

Bylaws to Protect Chatham's Marshes: Recommendations for Chatham's Coastal Resilience Bylaw

Gerry Stahl

Introduction

The Energy and Climate Action Committee (ECAC) is charged by the Chatham Select Board to evaluate and recommend strategies in response to threats of climate change to Chatham.¹ The ECAC has determined that the preservation of Chatham's salt marshes is probably the most important defense against climate change and sea-level rise in Chatham. The marshes buffer storms from hitting neighborhoods and provide many ecological services and resources, as well as absorbing greenhouse gases. Protecting the marshes over the coming several decades relies upon efforts to facilitate marsh migration, grounded in increasingly detailed scientific studies of the floodplain.

A major barrier to future Town efforts to plan and execute efforts to further salt-marsh resilience, preservation and migration in the Chatham Floodplain – or Coastal Resilience Zones (CRZ) – is likely to be private ownership of parcels in those areas. There are on the order of 1,000 private parcels in the CRZ. This could prevent Town efforts to examine, survey or sample environmental conditions in order to assess, predict or plan for strengthening resilience. Under current regulations, existing marsh will eventually be submerged and potential marsh migration will be largely blocked due to private ownership of involved parcels.

One solution to the extensive private ownership of wetlands in Chatham would be a serious voluntary managed retreat program.² However, given the volume of current private ownership – see Appendices B, C and D – it is unlikely that this will be undertaken. One common response to the proposal of a managed retreat program is the assumption that the wetlands bylaws will take care of preserving the marshes. The recommendations in this document are intended to strengthen the ability of the bylaws to do this.

The stated purpose of the Coastal Resilience Bylaw is: “to avoid, minimize, and mitigate the risk of environmental damage, loss of natural resources, and the resulting human suffering, and the loss of life and property resulting from storms, flooding, erosion, and continuing sea level rise, by promoting greater resiliency within areas subject to coastal flooding currently and as sea levels rise.” How is the future extent of the Floodplain defined or predicted? How are the zones within the Floodplain defined to incorporate the critical marsh migration areas? How are private homes discouraged in flooded areas? How will the Town determine when Floodplain resiliency is diminishing, decide how to improve resiliency, and assess when resiliency is improving if its agents cannot examine, survey or sample locations throughout the CRZ from time to time?

The following set of recommendations for the new Chatham Coastal Resilience Bylaw is a response to these concerns:

- Recommendation 1. That the Floodplain shall be defined by MC-FRM for 2070 (as the “best available flood risk model for the target year”).

¹ Chatham ECAC charge: “To evaluate and recommend strategies in response to threats of climate change to Chatham's environment, safety, and economy; and to advise the Select Board on opportunities to mitigate impacts. To recommend actions to reduce Chatham's contribution to climate change by focusing on energy conservation, renewable energy adoption, and mitigation/adaptation strategies. The Energy and Climate Action Committee will work in cooperation with other Town Boards and Committees, as well as Town employees and residents, in carrying out its charge....”

² See Stahl, G. (2026). *Managed retreat from Chatham's marshes*. Unpublished study. Download: <http://GerryStahl.net/elibrary/climate/retreat.pdf>. For general context, see Stahl, G. (2026). *Studying climate locally: The future of Chatham's marshes*. Chatham, MA: Gerry Stahl at Lulu. Download: <http://GerryStahl.net/elibrary/climate/climate.pdf>

- Recommendation 2. That the Special Transitional Area of the CRZ shall include the marsh migration areas predicted by the Center for Coastal Studies' latest maps for Chatham marshes using sea-level rise corresponding to MC-FRM 2070.
- Recommendation 3. That the "Additional Performance Standards within V Zone" (Section 8 of the Model Coastal Resilience Regulations) should apply equally throughout the whole CRZ (not just in the V Zone) to protect the entire wetlands area for marsh preservation and migration. This includes the regulation that if a structure in the CRZ incurs Substantial Damage due to floods or coastal storms after rebuilding to all applicable flood protection standards for a second time, then the structure shall either be (a) moved landward beyond the CRZ Zones or (b) demolished.
- Recommendation 4. That an entry-and-examine clause be included in the Coastal Resilience Bylaw, similar to the following: "The Commission, its agents, officers, and employees have authority to enter upon privately owned land to perform their duties under the regulations and may make or cause to be made such examinations, surveys, or sampling as the Commission deems necessary to promote salt-marsh resilience, preservation and migration as defined in these Bylaws, subject to the U.S. and Massachusetts constitutions."

This document will discuss the rationale for each of these recommendations. The recommendations and the research supporting them were developed as part of the author's activity on the ECAC and have been discussed within the ECAC. However, their formulation in this document is a personal statement by the author and goes beyond what has formally been approved by ECAC.

Recommendation 1. Use of MC-FRM for 2070 as the "best available flood risk model for the target year"

The Massachusetts Coast Flood Risk Model (MC-FRM) helps property owners, planners and policy makers consider ways to cost-effectively build resilience and plan for expected changes.³ It is a high-resolution, physics-based probabilistic hydrodynamic model that simulates dynamic coastal flooding across all coastal communities in Massachusetts. Developed by the Woods Hole Group with funding from the Commonwealth of Massachusetts, it evaluates how sea level rise and severe coastal storms impact the shoreline. Massachusetts is planning for a rise in relative mean sea level of up to 2.5 feet by 2050 and 4.3 feet by 2070 (compared to 2008 mean sea level) if global emissions are not significantly reduced (ResilientMass Plan 2023).

The preservation of salt marshes and other climate resilience measures require long-range planning and preparation. This recommendation is proposed as part of a climate resilience program for Chatham based on a long-range planning horizon. Climate change has begun, with significant occurrences of sea-level rise, flooding, wildfires, droughts and destructive storms throughout the world. Given the carbon and methane emissions already in the atmosphere and continuing to be released, it is virtually guaranteed that climate will get increasingly chaotic for the next several decades. This document therefore tries to project out 40 or 50 years. Chatham has not yet experienced conditions as extreme as elsewhere, but given its position jutting into the ocean, it may not be so lucky for long. Preservation of Chatham's marshes is a long-term concern. Study of the environment takes time—initial surveys of some marshes have already spread over multiple years. Major interventions, like those at Muddy Creek, Jackknife Beach and Frost Fish Creek, take many years to plan, permit, construct, adapt and monitor. One would want major efforts to have a useful life after completions, so the proposal is to prepare for conditions in 2070.

³ <https://www.woodsholegroup.com/innovation/massachusetts-coast-flood-risk-model>

Recommendation 2. Definition of the Special Transitional Area of the CRZ to include the marsh migration areas predicted by CCS studies corresponding to MC-FRM 2070

The new proposals for wetlands zoning, bylaws and regulations names new terminology for coastal resilience zones. Comparison of the proposed CRZ maps with the established FEMA map shows this correspondence:

FEMA: VE velocity zone	-- CRZ: VE Velocity Zone (nearest the sea)
FEMA: AO coastal A zone	-- CRZ: Moderate Wave Action Zone (MoWA)
FEMA: AE zone (Coastal A)	-- CRZ: AE Minimal Wave Action Zone (MiWA)
FEMA: X zone (.2% flood)	-- CRZ: Coastal Flood (MC-FRM 2070 1% flood)
CCS suitable marsh migration plus 100 foot buffer	-- CRZ: Special Transition Zone

The [Model Coastal Resilience Article](#) provides the following definition for the Special Transition Zone: “Predicted path of wetland migration – That portion of a *Special Transitional Area*, located adjacent to an existing salt marsh, beach, dune, or Other Coastal Wetland Resource, *where the wetland resource is predicted to migrate due to rising sea-levels*, based upon wetland migration identified in the best available wetland migration information for the Target Year.” However, it provides no guidance about where that area is or what to do there.⁴

ECAC contracted with the Center for Coastal Studies (CCS) to conduct a study of four of Chatham's salt marshes in 2024 and to do the same at the other nine marshes in 2026, with the primary goal of determining where the marshes can migrate as sea level rises. The completed study of the marshes in South and West Chatham determined that there will be substantial loss of marsh in the coming decades. On the positive side, the study also mapped where potential marsh migration is theoretically possible during this period.

Appendix A overlays the maps of potential marsh migration from the Center for Coastal Studies report on top of the maps of Coastal Resilience Zones from the Cape Cod Commission and illustrates a striking result: The areas of potential marsh migration in South and West Chatham with 3.0 feet of sea-level rise (slr) coincide almost exactly with the “A-Zone of Minimal Wave Action (MiWA)” as defined in the proposed Coastal Resilience Zones. *Virtually all of the potential marsh migration area is within the MiWA Zone* and most of that Zone is potential marsh. The zones leading up from the water to that zone – the Velocity Zone (V-Zone) and the Coastal A-Zone of Moderate Wave Action (MoWA) are either already marsh or will be marsh long before 2070. Most property owners have already recognized this and there are few buildings in these zones. Much of the land has already been donated or sold to the land trust or the Town open space program.

The three zones referred to above (V, MoWA and MiWA) are basically the old FEMA Floodplain (as designated in 2014). So, development in these zones has long been restricted. The CRZ Coastal Flood Zone is the area predicted by the MC-FRM 2070 to be flooded with a 1% annual probability. This is the same criterion used by FEMA in the past to define wetlands, but takes into account probable sea level rise of 3.0 feet by 2070. Such occasional flooding does not have a major effect on marsh migration (in contrast to regular tides based on sea level).

The maps in Appendices A and B relate predictions of marsh migration (from the CCS study), the CRZ zones (from Cape Code Commission maps) and ownership (from the Chatham appraisal office). They indicate that over time the

⁴ The Model Coastal Resilience Zone Wetlands Regulations (June 2024) on p. 10 refers the reader to CZM's SLAMM viewer for information on the predicted path of wetland migration: “The SLAMM viewer shows predicted wetland migration patterns for coastal towns throughout the state.” Unfortunately, that website is still not available after many years of promises: “CZM is in the process of identifying and characterizing marsh migration corridors throughout Massachusetts.” Furthermore, the SLAMM data was collected in 2011 or earlier, including both land elevation contours and sea level rise predictions. The viewer is not very clear at the parcel level of detail. For instance, none of the analysis in the Appendices could be done with the SLAMM viewer.

marshes spread out from current positions (which will be flooded and be incorporated in the sea) to upland – through the MiWA zone and into what should be defined as the Special Transition Zone. In order to protect potential new marsh around 2070, the Special Transition Zone should be defined to include *areas of potential marsh migration given 4.3 feet of sea level rise*, plus the 100 foot buffer. Maps of potential new marsh will be available from CCS study results in early 2027. Of course, the possibility of marsh establishing in the predicted areas depends upon those areas being undeveloped. That is why it is important to study the maps of existing housing in the Appendices.

To protect the areas of potential marsh in 2070, the Special Transition Zone should be defined in the Bylaws as those areas of the CRZ that include the marsh migration areas predicted by the Center for Coastal Studies' latest maps for Chatham marshes using sea-level rise of 4.3 feet, corresponding to MC-FRM 2070, plus a 100 foot buffer.

Recommendation 3. Removal of damaged structures throughout the CRZ

Most of the area in the old FEMA floodplain is either currently under water, in salt marsh or a potential migration area for salt marsh by 2070. Residences that remain in that floodplain are probably at high risk for flooding damage and personal harm. The Town should encourage retreat of private ownership from the floodplain.

Appendix C shows statistics and maps of property ownership and housing within each zone of the CRZ around each of the major marshes of Chatham. It should be noted that the recommendations in this document are for the protection of marsh areas; they do not necessarily apply to Coastal Resilience Zones that do not include current or potential marsh areas – for instance along the coastline. It may be ecologically benign to have houses on stilts along the beach, where human activity does not disturb the establishment of marsh grass, for instance. However, the establishment of new marsh, especially on sloped land rising to the upland, is fragile and requires a complete lack of human activity.

It is recommended that in the areas around the major marshes, the “Additional Performance Standards within V Zone” (Section 8 of the Model Coastal Resilience Regulations) should apply equally to the whole CRZ (not just the V Zone) to protect the entire wetlands area for marsh preservation and migration. This includes the regulation that if a structure in the CRZ incurs Substantial Damage due to floods or coastal storms after rebuilding to all applicable flood protection standards for a second time, then the structure shall either be (a) moved landward beyond the CRZ Zone or (b) demolished. It is not in the interest of Chatham's future to allow buildings and structures in the flood plain to be repaired, replaced or elevated after being repeatedly flooded by increasingly frequent storm surge and to continue blocking or disturbing the natural migration of salt marshes.

The proposed Wetlands Regulations performance standards (Sec. 4) provide different standards for the various zones and generally allow for construction, renovation or repair of structures that are elevated above a specific level. In particular, Section 4.6 provides for Additional Performance Standards within Special Transitional Areas to “allow the natural migration of wetlands resources due to sea level rise and increased frequency and intensity of storms.” As written, these standards seem designed to allow for exceptions and elevated structures above the marsh. Furthermore, it is not clear how the maps of Special Transitional Areas in Chatham were specified. The mapped Special Transitional Areas are rather skimpy. To protect the marshes, it is important to prevent construction, renovation or repair of structures throughout the floodplain and marsh migration areas. Even elevated structures will involve activities that destroy existing marsh and prevent the establishment of migrating marsh. Public ownership and control of the floodplain will become increasingly necessary to avoid losses to residents, costs to the Town and loss of salt marsh.

The specific proposal is the following:

For Sections 4.1, 4.2 and 4.3 of the Model Coastal Resilience Article, Chatham should adopt the *same* restrictive articles for the V-Zone, the MoWA and the MiWA to protect those areas for marsh migration:

- (a) *No new construction or expansion* of any building or other structure, road, impervious surface, or septic system shall be permitted.

- (b) *No new construction, expansion, substantial repair, or restoration* of any structure that redirects or channelizes floods including retaining walls, fences, and sea walls shall be permitted.
- (c) With respect to any building or other structure, in the event of a request for any Substantial Repair of the Foundation, any Substantial Improvement, or any restoration of a building or structure that has sustained Substantial Damage, *the entire building or structure shall be removed.*

It is not in the interest of Chatham's future to allow buildings and structures in the floodplain to be repaired, replaced or elevated after being flooded by increasingly frequent floods and to continue blocking the natural migration of salt marshes. Chatham should take measures now to minimize future housing damage and to protect salt marsh.

Recommendation 4. Inclusion of an entry-and-examine clause

The major local legal mechanism for protecting the salt marshes is the Wetland Protection Bylaw and Regulations, which are currently being revised in coordination with Harwich and Orleans. Preservation of marshes and facilitation of their migration will likely require physical interventions on private properties. An entry-and-examine clause would allow for conducting scientific studies on these properties and would provide a basis for expanding access in the future as climate change worsens.

Therefore, it is proposed that an entry-and-examine clause be included in the Wetland Protection Bylaw, similar to Harwich's existing clause. Here is a draft entry-and-examine clause wording: "The Commission, its agents, officers, and employees have authority to enter upon privately owned land in the CRZ to perform their duties under the regulations and may make or cause to be made such examinations, surveys, or sampling as the Commission deems necessary, including those made to promote salt-marsh preservation and migration, subject to the U.S. and Massachusetts constitutions."

The wetlands bylaw and regs – even as proposed for expansion in the coming months – do not ensure that the Town can undertake marsh preservation efforts on wetlands that are not Town-owned. They do not even allow studies of existing conditions on private property. (The CCS researchers were confined to Town and land trust properties, and could not sample sedimentation in key areas.)

The ECAC's concern in making these proposals is based on our charge to make recommendations about the long-term preservation of Chatham's salt marshes, grounded in increasingly detailed scientific studies of that environment. A major barrier to future Town efforts to plan and execute efforts to further salt-marsh resilience, preservation and migration in the Chatham CRZ is likely to be private ownership of parcels in the CRZ. There are on the order of 1,000 private parcels in the CRZ. This could prevent efforts to examine, survey or sample environmental conditions in order to assess, predict or plan for strengthening resilience. Given current regulations, existing marsh will eventually be submerged and potential marsh migration will be largely blocked due to private ownership of involved parcels.

The stated purpose of the Coastal Resilience Bylaw is: "to avoid, minimize, and mitigate the risk of environmental damage, loss of natural resources, and the resulting human suffering, and the loss of life and property resulting from storms, flooding, erosion, and continuing sea level rise, by promoting greater resiliency within areas subject to coastal flooding currently and as sea levels rise." How will the Town determine when such resiliency is diminishing, decide how to improve resiliency, and assess when resiliency is improving if its agents cannot examine, survey or sample locations throughout the CRZ from time to time?

The proposed entry and study clause is based on wording from bylaws in other towns, as listed in Appendix E. It may be more inclusive in intent than the wording in neighboring towns in that it is not closely tied to carrying out responsibilities relating to enforcement and/or permitting. In this sense, it is more like the state bylaw that grants the right of state workers involved in mosquito control to enter private land and even dig ditches and uproot vegetation there. However, the proposed language only authorizes entry to inspect, examine, survey, or sample — passive, non-invasive activity. It does not authorize implementation of marsh interventions (installing runnels, thin-layer sediment

placement, plantings, removing structures, etc.); that would require a Conservation Restriction, easement or land purchase.

The proposed recommendation uses the term "private property" in order to be explicit about limiting the rights of private ownership. However, the wording should perhaps be about "property not owned by the Town of Chatham or under a Conservation Restriction that allows entry and examination." There are many properties in Chatham owned by entities other than the Town or private individuals. Furthermore, there may even be conservation restrictions on some properties which do not authorize entry-and-examine activities by town agents.

Appendix A. Marsh migration into the Zone of Minimal Wave Action (MiWA)

The CCS study of four marshes in 2024 mapped areas that are predicted to be “suitable” (based on measured elevation and slope, etc.) for marsh migration in three periods: 2050 with 1.2 ft of sea-level rise (slr), 2070 with 1.8 ft slr and 2100 with 3.0 ft slr. The study uses relatively conservative projections from the UN IPCC 6th Assessment Report of 2021, compared to MC-FRM projection for 2070 of 4.3 ft slr. The following maps show the Cape Cod Commission's map of Chatham's Coastal Resilience Zones (based on MC-FRM 2070 projected 4.3 ft slr). Overlaid are CCS's projected marsh locations with 1.2, 1.8 and 3.0 feet of sea level rise.

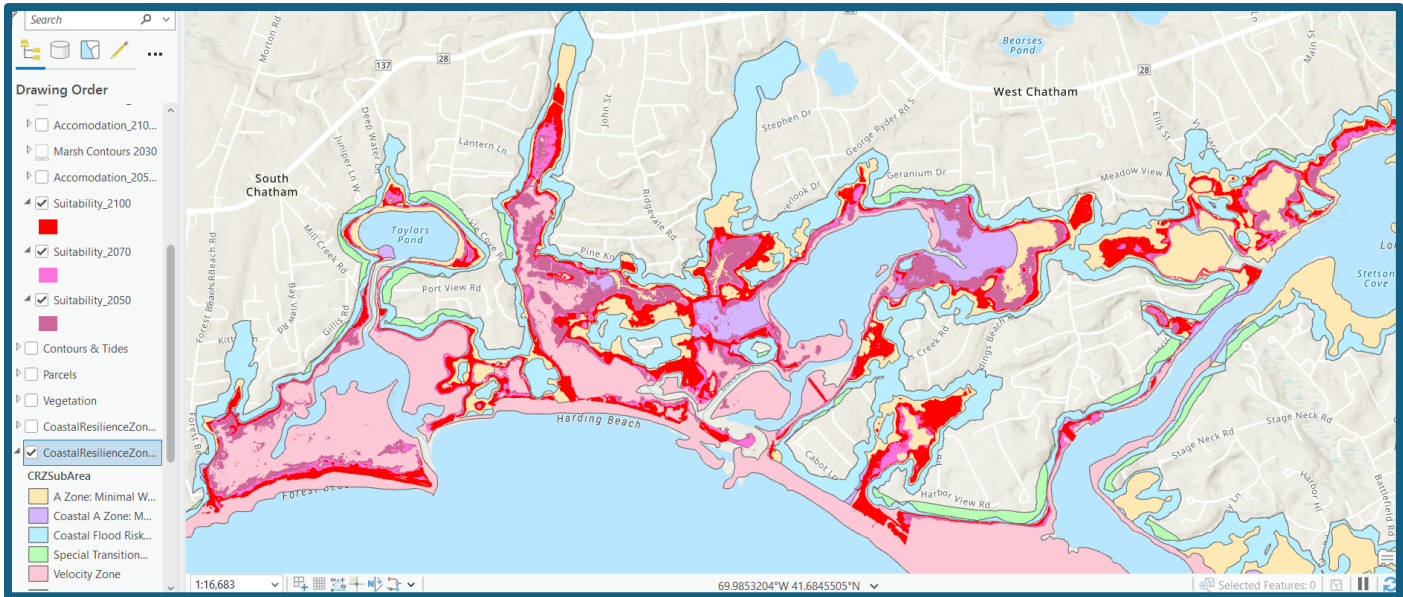


Figure 1 Coastal Resilience Zones (based on MC-FRM 2070): in pink (FEMA V or Velocity Zone), purple (Coastal A Zone - MoWA), yellow (Coastal A Zone - MiWA), blue (Coastal Flood Risk) and green (Special Transition) with CCS study areas suitable for marsh migration in 2050, 2070, 2100 (shades of red) – see index on left of map.

