# Intermunicipal Shoreline Management for Southeastern Cape Cod Bay


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# Coastal Geographic Research and Applied Science Program (CGRASS)

*An applied science program established in 2020 to be an unbiased source of science-based, coastal geographic information that can be applied to the contemporary challenges and threats associated with changing climate conditions confronting Cape Cod communities.*

Program Goal: To develop and visualize geospatial data to help Cape communities understand and confront emerging climate change threats in the coastal zone.

Research Focus:

- Use of physical and human coastal geographic data developed by CCS and other scientists to document and quantify past and present coastal change

- Development of information to inform regional system-based estimates of future shoreline conditions as the coast responds to rising sea levels and intense coastal storms

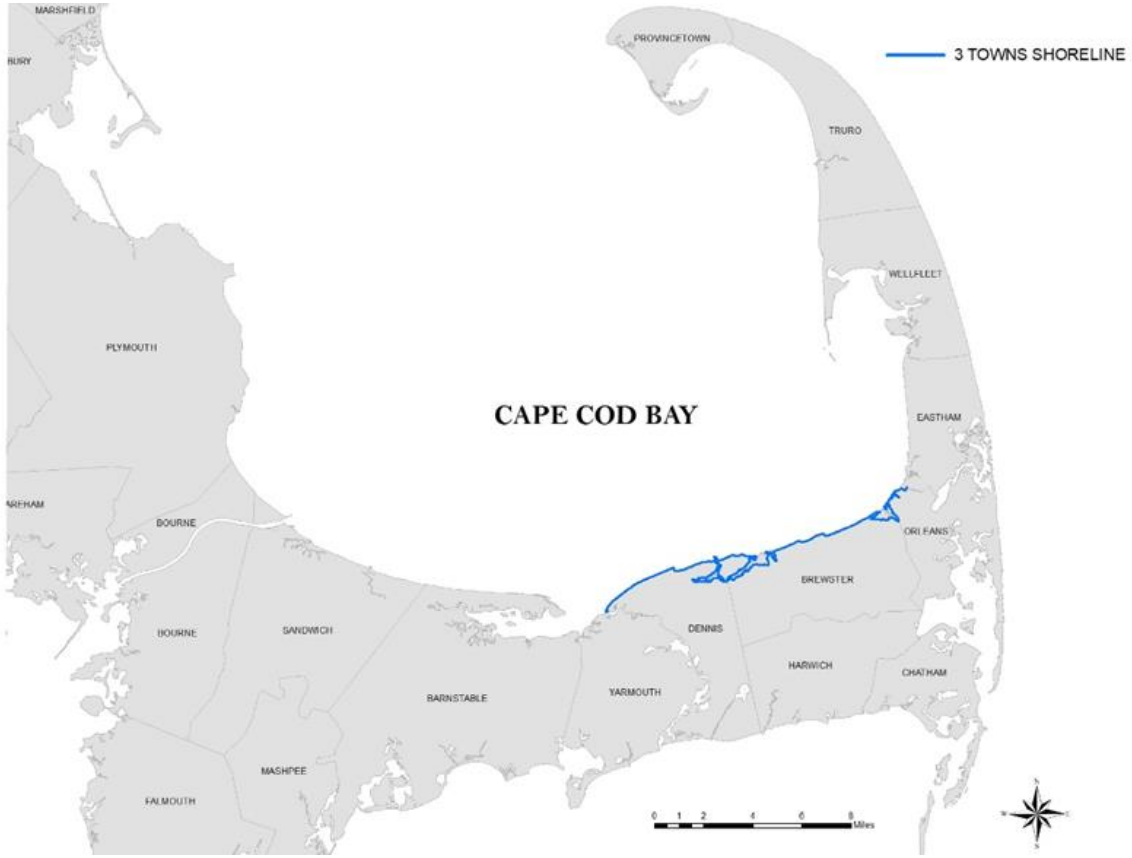
- Creation and ongoing maintenance of a public data portal that makes reliable and understandable geospatial data accessible to local municipalities, managers, and the public

# Intermunicipal Shoreline Management for Southeastern Cape Cod Bay

## Goals

## To maximize:

- The resiliency of the Cape Cod Bay shores of Dennis, Brewster, and Orleans through the application of consistent, complementary shoreline management strategies
- The ability of towns to work with natural processes and drivers of coastal change
- The potential of shorelines to operate independently of town boundaries and respond naturally to coastal hazards



# Intermunicipal Shoreline Management for Southeastern Cape Cod Bay

| Process | Focus |
| --- | --- |
| • Regional | • 14± miles of north-facing shoreline from Rock Harbor, Orleans to Chase Garden Creek, Dennis |
| • Resource-based | • Foundation based on current and evolving scientific data |
| • Multiple Phases | • Initial focus on identifying existing, complementary management strategies and developing baseline natural resource & human use spatial data |
| • Fluid & Flexible | • Responsive to emerging challenges of a changing climate |
| • Ambitious Goals | • Visualizing data to make it accessible and applicable to the needs of local coastal managers and the public |

