

HERRING RIVER RESTORATION PROJECT



Friends of Herring River, Wellfleet & Truro, MA

www.friendsofherringriver.org



FHR MISSION: Promote the restoration and environmental vitality of the Herring River Estuary

- Conduct public education, awareness and outreach activities
- Administer grants and contracts
- Raise funds





Friends of Herring River
Wellfleet and Truro, Massachusetts

Herring River
Restoration Committee

Herring River
Executive Council

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Restoration Projects

The objective is to restore the 1000+ acre Herring River Estuary, once one of the most productive salt marsh systems in the Northeast, by gradually removing existing restrictions in the river to restore natural tidal flow.

[Read More ...](#)



News & Events

The Herring River Restoration Project is frequently in the news. As the Project moves forward, our current newsletter and Calendar of Events will keep you up to date on what's happening.

[Read More ...](#)



Frequently Asked Questions

Want to know more about how the Project will affect water quality? Shellfish? Wildlife? These questions and more are answered by concise fact sheets.

[Read More ...](#)

Herring River Estuary: Restoring an Ecological Treasure

- Project updates
 - Reports & Fact sheets
 - Presentations
 - Videos
 - Newsletters
- ... and a lot more!*

Note: The vast majority of the information on these slides can be found on our website, www.herringriver.org



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Presentations

Annual Public Meetings

- 2017
- 2016
- 2015
- 2014
- 2013
- 2012

Project Updates

- Friends of Herring River Annual Meeting Presentation Aug 18, 2015
- High Toss Road Public Forum Meeting Minutes Feb 12, 2015
- High Toss Road Public Forum Presentation Feb 12, 2015
- Low-Lying Roads Public Forum Presentation Feb 4, 2015

HISTORICALLY, the Herring River supported a vibrant coastal river ecosystem and one of the largest nurseries for commercial and recreational fisheries in the Gulf of Maine.



Wellfleet Town reports from the late 1800's indicate that more than 200,000 river herring were netted annually from the river.

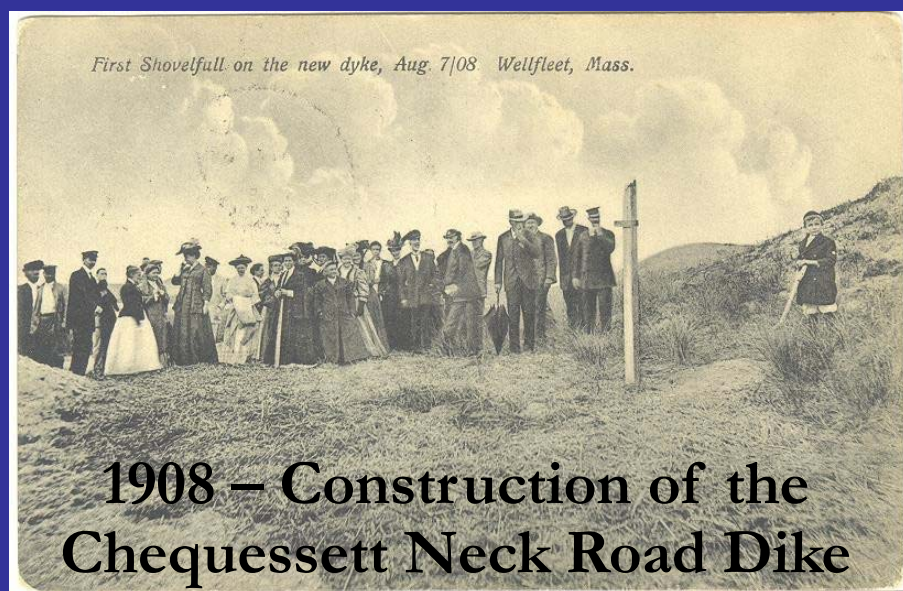
[Click here](#) to go to the Cape Cod National Seashore website for an excellent summary of the project, important events in the history of the Herring River and frequently asked questions.





The ecosystem was dramatically altered in 1909,

when efforts to control mosquitos resulted in the construction of a dike across the river's mouth at Chequessett Neck.

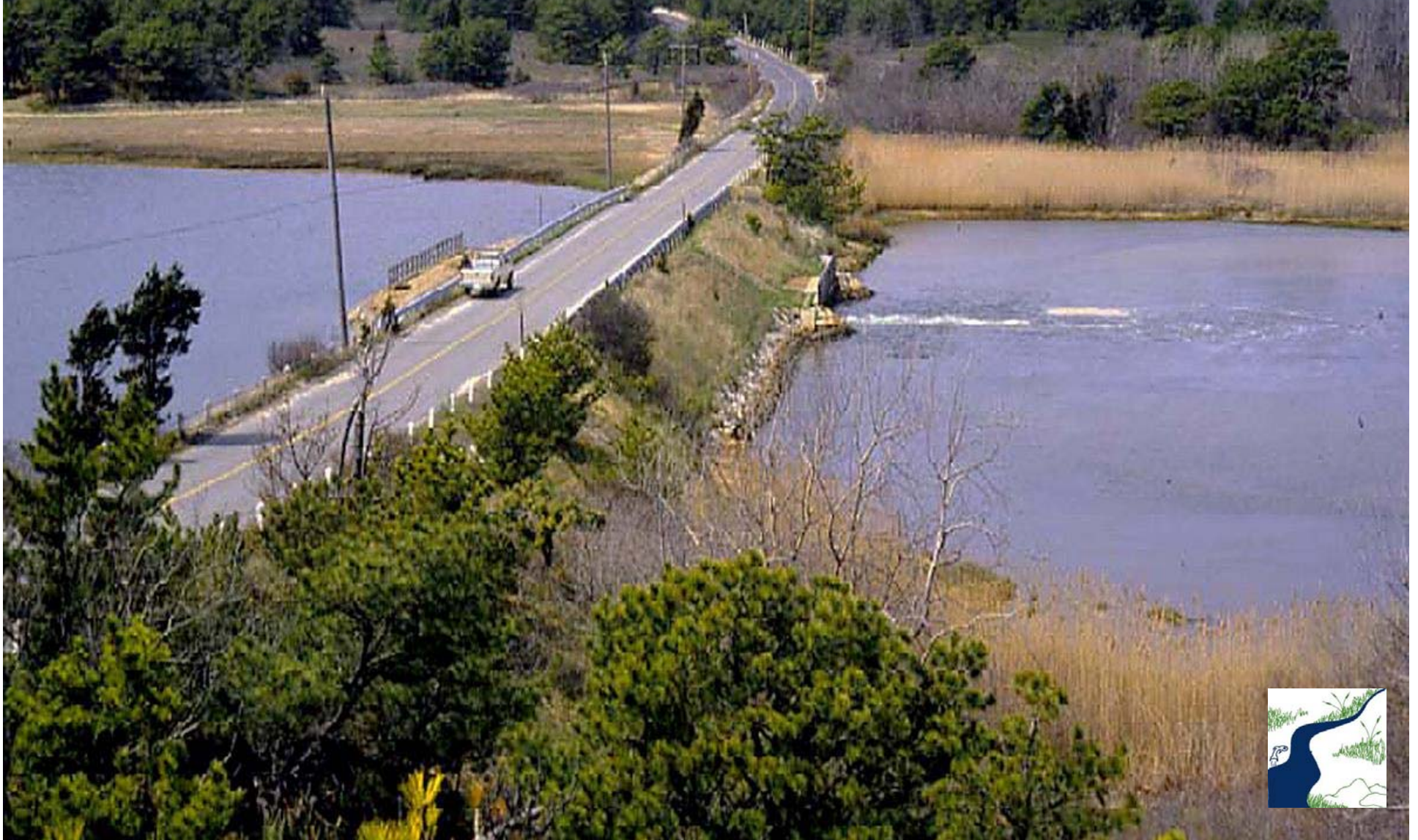


Today Herring River is one of the largest tidally-restricted estuaries in the northeastern United States

