United States
Department of
Agriculture

Natural Resources
Conservation Service

NRCS

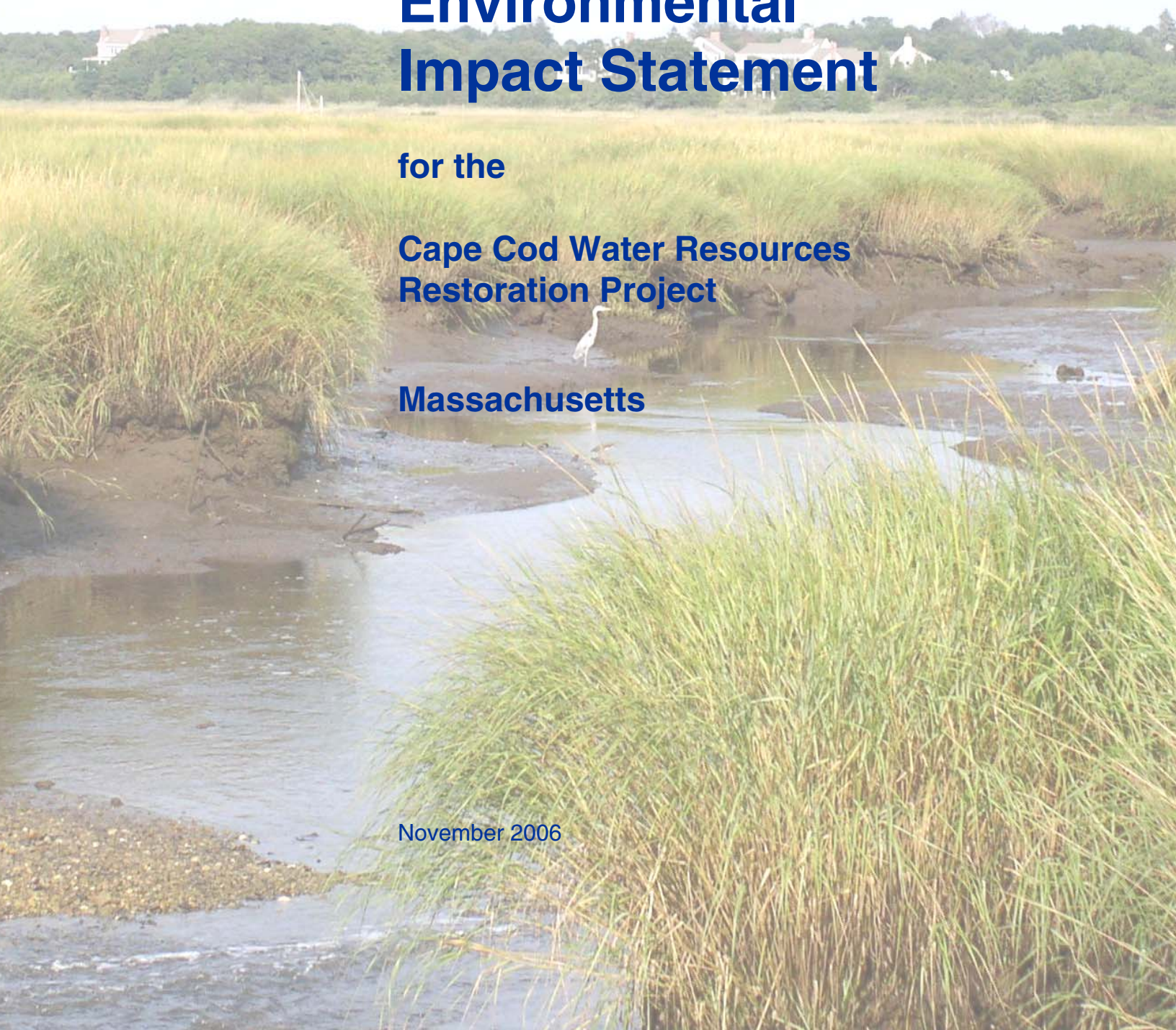
Helping People Help the Land

Final Watershed Plan and Areawide Environmental Impact Statement

for the

Cape Cod Water Resources Restoration Project

Massachusetts



November 2006

Office of Management and Budget fact sheet

Fact Sheet

Project Information

Project Name	Cape Cod Water Resources Restoration Project					
Total $ in K	$29,950					
Location of Project	(Include State, counties, and Congressional district) Massachusetts, Barnstable, MA-10					
Authorization	Public Law 83–566, 68 Stat. 666 as amended (16 U.S.C. 1001 et. seq.) 1954					
Background	(Purpose and description of project — not more than 10 lines) The purposes of the Cape Cod Water Resources Restoration Project are watershed protection and fish and wildlife development. The Sponsors' objectives are to (1) improve water quality for shellfish beds, (2) restore degraded salt marshes, and (3) restore anadromous fish passages. Alternatives to reach these objectives include, but are not limited to: Objective 1: Constructed wetlands, infiltration basins. Objective 2: Enlarging existing culverts to restore marsh hydrology to pre-restriction conditions. Objective 3: Water level control structures and fish ladders.					
Economic and financial data		Total traditional cost share		Total enhanced cost share	Annual O&M	
Costs	Project Purposes	Non–Fed	Federal	Non–Fed Federal	Non–Fed	Federal
	Improve water quality for shellfish beds	1,800,000	6,390,000	N/A	106,500	0
	Restore degraded salt marshes	3,200,000	11,340.000	N/A	25,200	0
	Restore anadromous fish passages	910,000	4,350,000	N/A	47,300	0
	Total Costs	5,910,000	22,080,000	N/A	179,000	0

Office of Management and Budget fact sheet - continued

Benefits	Project Purposes	Average annual Benefits		Number of direct beneficiaries	
		Onsite	Offsite	Onsite	Offsite
	Improve water quality for shellfish beds	7,264	Undeterminable	222,230	4.5 million
	Restore degraded salt marshes	1,497	Undeterminable	222,230	4.5 million
	Restore anadromous fish passages	4,191	Undeterminable	222,230	4.5 million

Benefit–to–Cost Ratio	Benefits = costs Benefits described in terms of Habitat Units. Project has a total of 12,952 habitat units. @ 4.625 (authorized rate)						
	Benefits = costs Benefits described in terms of Habitat Units. Project has a total of 12,952 habitat units. @ 4.625 (current rate)						
Budget Data	Funding schedule (Budget year + 5)	1st	2nd	3rd	4th	5th	6th
	Federal funds	1,700,000	1,700,000	3,00,000	3,00,000	3,00,000	3,00,000
	Non-Federal funds	305,000	305,000	600,000	600,000	600,000	600,000
Period of Analysis and Project Life	50						
Environmental Problems	(Significant impacts) The priority for improving water quality for shellfish beds was given to the preservation of open, productive areas where imminent closure was probable. These areas present the highest probability for success of mitigation measures and the greatest cost-benefit, as opposed to seeking possible reclassification of areas presently closed. Salt marshes provide habitat for estuarine invertebrates, fish, birds, and						

Office of Management and Budget fact sheet - continued

Environmental Problems	mammals and they are nursery grounds for several types of commercial fish and shellfish fisheries. In addition, salt marsh grasses have been shown to protect shorelines from erosion as well as play roles in nutrient cycling and pollution filtration. Salt marshes within large watersheds that are in close proximity to urban areas have the potential to be a significant sink for heavy metals such as zinc, copper, and lead, preventing contamination of estuarine waters. Despite these functions and their value to the local ecology and economy, salt marshes on Cape Cod have seen extensive declines. Current estimates suggest that 36 percent of the 28,000 acres of salt marsh historically present on Cape Cod has been lost or severely degraded over the past several hundred years, resulting in a loss of the functions and values that these wetlands provide. Marshes that were not completely filled were often altered by construction of roadways and rail beds, ditching for mosquito control, and diking for farmland. Tidal restriction has had a profound effect on Cape Cod salt marshes. Undersized, poorly functioning culverts have caused many salt marshes to experience changes in the vegetative structure, such as a change to a freshwater or brackish wetland type. Many of Cape Cod's restricted marshes have experienced a rapid expansion of phragmites, an invasive species. Changes in salt marsh vegetation are another result of tidal restriction. Many Cape Cod marshes have experienced changes in vegetative communities due to the ponding of freshwater on the marsh surface, often as a result of inadequate freshwater drainage from the marsh. Vegetation changes often result in unvegetated tidal flats, decreased water quality, and less frequent wildlife usage. Loss of vegetation may also expose deteriorating marsh soils to increased erosion and subsidence, resulting in persistent open water. Tidal restriction has decreased the water quality of the marshes themselves and of Cape Cod's estuaries. Poor tidal exchange, combined with excessive nutrient inputs, results in eutrophic conditions within many of Cape Cod's coastal bays and fringing marshes. Extensive stands of phragmites slow water movement and contribute large amounts of organic matter to water bodies, which can contribute to decreased dissolved oxygen concentrations. Cape Cod's tidally restricted salt marshes experience less wildlife usage than unrestricted marshes. Undersized and poorly functioning culverts limit fish passage into salt marshes. As mentioned earlier, tidal restriction promotes the expansion of phragmites stands. Marshes dominated by phragmites have lower habitat quality than salt marshes for a variety of wildlife. Monotypic stands of phragmites provide little foraging habitat for birds. The tidal and inland waters of Cape Cod serve as important habitat for

Office of Management and Budget fact sheet - continued

Environmental Problems	anadromous fish, which spend most of their adult lives in salt water and migrate to freshwater streams, rivers, and lakes to reproduce. Anadromous juvenile fish spend varying lengths of time in freshwater before migrating to saltwater, where they mature. Anadromous fish species within Cape Cod include American shad, rainbow smelt, tomcod, sea run trout, sea lamprey, and river herring, which comprises two closely related members of the family Clupeidae: alewife and blueback herring . River herring have been the focus of restoration efforts on Cape Cod, where there are 41 herring spawning ponds, covering about 5,400 acres. Overfishing, pollution, water diversion, and habitat degradation have reduced populations of anadromous fish in Massachusetts. Blockage of migration routes by dams and other structures across rivers and streams has eliminated access to large areas of potential spawning habitat. Barriers to migration (e.g., dams and poorly aligned culverts or bridges with an abrupt change in the stream bed elevation) prevent or restrict the movement of anadromous species upstream and downstream and cause some migratory populations to become landlocked. Fishways, also referred to as fish ladders or fish passes, are structures placed on or around man-made barriers to assist the natural migration of anadromous fish. Most fishways enable fish to pass around the barrier by swimming and leaping up a series of low steps into the waters on the other side of the barrier. Over time, however, many of the existing fishways on Cape Cod have deteriorated or failed, eliminating or reducing the ability of the fish to move upstream to spawning or nursery habitats. There are 93 existing fish passage structures and approximately 43 active river herring runs in Barnstable County.
Other Significant or Controversial Issues	(Brief summary) There are no known areas of controversy. The state, county, and towns all support the Project, and no issues or comments of opposition were received on the Draft Plan-EIS.
Evidence of Unusual Congressional or Local Interest	NRCS published a notice of intent to prepare the Plan-EIS in the Federal Register on June 24, 2005, and it published a notice of availability of the Draft Plan-EIS for public review in the Federal Register on August 1, 2006. NRCS sent a news release on the Draft Plan-EIS to 31 local media outlets on August 4, 2006, and published a legal notice of availability in the Cape Cod Times on August 9, 2006. The U.S. Environmental Protection Agency published a notice of availability of the Draft Plan-EIS in the Federal Register on August 11, 2006. This EPA notice started the 45-day public review period required for a Draft EIS under NEPA. NRCS distributed 68 copies of the document to individuals, nongovernmental environmental organizations, government agencies, political representatives, and the Wampanoag Tribe of Gay Head Aquinnah. NRCS also placed copies of the Draft Plan-EIS in the public libraries in each of the 15 towns on Cape Cod, and it made a copy available for downloading on its web site.

Office of Management and Budget fact sheet - continued

Evidence of Unusual Congressional or Local Interest	Comments on the Draft Plan-EIS were received from two State Representatives, 16 governmental agencies, and one nongovernmental organization. All local and state commenters supported the Project. No comments of opposition to the project were received during the 45-day review period, and no new issues of concern were raised.
Compliance	Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resources projects? **X** Yes No

[Federal Register: December 21, 2006 (Volume 71, Number 245)]
[Notices]
[Page 76633-76634]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr21de06-24]

DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

Cape Cod Water Resources Restoration Project, Barnstable County, MA; Record of Decision

1. Purpose--As State conservationist for the Natural Resources Conservation Service (NRCS), I am the Responsible Federal Official (RFO) for all NRCS projects in Massachusetts.

The recommended plan for the Cape Cod Watershed involves works of improvement to be installed under authorities administered by NRCS. This areawide planning Project \1\ includes 26 salt marsh restoration projects, 24 fish passage remediation projects, and 26 stormwater remediation projects.

\1\ We use ``Project'' in this ROD and the Plan-EIS to refer to the areawide Cape Cod Water Resources Restoration Project and ``project'' to refer to individual site restoration or remediation activities; the Project comprises 76 projects.

The Cape Cod Watershed plan was prepared under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666, as amended) by the Cape Cod Conservation District, Barnstable County Commissioners, the 15 towns of Barnstable County, and the Massachusetts Executive Office of Environmental Affairs. The scoping meeting, held during May 2005, established the NRCS, U.S. Department of Agriculture, as lead agency.

2. Measures taken to comply with national environmental policies--The Cape Cod Water Resources Restoration Project has been planned in accordance with existing Federal legislation concerned with the preservation of environmental values. The following actions were taken to ensure that the Cape Cod Watershed plan is consistent with national goals and policies.

Existing data and information pertaining to the Project's probable environmental consequences were obtained with assistance from other scientists and engineers. Documentary information as well as the views of interested Federal, State, and local agencies and concerned individuals and organizations having special knowledge of, competence over, or interest in the Project's environmental impacts were sought. This process continued until it was felt that all the information necessary for a comprehensive, reliable assessment had been gathered.

A complete picture of the Project's current and probable future environmental setting was assembled to determine the proposed Project's impact and identify unavoidable adverse environmental impacts that might be produced. During these phases of evaluation, it became apparent that there are legitimate conflicts of scientific theory and conclusions leading to differing views of the Project's environmental impact. In such cases, after consulting with persons qualified in the appropriate disciplines, those theories and conclusions appearing to be the most reasonable, and having scientific acceptance were adopted.

The consequences of a full range of reasonable and viable alternatives to specific improvements were considered, studied, and analyzed. In reviewing these alternatives, all courses of action that could reasonably accomplish the Project purposes were considered. Attempts were made to identify the economic, social, and environmental values affected by each alternative. Both structural and nonstructural alternatives were considered.

The alternatives considered reasonable alternatives to accomplish the project's objectives were (1) Water Resources Restoration Alternative, (2) No Action Alternative.

3. Conclusions--The following conclusions were reached after carefully reviewing the proposed Cape Cod Water Resources Restoration Project in light of all national goals and policies, particularly those expressed in the National Environmental Policy Act, and after evaluating the overall merit of possible alternatives to the Project:

a. The Cape Cod Water Resources Restoration Project will employ reasonable and practicable means that are consistent with the National Environmental Policy Act while permitting the application of other national policies and interests. These means include, but are not limited to, a Project planned and designed to minimize adverse effects on the natural environment while accomplishing an authorized Project purpose. Project features designed to preserve existing environmental values for future generations include: (1) Replacement of inadequately sized or failed culverts with larger culverts or bridges to restore tidal flushing to salt marshes; (2) reconstruction of failed fish passageways, replacement of collapsed or improperly aligned curves, or removing restrictions at bridges to provide full access to upstream spawning and nursery areas for anadromous fish; and (3) installation of catch basins and infiltration systems or other cost-effective

effective means of meeting national goals and is consistent in serving the public interest by including provisions to protect and enhance the environment. I also conclude that the recommended plan is the environmentally preferable plan.

4. Recommendations--Having concluded that the proposed Cape Cod Water Resources Restoration Project uses all practicable means, consistent with other essential considerations of the national policy, to meet the goals established in the National Environmental Policy Act, that the Project will thus serve the overall public interest, that the final EIS has been prepared, reviewed, and accepted in accordance with the provisions of the National Environmental Policy Act as implemented by Departmental regulations for the preparation of environmental impact statements, and that the Project meets the needs of the Project's sponsoring local organizations, I propose to implement the Cape Cod Water Resources Restoration Project.

Christine Clarke,
State Conservationist, Natural Resources Conservation Service, U.S. Department of Agriculture.
[FR Doc. E6-21847 Filed 12-20-06; 8:45 am]

BILLING CODE 3410-16-P

WATERSHED AGREEMENT

Between the

Cape Cod Conservation District

and

Barnstable County Commissioners

and

The Towns of Barnstable County (See Attachment A)

and

Massachusetts Executive Office of Environmental Affairs
(Hereinafter referred to as the Sponsors)

and the

Natural Resources Conservation Service
United States Department of Agriculture
(Hereinafter referred to as NRCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the sponsors for assistance in preparing a plan for works of improvement for the Cape Cod Water Resources Restoration Project, Massachusetts (including all land in Barnstable County, except the Massachusetts Military Reservation), under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 10001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the sponsors and NRCS, a Watershed Project Plan and Areawide Environmental Impact Statement, for works of improvement for the Cape Cod Water Resources Restoration Project, State of Massachusetts, hereinafter referred to as the watershed plan- Environmental Impact Statement, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. Cost-sharing rate for the establishment of enduring land treatment practices is up to 75 percent (commensurate with other programs at time of signing project agreement) of the actual cost of installing the enduring practices in the selected plan for the evaluation unit. The estimated total financial assistance cost for enduring practices is $13,283,000.

2. The NRCS will assist the sponsors in providing technical assistance to landowners or operators to plan and install land treatment practices shown in the plan. Percentages of technical assistance costs to be borne by the sponsors and NRCS are as follows:

Works of improvement	Sponsors (Percent)	NRCS (Percent)	Estimated technical assistance costs (Dollars)
Land treatment practices	0	100	$5,172,000
Adaptive Management	0	100	$1,635,000

3. The sponsors will obtain project agreements for not less than 5 percent of the priority sites identified in the problem area to carry out the planned land treatment measures. These project agreements will be obtained before construction begins on the first priority site.

4. The sponsors will obtain agreements with landowners or operators to operate and maintain the land treatment practices for their design life for the protection and improvement of the watershed.

5. The sponsors and NRCS will each bear the cost of project administration that each incurs, estimated to be $425,000 and $3,854,000 respectively.

6. The sponsors will acquire, or will ensure that land users or operators have acquired, with other than Public Law 83-566 funds, such real property as will be needed in connection with the works of improvement. ($0.)

7. The sponsors hereby agree that they will comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C..4601 et. seq.. as implemented by 7 CFR Part 21) when acquiring real property interests for this federally assisted project. If the sponsor is legally unable to comply with the real property acquisition requirements of the Act, it agrees that, before any Federal financial assistance is furnished, it will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the sponsor agrees that it will reimburse owners for necessary expenses as specified in 7 CFR 21.1006(c) and 21.1007.

   The cost of relocation payments in connection with the displacements under the Uniform Act will be shared by the sponsors and NRCS as follows:

	Sponsor	NRCS	Estimated relocation payment costs
	Percent	Percent	Dollars[1]
Relocation Payments	100	0	0

8. The sponsors will acquire, or ensure that the landowners or water users have acquired, such rights pursuant to State law as may be needed for the installation and operation of the works of improvement.

9. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto, will be the actual costs incurred in the installation of works of improvement or an approved variation.

10. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS and sponsors in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

11. A separate agreement will be entered into between NRCS and sponsors before either party initiate's work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

1 Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of the relation assistance and payments will be cost shared in accordance with the percentages shown.

12. This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may deauthorize or terminate funding at any time it determines that the sponsor has failed to comply with the conditions of this agreement. In this case, NRCS shall promptly notify the sponsor in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the sponsor or recoveries by NRCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the sponsor(s) having specific responsibilities for the measure involved.

13. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

14. The program conducted will be in compliance with the nondiscrimination provisions as contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statues, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and in accordance with regulations of the Secretary of Agriculture (7 CFR 15, Subparts A & B), which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex religion, marital status, or handicap be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.

15. **Certification Regarding Drug-Free Workplace Requirements (7CFR 3017. Subpart F.)**

By signing this watershed agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

Conviction means a finding of (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statues;

Criminal drug statute means a Federal or non - Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of sub-recipients or subcontractors in covered workplaces).

Certification:

A. The sponsors certify that they will or will continue to provide a drug-free workplace by:

1. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

2. Establishing an ongoing drug-free awareness program to inform employees about -
   a. The danger of drug abuse in the workplace;
   b. The grantee's policy of maintaining a drug-free workplace;
   c. Any available drug counseling, rehabilitation, and employee assistance programs; and
   d. The penalties that may be imposed upon for drug abuse violations occurring in the workplace

3. Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph 1;

4. Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will -
   a. Abide by the terms of the statement; and
   b. Notify the employer in writing of his or her conviction for a violation of a criminal drug statue occurring in the workplace no later than five calendar days after such conviction;

5. Notifying the NRCS in writing, within ten calendar days after receiving notice under paragraph 4b from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

6. Taking one of the following actions, within 30 calendar days of receiving notice under paragraph 4b, with respect to any employee who is so convicted -
   a. Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
   b. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

7. Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs 1, 2, 3, 4, 5, and 6

B. The sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.

C. Agencies shall keep the original of all disclosure reports in the official files of the agency.

16. **Certification Regarding Lobbying (7 CFR 3018) (applicable if this agreement exceeds $100,000).**

1. The sponsors certify to the best of their knowledge and belief, that:
   a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the

awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form – LLL, "Disclosure Form to Report Lobbying" in accordance with its instructions.

c. The sponsors shall require that the language of this certification be included in the award documents for all sub-awards at all tiers including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, US Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

17. **Certification Regarding Debarment, suspension, and Other Responsibility Matters - Primary Covered Transactions (7 CFR 3017).**

1. The sponsors certify to the best of their knowledge and belief, that they and their principals:
   a. Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency.
   b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes, or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and,
d. Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

2. Where the primary sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

18. Signatures

Witness my hand and seal on behalf of the Town of Barnstable, at Barnstable (Hyannis) this 16th day of February, 2007.

Town of Barnstable

By, John C. Klimm, Town Manager

Town of Bourne

The signing of this plan was authorized by a resolution of the governing body of the Town of Bourne adopted at a meeting held on January 9, 2007
[Date]

By: Linda M. Zuern
Title: Chair, Selectboard

Date: January 9, 2007

Secretary: Jamie Slowecki Address: 24 Perry Ave.

Date: Jan 9, 2007 Zip Code: 02532

Town of Brewster

The signing of this plan was authorized by a resolution of the governing body of the Town of Brewster adopted at a meeting held on December 4, 2006.
[Date]

By: Dyanne F. Cooney
Title: Chair, Selectboard

Date: December 4, 2006

Secretary: Jana R Ehrhart Address: 2198 Main St

Date: December 4, 2006 Zip Code: 02631

Town of Chatham

The signing of this plan was authorized by a resolution of the governing body of the Town of Chatham adopted at a meeting held on 1/9/07 [Date].

By: _____

Title: Chair, Selectboard

Date: 1/12/07

Secretary: LINDA SMULLIGAN Address: 549 MAIN ST, CHATHAM, MA 02633

Date: 1/12/07 Zip Code: 02633

Town of Dennis

The signing of this plan was authorized by a resolution of the governing body of the Town of Dennis adopted at a meeting held on October 10, 2006.
[Date]

By: _____
Title: Chair, Selectboard

Date: 01-02-07

Secretary: _____ Address: Town of Dennis
P.O. Box 2060

Date: 01-02-07 Zip Code: South Dennis, MA 02660-2060

Town of Eastham

The signing of this plan was authorized by a resolution of the governing body of the Town of Eastham adopted at a meeting held on 12/4/06 [Date].

By: Linda S. Burt
Title: Chair, Selectboard

Date: 12/18/06

Secretary: [illegible]-Lundborn

Date: 12/18/06

Address: 2500 State Highway

Zip Code: Eastham, MA 02642

Town of Falmouth

The signing of this plan was authorized by a resolution of the governing body of the Town of Falmouth adopted at a meeting held on _____.
[Date]

By: _____
Title: Chair, Selectboard

Date: 12/19/06

Secretary: _____ Address: _____

Date: 12/19/06 Zip Code: _____

Town of Harwich

The signing of this plan was authorized by a resolution of the governing body of the Town of Harwich adopted at a meeting held on 1-16-07 [Date].

By: Richard Waystack
Title: Chair, Selectboard

Date: 1-16-07

Secretary: S. Lombard Address: 732 Main St.

Date: 1-16-07 Zip Code: Harwich, MA 02645

Town of Mashpee

The signing of this plan was authorized by a resolution of the governing body of the Town of Mashpee adopted at a meeting held on December 11, 2006.
[Date]

By: _____
Title: Chair, Selectboard

Date: December 11, 2006

Secretary: John J. Cahalane Address: 16 GREAT NECK ROAD NORTH

Date: December 11, 2006 Zip Code: 02649

Town of Orleans

The signing of this plan was authorized by a resolution of the governing body of the Town of Orleans adopted at a meeting held on December 20, 2006. The resolution also included a stipulation that until a Town Meeting vote was obtained in compliance with the Town Charter, the Town would not bound by the Agreement.

By: John F. Kelly
Title: Town Administrator

Date: January 23, 2007

Secretary: Kenneth Palmer

Address: 19 School Road

Date: January 23, 2007

Zip Code: 02653

Town of Provincetown

The signing of this plan was authorized by a resolution of the governing body of the Town of Provincetown adopted at a meeting held on January 8, 2007.
[Date]

By: _____ Dr. Cheryl L. Andrews
Title: Chair, Selectboard Chairman, Board of Selectmen

Date: January 8, 2007

Secretary: Vernon G Porter Address: 260 Commercial St Provincetown Ma 02657

Date: January 9 2007 Zip Code: _____

Town of Sandwich

The signing of this plan was authorized by a resolution of the governing body of the Town of Sandwich adopted at a meeting held on January 4, 2007.
[Date]

By: _____
Title: Chair, Selectboard

Date: January 4, 2007

Secretary: Kathleen Coggeshall

Address: 130 Main Street, Sandwich, MA

Date: January 4, 2007

Zip Code: 02563

Town of Truro

The signing of this plan was authorized by a resolution of the governing body of the Town of Truro adopted at a meeting held on November 28, 2007.
[Date]

By: Alfred Gaechter
Title: Chair, Selectboard

Date: 12/12/06

Secretary: Julia L. Burton

Date: 12/13/06

Address: P.O. Box 2030
24 Town Hall Rd.
Truro, MA

Zip Code: 02666

Town of Wellfleet

The signing of this plan was authorized by a resolution of the governing body of the Town of Wellfleet adopted at a meeting held on 11/28/06.
[Date]

By: _____
Title: Chair, Selectboard

Date: 12/4/06

Secretary: Dawn E. Luckman Address: 300 Main St

Date: 12/4/06 Zip Code: 02667

Town of Yarmouth

The signing of this plan was authorized by a resolution of the governing body of the Town of Yarmouth adopted at a meeting held on December 5, 2006.
[Date]

By: Jeffrey K. Gaben

Title: Chair, Selectboard

Date: December 6, 2006

Secretary: Aubrey Groskopf

Address: Yarmouth Town Hall
1146 Route 28

Date: December 6, 2006

Zip Code: South Yarmouth, Ma. 02664

Barnstable County Commissioners

The signing of this plan was authorized by a resolution of the governing body of the Barnstable County Commissioners adopted at a meeting held on 12/20/06.
[Date]

By: _____
Title: Chairman

Date: 12/20/06

Address: _____

_____

Cape Cod Conservation District

The signing of this plan was authorized by a resolution of the governing body of the Cape Cod Conservation District adopted at a meeting held on

7 Dec 2006.
[Date]

By: Lee Evans

Title: District Chairman

Date: 12 Dec 2006

Address: Box 678

Barnstable MA 02630

Massachusetts Executive Office of Environmental Affairs

By: _____
Ian A. Bowles, Secretary

Date: March 26, 2007

Address: 100 Cambridge, 9th Floor

Boston, MA 02114

Natural Resources Conservation Service
United States Department of Agriculture

Approved by:

_____
CHRISTINE CLARKE, State Conservationist

Date: 3/3/09

Address: 451 West St.

Amherst, MA 01002

The Towns of Barnstable County

Barnstable

Bourne

Brewster

Chatham

Dennis

Eastham

Falmouth

Harwich

Mashpee

Orleans

Provincetown

Sandwich

Truro

Wellfleet

Yarmouth

Final Watershed Plan and Areawide Environmental Impact Statement

for the

Cape Cod Water Resources Restoration Project

Barnstable County, Massachusetts

November 2006

Prepared By:
U.S. Department of Agriculture,
Natural Resources Conservation Service

Sponsoring Local Organizations:
Cape Cod Conservation District
Barnstable County Commissioners
15 Towns of Barnstable County
Massachusetts Executive Office of Environmental Affairs

Technical Assistance By:
EA Engineering, Science, and Technology

Watershed Plan and Areawide Environmental Impact Statement for the Cape Cod Water Resources Restoration Project

Prepared by: United States Department of Agriculture
Natural Resources Conservation Service

Sponsors: Cape Cod Conservation District
Barnstable County Commissioners
15 Towns of Barnstable County
Massachusetts Executive Office of Environmental Affairs

Project Location: Barnstable County, Massachusetts

For More Information: Richard J. DeVergilio
Acting State Conservationist
USDA-NRCS
451 West Street
Amherst, MA 01002
413-253-4351

Plan Designation: Final

Comment Period: Written comments may be received on or before 30 days after the Environmental Protection Agency (EPA) publishes the notice of availability for the Final Plan-EIS in the Federal Register. Comments can be sent to:

Richard J. DeVergilio, Acting State Conservationist, USDA-NRCS, 451 West Street, Amherst, Massachusetts, 01002, c/o Carl Gustafson.

Abstract:
The purposes of the Cape Cod Water Resources Restoration Project are watershed protection and fish and wildlife development. The Sponsors' objectives are to (1) improve water quality for shellfish beds, (2) restore degraded salt marshes, and (3) restore anadromous fish passages. Alternatives under consideration to reach these objectives include, but are not limited to:

Objective 1: Constructed wetlands, infiltration basins or trenches, dry wells, and sand filters.
Objective 2: Enlarging existing culverts to restore marsh hydrology to pre-restriction conditions.
Objective 3: Water level control structures, fish ladders, and obstruction removals.

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Watershed Plan—Areawide Environmental Impact Statement for Cape Cod Water Resources Restoration Project

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Chapter 1
PROJECT SUMMARY

Project Name: Cape Cod Water Resources Restoration Project

County: Barnstable State: Massachusetts

Sponsors: Cape Cod Conservation District
Barnstable County Commissioners
15 Towns of Barnstable County
Massachusetts Executive Office of Environmental Affairs

Description of Recommended Plan:

The action of this plan addresses environmental degradation of water quality and fish and wildlife habitat. These actions include the following activities:

- Altering stream crossings to improve tidal flushing at locations where transportation infrastructure (roads, bridges, culverts, railroad tracks, etc.) has reduced the size of tidal channels and affected upstream salt marsh hydrology;
- Repairing or otherwise upgrading anadromous fish passages to restore the fish runs to their original capacity;
- Treating the first flush of stormwater runoff to improve water quality in shellfishing areas.

The recommended plan includes 26 priority salt marsh restoration projects, 24 priority fish passage obstruction remediation projects, and 26 priority stormwater remediation projects. The estimated cost of the Cape Cod Project is $30 million, of which $24 million would be Public Law 83-566 funds, and the estimated construction period for all individual projects is ten years.

As each individual project site is proposed for implementation by a local sponsor, it will be evaluated in more detail to determine if the design assumed for this planning-level study is the most feasible and effective. Other feasible and effective alternative designs will be considered. The impacts and benefits of each project will be evaluated in more detail in an Environmental Evaluation tiered to this EIS.

