

Chapter 6

FORMULATION AND COMPARISON OF ALTERNATIVES

6.1 FORMULATION PROCESS

NRCS worked with DMF, CZM, and town officials to identify sites with restricted tidal marshes, poorly functioning fish passages, or stormwater discharges into shellfish beds. NRCS then worked with DMF, CZM, and the towns to screen those sites to a list of preferred sites for each category. NRCS and DMF also identified measures that could be implemented to restore habitat or improve water quality for each type of project, they estimated the costs to implement specific projects, and they estimated the ecological value (habitat units) to be achieved from each project. The goal of the plan formulation process was to maximize National Ecosystem Restoration (NER) benefits (measured as habitat units) at the least cost.

A cost-effectiveness analysis will be done at each site during design for implementation to achieve greatest benefits for the least cost. For planning purposes alternatives were developed for each priority site. Priority sites were not compared across objectives because the proposed action is to restore/improve all the priority sites. The Project addresses existing problems not covered by current laws and regulations, which only address new land use changes.

Salt Marsh

Site Screening

One objective of the Cape Cod Water Resources Restoration Project is to restore tidal flow to restricted salt marshes along the Cape Cod coast. NRCS began the process of selecting the salt marsh sites by consulting with two coastal atlases of tidally restricted salt marshes prepared for the Massachusetts Wetlands Restoration Program: The Cape Cod Atlas of Tidally Restricted Salt Marshes (Cape Cod Commission 2001) and the Atlas of Tidally Restricted Salt Marshes in the Buzzards Bay Watershed (Buzzards Bay Project National Estuary program 2002). Combined with site visits, these atlases provided detailed information on 182 tidally restricted marshes on Cape Cod.

Field data were collected for each site, including information on marsh elevation, culvert inverts, site accessibility, and nearby utilities. In addition, photos were taken of each site. Town officials were contacted to assess their interest in restoring tidal flow to a particular site. A rating matrix was developed to display the following information to rank the sites:

<u>Category</u>	<u>Value</u>
Size of upstream affected area (salt marsh acres/ total affected acres)	less than 5 acres = 3 5 to 10 acres = 5 10 to 25 acres = 7 greater than 25 acres = 10
Is the upstream affected area contiguous to protected open space (ownership)?	yes = 1 no = 0
Does this tidal channel support a shellfish resource area?	yes = 1 no = 0
Is the channel or system part of an anadromous fish pathway?	yes = 1 no = 0
Does the affected area include Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife?	yes = 1 no = 0

Each site was further screened by assessing the feasibility of restoration. Sites were dropped if they could not feasibly be restored, if local interest was considered low or moderate, if restoring tidal flow would adversely affect nearby septic tanks or private wells, or if the site was already being addressed by another agency.

NRCS conferred again with town officials to verify their interest and support for the remaining sites. The result is a list of 26 salt marsh sites considered high priority for restoration by NRCS and Barnstable County towns. The results of this screening process are shown in Table B-1 in Appendix B.

Figure 6-1 shows the location of the 26 priority salt marsh projects, and Table 6-1 describes the conceptual restoration project proposed for each site.

Conceptual Design and Cost Development

Table 6-1 shows the estimated planning-level cost for each site. NRCS visited 158 restricted salt marsh sites to collect basic information to define the level of restriction, determine site accessibility for construction, identify utilities in the area, and note other site constraints or construction considerations. These site characteristics were recorded on a field data sheet along with photographs. The size of the proposed culvert to provide full tidal flow was based on 3.0 square feet of opening per 1.0 acre of upstream effected area (as identified in the Atlases). NRCS also contacted local town officials to obtain their input on their interest in restoring the site and other pertinent information. Typical construction costs included traffic control, site preparation, dewatering, excavation, removal of existing culvert, new culvert, backfill, and road paving.

Environmental Restoration Benefits

The ecological benefits from the salt marsh projects result from the increased ecological functions of the marsh. The habitat units associated with that benefit were calculated as the acreages of salt marsh