In general, the migration paths with up to 3 feet of slr are within the A-Zone: Minimal Wave Action (MiWA). Note that the marsh migration areas (shown in bright red, burgundy and rose) are within the old FEMA floodplain now called Velocity (pink), MoWA (purple) and especially MiWA (yellow). The brown (or light blue in Figure 1) Coastal Flood Risk indicates a flood threat to roads and houses, but not a particular concern for marsh migration. The small areas in light green are the Special Transition Areas, which include many buildings near the floodplain.

Access to Protect Chatham's Marshes

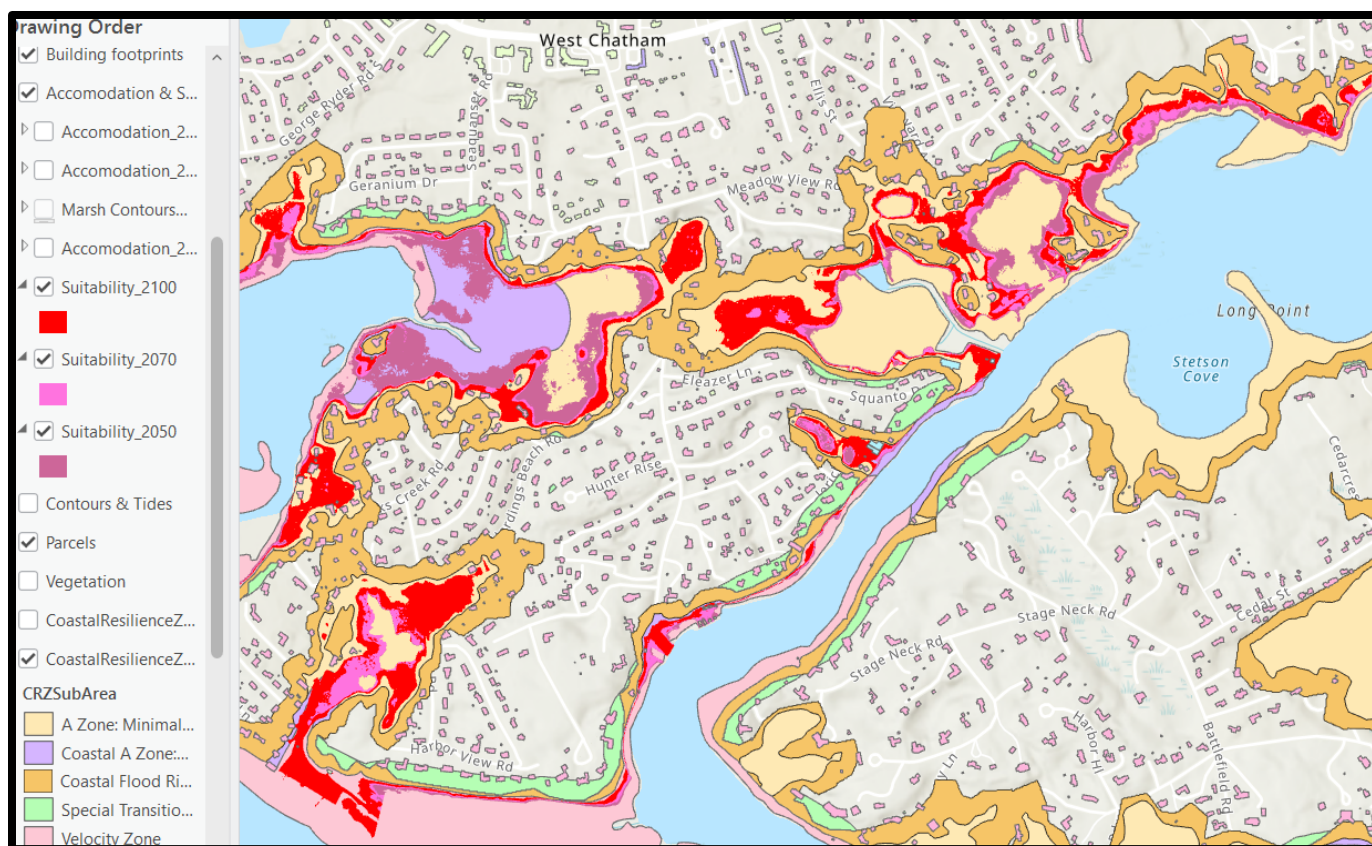


Figure 2. Detail view near Oyster Pond, with locations of buildings.

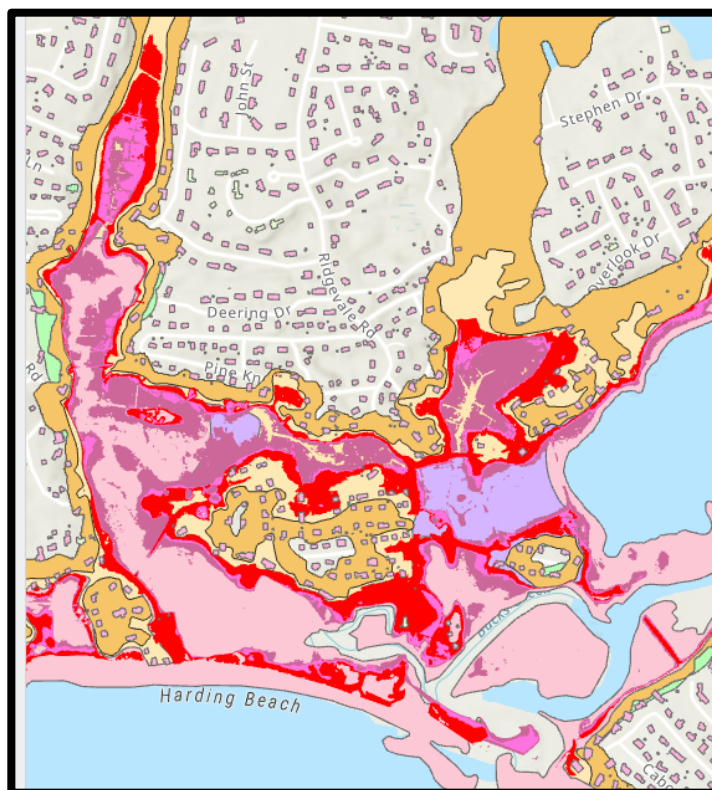


Figure 3. Detail view of Cockle Cove.

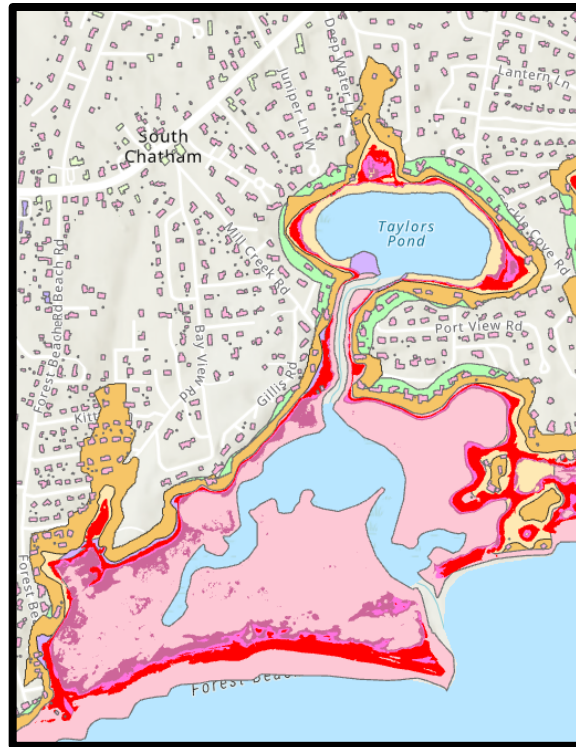


Figure 4. Detail view of Forest Beach and Taylor's Pond.

The following figures show privately owned parcels in the V-Zone, the MoWA and the MiWA, with parcel boundaries and street addresses. Note how many private properties overlap multiple zones. Figure 5 shows clearly how a marsh will tend to spread outward with rising sea level. The bright red areas are all suitable for marsh migration in terms of elevation and land slope. While most of the pink (V-Zone), purple (MoWA) and yellow (MiWA) zones are vacant of housing, there still are some privately owned parcels.

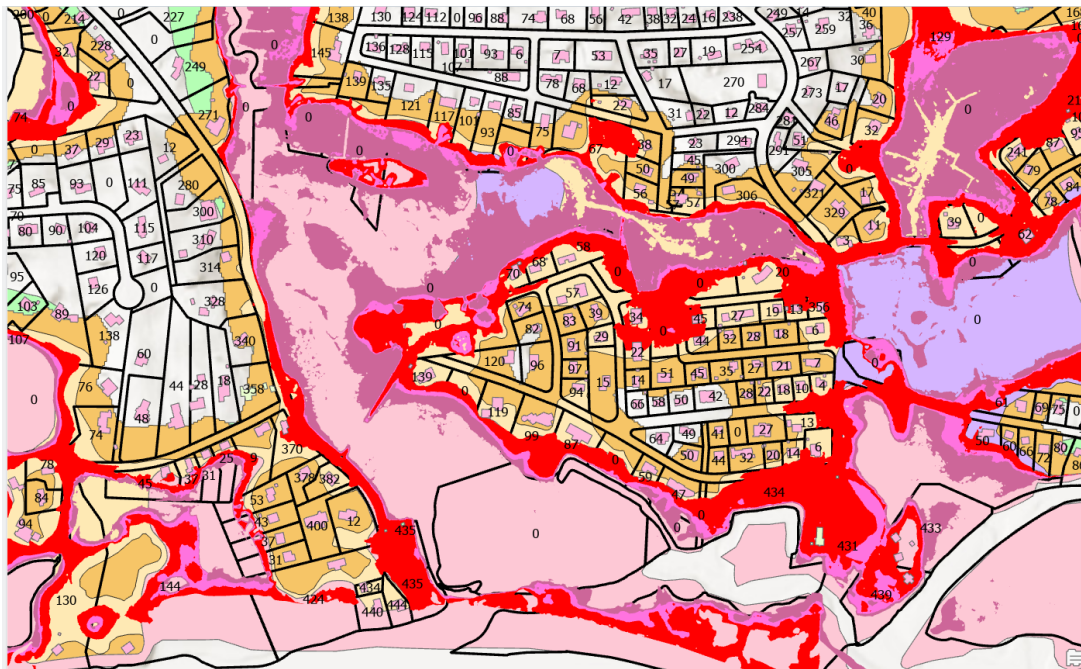


Figure 5. Detail view of Cockle Cove.

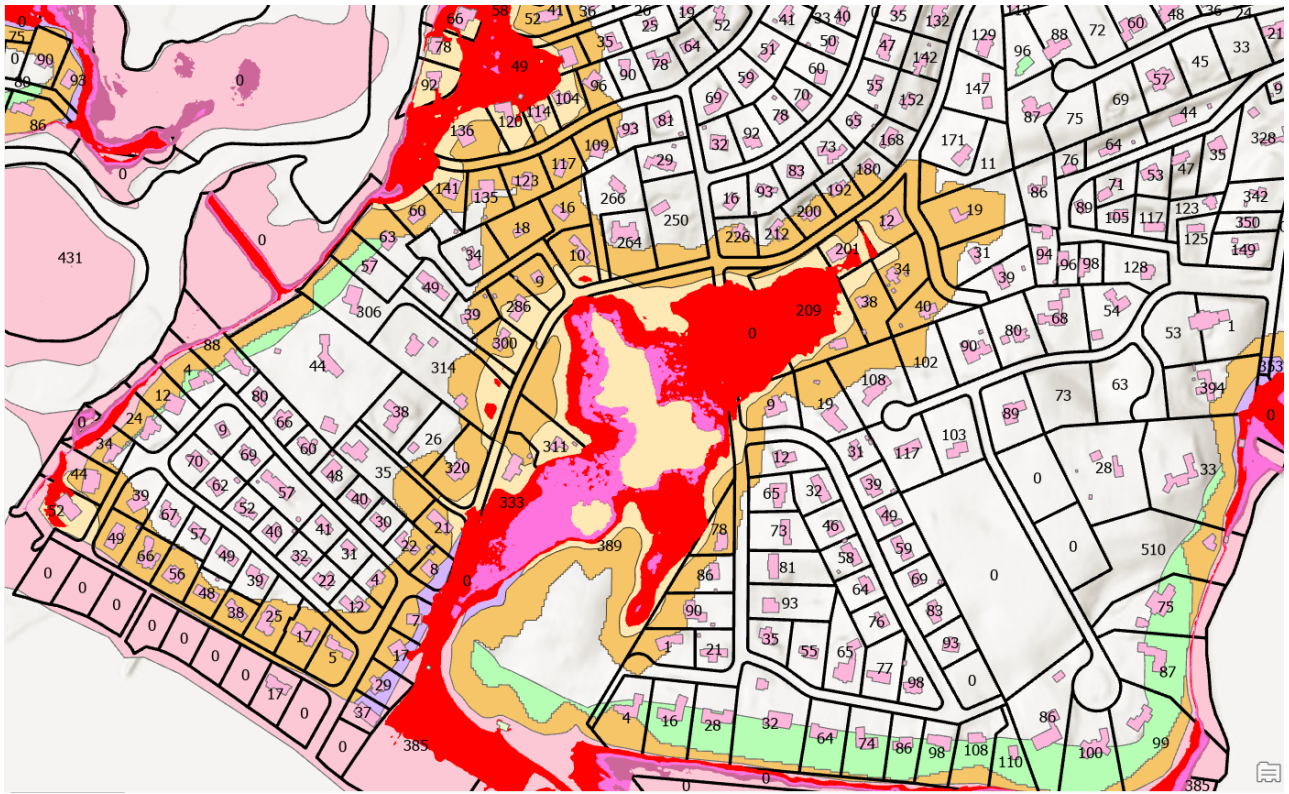


Figure 6. Detail view of Hardings Beach.

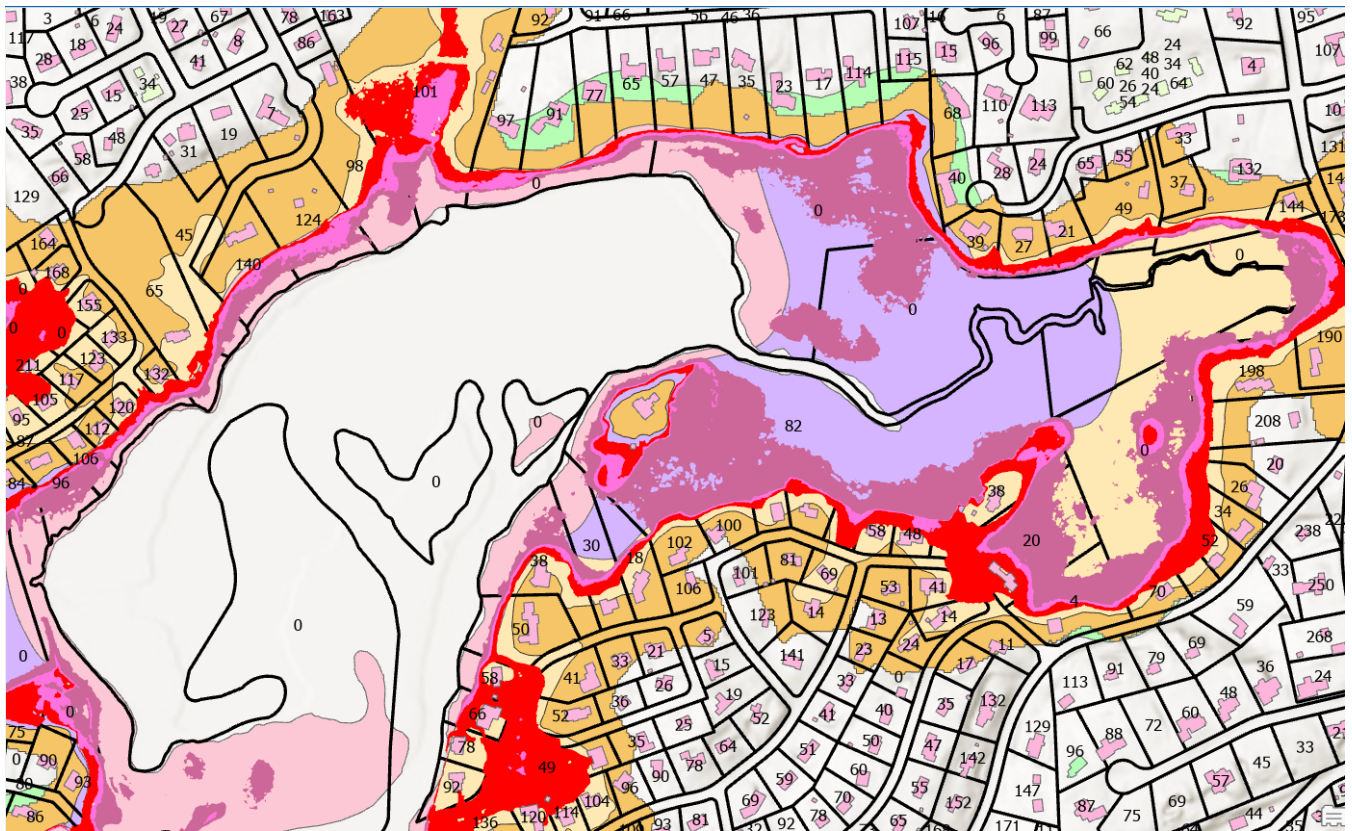


Figure 7. Detail view of Bucks Creek.

Appendix B. Maps of private properties in the Floodplain

Following are detail maps of parcels in the Coastal Resilience Zones (with street addresses), running across the four marshes studied, in different scales.

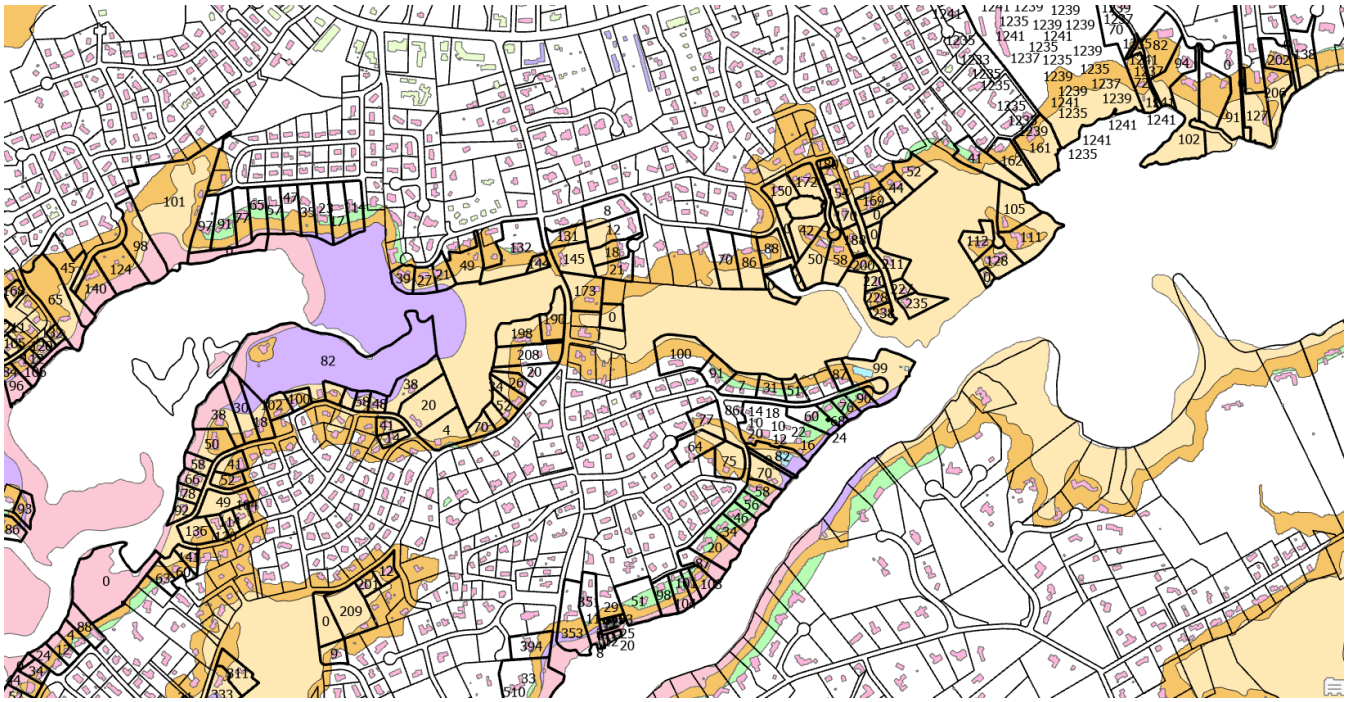


Figure 8. Detail view of Oyster Pond.