Resource Information:

- Size of watershed 243,740 acres[1/]
- Land use

	Acres	% of Watershed
Cropland	1,951	0.8
Forest	78,557	32.2
Developed land	102,144	42
Grassland	805	0.3
Other (wetlands, open land, etc.)	60,283	24.7
Massachusetts Military Reservation	20,248[1/]	—

1/ Massachusetts Military Reservation not included in Project

Land ownership – Private 75 % State/Town 13% Federal 12%

Number of farms 285* Average farm size acres 21*
**NASS 2002 Ag Census – no aquaculture*

Prime and important farmland acres 22,456

Number of minority farmers 15

Number of female farmers 57

Number of limited resource farmers 40

- Beneficiary Profile

Characteristic	Barnstable County	Massachusetts
Median Household Income[1/]	$45,933	$50,502
Median House Value[2/]	$178,000	$182,800
Median Age[3/]	44.6	36.5
Percent of population age 65 and over[4/].	23%	14%

[1/] P 53. Median Household Income in 1999 (DOLLARS)[1]. US Census 2000 Summary File 3 (SF3)-Sample Data.

[2/] H85. Median Value in 1999 (DOLLARS) for all Owner Occupied Housing Units [1]. US Census 2000 Summary File 3 (SF3)-Sample Data.

[3/] Barnstable county: http://www.city-data.com/county/Barnstable_County-MA.html; 2005 American Community Survey Data Profile Highlights: Massachusetts. http://factfinder.census.gov.

[4/] P8. Sex by Age [79]. US Census 2000 Summary File 3 (SF3)-Sample Data.

- Flood plains

Land Use	Flood plain (acres)
Crop	98
Pasture	94
Forest	47,459
Wetland	6,220
Open	4,437
Other	50,725

- Highly erodible cropland

Highly erodible cropland	380 acres
Potentially highly erodible cropland	789 acres

- Wetlands – acres by class (total 38,735)

Wetland Type[1/]	Code	Acres
Coastal bank bluff or sea cliff	BA	443
Barrier beach system	BB	1,060
	BB-BE	700
	BB-D	2,840
	BB-DM	60
	BB-M	18
	BB-OW	89
	BB-SM	18
	BB-SS	88
	BB-WS1	11
	BB-WS2	8
	BB-WS3	2
Coastal beach	BE	652
Bog	BG	114
Cranberry bog	CB	1,176
Coastal Dune	D	612
Deep marsh	DM	342
Shallow marsh, meadow, or fen	M	1,436
Open water	OW	12,030
Rocky intertidal shore	RS	14
Salt marsh	SM	10,117
Shrub swamp	SS	3,182
Tidal flat	TF	401
Wooded swamp, deciduous	WS1	2,125
Wooded swamp, coniferous	WS2	489
Wooded swamp, mixed trees	WS3	708

[1/] Massachusetts Department of the Environment Wetlands Conservancy Program

- Endangered species: The Massachusetts Division of Fisheries and Wildlife identifies 69 animal and 63 plant state and/or federally listed threatened or endangered species in Barnstable County. Section 7 consultation has been completed with the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service. Five federally listed whale species and four listed turtle species occur seasonally in the coastal waters off of Cape Cod. The National Oceanic and Atmospheric Administration concurs with NRCS's determination that the Project will not affect these federally listed marine species. The U.S. Fish and Wildlife Service states that no federally listed species or critical habitats are known to occur in the Project area. All individual projects brought forward for funding and implementation will be evaluated for their potential effect on threatened or endangered species. No direct effects are expected; construction will be scheduled to avoid conflicts with critical life stages, if applicable at any specific site. Consultation with the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and Massachusetts Division of Fisheries and Wildlife will be completed for each project as it is proposed for implementation.

- Cultural Resources: All project sites will be reviewed for historical and archaeological resources as they are proposed and considered for assistance. NRCS will review all project sites for their

potential to affect cultural resources. NRCS will perform file research, reconnaissance surveys, and where disturbance is expected outside the disturbed footprint, will perform phase 1 surveys. Consultation with both the State Historic Preservation Office and Wampanoag Tribe of Gay Head (Aquinnah) Historic Preservation Office will be completed for each project as it is proposed for implementation.

- Problem identification:
    - Degraded salt marshes—the Cape Cod Commission and the Buzzards Bay Project National Estuary Program identified over 182 sites where salt marshes have been altered by human activity
    - Restricted anadromous fish runs—the Massachusetts Division of Marine Fisheries (DMF) identified 93 fish passage obstructions on Cape Cod
    - Declining water quality of shellfish areas—DMF and town officials identified over 160 stormwater discharge points into shellfishing areas

- Alternatives considered:
    - Proposed Action/Recommended Plan
    - No action alternative

- Project purposes:
    - Restore degraded salt marshes
    - Restore anadromous fish passages
    - Improve water quality for shellfish beds

- Principal Project measures:
    - Enlargement of existing road culverts
    - Replacement or renovation of fish ladders
    - Construction of stormwater runoff treatment measures

- Project Benefits:
    - 26 salt marsh restoration projects to restore 1,500 acres of degraded salt marsh
    - 24 fish passage obstruction remediation projects to restore/improve access to 4,200 acres of spawning habitat for anadromous fish
    - 26 stormwater remediation projects to improve 7,300 acres of water quality for shellfish beds

- Project costs:

Works of improvement	PL 83-566 funds ($)	Other funds ($)	Total ($)
Enlargement or other alteration of culverts, bridges, etc. to improve tidal flushing	11,340,000	3,200,000	14,540,000
Replacement or renovation of fish ladders	4,350,000	910,000	5,260,000
Construction of facilities to treat stormwater runoff and reduce or eliminate bacterial contamination of shellfish beds	6,390,000	1,800,000	8,190,000
Adaptive management	1,880,000	80,000	1,960,000
Total	23,960,000	5,990,000	29,950,000

- Other impacts: Construction of each project could cause short-term, minor, adverse impacts to air, noise, vegetation, wildlife, and soils at the construction site; water quality at the construction site; and local traffic. There would be short-term, minor, beneficial impacts to the local economy from creation of construction jobs. Construction periods would be short, generally one or two weeks to one or two months. The Cape Cod Project complies with the General Conformity Rule for federal projects in nonattainment air quality regions (ozone on Cape Cod). Long-term beneficial impacts of the projects include improved water quality, improved anadromous fish runs, and increased recreational and commercial shellfish harvesting. There are no long-term negative impacts identified at this time. Consistent with the purpose of the salt marsh restoration projects, some freshwater wetlands and fringe uplands may be converted to salt marsh after tidal flushing is enhanced.

- Environmental values changed or lost:

  - Restoration of 1,500 acres of degraded salt marsh
  - Restoration/improvement of access to 4,200 acres of spawning, nursery, and juvenile habitat for anadromous fish
  - Improvement of water quality over 7,300 acres of shellfish beds

- Major conclusions: This Project will have long-term, beneficial effects on restoring the water resources and ecosystems along the coastal and inland areas of Cape Cod. The Project will have no significant detrimental effects on the natural resources or the human environment.

- Areas of controversy: There are no known areas of controversy. The state, county, and towns all support the Project, and no issues or comments of opposition were received on the Draft Plan-EIS.

- Issues to be resolved: There are no known issues to be resolved on an areawide planning basis. An Environmental Evaluation will be conducted for each site when funding becomes available to determine is there are any site-specific issues. If issues are identified, they will be resolved or the site will be removed from the Project.

Chapter 2
INTRODUCTION

The Watershed Plan and Areawide Environmental Impact Statement (EIS) for the Cape Cod Water Resources Restoration Project are combined into this single document. The purposes of the Project[1/] are to restore degraded salt marshes, restore anadromous fish passages, and improve water quality for shellfishing areas. Specifically, sponsors wish to:

- Improve tidal flushing in salt marshes where man-made obstructions (i.e., road culverts) have restricted tidal flow. This will help restore native plant and animal communities in salt marshes, and improve biotic integrity.
- Restore fish ladders and other fish passages that have deteriorated. This will allow greater numbers of anadromous fish (which spend most of their adult lives in salt water and migrate to freshwater streams, rivers, and lakes to reproduce; for example, alewife, blueback herring) to gain access to spawning areas, and support greater populations of other species (for example, striped bass, bluefish, weakfish, largemouth bass, chain pickerel) that depend on them for food.
- Maintain and improve water quality affecting shellfish beds by treating stormwater runoff. This will help ensure that shellfish beds which are threatened with closure remain open, and maintain or extend the current shellfishing season for beds whose use is restricted during certain times of year.

This Project is needed because human activity on Cape Cod has degraded its natural resources, including salt marshes, anadromous fish runs, and water quality over shellfish beds. The development of Cape Cod has required the construction of extensive road and railroad networks. Along the coast, culverts or bridges were needed for these networks to cross tidal marshes, and many of the openings through these structures are not large enough to allow adequate tidal flushing. When the culverts or bridges constrict flow, the tidal regime changes, which results in vegetation changes over time; what was once a thriving salt marsh can become a brackish or fresh water wetland dominated by invasive species. Together with funding from the Massachusetts Office of Coastal Zone Management (CZM), the Cape Cod Commission and the Buzzards Bay Project National Estuary Program identified over 182 sites where salt marshes have been altered by human activity. Through this Project we expect to improve tidal flushing at 26 sites. Current design guidelines prevent or minimize road or railroad construction from causing the same hydrological restrictions that occurred in the past.

Human activity on Cape Cod has also resulted in damming or diverting streams, causing anadromous fish to lose access to spawning grounds. In addition, water flow may have been altered by cranberry growers and other farmers. Fish ladders and other fish passage facilities have been built to help ensure that fish get access to spawning areas, but these structures deteriorate over time (end of design life), or they may be of obsolete design and need replacement to function properly. The Massachusetts Division of Marine Fisheries (DMF) identified 93 fish passage obstructions on Cape Cod; through this program we expect to restore 24 fish passages on Cape Cod to full function.

[1/] We use "Project" in this Plan-EIS to refer to the areawide Cape Cod Water Resources Restoration Project and "project" to refer to individual site restoration or remediation activities; the Project comprises 76 projects.

Cape Cod's economy depends on good water quality. Shellfishing, a multi-million dollar industry on the Cape, is only allowed in areas with excellent water quality. As land is developed, and more areas are paved, stormwater runoff may become contaminated with nutrients, metals, fertilizers, bacteria, etc. This runoff may carry enough fecal coliform bacteria to affect water quality in shellfishing areas, thus leading to closure of shellfishing areas, or restrictions on the periods when the beds can remain open. DMF and town officials identified over 160 stormwater discharge points into shellfishing areas. By controlling sources of runoff, separating clean water from contamination sources, and capturing and treating the most heavily contaminated runoff through a variety of measures (e.g., infiltration, constructed wetlands), this Project will help to maintain or improve water quality in up to 26 shellfish areas affecting 7,300 acres of shellfish beds. Current laws and regulations require stormwater management for all new developments, which prevents or minimizes new development from causing the same water quality impairments that occurred in the past.

The Cape Cod Conservation District, Barnstable County Commission, all 15 towns in Barnstable County, and the Executive Office of Environmental Affairs (EOEA) are the Project sponsors. They represent the local residents who requested the assistance from the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), to address the problems described above. Within EOEA are CZM and DMF, which are the lead state agencies for regulating shellfishing and anadromous fisheries. Both CZM and DMF provided technical data, information, and guidance in preparing this plan. The Cape Cod Conservation District and the Barnstable County Commission took the lead in public participation and outreach.

The plan was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 U.S.C. 1001-1008) and in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, as amended (42 U.S.C. 4321 et seq.). Responsibility for compliance with NEPA rests with NRCS as the implementing federal agency. The innovative scope of the project required NRCS to approve several adaptations of agency policies to fit the scope within the requirements of Public Law 83-566 and the agency's implementing regulations (7 CFR 622) as follows:

- Define the project area not by typical topographic watershed delineation, rather, it includes all of Barnstable County except the Massachusetts Military Reservation (Figure 2-1).
- Determine that improvements to shellfish beds would provide agricultural benefits and, therefore, NRCS could provide technical and financial assistance for installing measures on non-agricultural lands to address non-agricultural stormwater discharges to treat runoff prior to entering shellfish areas.
- Determine that NRCS could provide technical and financial assistance for installing measures to restore existing anadromous fish runs, which increase the food fish for other species for sport and commercial harvesting.
- Determine that NRCS could provide technical and financial assistance for installing measures to restore tidal flow to restricted salt marshes, which restore plant and finfish ecosystems in salt marshes.
- Determine that NRCS could assist in addressing the stormwater issues if the sponsors addressed the on-site septic system issues in areas where the pollutant source affecting shellfish beds is a combination of stormwater and on-site septic systems. Also determine that the sponsors' costs to

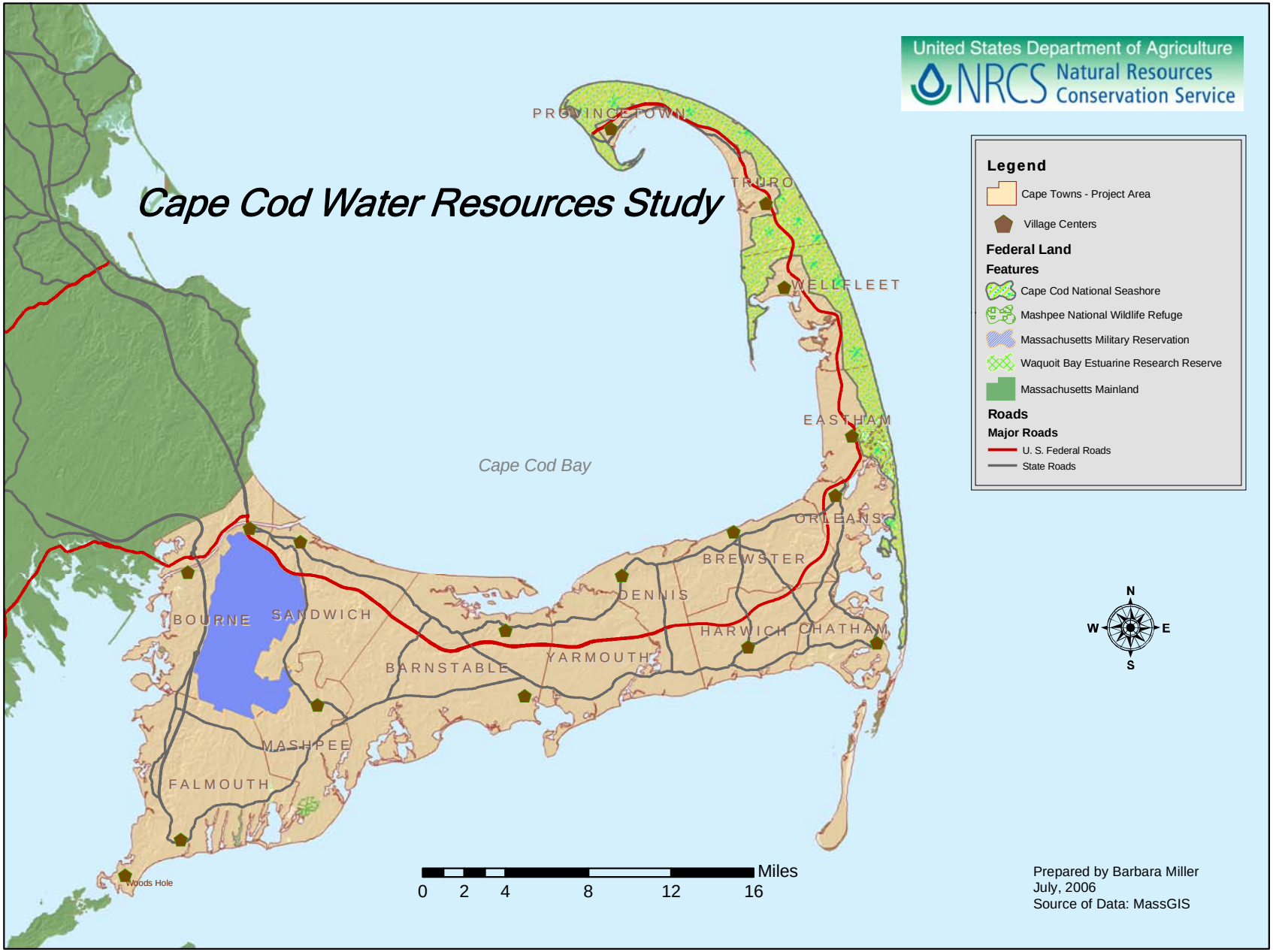

Fig. 2-1 Project location map

address the on-site septic system issues would be an acceptable in-kind contribution towards their cost share for addressing the stormwater issues.

- Concur in the use of the U.S. Army Corps of Engineers' (USACE's) methodology to determine project benefits in non-monetary terms of habitat units. This benefit is displayed in the National Ecosystem Restoration (NER) Account in lieu of the traditional National Economic Development (NED) Account. The Office of Management and Budget has accepted USACE projects justified using an NER account.
- The scope of the Cape Cod Water Resources Restoration Project falls under the purpose of Watershed Protection, conservation & proper utilization of land, land treatment. The proposed measures to address project objectives are all land treatment measures under watershed protection and can be cost shared at rates commensurate with other programs.
- The proposed measures to address project objectives will be installed by sponsoring towns or sponsoring state agency. Implementation will be through cooperative and or contribution agreements.
- Measures to restore the salt marsh ecosystems include replacing culverts with larger culverts and enlarging bridges, although associated with transportation infrastructure (roads, bridges, culverts, railroads, etc.), are eligible for PL 83-566 technical and financial assistance.

Tiering to the Plan-EIS

The Cape Cod Water Resources Restoration Project is in the planning stage. Through the process described in this Plan-EIS, and with considerable support from local and state agencies, NRCS has developed a list of 76 projects that will meet the sponsors' objectives. All of these projects have received a planning-level analysis to ensure that they appear feasible and capable of providing the habitat benefits sought through this areawide Project. When the Project is authorized and funded, the sponsors will propose specific projects to NRCS. NRCS will review each project in more detail to determine the best practice for that site and to verify that the habitat objectives will be achieved.

To satisfy the requirements of NEPA yet minimize the redundancy of evaluations, NRCS has adopted a tiered approach for implementing NEPA. The regulations of the President's Council on Environmental Quality, the primary federal agency responsible for implementing NEPA, encourage the use of tiering:

> Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review. Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement and incorporate discussions from the broader statement by reference and shall concentrate on the issues specific to the subsequent action. (40 CFR 1502.20)
>
> *Tiering* refers to the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared. Tiering is appropriate when the sequence of statements or analyses is: (a) From a program, plan, or policy environmental impact statement to a program, plan,

> or policy statement or analysis of lesser scope or to a site-specific statement or analysis… (40 CFR 1508.28)

NRCS regulations implementing NEPA (7 CFR 650) provide for the use of tiering as defined by the Council on Environmental Quality.

This Areawide EIS, then, serves as the planning-level analysis of environmental impacts and benefits from the commitment of NRCS technical and financial assistance funds and technical assistance for ecosystem restoration on Cape Cod. Discussions focus on the Cape Cod-wide environmental setting, preliminary project designs and cost estimates, and general areawide impacts. NRCS will complete an Environmental Evaluation tiered to this Plan-EIS for each specific project that is brought forward for funding. Each of these Environmental Evaluations will assess the impacts and benefits of constructing that specific project, focusing on the issues determined to be important for site-specific consideration through this Plan-EIS.

Organization of the Plan-EIS

This Plan-EIS follows the format recommended for such documents in the NRCS National Watershed Manual. NRCS developed this format to meet the water resources planning requirements of Public Law 83-566 and the environmental analysis required by NEPA. The elements of the plan are:

Section	Description
1. Summary	A brief version of the plan, suitable for use at meetings and presentations to describe the project
2. Introduction	An overview of the Cape Cod Water Resources Restoration Project and NRCS and NEPA policies pertinent to the areawide Plan-EIS.
3. Project setting	A description of those physical, social, economic conditions in the watershed that are pertinent to the project
4. Watershed problems and opportunities	A summary of the problems that need to be solved and the opportunities for enhancing the quality of life in the project area, based on public concerns and desires
5. Scope of the EIS	A summary of public concerns raised in the scoping process required by NEPA
6. Formulation and comparison of alternatives	A description of the rationale of plan formulation, from the development and comparison of alternatives to the selection of the recommended plan
7. Consultation and public participation	Documentation of the opportunities provided to the public for participating the planning process from the initial request for NRCS assistance to the preparation of the final plan

Section	Description
8. Recommended plan	A summary of the recommended plan, including descriptions of the projects selected for implementation and the purposes achieved by those projects in compliance with Public Law 83-566
9. References	A list of references used to prepare the technical descriptions of project setting and environmental effects
10. List of preparers	A list of the primary preparers of the Plan-EIS and their credentials
11. Index	A list of key terms and the sections in which they are discussed.

Chapter 3
PROJECT SETTING

For the purposes of this Watershed Plan, the Cape Cod Watershed includes all land on Cape Cod (Barnstable County) except the Massachusetts Military Reservation. No sites were identified within the boundary of the Massachusetts Military Reservation, and this area was excluded from the Project. This is a total of 243,740 acres (380.8 square miles). The Project area includes all or parts of the fifteen communities on Cape Cod.

3.1 REGIONAL IDENTITY

The Cape is a peninsula, reachable by car only by driving over one of the two bridges that cross the Cape Cod Canal. Because the Cape is geographically isolated, residents have a common identity and a strong sense of being separate from the rest of the state. People who live on the Cape recognize their interconnectedness and dependence on one Cape-wide sole source aquifer, and they are willing to work to maintain the strength and value of their common resources. The Barnstable County economy is fairly well-balanced among tourism, light industry, and retail sales, but tourism, with its associated use of natural resources, is vital to the Cape's economic success. Access to clean water, clean beaches, historic and artistic attractions and attractive town centers makes the Cape the attractive place that it is. As water quality in any one part of the Cape deteriorates, the entire region loses.

The Cape's natural environment is very similar to that of other northern Atlantic coastal sites, such as Block Island, Long Island, and coastal regions of New Jersey. It is dominated by pitch pine-jack pine woodlands; has cedar swamps, coastal salt ponds, and the world's largest known quaking bog found on a barrier beach; and is home to globally rare and endangered habitats, such as heath and sandplain grasslands and Atlantic White Cedar swamps. Development takes its toll on these rare habitats, but habitat loss is not a new phenomenon. For example, Atlantic White Cedar swamps only grow in a 100-mile-wide band along the shoreline of the Atlantic and the Gulf of Mexico. They are now globally rare. They were once abundant, but were largely destroyed, along with the rest of Cape Cod's native forests, for lumber and fuel and through the conversion of land to agriculture. The largest cedar swamp remaining on the Cape (11.9 acres) is at Marconi Station in Wellfleet.

3.2 CLIMATE

Winters on Cape Cod are cold, and summers are warm, but the ocean moderates extremes of temperature (USDA 1993). Average daily temperature varies from 29.6°F in January to 70.4°F in July, with an annual average of 49.6°F. Total annual precipitation is approximately 45 inches, and there is an average of 24 inches of snow annually. The climate is humid, and precipitation falls in roughly equal amounts throughout the year.

3.3 AIR QUALITY

Barnstable County is currently designated as a moderate nonattainment area for 8-hour ozone (U.S. EPA 2005). EPA defines nonattainment as an area that "does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant." Cape Cod is also located in the Ozone Transport Region, which consists of the mid-Atlantic and northeastern states extending from northern Virginia to Maine.

3.4 GEOLOGY

Barnstable County was formed during the last continental glacial period and the rise in sea level that followed glaciation (USDA 1993). The moving ice scraped, ground, and picked up the bedrock of southern New England, and deposited it as the glacial and postglacial sediments of Cape Cod. The rock debris, called drift, was carried south by the ice and deposited along the ice front. Later, as the sea drowned these glacial land forms, the drift along the shoreline was eroded and re-deposited as beaches and pits. Windblown sand was deposited as dunes.

Outwash plains are the most common glacial landform. Their downstream ends have all been washed away by marine erosion. The surface of the outwash plains is interrupted by kettle holes that were originally the sites of ice blocks buried by outwash deposits. In some areas these kettle holes are deep enough to expose the water table. Except for cranberry bog reservoirs formed by damming a stream, almost every pond on the Cape is a kettle hole. Water levels in these ponds rise and fall as the water table fluctuates. Some ponds have a defined outlet stream, but very few are stream-fed.

3.5 SOILS

Virtually all soils on Cape Cod (approximately 94 percent) are deep, excessively drained or well-drained sands formed primarily in outwash plains (USDA 1993). In these areas the seasonal high water table is generally greater than six feet below the surface. Low-lying areas of fresh-water wetlands and tidal marshes make up about 6 percent of the land on the Cape.

Soils defined as prime and important farmland occupy 22,456 acres on Cape Cod. Highly erodible cropland occupies 380 acres and potentially highly erodible cropland 789 acres.

3.6 GROUNDWATER

Cape Cod derives its water supply from a sole source aquifer that extends as deep as 400 feet below the ground surface (Cape Cod Commission 1999). The U.S. Environmental Protection Agency (EPA) designated this aquifer as a sole source aquifer, which means that it supplies 50 percent of the drinking water consumed in Cape Cod and has limited federal protection. Any activities that have the potential to contaminate the aquifer are subject to EPA review. Current threats to Cape Cod's groundwater include poorly functioning septic tanks, agricultural runoff, and road runoff (Cape Cod Commission 1999). Groundwater on Cape Cod discharges directly to coastal marshes, bays, and estuaries; excessive nutrients

and bacteria from poorly functioning septic systems, for example, can affect water quality in those receiving waters.

3.7 SURFACE WATERS

Watershed/Hydrology

Cape Cod is located in the Atlantic Coast Pine Barrens ecoregion. It is surrounded by Cape Cod Bay, Buzzards Bay, Nantucket Sound, and the Atlantic Ocean. Surface waters on Cape Cod include small streams, ponds, salt marshes, freshwater marshes, and bogs. Large rivers do not occur on the Cape because watersheds are small, owing to the peninsular landform and highly permeable sandy soils. Cape Cod has 109 miles of stream and nearly 1,000 freshwater ponds, many of which are used for agricultural irrigation and recreation. These ponds, which cumulatively cover nearly 11,000 acres, range in size from less than an acre to 735 acres, with the 21 biggest ponds having nearly half of the total Cape-wide pond acreage (Cape Cod Commission 2006). Floodplains occupy 109,000 acres on Cape Cod.

For the purposes of this Plan-EIS, the Cape Cod Watershed is defined as the land area of Cape Cod except for the Massachusetts Military Reservation. The Cape Cod Watershed, therefore, includes many smaller hydrologic watersheds draining to the tidal waters around the Cape.

Water Use Classification

The state of Massachusetts categorizes all waterbodies under a designated use classification system, which, as a minimum, protects all waters for recreation; aesthetic value; and fish, shellfish, and wildlife protection and propagation. Additional protections are provided by specific use classifications. Designated uses in Cape Cod waters are:

Class A	Public water supply Outstanding resource water	Long Pond, including tributaries and outlet stream
Class B	Public water supply, agricultural irrigation, and industrial cooling and process	All other freshwaters
Class SA	Shellfish harvesting without depuration	Coastal and marine waters—open shellfish areas
Class SB	Shellfish harvesting with depuration	Coastal and marine waters—restricted shellfish areas

Important to the water quality assessment of shellfish areas are the Massachusetts water quality standard for fecal coliform bacteria, which is specific to each designated use class (CMR 2004):

Class A	Fecal coliform bacteria shall not exceed an arithmetic mean of 20 organisms/100 mL in any representative set of samples, nor shall 10 percent of the samples exceed 100 organisms/100 mL.
Class B, Class SA, Class SB (waters not designated for shellfishing)	Fecal coliform bacteria shall not exceed a geometric mean of 200 organisms/100 mL in any representative set of samples, nor shall 10 percent of the samples exceed 400 organisms/100 mL.
Class SA (waters approved for open shellfishing)	Fecal coliform bacteria shall not exceed a geometric mean of 14 organisms/100 mL in any representative set of samples, nor shall 10 percent of the samples exceed 43 organisms/100 mL.
Class SB (waters approved for open shellfishing with depuration)	Fecal coliform bacteria shall not exceed a geometric mean of 88 organisms/100 mL in any representative set of samples, nor shall 10 percent of the samples exceed 260 organisms/100 mL.

In 2006, the state proposed amendments to its water quality standard for fecal coliform; the proposed changes are currently being reviewed by EPA for approval. Key changes to this standard include the use of *E. coli* and *Enterococci* as indicator organisms rather than general fecal coliform class (DEP 2005a).

Water Quality

The Massachusetts Department of Environmental Protection produces a biennial water quality report (the 305(b)/303(d) report, named after sections of the federal Clean Water Act that require states to prepare it) with its assessment of whether the waters of the state are meeting their designated use classifications (DEP 2004a). The state compares water quality and biological data from its waters to the state water quality standards to determine if the designated uses are being met. A water body that does not meet the standards is considered "impaired," and the state must develop a strategy to reduce the total amount ("load") of a pollutant being discharged to that water body in order for it to meet its designated use. This strategy is called a Total Maximum Daily Load or TMDL.

After assessing each state waterbody, the Department of Environmental Protection places it in one of five categories: Category 1—unimpaired and not threatened for all designated uses, Category 2—unimpaired for some uses and not assessed for others, Category 3—insufficient information to make assessments for any uses, Category 4—impaired or threatened for one or more uses but not requiring the calculation of a TMDL, and Category 5—impaired or threatened for one or more uses and requiring a TMDL.

Massachusetts' assessment of waterbodies on Cape Cod in the most recent water quality report (DEP 2004a) indicates that no waterbodies are listed under Category 1 because the Massachusetts Department of Public Health has issued a statewide health advisory for mercury pertaining to the consumption of finfish (primarily largemouth bass and smallmouth bass) in freshwater streams (MA Department of Public Health 2006). Five waterbodies are listed under Category 2 as having attained the uses of shellfishing and

recreation but have not been assessed for other uses: Bassing Harbor, Centerville Harbor, Chatham Harbor, Nauset Harbor, and Red Brook. Twenty-six waterbodies are not assessed (Category 3) due to insufficient information, and two waterbodies are listed under Category 4 as impaired because of the presence of exotic species: Bearse Pond, Long Pond.

There are 80 waterbody segments on Cape Cod classified as Category 5, including 18 ponds (3,710 acres) and 62 stream segments (33 square miles of stream habitat). Appendix C-2 lists the state's assessment of these Category 5 waterbodies. The causes of impairment differ among these streams, but include excessive concentrations of metals, pathogens, nutrients, organic enrichment, turbidity, and noxious aquatic plants. For each pollutant causing impairment in these Category 5 waterbodies, the State must prepare a TMDL that details the State's approach for reducing the pollutant entering the waterbody. To date, the State has prepared:

- Final TMDL for nitrogen in Stage Harbor, Sulphur Springs, Taylors Pond, Bassing Harbor, and Muddy Creek (DEP 2004b),
- Draft TMDL for pathogens for all of Cape Cod (DEP 2005b) and
- Draft TMDL for pathogens in Buzzards Bay (DEP 2005c).

Stormwater runoff is a significant contributor of fecal coliform bacteria to the waters of Cape Cod (DEP 2005b). The Draft TMDL for pathogens in 66 impaired segments on Cape Cod requires load reductions from the following sources:

- stormwater runoff (regulated under EPA's permit program for municipal separate storm sewer systems)
- stormwater runoff (not regulated)
- illicit discharge to storm drains
- leaky sanitary sewer lines
- failing septic systems
- point source discharge from wastewater treatment plants
- sanitary sewer overflows

Portnoy and Allen (2006) suggest that tidal restrictions of salt marshes may create water quality conditions behind the restrictions that favor accumulation and growth of fecal coliform bacteria.

Wastewater

Approximately 85 percent of Cape Cod is serviced by individual septic systems (EOEA 2004). The other 15 percent is served by sewer systems. Falmouth (810,000 gallons per day (gpd) capacity; discharge to groundwater), Chatham (440,000 gpd capacity; effluent is denitrified), Barnstable (4.2 million gpd capacity), and Provincetown (500,000 gpd capacity) have public sewer systems (DEP 2005b).

Stormwater

Most of the towns on Cape Cod are included in EPA's program to control stormwater runoff from urban areas. These towns have been issued a National Pollutant Discharge Elimination System (NPDES) permit for stormwater, which requires each town to develop and implement a stormwater management plan that addresses public outreach/education, public participation/involvement, illicit discharge detection and

elimination, construction site runoff control, post-construction runoff control, pollution prevention, and good housekeeping activities (EOEA 2004). Implementation of these programs will take several years; however, all participating towns covered by NPDES phases are required to fully comply with their permits by 2008.

