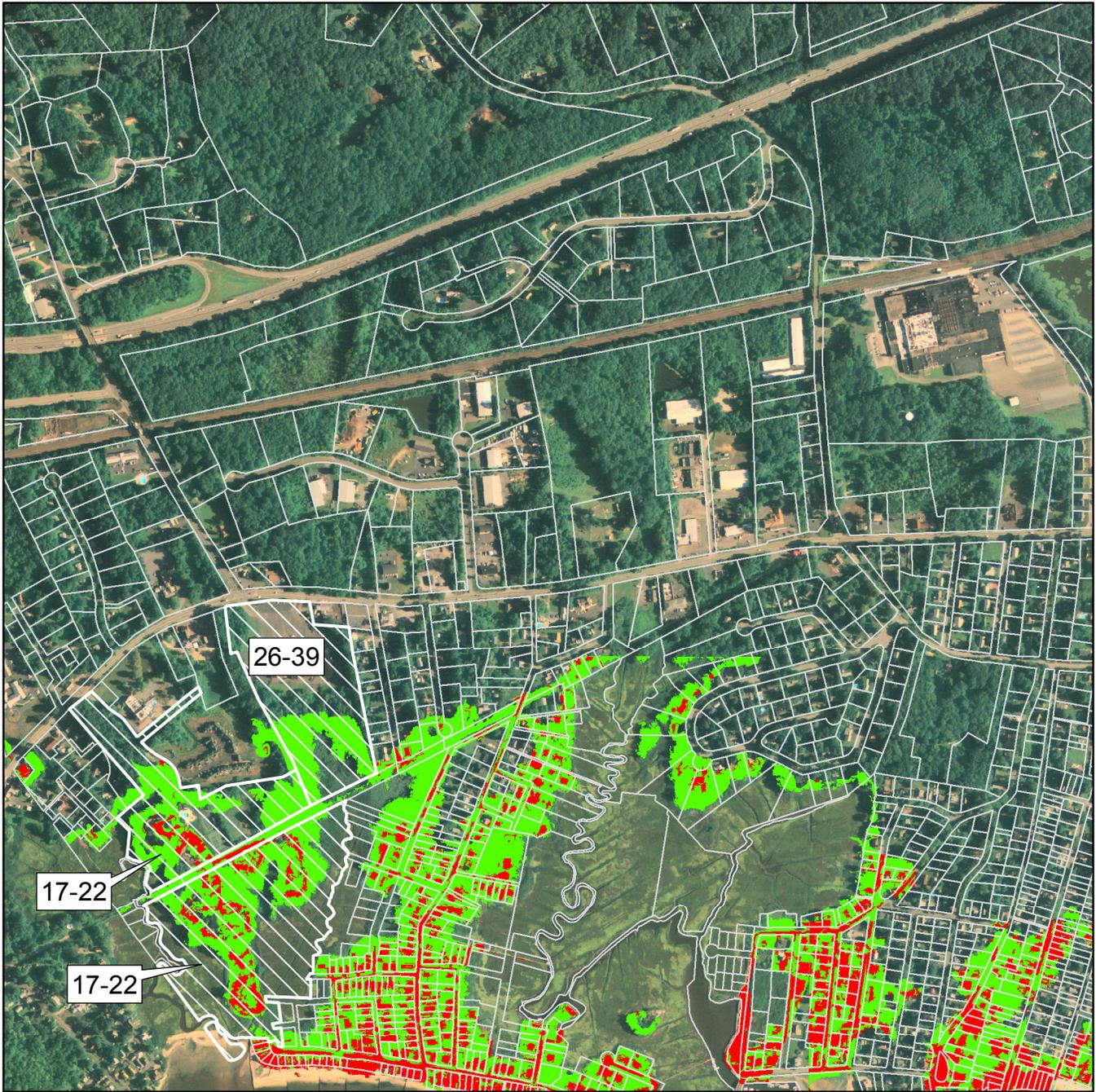
Marsh Advancement

- Developed Land Cover
- Forest, Grass, Ag Land Cover



Note: Only the top 15 unprotected parcels are outlined and labeled.





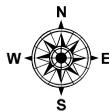
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see page 24

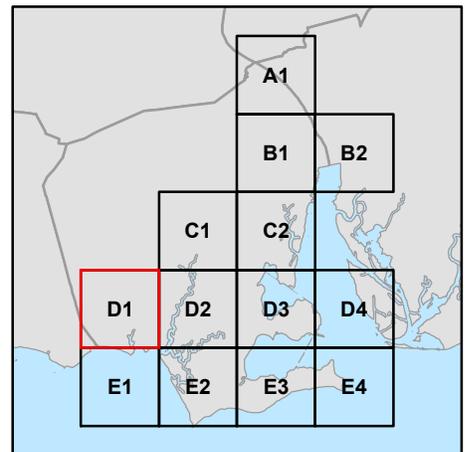
Marsh Advancement by the 2080s

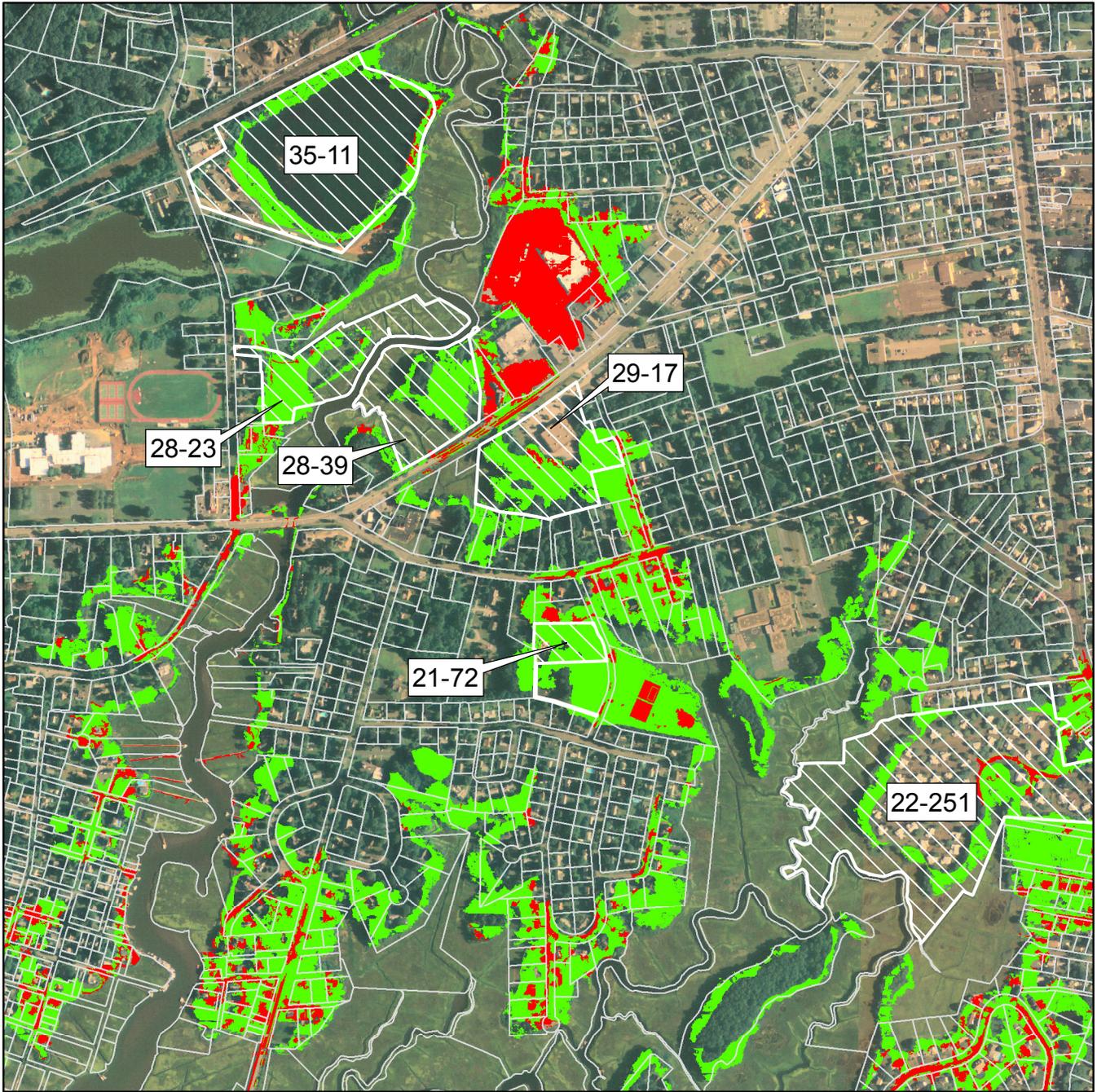
Town of Old Saybrook, CT

Unprotected Parcels - Map D1



Note: Only the top 15 unprotected parcels are outlined and labeled.