1970's – Dike Reconstruction



Chequessett Neck Road Dike, Constructed in 1909, 1973

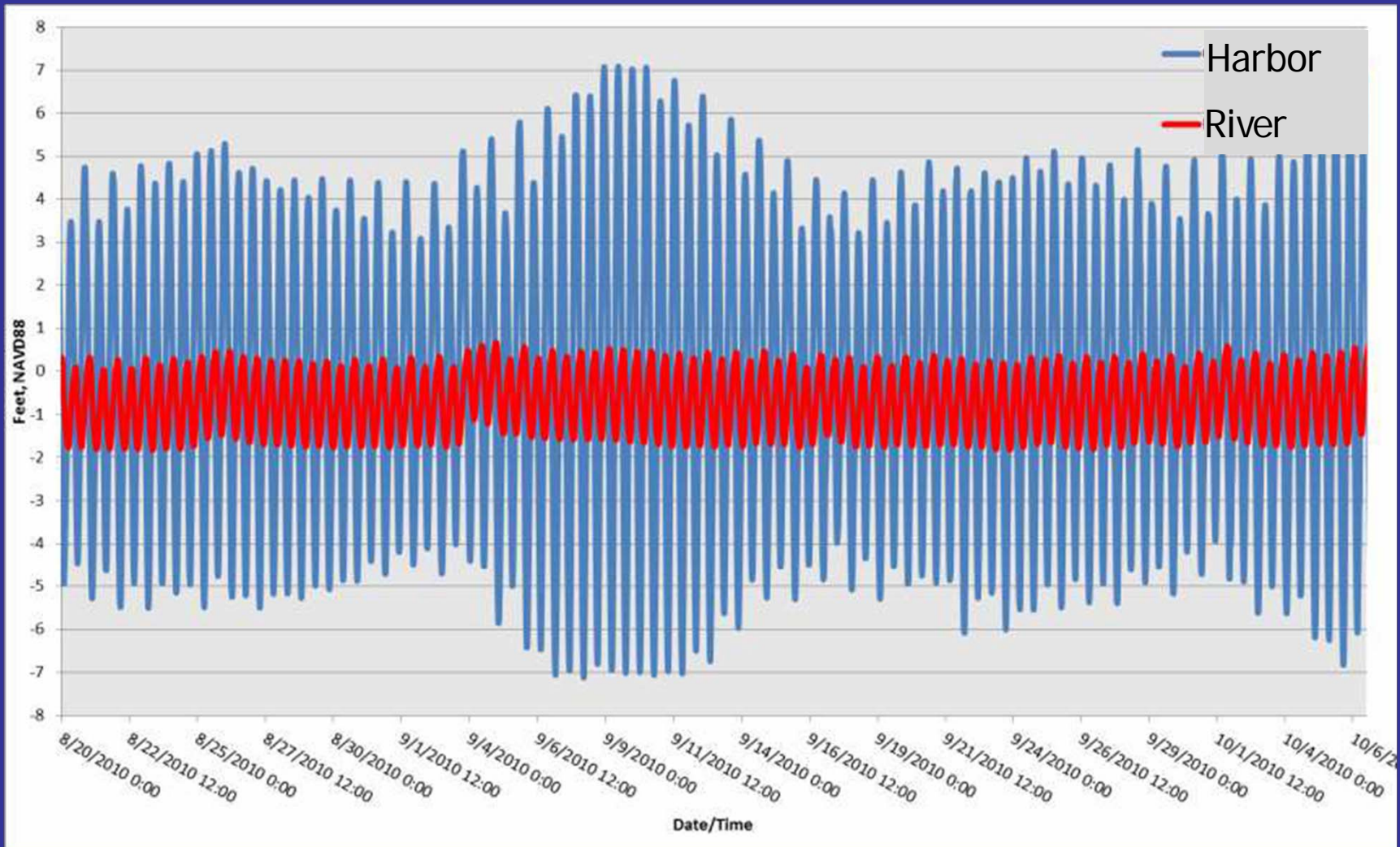


Original vs. current opening



Current Conditions of Herring River

Restricted Tide Range: Lower Basin Tides, Aug-Sept. 2010



Historic Marsh vs. Today



Herring River Today



- CNR dike designated point source for bacterial contamination - shellfish closures
- Classified as “impaired waters” under CWA standards (low pH, metals, path.)
- Marsh subsidence & acid sulfate soils -fish kills
- Degraded river herring habitat
- Loss of salt marsh - replaced by invasive species



Herring River: On-Going Effects of Tidal Restriction



Loss of
Estuarine
Productivity

Fecal Coliform
Bacteria Pollution =
closed shellfish areas



RECENT DATA = COLLECTED AND ANALYZED
THROUGH 20A17 CONFIRM AND FURTHER
SUBSTANTIATE THE DEGRADED CONDITION
OF THE HERRING RIVER FLOODPLAIN

Degraded
Habitat for
River Herring;
Acidification



Poor Water
Quality / Low
Dissolved
Oxygen =
Fish Kills





Proposed Project:

TIDAL RESTORATION FOR HERRING RIVER

The controlled removal of tidal restrictions to allow incremental restoration of tides, salinity, water quality, and plant & animal communities.





Restoration Project Objective:

Restore 1000+ acre Herring River Estuary – once one of the most productive salt marsh systems in the Northeast.

- **Phase 1:** Restore approx. 570 acres; 95% owned by CCNS

How:

Remove existing tidal restrictions and restore natural tidal flow incrementally over time

Why?

- Prevent ongoing degradation of the estuary
- Reclaim ecological & environmental benefits of a healthy estuary
- Replace a portion of the existing 40-yr-old dike with resilient infrastructure



Project Partners





Supporting Organizations

- Association to Preserve Cape Cod
- Cape Cod Conservation District
- Cape Cod National Seashore
- Coastal America Foundation
- Conservation Law Foundation
- Ducks Unlimited
- Friends of Cape Cod National Seashore
- Friends of Herring River
- Herring River Technical & Stakeholder Committees
- MA Bays Program
- MA Division of Ecological Restoration
- MA Environmental Trust
- National Park Service
- USDA Natural Resource Conservation Service
- The Nature Conservancy
- National Oceanic & Atmospheric Administration
- Town of Truro
- Truro Conservation Trust
- US Geological Survey
- US Fish & Wildlife Service
- Town of Wellfleet
- Wellfleet Conservation Trust



Memoranda of Understanding

2005 Memorandum of Understanding I

- Established stakeholder and technical committees
- The Towns of Wellfleet & Truro and CCNS agreed to examine the feasibility of restoration

2007 Memorandum of Understanding II

- Decision to develop jointly a detailed restoration plan
- Established the Herring River Restoration Committee

2016 Publication of the Final EIS/EIR

2016 Memorandum of Agreement III

- Defines roles and responsibilities to implement the approved plan

Permit Approvals Needed for the Herring River Restoration Project

Agency/Regulatory Authority	Permit/Approval	Status
Federal		
U.S. Department of the Interior – National Park Service	National Environmental Policy Act Review	Complete (Record of Decision June 21, 2016)
U.S. Environmental Protection Agency	U.S. Clean Waters Act - NPDES Construction General Permit	To be filed
U.S. Army Corps of Engineers	Individual Permit pursuant to Section 404 of Clean Water Act and Section 10 of Rivers and Harbors Act	To be filed
U.S. Department of the Interior - National Park Service	Review under Section 106 of the National Historic Preservation Act	Complete
U.S. Fish and Wildlife Service	Review under Section 7 of the Federal Endangered Species Act	To be completed
NOAA Fisheries	Essential Fish Habitat Review - Magnuson- Stevens Fishery Conservation & Management Act	To be completed
Federal Consistency Review	Review under Coastal Zone Management Act of 1972	To be reviewed
U.S. Coast Guard	Bridge Permit	Determination of Non-Applicability issued.