Figure 9. View of Forest Beach, Cockle Cove and Bucks Creek.

October 1, 2026

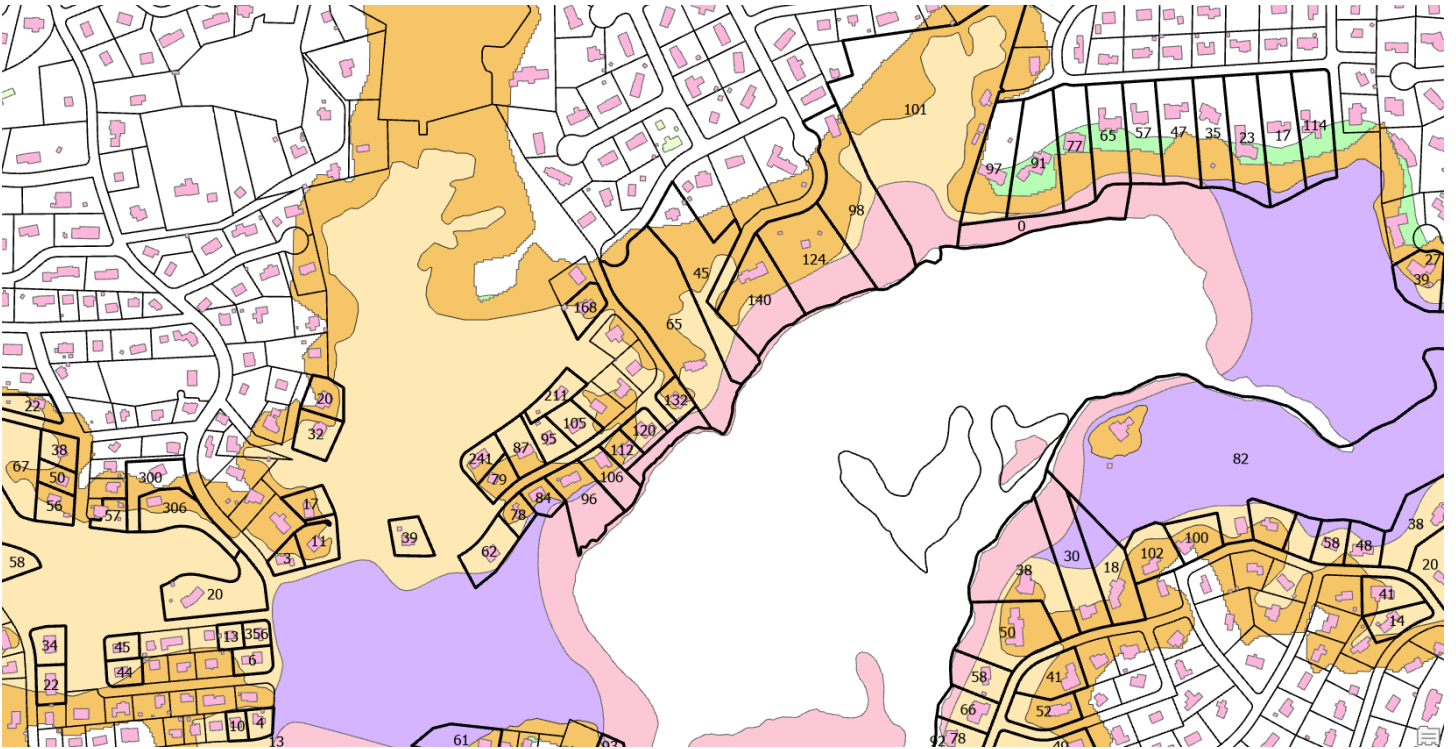


Figure 12. Detail view of upper Bucks Creek.

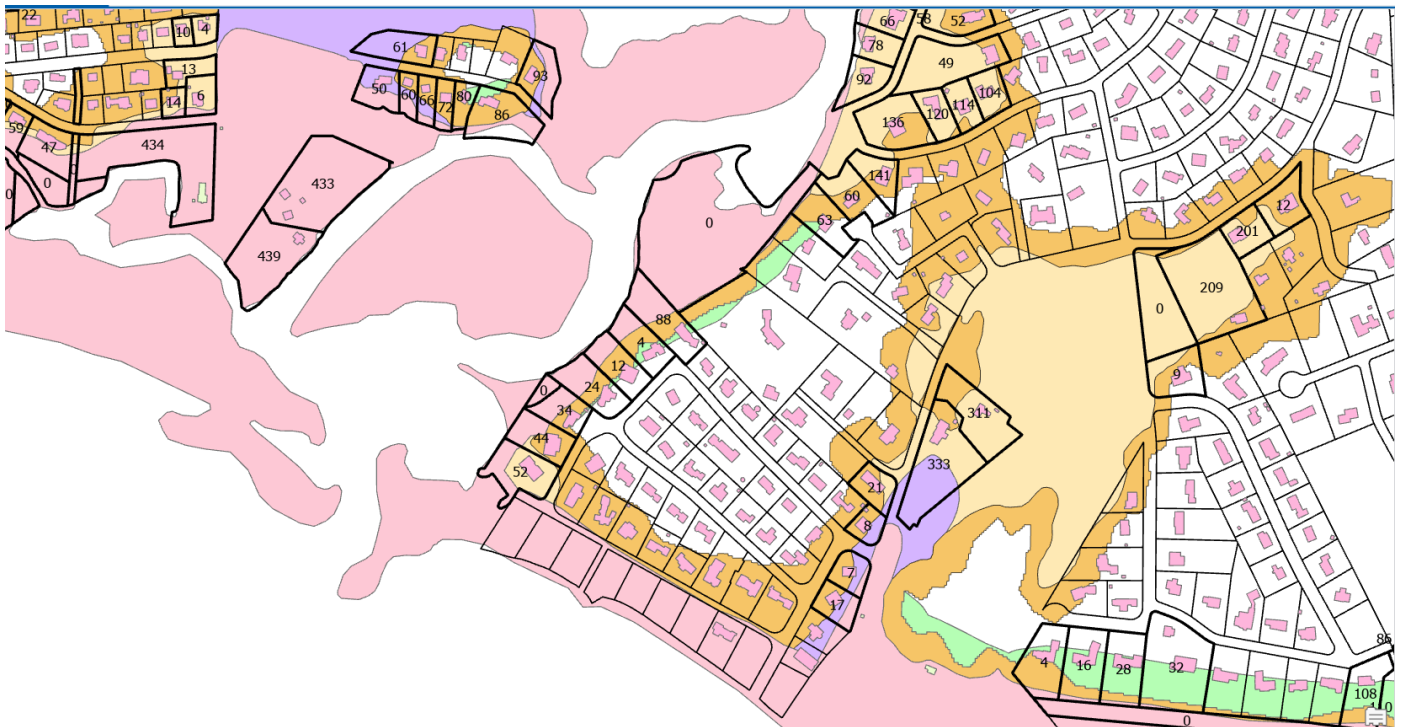


Figure 13. Detail view of lower Bucks Creek.

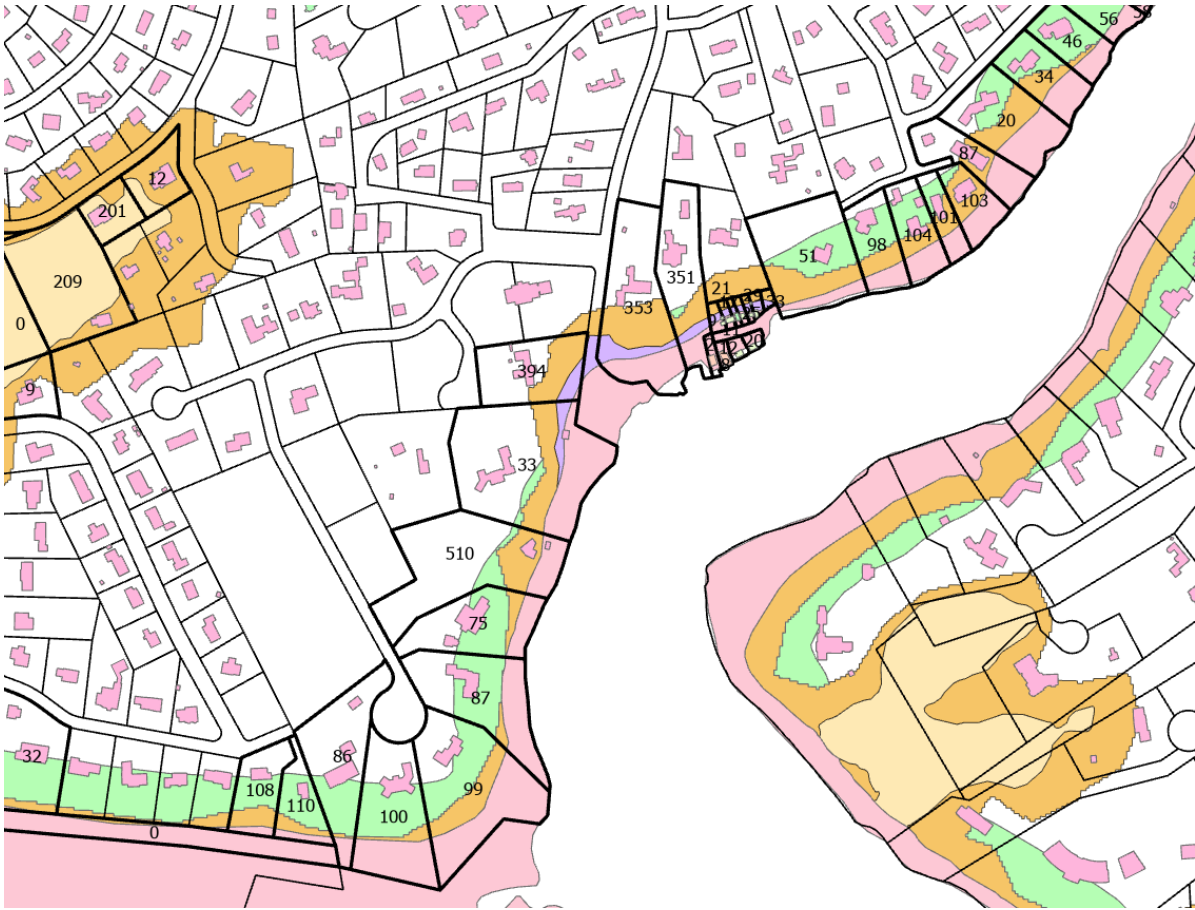


Figure 14. Detail view of Oyster Pond.

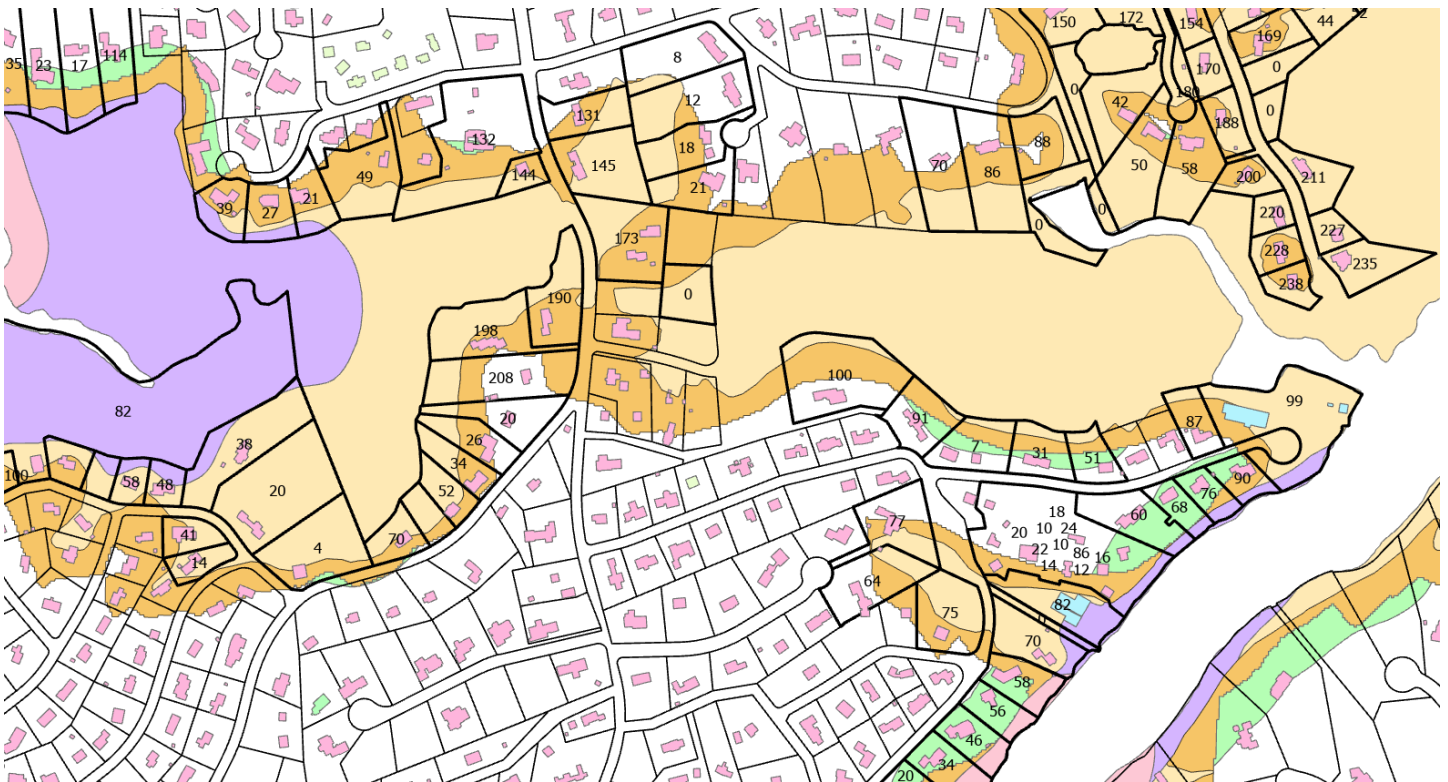


Figure 15. Detail view of Oyster Pond.

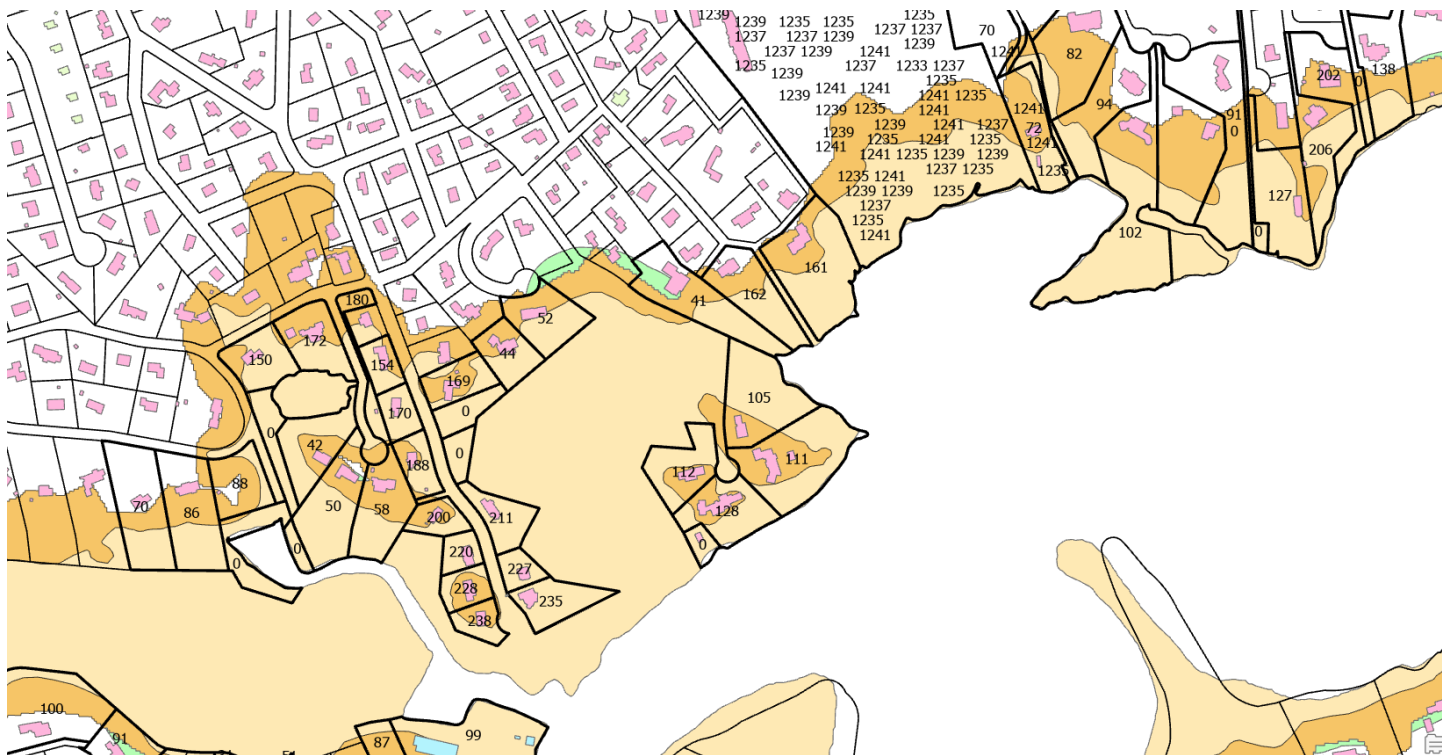


Figure 16. Detail view of Oyster Pond

Appendix C. Analysis of private ownership of parcels in 2017 FEMA Floodplain and 2070 migration area

On the following maps, the elevation of all parcels in Chatham are plotted based on state LiDAR data from 2021. The maps show the position of salt marsh for the present (shown in dark blue) and the future (shown in bright red). Marsh location is calculated using a simple “bathtub” model based on the definition of salt marsh as land at an elevation between local mean sea level (LMSL) and high tide line (HTL). Currently, LMSL = -0.34 ft. (NAVD88) and HTL = 3.12 ft. For future marsh, a sea-level rise of 4.30 ft. – which is what the MC-FRM model predicts for 2070 – was added to these limits. For the following map of last year’s ECAC study area (Figure 17), the predicted marsh migration path based on the calculations of the CCS study for the years in between 2025 and 2070 was then overlaid.