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Marsh Advancement by the 2080s

Town of Old Saybrook, CT

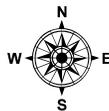
Unprotected Parcels - Map D2

Parcels

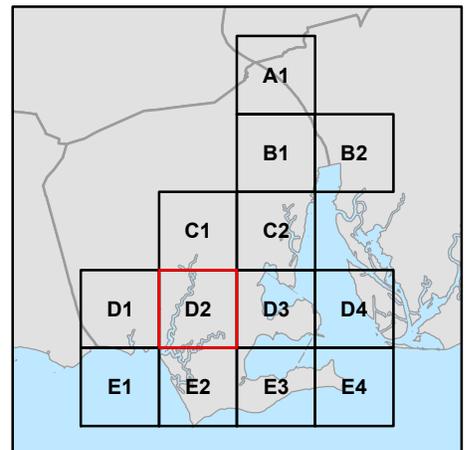
- Unprotected Parcels

Marsh Advancement

- Developed Land Cover
- Forest, Grass, Ag Land Cover



Note: Only the top 15 unprotected parcels are outlined and labeled.



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see page 23

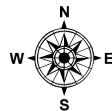


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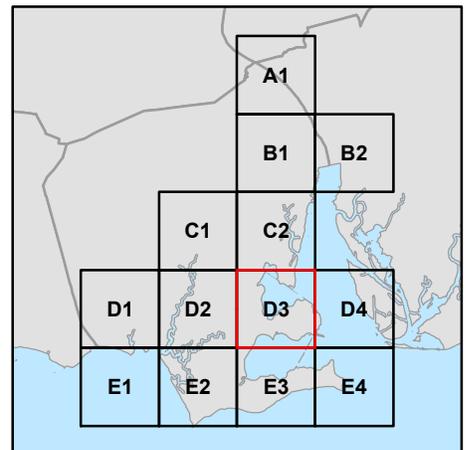
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

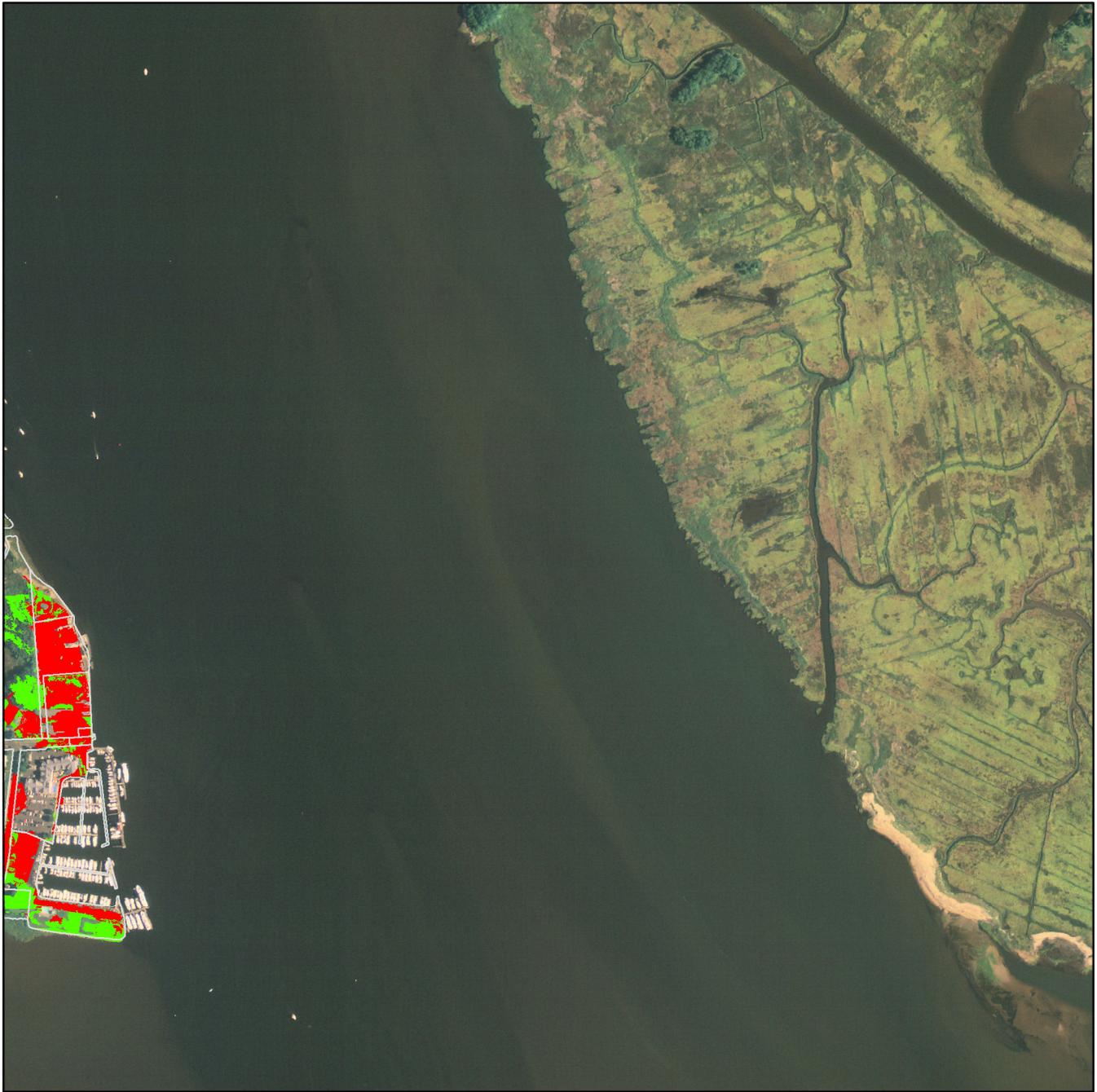
Unprotected Parcels - Map D3



Note: Only the top 15 unprotected parcels are outlined and labeled.



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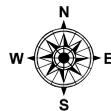
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see page 27

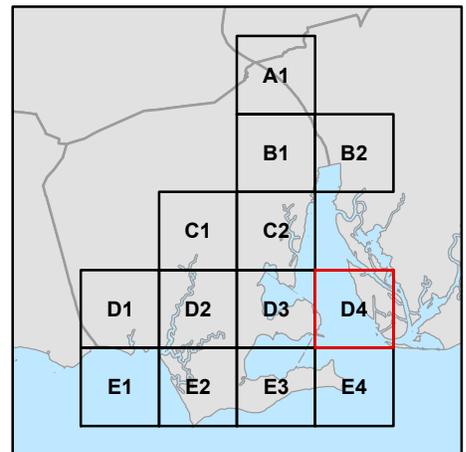
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Unprotected Parcels - Map D4



Note: Only the top 15 unprotected parcels are outlined and labeled.



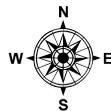


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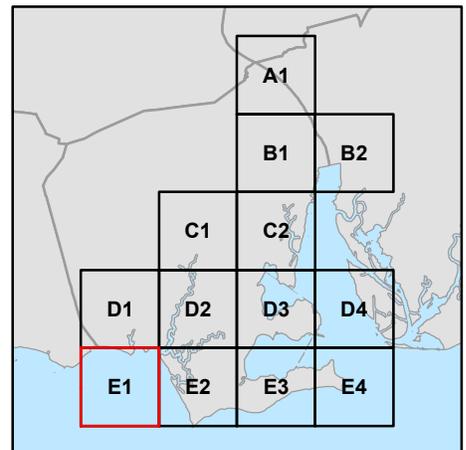


Marsh Advancement by the 2080s

Town of Old Saybrook, CT
Unprotected Parcels - Map E1



Note: Only the top 15 unprotected parcels are outlined and labeled.



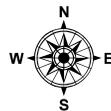
see page 24

see page 26

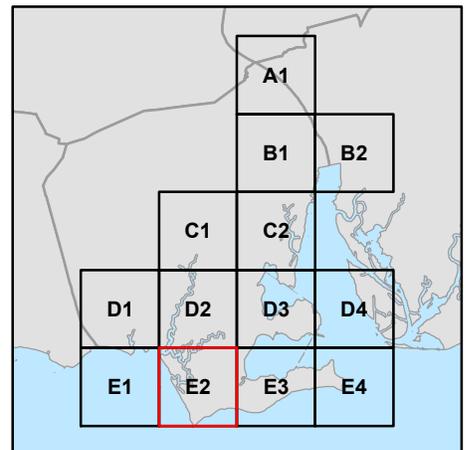


Marsh Advancement by the 2080s

Town of Old Saybrook, CT
Unprotected Parcels - Map E2



Note: Only the top 15 unprotected parcels are outlined and labeled.