Agency/Regulatory Authority	Permit/Approval	Status
State		
Executive Office of Energy and Environmental Affairs	MA Environmental Policy Act Review	Complete (MEPA Certificate July 15, 2016)
MA Department of Environmental Protection - Wetlands and Waterways	<ul style="list-style-type: none"> • Section 401 Water Quality Certification • Chapter 91 Waterways Permits and Licensing 	To be filed
Massachusetts Historical Commission	State Historic Register Review	Project Notification Form filed (Programmatic Agreement in place)
MA Dept of Transportation	Bridge Permit for Chequesset Neck Road Bridge	To be filed
Regional		
Cape Cod Commission	Development of Regional Impact Review	Scoping Application under review
Local		
Wellfleet Conservation Commission	Order of Conditions – MA Wetlands Protection Act and Local Bylaw	To be filed
Truro Conservation Commission	Order of Conditions – MA Wetlands Protection Act and Local Bylaw	To be filed





Proposed Project = “Alternative D” from the Final EIS/EIR (2016)

Final Environmental Impact Statement/Report “Alternative D” Project Components:

1. Remove or Retrofit Tidally Restrictive Structures
2. Prevent Impacts to Low-Lying Roads and Structures
3. Marsh Habitat Management (As Informed by Monitoring)



Proposed Project / Preferred Alternative

Final EIS/R “Alternative D”, Project Components:

1. Remove or Retrofit Tidally Restrictive Structures

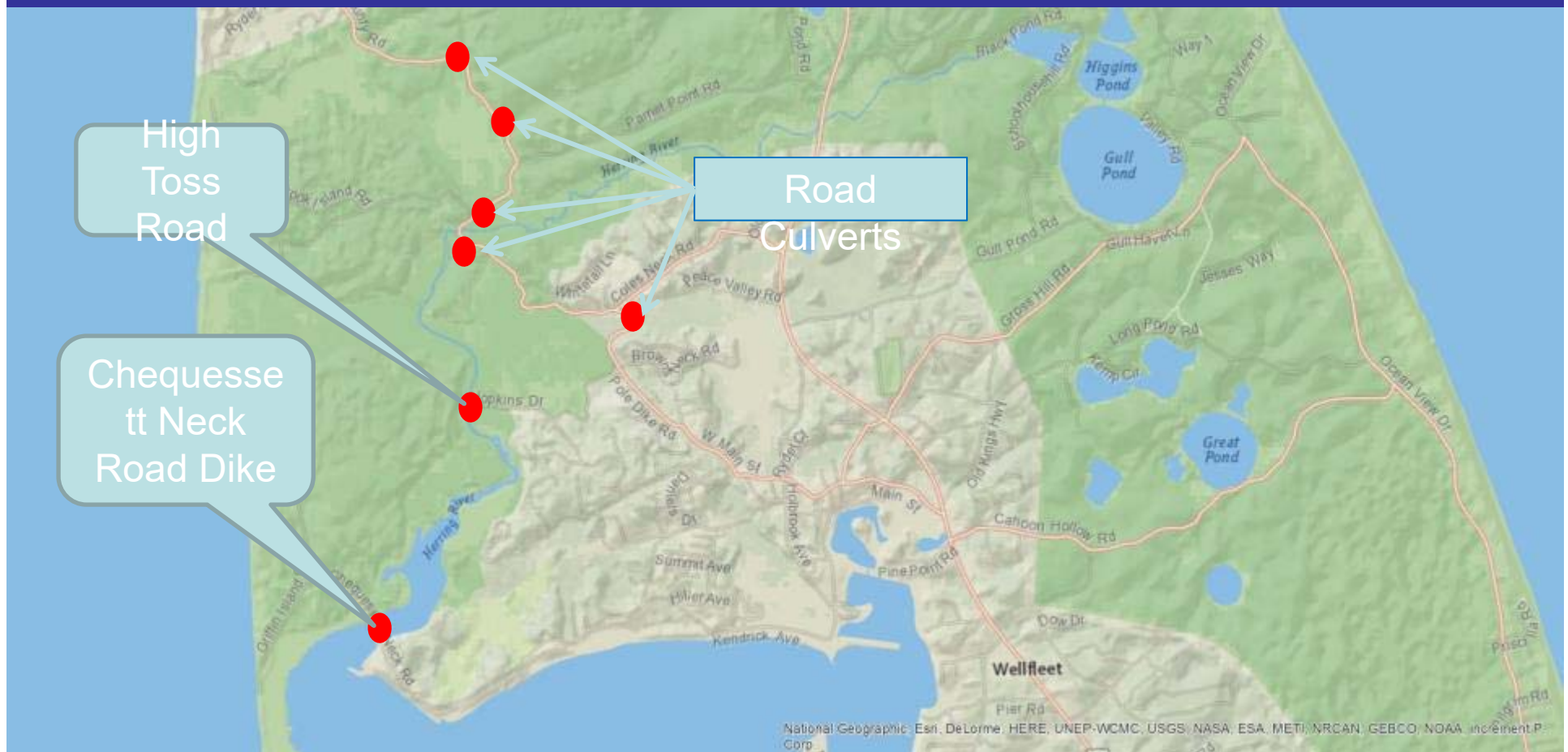
- Rebuild Chequessett Neck Road Dike
- Restore Natural Channel at High Toss Road (Road Eventually Discontinued)
- Enlarge Pole Dike, Bound Brook, and Old County Road Culverts

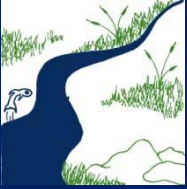


Proposed Project / Preferred Alternative

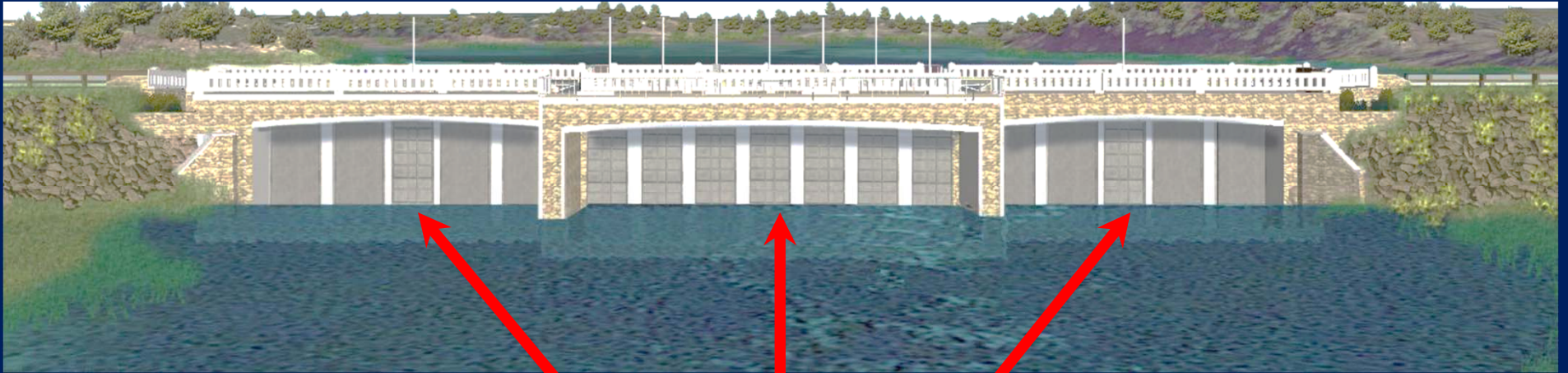
Final EIS/R “Alternative D”, Project Components:

1. Remove or Retrofit Tidally Restrictive Structures





Incremental Tidal Restoration Using Adjustable Slide Gates



165 ft wide bridge span
9 Adjustable Tide Gates & 8 Removable Panels

Herring River Restoration Project

Chequessett Neck Road Bridge Design

Friends of Herring River Annual Meeting

Herring River Restoration Committee
Towns of Wellfleet and Truro
Friends of Herring River
Cape Cod National Seashore

August 18, 2015



PRESENTATION OVERVIEW

- Bridge Layout and Design Elements/Approach
 - Tide Control Structures and Operation/Management
 - Public Access and Safety
- Construction Duration and Traffic Management
- Conceptual Portage and Water Access Improvements
- Next Steps

[CLICK HERE](#) to view slides from F&O presentation at the FHR 2015 Annual Meeting.
Note: design was at conceptual level; some adjustments have since been made



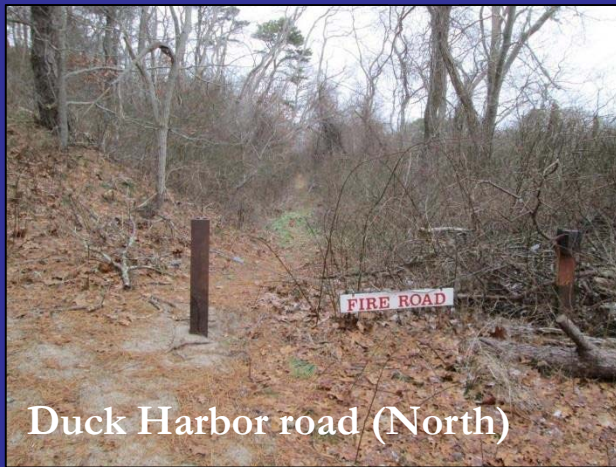
High Toss Road 0% Design Public Meeting

February 12 2015 | Discussion & Public Input

Current Conditions



High Toss Road Viewing West



Duck Harbor road (North)

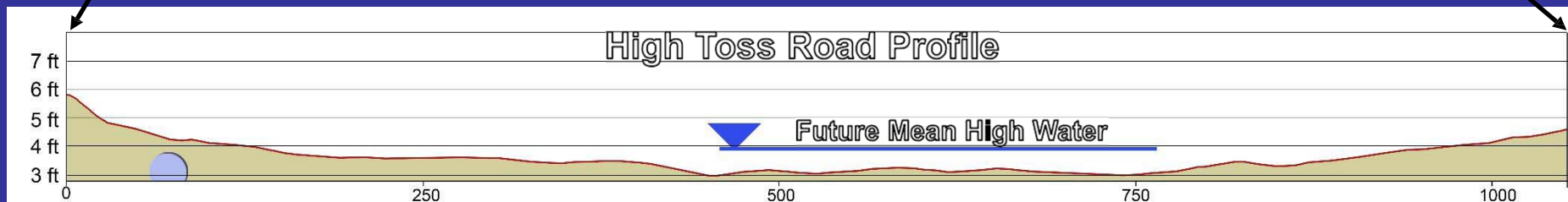
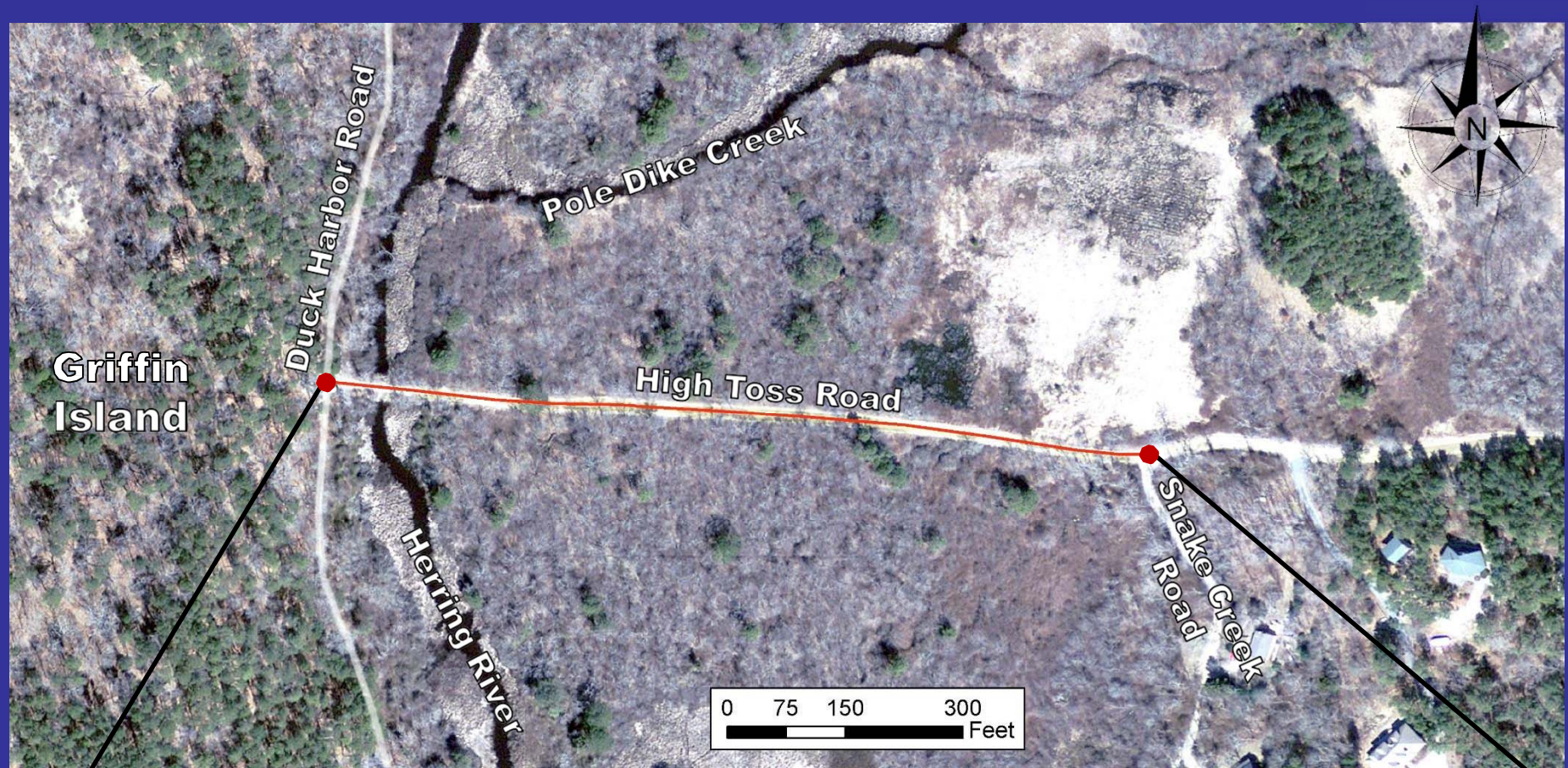