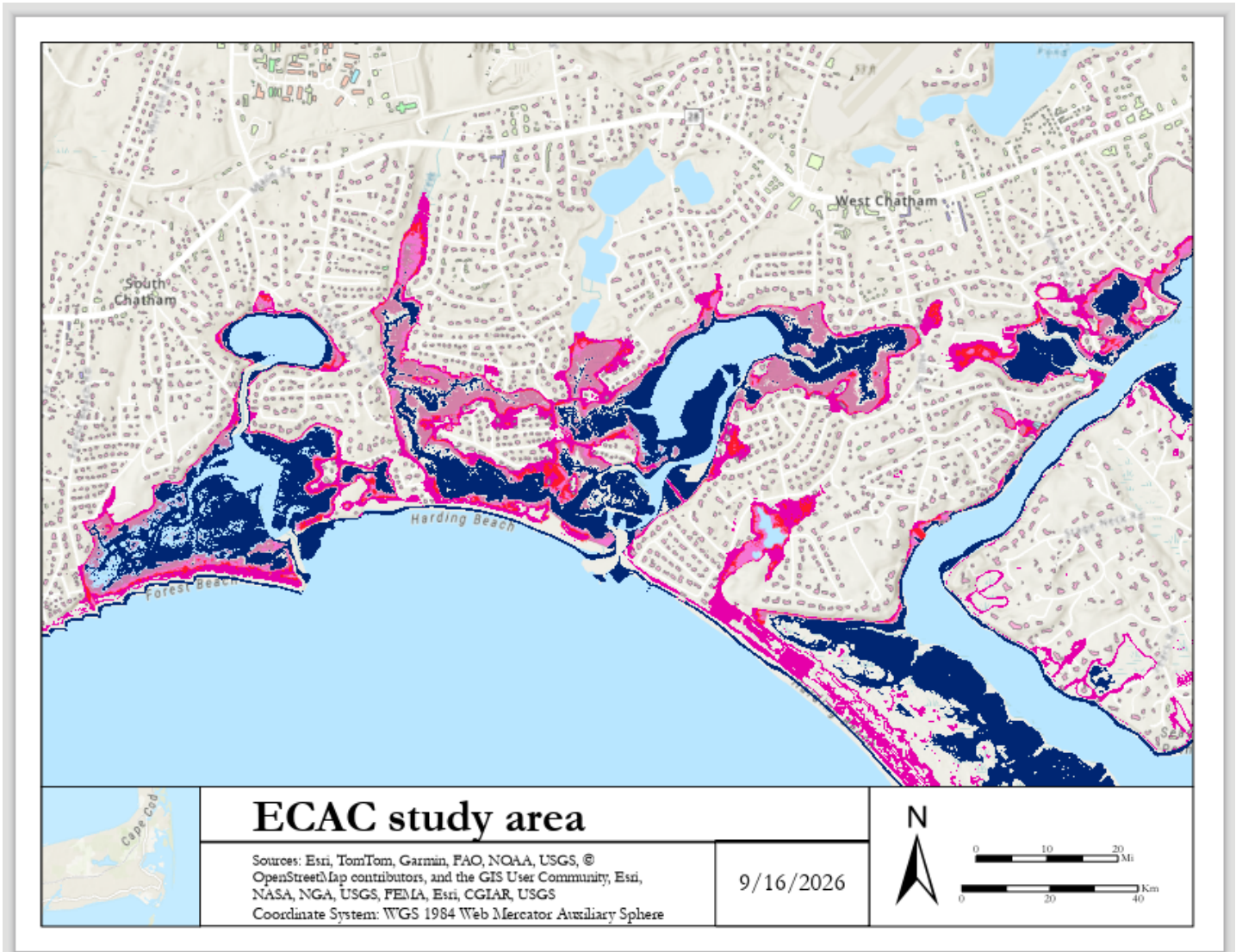


Figure 17. Area of the four marshes in the CCS study of 2025: Forest Beach, Cockle Cove, Bucks Creek and Oyster Pond salt marshes. Bright blue = extent of marsh currently (FEMA floodplain). Bright red = extent of marsh with 4.3 ft sea level rise as predicted for about 2070 by MC-FRM. Dull purple = marsh migration predicted by CCS for interim years.

Note that a 4.3 ft. rise will submerge the marsh that now goes up to about 3 ft. above sea level – so that the *marshes in 2070 will all be on land that is now dry* and the areas that are *currently marsh will be open sea*. As shown in the map, the area

predicted by CCS for marsh migration goes between these two areas, indicating the path of marsh migration. You can see in the map of the ECAC study area that the marsh will gradually spread out from its current positions and will migrate through the land in between the current and future positions. The future marsh does not overlap the current marsh, because the current marsh will be completely underwater and any marsh vegetation will be drowned by the 4.3 ft. sea-level rise. Note how much of the land for the future marsh and the land that migration must pass through is currently privately owned and even contains buildings, as documented in the following spreadsheet tables, derived from the maps in this document.

This analysis is a very rough estimate of the prospects for Chatham's marshes. It is based on a simplistic model of climate change and ecology. The visualization of future marsh location is based solely on ground elevation; it should be refined by the results of the 2026 CCS study of nine of the marshes. It assumes that there will be no interventions (by Town or residents, such as beach replenishment) or even natural sedimentation, storm surge or storm runoff. *It assumes there are no houses, barriers or roads blocking marsh migration.* In a sense, this is a best-case scenario, as in fact almost all the future marsh is on land that is privately owned, which is likely to hinder, block or minimize establishment of migrating or new marsh. Due to this concern with the consequences of habitation and private possession, the rest of this document assesses the private ownership of parcels in the current and future marsh land.

Table 1 shows the number of privately owned parcels that are (in 2026) or will be (in 2070) either totally contained within or partially overlapping marsh. Parcels owned by the Town of Chatham or by the local land trust are not included in the table. The statistics are presented for each marsh separately. (Note that this table does not include private parcels that will be flooded by marsh-level waters along the shore and elsewhere away from the 14 current major marshes; they would almost double the count of private parcels on wetlands and more than double the total appraised value of such.)

The parcels are counted in four sub-tables. First, the privately owned parcels that are **completely contained** within one of the major marshes as it exists **currently** (i.e., in the 2017 FEMA Floodplain or now in 2026). Second, the parcels that are **partially** in a given marsh and extend beyond it. Because the marsh edges do not correspond with parcel boundaries, it is hard to aggregate the appraised values of the marsh areas. The actual sums for each marsh lie somewhere between the "totally contained" values and the "partially contained" values. The third and fourth sub-tables present the privately owned parcels that are **completely contained** or **partially contained** within one of the major marshes as it is projected to exist in the **future** (i.e., with 4.3 ft. of sea level rise, as in the 2070 MC-FRM model).

Table 1. Subtotals of private parcels in the current floodplain and then private parcels in the 2070 floodplain. The subtotals are by marsh. First parcels are counted if they are fully contained in the floodplain and then if they are partially contained, so totals can be averaged between these extremes.

2017 contained: private parcels totally contained in FEMA floodplain

Sums of acreage, buildings, FY2027 land and appraisal values; count of parcels

marsh	Sum of Acres	Sum of Buildings	Sum of 2027 Land	Sum of 2027 Appraisal	Count of Parcels
Bucks Creek	12.35	8	\$7,479,400	\$11,965,700	7
Champlain Creek	12.06	7	\$14,801,000	\$26,334,600	7
Cockle Cove	8.98	5	\$2,942,800	\$5,197,700	8
Cotchpinicut Marsh	26.09	11	\$20,604,900	\$34,147,800	12
Forest Beach	25.47	12	\$9,868,200	\$15,207,800	10
Frost Fish Creek	5.92	17	\$798,400	\$9,018,100	17
Hardings Beach	2.25	2	\$3,977,800	\$6,470,000	2
Minister's Point	16.28	10	\$32,554,400	\$42,490,000	10
Morris Island	95.76	8	\$54,113,800	\$98,174,900	9

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Muddy Creek	4.31	2	\$2,027,700	\$6,369,800	2
Nickerson Neck	13.33	6	\$17,808,800	\$29,290,600	10
Oyster River	30.90	11	\$24,090,900	\$40,255,500	13
Red River	2.34	5	\$3,620,800	\$8,587,700	6
Tom's Neck	19.17	21	\$23,350,800	\$43,575,200	27
Grand Total	275.21	125	\$218,039,700	\$377,085,400	140

2017 overlap: private parcels partially contained in FEMA floodplain

Sums of acreage, buildings, FY2027 land and appraisal values; count of parcels

marsh	Sum Acres	of Buildings	of Sum of 2027 Land	Sum of 2027 Appraisal	Count Parcels	of
Bucks Creek	30.01		36	\$32,508,300	\$58,956,600	36
Champlain Creek	14.93		10	\$18,676,200	\$31,735,900	10
Cockle Cove	20.48		23	\$20,139,300	\$36,286,000	27
Cotchpinicut Marsh	39.76		20	\$48,367,000	\$80,270,700	24
Forest Beach	27.33		17	\$14,967,800	\$23,896,400	15
Frost Fish Creek	11.87		30	\$2,372,200	\$18,067,100	30
Hardings Beach	1.12		1	\$2,800,400	\$3,682,600	1
Minister's Point	22.52		16	\$51,275,600	\$71,418,100	16
Morris Island	106.93		14	\$59,335,500	\$108,763,600	15
Muddy Creek	20.57		18	\$10,390,000	\$27,233,700	22
Nickerson Neck	8.65		6	\$17,677,800	\$29,154,100	10
Oyster River	35.11		17	\$29,114,200	\$55,691,100	20
Red River	1.14		3	\$2,163,400	\$4,432,500	4
Tom's Neck	28.63		48	\$37,141,900	\$69,933,900	53
Grand Total	369.05		259	\$346,929,600	\$619,522,300	283

2070 contained: private parcels totally contained in MC-FRM model

Sums of acreage, buildings, FY2027 land and appraisal values; count of nonblank parcel IDs

marsh	Sum Acres	of Buildings	of Sum of 2027 Land	Sum of 2027 Appraisal	Count Parcels	of
Bucks Creek	35.48		35	\$32,451,200	\$57,857,500	37
Champlain Creek	37.56		30	\$35,771,300	\$55,856,500	24
Cockle Cove	10.89		15	\$15,950,700	\$26,441,100	19
Cotchpinicut Marsh	35.71		18	\$44,848,200	\$80,314,500	18
Forest Beach	11.60		18	\$22,294,500	\$33,939,700	16
Frost Fish Creek	44.62		49	\$10,635,500	\$35,374,600	50
Hardings Beach	5.99		8	\$6,194,900	\$9,513,600	6

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Minister's Point	21.79	17	\$44,499,900	\$70,822,500	15
Morris Island	16.31	7	\$17,633,600	\$31,090,700	7
Muddy Creek	9.52	6	\$2,851,800	\$6,564,300	10
Nickerson Neck	8.16	7	\$23,450,900	\$38,008,800	12
Oyster River	22.34	20	\$25,945,400	\$46,183,500	23
Red River	7.34	8	\$7,907,300	\$13,332,200	9
Tom's Neck	30.42	55	\$71,045,300	\$112,680,400	55
Grand Total	297.73	293	\$361,480,500	\$617,979,900	301

2070 overlap: private parcels partially contained in MC-FRM model

Sums of acreage, buildings, FY2027 land and appraisal values; count of parcels

marsh	Sum of Acres	Sum of Buildings	Sum of 2027 Land	Sum of 2027 Appraisal	Count of Parcels
Bucks Creek	47.95	70	\$71,874,700	\$130,871,400	72
Champlain Creek	41.93	39	\$50,681,800	\$79,894,100	31
Cockle Cove	17.73	37	\$29,466,400	\$51,252,900	41
Cotchpinicut Marsh	44.89	27	\$55,852,600	\$91,845,900	25
Forest Beach	35.58	66	\$80,934,100	\$128,932,400	66
Frost Fish Creek	64.21	67	\$21,801,900	\$63,460,300	70
Hardings Beach	17.10	19	\$26,507,900	\$51,305,400	26
Minister's Point	24.63	21	\$50,626,300	\$90,972,400	17
Morris Island	22.25	11	\$28,747,900	\$54,002,300	13
Muddy Creek	9.91	7	\$3,193,700	\$7,368,600	9
Nickerson Neck	19.08	14	\$49,908,700	\$78,977,100	21
Oyster River	37.45	34	\$44,666,500	\$86,012,800	38
Red River	19.09	33	\$31,406,000	\$59,111,200	33
Tom's Neck	48.05	70	\$116,679,250	\$177,031,150	75
Grand Total	449.85	515	\$662,347,750	\$1,151,037,950	537

It is hard to draw conclusions from these tables. However, note that although the predicted future marsh land is roughly equal to the existing marsh land (298 to 450 acres vs 275 to 369), there are about twice as many private houses there (293 to 515 vs. 125 to 259). Even on the existing marshes, there are over 100 private houses, which could impede Town efforts to preserve these marshes. On the 2070 marshes there are roughly 300 to 500 private houses.

Further conclusions will probably require targeted inquiry into each marsh and the ownership of individual properties contained in them. To orient such an investigation, the privately owned parcels are shown in the following maps for each of Chatham's major marshes. Dark blue = areas of the marsh in 2026. Bright red = areas of the marsh after 4.3 ft. sea-level rise (in about 2070 according to MC-FRM). Note that in electronic versions of this document these maps can be zoomed into quite well to locate the houses and plot lines.

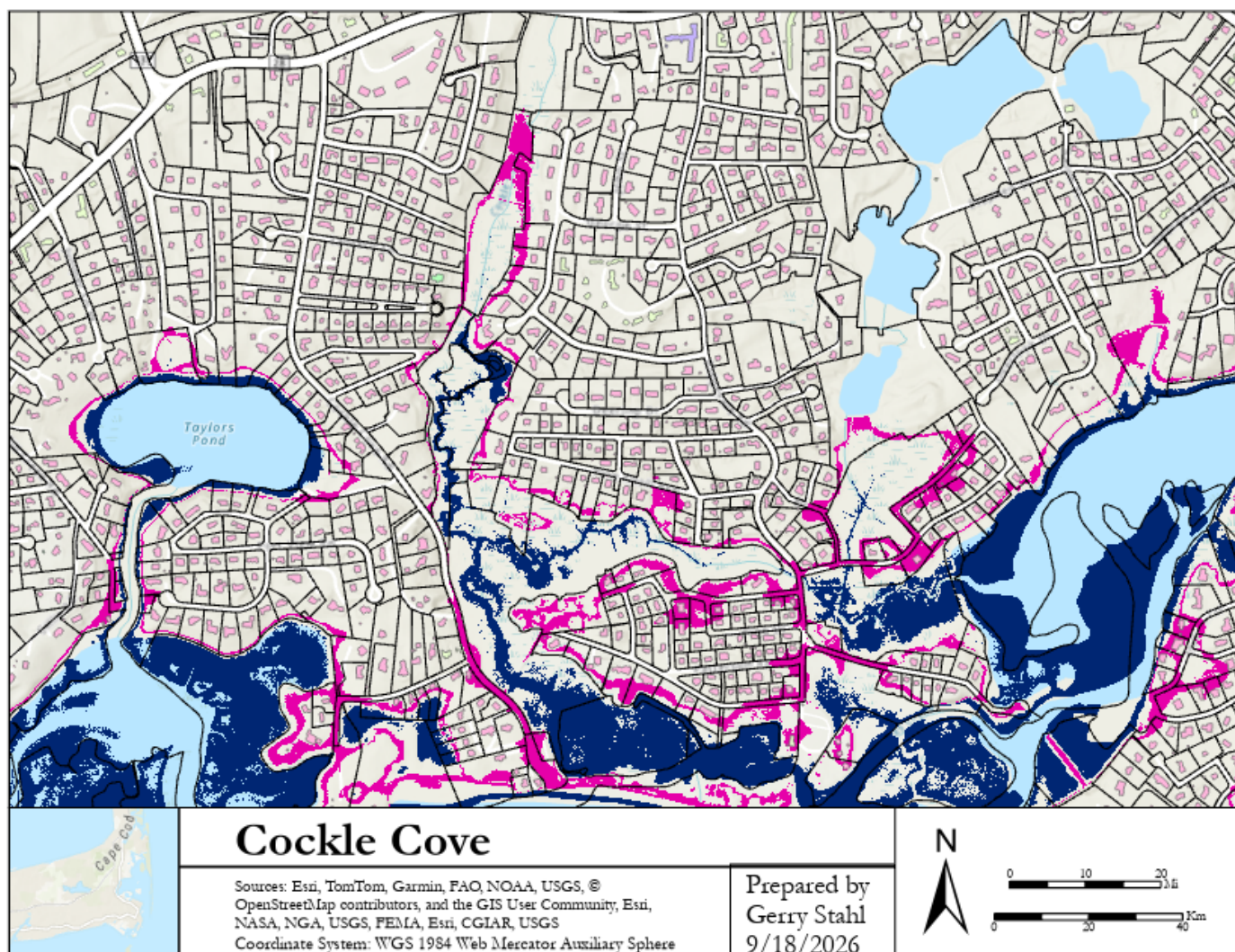


Figure 18. Area around Cockle Cove, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

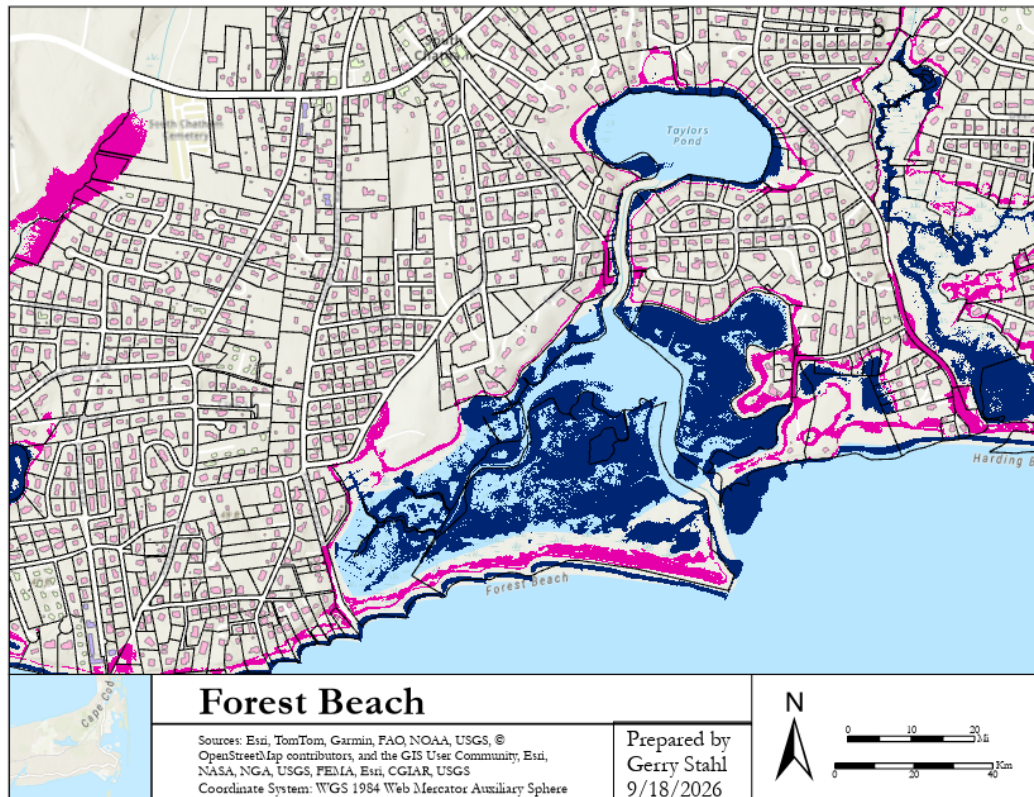


Figure 19. Area around Forest Beach, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