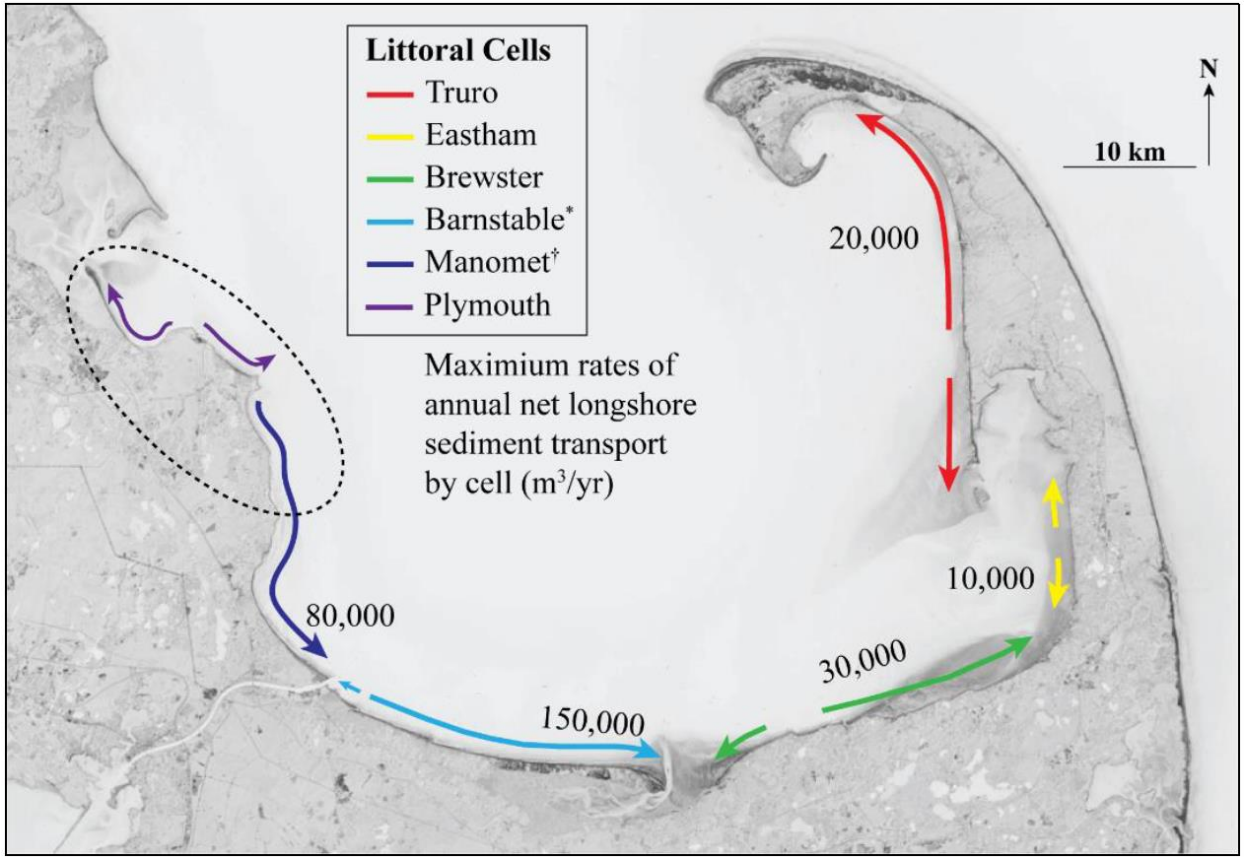
# Benefits of a Regional Approach

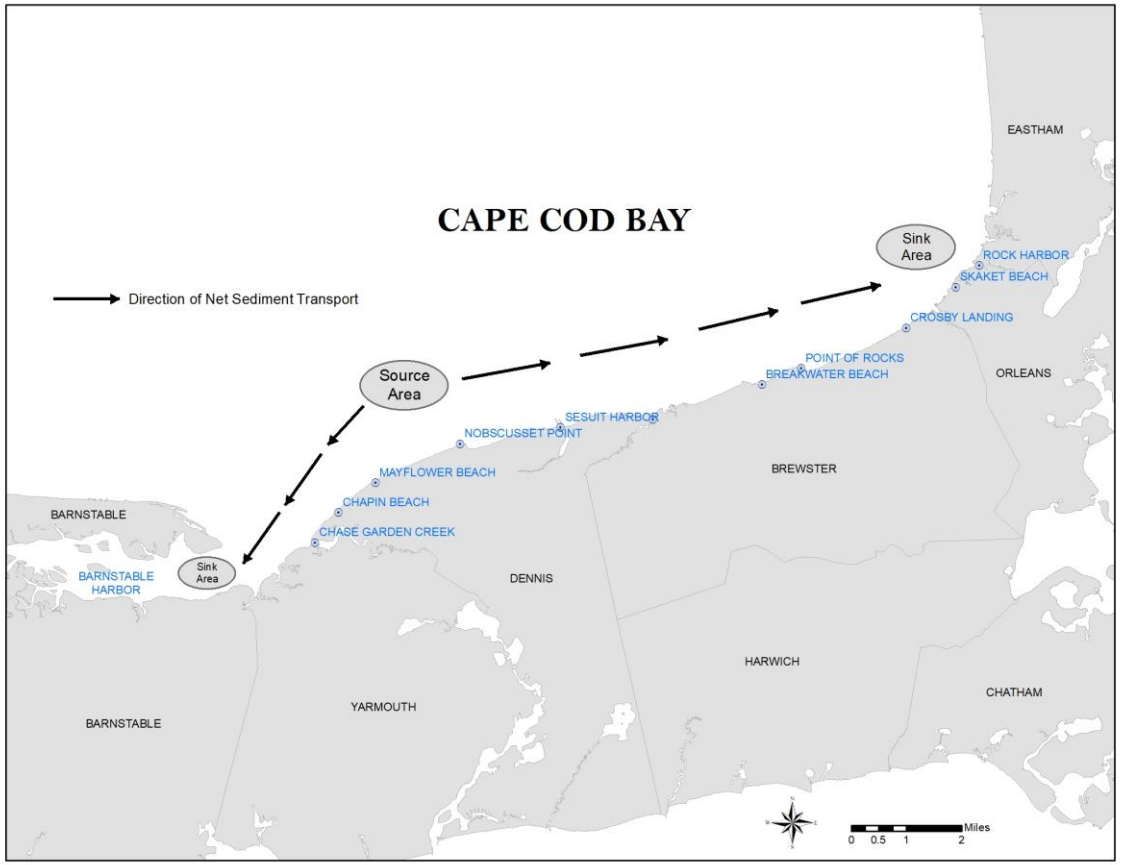
- **More effective shoreline management results with unified systems-based approach**
- **Ability to apply contemporary scientific data across town lines to emerging coastal management challenges**
- **Increased Resiliency in Shoreline Infrastructure/Protection & More Effective Project Review Process**
  - Uniform Management Principles, Policies, & Priorities
  - Common Performance Standards & Design Requirements
  - Standardized Project Conditions
- **Increased Cost Efficiencies & Savings Potential**
  - Economies of Scale
  - Nourishment
  - Project Cost Sharing
- **Greater Leveraging of Grant Opportunities with 3 Towns**

# Organizing Framework

- Natural resiliency of SE shoreline dependent on the ability of coastal landforms to erode and, through the shared, natural longshore sediment transport system, provide a continuous supply of sand to downdrift areas

