1 Introduction and Project Overview

For the past 40 years the scientific community has clearly documented, and society has increasingly recognized, the functions and values associated with coastal wetland systems. Estuarine communities, formed by complex mixing of tidally-driven saltwater and freshwater discharge, are among the most productive ecosystems on the earth. The subtidal waters and intertidal saltmarshes of these areas are vital for pollution control, storm surge protection, fish and shellfish habitat, waterbird use and overall near-shore productivity (Odum 1969, 1971; Nixon 1982; Teal 1986). Unfortunately, for many decades prior to this recognition many of the coastal marsh areas along the Atlantic Coast were subjected to long-term diking and drainage efforts with the intent of controlling mosquito populations and for agricultural and land development. These alterations dramatically changed the hydrologic patterns of tidally dependant wetlands. As tidal inundation and flushing were reduced natural estuarine function was impaired. In the Gulf of Maine watershed (from Cape Cod to Nova Scotia) nearly 30% of coastal wetlands have been altered by tidal restrictions. In the last decade, considerable efforts have been expended by many agencies and groups in the region toward identifying impacted coastal wetlands and implementing plans for restoring the tidal regimes and thus the natural functions of these areas (GOMC 2004).

The purpose of this Conceptual Restoration Plan (CRP) is to present a strategy for restoring ecological integrity to one of the largest impacted estuaries in New England: the Herring River located in Wellfleet and Truro, Massachusetts (Figure 1). Originally open to Wellfleet Harbor at Chequesset Neck, the inlet/mouth of the Herring River was diked in 1909, drastically restricting the frequency, range, and duration of tidal inundation. Subsequent drainage activities along the River further altered the hydrologic conditions. As the largest diked estuary within the Cape Cod National Seashore (CCNS), research performed by the National Park Service (NPS) and other cooperating institutions has been ongoing for approximately 35 years to document the effects of these hydrologic alterations and to lay the groundwork for restoration of this important ecological and cultural resource. The identified impacts from this research include the loss of productive saltmarsh habitat, water quality degradation, nuisance insect production, loss of fisheries, loss of shellfish habitat, and subsidence of the floodplain surface elevation.

At the heart of the issue is the difference in tidal range between the unrestricted Wellfleet Harbor side of the dike versus the Herring River side of the dike. On the Harbor side of the dike, the typical daily tidal range is 10 feet (from average high tides of 5 feet to low tides of -5 feet NAVD88), while on the River side this range is typically 2.0 feet (from average high tides of 0.9 feet to low tides of -1.1 feet NAVD88, NPS unpublished data, July 2007).

USGS Topographic Quadrangle
Wellfleet, MA

N

0 1,250 2,500 5,000 Feet

Site Locus

Herring River Tidal Restoration Project
Conceptual Restoration Plan
Wellfleet and Truro, MA

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(Note that all elevations in this document use the North American Vertical Datum of 1988 [NAVD 88]. In Wellfleet Harbor, mean low low water (MLLW) is -5.56 feet NAVD 88. See Figure 2 and the Glossary for more information on NAVD88, MLLW, and other tidal datums.)

Hydrologic modeling by NPS has indicated that reconfiguration of the Chequesset Neck Road dike and modified tidal controls could restore the tide-restricted River and its bordering saltmarsh habitat. The restoration project's fundamental concept is to implement changes that will increase important social, economic, cultural, and aesthetic values in addition to numerous environmental and ecological benefits within the 1100 acres former estuary. The NPS, representatives from various federal, state, regional, and local agencies and organizations, private land owners, and others have worked together over a number of years planning this restoration effort. In August 2005, the NPS and the Town of Wellfleet entered into a Memorandum of Understanding, which resulted in the formation of the Herring River Technical Committee (HRTC, see Section 3.1). The HRTC has reached consensus on the need for and importance of this restoration and has formulated a well-defined set of project goals consolidating research and the information necessary in order to assess project alternatives.

This Conceptual Restoration Plan is the key result of the HRTC's efforts. The CRP is intended to:

- describe existing conditions of the Herring River,
- present a history of past resource management of the Herring River,
- explain the need for restoration,
- describe, at a conceptual level, alternative measures to restore tidal exchange to the Herring River,
- discuss anticipated impacts, mitigation measures, and adaptive management objectives,
- determine subsequent steps needed, and
- document the public review process of the HRTC.

The assessment of alternatives and their potential environmental consequences are fundamental to the forthcoming environmental review processes pursuant to the Massachusetts Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA).

The following nine elements comprise the goals of this restoration project:

- Restoration of the natural tidal range and salinity throughout the floodplain including all tributary stream basins;
- Reestablishment of the physical connection with the marine environment for exchange of nutrients, organic matter, and biota;
- Restoration of the natural sediment budget to counter wetland subsidence;
- Improvement of water quality realized by increased salinity, alkalinity, and pH, and decreased metals and coliform bacteria;
- Control of salt-intolerant plants including invasive species;
- Reestablishment of native saltmarsh plants and animals;
- Improvement of estuarine fish and shellfish habitat;
- Improvement in the natural control of mosquitoes and other nuisance insects;
- Improvements in recreational access: boating, finfishing, shellfishing, bird watching, etc.

As noted above, the primary means, or driver, of river floodplain habitat restoration will be incremental increases in the exchange of tidal floodwaters between Wellfleet Harbor and the tide-restricted estuary and river. This exchange will occur by removing, replacing, or reconstructing the tidal control structure that has existed at the mouth of the river since 1909. The intent of improved tidal exchange is to reestablish hydrology, hydrography, and salinity distribution of the system to a desired and acceptable degree for the benefit of important tidal river and estuarine processes including the support of desirable estuarine animal and plant life.

Tidal restoration will occur gradually over an extended period of time and also will entail concurrent monitoring of environmental response to assess the achievement of project goals including the assessment of stakeholder concerns. This will ensure that the restoration proceeds in a manner that minimizes any potential adverse effects. A critical factor in the restoration design process is to achieve tidal flooding up to the spring high tide elevation of 5.1 feet (NAVD88) in order to restore ecologically sustainable estuarine habitats, but limit tidal flooding in areas where low-lying properties may need flood protection. To accomplish this objective, this CRP has considered site-specific tidal control alternatives (structures) that will restrict the elevation of spring and storm tides to 5.1 feet NAVD88. Importantly, major portions of the floodplain do not include low-lying properties sensitive to tidal flooding; for these areas, spring- and storm-tide heights would not be limited by tide-control structures.