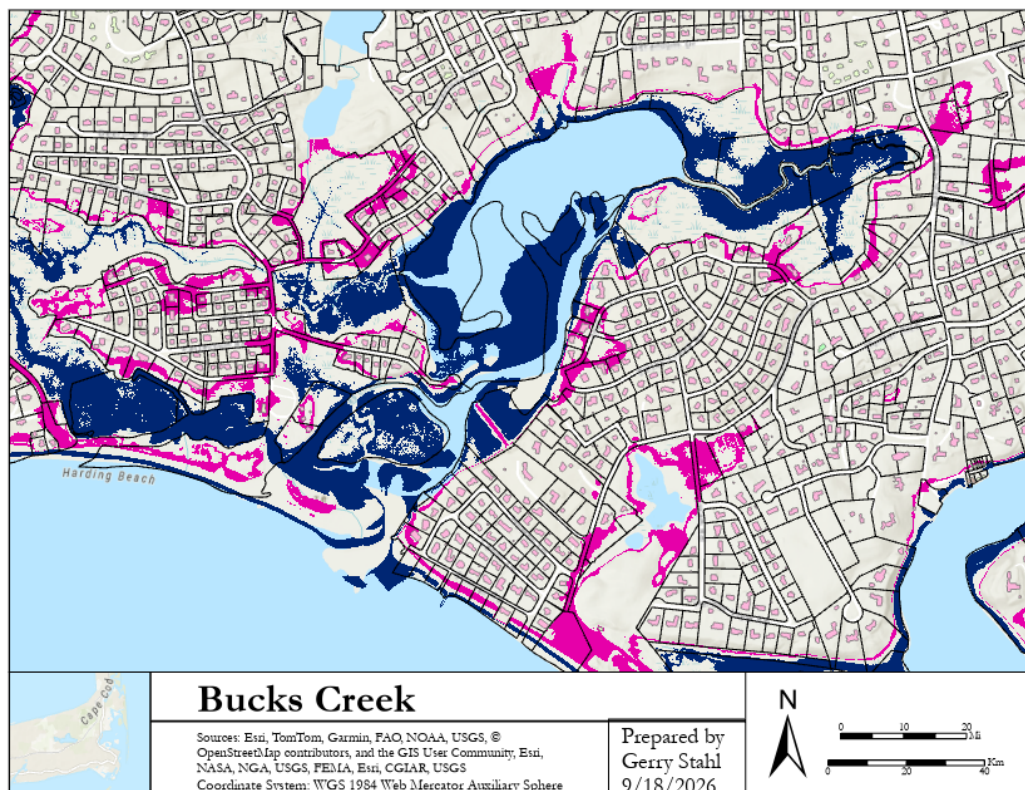


Figure 20. Area around Bucks Creek, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

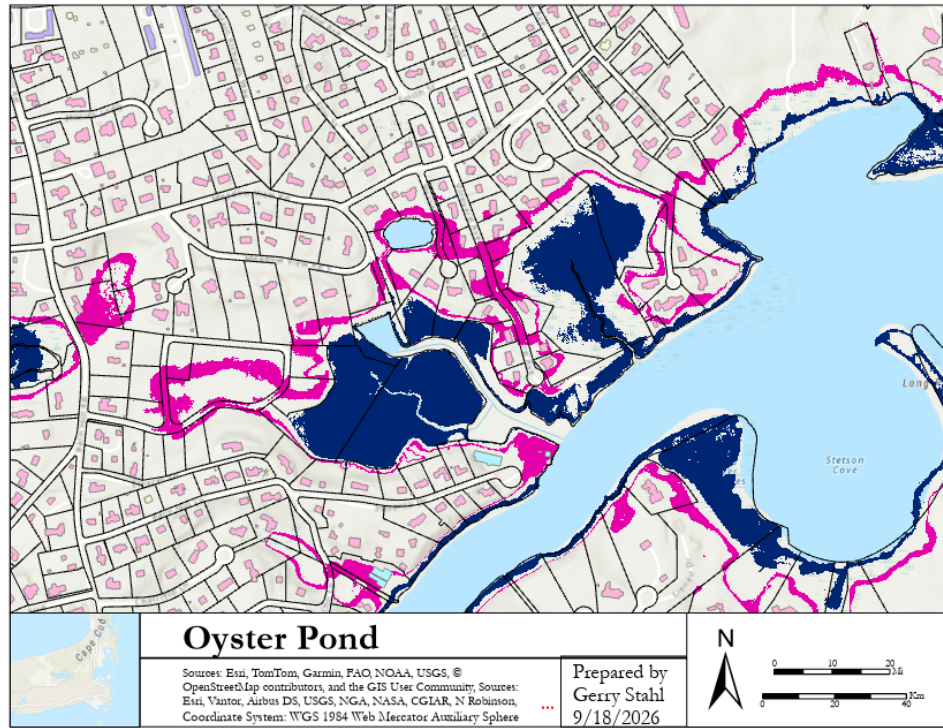


Figure 21. Area around Oyster Pond, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

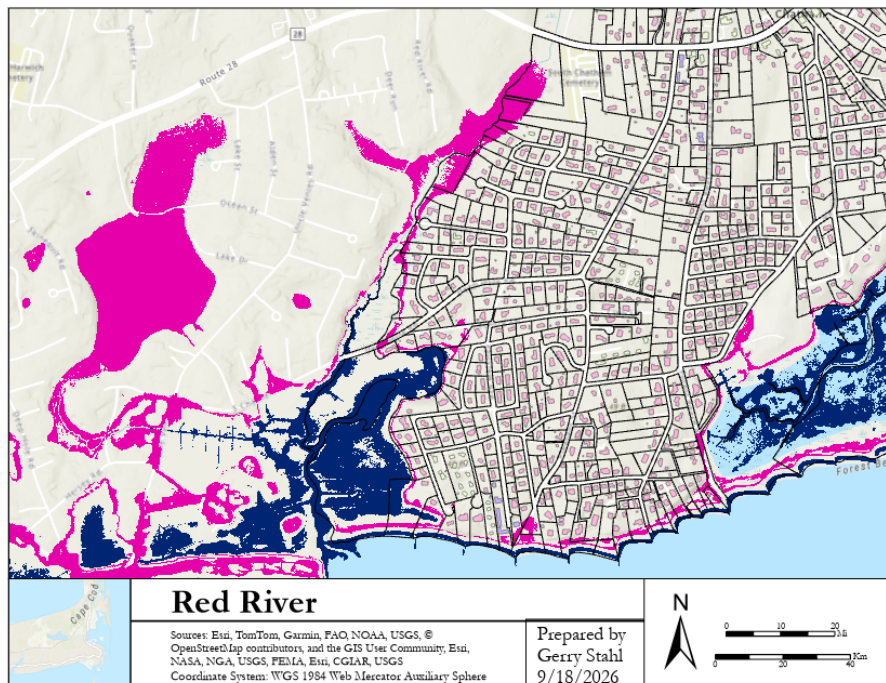


Figure 22. Area around Red River, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

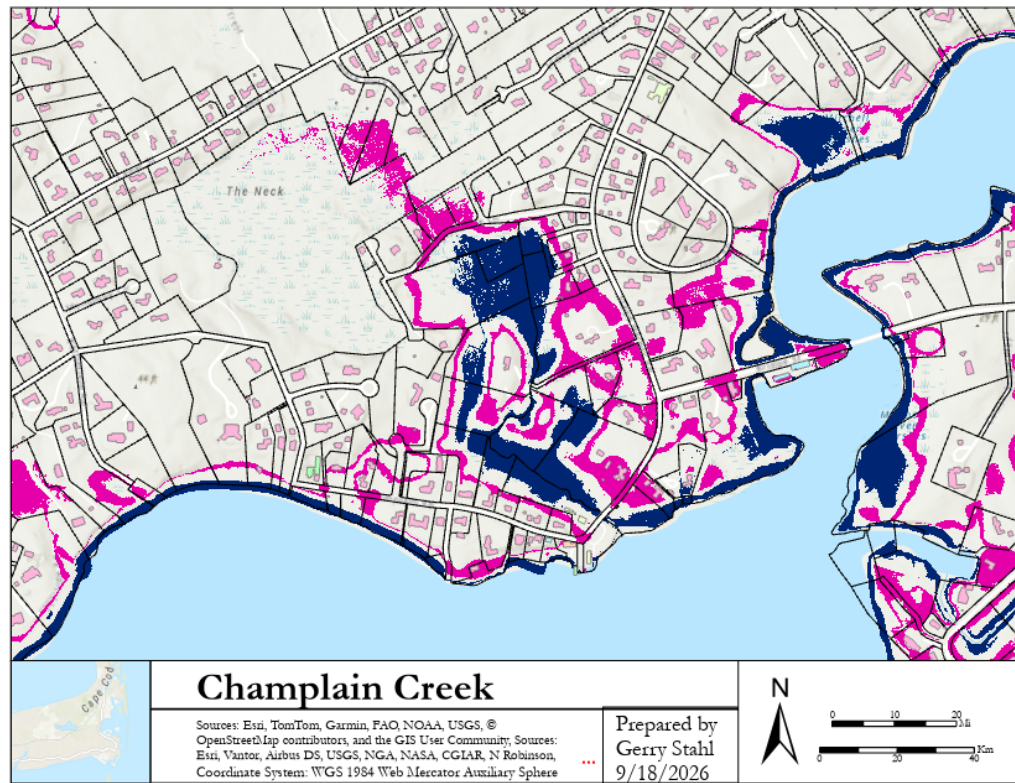


Figure 23. Area around Champlain Creek, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

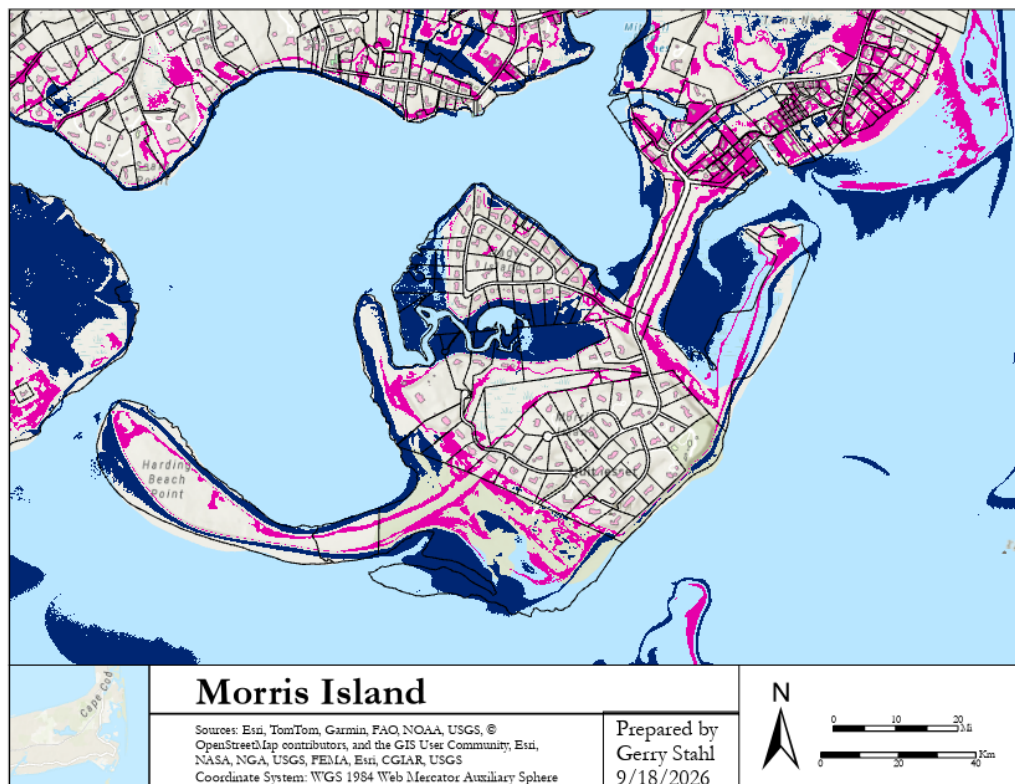


Figure 24. Area around Morris Island, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

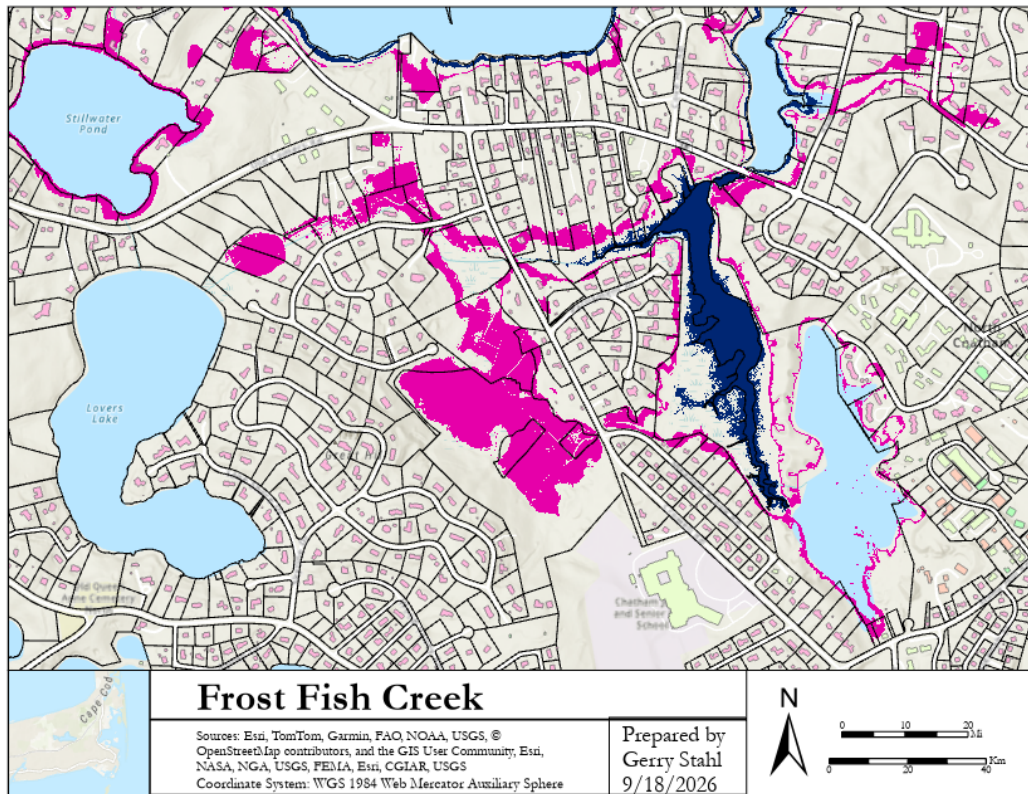


Figure 25. Area around Frost Fish Creek, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

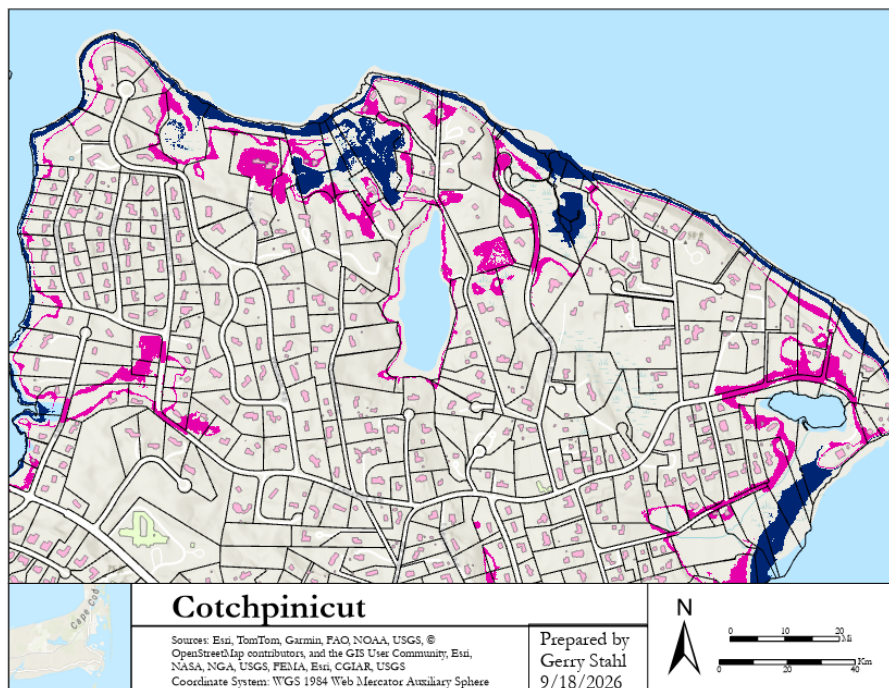


Figure 26. Area around Cotchpinicut, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

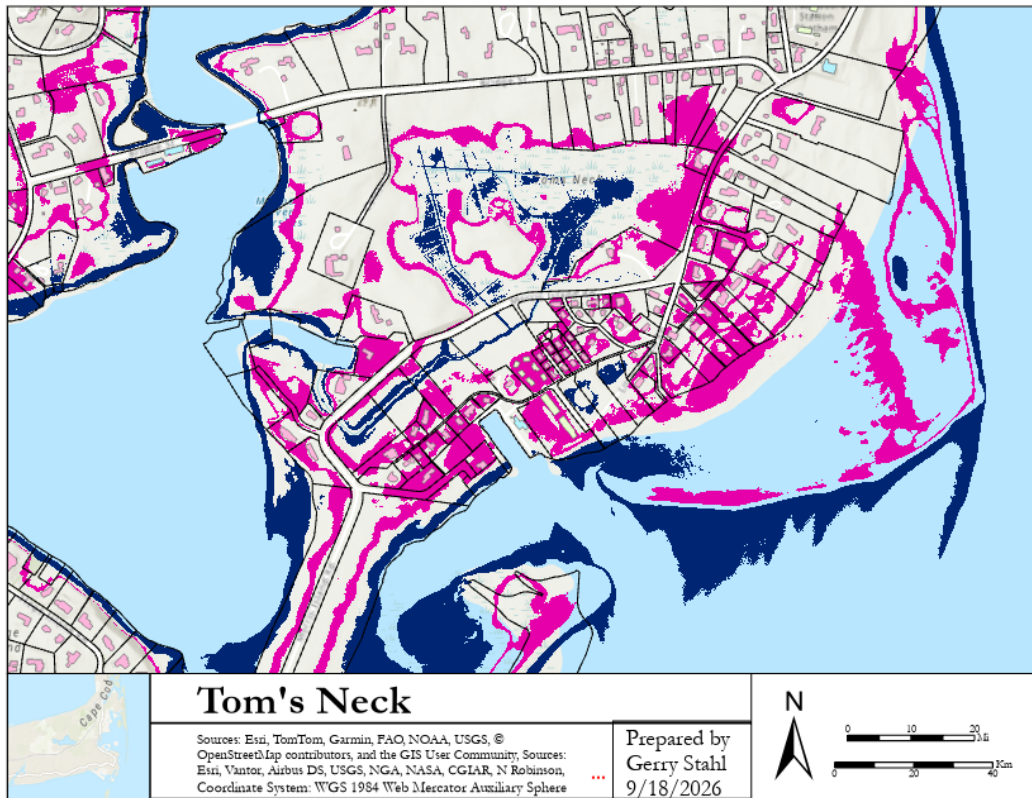


Figure 27. Area around Tom's Neck, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

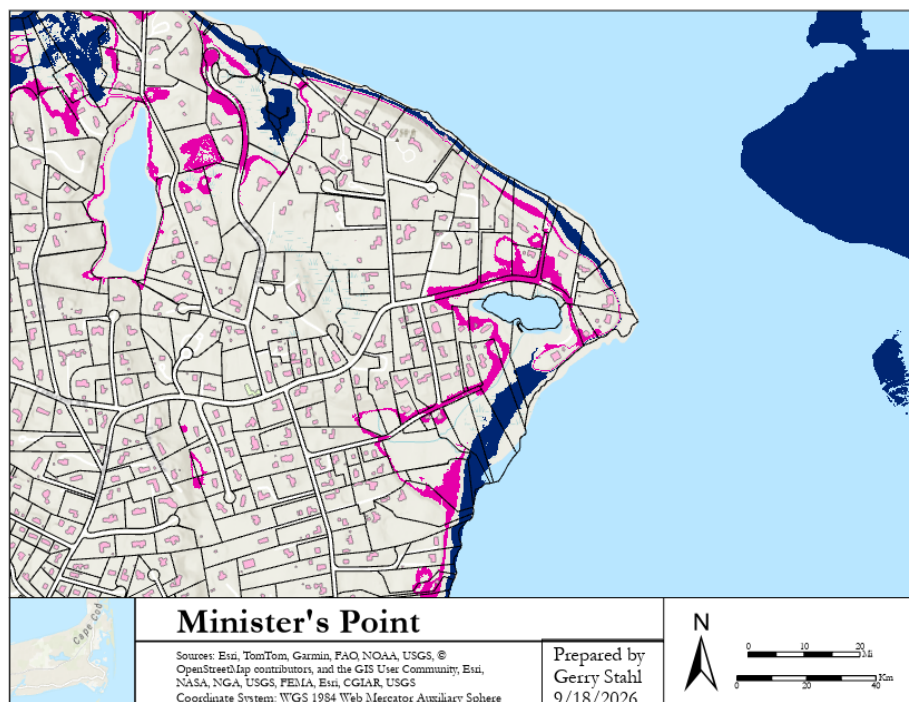


Figure 28. Area around Minister's Point, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