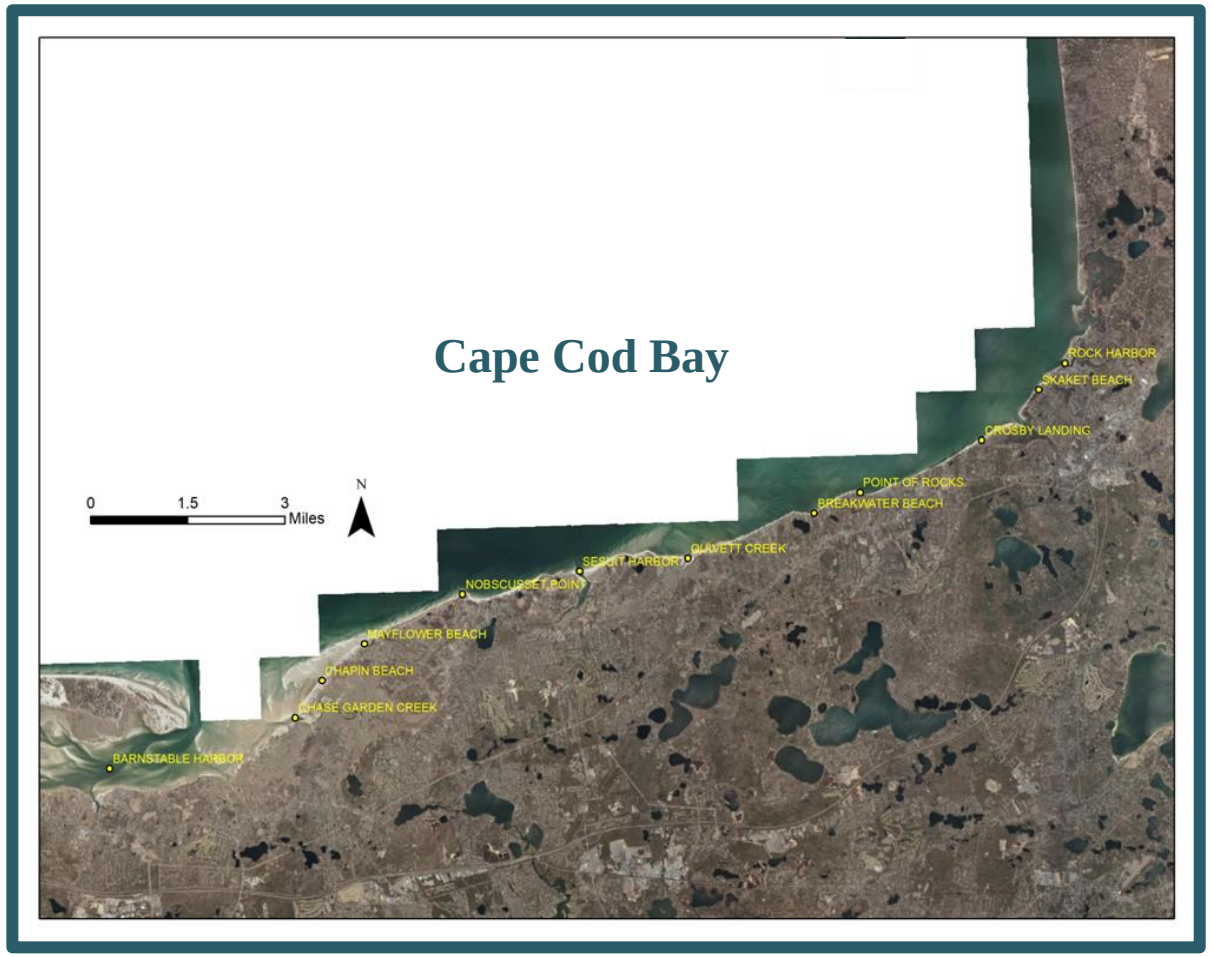
- Regional approach organized generally around the concept of littoral cells
  - Natural coastal compartments that transcend town boundaries & contain a complete cycle of sedimentation including sources, transport paths, and sinks