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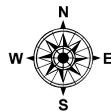
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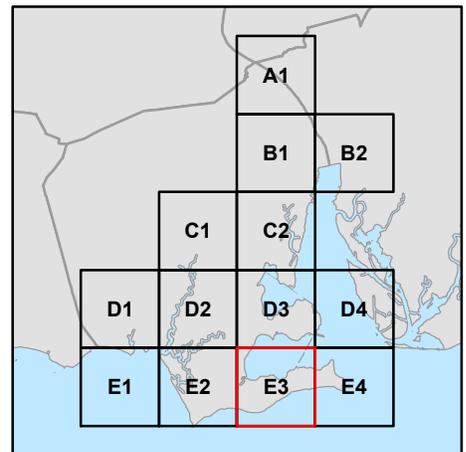
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

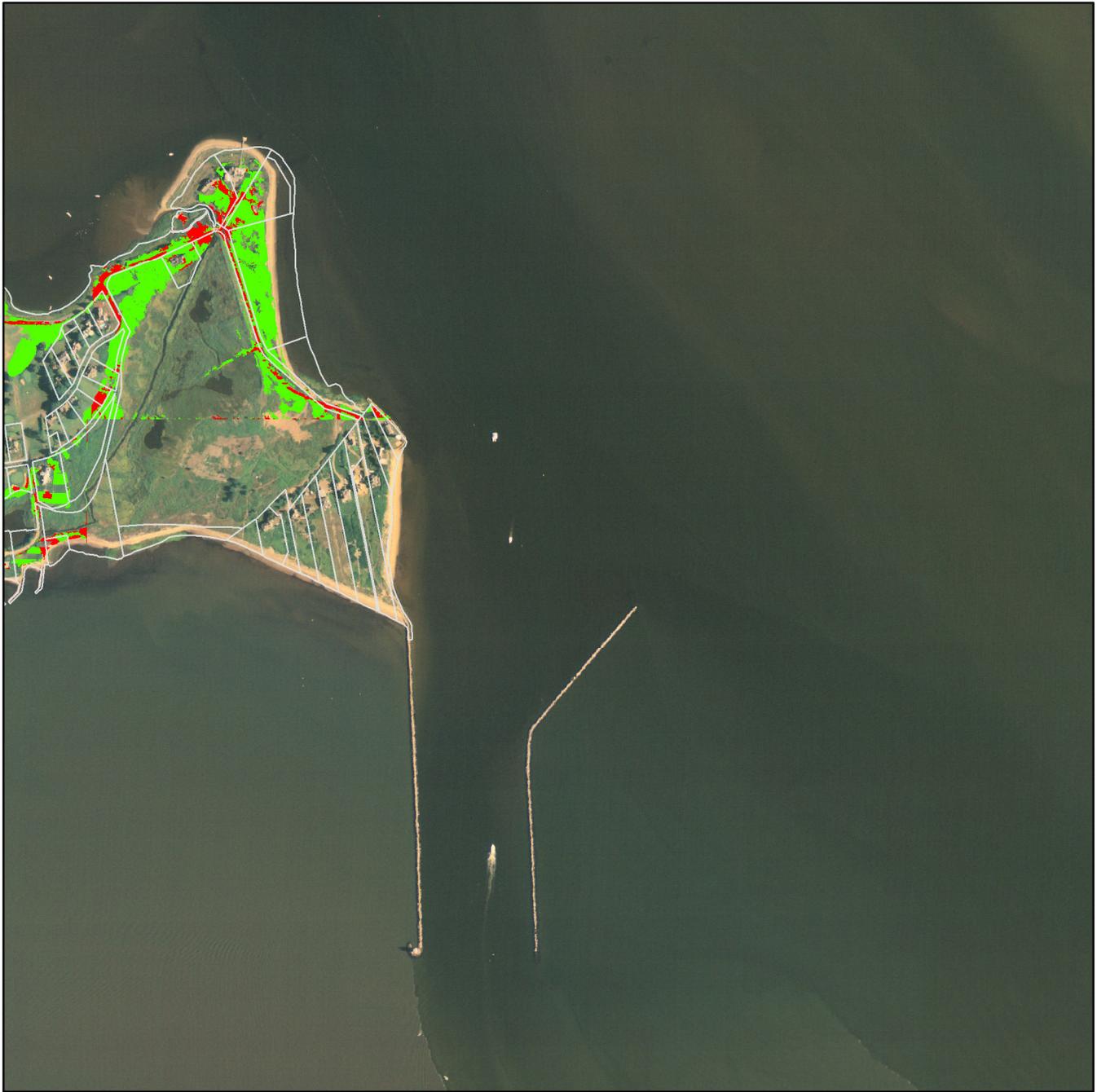
Unprotected Parcels - Map E3



Note: Only the top 15 unprotected parcels are outlined and labeled.



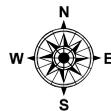
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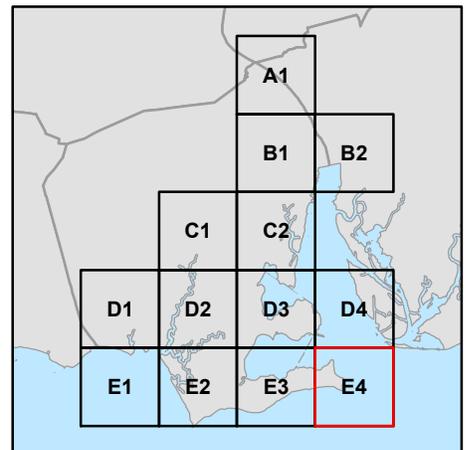
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Unprotected Parcels - Map E4



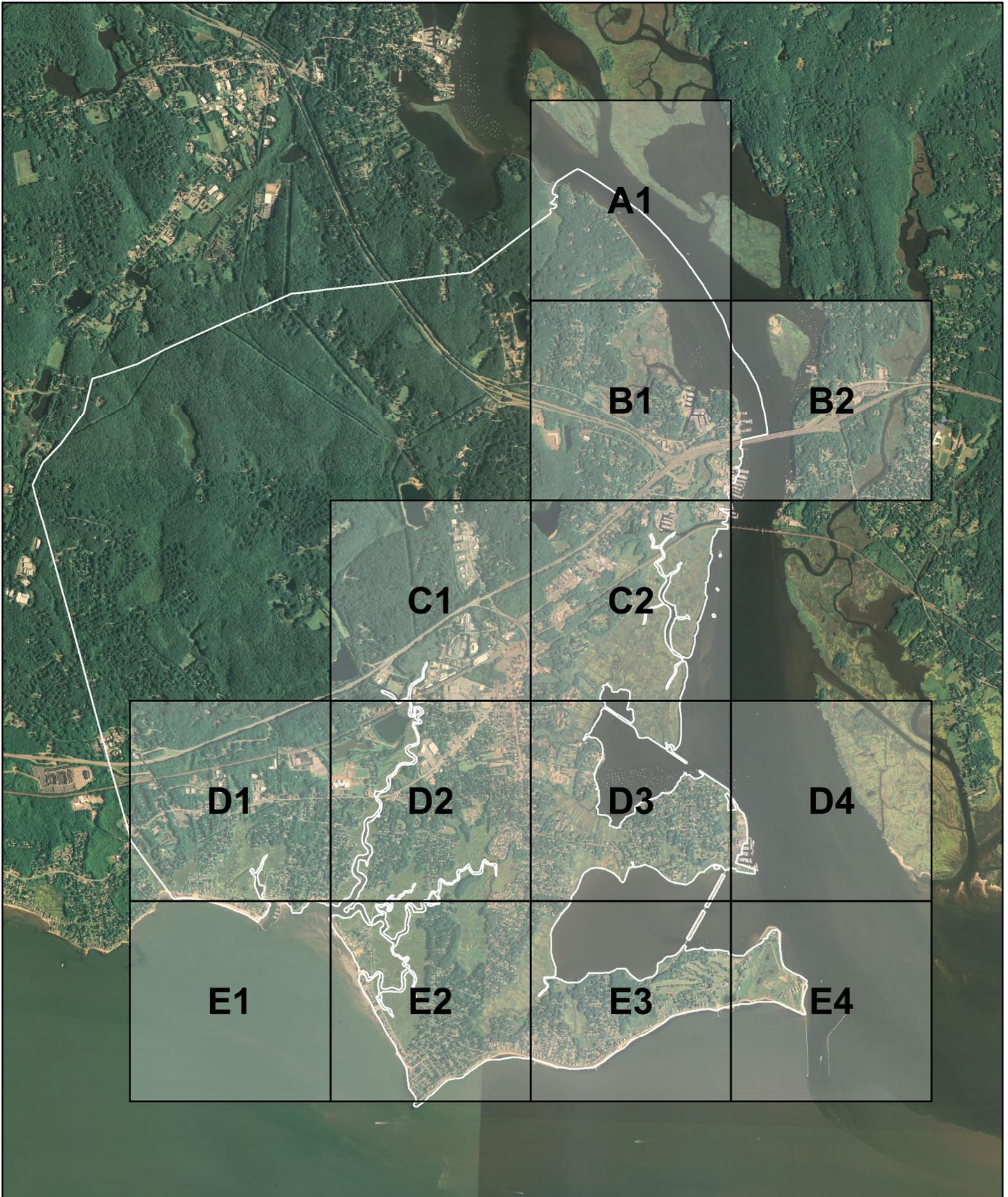
Note: Only the top 15 unprotected parcels are outlined and labeled.



Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Map Index - Advancement per Parcel





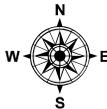
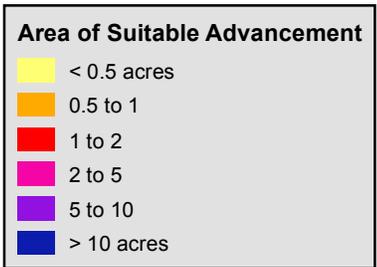
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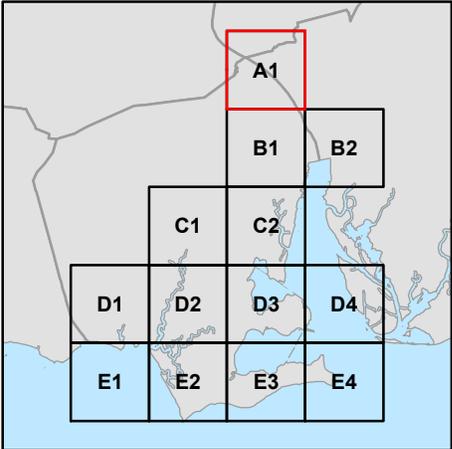
Marsh Advancement by the 2080s

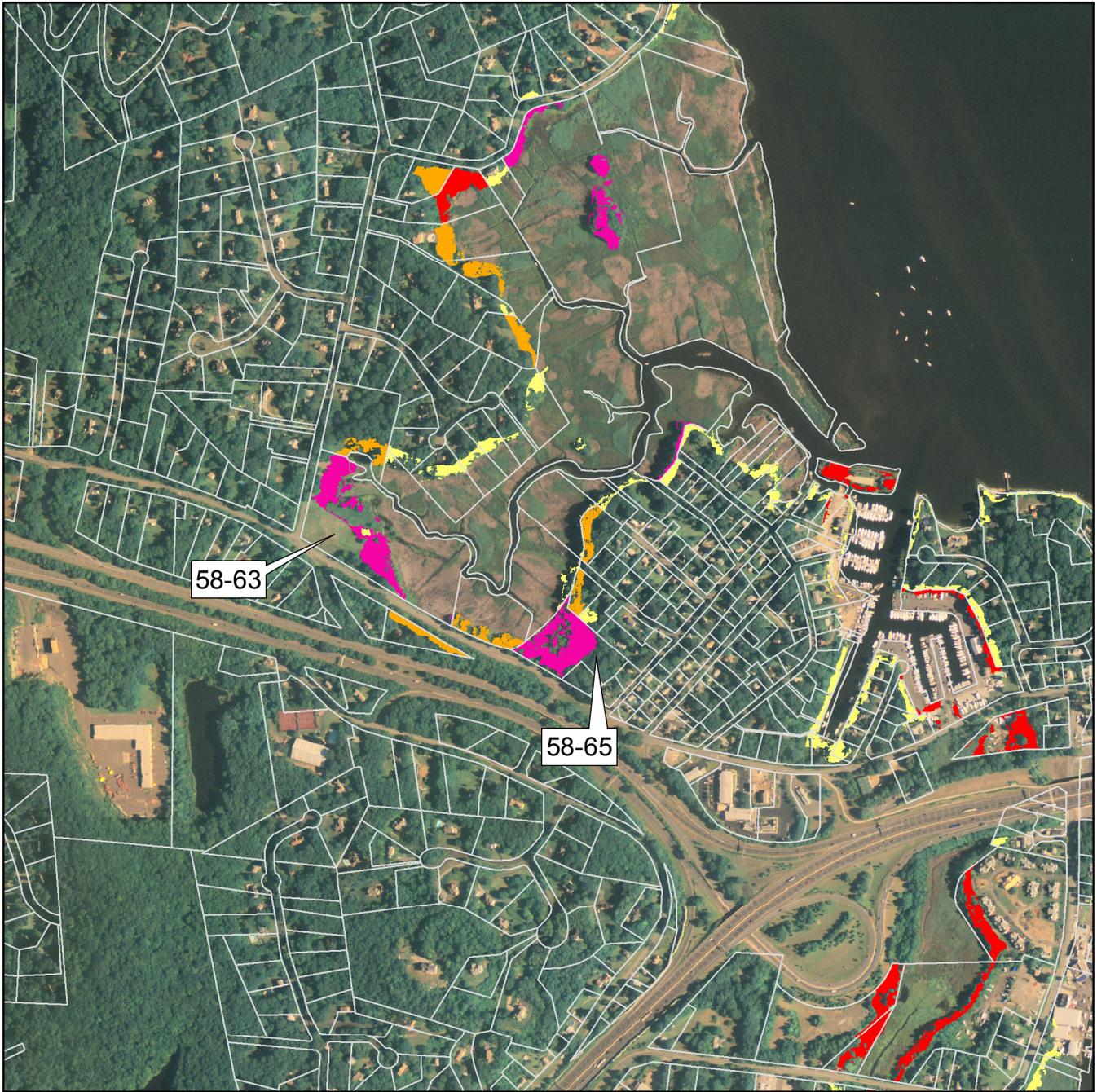
Town of Old Saybrook, CT

Advancement per Parcel - Map A1



Note: Only the top 15 unprotected parcels are labeled.





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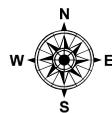
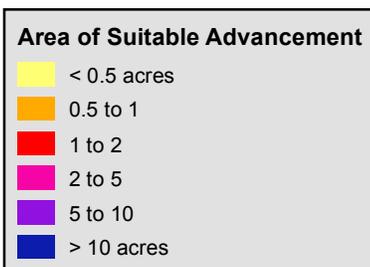


see page 33

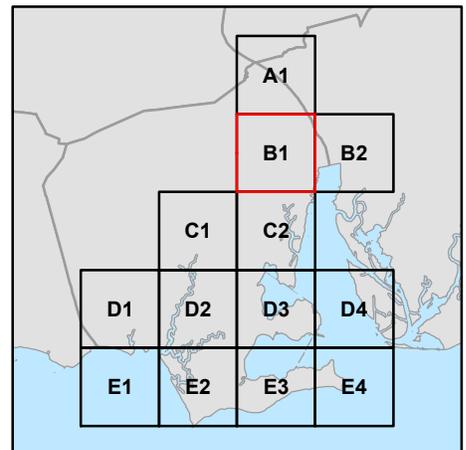
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Advancement per Parcel - Map B1



Note: Only the top 15 unprotected parcels are labeled.



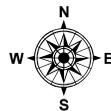
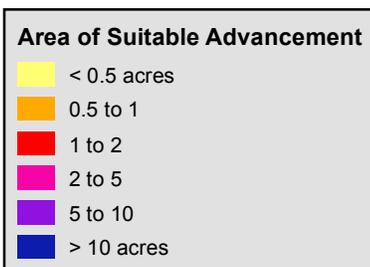
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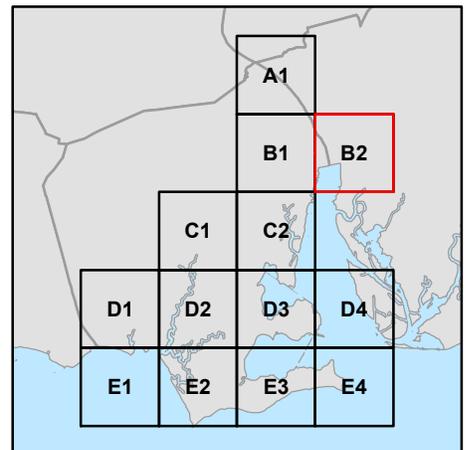
Marsh Advancement by the 2080s