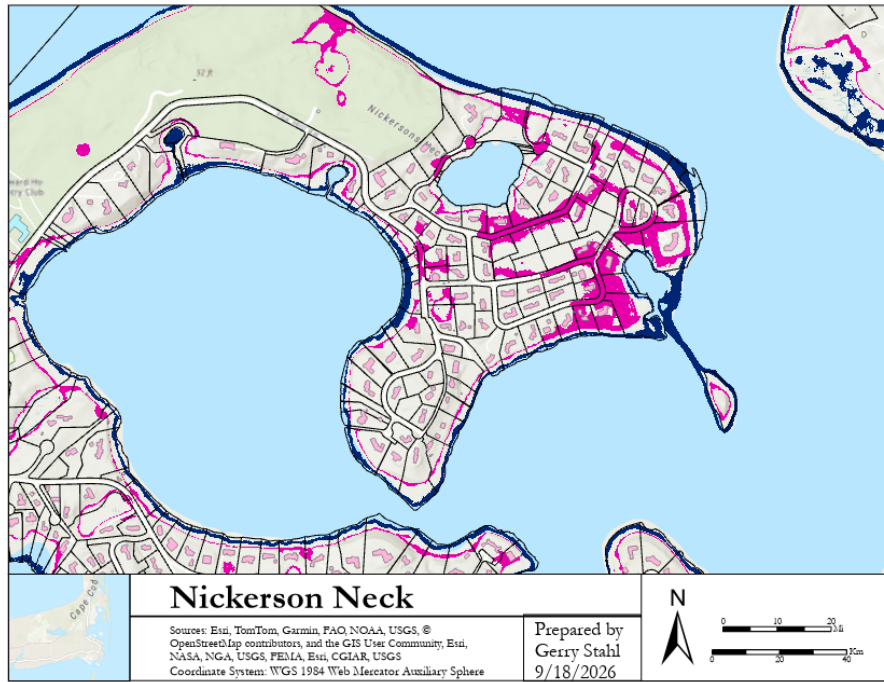


Figure 29. Area around Nickerson Neck, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

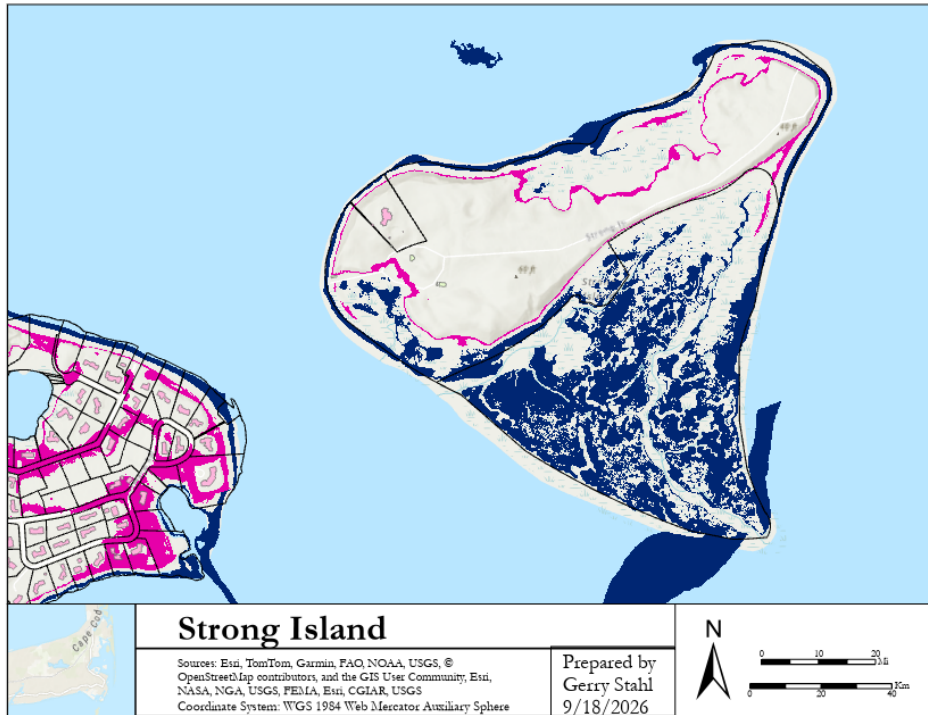


Figure 30. Area around Strong Island, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

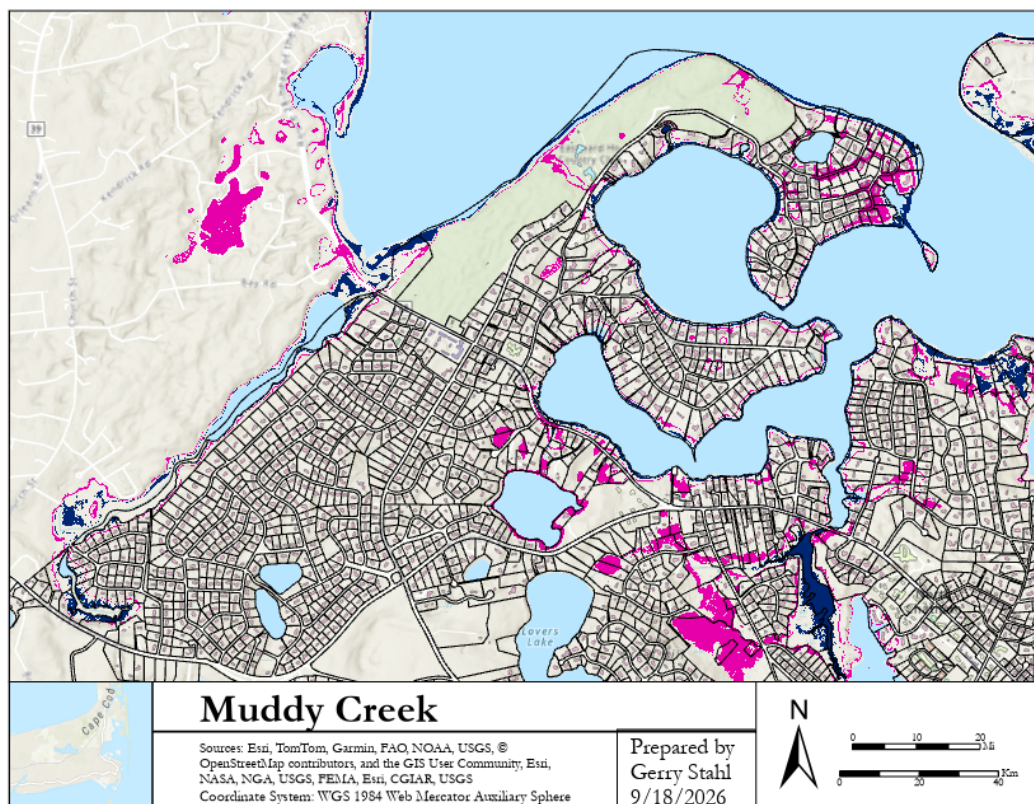


Figure 31. Area around Muddy Creek, with estimated 2026 marsh (dark blue) and estimated 2070 marsh (bright red) with 4.3 feet of sea level rise.

Appendix D. Analysis of private ownership of parcels in 2070 Coastal Resilience Zones

Appendix D complements the “analysis of private ownership of current and future salt marsh in Chatham” in Appendix C. That analysis used land elevation to map estimated current and future marsh locations and possible marsh migration paths. This analysis uses the map of Coastal Resilience Zones for 2070, as prepared by the Cape Cod Commission for the Chatham Conservation Commission. It is what will replace the FEMA map of the Floodplain as defined in 2017, to correspond to the revised Chatham Wetlands Bylaws.

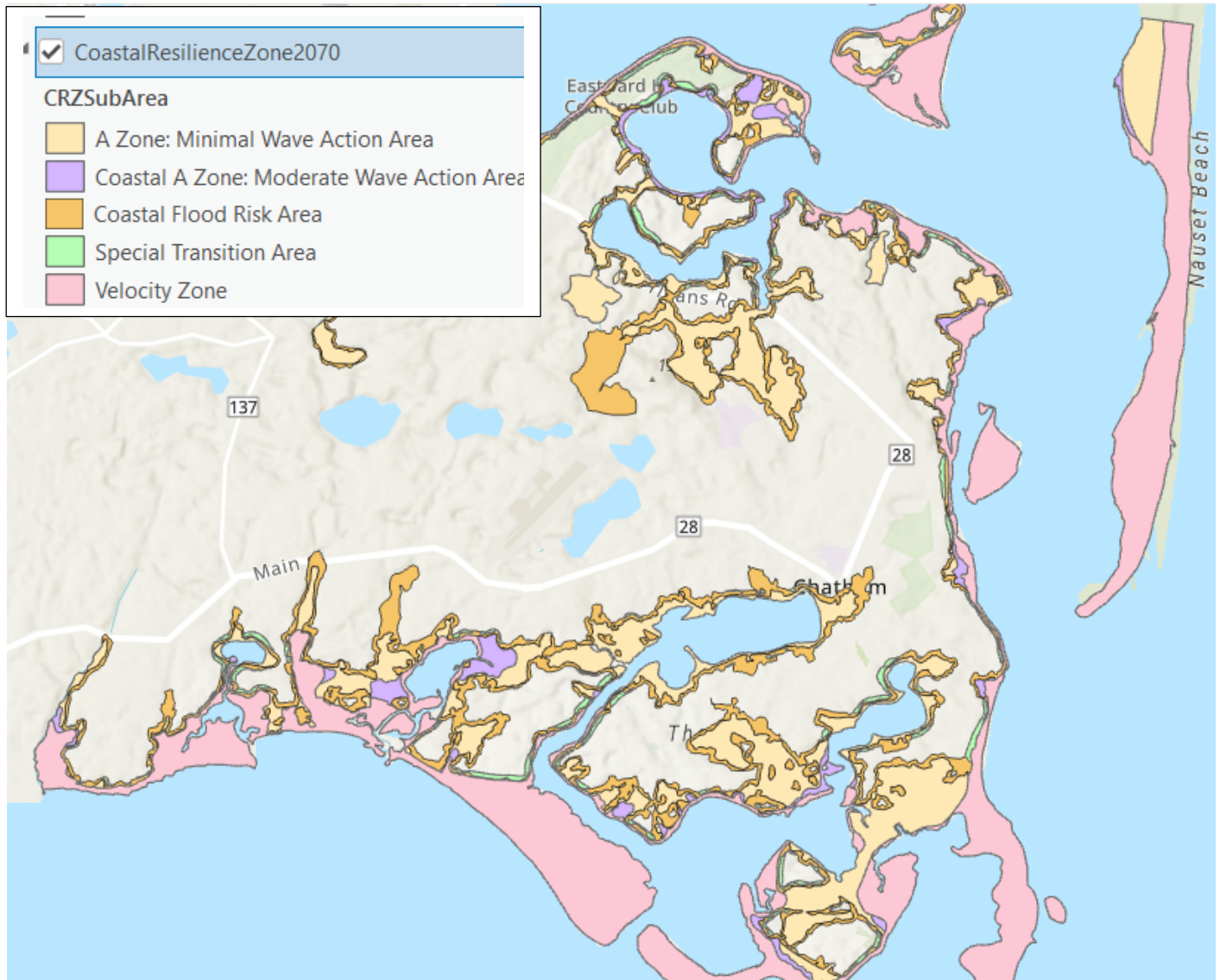


Figure 32. The Coastal Floodplain will be defined in terms of five “Coastal Resilience Zones” as shown in this map of Chatham. Revised Wetlands Bylaws and Regulations will be specified specifically for each of these five Zones.

This report estimates how many parcels are located (at least partially) within each of the five CRZs. (Parcels are not double counted if they are located in more than one zone.) Within each CRZ, the spreadsheet summarized in Table 2 below breaks down the parcels by owner type: owned by the Town of Chatham, by the Chatham Conservation Foundation local land trust (CCF), by the federal government, by tax-exempt condominium associations, by other nonprofits or by private owners/residents. The parcels owned by these entities are then grouped by marsh area. The

number of parcels, number of buildings on the parcels, sum of the land area and assessed values of the land and building are detailed in the spreadsheet and added up. (Parcel data was obtained from the Chatham Assessor in 2026 and includes assessments for FY 2027.)

Of over 8,000 parcels in Chatham, about 1,000 are partially or entirely in the Floodplain as defined in the CRZ map projection for 2070. While many of the largest parcels in the Floodplain are owned by the Town or CCF, 982 out of 1,132 the parcels are privately owned and they contain 950 of the 960 currently existing buildings.

Table 2. Spreadsheet subtotals for parcels in each Coastal Resilience Zone. The subtotals within each zone of the 2070 CRZ are by owner type and marsh area.

Sum of Parcels, Buildings, Acres, Land & Total Assessments – Sub-totaled by CR Zone, Owner Type, and Marsh Area

Coastal Resilience Zone	Owner type	Marsh area	Sum of Parcels	Sum of Buildings	Sum of Acres	Sum of Land	Sum of Appraisal
A Zone: Minimal Wave Action Area	CCF	Bucks Creek	9	0	22.42	\$886,400	\$886,400
		Champlain Creek	14	0	28.75	\$13,605,100	\$13,605,100
		Cockle Cove	9	0	37.47	\$3,014,600	\$3,014,600
		Cotchpinicut Marsh	2	0	4.35	\$397,300	\$397,300
		Forest Beach	2	0	1.29	\$44,300	\$44,300
		Frost Fish Creek	7	0	81.44	\$3,347,400	\$3,347,400
		Minister's Point	3	0	1.68	\$2,330,100	\$2,330,100
		Morris Island	3	0	17.34	\$1,826,800	\$1,826,800
		Muddy Creek	7	0	22.04	\$2,556,400	\$2,556,400
		Nickerson Neck	7	0	3.37	\$6,350,000	\$6,359,400
		Oyster River	6	0	26.60	\$6,032,600	\$6,032,600
		Red River	2	0	28.29	\$3,171,400	\$3,171,400
		Tom's Neck	9	0	47.17	\$3,380,200	\$3,380,200
	CCF Total		80	0	322.21	\$46,942,600	\$46,952,000
	condo	Cockle Cove	1	1	0.24	\$517,500	\$1,409,600
		Frost Fish Creek	4	4	8.53	\$0	\$0
		Tom's Neck	2	2	4.97	\$0	\$0
	condo Total		7	7	13.74	\$517,500	\$1,409,600
	nonprofit	Muddy Creek	1	0	1.50	\$31,400	\$31,400
	nonprofit Total		1	0	1.50	\$31,400	\$31,400
	Residential	Bucks Creek	90	91	68.67	\$80,837,800	\$152,749,700
		Champlain Creek	44	53	59.06	\$75,923,200	\$122,326,000
		Cockle Cove	91	86	37.33	\$65,476,300	\$117,660,000

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A Zone: Minimal Wave Action Area	Residential	Cotchpinicut Marsh	49	49	85.84	\$103,023,900	\$173,627,800
		Forest Beach	53	57	49.23	\$49,334,100	\$85,297,100
		Frost Fish Creek	99	98	71.47	\$25,709,700	\$87,510,000
		Hardings Beach	16	17	11.05	\$15,194,500	\$30,031,900
		Minister's Point	17	19	24.44	\$55,635,800	\$82,654,700
		Morris Island	22	24	40.74	\$54,573,500	\$120,819,800
		Muddy Creek	33	32	34.60	\$17,027,400	\$42,865,700
		Nickerson Neck	27	19	25.91	\$63,671,100	\$104,424,900
		Oyster River	67	58	79.06	\$78,930,000	\$154,441,300
		Red River	24	23	14.49	\$17,673,100	\$33,740,900
		Tom's Neck	131	122	72.08	\$167,232,760	\$274,181,060
		Residential Total	763	748	673.97	\$870,243,160	\$1,582,330,860
	Town	Bucks Creek	2	1	14.10	\$899,100	\$958,400
		Champlain Creek	5	2	29.11	\$6,541,200	\$7,102,200
		Cockle Cove	1	1	72.00	\$9,028,800	\$9,047,400
		Forest Beach	2	1	32.03	\$6,946,000	\$7,149,300
		Frost Fish Creek	9	1	9.56	\$3,025,400	\$3,387,800
		Hardings Beach	1	0	24.00	\$3,762,000	\$3,762,000
		Muddy Creek	1	0	1.75	\$384,900	\$384,900
		Oyster River	8	0	10.99	\$4,652,200	\$4,661,800
		Red River	4	0	10.87	\$924,700	\$924,700
		Tom's Neck	3	0	20.00	\$12,103,500	\$12,103,500
	Town Total	36	6	224.41	\$48,267,800	\$49,482,000	
	USA	Morris Island	2	0	70.35	\$23,111,400	\$23,164,400
	USA Total	2	0	70.35	\$23,111,400	\$23,164,400	
A Zone: Minimal Wave Action Area Total							
		889	761	1,306.18	\$989,113,860	\$1,703,370,260	
Coastal A Zone: Moderate Wave Action Area	CCF	Bucks Creek	3	0	9.36	\$130,000	\$130,000
		Hardings Beach	1	0	0.08	\$813,300	\$813,300
		Nickerson Neck	1	0	0.63	\$49,400	\$49,400
		CCF Total	5	0	10.07	\$992,700	\$992,700
	Residential	Bucks Creek	12	12	4.40	\$10,839,700	\$19,837,500
		Champlain Creek	2	3	0.51	\$2,819,500	\$4,353,100
		Forest Beach	12	12	4.69	\$15,136,000	\$21,938,100
		Hardings Beach	4	4	1.13	\$9,096,700	\$14,117,600
		Minister's Point	12	13	15.62	\$26,285,000	\$56,103,100
		Morris Island	2	2	16.60	\$11,478,700	\$21,186,300
		Nickerson Neck	4	2	2.20	\$5,213,500	\$6,863,200

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		Red River	7	7	2.99	\$6,720,000	\$12,510,500
	Residential						
	Total		55	55	48.14	\$87,589,100	\$156,909,400
	Town	Bucks Creek	1	0	7.00	\$1,978,300	\$1,978,300
		Champlain Creek	2	0	0.25	\$3,302,400	\$4,123,200
		Cockle Cove	1	0	27.40	\$3,436,000	\$3,577,500
		Forest Beach	1	0	0.07	\$726,100	\$726,100
	Town Total		5	0	34.72	\$9,442,800	\$10,405,100
Coastal A Zone: Moderate Wave Action Area Total			65	55	92.93	\$98,024,600	\$168,307,200
Coastal Flood Risk Area	CCF	Frost Fish Creek	1	0	0.36	\$365,500	\$365,500
		Minister's Point	1	0	0.54	\$124,500	\$124,500
		Nickerson Neck	1	0	2.50	\$7,610,600	\$7,610,600
		Strong Island	1	0	72.55	\$14,404,800	\$14,404,800
	CCF Total		4	0	75.95	\$22,505,400	\$22,505,400
	condo	Red River	1	1	0.99	\$0	\$0
	condo Total		1	1	0.99	\$0	\$0
	Residential	Bucks Creek	23	23	10.93	\$28,270,600	\$51,715,300
		Champlain Creek	6	5	3.89	\$8,226,500	\$11,942,600
		Cockle Cove	9	9	3.84	\$5,440,700	\$10,632,400
		Cotchpinicut Marsh	2	2	3.42	\$7,026,600	\$8,601,300
		Forest Beach	32	33	14.69	\$49,035,400	\$78,841,500
		Frost Fish Creek	7	8	3.37	\$2,588,700	\$6,020,200
		Hardings Beach	12	11	7.21	\$25,863,900	\$47,202,400
		Minister's Point	6	8	9.56	\$26,232,700	\$36,774,700
		Muddy Creek	15	15	14.54	\$7,320,200	\$19,733,700
		Oyster River	3	3	0.95	\$2,181,600	\$5,198,400
		Red River	9	10	3.40	\$10,104,300	\$24,173,000
		Tom's Neck	3	5	6.30	\$7,066,250	\$11,074,950
	Residential Total		127	132	82.10	\$179,357,450	\$311,910,450
	Town	Frost Fish Creek	1	0	1.46	\$492,400	\$492,400
		Muddy Creek	2	0	48.52	\$2,469,200	\$2,469,200
		Strong Island	1	0	69.00	\$2,740,000	\$2,740,000
	Town Total		4	0	118.98	\$5,701,600	\$5,701,600
Coastal Flood Risk Area Total			136	133	278.02	\$207,564,450	\$340,117,450
Special Transition Area							
	Residential	Oyster River	1	1	0.52	\$833,300	\$1,468,700
	Residential Total		1	1	0.52	\$833,300	\$1,468,700

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Special Transition Area Total							
			1	1	0.52	\$833,300	\$1,468,700
Velocity Zone	CCF	Bucks Creek	1	0	0.75	\$8,700	\$8,700
		Cotchpinicut Marsh	2	0	5.46	\$332,700	\$332,700
		Hardings Beach	1	0	7.64	\$1,277,400	\$1,277,400
		Minister's Point	1	0	1.44	\$391,300	\$391,300
		Morris Island	3	0	10.80	\$2,482,900	\$2,482,900
	CCF Total		8	0	26.09	\$4,493,000	\$4,493,000
	Residential	Bucks Creek	6	3	3.62	\$3,573,000	\$4,287,200
		Cockle Cove	2	0	7.57	\$108,500	\$108,500
		Cotchpinicut Marsh	2	0	1.25	\$116,000	\$116,000
		Forest Beach	3	1	2.31	\$672,300	\$868,400
		Hardings Beach	9	2	3.89	\$3,679,200	\$5,212,700
		Morris Island	2	0	2.51	\$102,500	\$102,500
		Nickerson Neck	1	0	0.35	\$23,800	\$23,800
	Residential Total		25	6	21.50	\$8,275,300	\$10,719,100
	Town	Cockle Cove	1	1	0.24	\$1,423,300	\$1,423,300
		Cotchpinicut Marsh	1	0	0.19	\$2,000,900	\$2,000,900
		Forest Beach	1	0	45.00	\$658,400	\$658,400
		Hardings Beach	3	3	236.00	\$4,545,900	\$4,619,300
		Minister's Point	1	0	0.22	\$3,803,000	\$3,803,000
		Morris Island	1	0	35.00	\$804,700	\$804,700
	Town Total		8	4	316.65	\$13,236,200	\$13,309,600
Velocity Zone Total			41	10	364.24	\$26,004,500	\$28,521,700
Grand Total			1,132	960	2,041.89	\$1,321,540,710	\$2,241,785,310

It should be noted that this analysis is a very rough one, intended just to provide a sense of the scale of the issue of private ownership of land that may be in the way of preserving existing wetlands and allowing marsh migration in the coming decades. Chatham's marshes are an incredible resource and a protection for much of the Town from some aspects of climate change. However, without major interventions, most of the marsh will disappear just as climate change is ramping up.