Herring River (South)

- [link to Public Forum Meeting Minutes Feb 12, 2015](#)
- [link to Public Forum Presentation Feb 12, 2015](#)



Discussion & Public Input



Low roads to be inundated will be elevated



View from above by Roland Duhaine and Mark Adams

Proposed Project / Preferred Alternative



Final EIS/EIR “Alternative D”, Project Components:

1. Remove or Retrofit Tidally Restrictive Structures

2. Prevent Impacts to Low-Lying Roads and Structures

- Build Mill Creek Dike
- Install Adjustable Tide Gate at Pole Dike Road Culvert
- Elevate Chequessett Yacht & Country Club Golf Course
- Elevate Low-Lying Roads (e.g. Pole Dike, Bound Brook, Old County)
- Implement Mitigation Plans for Privately-Owned Low Structures
- Use Adaptive Management to Monitor Affects and Support Decisions



Private property – CONCERNS:

- Mitigation measures in the FEIS/FEIR should be designed to account for the effects of climate change and sea level rise. (p. 27)
- The FEIS/FEIR should contain specific information regarding mitigation measures that would be taken in the event of unanticipated adverse impacts to private property and personal incomes. (p. 29)

Proposed Project / Preferred Alternative



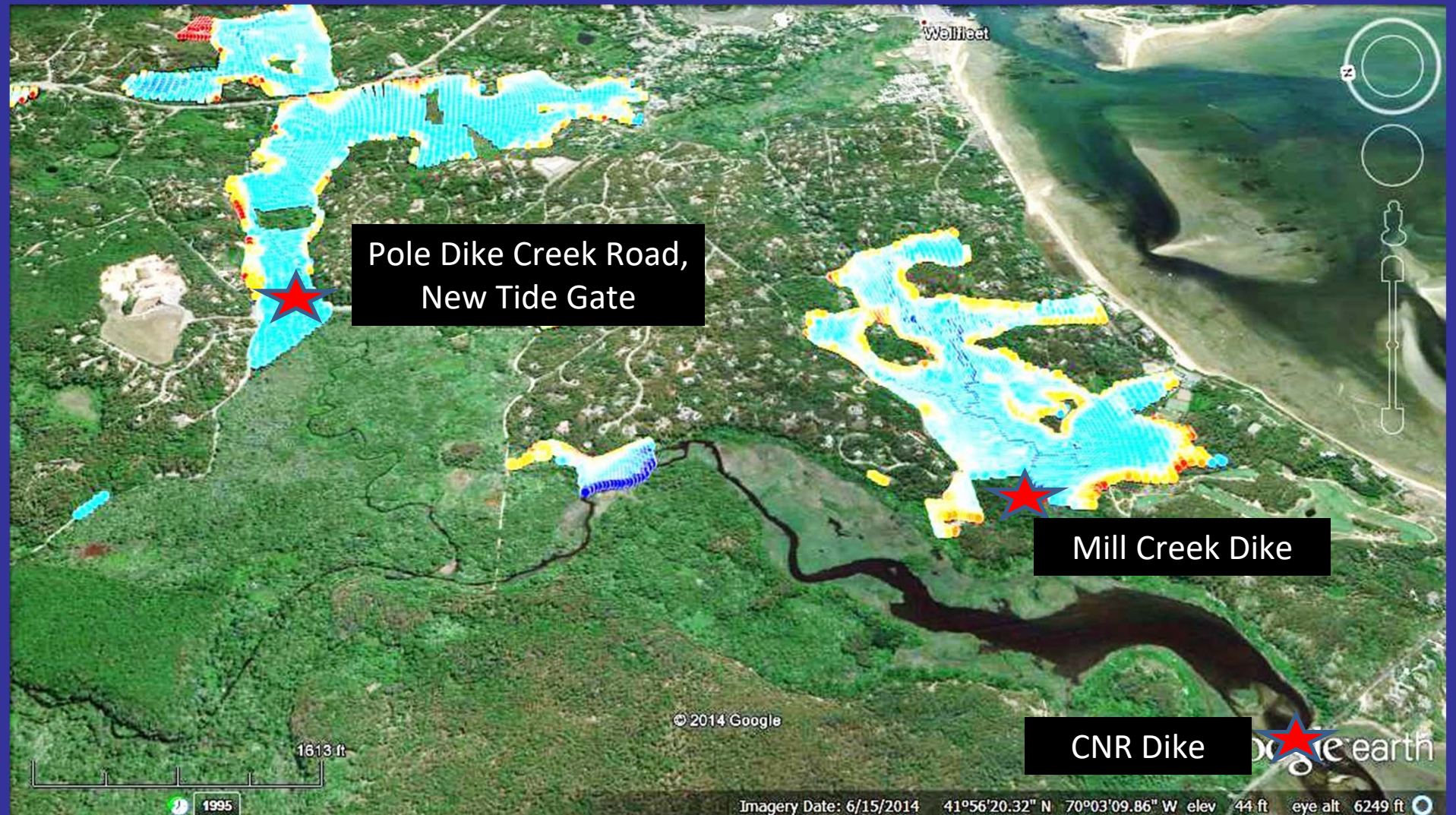
Final EIS/EIR “Alternative D”, Project Components:

2. Prevent Impacts to Low-Lying Roads and Structures





Additional dikes and tide gates at Mill Creek and Pole Dike Creek proposed to provide secondary flood protection





Pre-restoration property-specific measures to prevent impacts from restored tidal flow

EXAMPLES:

- CYCC Golf Course: Elevation and Regrading of Low Areas
- Land Exchange with NPS
- Flood Protection Berm to Protect Building
- Relocation of Wells Constructed in Historic Flood Plain
- Elevation and Regrading of Low Driveways and Access Roads



Proposed Project / Preferred Alternative

Final EIS/EIR “Alternative D”, Project Components:

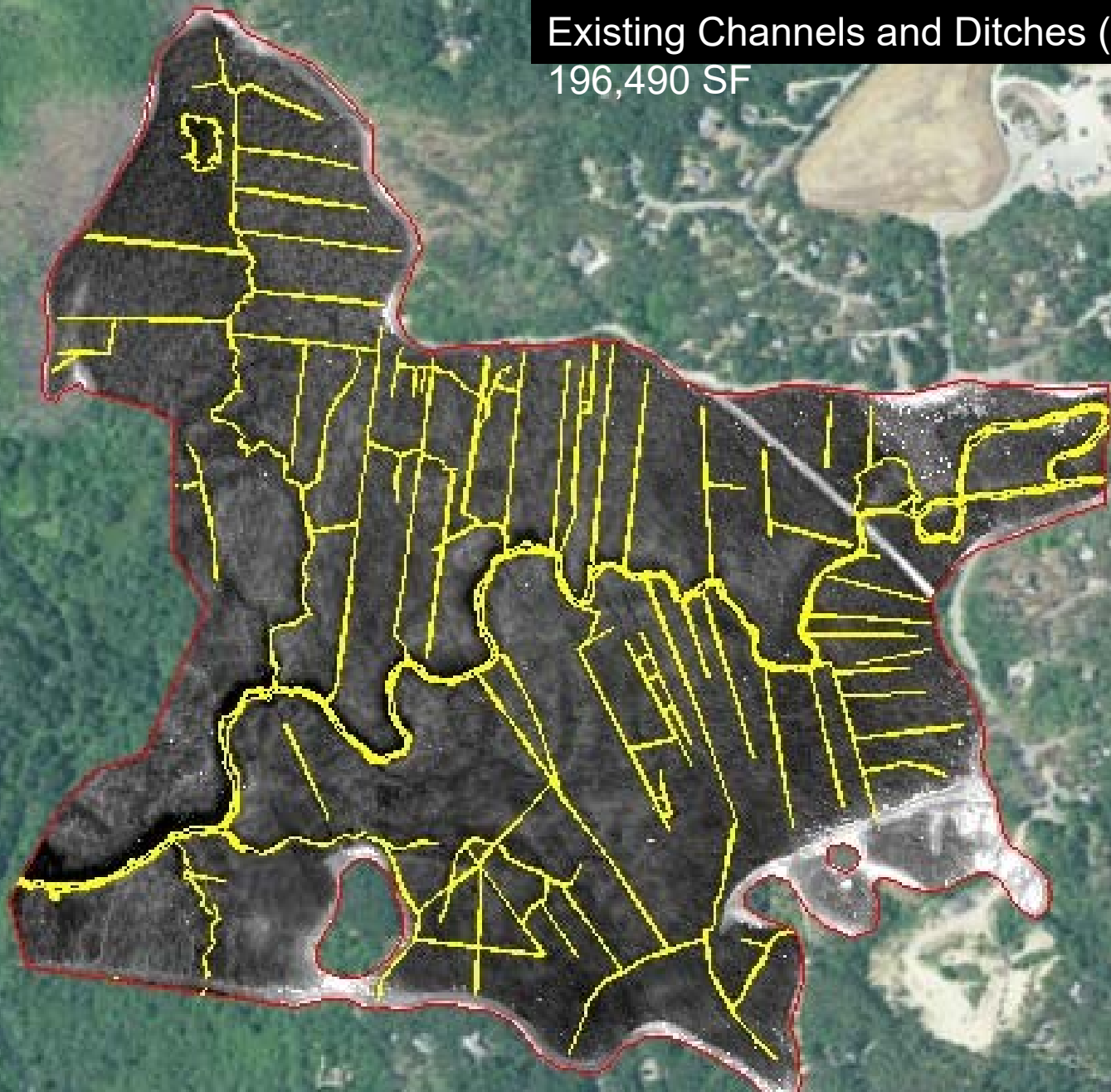
1. Remove or Retrofit Tidally Restrictive Structures

2. Prevent Impacts to Low-Lying Roads and Structures

**3. Marsh Habitat Management/“Secondary Management”
(As Informed by Monitoring)**

- Manage Trees, Shrubs, and Non-Native Invasive Vegetation
- Dredge Accumulated Sediment
- Create Small Channels and Ditches to Improve Tidal Circulation
- Restore Natural Channel Sinuosity
- Remove Dredge Spoil Berms and Other Anthropogenic Material to Facilitate Drainage of Ponded Water
- Apply Sediment to Build Up Subsided Marsh Surfaces

Lower Pole Dike Creek
Existing Channels and Ditches (1960):
196,490 SF



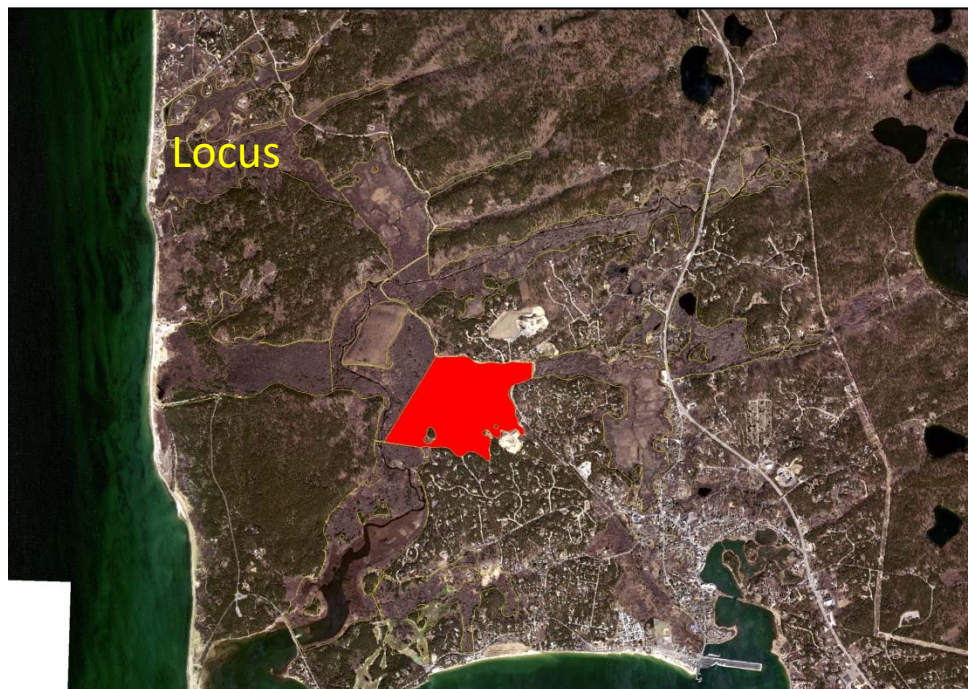
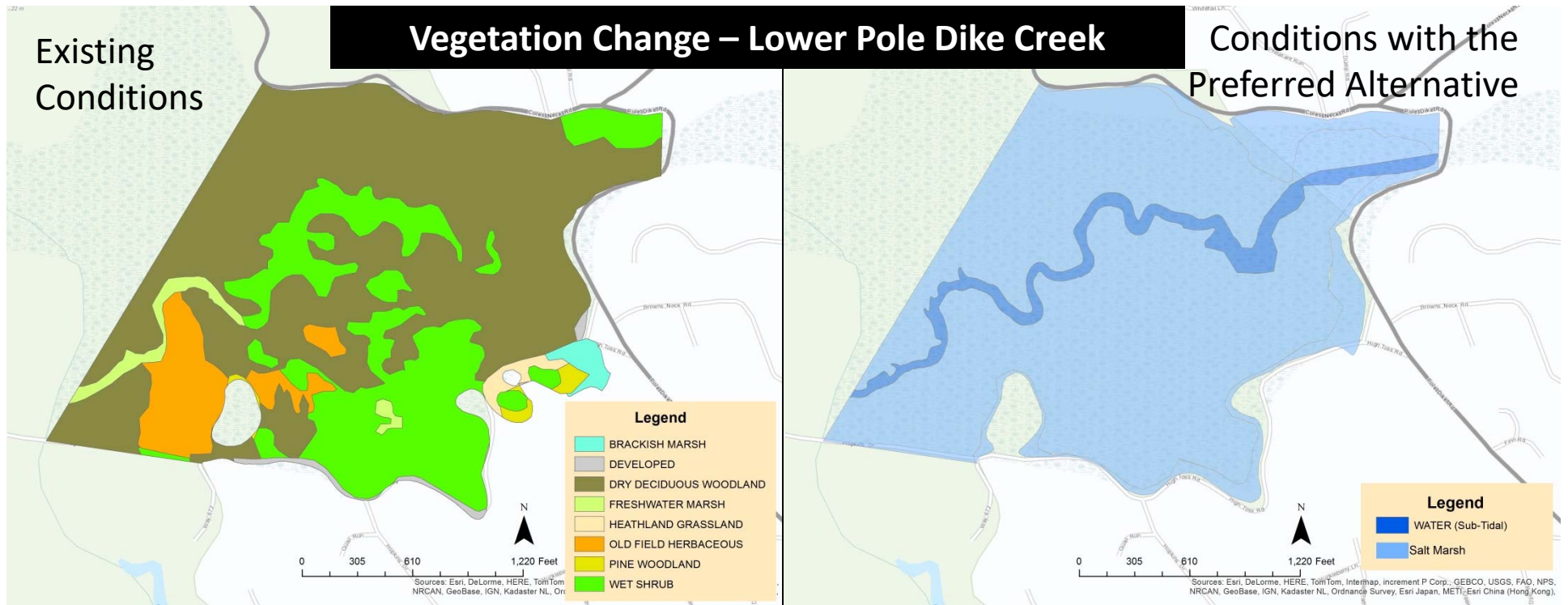
34

Obtained by InfoWave, Inc., from the USGS, United States Geological Survey, Reston, VA, for the purpose of the 1960 USGS map.