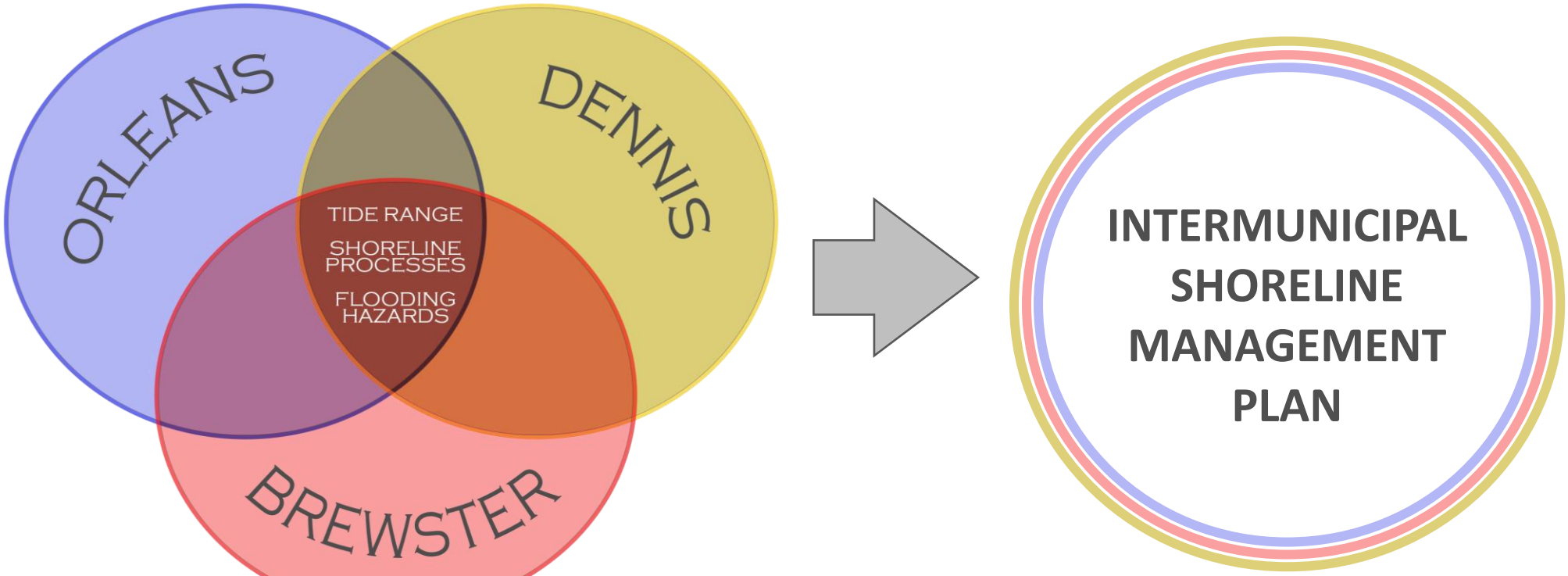



# Characteristics of the Shared Shoreline

| | Orleans | | Brewster | | Dennis | | Totals | |
|---|---|---|---|---|---|---|---|---|
| **Physical Characteristics** | | | | | | | | |
| Primary Summer Wind Direction | SW | | SW | | SW | | | |
| % Summer with Wind speed 20+ mph | | 18% | | 18% | | 18% | | |
| | | | | | | | | |
| Primary Winter Wind Direction | NW | | NW | | NW | | | |
| % Winter with Wind speed 20+ mph | | 36% | | 36% | | 36% | | |
| | | | | | | | | |
| Net Sediment Transport Direction | East | | East | | East/West | | | |
| | | | | | | | | |
| Mean Tide Range (Ft.) | 9.7 | | 9.7 | | 9.7 - 9.8 | | | |
| | | | | | | | | |
| 100-Year Flood Plain (NAVD88, Ft.) | 15 - 16 | | 15 - 16 | | 15 - 16 | | | |
| | | | | | | | | |
| | | % of Total | | % of Total | | % of Total | | % of Total |
| **Shoreline Length (Miles)** | **1.2** | **8.7%** | **5.6** | **40.6%** | **7.0** | **50.7%** | **13.8** | |
| Littoral Cell West (mi.) | 0.0 | 0.0% | 0.0 | 0.0% | 2.2 | 100.0% | 2.2 | 15.9% |
| Littoral Cell East (mi.) | 1.2 | 10.3% | 5.6 | 48.3% | 4.8 | 41.4% | 11.6 | 84.1% |
| | | | | | | | | |
| **Coastal Wetland Resources** | | | | | | | | |
| **Coastal Bank (mi.)** | **0.0** | **0.0%** | **0.9** | **37.5%** | **1.5** | **62.5%** | **2.4** | 17.4% |
| % of Town Shoreline | | 0.0% | | 16.1% | | 21.4% | | |
| % of Total Shoreline | | 0.0% | | 6.5% | | 10.9% | | |
| | | | | | | | | |
| **Coastal Dune & Barrier Beach (mi.** | **1.1** | **11.5%** | **4.0** | **41.7%** | **4.5** | **46.9%** | **9.6** | 69.6% |
| % of Town Shoreline | | 91.7% | | 71.4% | | 64.3% | | |
| % of Total Shoreline | | 8.0% | | 29.0% | | 32.6% | | |
| | | | | | | | | |