3.8 AQUATIC LIFE

Fish

The tidal and inland waters of Cape Cod serve as important habitat for anadromous fish, which spend most of their adult lives in salt water and migrate to freshwater streams, rivers, and lakes to reproduce. Anadromous juvenile fish spend varying lengths of time in freshwater before migrating to saltwater, where they mature. The anadromous fish return to spawn by the same route they followed to the ocean as juveniles and return to the same location in which they hatched. Some anadromous fish die after spawning (most salmon species), and others will migrate to freshwater rivers several times in their lives to spawn (WHRC 2005). Anadromous fish species within Cape Cod include American shad (*Alosa sapidissima*), rainbow smelt (*Osmerus mordax*), tomcod (*Microgadus tomcod*), sea run trout (*Salmo salar*), sea lamprey (*Petromyzon marinus*), and river herring, which comprises two closely related members of the family Clupeidae: alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) (Reback *et al.* 2004). Self-supporting runs of Atlantic salmon in the United States persist in eastern Maine, but there are no salmon runs within the Cape Cod Watershed (DMF 2005).

River herring have been the focus of the DMF's restoration efforts on Cape Cod, where there are 41 herring spawning ponds, covering about 5,400 acres. The coastal range of blueback herring extends from Nova Scotia to Florida, and the coastal range of the alewife extends from Labrador to South Carolina. Both species undertake upriver spawning migrations during the spring and are capable of spawning in riverine and lacustrine (lake, pond) environments. Good spawning areas are capable of supporting 1,100 herring per acre. Alewives begin spawning when temperatures reach 51°F, and blueback herring begin spawning when temperatures reach 57°F, typically three to four weeks later than alewives. Both species cease spawning when water temperatures reach 81°F. The freshwater habitat serves as a nursery area for most of the summer. In the fall, juvenile river herring migrate to the ocean to mature. Maturity occurs at three to five years. When mature, the river herring return to their natal streams to spawn. Alewives have the potential to live as long as ten years, and blueback herring live for approximately eight years (Reback *et al.* 2004).

Catadromous fish have the opposite migration pattern of anadromous fish; they spend most of their adult lives in freshwater and migrate to saltwater to spawn. The only catadromous species in the United States is the American eel (*Anguilla rostrata*). American eels spawn in the Sargasso Sea (part of the Atlantic Ocean, located between the West Indies and the Azores) in the spring. Eels typically spend one year at sea before migrating inland all along the United States coast. They then spend 5 to 20 years in freshwater rivers and lakes before returning to the Sargasso Sea to spawn, after which they die (NOAA 2005a).

Overfishing, pollution, water diversion, and habitat degradation have reduced populations of anadromous fish in Massachusetts (Reback *et al.* 2004). Blockage of migration routes by dams and other structures across rivers and streams has eliminated access to large areas of potential spawning habitat. Barriers to migration (e.g., dams and poorly aligned culverts or bridges with an abrupt change in the stream bed elevation) prevent or restrict the movement of anadromous species upstream and downstream and cause

some migratory populations to become landlocked (NOAA 2005a). Fishways, also referred to as fish ladders or fish passes, are structures placed on or around man-made barriers to assist the natural migration of anadromous and catadromous fish. Most fishways enable fish to pass around the barrier by swimming and leaping up a series of low steps into the waters on the other side of the barrier (NOAA 2005a). Over time, however, many of the existing fishways on Cape Cod have deteriorated or failed, eliminating or reducing the ability of the fish to move upstream to spawning or nursery habitats. DMF (2004) estimates that in Massachusetts there are more than 100 active river herring runs and 175 fish passage structures, of which 46 percent are in deteriorated condition and 50 percent function inadequately. DMF identified 93 existing fish passage structures and approximately 43 active river herring runs in Barnstable County

Although dams are one of the most serious factors in declining anadromous fish runs, other habitat factors have also been of concern. These include increased water temperatures and siltation of spawning areas due to the removal of riparian vegetation, siltation caused by sanding of roads in winter, and algal growth on spawning sites due to eutrophication (NOAA 2005a). According to DMF, the spring 2005 spawning season was one of the worst on record. Far fewer numbers of herring, shad, salmon and other species made their way to their spawning grounds than usual.

DMF has the authority within the Commonwealth to provide suitable passage for anadromous fish. DMF created the Anadromous Fish Dynamics and Management Program in 1984 to investigate and manage the anadromous fish resources of the Commonwealth (DMF 2005). DMF emphasizes fishway maintenance, reconstruction, replacement of fishway passage facilities with more advanced design, and stocking fish. DMF's propagation strategy for river herring is to collect adult fish from productive populations just prior to spawning and to transport them to a new potential spawning ground that has been made accessible. To maintain continuity of year classes, DMF typically stocks a single system for four to five years. This technique has been successful for river herring (Reback *et al.* 2004), but has had no success on Cape Cod for American shad and rainbow smelt.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires that management plans for federally managed fisheries identify as essential fish habitat those areas that are necessary to fish for their basic life functions. The National Marine Fisheries Service, regional Fishery Management Councils, and federal and state agencies work together to identify the essential habitat for each fish species and to develop conservation measures to protect and enhance that habitat (NOAA 2005b). The Act also requires that federal agencies consult with the National Marine Fisheries Service on all federal actions that may adversely affect essential fish habitat. Essential fish habitat is defined as "...those waters and substrate [the underlying bottom] necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA 2005b).

The New England Fishery Management Council was created by the Magnuson Stevens Fisheries Conservation and Management Act to manage living marine resources in New England. The Council is responsible for the creation of management plans for fisheries in federal waters off Massachusetts (NOAA 2005b). All tidal waters off Cape Cod could potentially be designated as essential fish habitat for the species listed in Appendix C-3. Areas designated as essential fish habitat can be viewed on the internet site of the National Marine Fisheries Service, <http://www.nero.noaa.gov/hcd/index2a.htm>.

Benthos

Benthic animals live on and within bottom sediments. The benthic community represents an important ecological component in an aquatic system by serving as food for many higher organisms, including finfish, crabs, and some species of waterfowl. Shellfish also serve an important ecological function by filtering the surrounding water and removing sediment, nutrients, algae, and bacteria. Freshwater mussels, an important component of riverine ecosystems, are particularly sensitive to pollution and siltation, which have caused their decline in many streams and rivers.

Most of Cape Cod's shoreline, except areas that are subject to heavy wave action, is potentially rich shellfish habitat. Shellfish species of commercial or recreational value found within the project areas in Cape Cod waters include:

Bay scallop	*Argopecten irradians*
Blue mussel	*Mytilus edulis*
Oyster	*Crassostrea virginica*
Quahog	*Mercenaria mercenaria*
Razor clam	*Siliqua patula*
Sea (surf) clam	*Spisula solidissima*
Soft shelled clam	*Mya arenaria*

The ecological health of shellfish beds depends on successful larval recruitment, optimal sediment types, and preferred salinity ranges. Variations in these factors contribute to natural fluctuations in shellfish populations, both in time and location (WHRC 2005). Shellfish beds are also susceptible to damage from human activities such as physical destruction during construction projects, siltation from excessive sediment loads in runoff, and toxic substances in runoff and wastewaters.

Contamination of shellfish waters by disease-causing organisms poses serious public health risks because shellfish will filter out and accumulate these microscopic organisms. The DMF Shellfish Program protects public health by closing contaminated beds to harvesting when the water quality criteria for Class SA and SB waters are not met. Public health protection is further provided through sanitary classification in accordance with the provisions of the National Shellfish Sanitation Program. DMF assigns sanitary classifications to shellfish growing areas as a result of sanitary surveys that include evaluations of pollution sources that may affect an area, hydrographic and meteorological characteristics, and water quality (DMF 2002). Based on its monitoring of shellfish waters, DMF categorizes shellfish beds as:

- Approved: shellfish beds are open daily throughout the year.
- Conditionally approved: monitoring indicates that microbial pollution standards are not met and the beds are temporarily closed during the year.
- Restricted: shellfish waters could only be harvested if shellfish were subjected to suitable purification processes.
- Conditionally restricted: shellfish beds that meet the criteria for "Restricted" classification except under certain conditions described in the Cape Cod watershed water quality management plan (DEP 2002).
- Prohibited: shellfish beds are closed to harvest for human consumption during anytime of the year

Shellfish managers also temporarily close certain shellfish beds during the winter months to allow them to rebound from active harvesting of the bed. This management strategy maintains the resource for the long-term growth and viability of the shellfish population.

3.9 SALT MARSHES

Salt marshes are widely recognized features on the Cape Cod landscape. These grass-dominated tidal wetlands occupy about 6,800 acres on Cape Cod and are found throughout the Cape's 15 towns. Cape Cod salt marshes are influenced by twice daily tidal inundation. Tidal flooding creates distinct vegetation patterns within these marshes. Marsh areas that are inundated by tidal waters on a daily basis are called low marsh and are dominated by saltwater cordgrass (*Spartina alterniflora*). Marsh areas inundated monthly by spring tides are termed high marsh and are dominated by salt hay grass (*Spartina patens*) and spike grass (*Distichlis spicata*). A transitional area is typically found between salt marshes and the adjacent freshwater wetlands or uplands. Plant species found within this zone typically include switchgrass (*Panicum virgatum*) and invasive common reed or phragmites (*Phragmites australis*) (Cape Cod Commission 2001). Salt marshes on Cape Cod are typically found behind barrier islands, within drowned river valleys, or along the fringe of sheltered coves.

Salt marshes provide habitat for estuarine invertebrates, fish, birds, and mammals (Padgett *et al*. 1998), and they are nursery grounds for several types of commercial fish and shellfish fisheries (Roman *et al*. 2002, Simas *et al*. 2001). Fish species that use salt marshes as nursery areas include mummichog (*Fundulus heteroclitus*), silverside (*Menidia menidia*), menhaden (*Brevoortia tyrannus*), bluefish (*Pomatomus saltatrix)*, and winter flounder (*Pleuronectes americanus*). In addition, salt marsh grasses have been shown to protect shorelines from erosion (Lindau and Hossner 1981), as well as play roles in nutrient cycling and pollution filtration (Niering and Warren 1980). Salt marshes within large watersheds that are in close proximity to urban areas have the potential to be a significant sink for heavy metals such as zinc, copper, and lead, preventing contamination of estuarine waters (Griffin *et al*. 1989).

NRCS created a Science Advisory Committee to advise it on a methodology for determining the functional values of salt marshes in the Cape Cod Watershed. The Committee developed a list of seven functions that are characteristic of Cape Cod salt marshes:

Function	Description
Shoreline stabilization	Salt marshes maintain existing shorelines and prevent erosion due to sea level rise and subsidence
Maintain tidal marsh elevation	Stable marsh elevations support tidal marsh hydrology and vegetation
Nutrient, organic carbon, and sediment flux	Salt marshes import and export nutrients and organic carbon via tidal flushing, deposition, and erosion
Resident and nonresident nekton[1/] utilization	Salt marshes provide habitat for non-migratory fish and shellfish

Function	Description
Bivalve species utilization	Salt marshes provide substrates that support a variety of bivalve species
Bird species utilization	Salt marshes are utilized by resident and migratory birds
Maintain characteristic plant community composition	Salt marshes support a native plant community

[1/] swimming marine animals, such as fish

Despite these functions and their value to the local ecology and economy, salt marshes on Cape Cod have seen extensive declines. Current estimates suggest that 36 percent of the 28,000 acres of salt marsh historically present on Cape Cod has been lost or severely degraded over the past several hundred years, resulting in a loss of the functions and values that these wetlands provide (Tiner *et al*. in press). Marshes that were not completely filled were often altered by construction of roadways and rail beds, ditching for mosquito control, and diking for farmland.

Construction of a roadway across a tidal creek often results in the installation of a culvert to allow tidal exchange between the upstream marsh and the downstream estuary or coastal waterway. Many of the roadways across Cape Cod salt marshes were built with undersized culverts that restrict the inflow of salt water to the marsh and the drainage of fresh water from the marsh. In many cases, these culverts can further restrict a natural tidal regime through complete or partial collapse, sediment clogging, and debris accumulation. The Cape Cod Commission and the Buzzards Bay Project National Estuary Program have identified 182 marshes that have been degraded due to tidal restriction (Cape Cod Commission 2001).

Mosquito ditching has altered many Cape Cod salt marshes by draining the upper reaches. The linearity of mosquito ditching creates unnatural hydrological conditions that accelerate drying of the marsh between tidal flooding events. Cape Cod marshes were often diked to provide farmland, resulting in little or no tidal water entering the marsh system.

Tidal restriction has had a profound effect on Cape Cod salt marshes. Undersized, poorly functioning culverts have caused many salt marshes to experience changes in the vegetative structure, such as a change to a freshwater or brackish wetland type. Many of Cape Cod's restricted marshes have experienced a rapid expansion of phragmites, an invasive species.

Changes in salt marsh vegetation are another result of tidal restriction. Many Cape Cod marshes have experienced changes in vegetative communities due to the ponding of freshwater on the marsh surface, often as a result of inadequate freshwater drainage from the marsh. Vegetation changes often result in unvegetated tidal flats, decreased water quality, and less frequent wildlife usage. Loss of vegetation may also expose deteriorating marsh soils to increased erosion and subsidence, resulting in persistent open water.

Tidal restriction has decreased the water quality of the marshes themselves and of Cape Cod's estuaries. Poor tidal exchange, combined with excessive nutrient inputs, results in eutrophic conditions within many of Cape Cod's coastal bays and fringing marshes (Cape Cod Commission 2000). Extensive stands of

phragmites slow water movement and contribute large amounts of organic matter to water bodies, which can contribute to decreased dissolved oxygen concentrations.

Cape Cod's tidally restricted salt marshes experience less wildlife usage than unrestricted marshes (Cape Cod Commission 2000). Undersized and poorly functioning culverts limit fish passage into salt marshes. As mentioned earlier, tidal restriction promotes the expansion of phragmites stands. Marshes dominated by phragmites have lower habitat quality than salt marshes for a variety of wildlife (Gulf of Maine Council on the Marine Environment 2005). Monotypic stands of phragmites provide little foraging habitat for birds.

3.10 THREATENED AND ENDANGERED SPECIES

The federal Endangered Species Act of 1973 protects plant and animal species considered to be in danger of extinction and their habitats. An endangered species is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range (USFWS 2005). The Fish and Wildlife Coordination Act also includes provisions for the protection of bald and golden eagles and endangered species of fish and wildlife, and the Bald and Golden Eagle Protection Act prohibits pursuing, wounding, killing, or capturing of bald and golden eagles.

The Massachusetts Endangered Species Act was enacted in 1990 and revised in 2005. The Act and its implementing regulations (321 CMR 10.00) protect rare species and their habitats by prohibiting the "take" of any plant or animal species listed as endangered, threatened, or of special concern by the Massachusetts Division of Fisheries and Wildlife. In reference to endangered or threatened animal species, take is defined as harassing, harming, pursuing, hunting, shooting, hounding, killing, trapping, capturing, or collecting. Disrupting the nesting, breeding, feeding, or migratory activity of listed bird species is also considered a take. In reference to plant species, take is defined as collecting, picking, killing, transplanting, or cutting. Permits for taking protected species for scientific, educational, conservation, or management purposes may be granted by the Division of Fisheries and Wildlife.

There are 69 animal and 63 plant state and/or federally listed threatened or endangered species found in Barnstable County (DFW 2003). The complete list is available in Appendix C-5, but the following list summarizes the types of threatened and endangered species that inhabit Cape Cod.

Type of Organism	Number of Threatened and Endangered Species on Cape Cod
Fish	4
Amphibians	3
Reptiles	3
Birds	21
Marine Mammals	1
Segmented Worms	1
Freshwater Mussels	4
Crustaceans	1
Insects	31
Vascular Plants	63

Four towns on Cape Cod are in the "top 10" in Massachusetts for the largest number of state-listed rare species records. The Town of Barnstable is one of only five towns in the state with more than 100 records of rare species. In addition, the National Oceanic and Atmospheric Administration identified two endangered whale species, three threatened whale species, two endangered sea turtle species, and two threatened sea turtle species that occur seasonally in waters off the coast of Massachusetts (Appendix C-5; see letter from M.A. Colligan, April 20, 2006, in Appendix A).

3.11 COASTAL ZONE

Under the Federal Coastal Zone Management Act of 1972, federal agencies are required to determine whether their activities are "reasonably likely to affect any coastal use or resource" and to minimize the potential impacts of their actions by complying with enforceable state policies to the fullest practical extent. If an activity is not fully consistent with an enforceable policy, the Federal agency must describe in its consistency determination the legal authority that prohibits full consistency. States and U.S. territories with marine or Great Lakes shorelines were given the opportunity to develop management plans for coastal resources.

The Massachusetts Coastal Zone Management Plan details the state laws, regulations, policies, and programs with which federal agencies must comply. The Plan comprises nine enforceable policies: water quality, habitat, protected areas, coastal hazards, port and harbor infrastructure, public access, energy, ocean resources, and growth management. The Massachusetts coastal zone includes all of Barnstable County (CZMP 2006).

3.12 LAND USE

Table 3-1
Land use distribution for Cape Cod Watershed

Land use	Acres	% of watershed
Cropland	1,951	0.8
Forest	78,557	32.2
Developed land	102,144	42
Grassland	805	0.3
Other (wetlands, open land, etc.)	60,283	24.7
Total	243,740	100.0

Data extrapolated from MassGIS 1999 land-use information**.**

For local and state officials, the main natural resource concern on Cape Cod is the rate of residential development. In 1971, development covered 60,000 acres. By 1999, this had increased to 103,000 acres, a 72 percent increase. Development now covers nearly half of the non-federal land on the Cape, and the pressure to build continues unabated. Land ownership on Cape Cod is estimated to be 75 percent private, 12 percent federal, and 13 percent state or town.

3.13 DEMOGRAPHICS

Barnstable County is the third fastest growing county in Massachusetts (EOEA 2004). Population on the Cape increased 224 percent from 1970 to 2000, and the Cape Cod Commission estimates that, with no additional growth management or land protection, the Cape will reach full build-out with 37,000 more houses and at least 50,000 more people by 2030.

Table 3-2
Demographic statistics

	Cape Cod	Massachusetts
Population	222,230	6,349,097
Number households	94,822	2,443,580
Median household income	$45,933	$50,502
Median house value	$178,000	$182,800
Percentage minority residents	5.8%	15.5%
Percentage age 65 and over[4/].	23%	14%
Percentage in poverty (1999)	4.6%	6.7%
Percentage involved in tourist-related occupations	31.3%	22.4%
Percentage involved in natural resource occupations (farming, fishing, forestry)	0.7%	0.2%

Data from 2000 US Census.

Although the Cape's median household income is approximately 10 percent lower than the state's median household income, poverty rates on Cape Cod are lower. Minority populations are also significantly lower on the Cape than elsewhere in the state. This may be because the Cape has very few heavily urbanized areas and generally attracts an older population, with a high percentage of retirees. People 62 years and over account for 26.4 percent of the Cape's population, but only make up 15.7 percent of the overall state population. The median age of the Cape population is 44.6 years, and median age of the state overall is 36.5. Of the state's 20 oldest communities with demographically older populations, 11 are on Cape Cod.

3.14 ECONOMY

It is noteworthy, as shown in Table 3-2, that nearly one-third of the Cape's workers are involved in tourist-related occupations, but the fraction employed in those occupations statewide is just over one-fifth. It is also notable that a much higher percentage of people on Cape Cod (more than three times the overall state percentage) work in the natural resources sector. Although Cape Cod accounts for approximately 5 percent of the state's land area, it has over 10 percent of the total number of individuals working in the natural resources sector. This clearly reflects the Cape's geographic setting, with hundreds of miles of shoreline and several hundred thousand acres of shellfish beds.

Farming

There are about 285 farms on Cape Cod; the average farm size is 21 acres. Based on the 2002 NASS Agriculture Census, there are 15 minority farmers, 57 female farmers and 40 limited-resource farmers on Cape Cod.

Commercial Fishing

DMF promotes and develops commercial fisheries through research, technical assistance, and the collection of statistics. Currently the American eel is the only anadromous or catadromous species that is commercially fished within the Project area. River herring have been commercially fished, but a 3-year moratorium through 2008 has temporarily stopped that fishery. The American eel is not a major commercial fish, however, and is not considered a quota-managed species by DMF (2006a).

Since the early 1800s, shellfish resources have played a key role in shaping Cape Cod's cultural and economic development. The total shellfish growing area for Cape Cod is 413,000 acres, which is used by commercial and recreational shellfishermen (DMF 2000). Commercial shellfish landings are reported annually by Massachusetts DMF (Table 3-3). Shellfish landings in 2002 were markedly higher than in other recent years, primarily for ocean quahog, mixed quahog, softshell clam, and bay scallop.

Table 3-3
Barnstable County commercial shellfish landings and economic values (2001-2004)

	2001	2002	2003	2004	
SPECIES	Pounds	Pounds	Pounds	Pounds	Value ($)[2/]
Bay Scallop	201,719	452,315	264,110	116,871	747,974
Oyster	74,085	84,040	130,304	173,364	138,691
Quahog (Cherrystone)	616,716	453,947	309,628	269,074	37,670
Quahog (Chowder)	531,931	443,960	265,375	455,580	113,895
Quahog (Littleneck)	1,268,803	1,012,368	901,288	754,902	1,283,333
Quahog (Mixed)	2,078,958	5,112,517	2,494,780	1,858,533	no data
Razor Clam	6,103	89,176	261,693	363,703	592,835
Soft Shell Clam	2,676,338	5,758,973	2,573,834	2,275,472	3,640,755
Other Shellfish[1/]	528,076	2,061,287	723,766	1,622,807	1,914,912[3/]
Total	7,982,729	15,468,583	7,924,778	7,890,252	8,470,065

Source: Dean (2006a and 2006b).
[1/] Species not reported in shellfish beds of project sites: conch, mussels, ocean quahog, sea scallops, mussels, etc.
[2/] Values are calculated from 2005 costs/pound dollars.
[3/] Value calculated from average cost/pound ($1.18) of other shellfish in 2005.

3.15 RECREATION

Recreational Fishing

The DMF Bureau of Recreational Fisheries maintains the anadromous fish resources of Cape Cod by reestablishing, augmenting, and enhancing anadromous runs. The Bureau also manages the Commonwealth's sport fisheries for important game fish. Catadromous and anadromous species fished for recreational purposes and the regulations governing the fishery are (DMF 2006b):

Fish Species	Season (open-closed)	Size Limit	Possession Limit
American eel	All Year	6 inches	50 fish
Shad	All Year	None	6 fish
Smelt	June 15 – March 15	None	None
Striped Bass	All Year	28 inches	2 fish
White Perch	All Year	8 inches	25 fish

Harvest, possession, sale, and use of river herring are prohibited until 2009 (DMF 2006b).

Recreational shellfish landings are not included in DMF's comprehensive shellfish database. Some recreational data are collected by individual towns and reported to DMF; however, this is a voluntary program and therefore considered a partial listing. Reported recreational shellfish landings were somewhat higher in 2001 than all subsequent years, with approximately 1,000,000 pounds of shellfish reported (Table 3-4).

Table 3-4
Barnstable County recreational shellfish landings and economic values (2001-2004)

	2001	2002	2003	2004	
Species	Pounds	Pounds	Pounds	Pounds	Value ($)
Bay Scallop	12,432	73,600	10,249	11,240	2,023[1/]
Oyster	54,608	31,941	39,142	73,350	102,690[2/]
Quahog (Cherrystone)	34,524	29,546	25,775	22,120	[3/]
Quahog (Chowder)	30,839	27,711	30,070	29,121	[3/]
Quahog (Littleneck)	104,998	82,618	74,005	81,315	[3/]
Quahog (Mixed)	693,912	385,827	280,624	317,952	no data
Razor Clam	1,290	1,250	200	1,370	63.36[4/]
Soft Shell Clam	83,917	102,590	72,863	72,118	2,207[5/]
Other Shellfish[6/]	3,994	3,243	5,479	14,949	---
Total	1,020,514	738,326	538,407	623,534	106,983

Source: Churchill (2006a and 2006b)
[1/] DMF reported values = $9/50 pounds for in-shell
[2/] DMF reported values = $1.40/pound
[3/] No values attributed to these species in 2004
[4/] DMF reported values = $1.85/40 pound bushel (bushel = 195 razor clam shells)
[5/] DMF reported values = $1.53/50 pound bushel (bushel = 547 soft shell clam shells)
[6/] Species not reported in shellfish beds of project sites: conch, mussels, ocean quahog, etc.

Beaches

There are over 390 public beaches in Barnstable County. The town health departments monitor water quality at beaches weekly during the summer months (June – August). Water quality standards for bathing beaches are expressed in terms of the concentration of *Enterococci*, a subset of fecal streptococci or *Escherichia coli*, a fecal coliform (Barnstable County Department of Health 2005):

- Marine Water: No single sample shall exceed 104 *Enterococci* colonies per 100 mL and the geometric mean of the most recent five (5) samples within the same bathing season shall not exceed 35 colonies per 100 mL.
- Fresh Water: (1) No single sample shall exceed 61 *Enterococci* colonies per 100 mL and the geometric mean of the most recent five (5) samples within the same bathing season shall not exceed 33 colonies per 100 mL; or (2) No single sample shall exceed 235 *E. coli* colonies per 100 mL and the geometric mean of the most recent five (5) samples within the same bathing season shall not exceed 126 colonies per 100 mL (DEP 2005a).

In 2005, several beaches on Cape Cod were temporarily closed to the public due to high concentrations of fecal coliform bacteria (Table 3-5) (Barnstable County Department of Health 2005). Most closures were in effect for only a few days until follow-up sampling indicated that the criteria had been met again; however, two beaches in Chatham were permanently closed until further notice due to fecal coliform bacteria (Town of Chatham 2005). Stormwater runoff is the dominant cause for elevated fecal coliform concentrations on public beaches (Barnstable County Department of Health 2005). Runoff carries pollutants from roads and other paved surfaces directly to the surface water of beaches and ponds. Waste from pets and wild animals (seals, seagulls, ducks and geese) is another possible cause of contamination.

Table 3-5
Results of beach monitoring in Barnstable County for 2005

Town	No. beaches	No. samples[1/]	No. failures[2/]	% Closure
Barnstable	42	546	14	3
Bourne	10	130	1	<1
Brewster	13	169	2	1
Chatham	17	---	---	---
Dennis	23	299	4	1
Eastham	16	240	24	10
Falmouth	23	299	10	3
Harwich	25	325	3	<1
Mashpee	9	117	1	<1
Orleans	12	156	2	1
Provincetown	18	273	28	10
Sandwich	11	143	3	2
Truro	15	200	5	3
Wellfleet	19	247	0	0
Yarmouth	27	351	5	1
Total	280	2,650	85	3

[1/] Total number of samples measured for fecal coliform during June-August.
[2/] Total number of samples that failed to meet fecal coliform water quality standards during the sampling period, leading to temporary closures.

3.16 NATURAL AREAS

National Estuarine Research Reserve

The National Estuarine Research Reserve program is a partnership between the National Oceanic and Atmospheric Administration and coastal states to protect estuarine land and water for long-term research and education. The only reserve on Cape Cod is the Waquoit Bay Reserve, which is located in the towns of Falmouth and Mashpee on the south shore of the Cape (Figure 2-1). This reserve is approximately 2,600 acres in size and encompasses open waters, barrier beaches, marshlands, and uplands (NERR 2006).

National Wildlife Refuge

The Eastern Massachusetts National Wildlife Refuge Complex comprises eight ecologically diverse refuges that include inland and coastal wetlands, forests, grasslands, and barrier beaches. The U.S. Fish and Wildlife Service manages the refuges to conserve and protect a diversity of native wildlife habitats and species. The Mashpee National Wildlife Refuge, located in the towns of Mashpee and Falmouth (Figure 2-1), is the only refuge located within the Project boundary in Cape Cod. This refuge consists of 5,871 acres and preserves salt marshes, cranberry bogs, Atlantic white cedar swamps, freshwater marshes, and a vernal pool (USFWS 2001).

Cape Cod National Seashore

The Cape Cod National Seashore (Figure 2-1) comprises 43,608 acres of shoreline, salt marshes, freshwater kettle ponds, and uplands and a wide diversity of species supported by these habitats. The Resource Management Division monitors the health and potential threats to natural resources at the Seashore. Annual resource management programs include protecting nesting habitat for piping plover and restoration of salt marsh habitats and herring river areas. The seashore offers six swimming beaches, 11 self-guiding nature trails, and a variety of picnic and scenic overlooks (NPS 2006).

3.17 CULTURAL RESOURCES

Native populations have inhabited Cape Cod since the re-establishment of plant and animal communities after glacial ice left the area some 13,500 years before present (BP). Radiocarbon dating places the first people in New England at approximately 10,000 BP. The people hunted caribou and smaller animals found in the sparse, tundra-like environment and lived in small, mobile groups. Very little archaeological evidence dating to this Paleo-Indian period is found in New England.

Prehistoric occupation of Cape Cod increased in the Middle Archaic Period, 8000-6500 years BP. The people inhabited sites near the headwaters of freshwater streams and glacial outwash channels at a considerable distance from the coast. These early environmental zones suggest that these sites were used to harvest anadromous fish, whose present-day spawning patterns are believed to have been established by this time. In the Late Archaic Period, 6000-3000 years BP, there was an even greater increase of

activity as human populations established across the area. People were organized in mobile groups that took advantage of new habitats and seasonally abundant resources.

In the Woodland Period, 3000 BP to 450 BP, people lived in semi-permanent villages, where they exploited the many resources available since archaic times and began cultivating plants. Pottery manufacturing developed around 1000 BP in New England. After 1000 BP, stable food supplies and increased use of permanent settlements led to a population increase. Archaeological and historical evidence suggests that Woodland era sites consisted of large villages and smaller peripheral sites surrounded by agricultural fields. Many of the small peripheral sites were occupied to take advantage of seasonally available food and to seek lithic materials for stone tool manufacture. Woodland archaeological sites can be quite large and are found frequently across New England.

In the Contact Period, beginning about 450 BP, Europeans began to arrive along the shores and eventually settled the area. Permanent European settlement is recognized with the establishment of Sandwich in 1637. Settlements in Barnstable, Yarmouth, and Eastham followed shortly thereafter.

By the time the Europeans arrived, native peoples had extensively settled Cape Cod. Although the population of the Native Americans is difficult to estimate, it is safe to say that at least the outer Cape was extensively settled. Good information on the mid and inner Cape areas is not available; however, populations were undoubtedly present during the period. Ethno-historical accounts also verify that populations existed in the Sandy Neck area of Sandwich, as well as Barnstable and Yarmouth. Early explorers such as Champlain and Gosnold spoke of settlements with cornfields, wigwams and palisades, but none of these have been verified archaeologically. As of 1987, eleven contact period sites were known in the area. Most of these sites are located on the outer Cape; five sites are burial places, with the remainder being deposits from which European materials were recovered.

The Plantation Period begins with the landing of the Pilgrims in 1620 through 1692. During this period, Native American populations suffered significant population losses from diseases brought by Europeans. Displacement from traditional settlements also occurred during this time due to encroachment of the Europeans. A sizable native population remained in the area despite the devastating effects of disease. Core areas of native populations survived in the Barnstable and Eastham areas. During this time, Europeans tended to cluster in defined settlement areas. The four primary population centers were Sandwich, Barnstable, Yarmouth, and Nauset (now Eastham/Orleans). Numerous National Register Historic Districts and properties in the project area reflect this historic settlement.

Transportation on the Cape for both Native Americans and Europeans was based on the trail system developed by the Native Americans. As the Cape was settled more intensively, these trails were converted to cart paths or roadways. A less clearly defined road system developed on the Outer Cape where settlement was more dispersed (Bradley *et al*. 1987).

