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

• Project updates
• Reports & Fact sheets
• Presentations
• Videos
• Newsletters

... and a lot more!
**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.

1908 – Construction of the Chequessett Neck Road Dike

**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
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
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

<table>
<thead>
<tr>
<th>Agency/Regulatory Authority</th>
<th>Permit/Approval</th>
<th>Status</th>
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<tbody>
<tr>
<td><strong>Federal</strong></td>
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<tr>
<td>U.S. Environmental Protection Agency</td>
<td>U.S. Clean Waters Act - NPDES Construction General Permit</td>
<td>To be filed</td>
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<tr>
<td>U.S. Army Corps of Engineers</td>
<td>Individual Permit pursuant to Section 404 of Clean Water Act and Section 10 of Rivers and Harbors Act</td>
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<td>U.S Department of the Interior - National Park Service</td>
<td>Review under Section 106 of the National Historic Preservation Act</td>
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<td>U.S. Fish and Wildlife Service</td>
<td>Review under Section 7 of the Federal Endangered Species Act</td>
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<td>NOAA Fisheries</td>
<td>Essential Fish Habitat Review - Magnuson- Stevens Fishery Conservation &amp; Management Act</td>
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<td>Federal Consistency Review</td>
<td>Review under Coastal Zone Management Act of 1972</td>
<td>To be reviewed</td>
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<tr>
<td>U.S. Coast Guard</td>
<td>Bridge Permit</td>
<td>Determination of Non-Applicability issued.</td>
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<td><strong>State</strong></td>
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<tr>
<td>Executive Office of Energy and Environmental Affairs</td>
<td><strong>MA Environmental Policy Act Review</strong></td>
<td>Complete (MEPA Certificate July 15, 2016)</td>
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</table>
| MA Department of Environmental Protection - Wetlands and Waterways | • 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

- High Toss Road
- Chequesse tt Neck Road Dike
- Road Culverts
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

[Map showing the location of Griffin Island, Duck Harbor Road, Pole Dike Creek, Herring River, High Toss Road, and Snake Creek Road, with a profile showing future mean high water levels.]
Low roads to be inundated will be elevated
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

- Mill Creek Dike
- Pole Dike Creek, New Tide Gate
- Upper Pole Dike Creek Sub-Basin
- Mill Creek Sub-Basin

Approximate Area of Low Road Segments
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
Lower Pole Dike Creek
NATURAL CHANNELS: 65,127 SF
**Vegetation Change – Lower Pole Dike Creek**

### Existing Conditions

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<tr>
<th>Cover Types</th>
<th>Existing (Acres)</th>
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<tr>
<td>BRACKISH MARSH</td>
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<tr>
<td>DEVELOPED</td>
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<tr>
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<td>FRESHWATER MARSH</td>
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<td>PINE WOODLAND</td>
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<td>WET SHRUB</td>
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<td>SALT MARSH</td>
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<tr>
<td>WATER</td>
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<tr>
<td>MISC. NON-TIDAL</td>
<td>6</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>112</strong></td>
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### Conditions with the Preferred Alternative

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<tr>
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<th>Preferred Alternative (Acres)</th>
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<tr>
<td>WATER (Sub-Tidal)</td>
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<tr>
<td>Salt Marsh</td>
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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

1. Monitor (initial)
2. Predict Outcomes
3. Make Decision
4. Carry Out Action
5. Monitor Outcomes
6. Compare
7. Update/Learn

Iterative Cycle
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, Diamondback 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)
“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

photo: S. Baldwin
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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