| **Intertidal Flats (acres)** | **387.8** | **10.8%** | **2495.5** | **69.4%** | **713.0** | **19.8%** | **3596.3** | |
| Sesuit Harbor West (mi.) | 0.0 | 0.0% | 0.0 | 0.0% | 457.0 | 100.0% | 457.0 | 12.7% |
| Sesuit Harbor East (mi.) | 387.8 | 12.4% | 2495.5 | 79.5% | 256.0 | 8.2% | 3139.3 | 87.3% |
| Avg Seaward Extent (Ft.) | 2,666 | | 3,676 | | 840 | | | |
| | | | | | | | | |
| **Salt Marsh (acres)** | **176.0** | **16.3%** | **251.5** | **23.2%** | **654.4** | **60.5%** | **1081.9** | |
| | | | | | | | | |
| **Shoreline Alterations** | | | | | | | | |
| **CES Length (Miles)** | **0.0** | **0.0%** | **0.9** | **16.1%** | **2.8** | **40.0%** | **3.7** | 26.8% |
| Littoral Cell West (mi.) | 0.0 | 0.0% | 0.0 | 0.0% | 0.7 | 31.8% | 0.7 | 31.8% |
| Littoral Cell East (mi.) | 0.0 | 0.0% | 0.9 | 16.1% | 2.1 | 43.8% | 3.0 | 25.9% |
| | | | | | | | | |
| **Groins (#)** | **1.0** | **2.6%** | **29.0** | **74.4%** | **9.0** | **23.1%** | **39.0** | |
| Littoral Cell West (mi.) | 0.0 | 0.0% | 0.0 | 0.0% | 3.0 | 100.0% | 3.0 | 7.7% |
| Littoral Cell East (mi) | 1.0 | 2.8% | 29.0 | 80.6% | 6.0 | 16.7% | 36.0 | 92.3% |



# Comprehensive Management Framework



# Task 1: Coastal Structures Inventory and Beach Nourishment Research

- **Coastal Structures Field Survey**
  - Update of 10-year-old state infrastructure inventory
  - Baseline data regarding human alterations that may limit volume of sand available to coastal resources
- **Beach Nourishment Research and Site Identification**
  - Research of available town records for approximately 368 shorefront parcels
  - Baseline data regarding human mitigation to supplement volume of sand available to coastal resources
- **Shoreline Nourishment Demand Analysis**
  - Estimate of potential future demand for beach nourishment along the southeastern shoreline