Chapter 4
WATERSHED PROBLEMS AND OPPORTUNITIES

Approximately 40 percent of the land on Cape Cod has been developed (EOEA 2004). This development has degraded the natural environment of the Cape. Runoff from developed areas carries pollutants such as bacteria, nutrients, and toxic substances into the Cape's streams, ponds, and estuaries. Road and railroad networks cross the Cape's salt marshes, in many cases, with culverts or bridges that were built too small to allow normal tidal flushing of the marsh. Dams and road crossings on streams restrict or eliminate the upstream movement of anadromous fish to their historical spawning grounds. The increased level of public awareness of the negative effects of development on natural resources has led to the promulgation of local and state laws to reduce those effects. These laws and their implementing regulations prohibit or control many of the activities that, for example, resulted in restricting tidal flows to salt marshes or increasing pollutant loads to receiving waters. However, although these laws and restrictions control future development, they do not address existing conditions in developed areas. The purpose of the Cape Cod Water Resources Restoration Project is to mitigate the effects of some of this development on the region's existing water quality, fish, and wildlife by restoring degraded salt marshes, restoring anadromous fish passages, and improving water quality in shellfishing areas. Detailed information follows on the purpose and need for each of these types of projects.

Salt Marshes

"Tidal wetlands create the foundation of a coastal food web that supports a large variety of coastal fish and bird species. They also provide vital nesting and breeding habitats for migratory waterfowl along the Atlantic Flyway. Coastal wetlands serve as important nursery and spawning grounds for many commercially and recreationally important fish and shellfish species. They play a critical role in maintaining water quality. Additionally, tidal wetlands provide irreplaceable protection from the flooding associated with storm surges and other serious weather events—a serious risk to the environment and economy of Cape Cod. Tidal wetlands are arguably the most productive and valuable of all the state's natural systems.

Tidal restrictions cause hydrological changes that typically reduce the maximum elevations of tidal flooding and lower the water's salt concentration. These changes cause a major transformation in vegetation and alter the entire upstream salt marsh. Common Reed (Phragmites australis) and other invasive species that are more tolerant of brackish conditions often displace native salt marsh grasses and rushes, thereby reducing plant diversity and changing vegetative structure (from a low grassy meadow to a tall reedy thicket). This change in vegetation, in turn, causes a major shift in wildlife use, as once diverse native salt marsh creatures are replaced by fewer, more generalist species. In sum, most tidal restrictions — by altering hydrology and salinity — significantly harm upstream tidal ecosystems.

The loss and fragmentation of coastal wetlands that is caused by transportation infrastructure, tide gates, and other engineering structures, often reduce a wetlands system's capacity to store floodwaters and to protect inland ecosystems and properties from storm damage. Tidal restrictions sometimes exacerbate the damage caused by major coastal storms because they can impound storm water and thus increase the severity of flood events. Long-term restrictions cause wetland subsidence, setting the stage for even greater storm-surge damage when restrictions breach."

(Information from the Introduction, Cape Cod Atlas of Tidally Restricted Salt Marshes)

Cape Cod has about 6,800 acres of salt marsh. The Cape Cod Commission and the Buzzards Bay Project National Estuary Program have identified 182 wetland restrictions associated with transportation infrastructure (roads, bridges, culverts, railroads, etc.) on Cape Cod. These restrictions affect the hydrology of approximately 4,800 acres of salt marsh. Some of these restrictions are not remediable, because of development that has taken place around the marsh after the restriction was installed. In those situations, restoring full flushing would lead to inundation of homes, septic systems, or other appurtenances. However, restoration is possible at many sites. It is the intent of the sponsors and NRCS to identify sites where restoration may be feasible and will have the most ecological benefit, and to determine where the local interest is greatest and the communities are willing to raise their share of the costs of remediation. NRCS and the sponsors would then enter into agreements with those communities to carry out works of improvement. NRCS estimates that the Project would improve tidal flushing in 1,500 acres of salt marsh at a cost of $14.5 million, of which the NRCS share would be $11.3 million. Projects would be constructed over the course of several years to address this resource concern.

Fish Passages

"Anadromous fish live in the sea but must enter fresh water rivers and streams to spawn. Massachusetts coastal systems support 16 species of anadromous fish. Species such as the rainbow smelt, American shad and river herring (alewives and blueback herring) play an important role in recreational and commercial fisheries; therefore, program efforts tend to concentrate on these four. They are not only targeted by active fisheries but also serve as an important food source for the high-ranking predators such as striped bass and bluefish. Of the approximate 100 herring runs in Massachusetts, populations may vary in size from a few thousand to over a million individuals.

With a small number of exceptions, the important river herring spawning/nursery habitats on coastal streams have been made accessible through the construction of fishways. Many of these structures have deteriorated, and are often of obsolete design. The emphasis of future work should be on the replacement of these fish ladders in order to preserve or augment the populations they serve rather than to create new populations by accessing minor habitats. Stocking fish is also an important component of our work. When we have gained access to a spawning area either through ladder construction or some other means, we stock the new site with adult herring collected from a well-established population. The offspring of these fish will imprint on the new spawning grounds and return as mature adults in three to five years. To maintain a continuity of year classes, we typically carry on stocking in a single system for four or five consecutive years. This process of creating and enhancing Massachusetts' river herring populations has had a long history of success and has been used as a model for restoration programs in several other states.

While MarineFisheries continues to address passage obstructions and degraded water quality, new problems have arisen. On Cape Cod, sandy soils combined with shoreline development and beach nourishment have contributed to a deposition of sand in the outlets of many spawning area ponds. During low water years, pond levels may drop below the outlet elevation trapping juvenile herring in the pond and delaying or preventing downstream migration.

A second concern is the increasing number of requests for water withdrawal permits either from surface water bodies or from wells close to anadromous fish habitats. Stream withdrawals may create migration barriers within the stream by lowering water levels and may also draw in and trap fish at the intake. Withdrawals from spawning areas can also reduce productivity by decreasing the spawning area available.

Conflicts between anadromous fish and agriculture operations have occurred historically and persist today. Agricultural impacts include blockage of passage, diversion of stream flow, entrapment and stranding of juveniles. Solutions to these problems are attainable with the cooperation of the industry, and MarineFisheries is working with farming associations to develop practice, which will eliminate many of these problems."

(Information from the Mass. Division of Marine Fisheries web site.)

Cape Cod has 109 miles of freshwater streams, nearly 1,000 ponds covering almost 11,000 acres, and 41 herring spawning ponds covering 5,400 acres. DMF has identified and inventoried 93 structures on Cape Cod that need repair if they are to work as designed. It is the intent of the sponsors and NRCS to identify sites where improving or replacing fish passage structures is feasible and will open the greatest acreage of spawning upstream, to determine where the local interest is greatest and the communities are willing to raise their share of the costs of remediation, and then to enter into agreements with those communities and DMF to carry out works of improvement. NRCS estimates that the Project would improve access to 4,200 acres of herring spawning habitat at a cost of $5.3 million, of which the NRCS share would be $4.4 million. Projects would be constructed over the course of several years to address this resource concern.

Shellfish Areas

Cape Cod has 430,000 acres of shellfish beds. Shellfishing, for commercial and recreational purposes, is a multi-million dollar industry in Massachusetts. Economic value to Cape Cod includes the wholesale value of the shellfish themselves, the price of permits and licenses, the cost of shellfishing gear, and all the revenue attributable to the restaurant trade, tourist lodging, etc. Some shellfishermen only harvest wild stock; others also raise shellfish in areas, known as aquaculture grants, that are leased to them by the local community.

Shellfish populations are cyclical, and in general follow an eight-to-ten-year cycle of growth and decline in numbers. Shellfishing areas vary in productivity. Good beds are worth thousands of dollars annually, during both the growth and decline cycles; others are barely worth harvesting, and can remain untouched for several years. Over time, unharvested shellfish beds typically become buried in silts and other sediment. This tends to smother the ocean bottom at those sites, and reduce oxygen levels in the underlying flats. As oxygen levels fall, shellfish become unable to survive, and those beds that are silted over can become unproductive. Therefore, as long as there is enough economic or recreational incentive to do so, shellfishing can help sustain shellfish populations by disturbing the sea floor, and allowing better exchange of oxygen between sea water and the underlying substrate.

Barring large incidents, such as the oil spill that occurred in Buzzards Bay in 2003, or the red tide bloom of spring 2005, during which thousands of acres of shellfish beds were temporarily closed, the ability to harvest shellfish is based on the presence or absence of fecal coliform bacteria in the waters overlying the beds. The U.S. Food and Drug Administration sets the limit for shellfishing at 14 colonies of fecal coliform bacteria per 100 mL of water or 70 colonies of total coliform bacteria per 100 mL of water.

DMF follows FDA guidelines and regulates the opening or closing of shellfish beds in Massachusetts. DMF conducts sanitary surveys of all shellfish areas and their near-shore contributing watersheds, identifying as many sources of possible contamination as it can find. In many cases, road drainage systems are the sources of water pollution. Stormwater runoff can pick up bacteria, as well as other contaminants, as it flows across roads, farmland, other open land, lawns, etc., and dump this water into

storm drain systems, where it flows into coastal waters. Stormwater runoff treatment systems can be effective, depending on a number of factors, in reducing the levels of pollutants discharged to receiving waters. All runoff treatment systems must be tailored to site conditions (soils, slopes, drainage area, amount of impervious area, depth to seasonal high water table, proximity to receiving waters, type of improvement desired, etc.). It is the intent of the sponsors and NRCS to identify road drainage systems where treatment is feasible and will have the greatest impact on water quality in shellfishing areas, and to determine where the local interest is greatest and communities are willing to raise their share of the costs of remediation. NRCS would then enter into agreements with those communities and DMF to carry out works of improvement. NRCS estimates that the Project would improve water quality over 7,300 acres of shellfish beds at a cost of $8.2 million, of which the NRCS share would be $6.4 million. Projects would be constructed over the course of several years to address this resource concern.

Chapter 5
SCOPE OF THE EIS

NRCS conducted a scoping process to identify the concerns of the public, state and local governments, and federal, state, and local agencies and to meet NEPA requirements for public participation. The Cape Cod Conservation District (CCCD) and the Barnstable County Commission's Coastal Resources Committee hosted an initial meeting in Barnstable on October 11, 2001, to introduce the public to the NRCS Small Watershed Program and to explore local problems and NRCS opportunities for addressing those problems. Local citizens and town and state representatives attended the meeting and provided their comments on water resources problems. NRCS then hosted a public meeting in South Yarmouth on May 18, 2005, to seek public input on the watershed plan then in early stages of development. After NRCS gave an introduction to the proposed plan to address stormwater discharges, tidal restrictions on salt marshes, and fish passage obstructions, local citizens and town officials provided comments. Massachusetts NRCS published the notice of its intent to prepare this Plan-EIS in the Federal Register on June 24, 2005, but it received no comments in response to the notice. Throughout this period, the CCCD and NRCS partnership also met individually with congressional staff; town and county governments; the Wampanoag Tribe of Gay Head (Aquinnah); the Mashpee Wampanoag Tribe; federal, state, and local agencies; and state and local interest groups, as described further in Section 7.

The concerns identified by the public are listed in Table 5-1 along with concerns that NRCS is required to address through the NEPA process. The degree of concern is a relative ranking of the importance attached to the concern by the public, primarily measured by the relative number of comments or depth of discussion. The degree of significance is a relative ranking by the agencies involved in the scoping process of the issues that are important for defining the problems or formulating and evaluating alternative solutions. In rating the degree of significance, NRCS and the agencies considered that the current plan covers a broad range of projects and environments and project-specific concerns will be addressed further in NEPA documents tiered to this EIS. NRCS, for example, will evaluate site-specific impacts to threatened and endangered species and cultural resources for each project as it is considered for individual funding. Concerns that are rated high or moderate in significance are discussed in further detail in this Plan-EIS.

Table 5-1
Identified concerns

Economic, social, environmental, and cultural concerns	Degree of concern[1/]	Degree of significance to the decisionmaking[2/]	Remarks	Section of Plan-EIS where concern is discussed
Shellfish beds	High	High	Primary concern of residents, sponsors and Massachusetts DMF (water quality, closure to shellfishing)	6.3.5 6.3.9 6.3.10
Anadromous fisheries	High	High	Primary concern of residents, sponsors and Massachusetts DMF (restricted passages)	6.3.5 6.3.9 6.3.10
Salt marshes	High	High	Primary concern of residents, sponsors and Massachusetts DMF (restricted tidal flushing)	6.3.6
Water quality	High	High	Primary concern of residents and sponsors	6.3.4
Groundwater quality	High	Moderate	May be affected by stormwater projects	6.3.3
Threatened and endangered species	Moderate	Moderate	Analysis of effects required by Endangered Species Act	6.3.7
Human health and safety	Moderate	Moderate	Evaluated for all NRCS projects	6.3.13
Beaches	Moderate	Moderate	Affected by stormwater projects	6.3.10
Wildlife habitat	Moderate	Moderate	May be affected by salt marsh projects	6.3.6
Nontidal wetlands	Low	Moderate	Analysis of effects required by Clean Water Act and Executive Order 11990	6.3.6
Cultural resources	Low	Moderate	Analysis of effects required by National Historic Preservation Act	6.3.12

Economic, social, environmental, and cultural concerns	Degree of concern[1/]	Degree of significance to the decisionmaking[2/]	Remarks	Section of Plan-EIS where concern is discussed
Invasive species	Low	Moderate	*Phragmites* replaced through salt marsh improvements	6.3.6
Prime and important farmland	High	Low	Evaluated for all NRCS projects; not affected by this Project	
Highly erodible cropland	High	Low	Evaluated for all NRCS projects; not affected by this Project	
Local funding for water quality improvements	High	Low	Citizen concern over lack of local funding. Decision making by state and local political bodies	
Public open space	Moderate	Low		
Tax rates	Low	Low	Decision making by Congress and state and local political bodies	
Streamflow	Low	Low	Water withdrawals regulated by the state	
Population growth	Low	Low		
Navigation in tidal channels (dredging)	Low	Low		
Coastal flood zones	Low	Low		
Old water and sewer systems (100+ years)	Low	Low		

[1/] Concerns raised in scoping process or required by Agency or federal policy, rated on relative occurrence of statements of concern

[2/] Relative significance of given concern for defining the problems and formulating and evaluating alternative solutions.

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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:

Category	Value
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

restored to full tidal flushing and, therefore, full ecological function. Table 6-1 shows the estimated habitat unit benefits for each site.

Fish Passage

Site Screening

DMF conducted a survey in 2001 and 2002 to collect information on the present state of fish passage in Massachusetts coastal streams and rivers and help guide future restoration efforts. Statewide, the survey covered 215 coastal streams; 493 lakes, ponds, or reservoirs; and 380 obstructions to migratory fish passage. It also included discussions with regional biologists, harbormasters, and local herring and shellfish wardens. The survey identified 93 existing fish passage structures and approximately 43 active river herring runs in Barnstable County, and it demonstrated that Massachusetts has a large investment in fish passage along the coastal rivers and streams. DMF recommended numerous projects that should be undertaken over the next several years. These projects included the maintenance, repair, and re-design of failing or inefficient existing fishways and the construction of new fishways to provide access to additional spawning grounds (DMF 2004).

The 93 fish passage sites were ranked by DMF using 12 criteria that assessed relative ecological, economic, and social importance as well as the practicality of providing or improving fish passage on Cape Cod. A description of the criteria used to rank the sites and an explanation of the values given for each criterion are shown in Table 6-2. Positive values represent benefits to the overall stream system, and negative values represent impairments. The ranges of values as well as the values themselves were developed by the DMF anadromous fish biologists. The values given for all the criteria were summed to determine a total score for each project site. Sites that ranked high but were given the value "0" for the need criterion were eliminated. The highest ranking 24 remaining sites were selected as priority sites for fish passage restoration. Table B-2 in Appendix B summarizes the evaluation DMF used to rank the original 93 fish passage sites, with the top 24 sites identified by shading. DMF is using the evaluation procedure it developed for this Project to evaluate the remaining statewide fish passage obstructions identified by DMF.

Figure 6-2 shows the location of the 24 fish passage projects, and Table 6-3 describes the conceptual treatment system proposed for each site.

Conceptual Design and Cost Development

NRCS visited each fish passage site to collect information on site conditions and to estimate construction cost for each project. NRCS surveyed the river/stream systems from mouth to headwaters and created a site specific label for each site. At each site, general physical characteristics of the water bodies (spawning areas) and data of specific importance to anadromous fish were noted. All obstructions and fishway characteristics were recorded on a field data sheet and photographed.

Site-specific details were documented for the first impassable obstruction and its impoundment area to assist in the evaluation of future alterations or fish passage possibilities. On some streams, information was gathered on additional impassable obstructions as well. River obstruction type, estimated total and future potential anadromous fish populations, and observed construction issues were recorded. When a fishway was present, the type of design, and needed repairs were recorded along with a brief description of the state of fish passage and the potential for further improvements.

The fish passage obstructions for the Project are manmade. The restrictions fall into the following categories: road culverts, cranberry bog dikes, and dams. The majority of the dams are 6 feet or under in height. Weir pool and notched weir pool fishways were by far the most common designs employed in Cape Cod, followed by the denil ladder, stream baffles, Alaskan Steeppass and combination designs. About half of the existing fishways were judged to be in deteriorated and non-functioning condition.

Construction costs were based on U.S. Fish and Wildlife Service cost for standard denil construction ($25,000 per vertical foot) and NRCS estimates for weir pool construction ($25,000 per vertical foot), Alaskan steep pass construction ($5,600 per 10-foot section), and ditch/channel cleanout/construction ($10,000 per liner foot). Table 6-3 shows the estimated planning-level cost for each site.

Environmental Restoration Benefits

The primary ecological benefit from the fish passage projects is unrestricted access to spawning habitat upstream of the project site (in some cases upstream to the next restriction). The habitat units associated with that benefit were calculated as the acreages of spawning habitat to which full access would be restored. Table 6-3 shows the estimated habitat unit benefits for each site.

Stormwater

Site Screening

Through discussions with town officials and DMF, NRCS identified 160 sites as potential restoration projects for implementation of stormwater best management practices (BMPs). NRCS and DMF used 15 criteria to initially evaluate these sites for stormwater remediation activities (Table 6-4). These criteria ranged from ecological assessments to community-level support to long-term success of a project. The first two criteria were used to screen out sites that (1) were already being addressed by another agency or watershed group or (2) had no feasible solution. For the remaining 13 criteria, numeric values were developed to rank the range of conditions applicable to the criteria (Table 6-4). Through a collaborative process, NRCS and DMF biologists and engineers assigned values for each criterion to each project, summed the values for each project, and ranked the projects by total value. NRCS completed 117 site visits, reviewed topographical and soils maps, delineated drainage areas, developed alternatives, and prepared cost estimates for the recommended BMP alternatives.

Further review and discussion by DMF Area Shellfish Biologists resulted in some re-ordering of the list using subjective criteria, including relationships between areas, the importance and diversity of the shellfishery, and present sanitary classification of the areas. During this process, the highest priority was given to the preservation of open, productive areas where imminent closure was probable. It was decided that these areas present the highest probability for success of mitigation measures and the greatest cost-benefit, as opposed to seeking possible reclassification of areas currently closed. After this process was completed, a final prioritized list of 35 sites was produced. In the process of reviewing these 35 priority sites with town officials for their concurrence, 17 additional sites were identified and had to be re-ranked by DMF. From this final list of 52 sites, the 26 priority were selected for this plan based upon DMF's recommendations on which proposed remediation measures would have a potential impact on classification (high potential = 5, moderate = 3, low = 1). Sites rated as low potential were excluded.

Table B-3 in Appendix B shows the list of 160 sites considered (without ranking values). Table B-4 shows the individual ratings and the rankings of the 52 projects carried through this screening process,

with the top 26 sites identified by shading. Figure 6-3 shows the location of the 26 priority stormwater projects, and Table 6-5 describes the conceptual treatment system proposed for each site.

Conceptual Design and Cost Development

NRCS reviewed several strategies and BMPs that could be used to reduce fecal coliforms in stormwater runoff:

Source reduction:

- Disconnecting roof runoff from the street drainage system, and allowing it to flow to other areas, where it can be recharged into the soil.
- Covering possible sources of contamination, such as animal manure piles, to keep rain water clean.
- Diverting clean water around potential sources of contamination.

Filtration:

- Construction of structures that will capture the first flush of runoff from a storm and treat it by filtering the runoff through sand, or a combination of sand and organic matter. Filtration systems are prone to clogging unless the runoff is pre-treated to remove suspended solids and other fine materials before the runoff enters the filter system. Typically runoff that has been filtered is returned to the existing street drainage system through some sort of outlet. Runoff that exceeds the system's capacity to capture and treat water typically flows through the existing drainage system to receiving waters untreated.

Infiltration:

- Infiltration systems are similar to filtration systems, except that the first flush of runoff is directed into an area where it can infiltrate back into the underlying soils. Otherwise they work the same way. Pre-treatment of runoff to remove suspended solids is vital if the infiltration system is to work for any length of time; in addition, the seasonal high water table must be deep enough below the surface to allow at least a two-foot separation between the bottom of the infiltration system and the water table. In addition, soils need to be permeable enough to allow infiltration of the first flush of stormwater.

Constructed wetlands:

- These only work in areas where the seasonal high water table is high enough to support a wetland, or in areas with relatively impermeable soils (which are very likely to become clogged with fine materials and hold water more or less permanently). They depend on detention of runoff, some settling of sediment (and whatever contaminants are adsorbed onto sediment particles), and biological action by the organisms that grow in the wetland.

Water quality swales:

- Typically these are dry systems, with a dense growth of vegetation, that capture runoff, slow it down, allow sediment to settle, and provide some limited biological treatment.

Other stormwater runoff treatment systems can also be effective, depending on a number of factors. All runoff treatment systems must be tailored to site conditions (soils, slopes, drainage area, amount of

impervious area, depth to seasonal high water table, proximity to receiving waters, type of improvement desired, etc.).

Biologists from DMF and NRCS consulted with the Charles River Watershed Association to finalize the list of BMPs that, given the constraints of each project site, would allow for optimal removal efficiency for fecal coliforms. Two case studies within Massachusetts have demonstrated the effectiveness of infiltration structures and leaching galleys in reducing fecal coliforms in stormwater and in opening shellfish beds back up for harvesting:

> Broad Marsh River Storm Water Remediation Project (EPA 2006): The town of Wareham implemented infiltration structures to reduce suspended solids and fecal coliform bacteria from storm water runoff. The results of this project included a 99 percent removal of fecal coliform, and local shellfish beds were reopened for harvesting.
>
> Lake Tashmoo Storm Water Remediation Project (EPA 2006): The town of Tisbury (Martha's Vineyard) implemented first-flush leaching basins to reduce concentrations of fecal coliform from storm water runoff. Results of this project included a 91 percent decrease in fecal coliforms, and local shellfish beds were reopened for harvesting.

Each site was visited to collect or confirm information on topography, land use, site condition, barriers to successful installation (for example, utilities in street, narrow rights-of-way). Many of the potential BMPs were determined to be infeasible because of the site configuration and space constraints of each project. A BMP was selected for each stormwater project site and a conceptual design was completed in order to develop the cost of each project. Catch basins and infiltration chambers were selected in most areas, because groundwater levels were determined to be too shallow for leaching galleys. Leaching galleys were selected for a few sites where there is adequate depth to groundwater. Other recommended BMPs for only a few projects included the installation of grass swales, constructed wetlands, or other detention facilities.

BMPs were sized for collecting and treating the first inch of runoff. The volume of that runoff was calculated from an estimate of the impervious area (roofs, driveways, pavement, etc.) in the drainage area. To the extent possible, standard designs were used for cost estimates. Table 6-5 shows the estimated planning-level cost for each site.

Environmental Restoration Benefits

The primary ecological benefit from the stormwater management projects is improvement of water quality. The habitat units associated with that benefit were calculated as the acreages of the shellfish beds over which water quality would be improved. For most projects, the habitat units were equal to the total shellfish growing area identified in DMF's shellfish database. In cases where the shellfish area is very large and the area affected by the project is likely to be smaller, DMF scientists estimated the portion of the growing area that is affected by the discharge. Table 6-5 shows the estimated habitat unit benefits for each site.

Table 6-1
Priority salt marsh restoration projects

Site no.	Town	Location	Description of project	Estimated project costs ($)[1/]	Habitat units[2/]
BA-SM-6	Barnstable	Maraspin Creek at Commerce Road	Erosion and scour, phragmites invasion. Restricted by 3-foot CMP (3 X 75 ft). A 16-sq ft culvert would be installed.	255,000	5
BA-SM-12	Barnstable	Unnamed channel off Bumps River at Bay Lane	Sedimentation, phragmites invasion. Wetland restricted by 30-inch concrete headwall (2.5 X 36 ft). A 30-sq ft culvert would be installed.	296,000	10
BA-SM-18	Barnstable	Unnamed Creek at Hawes Avenue	Large Scour basin near opening, minor bank erosion. Wetland restricted by two 3-foot MP (2 X 250 ft). A 36-sq ft culvert would be installed.	975,000	12
BA-SM-19	Barnstable	Snows Creek at Ocean Street	Phragmites invasion, scour basin, vegetation die-off. Wetland restricted by 3-foot MP (3 X 30 ft). A 60-sq ft culvert would be installed.	360,000	20
BN-SM-6	Bourne	Mashnee Rd. culvert	Road restriction has caused phragmites invasion. A 9-sq ft culvert would be installed.	104,000	5
BN-SM-16	Bourne	Kenwood Rd. culvert	Wetland restricted by culvert. Road restriction has caused phragmites invasion. A 12-sq ft culvert would be installed.	238,000	4
BN-SM-28	Bourne	Railroad dike culvert near Pocasset River	Marsh diking has limited salt water inflow and caused phragmites invasion. A 6-sq ft culvert would be installed.	110,000	1
BN-SM-32	Bourne	Bridge off Benedict Road	Inadequately sized bridge crossing, phragmites invasion. An 18-sq ft culvert would be installed.	62,000	8
BN-SM-38	Bourne	Service Road culvert on Canal	Scour basin, erosion. Wetland restricted by roadway. A 24-sq ft culvert would be installed.	203,000	8
BN-SM-39	Bourne	Earthen bog dike culvert on L. Buttermilk Bay	Phragmites invasion. Wetland restricted by dike. A 12-sq ft culvert would be installed.	263,000	4
BN-SM-43	Bourne	Earthen dike culvert off Mashnee Road	Phragmites invasion. Wetland restricted by dike. A 27-sq ft culvert would be installed.	631,000	10

Table 6-1 (cont.)
Priority salt marsh restoration projects

Site no.	Town	Location	Description of project	Estimated project costs ($)[1/]	Habitat units[2/]
BR-SM-6	Brewster	Unnamed channel off Stony Brook at Route 6A	Large scour basin, erosion around headwall, phragmites invasion. Wetland Restricted by 2.5-foot MP (2.5 X 50 ft). A 96-sq ft culvert would be installed.	322,000	32
CH-SM-4	Chatham	Unnamed channel off Bucks Creek at Cranberry Lane	Scouring and bank erosion, phragmites invasion. Wetland restricted by 18-inch MP (1.5 X 31 ft.). A 16-sq ft culvert would be installed.	151,000	6
DE-SM-5	Dennis	Weir Creek at Lower County Road	Minor scouring and bank erosion, phragmites invasion. Wetland restricted by 2-foot C/MP (2 X 57 ft). An 84-sq ft culvert would be installed.	236,000	42
EA-SM-1	Eastham	Rock Harbor Creek at Dyer Prence Road	Major scouring and erosion, vegetation dieback. Wetland restricted by 30-inch concrete headwall (2.5 X 60 ft). A 36-sq ft box culvert would be installed.	288,000	12
HA-SM-4	Harwich	Tributary to the Herring River at Lothrop Road	Phragmites invasion. Wetland restricted by 20-inch CPP (1.75 X 36 ft). A 42-sq ft box culvert would be installed.	279,000	14
HA-SM-9/ CH-SM-7	Harwich/ Chatham	Muddy River at Route 28	Major scouring, bank erosion, vegetation dieback. Wetland restricted by two 2.6 ft X 3.7 ft CBC. A 54-sq ft culvert would be installed.	752,000	18
SA-SM-9	Sandwich	Long Creek/Cow River at Ploughed Neck Road	Phragmites and purple loosestrife invasion. Wetland restricted by 3-foot concrete pipe (50 ft long). A 160-sq ft box culvert would be installed.	303,000	80
TR-SM-4	Truro	Pamet River at Route 6	Phragmites invasion. Wetland restricted by 4-foot concrete pipe (4 X 375 ft). A 450-sq ft culvert would be constructed.	2,225,000	152
WE-SM-3	Wellfleet	Blackfish Creek at Route 6	Scouring, erosion, vegetation dieback. Wetland Restricted by 2-foot MP (2 X 125 ft). A 51-sq ft culvert would be installed.	660,000	17

Table 6-1 (cont.)
Priority salt marsh restoration projects

Site no.	Town	Location	Description of project	Estimated project costs ($)[1/]	Habitat units[2/]
WE-SM-4	Wellfleet	Indian Neck marsh channel at earthen dike	Scouring and erosion, conversion to freshwater wetland. Wetland restricted by 1-foot CMP (1.25 X 30 ft). A 21-sq ft culvert would be installed.	95,000	7
WE-SM-5	Wellfleet	Mayo Creek at Commercial Street	Scouring and erosion, phragmites invasion. Wetland restricted by 30-inch CMP (2.5 X 90 ft). A 57-sq ft culvert would be installed.	369,000	19
WE-SM-6	Wellfleet	Herring River at Chequessett Neck Road	Conversion to upland, acidified water, metal leaching, phragmites invasion. Wetland restricted by one 6-foot and two 7-foot box culverts (44 ft. long). A 3,000-sq ft culvert would be constructed with a bridge opening, which also allows fish passage.	4,795,000	1,000
YA-SM-2	Yarmouth	Hallets Mill Pond at Mill Lane	Scouring and erosion, phragmites invasion. Wetland restricted by 2-foot pipe (2 X 50 ft). An 18-sq ft culvert would be installed.	242,000	6
YA-SM-3	Yarmouth	Short Wharf Creek at Thacher Shore Road	Scour and bank erosion, vegetation dieback. Wetland restricted by 2-foot CP (2 X 50 ft). A 12-sq ft culvert would be installed.	175,000	4
YA-SM-5	Yarmouth	Unnamed channel into salt pond at Bayview Street	Scour, some phragmites invasion. Wetland restricted by 18-inch CP (1.5 X 210 ft). An 8-sq ft culvert would be installed.	153,000	1
			Total	14,542,000	1,497

[1/] Estimated project costs include construction, contingencies (15%), engineering services (8%), administration/ inspection (6% federal; 2.4% local), permits, and land rights. Because salt marsh restoration projects require an additional level analysis for implementation, the estimated costs include an additional project management and engineering cost at 45% of construction costs (based on information from CZM's Wetlands Restoration Program).
[2/] Acres of salt marsh habitat restored.
Notes:
CMP=Corrugated Metal Pipe
MP=Metal Pipe
CPP=Corrugated Plastic Pipe
C/MP=Metal-lined Concrete Pipe
CBC=Concrete Box Culvert
CP=Concrete Pipe

Table 6-2
Criteria used to determine priority fish passage obstruction remediation projects

Criterion	Description of criterion	Description of value	Value
Obstruction number	Stream obstructions (dams, culverts), even if provided with fish passage facilities, can prevent river herring from reaching spawning grounds. The number of obstructions on a stream presents a negative factor in determining potential for development in a system.	Constant	-3 per obstruction
Acreage	Potential population size is loosely related to the amount of habitat available in a system. The total acreage available is important in determining the systems priority for fishway work.	1-5 acres	0
		6-20 acres	3
		21-50 acres	6
		51-100 acres	9
		100 + acres	12
Existing populations[1/]	Most river systems on Cape Cod that have significant habitat currently have populations of river herring. DMF emphasizes that future work should be on preserving existing populations rather than creating new ones. This criterion is important in developing priorities.	Low Population	0
		High Population	15
Stream flow[1/]	Some streams within Cape Cod have chronically low stream flows during fall juvenile migration periods, resulting in occasional loss or partial loss of a year class. The priority for development was reduced for these streams depending on the severity of the problem.	No Stream Flow	-10
		Good Stream Flow	0
Public access[1/]	Some streams are more accessible to the public for recreation than others. Accessible systems were increased in ratings.	Not Accessible	0
		Accessible	5
Water quality issues[1/]	If water quality was considered sufficiently poor to affect productivity of river herring populations, negative values were assigned to the system.	Poor	-5
		Good	0
Conflicting water usage[1/]	Demand on water for agricultural purposes (cranberry bogs) and occasionally public water supplies can have a deleterious effect on river herring populations. Where this situation exists, negative values were given.	Agricultural Demand	-5
		No Agricultural Demand	0

Table 6-2 (cont.)
Criteria used to determine priority fish passage obstruction remediation projects

Criterion	Description of criterion	Description of value	Value
Construction difficulty[1/]	In some situations, the construction of passage facilities is technically difficult or overly expensive. The rating was reduced accordingly.	Difficult	-5
		Not Difficult	0
Environmental benefits[1/]	The provision of fish passage at some locations would provide benefits to other anadromous species, such as American shad and smelt. Additional value was given to these systems.	No Benefit	0
		Benefit	3
Community support[1/]	If a town, city, environmental organization, community group, etc. has expressed support for the project, extra value was given to the system.	No Support	0
		Support	3
Need	Some fish passage structures are currently adequate while others have varying needs of replacement or repair. Where passage was obstructed, restricted, or deteriorating, higher values were given.	None (passage unimpeded)	0
		Preventive (deteriorating)	5
		Necessary (restricted passage)	10
		Critical (obstructed passage)	15

[1/] For this criterion, a range of values was given in evaluating the site; only the low and high values are depicted on the table.