Historically, marsh has been steadily diminished by residential development. The current marsh is largely surrounded by private residences and will be drowned in place by sea-level rise. Meanwhile marsh migration will be largely blocked by private ownership of the upland. Potential sites for future marsh are also privately owned and conversion to marsh will be resisted. Wetlands regulation has historically been formulated to counter development of the land to meet human purposes such as farmland, cranberry bogs, streets, housing, industry. With climate change, it is now important to be future-facing and to develop bylaws and regulations to facilitate marsh preservation and migration.

At the same time, owners of property in the Floodplain are financially threatened. Their lots cannot be further developed and flood insurance on existing structures is increasingly expensive and hard to obtain. The value of their

real estate will decrease and eventually be taken over by the sea. With no program of managed retreat in sight, both the floodplain and its residents are endangered.

With no right of entry and examination on private parcels in the Floodplain, detailed investigation of changing ecological conditions is essentially limited. The Town's ability to plan and implement measures to mitigate climate change is drastically restricted. But conditions in Chatham are going to be changing dramatically in the coming decades with climate change and the old rules and attitudes will not protect the residents or the ecology of the town for long.

More detailed analysis is needed to determine specific actions. In order to orient next steps of investigation or analysis, the following maps show the parcel lines and house footprints as well as the CRZ zones for each of Chatham's major marshes. Note that color codes for the ownership type of each parcel are overlaid on top of the color codes for the CRZ zones, making interpretation confusing. Digital versions of this document allow considerable zooming in to see details.

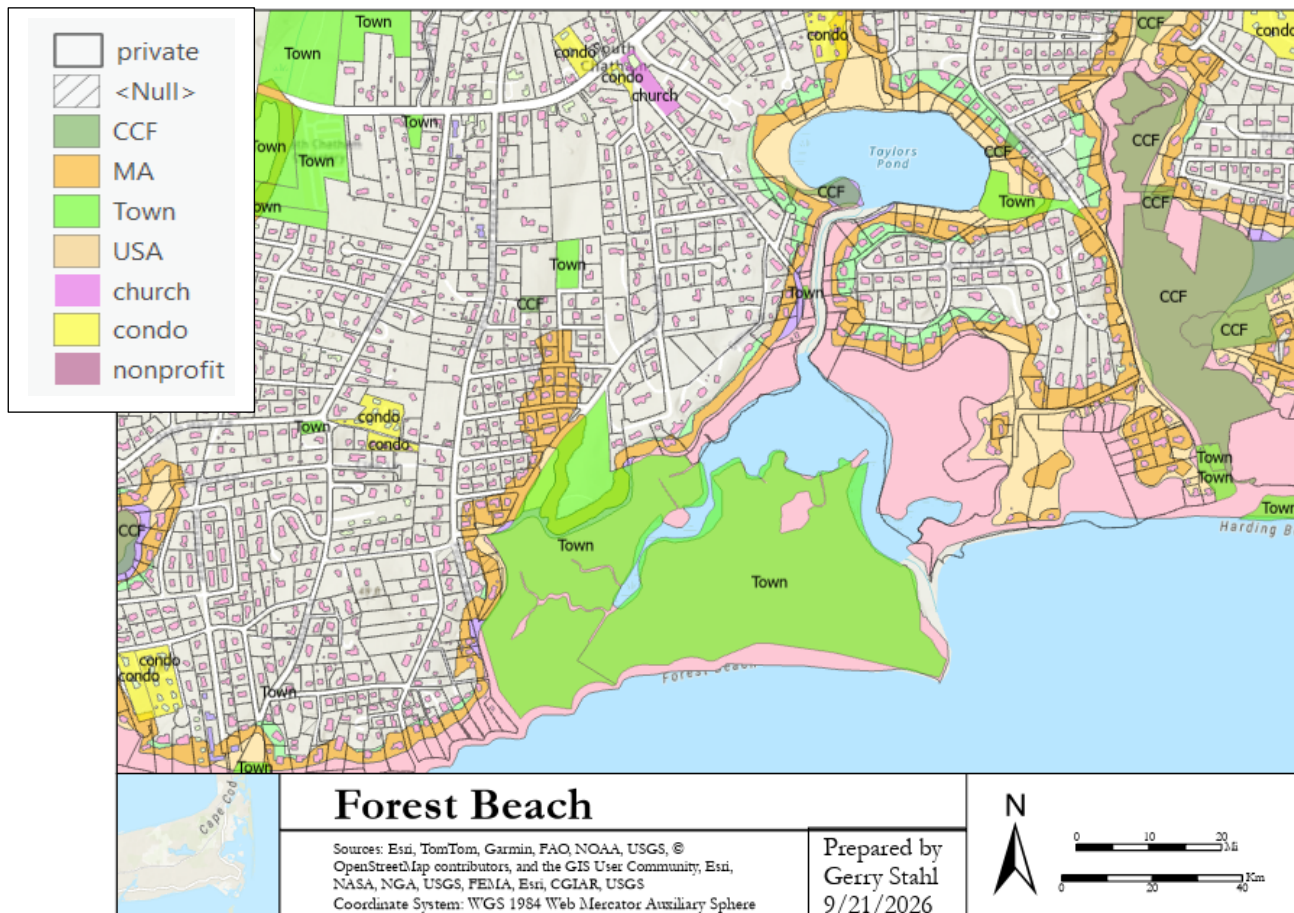


Figure 33. Type of property ownership in each CRZ around Forest Beach.

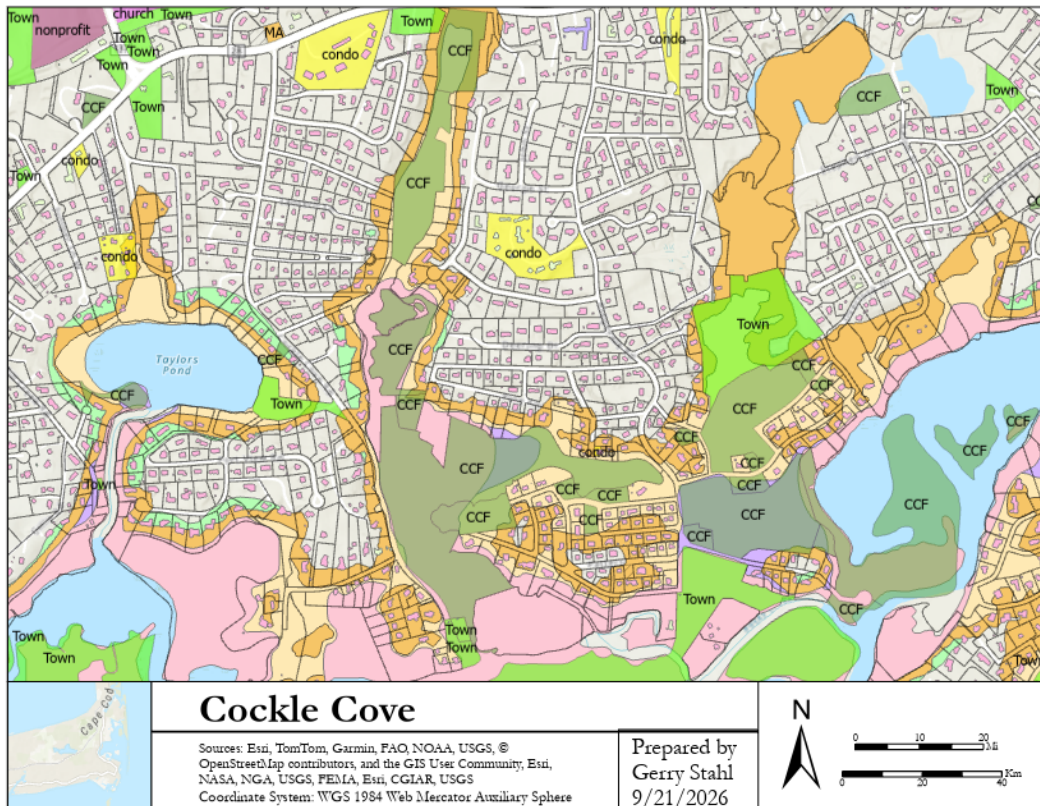


Figure 34. Type of property ownership in each CRZ around Cockle Cove.

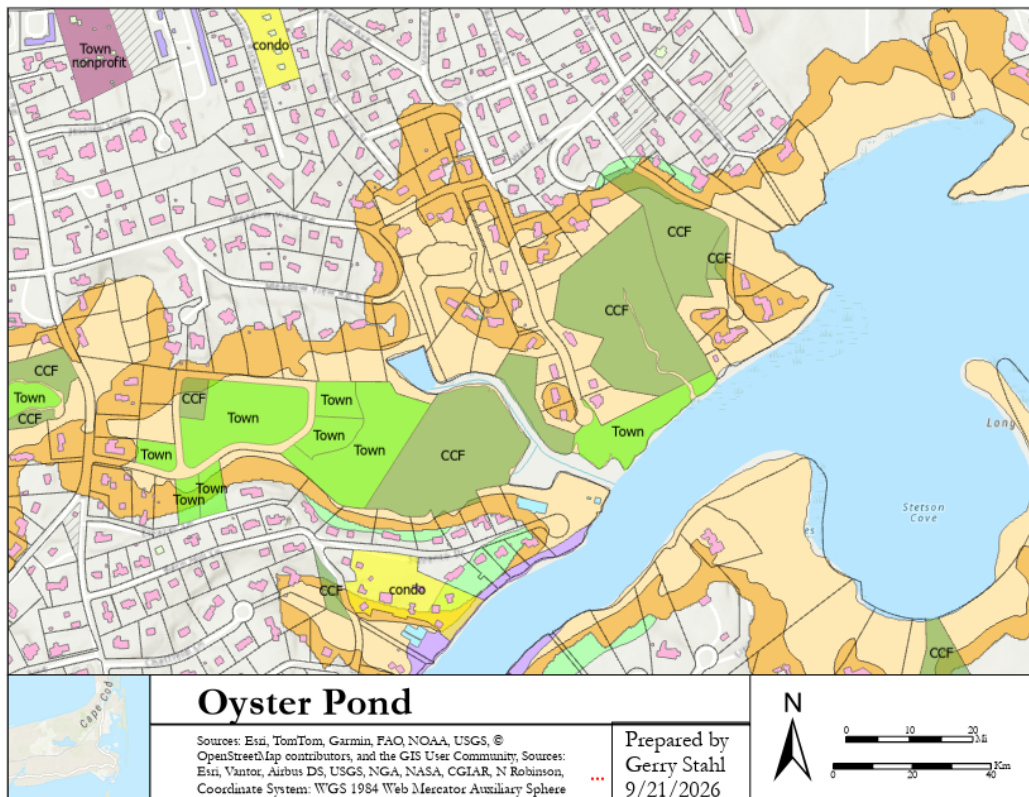


Figure 35. Type of property ownership in each CRZ around Oyster Pond.

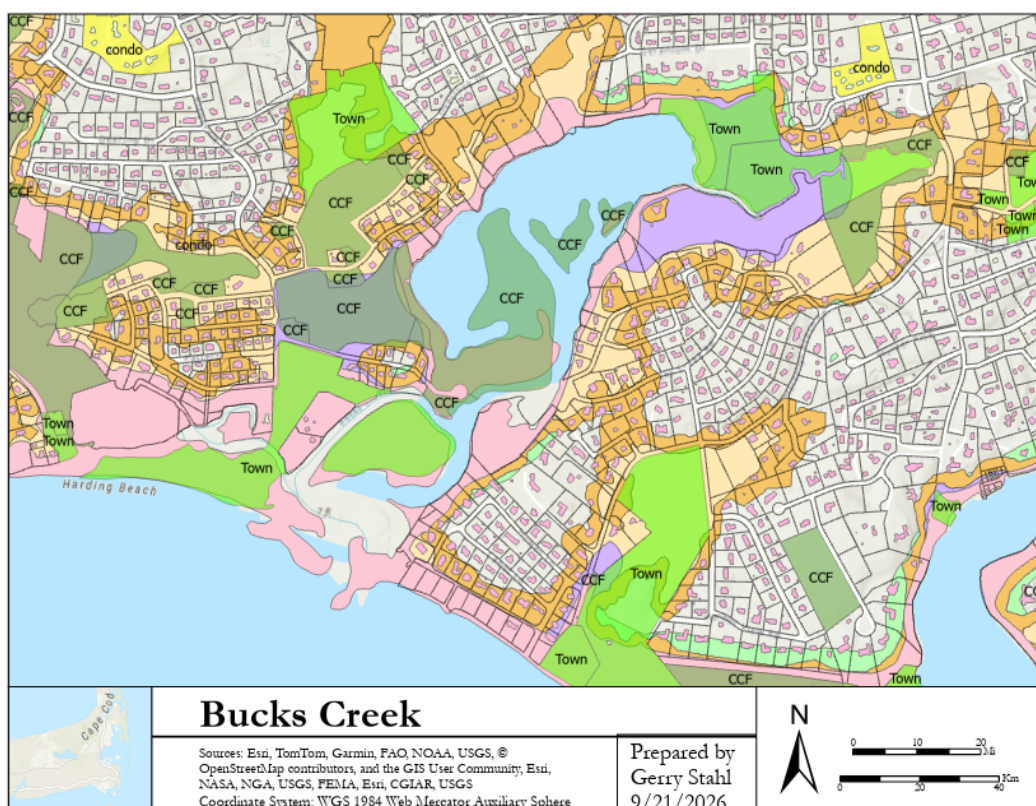


Figure 36. Type of property ownership in each CRZ around Bucks Creek.

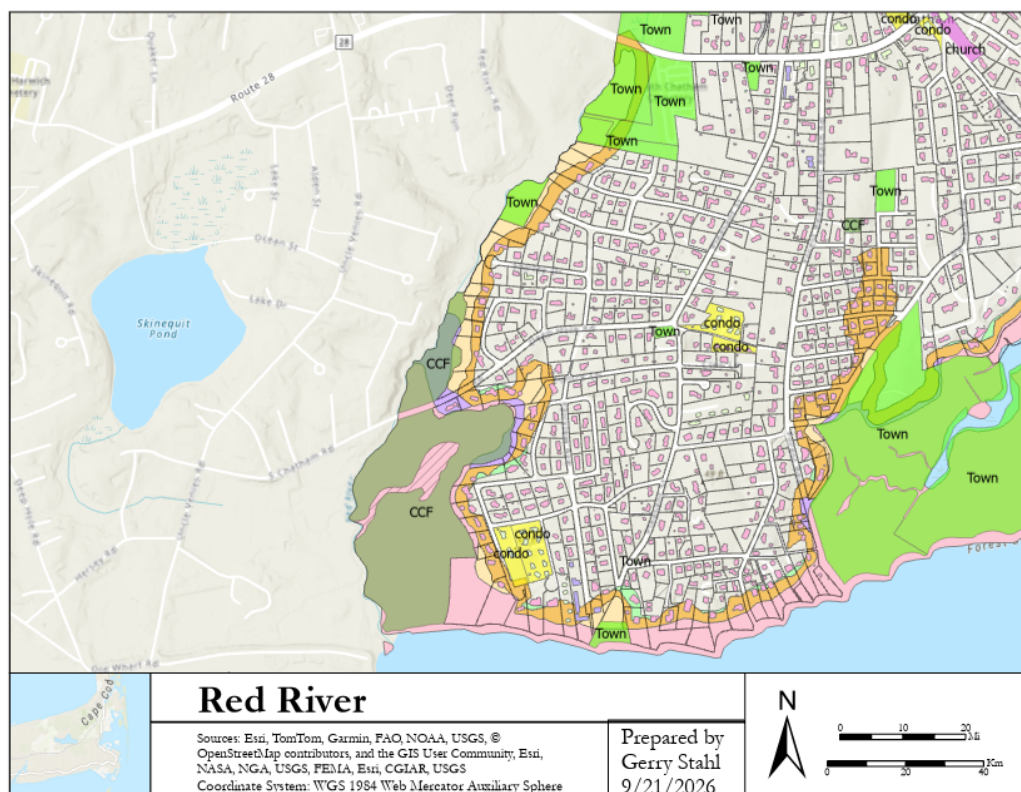


Figure 37. Type of property ownership in each CRZ around Red River.