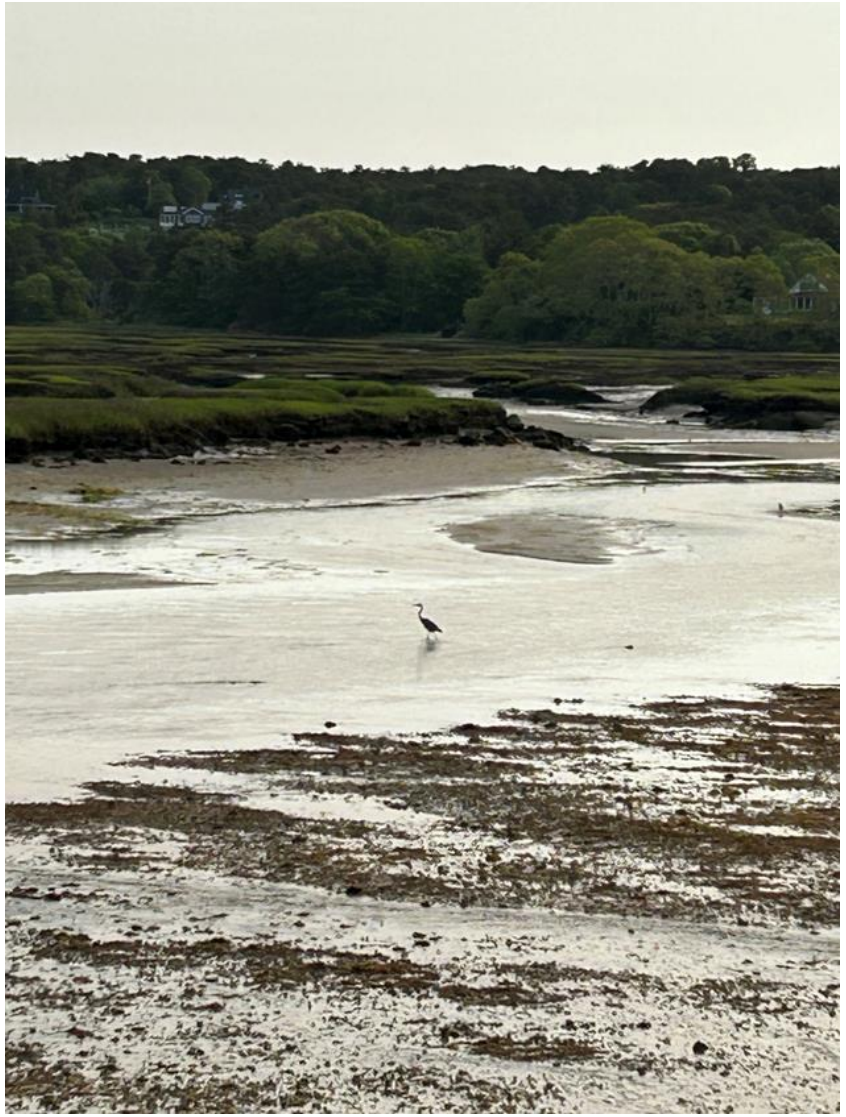
# Task 2: Shoreline Management Framework

- **Memorandum of Agreement (MOA)**
  - Agreement to pursue an intermunicipal or regional management approach grounded in uniform, science-based strategies, principles, and policies that promote responsible stewardship of a shared shoreline

- **Draft Framework Components**

  **Approach**
  - Develop a set of 25 uniform principles and policies strategies grounded in the similarities of present 3-Town shoreline management approaches
  - Emphasize standardized, science-based strategies for achieving the objectives of the state Wetlands regulations (310 CMR 10.)) and Local Wetland Bylaws
  - Implement through consistent project level requirements for NOIs and accompanying Plans and standardized approval conditions for OOCs

  **Benefits of a Science-Based Approach**
  - Underlies current local Wetlands Bylaws and the Massachusetts wetlands regulations
  - Supports flexible management strategies that can evolve in response to a changing climate