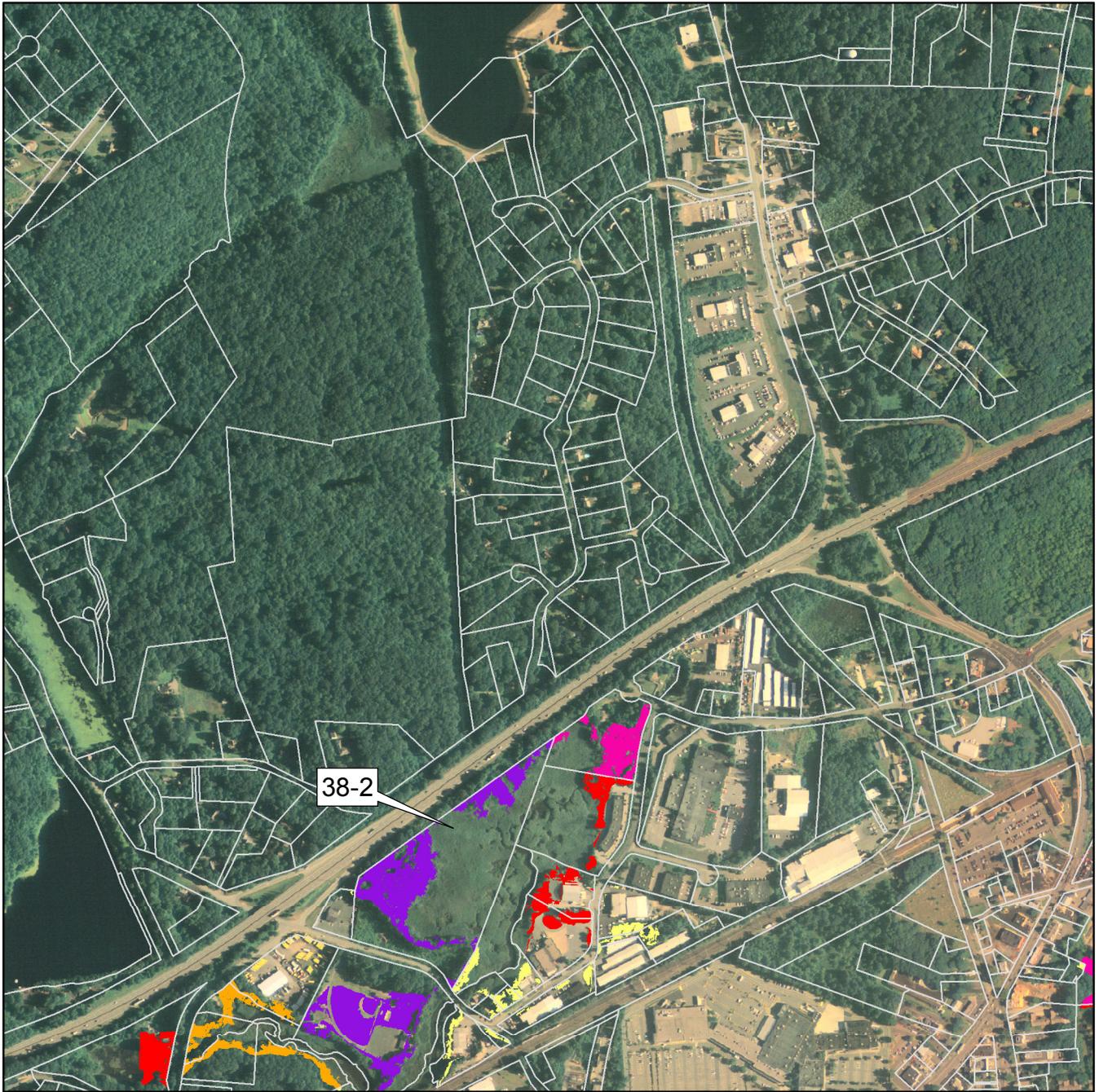
Town of Old Saybrook, CT

Advancement per Parcel - Map B2



Note: Only the top 15 unprotected parcels are labeled.





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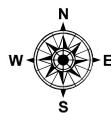
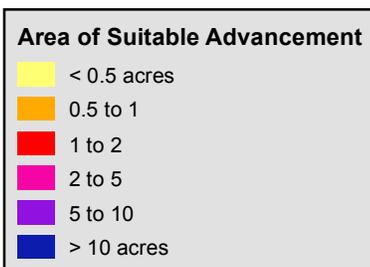


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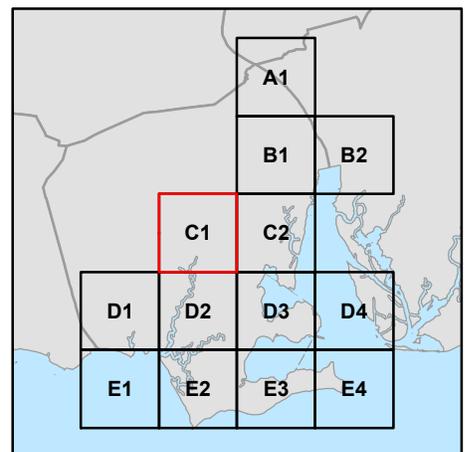
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

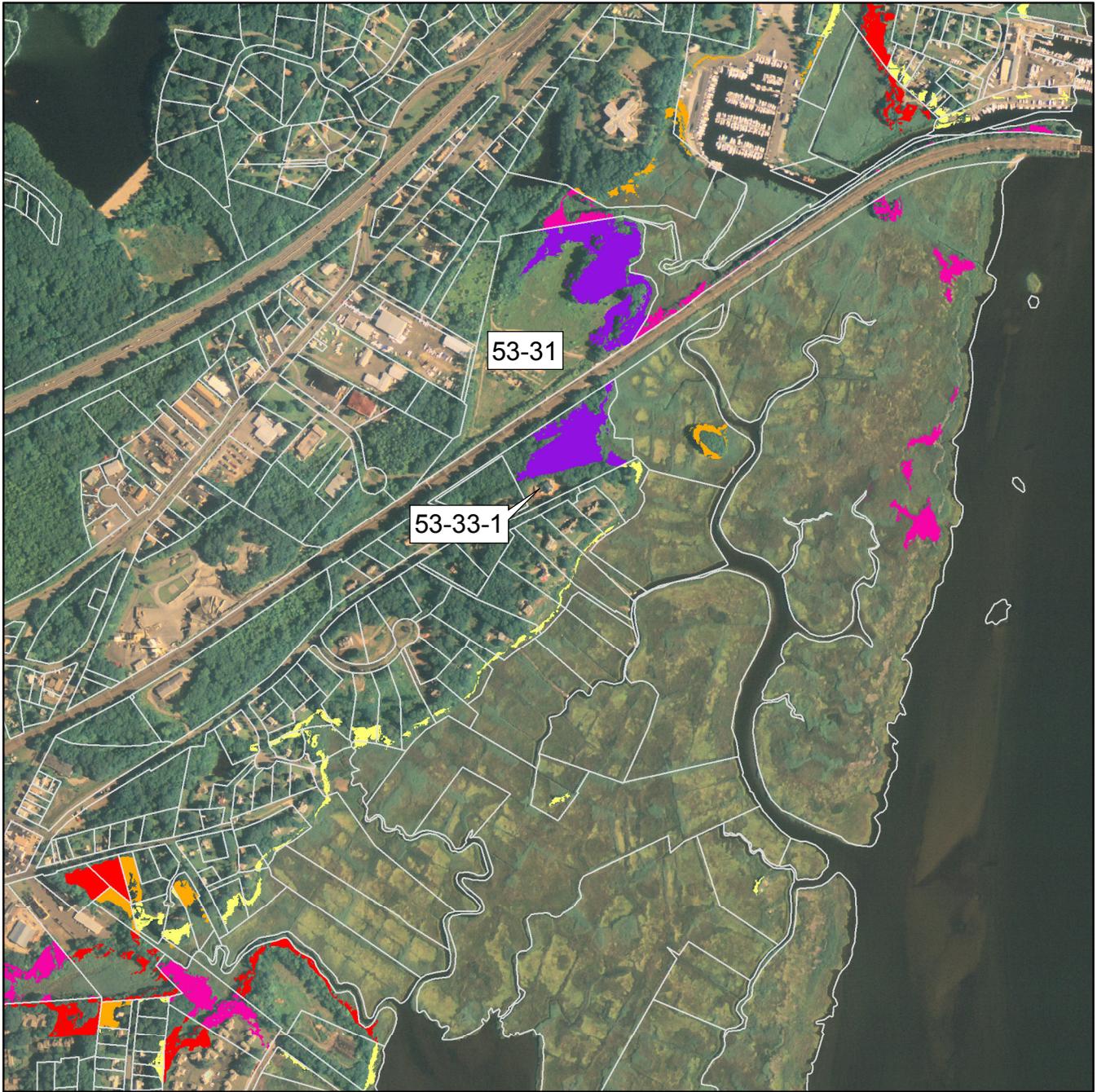
Advancement per Parcel - Map C1



Note: Only the top 15 unprotected parcels are labeled.