Table 6-3
Priority fish passage obstruction remediation projects

NRCS site number	Town	Waterbody	Description of project	Estimated project costs ($)[1/]	Habitat units[2/]
BA-FP-LE-1	Barnstable	Red Lilly Pond	Outlet to Lake Elizabeth and Red Lily Pond. Install concrete abutments with provisions for flash boards. Replace fishway.	36,000	10
BA-FP-MMR-2	Barnstable	Marston Mills River	Location of the Mill Pond Dam and fish ladder. Replace existing concrete notched weir fishway.	478,000	6
BA-FP-MMR-5 [3/]	Barnstable	Marston Mills River	Install 2 channel retention structures at pond outlet for a distance of approx. 20 feet into pond. Extension would be a concrete wall.	170,000	250
BA-FP-SanR-1 and	Barnstable	Santuit River	Bog sluice. Replace fishway.	170,000	166
MA-FP-SR-2 [4/]	Mashpee	Santuit River	Outlet to Santuit Pond. Install three sections of Alaskan steep pass along with resting and connector sections.	118,000	
BA-FP-WL-1	Barnstable	Wequaquet Lake	Outlet of Wequaquet Lake. Remove sand and install two channel retention structures at the outlet of Wequaquet Lake. Also, remove sand and retain channel below Long Pond.	225,000	702
BO-FP-MR-2 and	Bourne	Monument River	Benoits Pond Dam. Concrete Work - Hole in floor of sluice and sections needing gunite treatment. Remove sections of loose and cracked concrete, repair and replace as needed.	67,000	501
BO-FP-MR-3 [4/]			Concrete deflector barrier dam with stop logs is needed.	118,000	
BO-FP-RB-1 and	Bourne	Red Brook	Two Alaskan steep pass sections along with resting and connector sections.	181,000	17
BO-FP-RB-2 [4/]			Repair a leaking notched weir pool.	56,000	
BR-FP-SB-3	Brewster	Stoney Brook	600 linear feet of channel retention needed.	139,000	386

Table 6-3 (cont.)
Priority fish passage obstruction remediation projects

NRCS site number	Town	Waterbody	Description of project	Estimated project costs ($)[1/]	Habitat units[2/]
CH-FP-LL-1 and	Chatham	Lovers Lake	Upstream of culvert, replace current fishway with one section of Alaskan steep pass along with resting and connector section.	36,000	16
CH-FP-LL-1A and			Current culvert has collapsed and restricting passage of fish. Culvert needs to be replaced.	555,000	
CH-FP-LL-2 [4/]			Replace current fishway with one section of Alaskan steep pass along with resting and connector section.	36,000	
CH-FP-LL-4 [5/]	Chatham	Lovers Lake	Replace current fishway with one section of Alaskan steep pass along with resting and connector section.	36,000	36
DE-FP-SC-1	Dennis	Sesuit Creek	Scargo Lake Outlet. Sand deposition blocks outlet. Extend existing channel retention structure for approx. 20 feet into Long Pond. Extension would be concrete wall. Two 20-foot walls are needed. Replace culvert under an un-paved connector, and clean culvert between the pond outlet and culvert under Doctor Lord's Road S.	994,000	53
EA-FP-HR-1	Eastham	Herring River	Sand deposition blocks outlet. Extend existing channel retention structure for approx. 20 feet into pond. Extension would be concrete wall (2 walls are needed).	118,000	42
FA-FP-ChR-2	Falmouth	Childs River	Install self cleaning screened barrier for downstream migrating juveniles.	26,000	317
FA-FP-CL-1	Falmouth	Cedar Lake Ditch	Road construction issues.	170,000	21
HA-FP-HR-3	Harwich	Herring River	Outlet to Long Pond. Sand deposition blocks outlet to Long Pond. Extend existing channel retention structure approx. 30 feet into Long Pond. Extension would be concrete wall.	181,000	1,119

Table 6-3 (cont.)
Priority fish passage obstruction remediation projects

NRCS site number	Town	Waterbody	Description of project	Estimated project costs ($)[1/]	Habitat units[2/]
MA-FP-QR-7	Mashpee	Quashnet River	Sand deposition blocks outlet. Extend existing channel concrete retention structure for approx. 30 feet into the pond. Two 30-foot walls needed.	118,000	317
OR-FP-PL-1	Orleans	Pilgrim Lake	A complete replacement is needed. Replacement includes a 415-foot-long series of notched weir pools.	1,104,000	39
WE-FP-HR-1	Wellfleet	Herring River	Removal of obstruction and construction of bridge.	—[6/]	157
YA-FP-WB-1	Yarmouth	Whites Brook	Work on Fish Passage. 10-foot Alaskan Steep Pass section to be attached to pond level concrete control structure. Install resting section and connector section. Open section from the control structure to the pond.	118,000	36
			Total Cost	5,250,000	4,191

[1/] Estimated project costs include construction, contingencies (15%), engineering services (12%), administration/ inspection (6% federal; 2.4% local), permits, and land rights. The estimated costs include an additional project management and engineering cost at 43% of construction costs based on information provided by the Massachusetts Division of Marine Fisheries to plan, design and implement site specific projects.
[2/] Acres of spawning habitat to which access has been fully restored.
[3/] Completion of BA-FP-MMR-2 is required for anadromous fish to have access to BA-FP-MMR-5.
[4/] The following sites are grouped together because all improvements are needed to provide access to the same spawning areas:
BA-FP-SanR-1 and MA-FP-SR-2; Total spawning area = 166 acres
BO-FP-MR-2 and BO-FP-MR-3; Total spawning area = 501 acres
BO-FP-RB-1 and BO-FP-RB-2; Total spawning area = 17 acres
CH-FP-LL-1, CH-FP-LL-1A, and CH-FP-LL-2; Total spawning area = 16 acres
[5/] Completion of CH-FP-LL-1, CH-FP-LL-1A, and CH-FP-LL-2 is required for anadromous fish to have access to CH-FP-LL-4.
[6/] Fish passage will be accomplished with construction of the bridge under the salt marsh restoration objective (see site no. WE-SM-6 in Table 6-1). There are no additional costs for fish passage.

Table 6-4
Criteria used to determine priority stormwater remediation projects

No.	Criterion	Description	Value
1	Is someone else addressing this site? Yes/No If there are other agencies or watershed groups conducting restoration, then site is removed from the list.		0
2	Is there a feasible solution? Yes/No If feasible, continue with ranking; otherwise stop the site ranking		0
3	Distance from discharge site to target shellfish beds	less than 50 ft 50 ft - 500 ft greater than 500 ft.	5 3 1
4	Other land uses may impact shellfish beds	None Other stormwater discharges Many uncontrollable sources	5 3 1
5	Community support	Support Neutral Oppose	5 3 1
6	Land rights	Public land 1 private landowner More than 1 private landowner	5 3 1
7	Additional beneficial impacts (beaches, sediment reduction for fish runs, flooding)	More than 1 One None	5 3 1
8	Negative environmental impacts?	No Yes	5 1
9	Discharges to salt marsh	Marsh immediately downstream Marsh immediately upstream No salt marsh	5 3 1

Table 6-4 (cont.)
Criteria used to determine priority stormwater remediation projects

No.	Criterion	Description	Value
10	Potential for future development in the watershed	Little Some Major	5 3 1
11	Monitoring data to support closures available?	Yes No	5 1
12	Animal impacts	None Some Major	5 3 1
13	Productivity of shellfish beds	High Moderate Low	5 3 1
14	Aquaculture present?	Yes No	5 1
15	Outfall within Area of Critical Environmental Concern?	Yes No	5 1

Table 6-5
Priority stormwater remediation projects

Site no.	Town	Location	Description of the project[1/]	Estimated project costs ($)[2/]	Habitat units[3/]
BA-SW-1	Barnstable	Cotuit Town Pier at Oyster Place Road	Install 12 infiltration systems to treat runoff from Main St and Oyster Rd. enter Cotuit Bay	227,000	536
BA-SW-2	Barnstable	Cotuit Old Shore Rd from Main St. to Boat Landing	Install 4 infiltration systems to treat runoff from Main St. and all runoff from Old Shore Rd discharge into Cotuit Bay	71,000	536
BA-SW-9	Barnstable	East Bay Boat Ramp	Install 4 infiltration systems to treat runoff from East Bay Rd. enters East Bay	78,000	157
BA-SW-13	Barnstable	Bay Shore Rd	Install 52 infiltration systems to treat runoff from several subdivision roads enters Lewis Bay	976,000	46
BA-SW-18	Barnstable	Scudder Lane Boat Ramp	Install 6 infiltration systems to treat runoff from Scudder Lane enters Barnstable Harbor.	105,000	2,092
BO-SW-4	Bourne	Cohasset Narrows	Install 50 infiltration systems to treat runoff from Rt. 6, cross streets and adjacent developed property flows into Buttermilk Bay; traffic, access, and safety are issues; tourist economy and other concerns must be addressed.	1,183,000	221
BO-SW-7	Bourne	Queen Sewell Cove	Install 14 infiltration systems to treat runoff from Lewis Point Rd enters Queen Sewell Cove	255,000	98
DE-SW-4	Dennis	Fisherman's Landing	Install 2 infiltration systems to treat surface runoff from boat ramp and Fishermans Landing Rd. discharge into Kelley's Bay; alternative BMP would be to repave plot with unit pavers designed to infiltrate runoff.	44,000	298
DE-SW-5	Dennis	Leif Ericson	Install 3 infiltration systems to treat runoff from residential streets are collected by catch basin and discharge to Kelley's Bay	71,000	298
DE-SW-11	Dennis	Wrinkle Point	Install 5 infiltration systems to treat surface runoff from road discharges into Bass River	69,000	204

Table 6-5 (cont.)
Priority stormwater remediation projects

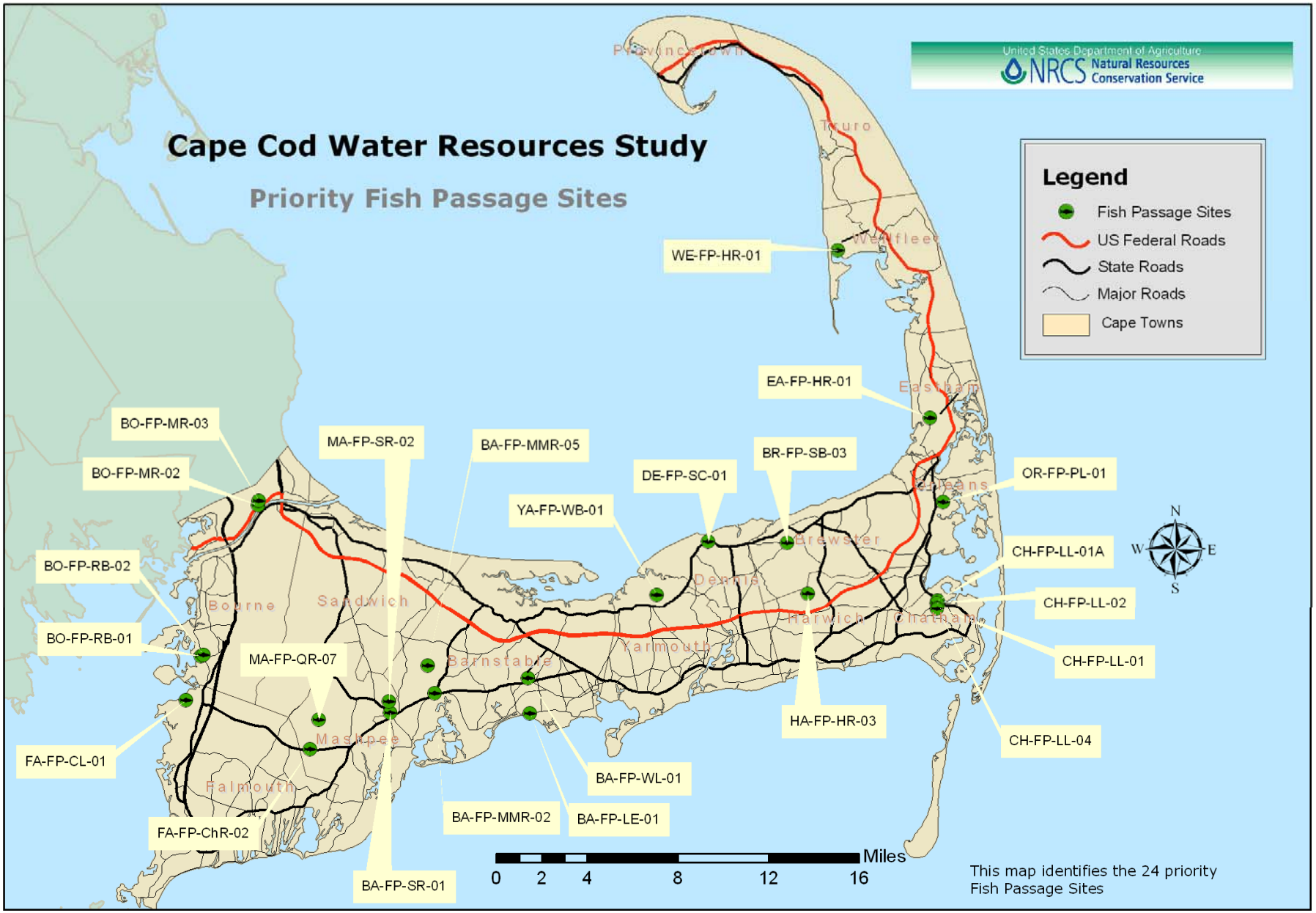
Site no.	Town	Location	Description of the project[1/]	Estimated project costs ($)[2/]	Habitat units[3/]
EA-SW-1	Eastham	Salt Pond	Install 2 infiltration systems to treat runoff is delivered through storm system to Salt Pond; alternative BMP would be to construct wetland - swale	297,000	22
EA-SW-4	Eastham	Fort Hill	Install 7 infiltration systems to treat runoff is delivered through road cuts to the marsh affecting WQ and shellfish areas in Town Cove	153,000	416
FA-SW-2	Falmouth	Curley Blvd	Install 28 infiltration systems to treat runoff from Curley Blvd and Quaker Rd discharges into Dam Pond through drainage system and overland flow- then into Wild Harbor River and Buzzards Bay; alternative BMP would be to repave plot with unit pavers designed to infiltrate runoff.	480,000	17
HAR-SW-1	Harwich	Hulse Pt	Install 1infiltration systems to treat surface runoff from road discharge into Doanes Creek	41,000	19
HAR-SW-2	Harwich	Lower County Rd.	Install 8 infiltration systems to treat surface runoff from road and marina discharge into Allens Harbor	266,000	19
MA-SW-2	Mashpee	Shoestring Bay	Install 6 infiltration systems to treat runoff from Mashpee Neck Rd. discharges to Shoestring Bay; alternative BMP would be to repave plot with unit pavers designed to infiltrate runoff.	99,000	102
ORL-SW-3	Orleans	High Tide Ln. Marina	Install 4 infiltration systems to treat surface runoff from road and marina discharge into Meeting House Pond	110,000	314
PR-SW-1	Provincetown	Provincetown Inn	Install 8 infiltration systems, based on Town's consultant's recommendations for Phase I outfall modifications	485,000	131
WE-SW-5	Wellfleet	Holbrook Ave	Install 7 infiltration systems to treat surface runoff from Holbrook Rd discharges into Mayo Creek	111,000	247

Table 6-5 (cont.)
Priority stormwater remediation projects

Site no.	Town	Location	Description of the project[1/]	Estimated project costs ($)[2/]	Habitat units[3/]
WE-SW-6	Wellfleet	Commercial St.1	Install 16 infiltration systems to treat surface runoff from Commercial St., E. Commercial St., and Railroad Ave. including sidewalks, lots, and roofs discharge into Duck Creek	448,000	247
YA-SW-5	Yarmouth	Mill Creek @ 28	Install 116 infiltration systems to treat runoff from Rt. 28 discharges into Mill Creek via storm drain system	1,918,000	26
YA-SW-7	Yarmouth	Mill Creek @ Bogs	Install 12 infiltration systems to treat runoff from Rt. 28 discharge to Mill Creek via storm drain system	265,000	26
YA-SW-32	Yarmouth	Susan Rd.	Install 6 infiltration systems to treat runoff from Susan Rd discharges to Follins Pond via road cuts and storm drain system	94,000	298
YA-SW-33	Yarmouth	Aunt Dorahs	Install 8 infiltration systems to treat runoff from Aunt Dorah's Ln discharge to Follins Pond via pocket wetland	126,000	298
YA-SW-35	Yarmouth	Longview	Install 10 infiltration systems to treat runoff from Longview Rd discharges to Follins Pond via storm drain system and overland flow	153,000	298
YA-SW-45	Yarmouth	Merchant Ave 2	Install 4 infiltration systems to treat runoff from Merchant Rd discharges to Folins Pond via storm drain system and overland flow	67,000	298
			Total	8,192,000	7,264

[1/] This description is of an alternative that appears feasible and capable of improving water quality for the shellfish area. The most cost efficient and best practices (described on page 6-5) will be determined on a site by site basis during the implementation phase of the project.
[2/] Estimated project costs include construction, contingencies (10-15%), engineering services (24 %), administration/inspection (6% federal; 2.4% local), permits, and land rights.
[3/] Acres of shellfish bed over which water quality would be improved by the stormwater remediation project.

Fig. 6-1 Priority salt marsh sites


United States Department of Agriculture
NRCS Natural Resources Conservation Service
Cape Cod Water Resources Study
Priority Fish Passage Sites
Legend
Fish Passage Sites
US Federal Roads
State Roads
Major Roads
Cape Towns
WE-FP-HR-01
EA-FP-HR-01
OR-FP-PL-01
BR-FP-SB-03
DE-FP-SC-01
YA-FP-WB-01
BA-FP-MMR-05
MA-FP-SR-02
BO-FP-MR-03
BO-FP-MR-02
BO-FP-RB-02
BO-FP-RB-01
MA-FP-QR-07
FA-FP-CL-01
FA-FP-ChR-02
BA-FP-SR-01
BA-FP-MMR-02
BA-FP-LE-01
BA-FP-WL-01
HA-FP-HR-03
CH-FP-LL-04
CH-FP-LL-01
CH-FP-LL-02
CH-FP-LL-01A
Provincetown
Truro
Wellfleet
Eastham
Orleans
Brewster
Dennis
Harwich
Chatham
Yarmouth
Barnstable
Mashpee
Falmouth
Sandwich
Bourne
N
W
E
S
Miles
0 2 4 8 12 16
This map identifies the 24 priority Fish Passage Sites

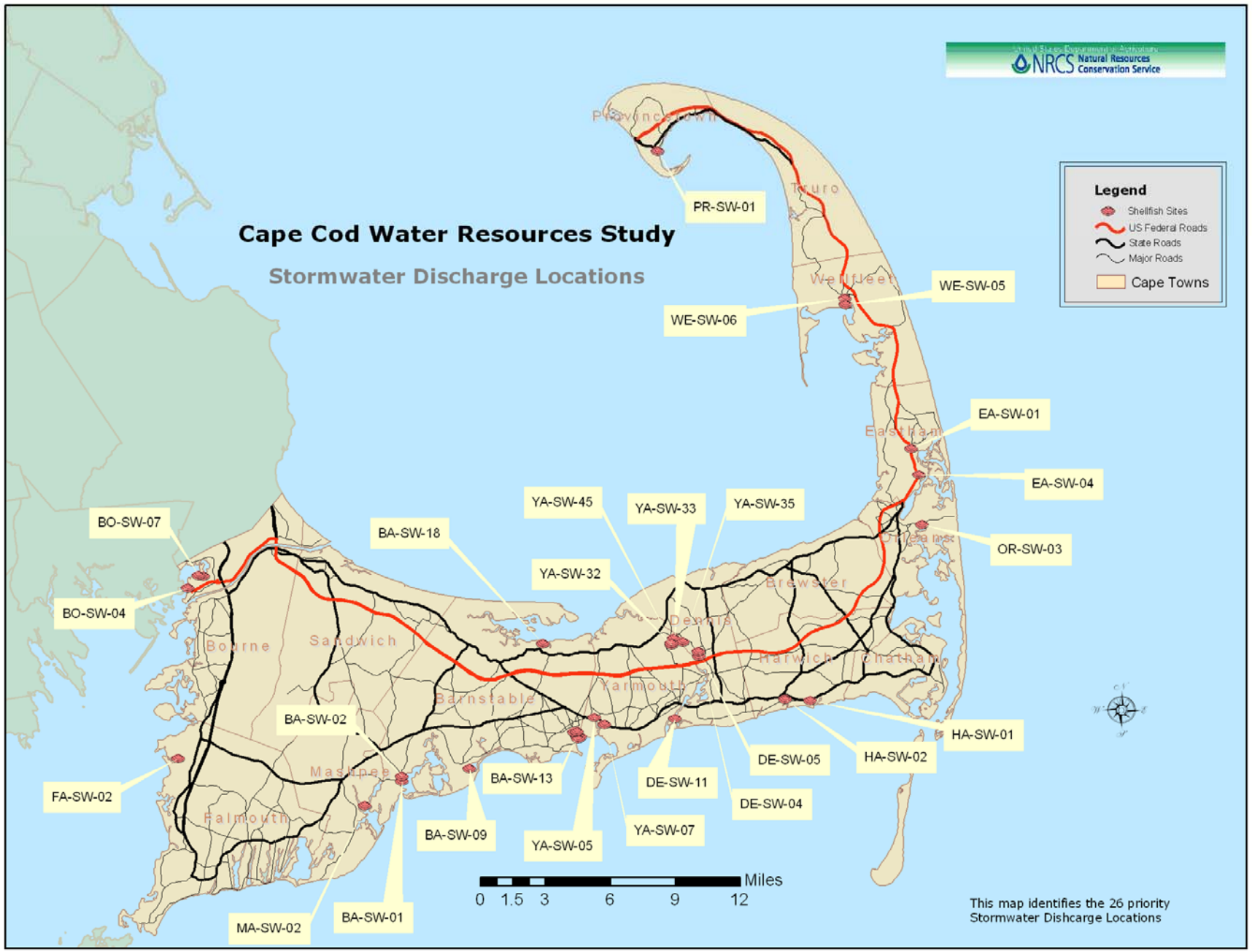


Fig. 6-3 Priority stormwater sites

6.2 DESCRIPTION OF ALTERNATIVE PLANS

Proposed Action—Cape Cod Water Resources Restoration Project

The proposed action is for NRCS to provide funding and technical assistance for projects to (1) restore degraded salt marshes by improving tidal flushing in salt marshes where road culverts and other restrictions have significantly reduced tidal flushing, (2) restore anadromous fish passages by restoring fish ladders and other fishways that have deteriorated, and (3) improve water quality for shellfishing areas by treating stormwater runoff.

Through the ranking process described in Section 6.1, NRCS has developed lists of priority sites for each of these three categories of projects. These projects are summarized in Table 6-1 (26 salt marsh sites), Table 6-3 (24 fish passage sites), and Table 6-5 (26 stormwater sites). More details on each project (site photographs, descriptions, cost estimates) are available through the NRCS office in Amherst, Massachusetts (see page i for contact information). The total cost for category of project is:

Salt marsh sites	$ 14.5 million
Fish passage sites	$ 5.3 million
Stormwater sites	$ 8.2 million
Total	$ 28.0 million

NRCS estimates that these funds will be expended over a 10-year period after the Cape Cod Project funding is appropriated by Congress.

The projects listed in Section 6.1 may not be the final list of projects that eventually get implemented under the Cape Cod Project. Selection of final projects will depend (1) on which projects are brought forward for final assistance by the towns, the County, and/or EOEA, and (2) on the results of a final, detailed evaluation of each site, including costs and environmental impacts and benefits. New sites may be proposed by the local organizations. A new site would be evaluated first by NRCS through the screening/ranking process described in Section 6.1, and if it ranks within the range of the sites currently on the priority list, it would be added to the list and become eligible for assistance.

No Action Alternative

Under the No Action Alternative, NRCS would not provide funding or technical assistance to projects for treating stormwater on Cape Cod. NRCS would continue to provide funding and technical assistance for restoring tidal marshes and restoring fish passages under the Farm Bill's Wildlife Habitat Incentives Program (WHIP) and/or the Wetlands Restoration Program (WRP) if funding is available. The County, towns, or EOEA may choose to implement some of these projects through state, local, or other sources of federal funding, but the number of projects to be implemented would be substantially less. NRCS estimates that the current level of restoration/remediation work on the Cape is one or two salt marsh restoration projects, one or two fish passage replacements, and one to three stormwater remediation projects each year. Some federal funding for these projects is declining, though, and the number of projects is expected to decline in the future. NRCS estimates that it would take the Sponsors twenty years to achieve their objectives for restoring the proposed sites without the Project action.

6.3 EFFECTS OF ALTERNATIVE PLANS

In this section, the effects of the Proposed Action and No Action Alternatives on the natural and human environment are described. Resources that are not affected by either alternative (for example, geology, climate) are not included in this section.

Under either alternative a certain number of environmental restoration projects may be conducted each year by the County, the towns, and EOEA using funding sources other than NRCS. It is not possible to project into the future how many such projects will occur, and given declining federal funding from other sources, the current level of projects may not be sustained in the future. The impacts from these projects will occur under either alternative, so they are not factors in deciding between the two alternatives. Therefore, these non-NRCS projects are not discussed as components of either the Proposed Action or No Action Alternatives.

In addition to the impacts described in this section, construction of projects funded under the proposed Cape Cod Water Resources Restoration Project would have short-term, minor effects on vegetation, animals, noise, traffic, the local economy (jobs), and people in the immediate vicinity of the construction. In general, though, these projects would be small in scope with the entire construction period typically being one or two weeks up to one or two months, and best management practices would be used to minimize environmental impacts. These impacts, therefore, are not discussed in detail.

6.3.1 AIR QUALITY

Proposed Action Alternative

Barnstable County is currently designated as a moderate nonattainment area for 8-hour ozone, which means that the applicability of the Clean Air Act General Conformity rule must be assessed. The rule applies if the total of direct and indirect emissions from a proposed federal action in a nonattainment area exceed the threshold levels specified in EPA's air quality regulations (40 CFR 93.153(b)(1)). For areas of moderate ozone nonattainment, these thresholds are 100 tons/year of nitrogen oxides (NO_X) and 50 tons/year of volatile organic compounds (VOCs), which are the pollutants most responsible for the formation of ground-level ozone.

Each of the components of the restoration Project (salt marsh, stormwater, and fish passages improvements) would result in emissions of air pollutants from construction equipment. In order to evaluate the applicability of this Clean Air Act requirement, annual air emissions were calculated for each of the three mitigation tasks. Air emissions were estimated from equipment types, engine sizes, and estimated hours of operation for a typical project and from emission factors for diesel engines in EPA's AP-42 emission factor document (EPA 1995). This screening-level calculation was a conservative approach, designed to overestimate actual emissions. The emission calculations and assumptions are provided in Appendix C-1.

The emission analysis focused on NO_X, because VOC emissions by comparison are negligible for such construction activities. Assuming four stormwater projects, four salt marsh projects, and three fish passage projects per year, NO_X emissions would be approximately 9 tons/year. This level of emissions would be well below the 100 tons/year threshold, so the General Conformity Rule would not apply to the

Cape Cod Project and no further air quality analysis is required. In fact, the number of annual projects could increase ten-fold, and the Project would still remain under the NO_X significance threshold.

No Action Alternative

None of the proposed construction projects would occur under the No Action Alternative; there would be no construction-related air emissions and no change in air quality.

6.3.2 SOILS

Proposed Action Alternative

Each of the proposed projects, regardless of which type of project it is, would result in short-term, minor disturbance of soils in the construction area. Erosion and sediment control measures would be employed for each project, and the soils would be restabilized by vegetation after construction is completed. An erosion and sediment control plan would be prepared before construction could begin on any project. None of the projects would affect prime or important farmland soils.

The salt marsh projects would have long-term, moderate impacts on the soils within and immediately adjacent to each salt marsh restoration site. The influx of salt water to a higher elevation would increase flooding of those soils, which, in turn, would increase periods of low dissolved oxygen in the soil, increase salt content, and alter chemical properties. The reintroduction of tidal water would promote the growth of salt marsh vegetation that is tolerant of these conditions.

The proposed fish passage projects would have no long-term effect on soils.

The proposed stormwater projects are designed to capture the first inch of runoff and route it through the soil to filter out bacteria and other pollutants. These projects, therefore, would have long-term, minor effects on soils by increasing the loading of pollutants. The effects are considered minor because the area affected at each project site is small, the sites are all in developed areas (mostly roadways or adjacent to roadways), and the practice of using soils for runoff treatment has become well established and accepted.

No Action Alternative

Construction would not occur under the No Action Alternative; therefore, no effects to soils would occur.

Salt marshes that are currently experiencing changes in vegetation and marsh substrate erosion would continue to deteriorate. Soils would be expected to continue decomposing, resulting in increased erosion and subsidence and in persistent open water areas. A lack of sediment accretion would decrease the ability of salt marshes to keep pace with rising sea levels.

6.3.3 GROUNDWATER

Proposed Action Alternative

The proposed salt marsh projects may affect local groundwater resources. Removing tidal restrictions would increase the amount of water entering the salt marsh, potentially elevating the water table in adjacent freshwater wetlands and surrounding uplands, particularly during the higher monthly (spring) tides. Elevated groundwater levels have the potential to affect nearby septic systems, water wells, and even buildings on properties around the marsh. Although each potential restoration site was selected because septic systems or private wells are not thought to be located near the marsh, site-specific Environmental Evaluations tiered to this EIS would re-evaluate this potential problem for each marsh project to ensure there would be no problems. A topographic survey would be performed to aid in determining the effects on surrounding properties.

The proposed fish passage projects would not affect groundwater.

The proposed stormwater projects are designed to capture the first inch of runoff and route it through the ground to filter out bacteria and other pollutants. These structures only work if there is an adequate depth of soil above the existing water table to provide this filtering function. Furthermore, all projects are located within 200 feet of tidal waters (and mostly within 50 feet), so the water routed to the soil would move toward those surface waters. These projects, therefore, are not expected to adversely affect groundwater, and they would have no effect on Cape Cod's sole source aquifer.

No Action Alternative

Groundwater would not be affected under the No Action Alternative; existing conditions would continue.

6.3.4 SURFACE WATERS

Hydrology

Proposed Action Alternative

The proposed salt marsh projects would enhance the hydrology within each restored marsh to as close to its pre-restriction condition as possible without causing other negative impacts, and they would restore tidal influence to a larger area of the Cape. The replacement of inadequately sized, damaged, or blocked culverts would allow greater tidal exchange between the marsh and the outside bay or estuary. Increasing the size of the undersized culverts or bridges would also allow increased outflow of upland runoff, reducing or eliminating any backwater effects the restrictions may now have on storm flows. The reintroduction of tidal flushing would also affect freshwater wetlands, ponds, or streams that become inundated by tidal water, converting these areas to salt marsh or other forms of intertidal habitat. These impacts would be addressed in site-specific Environmental Evaluations.

The salt marsh projects have the potential to affect the use of adjacent properties because of increased water levels. In the time since the marsh inlets became restricted, the towns or the property owners around the marshes may have constructed roads or buildings or other structures that could be adversely affected by higher water levels. NRCS screened out sites where impacts to such structures could be

determined in advance. Each specific project proposed for funding, however, would be evaluated in more detail in the site-specific Environmental Evaluation to ensure that adjacent structures would not be affected. This evaluation could include field surveys and hydrologic modeling, which would include the analysis of storm surges and possible flooding events.