# Task 3: Creation of an Intermunicipal Shoreline Management Geodatabase

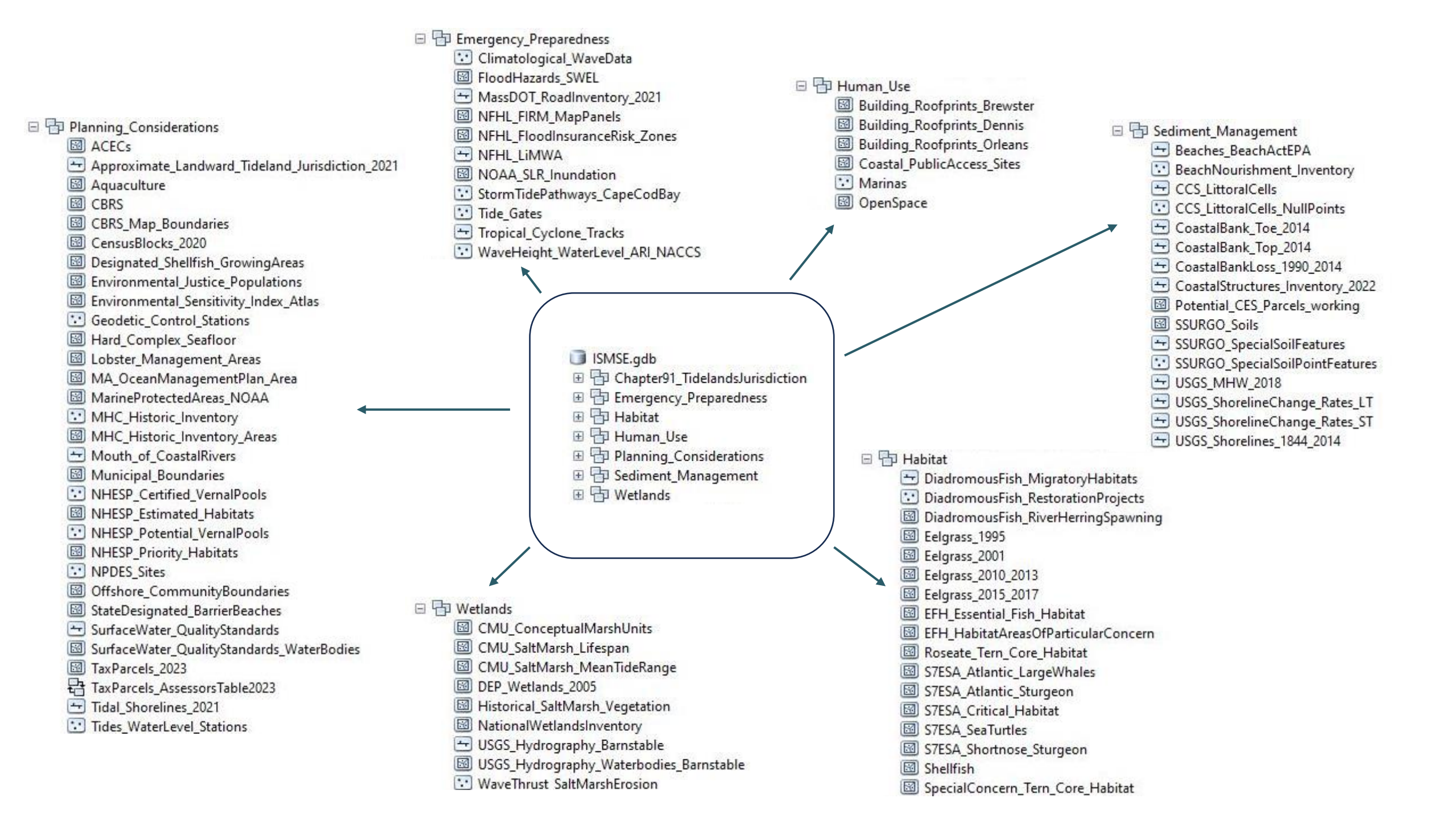
## Benefits of a Spatial Format

- Quickly analyze and summarize by location
- Layer regional information to identify patterns in data
- Methods for organizing, sharing and compiling data in a standardized way
- Data visualizations

## Task Goals

- Compile and review existing relevant geospatial data
- Identify disparities and develop new regional layers based on local needs
- Deliver a useful management tool