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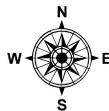
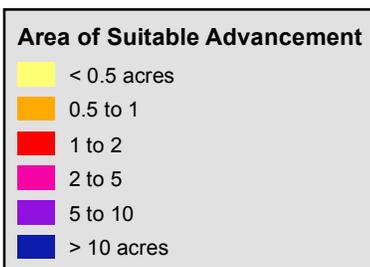
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see page 36

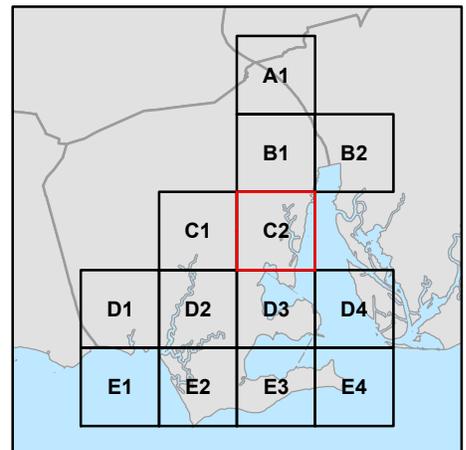
Marsh Advancement by the 2080s

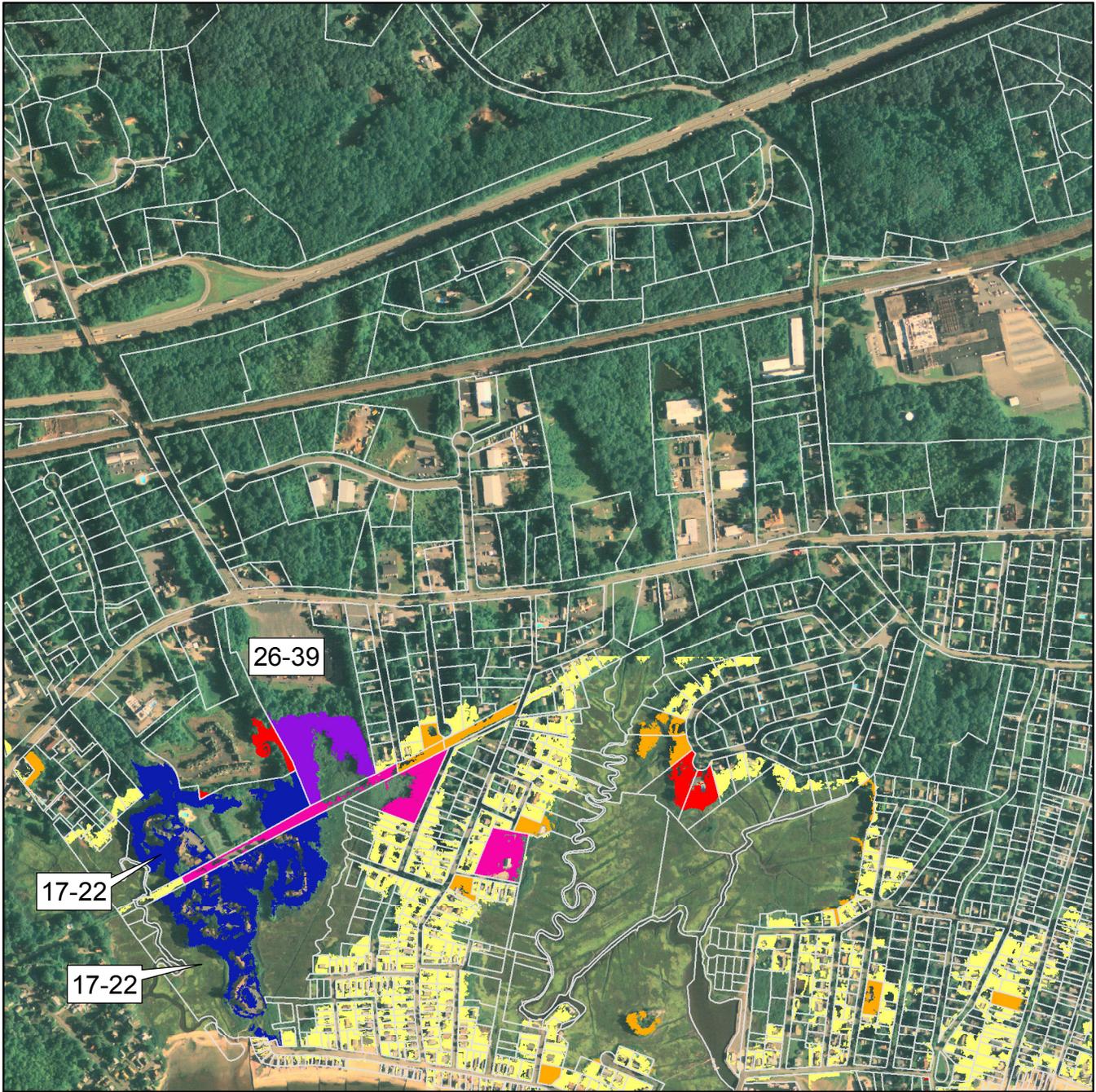
Town of Old Saybrook, CT

Advancement per Parcel - Map C2



Note: Only the top 15 unprotected parcels are labeled.





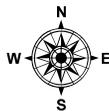
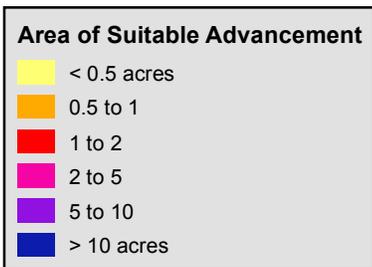
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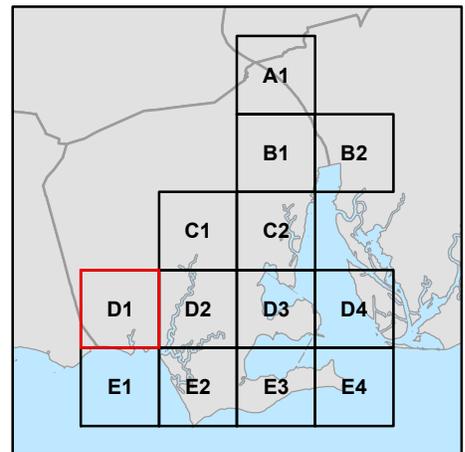
Marsh Advancement by the 2080s