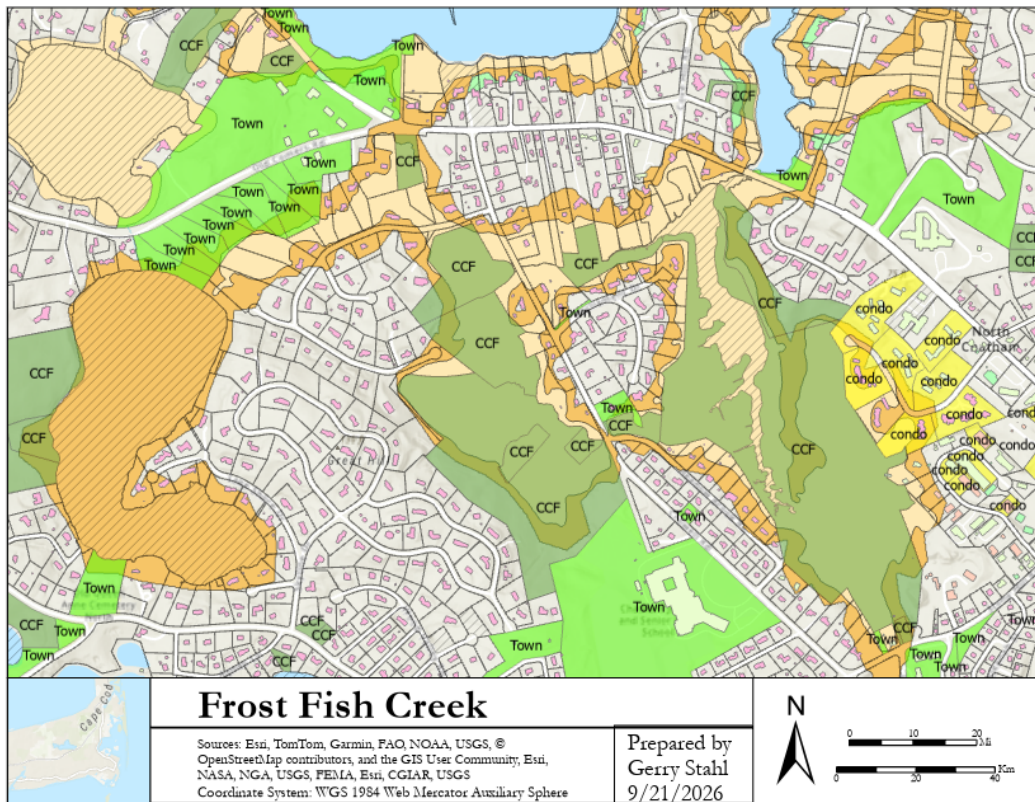


Figure 38. Type of property ownership in each CRZ around Frost Fish Creek.

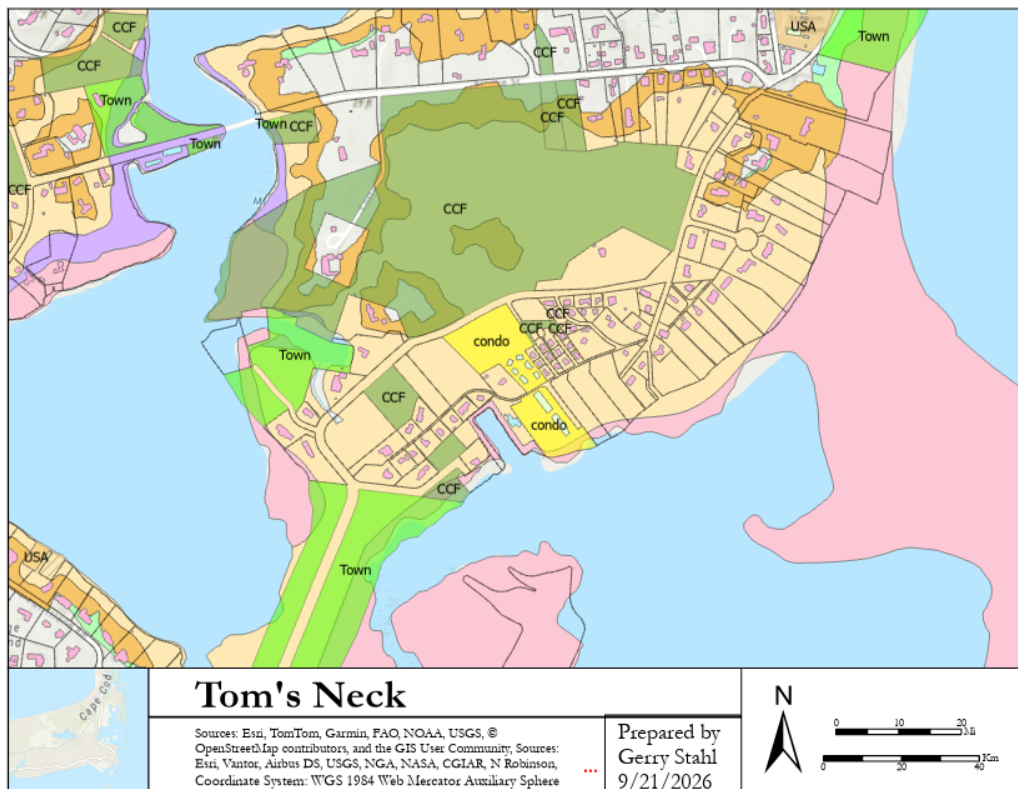


Figure 39. Type of property ownership in each CRZ around Tom's Neck.

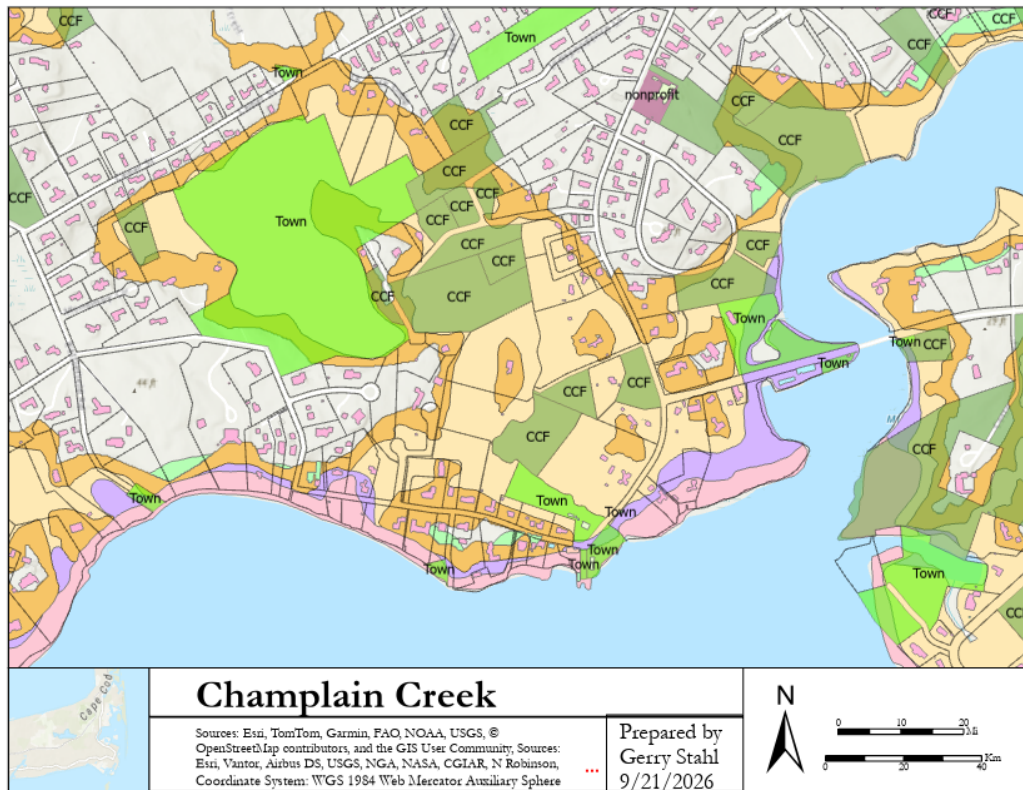


Figure 40. Type of property ownership in each CRZ around Champlain Creek.

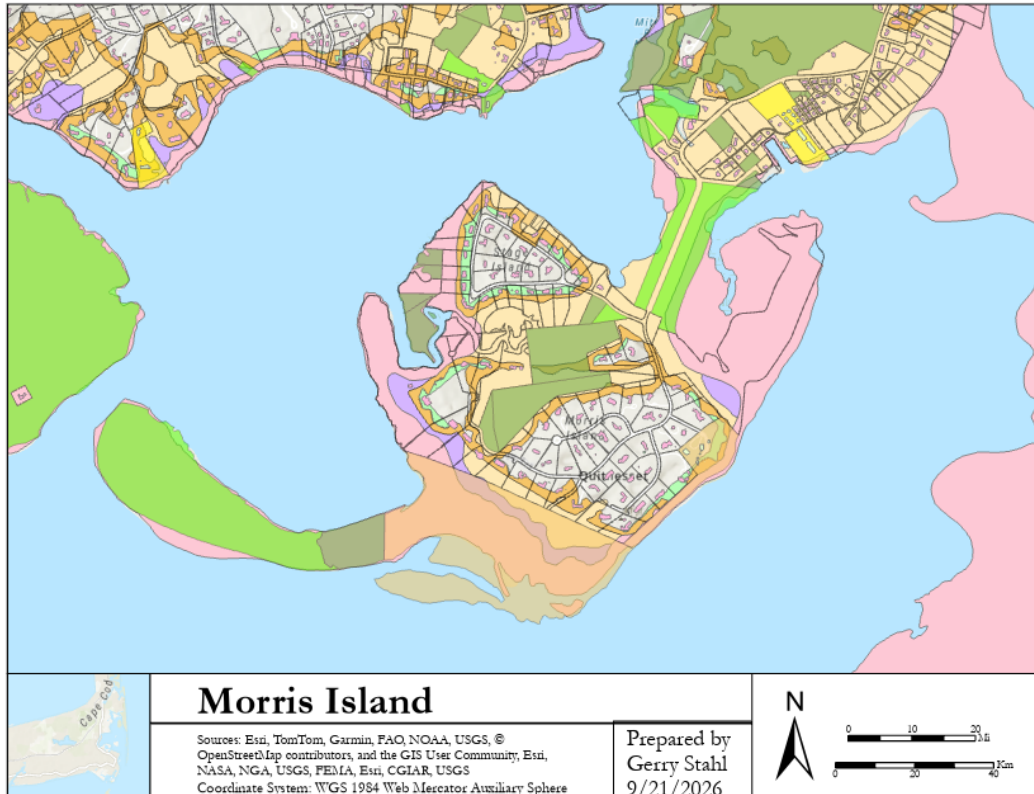


Figure 41. Type of property ownership in each CRZ around Morris Island.

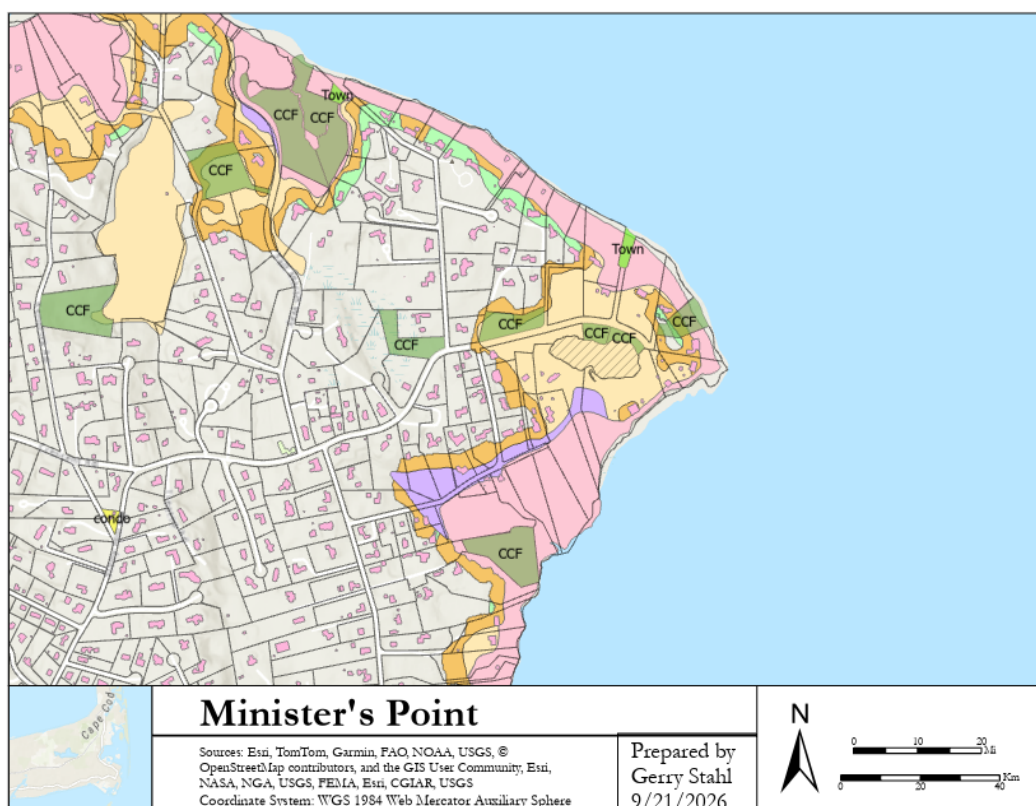


Figure 42. Type of property ownership in each CRZ around Minister's Point.



Figure 43. Type of property ownership in each CRZ around Nickerson Neck.

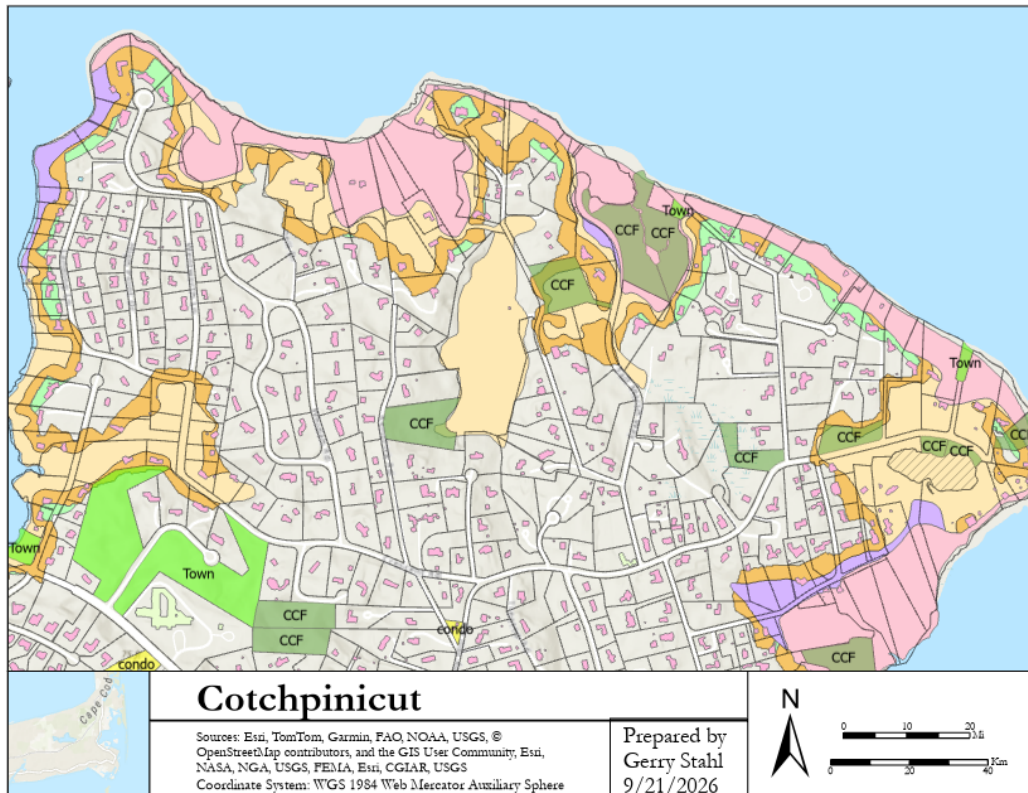


Figure 44. Type of property ownership in each CRZ around Cotchpinicut.



Figure 45. Type of property ownership in each CRZ around Strong Island.

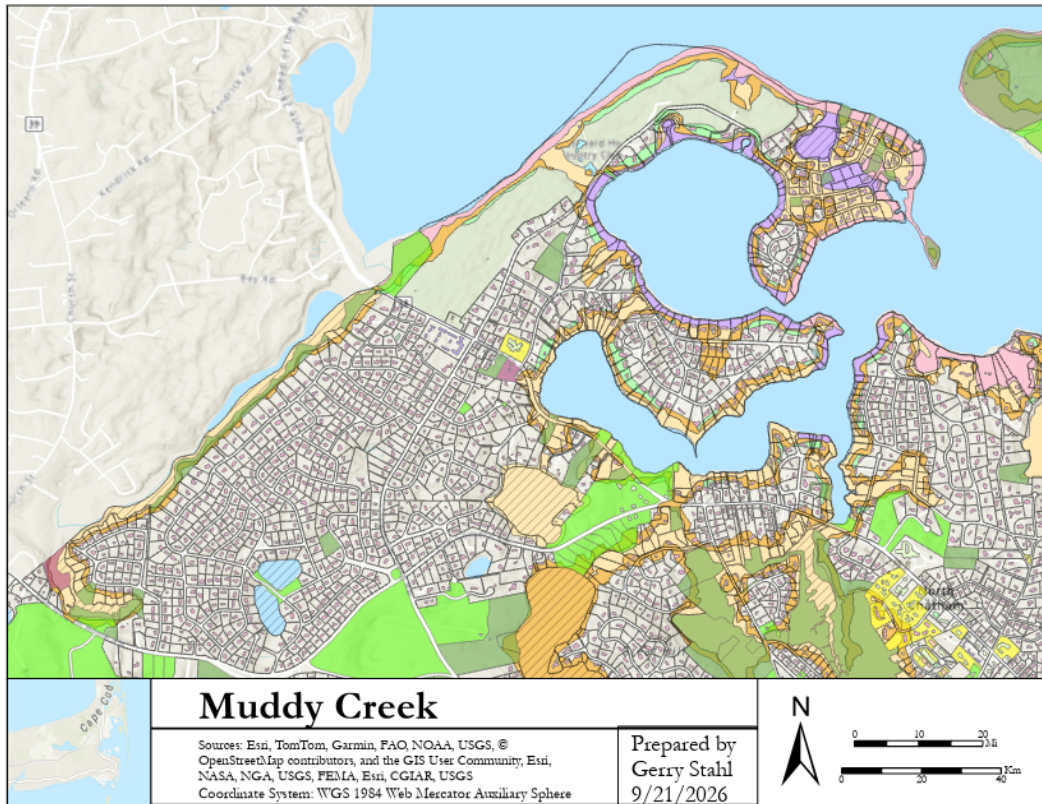


Figure 46. Type of property ownership in each CRZ around Muddy Creek.

Appendix E. Entry clauses in other towns

Entry-and-examine clauses are already established in the laws of Massachusetts, Harwich, Orleans and many other coastal towns, but not in Chatham's. Here are some existing clauses:

- **Massachusetts** (Wetlands Protection Act): MGL c. 131, §40. "The conservation commission and its agents, officers, and employees, along with MassDEP's commissioner and staff, may enter privately owned land to perform their duties under the section."
- **Harwich** (Wetland Protection Regulations): "The Commission, its agents, officers, and employees have authority to enter upon privately owned land to perform their duties under the regulations and may make or cause to be made such examinations, surveys, or sampling as the Commission deems necessary, subject to the U.S. and Massachusetts constitutions."
- **Eastham** (Ch. 155, Wetlands Protection): "The Commission, its agents, officers, and employees shall have the authority to enter upon privately owned land for the purpose of performing their duties under this bylaw and may make or cause to be made such examinations, surveys or sampling as the Commission deems necessary."

Provincetown (Wetlands Protection Bylaw, Ch. 12): "The Commission, its agents, officers, and employees may enter upon privately owned land to perform bylaw duties and may make or cause to be made such examinations, surveys, or sampling as the Commission deems necessary, subject to the U.S. and Massachusetts constitutions."

- **Nantucket**: "Commission members, employees, and agents may enter privately owned land to perform their bylaw duties, and in doing so may take samples and photographs and make examinations."
- **Chatham**: Ch. 272 Sec. 11. Enforcement and Remedies, authorizes the Building Commissioner, Health/Environment Director, Commission, and its agents to enforce the bylaw and seek injunctive relief — but that's litigation authority, not a right to physically enter private land.

In summary: The following towns have full entry-and-examine clauses (entry and authority to survey/sample, with no owner-consent caveat): Harwich, Brewster, Orleans, Yarmouth, Eastham, Provincetown, Ipswich, Rockland, Newbury, Southbridge (partial list). Barnstable and Dennis have clauses for entry allowed, but examination/survey/sampling requires owner authorization. Wellfleet and Falmouth have very weak entry-and-examine clauses. Chatham has no entry-and-examine clause.

While some of these established bylaws may be restricted to activities relating to enforcement and/or permitting, by their context in the bylaws or otherwise, that does not mean that a broader bylaw cannot be adopted in Chatham. Setting such a precedent could be appropriate when a town that has so much marsh is revising its bylaws specifically to meet the extremes of climate change that have already begun. It is not too soon to get serious about anticipating the effects of climate change and sea-level rise in Chatham, even if that involves pushing the legal status quo.