# Task 3: Creation of an Intermunicipal Shoreline Management Geodatabase


ISMSE.gdb
Chapter91_TidelandsJurisdiction
Emergency_Preparedness
Habitat
Human_Use
Planning_Considerations
Sediment_Management
Wetlands
Emergency_Preparedness
Climatological_WaveData
FloodHazards_SWEL
MassDOT_RoadInventory_2021
NFHL_FIRM_MapPanels
NFHL_FloodInsuranceRisk_Zones
NFHL_LiMWA
NOAA_SLR_Inundation
StormTidePathways_CapeCodBay
Tide_Gates
Tropical_Cyclone_Tracks
WaveHeight_WaterLevel_ARI_NACCS
Human_Use
Building_Roofprints_Brewster
Building_Roofprints_Dennis
Building_Roofprints_Orleans
Coastal_PublicAccess_Sites
Marinas
OpenSpace
Sediment_Management
Beaches_BeachActEPA
BeachNourishment_Inventory
CCS_LittoralCells
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CoastalBank_Toe_2014
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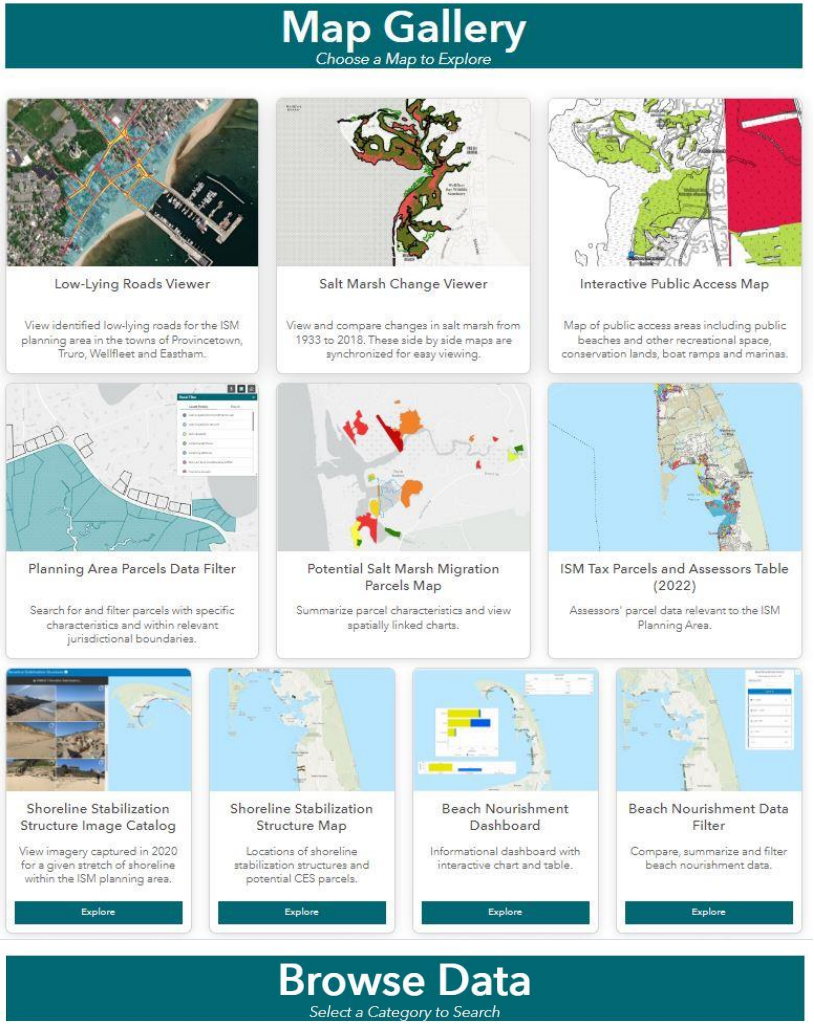
Lobster_Management_Areas
MA_OceanManagementPlan_Area
MarineProtectedAreas_NOAA
MHC_Historic_Inventory
MHC_Historic_Inventory_Areas
Mouth_of_CoastalRivers
Municipal_Boundaries
NHESP_Certified_VernalPools
NHESP_Estimated_Habitats
NHESP_Potential_VernalPools
NHESP_Priority_Habitats
NPDES_Sites
Offshore_CommunityBoundaries
StateDesignated_BarrierBeaches
SurfaceWater_QualityStandards
SurfaceWater_QualityStandards_WaterBodies
TaxParcels_2023
TaxParcels_AssessorsTable2023
Tidal_Shorelines_2021
Tides_WaterLevel_Stations
Habitat
DiadromousFish_MigratoryHabitats
DiadromousFish_RestorationProjects
DiadromousFish_RiverHerringSpawning
Eelgrass_1995
Eelgrass_2001
Eelgrass_2010_2013
Eelgrass_2015_2017
EFH_Essential_Fish_Habitat
EFH_HabitatAreasOfParticularConcern
Roseate_Tern_Core_Habitat
S7ESA_Atlantic_LargeWhales
S7ESA_Atlantic_Sturgeon
S7ESA_Critical_Habitat
S7ESA_SeaTurtles
S7ESA_Shortnose_Sturgeon
Shellfish
SpecialConcern_Tern_Core_Habitat
Wetlands
CMU_ConceptualMarshUnits
CMU_SaltMarsh_Lifespan
CMU_SaltMarsh_MeanTideRange
DEP_Wetlands_2005
Historical_SaltMarsh_Vegetation
NationalWetlandsInventory
USGS_Hydrography_Barnstable
USGS_Hydrography_Waterbodies_Barnstable
WaveThrust_SaltMarshErosion

# Subsequent Phases of Project – ISMP Implementation




## Utilize A Public Data Portal to

- Support collaboration between the town partnership and other organizations
- Share data with non-GIS users
- Maximum use of data by town staff and the public without the need for specialized software
- Provide an online resource of interactive maps and applications that aid in the visualization and interpretation of coastal zone data

# Comments or Questions?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