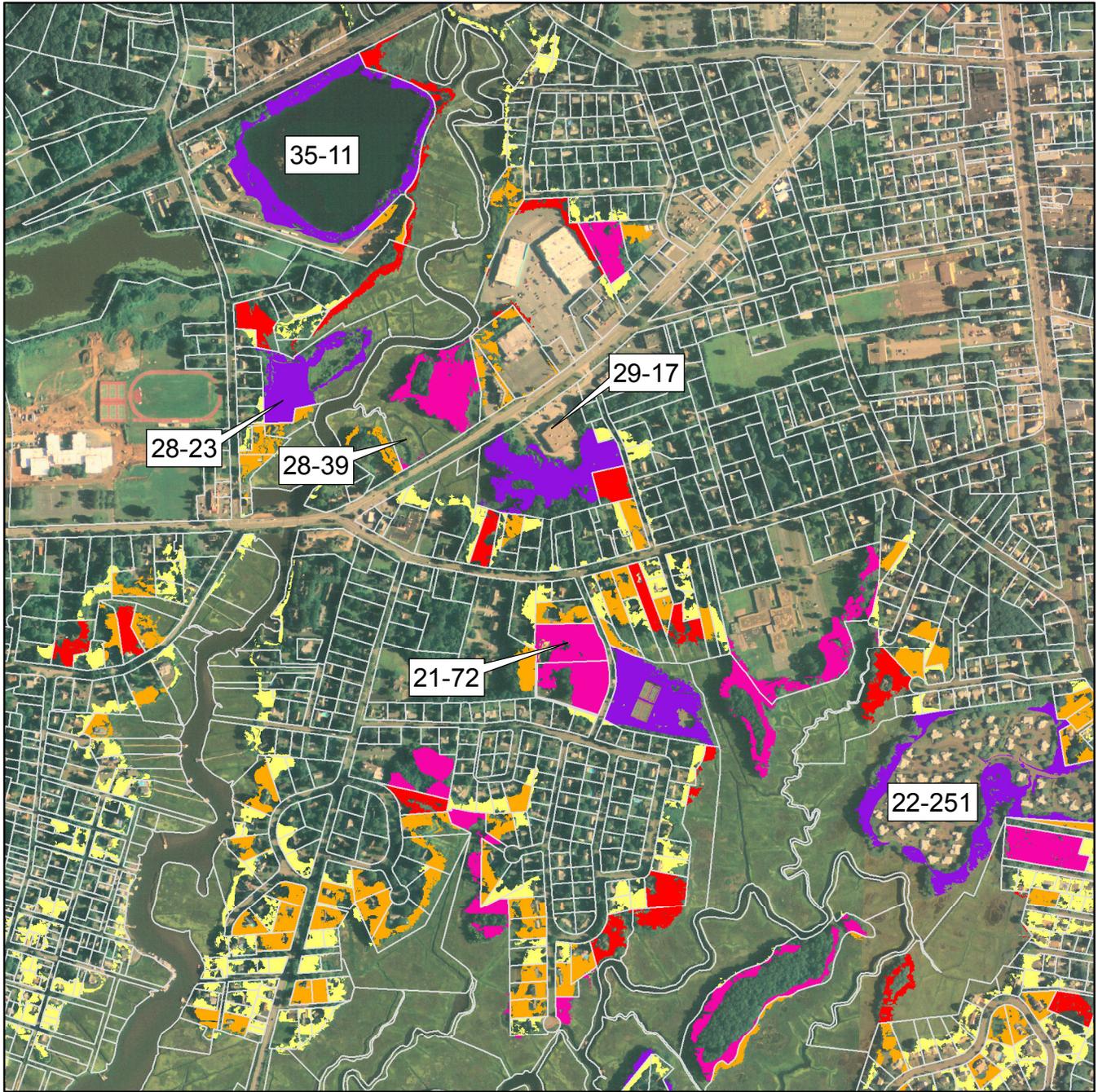
Town of Old Saybrook, CT

Advancement per Parcel - Map D1



Note: Only the top 15 unprotected parcels are labeled.





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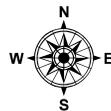
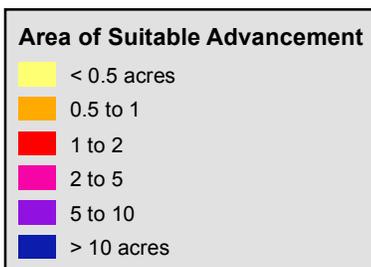


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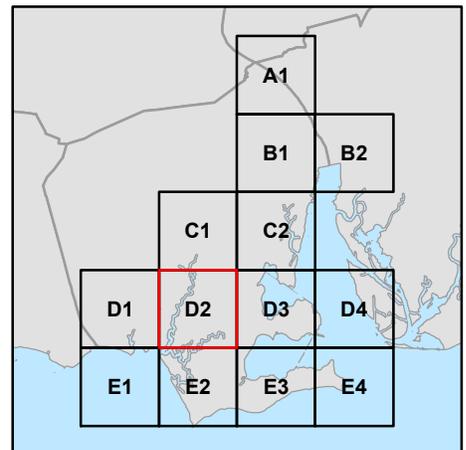
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Advancement per Parcel - Map D2



Note: Only the top 15 unprotected parcels are labeled.



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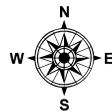
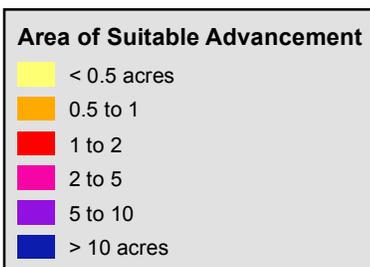


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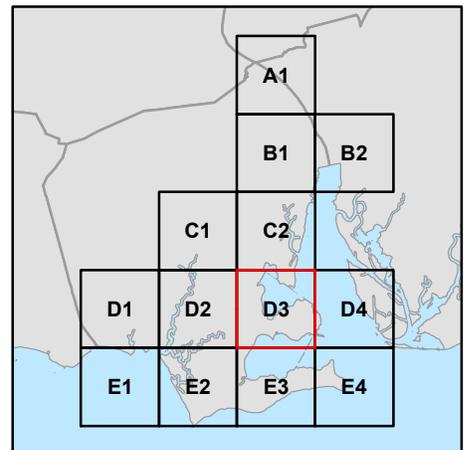
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Advancement per Parcel - Map D3



Note: Only the top 15 unprotected parcels are labeled.



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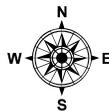
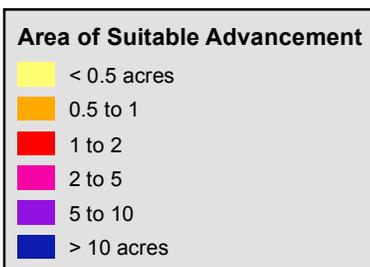


see page 41

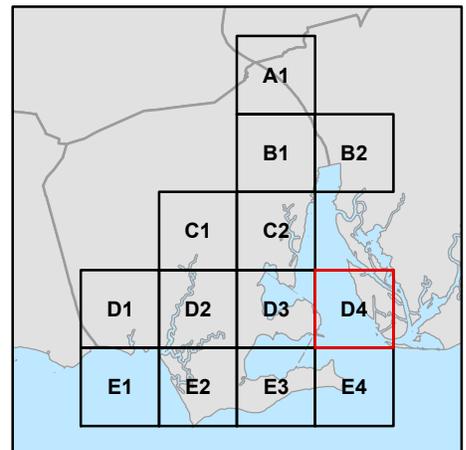
Marsh Advancement by the 2080s

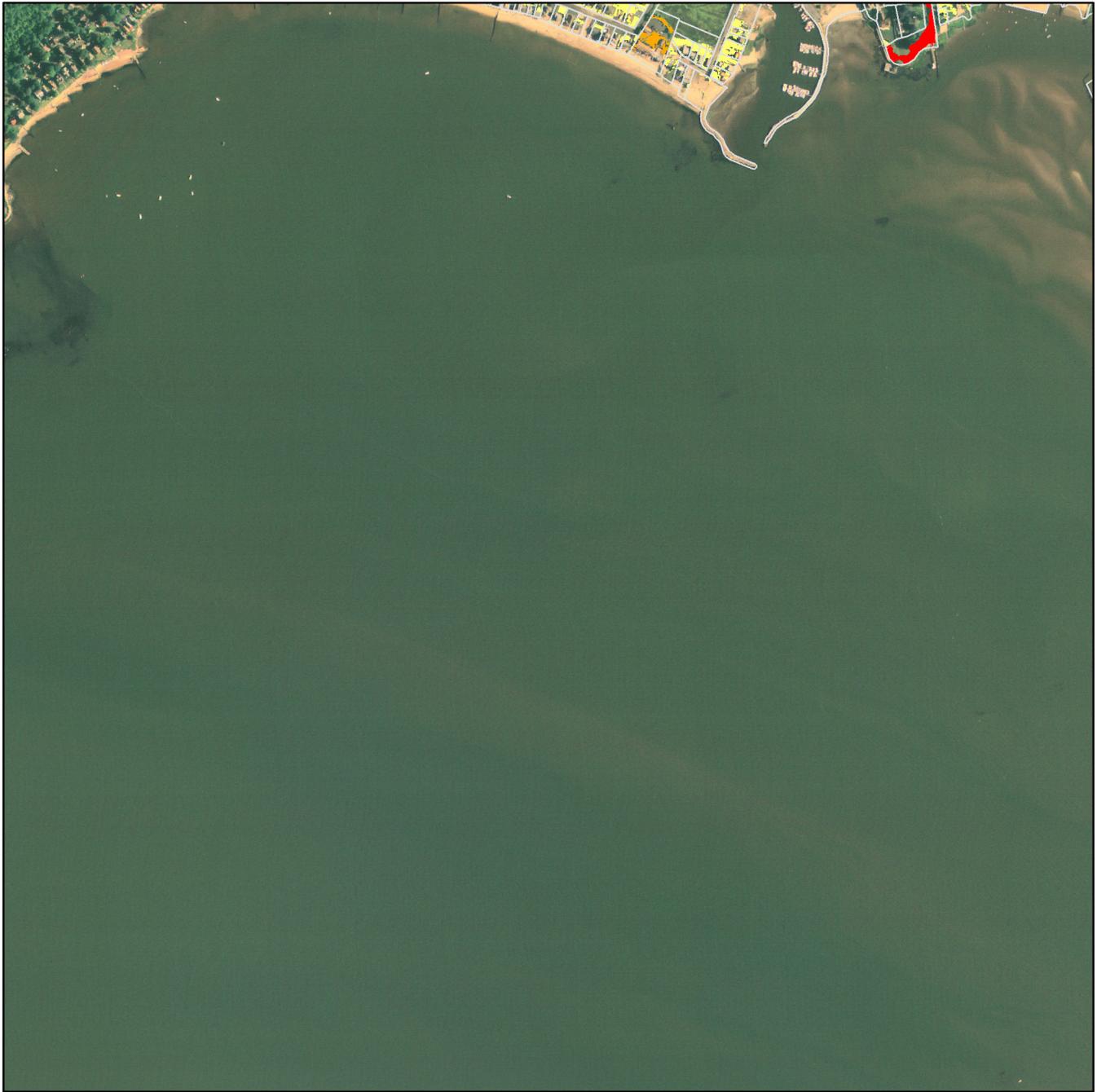
Town of Old Saybrook, CT

Advancement per Parcel - Map D4



Note: Only the top 15 unprotected parcels are labeled.