Lower Pole Dike Creek
NATURAL CHANNELS:
65,127 SF

Source: Esri, DigitalGlobe, GeoEye, United States, United AEC, Schnapping, Geoport, IGN, CNR, Swisstopo, and the GIS User community.

35



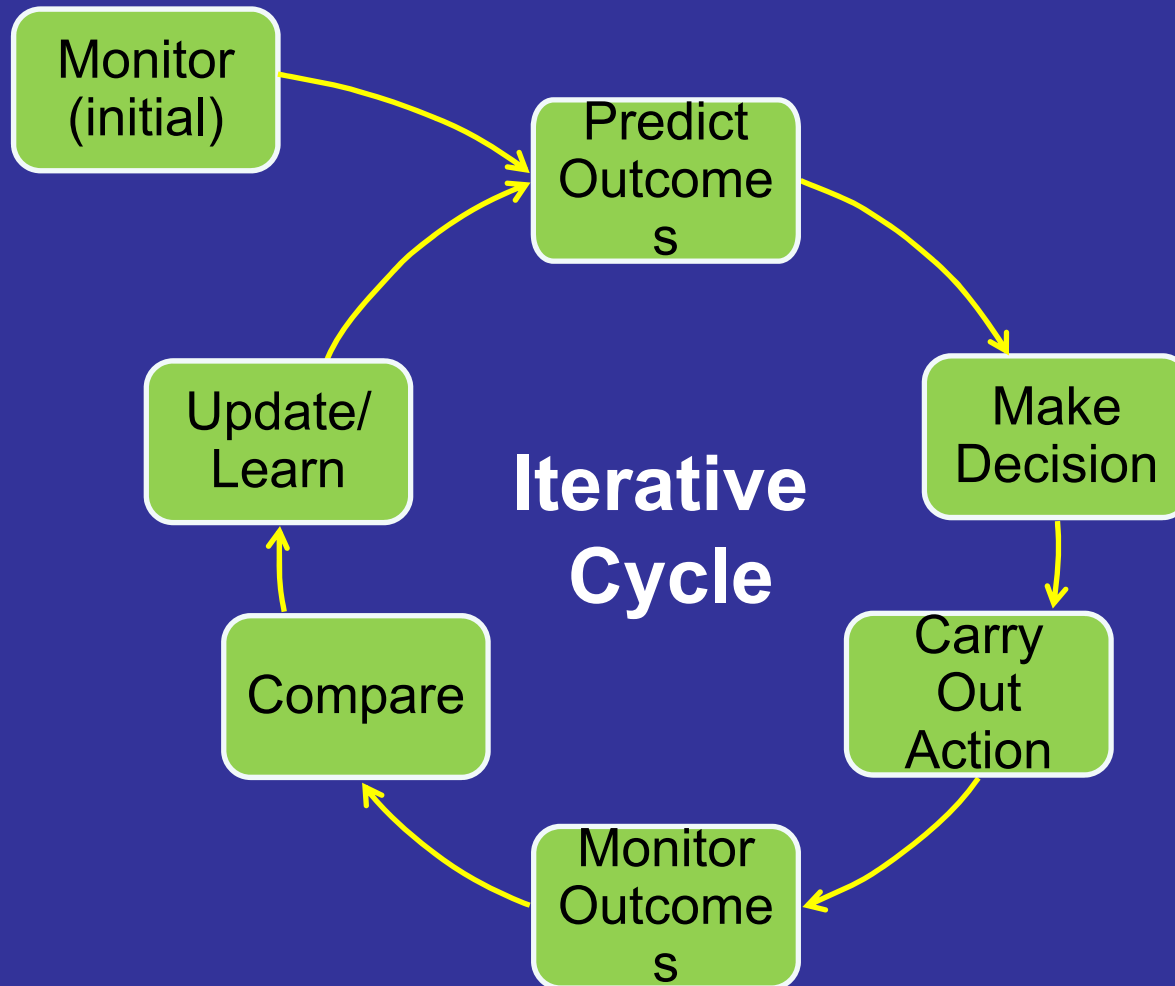
Existing (Acres)	Cover Types	Pref. Alt. (Acres)
1	BRACKISH MARSH	
1	DEVELOPED	
69	DRY DECIDUOUS WOODLAND	
2	FRESHWATER MARSH	
1	HEATHLAND GRASSLAND	
8	OLD FIELD HERBACEOUS	
1	PINE WOODLAND	
29	WET SHRUB	
	SALT MARSH	98
	WATER	8
	MISC. NON-TIDAL	6
112	TOTAL	112

What is Adaptive Management?

- A Structured Decision-Making (SDM) approach to recurrent decision making in the face of uncertainty, with a focus on reducing uncertainty to improve future decision making.
- Learning through the process of decision making and adapting your management based on what is learned.



Iterative Cycle: Managing & Learning



Why an AM Approach is Appropriate for Restoration of the Herring River Estuary

- There are uncertainties about how the system will respond to restoration actions
- Decisions regarding actions must be made in the face of this uncertainty
- The long-term nature of the restoration provides the opportunity to formally learn – through a repeated cycle of prediction, decision making, and focus monitoring – and to adapt the decisions regarding management actions based on this learning



Where else is **Structured Decision-Making & Adaptive Management** used?

Some Dept. of Interior Projects

- Non-Native Fish Control below Glen Canyon Dam
- Management of Salt Marsh Habitats in Northeast Region FWS Refuges
- South San Francisco Bay Salt Pond Restoration Project
- Habitat Restoration for New England Cotton-tail Rabbits
- Multi-Species Management of the Horseshoe Crab and Shorebird Populations in Delaware Bay
- Everglades Wetlands Restoration Project
- Regional and Field Perspectives on Factors that Affect Decision Making with Respect to American Shad
- Habitat Management for Multiple Wetland Bird Objectives on National Wildlife Refuges
- Conservation and Management Decisions for Mountain Plovers throughout the Annual Cycle
- Application of Structured Decision Making to Assess Multiple Scale Monitoring Needs for Waterbird Management
- Missouri River Emergent Sandbar Habitat Creation
- Atlantic Salmon Recovery

Project Benefits: RESTORED COASTAL HABITAT



- ✓ 11+ River Miles for River Herring
- ✓ Access to 160 Pond Acres for Spawning
- ✓ Improved Water Quality
- ✓ 200+ Acres Clam and Oyster Habitat
- ✓ Increase and Sustain Declining Salt Marsh Habitat
- ✓ Habitat for Marine Species; Striped Bass, Winter Flounder, Diamond-back Terrapin
- ✓ Engine of Productivity for Near- and Off-Shore Marine Habitats



Project Benefits: RESTORED ECOSYSTEM SERVICES

- ✓ Shellfishing: Elimination of Bacterial Contamination of Recreational and Commercial Habitats
- ✓ Other Recreation: Boating, Hiking, Fishing
- ✓ Managing Sea Level Rise: Estuarine Habitats More Resilient to Coastal Flooding; Improved Drainage
- ✓ Natural Mosquito Control: Tidal Flushing of Breeding Areas, Larvae-eating Fish
- ✓ Reduce Methane Emissions: Equal to Taking Hundreds of Cars off the Road Each Year (preliminary data)
- ✓ Local Economy: \$1 Spent on Coastal Restoration = \$13 to Local Businesses (Center for Amer. Progress/OXFAM 2014)





Friends of Herring River Annual Meeting | 15 August 2017

“The term **blue carbon**, while not a common term, is simply the carbon captured by the world's ocean and coastal ecosystems.”