The proposed fish passage projects would only have local, minor effects on hydrology. The improved passages may remove local blockages and divert some flow, for example, from a spillway to the fishway, but there would be no effect on stream hydrology above or below the project site.

The proposed stormwater projects would also have local, minor effects on hydrology because the first inch of runoff would be routed from the surface drainage way to the ground. This effect is minor because the project sites are located within 200 feet of the receiving water at the most downstream ends of the local watersheds and the areas affected are small.

All salt marsh and fish passage projects and possibly some of the stormwater projects would require construction activities in the floodplain. There would be no above-ground permanent structures placed in the floodplain and no permanent changes to the functioning of the floodplain from any projects.

No Action Alternative

There would be changes to existing hydrology on Cape Cod from the No Action Alternative. The restrictions on tidal marsh inlets would continue to reduce tidal flow into the marshes and possibly reduce flood flows out of the marshes. Over time, some restrictions could close further from additional siltation or blockage, thereby restricting tidal flushing even more.

Water Quality

Proposed Action Alternative

The proposed salt marsh and fish passage projects would cause short-term, minor, increases in turbidity in the surface water at the construction site and for some distance downstream. Some construction in the waters themselves would be required for many projects, although the projects are generally small enough that equipment would not have to enter the waters directly. In-water construction activity for the proposed salt marsh and fish passage projects is estimated to take a few days up to a few weeks. Some projects may require the temporary construction of a cofferdam to conduct work in dry conditions and minimize potential effects on water quality. Silt curtains may also be used to minimize migration of turbidity offsite from instream construction. Banks that may be disturbed during construction activities would be restored and stabilized, so there would be no long-term negative effects to water quality.

As discussed above for soils, to minimize movement of soils into the adjacent receiving water, erosion and sediment control measures would be employed for all projects that would disturb the land, and the soils would be restabilized by vegetation after construction is completed. An erosion and sediment control plan would be prepared before construction could begin. If the disturbed area exceeds one acre, a general NPDES permit for construction activities would be required from EPA before construction could begin.

The proposed salt marsh projects would have several long-term effects on water quality in Cape Cod's salt marshes and adjacent estuaries. Increased tidal flushing would reduce the retention times of organic,

oxygen-demanding substances and increase the flow of well-oxygenated water, thereby improving dissolved oxygen concentrations in the marsh. Increased flushing would also increase the abilities of the marshes to function in trapping nutrients, which could improve water quality in adjacent bays and estuaries, and in exporting detritus, which would increase food supply to organisms in the bays and estuaries. Increased flushing may also dilute and reduce concentrations of fecal coliform bacteria upstream of the obstruction.

The proposed fish passage projects would provide long-term, minor water quality benefits in the immediate vicinity of the project and downstream because dissolved oxygen concentrations would be increased by greater aeration of the water passing down the steps of the fishway.

As demonstrated in the two Massachusetts projects cited in Section 6.1, the proposed stormwater projects would result in long-term improvements in water quality from the reductions of fecal coliform bacteria and other contaminants associated with storm water runoff. These effects would occur primarily through the infiltration of runoff through layers of natural media (e.g. pea gravel, clean stone, and grass) or soil, and removal of fines and fecal coliform bacteria. These improvements would complement the state's and towns' efforts to reduce fecal coliform bacteria in these waters through the TMDL being prepared by the state. They will contribute toward the goal of having these waters meet the state standard for bacteria, and removing these waters from the state's list of impaired waters. Priority stormwater remediation projects (Table 6-5) would benefit the following waterbodies listed by the State as needing a TMDL (Category 5 waters) for pathogens or nutrients:

Project Site No.	Waterbody Improved	TMDL Pollutant	TMDL Reference
BA-SW-13	Hyannis Harbor	pathogens	DEP (2005a)
WE-SW-6	Duck Creek	pathogens	DEP (2005a)
BA-SW-2	Cotuit Bay	pathogens	DEP (2005a)
PR-SW-1	Provincetown Harbor	pathogens	DEP (2005a)
BO-SW-4	Buttermilk Bay	pathogens	DEP (2005a)
DE-SW-11	Bass River	pathogens	DEP (2005a)
YA-SW-5	Mill Creek	nutrients pathogens	DEP (2004b) DEP (2005a)
MA-SW-2	Shoestring Bay	pathogens	DEP (2005a)
YA-SW-7	Mill Creek Lewis Creek	nutrients pathogens	DEP (2004b) DEP (2005a)

Additional long-term benefits of the proposed alternative would be the reduction of floatable materials (e.g. plastic, aluminum cans, paper, etc) that often carry oil and grease. These materials would be trapped by pre-treatment measures and prevented from entering local waterbodies.

No Action Alternative

The No Action Alternative would result in the continued gradual decline of the waters on Cape Cod. Tidal restrictions would remain in place, limiting tidal flushing and reducing oxygen concentrations in the

marsh waters. Concentrations of fecal coliform bacteria and other pollutants would continue to increase as the watershed continues to develop.

6.3.5 AQUATIC LIFE

Proposed Action Alternative

Construction of the proposed salt marsh and fish passage projects would temporarily disrupt aquatic life in the vicinity of the projects due to turbidity and physical activity in the water. Soil disturbances and in-water construction activities are estimated to take a few days up to a few weeks. Projects would be constructed in periods where critical life stages would not be present. Time-of-year restrictions in the permits required for instream construction, for example, would prohibit construction during the spring migration, spawning, and nursery period for river herring.

The proposed salt marsh projects would have a long-term, major beneficial effect on aquatic organisms in the restored tidal marshes. The increased sizes of the marsh inlets would physically allow more movement in and out of the marshes by fish and some invertebrates. The increased volume of water and improved water quality in the marshes would increase the availability and quality of habitat for all trophic levels of aquatic organisms. These improvements would benefit fish that spend all or most of their life in salt marshes, such as mummichog and Atlantic silverside, and fish that use the marshes for primary spawning and nursery areas, such as alewife and blueback herring. Larger numbers of smaller, resident foraging fish in the marshes would provide an increased food source for the larger predatory fish that would also be able to move more easily into and out of the marshes because of the larger passageways. Aquatic organisms in the bays and estuaries outside of the marshes would also benefit by the export of detritus, which serves as food for the lower trophic levels of the food web. Fish that prefer the existing fresh or low-salinity fringe marshes would lose habitat as salinity increases after the restriction is removed. Some of this displaced habitat may move upstream as the salt water floods a larger area.

The proposed fish passage projects would have long-term, major benefits toward reversing the general decline of anadromous fish on Cape Cod over the last century. The restoration of full function to fish passage structures would allow river herring, in particular, to access new and former spawning and nursery habitats. In many cases, a partially functioning fishway now supports a small population of river herring in a stream. Improving access upstream would allow more fish to return to the spawning grounds each spring and promote growth of that stream's natural population. In other cases where a natural run does not exist now, several years of stocking by DMF would be employed to develop a new population imprinted on that stream. Other anadromous and catadromous fish, such as sea run trout and eels, would also benefit from improved stream passage. Large predator fish (for example, striped bass, bluefish, and Atlantic cod) in the downstream bays and estuaries would benefit from this increase in river herring, an important prey species. The increased number of eggs and juvenile fish in the spawning and nursery areas would also serve as increased food supply for locally resident fish, birds, mammals, and other predators.

The proposed stormwater projects would have only minor effects on aquatic organisms. Construction would not directly affect receiving water biota in the short term because the projects would occur away from the shoreline, and runoff of sediment from the disturbed areas would be minimized by erosion and sediment controls. In the long-term, the primary benefit of the stormwater projects—removing fecal coliform bacteria—would be increased use of the shellfish beds for recreational and commercial fishing.

Improved water quality would allow increased harvesting of the beds, which would result in reduction of shellfish populations. The coincidental removal of other pollutants (sediment and metals adsorbed to sediments) would have a long-term, minor benefit to the shellfish growing in the beds where these storm systems discharge.

In compliance with the Magnuson Stevens Fisheries Conservation and Management Act, NRCS has submitted to the National Marine Fisheries Service an assessment of the potential effects of the Project on essential fish habitat (Appendix C-4). The salt marsh restoration projects could have an effect on non-mobile life stages (eggs, plankton) of managed fish species that would be present in the area during construction, although these effects would be negligible because the projects are small in size, limited in duration (less than one or two weeks of actual in-water construction per project), and widely separated in time (two or three per year) and location (all of Cape Cod). Improvements to tidal salt marshes would result in increased marsh habitat, increased populations of prey species, and increased production of organic materials entering the food web. The proposed fish passage and stormwater projects would not directly affect designated essential fish habitat. Improvements to fish passages would make more spawning and nursery habitat available to anadromous fish that are food sources for some of the fish covered by federal management plans and, therefore, indirectly contribute to improved populations of those fish. Fish passage sites would be located in nontidal waters and not within the designated essential habitat. Stormwater projects would be located in upland areas and, with appropriate best management practices for erosion and sediment control, would not affect tidal waters.

No Action Alternative

Under the No Action Alternative, the aquatic communities would continue with declining trends in several important cases. Tidally restricted salt marshes would continue to lose function as spawning areas, nurseries, and refuges for marsh-dependent species. Herring runs would decline as the functionality of existing fishways continued to decline, further restricting fish from returning to their spawning areas. NRCS would undertake no restoration project under this program, so there would be no need for consultation with the National Marine Fisheries Service about essential fish habitat.

6.3.6 WETLANDS

Proposed Action Alternative

The proposed salt marsh projects would restore tidal flow to the selected marshes and have long-term, major benefits for the marshes' ecology. (For the purpose of this EIS, the term salt marsh includes the entire area flooded by tidal water on a daily basis, which encompasses a variety of habitats found within the intertidal zone, such as mud flats, tidal pools, channels, and hummocks.) Restoring tidal flow would increase the tidal range within each marsh, converting marsh that has become dominated by the invasive species phragmites to native salt marsh vegetation. These increases in salt marsh area would result in corresponding decreases in fringe brackish or freshwater wetlands and upland, terrestrial areas. These changes would lead to shifts in the wildlife communities in the region as amphibians, reptiles, birds, and mammals that use salt marsh habitat displace the animals that use the existing freshwater and upland habitats. This change is considered an overall ecological benefit because of the greater functional values of adequately flushed tidal marshes over poorly flushed brackish marshes and adjacent uplands.

Mosquito populations may be affected by the changing hydrologic conditions in the marshes. Populations are likely to decrease if increases in tidal flow improve flushing in the marshes and disrupt standing pools of water, and if high marsh areas are adequately drained during ebb and low-tide cycles. If pools of water are left standing in the high marsh between flushing events, however, they could become mosquito breeding grounds. The Massachusetts Department of Agricultural Resources State Reclamation and Mosquito Board implements an integrated mosquito management program on Cape Cod that includes (1) selected ditch maintenance to improve drainage and flushing of tidal marshes and (2) use of larvicides to control mosquitoes before they emerge into the adult form. NRCS would work with the Department of Agricultural Resources on follow-up observations in restored marshes to determine if implementation of the Department's management program would be necessary.

The proposed salt marsh projects also would create a long-term benefit by restoring stands of submerged aquatic vegetation, such as eelgrass (*Zostera marina*). Eelgrass beds are an important habitat in Buzzard's Bay and in coastal ponds on Cape Cod. They serve as breeding, nurseries, and feeding grounds for a variety of fish species. Eelgrass beds are sensitive to water quality, and improving tidal flow into salt marsh systems is likely to improve water quality, potentially increasing eelgrass beds in open water portions of salt marshes.

The proposed fish passage projects would have no long-term effects on wetlands. Water levels at the impoundments in the vicinity of the project would be maintained at their existing elevations, which would maintain existing freshwater wetlands around those ponds.

The proposed stormwater projects would not affect wetlands.

No Action Alternative

Restrictions to tidal flow would remain and perhaps become more restrictive from further siltation or blockage, resulting in continued marsh degradation. In many cases, marshes would continue to experience a decrease in ecological value as phragmites continues to expand into the marsh, displacing native salt marsh vegetation. Existing non-tidal freshwater wetlands adjacent to marshes would remain intact and possibly expand as the salt marshes contract.

6.3.7 THREATENED AND ENDANGERED SPECIES

Proposed Action Alternative

In compliance with the federal and state Endangered Species Acts, NRCS sent letters to the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, and the Massachusetts Division of Fisheries and Wildlife advising them of the Cape Cod Water Resources Restoration Project and of its intent to consult with the agencies in the future on each specific project. Responses were received from each agency (Appendix A).

The U.S. Fish and Wildlife Service (June 21, 2006) stated that no federally listed threatened or endangered species or critical habitat under its jurisdiction was known to occur in the project areas, and no further consultation under Section 7 is required for this Plan-EIS.

The National Oceanic and Atmospheric Administration (April 20, 2006) identified nine threatened or endangered whale and turtle species known to occur seasonally in waters off the coast of Massachusetts (see Appendix C-5). NRCS determined that the proposed projects of the Cape Cod Water Resources Restoration Project would not affect any of these marine species and submitted a letter to NOAA (July 6, 2006) seeking their concurrence. NOAA concurred with that determination (July 21, 2006) and stated that no further consultation under Section 7 is required.

The Massachusetts Division of Fisheries and Wildlife (May 19, 2006) identified five fish passage project sites and six salt marsh project sites that fall within the state's designated areas for "priority habitat" or "estimated habitat" (the state letter includes one other site ("BN-33") that has been screened from the list of priority sites). Projects within these designated habitat areas require a filing for Project Review by the Division of Fisheries and Wildlife. If a specific project were to require a "take" of a state-protected species, an application for a conservation and management permit would have to be submitted to the Division of Fisheries and Wildlife. When granted, conservation and management permits often include a Conservation Restriction to offset the proposed take.

The potential for effects of the proposed projects on threatened and endangered species would vary from site to site, and site-specific assessments have not been conducted at this time. Each site would be evaluated specifically for potential effects in the Environmental Evaluation that would be prepared before NRCS would provide funding and technical assistance for that project. This evaluation would include the consultations with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration, as required under Section 7 of the federal Endangered Species Act, and consultation with the Massachusetts Division of Fisheries and Wildlife under the state Endangered Species Act.

In general, there are no areawide constraints on the Cape Cod Project from threatened or endangered species. Similar restoration projects have been undertaken previously by the towns and the state. Time-of-year restrictions on construction work may be required to protect threatened or endangered species during critical life stages (for example, spawning or nesting), but this would not affect the Project because the short construction time for any single project would allow it to be scheduled around any such restrictions.

No Action Alternative

Under the No Action Alternative, NRCS would not fund any restoration projects under this program, so there would be no effect from NRCS actions on threatened or endangered species on Cape Cod.

6.3.8 COASTAL ZONE

Projects that may be undertaken by other federal agencies under either alternative would have to comply with the Act and demonstrate compliance with the state's Coastal Zone Management Plan.

Proposed Action Alternative

Under the Coastal Zone Management Act, NRCS is required to demonstrate that the proposed Project is consistent with the Massachusetts Coastal Zone Management Plan to the maximum extent practical. The Massachusetts Office of Coastal Zone Management, as an agency within the Massachusetts Executive Office of Environmental Affairs, is a sponsor and fully supportive of the Cape Cod Project (see letter of

September 15, 2006, in Appendix A). The Cape Cod Project would be entirely consistent with the Plan and would comply with the following specific policies that are directly related to the Project's objectives:

Policy	Effect
Water Quality Policy #1: Ensure that point-source discharges in or affecting the coastal zone are consistent with federally approved state effluent limitations and water quality standards.	Stormwater remediation projects would contribute toward meeting the goals of the fecal coliform TMDL for Cape Cod tidal waters and meeting future goals for stormwater control to be implemented under town NPDES permits.
Habitat Policy #1: Protect coastal resource areas including salt marshes, shellfish beds, dunes, beaches, barrier beaches, salt ponds, eelgrass beds, and freshwater wetlands for their important role as natural habitats.	The Cape Cod Project would restore currently degraded resource areas—salt marshes, tidal waters, and anadromous fish runs.
Habitat Policy #2: Restore degraded or former wetland resources in coastal areas and ensure that activities in coastal areas do not further wetland degradation but instead take advantage of opportunities to engage in wetland restoration.	Salt marsh restoration projects would restore tidal flooding to marshes where it is currently restricted, thereby restoring former salt marsh habitat.
Protected Areas #3: Ensure that proposed developments in or near designated or registered historic districts or sites respect the preservation intent of the designation and that potential adverse effects are minimized.	No effects on designated or registered historic districts or sites would be expected. Each individual project site would be evaluated further in a site-specific Environmental Evaluation to ensure there are no adverse effects from that project.
Coastal Hazard Policy #2: Ensure construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. Approve permits for flood or erosion control projects only when it has been determined that there will be no significant adverse effects on the project site or adjacent or downcoast areas.	There would be no interference with water circulation or sediment transport from the Cape Cod Project. Salt marsh restoration projects would restore tidal flooding to marshes where it is currently restricted, thereby restoring former salt marsh habitat.

No Action Alternative

NRCS would not be required to comply with the Coastal Zone Management Act under the No Action Alternative, because there would be no federal action.

6.3.9 ECONOMY

Proposed Action Alternative

The proposed salt marsh and fish passage projects would create long-term, minor, indirect benefits for the local economy by increasing components of the food web (organic matter, prey fish) that sustain populations of larger commercial prey fish. Increased herring runs, for example, that would be expected from the fish passage projects would help sustain or expand the populations of striped bass, bluefish, and cod. Demand for river herring for bait for game fish has been increasing, and increased runs would bring anglers to the area and increased revenue from herring permit sales.

The proposed stormwater projects would have long-term, major benefits for the commercial shellfishing industry by improving water quality (reduction of fecal coliforms), thereby reducing or eliminating the number of days that the shellfish beds affected by these discharges would be closed to fishing. Currently, the total number of harvest days for commercial shellfishing is reduced when beds are closed because of excessive fecal coliform concentrations. Many of the proposed projects are located in areas where shellfish beds currently fluctuate between being closed and open because existing water quality is affected for short periods by polluted stormwater runoff. These projects were highly rated in the screening process because of the high potential for stormwater treatment to reduce the pollution and thereby reduce, if not eliminate, the number of days those beds would be closed or potentially closed if remedial measures are not installed. Increased numbers of fishing days and fishing areas would result in increased commercial shellfish landings. One of the goals of the proposed projects would be to prevent the downgrade of shellfish beds that are currently classified as “approved” and “conditionally approved” to “restricted” or “prohibited”. If all priority projects would be implemented, up to 3,700 acres of “approved” beds would be maintained at their current classified status, 3,200 acres of “conditionally approved” shellfish beds would either be maintained at their current status or potentially upgraded to “approved” status, and 320 acres of “prohibited” and “restricted” beds would be potentially upgraded so that limited fishing would be allowed in these areas.

No Action Alternative

The No Action Alternative would have a long-term, minor adverse impact on the local economy owing to continued declines in commercial shellfishing as continued development of the Cape leads to increased contamination of local shellfish waters and increased closures of shellfish beds. Specifically, those beds that are targeted under the Cape Cod Project because they fluctuate between being closed and open would be closed for increasing number of days. A portion of the 6,900 acres of shellfish beds currently classified as “approved” and “conditionally approved” would likely be downgraded in classification because of increasingly high fecal coliform concentrations. The economic value of the shellfish industry would decline because of reduced harvesting.

6.3.10 RECREATION

Proposed Action Alternative

The proposed salt marsh projects would have long-term, minor, indirect effects on sport fishing through the food web effects discussed previously.

The proposed fish passage projects would have long-term, major benefits for recreational fish populations. Increased river herring populations would serve as increased food sources for sport fish such as largemouth bass and pickerel, and success of these projects could ultimately contribute toward removal of current recreational fishing restrictions for river herring.

The proposed stormwater projects would have long-term, major benefits for recreational shellfishing by reducing fecal coliform bacteria in stormwater runoff and increasing the number of recreational harvesting days by elevating bed classifications to "approved" in areas where they currently fluctuate between open and closed. The projects may also benefit nearby beaches by reducing fecal coliform bacteria in the water and reducing the number of days the beaches are closed.

No Action Alternative

The no action alternative would have a long-term, minor adverse impact on recreation owing to continued declines in herring runs, increased contamination of local shellfish waters and increased closures of shellfish beds. Specifically, those beds that are targeted under the Cape Cod Project because they fluctuate between being closed and open could be closed for increasing number of days.

6.3.11 NATURAL AREAS

Proposed Action Alternative

One of the priority salt marsh projects—Herring River, Wellfleet (WE-6)—would be constructed on land adjacent to the Cape Cod National Seashore, but the salt marsh that would be benefited by the project lies within the seashore. The National Seashore is fully supportive of the project (see letters of June 8 and October 10, 2006, in Appendix A). No other projects on the priority lists would affect designated natural areas.

No Action Alternative

The No Action Alternative would have no effect on natural areas.

6.3.12 CULTURAL RESOURCES

Proposed Action Alternative

The potential exists for effects upon archaeological and historic resources from construction of any of the proposed projects. To determine these effects, federal agencies are required to follow the Section 106 process, named for Section 106 of the National Historic Preservation Act 1966 as amended. This process requires the federal agency to take into account the effect of the federally assisted undertaking on any site, district, or object that is included in or eligible for listing on the National Register of Historic Places. The process also requires consultation with federally recognized tribes—in this case the Wampanoag Tribe of Gay Head (Aquinnah) (WTGHA)—and the State Historic Preservation Officer (SHPO).

The potential for each project to affect cultural resources would be evaluated in more detail in an Environmental Evaluation tiered to this EIS. This evaluation would be based on whether (1) the proposed construction would disturb the ground in areas which contain or are likely to contain resources which

were previously undisturbed, (2) there are historic or archaeological resources within the area that would be disturbed, and (3) the site is a Traditional Cultural Place to which a recognized tribal entity, in this case the WTGHA, attaches a particular cultural significance.

Salt Marsh Sites

Restoring tidal flow, in most cases, would involve the upgrading of a previously installed culvert or other roadway-related structure that is restricting tidal flow to a salt marsh. These projects would generally involve removal and replacement of structures in previously disturbed or artificial fill and, thus, are not likely to affect cultural resources negatively.

NRCS would evaluate all of the structures to be replaced for the project's potential to affect archaeological or historic resources. Concurrence letters would be sent to the SHPO and the WTGHA would be consulted as per Section 106. This process would be undertaken during planning the individual projects. NRCS may choose to seek Memoranda of Understanding with the SHPO and the Wampanoag Tribe of Gay Head (Aquinnah) to facilitate the 106 process.

Fish Passage Sites

Native peoples heavily utilized the fish resources available to them. They gathered the anadromous species by spearing and netting. Some streams were shallow enough that catching by hand would have been relatively easy. All of the fish passage locations can be assumed to be archaeologically sensitive because of this extensive native fishery. Whether or not previous construction of the existing ladders disturbed any pre-existing sites is unknown at this time. It can also be assumed, though, that if these sites were present when the ladders were built, they were damaged and can be considered disturbed.

The first step would be to perform sufficient file and documentary research to determine if known archaeological and/or historic sites exist in the area. A literature report would be prepared by an archaeological consultant, followed by a field investigation to determine if the project area contains unknown archaeological sites.

The next step would be to determine what effect the proposed projects might have on this group of sensitive and known sites. This step would be carried out in the field, in conjunction with those individuals who are planning the layout of the project. It is important that this assessment take place early in the planning process to avoid costly and unnecessary delays. The proposed design would be assessed for its potential to disturb the ground in areas which were not previously disturbed by earlier construction of the existing fish ladder or adjacent areas. This assessment would include potential access roads, staging areas, and borrow pits. If the area has not been previously disturbed and/or if construction of the replacement ladder would not exceed the footprint of the existing ladder for any reason, then the proposed project would have no effect on buried cultural resources, and no further archaeological investigation would be required.

If, however, the project would disturb sensitive areas which are previously undisturbed, then a Phase 1 investigation would be conducted. This Phase 1 investigation would consist of a number of shovel test pits and screening of the soil horizons to look for evidence of human occupation. This evidence might include artifacts related to tool production, such as spear points, or evidence of habitation and byproducts of cooking, such as charcoal, animal bones, or shell middens (waste shell piles). It may also reveal evidence of colonial occupation or habitation like buttons, metal ware, nails, etc.

The proposed design would also be assessed for its possible impact on historic properties in the area; for example, where an existing fish ladder was constructed on a property that is listed or eligible for listing on the National Register of Historic Places and possesses characteristics which contribute to the historic property.

The third assessment would be to determine by consultation with the WTGHA whether they attach traditional significance to the area. These properties are referred to as Traditional Cultural Places. A ladder may have been constructed in an area which their ancestors once harvested fish. In this case, the WTGHA as a sovereign Nation becomes a consulting party on the proposed construction. The Tribe would be consulted for their input on each project.

When the site investigation is made, standing historic resources would be evaluated with respect to project effects. Visual examination would be made to verify that any historic properties identified by file research would not be adversely affected by the installation of the new fish passage structure.

The results of these assessments would determine the nature of Section 106 consultation with the SHPO and the WTGHA. If the area of potential effect is found to be either previously disturbed or, if upon Phase 1 investigation, is found not to contain archaeological or historic resources, a letter would be sent to the SHPO requesting their concurrence with the NRCS determination of no effect on cultural resources.

If archaeological materials are discovered during the phase 1 investigation, the site would be evaluated for significance and a determination of effect would be made by NRCS based on an archaeologist's recommendation. Should NRCS make the determination that the site is not significant, and if the SHPO concurs in that determination and the WTGHA is consulted, then the project may go forward after receipt of the SHPO concurrence letter. If either the determination by NRCS or the SHPO finds the site to be a significant resource, then modifications to the project would be explored to avoid disturbing these resources.

If concurrence cannot be reached among the consulting parties and NRCS, documentation may be submitted to the Advisory Council for Historic Preservation for their participation in negotiating a Memorandum of Agreement to which all parties agree. If for some reason sufficient changes cannot be made to avoid damaging the resources, NRCS can elect to either withdraw assistance for that particular fish passage project or enter into a recovery phase where a percentage of the site would be recovered prior to construction. It has been NRCS's experience that the great majority of significant resources can be avoided through design modifications, thereby negating the need for recovery activities.

Stormwater Sites

Infiltration of stormwater in most cases would involve excavation beneath existing streets and highways to install catch basins or similar structures. In other situations, existing stormwater systems may be modified to accommodate deeper or additional dry wells or similar structures. These structures would be located beneath streets and highways where previous construction has disturbed the original subsurface. There are some instances, though, where previously undisturbed areas would be utilized for the stormwater structure installation. In these areas, the normal field investigation would be followed by a phase 1 archaeological survey.

NRCS would evaluate each of the structures to be installed to assess its potential to affect archaeological or historic resources. Letters of NRCS findings would be sent to the SHPO, and the WTGHA would be

consulted as required by Section 106. This process would be undertaken during planning of the individual projects.

No Action Alternative

Under the No Action Alternative the proposed construction projects would not occur, and there would be no effects on cultural resources.

6.3.13 HUMAN HEALTH AND SAFETY

Proposed Action Alternative

Under the Proposed Action, NRCS would fund an estimated five to ten construction projects each year for approximately ten years. All construction projects involve increased risks to human health and safety, both to project workers and to the public that may be near to the projects. Contractors would be required to follow federal and state regulations for protecting workers and the public to minimize those risks. For projects affecting public roads (salt marsh and stormwater projects), traffic control would be instituted where necessary to ensure safe travel through the project area, to protect both the public and the construction workers.

No Action Alternative

NRCS would undertake no projects under the No Action Alternative, so there would be no effects on human health and safety.

6.3.14 CUMULATIVE IMPACTS

Proposed Action Alternative

NEPA requires the federal agency preparing an EIS to evaluate the cumulative impacts of its proposed action and the impacts of other known past, present, and future actions in the affected area. The adverse impacts from the Cape Cod Project would be associated with construction activities and would be short-term in duration and minor in magnitude. The construction of any single project would only take a few weeks up to a few months, and it would disturb only a small area in the immediate vicinity of the project. The total number of projects is expected to be five to ten per year, and they would be widely scattered around the Cape. These projects, therefore, would make negligible additional adverse impacts on resources on the Cape compared to other large-scale road and development projects occurring during the Project lifetime. There would be no long-term adverse impacts from the Project after construction is completed. The incremental cumulative adverse impacts of the Project, therefore, are minor when added to other past, present, and foreseeable future actions.

The long-term positive benefits of the Cape Cod Project—improved salt marsh flushing and ecology, improved fish passages and herring runs, improved water quality and shellfishing—would mitigate historical adverse effects on the resources from human activity and development on Cape Cod. The Project would complement other marsh, fish passage, and water quality restoration and remediation projects that are being undertaken or planned by the towns and state and federal agencies. There are no

known conflicts between the projects proposed under the Cape Cod Project and other projects proposed by other agencies.

No Action Alternative

There would be no cumulative impacts from construction activities under the No Action Alternative. Although other agencies would implement planned restoration and remediation projects, the cumulative long-term benefits in ecological values would be less because areas that would be benefited by the Cape Cod Project would not be improved. Salt marshes would continue to decline in ecological value as inlets were silted in, tidal flushing decreased, water quality degraded, and invasive species expanded. Fish passages that are currently partially restricted would probably become less effective in the future, and herring runs would continue their declines. Water quality would continue to be affected by bacterial contamination from stormwater runoff, and shellfish beds would continue to be closed.

6.3.15 LONG-TERM PRODUCTIVITY AND COMMITMENT OF RESOURCES

NEPA requires the federal agency to determine if the proposed action, in combination with other actions, would sacrifice the enhancement of significant long-term productivity as a tradeoff for short-term uses. The Cape Cod Project would enhance long-term ecological and economic productivity through improved salt marshes, fish passages, and water quality.

NEPA also requires the federal agency to determine if the proposed action would irreversibly and irretrievably commit the use of resources such as important farmlands, wetlands, and fish and wildlife habitat. The Cape Cod Project would not result in the long-term use or loss of any natural resources.

6.3.16 CONSISTENCY WITH LOCAL AND REGIONAL PLANS

The Cape Cod Water Resources Restoration Project has been thoroughly coordinated with and has the support of Barnstable County, the 15 towns of Barnstable County, the Cape Cod Commission, key state environmental agencies (Executive Office of Environmental Affairs, Division of Marine Fisheries, and Office of Coastal Zone Management), and the National Park Service. Letters of support received from some of these agencies are included in Appendix A. The projects of the CCWRRP are consistent with key environmental planning documents for the Cape, including the Massachusetts Bay Program's Comprehensive Conservation and Management Plan, the Cape Cod Commission's Regional Policy Plan for Barnstable County, and the Cape Cod Watershed Assessment and Action Plan.

6.4 COMPARISON OF ALTERNATIVE PLANS

Table 6-6 summarizes the major environmental and socioeconomic benefits of the two alternatives: No Action (without project) and Proposed Action—the Cape Cod Water Resources Restoration Project (with project). The comparison focuses on the Environmental Quality account, which is the basis for selection of the National Ecosystem Restoration plan.