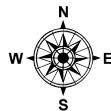
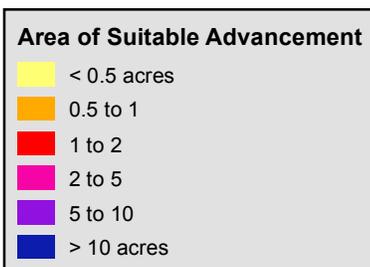
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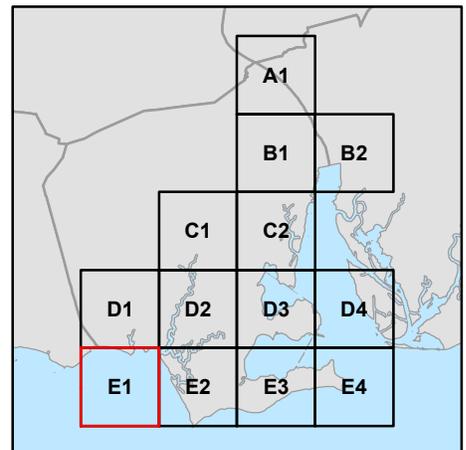
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Advancement per Parcel - Map E1



Note: Only the top 15 unprotected parcels are labeled.



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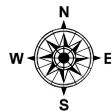
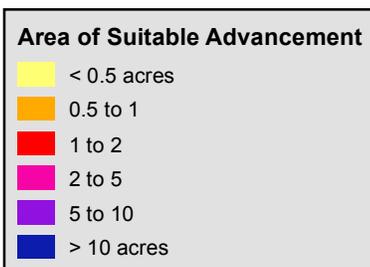
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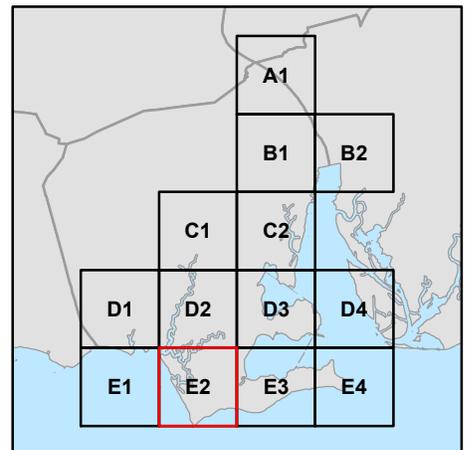
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Advancement per Parcel - Map E2



Note: Only the top 15 unprotected parcels are labeled.



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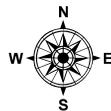
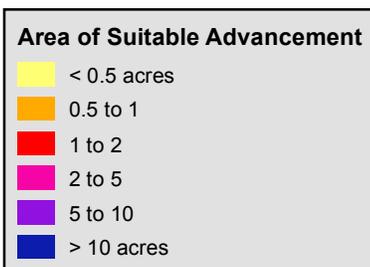
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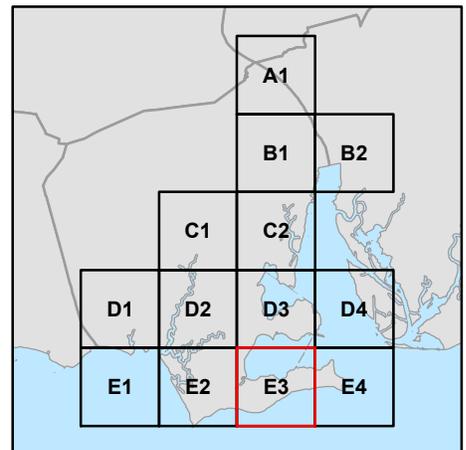
Marsh Advancement by the 2080s

Town of Old Saybrook, CT

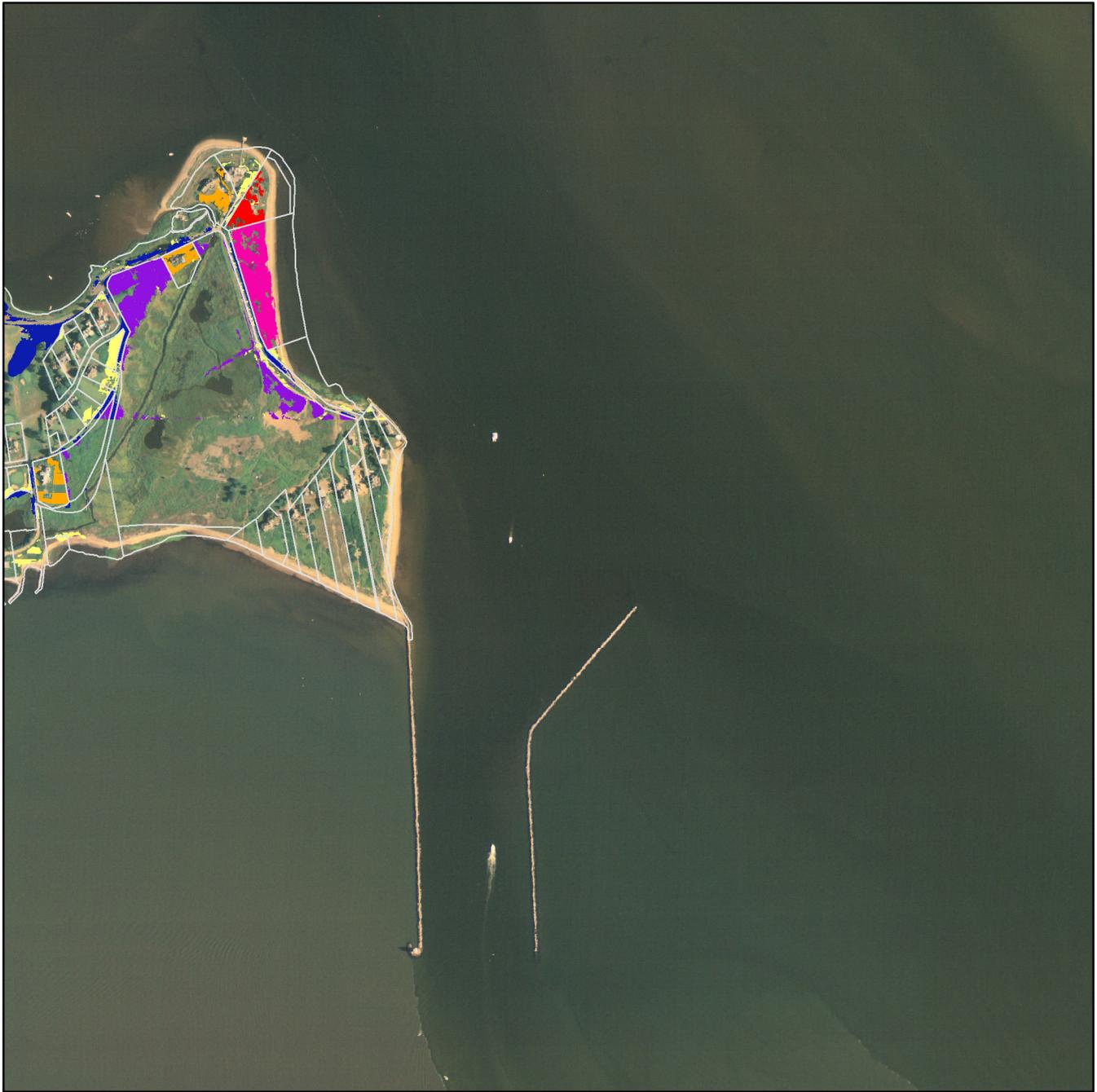
Advancement per Parcel - Map E3



Note: Only the top 15 unprotected parcels are labeled.



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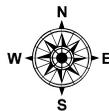
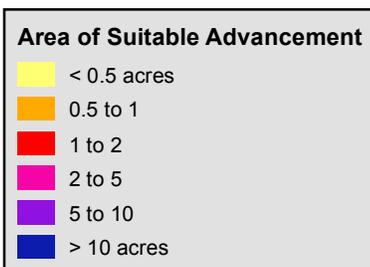


0 500 1,000 2,000 3,000 Feet

Marsh Advancement by the 2080s

Town of Old Saybrook, CT

Advancement per Parcel - Map E4



Note: Only the top 15 unprotected parcels are labeled.