Dr. Kevin Kroeger. PhD, Research Biogeochemist,
United States Geological Service, Woods Hole
Oceanographic Institute

[CLICK HERE](#) for FHR 2017 Annual Meeting slides including
Dr. Kroeger's presentation

Blue Carbon in the Herring River: Can We Reduce Greenhouse Gas Emissions through Wetland Restoration?

Kevin D. Kroeger

USGS Woods Hole Coastal & Marine Science Center





Next Steps to Move Forward

- ✓ Final Environmental Impact Statement/Report, National Park Service Record of Decision (National Environmental Policy Act)
- ✓ Cape Cod Commission Opens Development of Regional Application
- ✓ Establish Management Structure to Implement and Oversee the Project: **MOU-III**

- Complete Technical Designs for Chequessett Neck Dike, Other Water Control Structures, and Roadway Flood Prevention: **Underway**
- Develop Agreements with Affected Property Owners and Complete Technical Designs for Flood Prevention Measures: **Underway**
- Finalize Adaptive Management and Monitoring Plan: **Underway**

- Prepare and Submit Permit Applications: **2019**
- Obtain Funding: Estimated \$40-60 million over 5-10 years
- Initiate Construction, Soonest Foreseeable Start Date: **2022**

Reasons for Pursuing a Phased Project:



- Highly Conservative and Risk-Adverse Approach
- Consistent With FEIS/FEIS Preferred Alternative
- Facilitates Construction of Major Project Infrastructure Elements
- Allows Tidal Restoration to a Large Portion (approx. 64%) of the Full Project Area
- Minimizes Effects on Private Land
- Provides a Regulatory “Stopping Point” Where the Project Would Need to Be Reviewed and Permits Amended/Renewed Before Proceeding
- Affords the Opportunity to Collect Detailed Data and Improve Predictive Models/Projections

Project Phasing / Permitting Sequence



Phase 1: Definite

- Chequessett Neck Road Dike
- Mill Creek Dike and Tidegates
- CYCC Golf Course Work
- High Toss Road Channel and Road Removal
- Pole Dike Road: Elevation, Culvert, and Tidegate

Phase 1: To Be Determined Based on Landowner Agreements and Allowable Restored Tide Range

- *Other Mill Creek Property Mitigation*
- *Incremental Opening of Mill Creek Tidegates*
- *Vegetation Management in Lower Sections*
- *Elevation of Lowest Road Sections*

Hydrologic Extent of Phase 1 Tidal Restoration:



- Chequessett Neck Tide Gates Would Be Opened Incrementally to a Specified Maximum High Tide Level
- Mill Creek Tide Gates Would Be Opened to Provide a Limited Tidal Range in the Mill Creek Sub-Basin
- Mill Creek Tide Gates Would be Actively Managed and Closed During Severe High Tides
- Pole Dike Road Tide Gate Would be Set for Drainage Only; No Tides in Upper Pole Dike Creek Sub-Basin



Restoration Area At the End of Phase 1

All 570 ac of public & private property in Phase 1 restoration area are currently regulated wetlands.

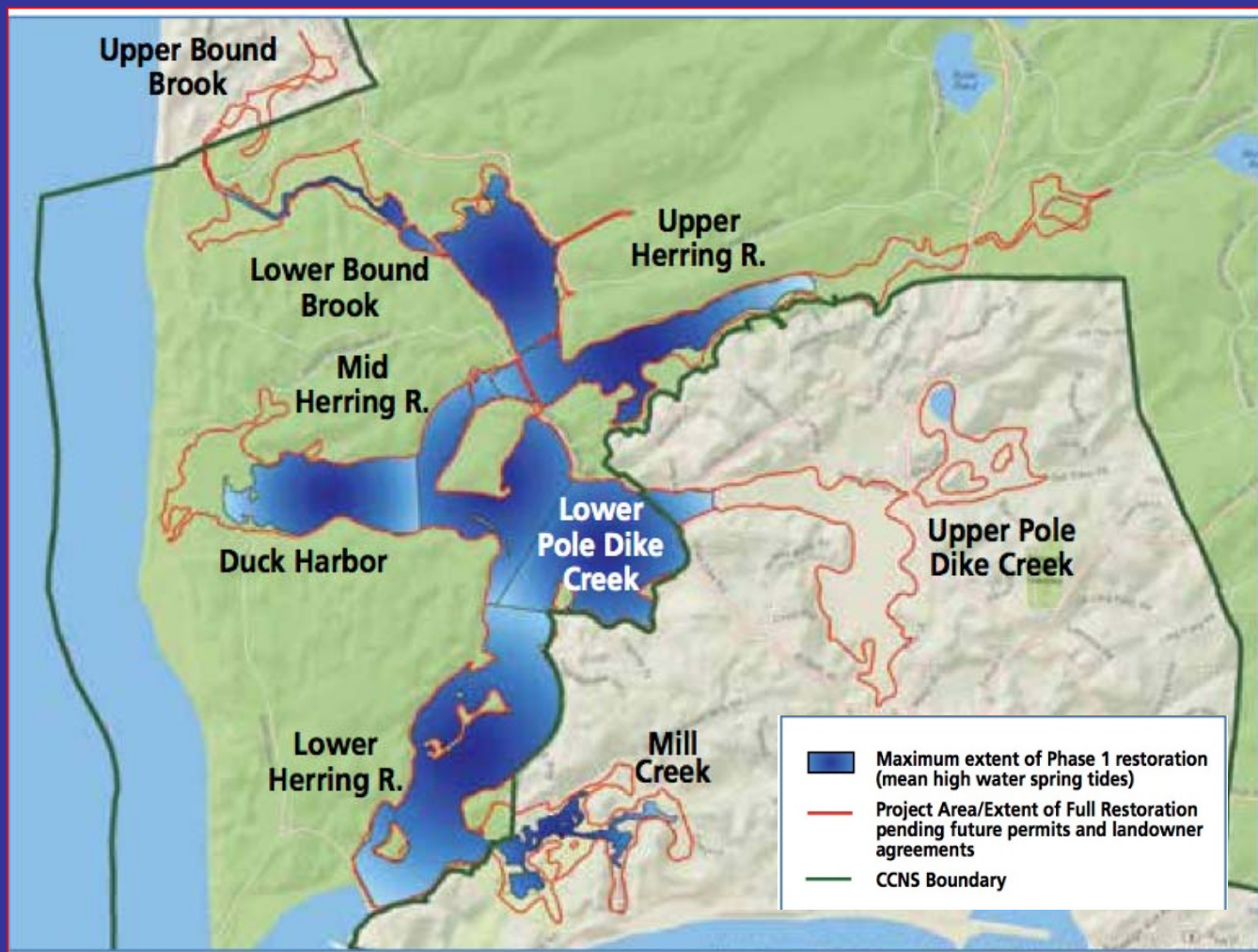
≈535 ac (95%) NPS

≈30 ac (5%) private land subject to monthly tidal influence

≈10 ac CYCC

≈9 ac Wellfleet Conservation Trust

≈11 ac twelve (12) residential properties



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QUESTIONS?