Table 6-6
Summary and comparison of alternative plans[1/]

Effects	Without project	With project[2/]
Measures	None	26 salt marsh restoration projects 24 fish passage obstruction remediation projects 26 stormwater remediation projects
Project investment	$0	$29,950,000
Environmental Quality Account—Ecology—Water		
Tidal water hydrology	0 acres of salt marsh with enhanced tidal flushing (continued restricted tidal flushing may result in a further loss of salt marsh owing to vegetation dieback and soil subsidence)	1,500 acres of salt marsh with enhanced tidal flushing
Tidal water quality	0 acres of salt marsh with improved water quality and continued restriction of tidal flushing	1,500 acres of salt marsh with improved water quality resulting from increased tidal flushing
	0 acres of tidal water over shellfish beds with decreased fecal coliform concentrations because of no additional stormwater treatment	7,300 acres of tidal water over shellfish beds with decreased fecal coliform concentrations, thereby supporting the TMDL for pathogen and nutrient reductions on Cape Cod and possible delisting of affected waters from the state list of impaired water; and with reductions in other pollutants (sediment, trash, nutrients, toxic substances) removed by stormwater treatment
Environmental Quality Account—Ecology—Plants		
Salt marshes	0 acres of salt marsh vegetation restored; large stands of invasive phragmites continue to expand	1,500 acres of salt marsh vegetation restored; areas of invasive phragmites reduced

Table 6-6 (cont.)
Summary and comparison of alternative plans[1/]

Effects	Without project	With project[2/]
Environmental Quality Account—Ecology—Animals		
Salt marshes	0 acres of habitat restored for salt marsh animals (continued use by intertidal, freshwater, and upland wildlife)	1,500 acres of habitat restored for animals using salt marshes for all or part of their life cycle
Anadromous fish	0 acres of spawning habitat restored to full access for anadromous fish	4,200 acres of spawning habitat restored to full access for anadromous fish Improved river herring runs Increased biological productivity of streams
Other Socio-Economic Account—Commercial and Recreational Shellfishing		
Shellfish beds	0 acres of water quality improvement (water quality would continue to decline, and the number of acres of closed beds would likely increase as a result)	3,200 acres of "conditionally approved" shellfish beds maintained at current classification and potentially upgraded to "approved" classification 3,700 acres of "approved" shellfish beds maintained at current classification 320 acres of "prohibited" or "restricted" shellfish beds potentially upgraded to "conditionally approved" classification

[1/] Current remediation work by NRCS and other agencies would continue with or without the Cape Cod Project; this ongoing work is not included in the evaluation for either alternative.

[2/] With project effects include the use of adaptive management for salt measure and stormwater measures to maximize project benefits.

6.5 RISK AND UNCERTAINTY

Risk and uncertainty is expected and inherent in a watershed plan. Each project has a certain level of risk and uncertainty associated with it, which may change the overall costs or benefits of the project. Ecosystem restoration is not an exact science; stormwater remediation measures and salt marsh restoration measures, in particular, have risks and uncertainties associated with their final outcomes. Adaptive management is commonly used for such ecosystem restoration projects because of these risks and uncertainties. A list of probable risks and uncertainties is identified for each category of project:

Salt marsh restoration projects

- Presence of improvements (e.g., wells, septic tanks) around marshes could make implementation of specific projects impossible or more expensive than estimated
- Local opposition from adjacent property owners could prevent implementation of specific projects.
- More detailed modeling and field surveys may be required to define project effects on adjacent properties accurately.
- Construction costs may increase because of site-specific factors unknown at this time.
- Adaptive management may show that enhancing or restoring tidal flow has not restored the salt marsh habitat as expected, and some additional work may be necessary such as additional interior channels.

Fish passage obstruction remediation projects

- Following improvement of fishways, DMF intends to implement a fish restocking program to reintroduce river herring species in the project area. Reintroduced fish may not survive or return to the project area.
- DMF funding for the restocking program could decrease and sufficient base populations imprinted on the stream may not develop.
- Construction costs may increase because of site-specific factors unknown at this time.

Stormwater remediation projects

- Future growth and development of Cape Cod will likely result in increased impervious surfaces and consequently increasing stormwater runoff into tidal waters. Current state law requires new developments to treat the first flush of runoff; however, the overall effectiveness of the proposed BMP treatments could be reduced if other pollutant sources are not controlled or reduced.
- Adaptive management may show that proposed facilities are less effective than thought, the proposed number of treatment facilities may not provide the expected efficiency removals for existing fecal coliform loads, or other toxic compounds (e.g. metals, PCBs, pesticides) may be causing impairment to shellfish beds and more expensive treatment methods are required.
- Reduction of fecal coliform bacteria may not improve the health of targeted shellfish beds and extend the number of days that the shellfish beds are open.
- The implementation of proposed BMPs may not provide adequate water quality benefits to support upgrading shellfish beds that are currently classified as “restricted” to “conditionally approved” or “approved” status.
- Tourism may be affected if construction activities are conducted during peak tourism months.
- Construction costs may increase because of site-specific factors unknown at this time, e.g., underground utilities requiring relocation.

6.6 RATIONALE FOR PLAN SELECTION

The recommended plan is the Proposed Action (Cape Cod Water Resources Restoration Project) because it maximizes ecological benefits and is the National Ecosystem Restoration (NER) Plan. The Recommended Plan achieves the desired level of improvement for the least cost. For each project type (shellfish, fish passage, and saltmarsh), as summarized in Table 6-6, the Restoration Project would provide a greater number of habitat units and greater other environmental benefits than the No Action Alternative:

Salt marsh restoration: The total acreage of salt marsh habitat will increase by 1,500 acres.

Additional benefits of the proposed salt marsh restoration projects would be (1) regrowth of salt marsh vegetation, which in turn would provide support for the marsh substrate and prevent erosion, (2) enhanced habitat for a variety of wildlife (3) improved water quality within the tidal creek network and within adjacent estuaries, (4) improved hydrology within each restored marsh, (5) increased breeding grounds and nursery habitat for fish species, (6) increased fish movement into the marshes because of wider inlet passages, and (7) increased inputs of organic material and prey fish into the bay and estuarine food webs.

Fish Passage Obstruction Remediation: Full access will be provided to 4,200 acres of spawning habitat for anadromous fish species; river herring is the primary target.

Additional benefits of the proposed fish passages projects would be (1) restoration of anadromous fish populations, (2) increased biological productivity in the streams associated with re-establishment of anadromous fish to historic habitat, (3) increased populations of out-migrating juveniles that will provide forage for marine and estuarine fish, (4) additional recreational fishing opportunities, and (5) increased commercial fish landings and quotas.

Stormwater Remediation: Water quality would be improved over 7,200 acres of shellfish beds to help maintain or improve the classification of those beds.

Additional benefits of the proposed stormwater remediation projects would be (1) improved water quality in tidal waters on the state's impaired waters list (303(d)) by reducing fecal coliform bacteria, which is the primary pollutant causing the impairment, (2) increased commercial and recreational shellfish activities by reducing the number of shellfish beds that are partially or completely closed due to bacteria, (3) increased total number of days that shellfish harvesting can occur in a specific bed, (4) increased economic value of the shellfish industry located in the Cape Cod Watershed, and (5) increased number of landings for commercial shellfish.

The No-Action Alternative for shellfish, fish passage, and saltmarsh restoration would provide none of these ecological benefits.

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Chapter 7
CONSULTATION AND PUBLIC PARTICIPATION

Finding a way to meet the need: Since 1998 the Cape Cod Conservation District (CCCD) has received more requests for assistance for stormwater remediation to clean up runoff affecting shellfish areas under the Conservation Technical Assistance Program than it could address. The Coastal Resources Committee of the Barnstable County Commission (BCC) also recognized the increasing problems affecting shellfish, degraded salt marshes, and anadromous fish passages, but it has limited resources to address them. The CCCD and the BCC requested assistance from NRCS on October 9, 2002, to try to address these concerns.

The NRCS Small Watershed Program is designed to "fill the gaps" and not replace or compete with existing programs. During the planning process it became apparent that the problems were many and NRCS help would be appreciated.

Project Sponsors

There are many local, state, and federal agencies that have direct interests and responsibilities for shellfish, salt marshes, and fish passages on Cape Cod. At the initiation of the planning process, NRCS met with local town officials, shellfish wardens, citizens, and state and federal agencies to further define the problems and collect existing information. This process led to establishing new partnerships and strengthening existing ones.

The initial Project sponsors are the CCCD and the BCC. The third sponsor is the Executive Office of Environmental Affairs, representing the Office of Coastal Zone Management (salt marsh) and the Division of Marine Fisheries (shellfish and anadromous fish). Assistance from these state agencies has been crucial for data collection and analysis. Each of the 15 towns in Barnstable County was included as a Project sponsor since each site-specific project will be implemented and maintained by a town.

Public Participation

The Cape Cod Commission's Regional Policy Plan and the EOEA Watershed Assessment and Action Plan both list stormwater runoff, fish passage, and salt marsh restoration as priority goals/objectives identified through their public surveys.

The Barnstable County Commission's Coastal Resources Committee hosted an initial meeting in Barnstable on October 11, 2001. Support was unanimous for continued development of the Project under the Small Watershed Program to help restore the area's natural resources. Over the next four years local, state, and federal officials were contacted for information and guidance. Several articles were published in newspapers informing the public of the problems and opportunities with restoring degraded salt marshes and anadromous fish runs, and improving water quality for shellfish beds. A public meeting was held on May 18, 2005, to seek public input on the watershed plan then in early stages of development. In addition to NRCS staff, Cape Cod Conservation District representatives, and Barnstable County commissioners, around 30 citizens attended the meeting. Attendees made 24 statements in favor of the project and none opposed.

The CCCD mailed information on the project to over 400 citizens, town officials, and state and federal representatives asking for their opinions and support. The CCCD and NRCS partnership also met individually with Wampanoag Tribe of Gay Head (Aquinnah) Tribe and the Mashpee Wampanoag Tribe.

Planning Team

An Interdisciplinary Planning Team provided for the "technical" administration of this Project. Technical administration includes tasks pursuant to the NRCS nine step planning process, and planning procedures outlined in the NRCS-National Planning Procedures Handbook. Examples of tasks completed by the planning team include, but are not limited to, Preliminary Investigations, Resource Inventorying, Analysis of Resource Data, Formulating and Evaluating Alternatives.

- More than 160 stormwater discharge sites were evaluated to determine if there is a feasible solution, delineate drainage area, check soils, and develop a cost estimate.
- Approximately 182 tidal restriction sites were evaluated to measure the existing culvert, estimate degree of restriction, identify any construction concerns (utilities, recent work, etc) and develop a cost estimate.
- Based on the DMF inventory of 93 obstructed or partially obstructed fish passages, the planning team worked with DMF to develop cost estimates and identify issues affecting fish passage improvements.

Data collected from partner agencies, databases, landowners, and others throughout the entire planning process were evaluated. Informal discussions among the planning team, partner agencies, and landowners were conducted throughout the entire planning period

Technical Advisory Group

The following organizations were involved in the development of this plan and provided technical support, information, data analysis, and guidance:

- Cape Cod Conservation District
- Cape Cod Commission
- Barnstable County Commissioners
- Barnstable County Coastal Resources Committee
- Executive Office of Environmental Affairs
- Massachusetts Division of Marine Fisheries
- Massachusetts Office of Coastal Zone Management
- Massachusetts Department of Fish and Game
- Massachusetts Department of Environmental Protection
- Massachusetts Department of Agricultural Resources
- Massachusetts Highway Department
- National Park Service
- National Oceanic and Atmospheric Administration
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- Buzzards Bay Project - National Estuary Program
- Mashpee Wampanoag Tribe

- Town boards of health, natural resource departments, conservation commissions, shellfish wardens, and harbor masters.

Meetings held with these organizations are summarized in Table 7-1.

Table 7-1
Meetings for consultation and public involvement

Date	Purpose	Participating organizations
10-11-2001	Initial public meeting to assess support	• Barnstable County Commission's Coastal Resources Committee • Area Shellfishermen • Massachusetts Division of Marine Fisheries • Waquoit Bay National Estuarine Reserve • Brewster Natural Resources • Barnstable County Extension • Sandwich Conservation Commission • Coastal Management Shellfish Bed Restoration Program • Citizens • Massachusetts Office of Coastal Zone Management • Dennis Natural Resources • Cape Cod Conservation District
11-2001	Discuss the proposed Project	• County Commissioners • Cape Cod Conservation District
1-2002	Discuss the proposed Project	• Congressmen Delahunt's staff • Cape Cod Conservation District
11-2002	Present the proposed Project	• Coastal Resources Committee • Cape Cod Conservation District
12-2002	Discuss the proposed Project	• Representative Murray's staff
12-2002	Discuss the proposed Project	• Barnstable County Shellfish Officers Committee • Cape Cod Conservation District
1-2003	Present the proposed Project	• Executive Office of Environmental Affairs Watershed Team
2-2003	Discuss the proposed Project	• Massachusetts Office of Coastal Zone Management
3-2003	Discuss the proposed Project	• Barnstable County Commissioners • Cape Cod Conservation District
3-25-2003	Discuss anadromous fish habitat problems on Cape Cod	• Massachusetts Division of Marine Fisheries

Table 7-1 (cont.)
Meetings for consultation and public involvement

Date	Purpose	Participating organizations
5-2003	Discuss the proposed Project	• Senator O'Leary's staff • Cape Cod Conservation District
5-2003	Discuss the proposed Project	• Northeast Regional Implementation Team of Coastal America
4-29-2003		• U.S. Army Corps of Engineers • National Oceanic and Atmospheric Administration • Department of Housing and Urban Development • U.S. Geological Survey • U.S. Environmental Protection Agency • U.S. Fish and Wildlife Service • Massachusetts Executive Office of Environmental Affairs - River Restore • Massachusetts Executive Office of Environmental Affairs - Wetland Restoration
11-12-2003	Discuss the proposed Project	• Massachusetts Office of Coastal Zone Management
12-2003	Discuss the proposed Project	• Cape Cod Conservation District • Barnstable County Commissioners
2-10-2004	Discuss stormwater management	• Dennis and Yarmouth Departments of Public Works • Department of Natural Resources • Massachusetts Office of Coastal Zone Management • Massachusetts Division of Marine Fisheries
2-25-2004	CRC Presentation	• All Barnstable County towns represented
4-14-2004	Discuss the proposed Project	• County Commissioners
4-23-2004	Review of criteria for stormwater sites	• Massachusetts Division of Marine Fisheries, Shellfish Division Leaders
4-24-2004	Presentation on the proposed Project	• Cape Cod Museum of Natural History Members • Citizens
5-19-2004	Presentation on the proposed Project	• Cape Cod Commission: Planner and Groundwater Specialist
5-19-2004	Presentation on the proposed Project	• Town of Bourne Selectmen • Department of Public Works • Conservation Commission • Bourne Department of Natural Resources
10-12-2004	Discuss salt marsh modeling	• Salt Marsh Scientist Advisory Group

Table 7-1 (cont.)
Meetings for consultation and public involvement

Date	Purpose	Participating organizations
10-14-2004	Presentation on the proposed Project	• Barnstable County Shellfish Officers
10-18-2004	Presentation on the proposed Project	• Coastal America Northeast Regional Implementation Team
11-03-2004	Discuss the proposed Project	• Cape Cod Conservation District meeting with C. Young, J. Ryder at Congressman Delahunt's Quincy Office
12-01-2004	Discuss the proposed Project	• Department of Environmental Protection (Commissioner and Director of Southeast Regional Office)
3-9-2005	Discuss the proposed Project	• Barnstable County Commissioners and Coastal Resources Committee • Cape Cod Conservation District
3-10-2005	Discuss the proposed Project	• Mashpee Wampanoag Tribe: President and Vice President of Tribal Council (Marshall and Hendricks)
4-6-2005	Discuss the proposed Project	• Senator O'Leary's staff • Senator Murray's staff • Cape Cod Conservation District
5-12-2005	Discuss the proposed Project and DEP models for embayments	• Department of Environmental Protection Estuary Program
5-18-2005	Public meeting	• NRCS • Cape Cod Conservation District • Barnstable County Commissioners • Public citizens
6-12-2006	Discuss the proposed Project	• EOEA Director of Water Policy • CZM Assistant Director and staff
8-24-2006	Discuss the proposed Project	• DMF Director and staff
10-4-2006	Discuss the proposed Project	• Cape Cod Conservation District • Barnstable County Commissioners • Congressman Delahunt's staff • Senator Kerry's staff • State Senator O'Leary's staff • State Senator Murray's staff • Representative Perry's staff • Nantucket Conservation District

Plan Review and Development

A Pre-Draft version of this Watershed Plan-Areawide Environmental Impact Statement (Plan-EIS) was submitted to the NRCS-National Water Management Center, Project Sponsors, Planning Team, Technical Advisory Group, and town resource staff for formal Interagency Review. Comments received from these reviewers were incorporated into the Draft Plan-EIS made available to the public for review in August 2006.

NEPA Public Review

NRCS published a notice of intent to prepare the Plan-EIS in the *Federal Register* on June 24, 2005, and it published a notice of availability of the Draft Plan-EIS for public review in the *Federal Register* on August 1, 2006. NRCS sent a news release on the Draft Plan-EIS to 31 local media outlets on August 4, 2006, and published a legal notice of availability in the *Cape Cod Times* on August 9, 2006. The U.S. Environmental Protection Agency published a notice of availability of the Draft Plan-EIS in the *Federal Register* on August 11, 2006. This EPA notice started the 45-day public review period required for a Draft EIS under NEPA. NRCS distributed 68 copies of the document to individuals, nongovernmental environmental organizations, government agencies, political representatives, and the Wampanoag Tribe of Gay Head Aquinnah. NRCS also placed copies of the Draft Plan-EIS in the public libraries in each of the 15 towns on Cape Cod, and it made a copy available for downloading on its web site: http://www.ma.nrcs.usda.gov/news/news_CCWRRP_draftEIS.html. Copies of the Federal Register notices, the legal notice, the news release, the list of media outlets, and the distribution list are provided in Appendix A. The 45-day public review period ended on September 25, 2006.

Comments on the Draft Plan-EIS were received from two State Representatives, 16 governmental agencies, and one nongovernmental organization. All local and state commenters supported the Project. No comments of opposition to the project were received during the 45-day review period, and no new issues of concern were raised. Minor revisions were made to the Final Plan–EIS based on comments received. Table 7-2 summarizes the comments received (including several received after the official review period ended) and notes the change, if any, made to the Plan-EIS. Comment letters are provided in Appendix A.

Consultation Under Section 106, National Historic Preservation Act

On March 22, 2006, NRCS sent letters describing the Cape Cod Water Resources Restoration Project to the State Historic Preservation Officer and the Tribal Historic Preservation Officer for the Wampanoag Tribe of Gay Head Aquinnah (Appendix A). As stated in the letters, NRCS will complete the consultation required under Section 106 for each project that is brought forward for funding and implementation. NRCS will consult the State and Tribal Historic Preservation Officers during the Environmental Evaluation conducted for each project.

Consultation Under Section 7, Endangered Species Act

On April 5, 2006, NRCS sent letters describing the Cape Cod Water Resources Restoration Project to the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration. In a letter of June 21, 2006, USFWS stated that no federally listed or proposed threatened or endangered species or critical habitat was known to exist in the project areas, and no further consultation under Section 7 is required. NOAA, in a letter of April 20, 2006, stated that nine federally listed whale and sea turtle species occur seasonally in the waters off of Cape Cod and requested that NRCS make a determination of

the effect of its proposed Project on these species. NRCS responded, in a letter of July 6, 2006, with a determination of no effect from proposed project activities, and NOAA concurred with that determination in a letter of July 21, 2006. NOAA also stated that no further consultation under Section 7 is required. USFWS and NOAA letters are provided in Appendix A.

Table 7-2
Comments and responses

	Comment	Commenter	Response
1	Support Project	Cape Cod Commission (9-8-06) Barnstable Association for Recreational Shellfishing (9-14-06) Association to Preserve Cape Cod (9-15-06) Massachusetts Office of Coastal Zone Management (9-15-06) Massachusetts Department of Environmental Protection (9-20-06) State Representative Demetrius J. Atsalis (9-20-06) U.S. Environmental Protection Agency (9-21-06) Town of Barnstable Conservation Division (10-2-06) Town of Barnstable, Town Manager (10-10-06) Town of Dennis Board of Selectmen (10-10-06) National Park Service, Cape Cod National Seashore (10-10-06) Town of Brewster Board of Selectmen (10-11-06) Town of Yarmouth, Town Administrator (10-11-06) National Oceanic and Atmospheric Administration Restoration Center Northeast Region (10-12-06) Town of Bourne, Town Administrator (10-17-06) State Representative Jeffrey Davis Perry (10-20-06)	No response necessary
2	Project sites fall within Priority Habitat and Estimated Habitat, which requires further case-by-case review.	Massachusetts Division of Fisheries and Wildlife (9-5-06)	No change to document necessary. Need for additional consultation on state protected species is already described in §§ 6.3.7, 8.2, and 8.3.

Table 7-2 (cont.)
Comments and responses

	Comment	Commenter	Response
3	Consult with Division of Marine Fisheries for improvements to anadromous fish runs.	Massachusetts Division of Fisheries and Wildlife (9-5-06)	No change to document necessary. DMF is a project partner and has been consulted throughout the planning process.
4	Section 10 and 404 permits may be required for some projects.	U.S. Army Corps of Engineers (9-5-06)	No change to document necessary. Potential need for Section 404/10 permits is already described in § 8.3.
5	Additional review by Cape Cod Commission may be required for individual projects that exceed thresholds defined by the Act.	Cape Cod Commission (9-8-06)	Possible review under the Cape Cod Commission Act has been added to § 8.3.
6	Future project-specific planning should include analysis of alternative designs, more robust diagnosis of environmental diagnosis, and full treatment of post-project monitoring and long-term maintenance.	Cape Cod Commission (9-8-06)	No change to document necessary. As described in §§ 1.0, 2.0, 6.2, and 8.2-8.6, Each future project will be evaluated in more detail, including analysis of site-appropriate, cost-effective alternative designs; monitoring and maintenance requirements; and site-specific environmental impacts.
7	Individual projects should be coordinated with EPA, CZM, DMF, and the Corps	U.S. Environmental Protection Agency (9-21-06)	No change to document necessary. The need for additional consultation with these state and federal agencies is already described in §§ 8.2 and 8.3.
8	Consider including East Harbor (Pilgrim Lake) among sites for this Project	National Park Service, Cape Cod National Seashore (10-10-06)	No change to document necessary. This site was dropped because it was being addressed by others, which was one of the screening criteria (§ 6.1). If the Cape Cod Project is funded and the East Harbor project is proposed for implementation by a Project Sponsor, NRCS will re-evaluate the project for inclusion at that time.
9	Note in the water quality section that tidal restrictions exacerbated fecal pollution and impede fish passage.	National Park Service, Cape Cod National Seashore (10-10-06)	A sentence referencing tidal restrictions and fecal coliforms has been added to § 3.7 based on cited article provided to NRCS. Fish passage is not discussed in § 3.7.

Table 7-2 (cont.)
Comments and responses

	Comment	Commenter	Response
10	Note that the water quality of Wellfleet's Herring River is impaired for acidity and metals due to diking and drainage.	National Park Service, Cape Cod National Seashore (10-10-06)	No change made to document. Individual sites are not been discussed in §3.7. Appendix C-2 notes that the Herring River is impaired for metals and pH.
11	Include the water quality effects of diking and marsh drainage in § 3.9.	National Park Service, Cape Cod National Seashore (10-10-06)	No change made to document. Some of the effects of tidal restrictions on water quality are already mentioned in §3.9. The cited reference was not provided.
12	Rephrase statement from Cape Cod Atlas on p. 4-1.	National Park Service, Cape Cod National Seashore (10-10-06)	No change made to document. Referenced statement is a quote from Cape Cod Atlas; distinction between "more tolerant of" and "better competitor than" is not considered significant enough to warrant a change.
13	Salt water intrusion was not mentioned as a public concern in Table 5-1.	National Park Service, Cape Cod National Seashore (10-10-06)	No change made to document. Salt water intrusion was not specifically mentioned as a concern in NRCS public meetings, so it is not listed in Table 5-1. Salt water intrusion is mentioned as a possible Project effect in § 6.3.3.
14	Give place names from current USGS quad sheets for restoration sites listed in Table 6-1.	National Park Service, Cape Cod National Seashore (10-10-06)	Locations described in the Cape Cod Atlas have been added to Table 6-1.
15	Projects in Table 6-2 that contribute to all three objectives should be given especially high priority scores.	National Park Service, Cape Cod National Seashore (10-10-06)	No change made to document. The criteria in Table 6-2 apply only to sites selected by DMF specifically for restoration of existing fish passageways. Most sites for which benefits would accrue to all three project objectives are salt marsh restoration projected. The presence of a shellfish resource and an anadromous fish passageway was considered in ranking of salt marsh restoration projects, as described on p. 6-2.
16	Explain different cost estimates given for same project—Wellfleet's Herring River—in Tables 6-1 and 6-3.	National Park Service, Cape Cod National Seashore (10-10-06)	Table 6-3 has been modified to delete the cost for the fish passageway and to refer to the same project in Table 6-1.

Table 7-2 (cont.)
Comments and responses

	Comment	Commenter	Response
17	Mention on p. 6-28 that increased tidal flushing would reduce fecal coliform concentrations over shellfish beds.	National Park Service, Cape Cod National Seashore (10-10-06)	A sentence has been added on p. 6-28 as suggested.
18	Consider dredging and flushing projects to remove nitrogen-rich sediment and improve water quality.	Town of Brewster Board of Selectmen (10-11-06)	No change made to document. Dredging or sediment removal projects were not rated as moderate or high concerns after the public scoping process (§ 5), and removing nitrogen-rich sediment would not contribute toward the water quality goal of reduced bacterial contamination for shellfishing waters. As an ancillary benefit, the stormwater projects will help remove nitrogen and sediment from runoff and reduce future loadings to receiving waters.

Chapter 8
RECOMMENDED PLAN

8.1 PURPOSE AND SUMMARY

NRCS developed the Cape Cod Water Resources Restoration Project in coordination with the local sponsors: Cape Cod Conservation District, Barnstable County Commission, the 15 towns of Barnstable County, and the Executive Office of Environmental Affairs, represented by the Office of Coastal Zone Management, and Division of Marine Fisheries. Both NRCS and the local sponsors support the goals and objectives of the Cape Cod Water Resource Restoration Project and are committed to supporting the individual restoration projects through funding, technical assistance, project implementation, and in-kind matches.

The Cape Cod Water Resources Restoration Project includes individual projects for:

- Altering stream crossings to improve tidal flushing at locations where a road has reduced the size of the tidal channel and affected upstream salt marsh hydrology;
- Repairing and upgrading fish passages to restore herring runs; and
- Treating the first flush of stormwater runoff to improve water quality in shellfish areas.

NRCS and the sponsors started with lists of 182 tidally restricted salt marshes, 93 fish passage obstructions, and 158 stormwater discharge sites at shellfish beds. After a screening and ranking process, the recommended plan includes 26 priority salt marsh restoration projects, 24 priority fish passage obstruction remediation projects, and 26 priority stormwater remediation projects. The estimated cost of the Project is $30 million, of which $24 million would be Public Law 83-566 funds, and the estimated Project duration (for construction of all individual projects) is ten years.

The Project supports the purposes of Public Law 83-566 because Cape Cod has significant land or water management problems that can be solved or alleviated by measures for water quality management and public fish and wildlife. Under Public Law 83-566, the Cape Cod Project must be approved by Congress because the cost exceeds $5 million.

As required by Public Law 83-566, the Project contains benefits directly related to agriculture because the water quality improvements from the stormwater remediation projects would increase the number of days harvesting would occur in shellfish beds that would otherwise be closed. The Project also would benefit rural communities because each of the towns on Cape Cod has a population less than 50,000.

8.2 MEASURES TO BE INSTALLED

The proposed measures to be installed for the priority projects are summarized in Tables 6-1, 6-3, and 6-5. In general, these projects include:

Salt marsh restoration	Replacement of inadequately sized or failed culverts with larger culverts or bridges
Fish passage obstruction remediation	Reconstruction of failed fishways; replacement of collapsed or improperly aligned culverts; removing restrictions at bridges
Stormwater remediation	Installation of catch basins and infiltration systems (leaching galleys, infiltration pits)

As each project site is proposed for implementation by a local sponsor, it will be evaluated in more detail to determine if the design assumed for this planning-level study is the most feasible and effective. Other feasible and effective alternative designs will be considered. The impacts and benefits of each project will be evaluated in more detail in an Environmental Evaluation tiered to this EIS. In general, construction of each project could cause short-term, minor, adverse impacts to air, noise, vegetation and soils, water quality, and local traffic at the construction site. There would be short-term, minor, beneficial impacts to the local economy from creation of construction jobs. Construction periods would be short, generally one or two weeks to one or two months. The Project complies with the General Conformity Rule for federal projects in nonattainment air quality regions (ozone on Cape Cod). Long-term beneficial impacts of the projects include improved water quality, improved anadromous fish runs, and increased recreational and commercial shellfish harvesting. There are no long-term negative impacts identified at this time, although the specific effects of each project on threatened and endangered species and archaeological and historical sites needs to be investigated further in the site-specific Environmental Evaluations, which would focus on the following resources and issues:

Stormwater remediation:
- Shellfish bed classification and expected water quality benefits
- Required permits; erosion and sediment control
- Threatened and endangered species; Section 7 consultation; time-of-year restrictions

Fish passage obstruction remediation:
- Required permits; erosion and sediment control; mitigation of instream construction impacts
- Archaeological and historical sites; Section 106 consultation
- Threatened and endangered species; Section 7 consultation; time-of-year restrictions

Salt marsh restoration:
- Potential effects of higher groundwater table on wells and septic systems
- Potential effects of converting freshwater wetlands to tidal, salt affected wetlands
- Potential effects of higher water levels in the marsh on improvements around the marsh
- Required permits; erosion and sediment control; mitigation of instream construction impacts

- Threatened and endangered species; Section 7 consultation; time-of-year restrictions
- Essential fish habitat; consultation with National Marine Fisheries Service

The priority projects listed in Section 6.1 may not be the final list of projects that get implemented under the Cape Cod Project. Selection of final projects will depend (1) on which projects are brought forward for final assistance by the towns or EOEA and (2) on the results of a final, detailed evaluation of each site, including costs and environmental impacts and benefits. New sites may be proposed by the local organizations. A new site would be evaluated first by NRCS through the screening/ranking process described in Section 6.1, and if it ranks within the range of the sites currently on the priority list, it would be added to the list and become eligible for assistance.

8.3 PERMITS AND COMPLIANCE

Specific permitting requirements will be identified in the Environmental Evaluation for each specific project. Because many of the projects involve construction in or near the water, the list of potentially applicable environmental permits, approvals, and consultations includes:

- Section 404/Section 10
- Section 401 Water Quality Certification
- Massachusetts Notice of Intent (state and municipal)
- Massachusetts Chapter 91 Waterways License
- Massachusetts Department of Environmental Protection Environmental Notification Form (Massachusetts Environmental Protection Act)
- Project review filing/conservation and management permit (Massachusetts Endangered Species Act)
- Special permit—anadromous fish passageway
- Coastal zone consistency determination
- Cape Cod Commission Act
- Erosion and sedimentation control plan
- Section 7 consultation, threatened and endangered species
- Section 106 consultation, archaeological and historical sites

Certain federal laws, executive orders, and policies protect specific resources of national importance; for example, wetlands, habitat for threatened and endangered species, and archaeological and historical sites. The Cape Cod Project will comply with all of this national guidance, as summarized in Table B-5 in Appendix B.

8.4 COSTS

Cost sharing between Public Law 83-566 and other sources is shown in Tables 8-1 and 8-2. The estimated total Project costs are $29,950,000. The estimated construction costs for structural measures total $17,720,000. The Sponsor's estimated cost of construction is $4,430,000 and the estimated cost of construction eligible for Public Law 83-566 funding is $13,290,000.

Ecosystem restoration is not an exact science and stormwater remediation measures and salt marsh restoration measures have a degree of uncertainty (Section 6.5 Risk and Uncertainty). Adaptive management is collecting and applying the information gained from monitoring the installed works of improvement to ensure that the planned habitat unit benefits are obtained. Some additional work may be necessary such as additional treatment facilities (e.g. leaching chambers) for stormwater projects or interior ditching in salt marshes. Adaptive management is also applying the information gained from monitoring to the design of new project sites. The estimated costs of data collection for achieving the planned habitat unit benefits (i.e., adaptive management) total $1,960,000. Data collection includes environmental surveys of restored salt marshes and water quality monitoring of shellfish areas for defining additional work measures needed to achieve the most benefits at the least costs. NRCS policy (General Manual 190, Part 410.12(a)(4)) supports the use of post-project monitoring to ensure that planning and evaluation procedures have a sound technical basis. Monitoring of selected individual projects will determine whether they are functioning as planned, provide a basis for re-engineering if necessary, and improve the planning and evaluation of later projects.

Construction costs for structural measures are direct costs for installation (Table 8-2). Construction includes such items as excavation and removal of existing under-sized culverts and obsolete fish passage structures, installation of new culverts, fish passage structures and stormwater remediation measures, and seeding of disturbed areas. Engineering services include the direct cost of engineers and other technicians for surveys, investigations, designs, and preparation of plans and specifications for structural measures, including vegetative work and the preparation of operation and maintenance plans. CZM and DMF currently have an effective and efficient program delivery system for restoring salt marshes and anadromous fish runs. Implementation for these projects objectives would capitalize on their experience and existing systems. Their experience provided the basis for estimating the additional costs associated with the complexities of site specific project implementation. Salt marsh restoration projects include an additional project management and engineering cost at 45 percent of construction costs. Anadromous fish run restoration projects include an additional project management and engineering cost at 43 percent of construction costs.

Project administration costs include the cost of contract administration, review of engineering plans prepared by others, contract administrators, and inspection services during construction. The total estimated cost of Project administration is $4,290,000. The Sponsors estimated cost of Project administration is $430,000 and the estimated cost of Project administration eligible for Public Law 83-566 funding is $3,860,000.

Table 8-1
Estimated installation cost – Cape Cod Water Resources Restoration Project

Installation cost measure	Estimated costs[1/] PL 83-566 funds ($)	Other ($)	Total ($)
Stormwater Remediation	6,390,000	1,800,000	8,190,000
Fish Passage Obstruction Remediation	4,350,000	910,000	5,260,000
Salt Marsh Restoration	11,340,000	3,200,000	14,540,000
Adaptive Management[2/]	1,880,000	80,000	1,960,000
Total	23,960,000	5,990,000	29,950,000

[1/] Price Base 2006 November 2006

[2/] Adaptive management costs are for marsh vegetation mapping and shellfish embayment water quality sampling and analysis based on CZM and DMF estimates.

Table 8-2
Estimated Distribution of Installation Costs
Cape Cod Water Resources Restoration Project

	PL 83-566 funds ($)[1/]				Other funds ($)[1/]					
Installation cost measure	Construction	Engineering	Project administra-tion	Total PL 83-566 cost	Construction	Sponsor engineering costs	Land rights	Project admini-stration	Total other	Total cost
Stormwater Remediation [2/]	4,560,000	1,460,000	370,000	6,390,000	1,520,000	130,000	0	150,000	1,800,000	8,190,000
Fish Passage Obstruction Remediation [3/]	2,160,000	920,000	1,270,000	4,350,000	720,000	120,000	0	70,000	910,000	5,260,000
Salt Marsh Restoration[4/]	6,350,000	2,790,000	2,200,000	11,340,000	2,120,000	650,000	230,000	200,000	3,200,000	14,540,000
Adaptive Management	220,000	1,640,000	20,000	1,880,000	70,000	4,000	0	7,000	80,000	1,960,000
Total	13,290,000	6,810,000	3,860,000	23,960,000	4,430,000	900,000	230,000	430,000	5,990,000	29,950,000

[1/] Price Base 2006; total costs does not equal the sum of the project costs in Tables 6-1, 6-3, and 6-5 because of rounding November 2006
[2/] See Table 6-5 for specific site descriptions and costs
[3/] See Table 6-3 for specific site descriptions and costs
[4/] See Table 6-1 for specific site descriptions and costs

Land rights costs are direct and related costs for the right to install, operate, and maintain works of improvement. It is anticipated that all work will be on public land or land already under agreement for works of improvement and there are no costs anticipated for land rights other than the costs for re-locating some buried utilities during construction..

Sponsor engineering costs are the estimated costs for the sponsor to obtain permits for the works of improvement. This cost is estimated to be $25,000 for each salt marsh restoration site, $5,000 for a fish passage site and $5,000 for a stormwater remediation site.

8.5 INSTALLATION AND FINANCING

Installation

Works of improvement will be installed over a ten-year period following authorization of federal assistance under the Watershed Protection and Flood Protection Act, Public Law 83-566. Installation of the works of improvement is voluntary and specific projects will be brought forward for technical and financial assistance by the towns or EOEA. Installation of the works of improvement will vary from year to year based on the availability of sponsor and federal funds. It is anticipated that the average annual amount will be $3.0 million.

Responsibilities

Responsibilities for carrying out a site-specific project will be shared between the Natural Resources Conservation Service and the Sponsors as follows:

NRCS

a. Provide overall Project administration.
b. Provide engineering design and construction inspection for works contracted by NRCS.
c. Provide engineering designs for works contracted by Sponsors.
d. Provide funds to Sponsors for preparing engineering designs and construction inspection for works contracted by Sponsors.
e. Provide up to seventy-five percent (75%) of the total construction costs. The cost share rate is to be commensurate with other national programs at the time of signing project agreements.
f. Provide funds to Sponsors to collect data necessary for adaptive management of water quality improvement measures for shellfish areas and adaptive management for restoring salt marshes.
g. Provide funds to Sponsors for project management and engineering typically performed by NRCS to implement projects.

Sponsors

a. Provide at least twenty-five percent (25%) of the total construction costs.
b. Be responsible for their Project and contract administration costs for installing works of improvement.
c. Acquire any land rights necessary for installing the works of improvement.
d. Bear the costs of relocating or modifying utilities.
e. Secure all required federal, state and local permits.

f. Be responsible for operation and maintenance of all components of installed works of improvement.
g. Be responsible for their Project and contract administration costs for collecting data necessary for adaptive management of water quality improvement measures for shellfish areas and adaptive management for restoring salt marshes.
h. When funded by NRCS, provide project management and engineering typically performed by NRCS to implement projects

Contracting

Each site-specific project or groups of projects will be constructed through project agreements between NRCS and the Sponsor for that site by means of a federal contract, local contract, division of work, or force account.

Land Rights

The Sponsors will be responsible for acquiring the land rights and rights-of-way necessary to install, operate and maintain the works of improvement. The Sponsors will also be responsible for the satisfactory relocation or modification of all utilities disturbed as a result of the project.

8.6 OPERATION AND MAINTENANCE

Operation includes the administration, management, and performance of non-maintenance actions needed to keep each completed practice safe and functioning as planned. Maintenance includes the performance of work, preventing deterioration of installed practices, and repairing damage or replacement of the practice if one or more of its components fail. Damages to completed practices caused by normal deterioration, drought, flooding, sedimentation or vandalism are considered normal maintenance.

The Sponsor's liability for O&M extends throughout the actual life of the installed practice. A separate O&M agreement will be developed for each site specific or group of site, and signed prior to construction of that site. The agreements will provide for inspections, reports, and procedures for performing the maintenance items. An O&M plan will be included with the agreement. Operation and maintenance of stormwater remediation measures is critical to the success of reducing pollutant loadings to shellfish areas. O&M agreements will have strict requirements for Sponsors to inspect and perform maintenance work (e.g. removing sediment from catch basins). Each practice is to be inspected on a regular scheduled basis, and immediately following major storms, earthquakes or other occurrences which may adversely affect the practice.

The estimated average annual operation and maintenance costs are $1.8 million (Table 8-3, evaluated for a 50-year period).

Table 8-3
Estimated average annual costs – Cape Cod Water Resources Restoration Project

Installation cost measure	Amortization of installation costs ($)	Operation, maintenance and replacement costs ($)	Total ($)
Stormwater remediation	439,800	106,500	546,300
Fish passage obstruction remediation	281,900	47,300	329,200
Salt marsh restoration	781,000	25,200	806,200
Adaptive management	105,000	0	105,000
Total	1,607,700	179,000	1,786,700

Based on 50-year project evaluation period.
Discount rate of 4.875%.
Price base is 2006.

November 2006

Chapter 9
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Chapter 10
LIST OF PREPARERS

Name	Present title (time in job-yrs)	Education: degree	Education: cont. educ.	Experience (titles/time in job-yrs)	Other (licenses, etc.)
USDA Natural Resources Conservation Service					
Don Liptack	District Conserv – 15	BS, Wildlife Mgmt MS, Resource Mgt and Admin		NRCS – 27	
Dan Barnett	Civil Eng – 11	BS, Forest Eng Assoc Degree, Forest Mgmt		CE – 4 AE – 7	Prof Civil Eng MA-567869 ME-9851
Larry Boutiette Jr.	Civil Eng – 37	BS, Civil Eng		Project/ Constr Eng – 20 Area Eng – 5 Eng Special - 3	Prof Civil Eng MA-32747
Marc MacQueen	Soil Conserv – 14	BS, Wildlife Biology		NRCS – 35	
Rudy Chlanda	Geologist – 28	BS, Geology	Grad work UMass, Wright St	NRCS – 33	Cert Prof Geologist CPG
Barb Miller	GIS Specialist – 6	BS Wildlife Management	Geography, graduate work	Dairy farmer–23 SCT – 3 SC – 5.5	Cert Crop Advisor
Beth Schreier	Soil Conserv – 5	BS, Environ Studies		Biologist – 6 Environ Sci – 4	
Andrew Lipsky	State Biologist – 1	BS, Environ Sci & Political Sci MS, Environ Sci & Watershed Hydrol		Biologist – 3 Restoration Ecologist-8	Cert Conserv. Planner Wildlife Mgmt Specialist

Name	Present title (time in job-yrs)	Education: degree	Education: cont. educ.	Experience (titles/time in job-yrs)	Other (licenses, etc.)
Pam Failing	Civil Eng – 11	BS, Forest Eng BA, Gen Studies AAS, Civil Tech AAS, Surv Tech	Post-grad studies in Environ Eng	Civil/Survey Tech – 10 Civil Eng – 11	PE, NY 078448
Greg Smead	Civil Engineer (retired)	BS Civil Eng	Grad work at UMass	Civil Eng – 38	
John O'Neill	Economist (retired)	BS, Nat Res Economics		Economist – 32	
Rick DeVergilio	State Resource Conserv – 9	BS, Plant and Soil Science		NRCS – 33	
Carl Gustafson	State Conserv Eng – 18	BS, Civil Eng		NRCS – 35	Prof Civil Engr MA – 35602, ID – 3443
Massachusetts Division of Marine Fisheries					
Phil Brady	Sr. Marine Fisheries Biologist - 4	MS, Marine Biol BS, Marine Biol	Radiol Sci Fisheries Acad Shellfish Sanitation Shoreline Surveys IFIM Oceanog Medical Entomol Fish Passage and Diversion Facilities.	Marine Fisheries Biologist – 27	Cert. SCUBA Diver U.S. Naval Commendation RCT Great Lakes. U.S. Naval Commendation Rear Admiral W.C. Turville, Medical Corps.
Ken Reback	Fisheries Consultant	BS, Bus Admin	Fisheries Biol	Marine Fisheries Biologist – 34	

Name	Present title (time in job-yrs)	Education: degree	Education: cont. educ.	Experience (titles/time in job-yrs)	Other (licenses, etc.)
Jim Fair	Fisheries Consult	BS, Fisheries Biology	State Mgmt Program	Marine Fisheries Biologist – 10 Deputy Dir DMF – 23	
Dave Whittaker	Senior Marine Fisheries Biologist	BS Pre-med Biology	Public Health	Marine Fisheries Biologist – 16 Sr. Biologist – 4 Dir. Pub. Health, New Bedford–3 Hosp. Adm. – 13	RS CPHO
Massachusetts Office of Coastal Zone Management					
Tim Smith	Restoration Ecologist – 6	MS, Environ Science		Restor Ecol – 10 Land Mgr – 7	
Hunt Durey	Restoration Prog Manager – 1	MS, Environ Law BS, Natural Resources		Restoration Planner – 5 Environ Sci – 5	
EA Engineering, Science, and Technology					
H. Jeffrey Elseroad	Senior Environ Scientist – 22	MSE, Environ Eng BA, Chemistry		Environ Eng – 8 Environ Scientist – 3	
Cristi D. Bishop	Scientist – 4	MS, Biology BS, Marketing	Ecotox	Research Assoc, Lab/Project Mgr – 6	
Michelle L. Harden	Environ Scientist – 4	BS, Environ Science		Lab Tech – 1	
Charles J. Katuska	Environ Restor Ecologist – 2	MFS, Wildlife Ecology BS, Biology		Environ Sci – 17 Ecol/Environ Scientist – 10	Professional Wetl Sci No. 696
Timothy Twohig	Soil Scientist – 1	MS, Environ Science BS, Environ Science/Mgmt		Graduate Research Asst – 3	

Name	Present title (time in job-yrs)	Education degree	Education cont. educ.	Experience (titles/time in job-yrs)	Other (licenses, etc.)
David A. Mayhew	Senior Scientist – 29	MS, Fisheries Science BA, Biology		Field Team Leader – 5	Am Fish Soc Cert Fish Sci No. 1655
Mary Alice Koeneke	Environ Scientist – 29	MS, Environ Biology BS, Biology		Naturalist – 4 Instr/Research Asst – 3	
Charles W. Leasure	Scientist – 12	BS, Horticulture		Horticulturist – 5 Lab Tech – 2	
Suzanne E. Boltz	Senior Scientist – 13	MS, Fish/Wildlife Science BS, Environ Bio	Environ Impact Analysis	Aquatic Ecologist – 4 Teach/Research Assist – 4	

Chapter 11
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INDEX (CONT.)

Appendix A
LETTERS AND ORAL COMMENTS ON DRAFT PLAN-EIS

CONTENTS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

June 21, 2006

Reference: Project: Watershed plan; Location: Cape Cod, MA

Rick DeVergilio
U.S. Dept. of Agriculture
Natural Resources Conservation Service
451 West St.
Amherst, MA 01002

Dear Mr. DeVergilio:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Michael J. Amaral

Michael J. Amaral
Endangered Species Specialist
New England Field Office

1. Cecil Curran
2. Gordon

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

Orig - C.F.
Copy (Carl) Rich

APR 20 2006

APR 24 2006

Cecil Curran
US Department of Agriculture
Natural Resources Conservation Service
451 West Street
Amherst, Massachusetts 01002

Dear Mr. Currin,

This is in response to your letter dated April 5, 2006 requesting information on the presence of any species listed as threatened or endangered or any designated critical habitat in the vicinity of Cape Cod, Massachusetts. The Natural Resources Conservation Service (NRCS) is developing a watershed plan for Cape Cod to restore salt marshes, restore and protect shellfish beds by treating stormwater runoff, and restoring fish passage on existing anadromous fish runs.

Several listed species of whales and sea turtles are known to occur seasonally in the waters off of Massachusetts. Federally endangered Northern right whales (*Eubalaena glacialis*) have been documented in the nearshore waters of Massachusetts from December through June and are likely to be present in Cape Cod Bay from December 15 – April 15 and Great South Channel from March 1 – June 30. Endangered Humpback whales (*Megaptera novaeangliae*) feed during the spring, summer, and fall over a range that encompasses the eastern coast of the United States. Humpback whales are found off the coast Massachusetts from March 15 – November 30. Fin (*Balaenoptera physalus*), Sei (*Balaenoptera borealis*) and Sperm (*Physter macrocephalus*) whales are also seasonally present in New England waters but are typically found in deeper offshore waters.

Certain New England waters have also been designated as critical habitat for the Northern Right whale (final rule at 59 FR 28793). The Great South Channel critical habitat is the area bounded by 41°40' N/69°45' W; 41°00' N/69°05' W; 41°38' W; and 42°10' N/68°31' W. The Cape Cod Bay critical habitat is the area bounded by 42°02.8' N/70°10' W; 42°12' N/70°15' W; 42°12' N/70°30' W; 41°46.8' N/70°30' W and on the south and east by the interior shore line of Cape Cod, Massachusetts.

The sea turtles in northeastern nearshore waters are typically small juveniles with the most abundant being the federally threatened loggerhead (*Caretta caretta*) followed by the federally endangered Kemp's ridley (*Lepidochelys kempi*). Loggerhead turtles have been found to be relatively abundant off the Northeast coast (from near Nova Scotia, Canada to Cape Hatteras, North Carolina). Loggerheads and Kemp's ridleys have been documented in waters as cold as 11°C, but generally migrate northward when water temperatures exceed 16°C. These species are

typically present in New England waters from June 1 – November 30. Federally endangered leatherback sea turtles (*Dermochelys coriacea*) are located in New England waters during the warmer months as well. While leatherbacks are predominantly pelagic, they may occur close to shore, especially when pursuing their preferred jellyfish prey. Green sea turtles *(Chelonia mydas)* may also occur sporadically in New England waters, but those instances would be rare.

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, states that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Any discretionary federal action that may affect a listed species must undergo Section 7 consultation. The NRCS is responsible for determining if the proposed project is likely to affect listed species and obtaining the concurrence of NMFS with their determination. However, it is unlikely that listed whales or sea turtles would be present in the areas affected by the restoration project.

Your information request has been forwarded to Chris Boelke of NMFS' Habitat Conservation Division (HCD). HCD staff oversee programs related to the Fish and Wildlife Coordination Act and designated Essential Fish Habitat. You may receive information on the presence of other NOAA trust resources from HCD staff. Mr. Boelke can be reached at (978)281-9131. Should you have any questions regarding these comments, please contact Julie Crocker of my staff at (978)281-9300 x6530.

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

Cc: Boelke, F/NER4

File Code: Sec 7 USDA/NRCS Cape Cod watershed plan

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
451 West Street
Amherst MA 01002

www.ma.nrcs.usda.gov
phone: 413-253-4351
fax: 413-253-4375

July 6, 2006

Ms. Mary Colligan
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, Northeast Region
One Blackburn Drive
Gloucester, MA 01930-2298

Dear Ms. Colligan:

In a letter dated April 5, 2006, Massachusetts Natural Resources Conservation Service (NRCS) requested information on the presence of any listed threatened and endangered species or any designated critical habitat that may be present within the project areas proposed as part of the Cape Cod Water Resources Restoration Project (Section 7 Review).

NRCS is preparing the Watershed Plan and Areawide Environmental Impact Statement (EIS) for the Cape Cod Water Resources Restoration Project (CCWRRP). The purposes of the project are to restore degraded salt marshes, restore anadromous fish passages, and improve water quality for shellfishing areas. The CCWRRP includes individual projects for the following:

- Altering stream crossings to improve tidal flushing at locations where a road has reduced the size of the tidal channel and affected upstream salt marsh hydrology;
- Repairing and upgrading fish passages to restore anadromous fish (e.g. herring) habitat; and
- Treating stormwater runoff from urban areas to improve water quality and shellfish harvesting.

The CCWRRP includes 26 priority salt marsh restoration projects, 24 priority fish passage obstruction remediation projects, and 26 priority stormwater remediation projects. The CCWRRP is in the planning stage. If Congress approves funding for CCWRRP, NRCS will review each priority project in more detail to determine the best practice for that site and to verify that the habitat objectives will be achieved. Alternative sites may also be selected for implementation if they meet all of the criteria described in the EIS.

In your letter dated 20 April 2006, several federally listed species of whales and sea turtles were reported to occur seasonally in the waters off the coast of Massachusetts. Whale species listed in the letter included the federally endangered Northern right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physter macrocephalus*).

Humpback whales are found seasonally off the coast of Massachusetts, and fin, sei, and sperm whales are found seasonally in deeper offshore waters; CCWRRP projects would not affect the habitat for these four species. The majority of Northern right whale individuals in the North Atlantic population range from wintering and calving areas in coastal waters off the southeastern United States to summer feeding and nursery grounds in New England waters. Cape Cod Bay and the Great South Channel were designated by NMFS as critical habitat for northern right whales. No CCWRRP projects would affect the Great South Channel, but some salt marsh restoration projects would be located on the coastline of Cape Cod Bay.

Turtle species listed in the letter included the federally threatened loggerhead turtle (*Caretta caretta*) and endangered Kemp's ridley turtle (*Lepidochelys kempi*), leatherback turtle (*Dermochelys coriacea*), and green turtle (*Chelonia mydas*). Although the green turtle is rare in New England waters, the loggerhead, Kemp's ridley, and leatherback turtles are present in Massachusetts coastal waters in summer and fall months when ocean temperatures are warmer.

The salt marsh restoration projects would improve tidal flushing in salt marshes where man-made obstructions (i.e., road culverts, bridges) have restricted tidal flow. The change in tidal regime has resulted in vegetation changes over time, and what were once thriving salt marshes have become brackish or freshwater wetlands dominated by invasive species. These projects would involve replacing the existing tidal restriction with a larger culvert or bridge to increase tidal flushing and help restore native plant and animal communities in salt marshes, and improve biotic integrity. Construction of the proposed salt marsh projects would temporarily disrupt aquatic life in the vicinity of the road crossings due to turbidity and physical activity in the water. The listed whale species are known to occur seasonally in the waters off of Massachusetts, but would not be impacted by the salt marsh restoration projects. These species are mostly found in deeper waters and would not be present in the salt marsh areas. The federally and state listed sea turtles mainly nest in warmer and tropical climates. The species listed within the letter have been observed around Cape Cod, but mostly in deeper waters. The leatherback and loggerhead sea turtles may enter shallow estuarine bays and possibly enter river mouths following prey, but those instances are a rare occurrence.

The fish passage remediation projects include streams that are dammed, diverted, or otherwise altered, and have had fish ladders or other fish passage structures built for anadromous fish. Over time, these fish passage structures have naturally deteriorated and need to be repaired or replaced to function properly. The fish passage remediation projects would restore fish ladders and other fish passages that have deteriorated. These restorations would allow greater numbers of anadromous fish to gain access to spawning areas, and support greater populations of other species that depend on them for food. The fish passage projects would be completed on nontidal streams and would not affect any of the listed whale or sea turtle species, because those species are not present in the nontidal streams.

Stormwater on Cape Cod carries many toxic pollutants that harm the aquatic environment, and fecal coliform bacteria are the main constituent that affects shellfish bed closures. The stormwater remediation projects would capture and treat contaminated stormwater runoff through effective best management practices (BMPs). Effective treatment of stormwater from urban areas would improve water quality (i.e. reduce fecal coliform and other pollutants of concern) and help keep shellfish beds open for commercial and public use. Construction

activities to install stormwater BMPs would not directly affect receiving water biota because the projects occur on land off the shoreline, and runoff of sediment from the disturbed areas is minimized by erosion and sediment controls. These projects would not affect the listed whale or turtle species.

The fish passage remediation project sites and the stormwater treatment project sites are not located within the designated critical habitat for the northern right whale. A few salt marsh restoration projects are located on the south and east shoreline of Cape Cod Bay. The salt marsh restoration projects are not likely to jeopardize the continued existence of the listed northern right whale or destroy or adversely modify its designated habitat. The listed whale species are known to occur seasonally in Cape Cod Bay, but will not be impacted by the salt marsh restoration projects. There are no projects associated with the CCWRRP that are located within the Great South Channel.

Based on our research of the species listed above, the NRCS has determined that the CCWRRP would have no effect on federally listed whale or turtle species in the Massachusetts coastal and oceanic waters. NRCS requests concurrence in this determination from NMFS.

Should you have any questions regarding this letter, please contact Rick DeVergilio, State Resource Conservationist at 413-253-4379.

Sincerely,

CECIL B. CURRIN
State Conservationist

cc: R. DeVergilio, State Resource Conservationist, NRCS, Amherst

Cecil
Copy: Cecil

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

AUG 07 2006
JUL 27 2006
JUL 21 2006

Cecil B. Currin
US Department of Agriculture
Natural Resources Conservation Service
451 West Street
Amherst, Massachusetts 01002

Dear Mr. Currin,

This is in response to your letter dated July 6, 2006 regarding the Massachusetts Natural Resources Conservation Service's (NRCS) Cape Cod Water Resources Restoration Project (CCWRRP). NRCS has made the preliminary determination that this project will not affect any species listed under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS) and has requested NMFS concurrence with this determination.

In a letter dated April 20, 2006, NMFS provided information to NRCS on the listed species that are known to seasonally occur in Cape Cod Bay. The CCWRRP includes 26 priority salt marsh restoration projects, 24 priority fish passage obstruction remediation projects, and 26 priority stormwater remediation projects. None of these projects will occur in Cape Cod Bay where listed whales and sea turtles are likely to occur. As such, NMFS concurs with NRCS' determination that the CCWRRP will have no effect on any listed species under NMFS jurisdiction. As such, no consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, is necessary. Should you have any questions regarding these comments, please contact Julie Crocker at (978)281-9300 x6530 or by email (julie.crocker@noaa.gov).

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

Cc: Boelke, F/NER4

File Code: Sec 7 USDA NRCS Mass. no effect

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

May 19, 2006

Natural Resources Conservation Service
Attn: Cecil Currin
451 West Street
Amherst, MA 01002

MAY 25 2006

Re: Cape Cod Watershed Plan
Bourne, Mashpee, Barnstable, Wellfleet, Harwich & Eastham
NHESP Tracking Number: 06-19857

Dear Mr. Currin,

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for information regarding state-protected rare species in the vicinity of the above referenced site. We have reviewed the site and would like to offer the following comments.

The project sites submitted all fall within NHESP *Priority Habitat* (PH) and *Estimated Habitat* (WH) regulatory polygons. Attached are the specific project site locations, along with a list of the rare species that have been documented to occur within the vicinity of the project sites.

These species are protected under the Massachusetts Endangered Species Act (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.37 and 10.59). Fact sheets for this species can be found on our website http://www.state.ma.us/dfwele/dfw/nhesp/nhfact.htm.

This evaluation is based on the most recent information available in the NHESP database, which is constantly being expanded and updated through ongoing research and inventory. Should your site plans change, or new rare species information become available, this evaluation may be reconsidered.

If you have any questions regarding this review please call Jenna Garvey, Environmental Review Assistant, at (508) 792-7270 ext. 303.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

Priority Habitat 1435 (PH 1435) & Estimated Habitat 404 (WH 404)

Bourne - Sites: BO-MR-2 and BO-MR-3
State-listed rare species in the vicinity of project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Clemmys guttata	Spotted Turtle	Reptile	SC
Helianthemum dumosum	Bushy Rockrose	Plant	SC
Leptodea ochracea	Tidewater Mucket	Mussel	SC
Ligumia nasuta	Eastern Pondmussel	Mussel	SC
Notropis bifrenatus	Bridle Shiner	Fish	SC
Terrapene carolina	Eastern Box Turtle	Reptile	SC

Priority Habitat 1648 (PH 1648) & Estimated Habitat 7071 (WH 7071)

Mashpee - Site: MA-QR-7
State-listed rare species in the vicinity of project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Anax longipes	Comet Darner	Dragonfly	SC
Clemmys guttata	Spotted Turtle	Reptile	SC
Enallagma laterale	New England Bluet	Damselfly	SC
Leptodea ochracea	Tidewater Mucket	Mussel	SC
Polygonum puritanorum	Pondshore Knotweed	Plant	SC
Terrapene carolina	Eastern Box Turtle	Reptile	SC

Priority Habitat 1589 (PH 1589) & Estimated Habitat 445 (WH 445)

Barnstable – Site: BA-MMR-5
State-listed rare species in the vicinity of project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Alasmidonta undulata	Triangle Floater	Dragonfly	SC
Enallagma laterale	New England Bluet	Damselfly	SC
Leptodea ochracea	Tidewater Mucket	Mussel	SC
Ligumia nasuta	Eastern Pondmussel	Mussel	SC
Notropis bifrenatus	Bridle Shiner	Fish	SC
Polygonum puritanorum	Pondshore Knotweed	Plant	SC
Terrapene carolina	Eastern Box Turtle	Reptile	SC

Priority Habitat 1150 (PH 1150) & Estimated Habitat 352 (WH 352)

Wellfleet – Site: WE-HR-1
State-listed rare species in the vicinity of project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Dichanthelium ovale ssp. pseudopubescens	Commons's Panic-grass	Plant	SC
Malaclemys terrapin	Diamondback Terrapin	Reptile	T
Terrapene carolina	Eastern Box Turtle	Reptile	SC

Priority Habitat 1150 (PH 1150) & Estimated Habitat 363 (WH 363)

Wellfleet – Site: WE-4
State-listed rare species in the vicinity of project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Charadrius melodus	Piping Plover	Bird	T
Corema conradii	Broom Crowberry	Plant	SC
Malaclemys terrapin	Diamondback Terrapin	Reptile	T
Scaphiopus holbrookii	Eastern Spadefoot	Amphibian	T
Terrapene carolina	Eastern Box Turtle	Reptile	SC

Priority Habitat 1550 (PH 1550) & Estimated Habitat 5063 (WH 5063)

Bourne – Site: BN-28 & BN-33
State-listed rare species in the vicinity of the project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Liatris scariosa var. novae-angliae	New England Blazing Star	Plant	SC
Malaclemys terrapin	Diamondback Terrapin	Reptile	T
Sterna dougallii	Roseate Tern	Bird	E
Sterna hirundo	Common Tern	Bird	SC
Terrapene carolina	Eastern Box Turtle	Reptile	SC

Priority Habitat 1435 (PH 1435) & Estimated Habitat 3079 (WH 3079)

Bourne – Site: BN-39
State-listed rare species in the vicinity of the project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Malaclemys terrapin	Diamondback Terrapin	Reptile	T
Sterna dougallii	Roseate Tern	Bird	E
Sterna hirundo	Common Tern	Bird	SC
Terrapene carolina	Eastern Box Turtle	Reptile	SC

Priority Habitat 1650 (PH 1650) & Estimated Habitat 466 (WH 466)

Barnstable – Site: BA-18
State-listed rare species in the vicinity of the project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Charadrius melodus	Piping Plover	Bird	T
Sterna dougallii	Roseate Tern	Bird	E
Sterna hirundo	Common Tern	Bird	SC
Sterna antillarum	Least Tern	Bird	SC

Priority Habitat 1592 (PH 1592) & Estimated Habitat 447 (WH 447)

Harwich – Site: HA-4
State-listed rare species in the vicinity of the project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Terrapene carolina	Eastern Box Turtle	Reptile	SC
Ixobrychus exilis	Least Bittern	Bird	E

Priority Habitat 1422 (PH 1422) & Estimated Habitat 391 (WH 391)

Eastham – Site: EA-1
State-listed rare species in the vicinity of the project site:

Scientific Name	Common Name	Species Type	DFW_RANK
Terrapene carolina	Eastern Box Turtle	Reptile	SC
Malaclemys terrapin	Diamondback terrapin	Reptile	T
Helianthemum dumosum	Bushy Rockrose	Plant	SC

USDA NRCS
Natural Resources Conservation Service

United States Department of Agriculture

Natural Resources Conservation Service

451 West Street
Amherst,
Massachusetts
01002-2995

413-253-4351

March 22, 2006

Brona Simon, State Archaeologist
Deputy State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

RE: Cape Cod Water Resources Restoration Project

Dear Ms. Simon:

The purpose of this letter is to bring the Cape Cod Water Resources Restoration Project to your attention. Our approach for compliance with Section 106 is described below. We would appreciate your concurrence with our approach or suggestions as to how to improve the process.

The project, located in Barnstable County will consist of three components with the expressed purposes of 1) Restoring salt marshes and their aquatic ecosystems through enlarging or replacing culverts where they are causing tidal restrictions 2) Replacing failed fish passage structures in anadromous fish runs and, 3) Restoring and protecting shellfish beds by treating stormwater runoff through the construction of wetlands, dry wells, and other infiltration structures. The website below and the enclosed brochure explain the project in greater detail.

http://www.capecodcd.org/Cape_Cod_Water_Resources.pdf

NRCS wants to provide you with advance notice of this effort with the anticipation that funding will follow to implement the work. A Draft EIS is being prepared for NRCS by EA Engineering Science and Technology Incorporated. We expect the DEIS will be sent out for comment in July. The DEIS will address Section 106 in a general fashion since the sequence of installation and exact locations of the projects have not been determined at this time.

This is an exciting and innovative endeavor for NRCS and our partners. Over the last several years, data gathering and prioritization has been done to locate and prioritize areas where ecosystems have been compromised.

Salt marsh restoration projects consist of removing existing culverts beneath highways which restrict tidal flow to the marsh. These projects will nearly all involve the excavation of existing roadways and installation of larger culverts in previously disturbed

soils. NRCS will review all these projects for their potential to affect cultural resources, though we expect most, if not all, to have no effect.

Stormwater infiltration projects will generally consist of excavation of existing road surfaces to install leaching catch basins to infiltrate stormwater runoff. The majority of these projects will involve excavating previously disturbed soils beneath highways.

Where infiltration basins will be installed off the paved roads, NRCS will perform archaeological reconnaissance. If a location is determined to be undisturbed, a phase 1 archaeological investigation will be performed. NRCS anticipates that less than 10% of the stormwater projects will be located off existing highways.

Fish passage projects will generally consist of the removal and replacement of existing fish ladders that have fallen into disrepair. These projects are located in and along streams that hold anadromous fish runs, therefore located in archaeologically sensitive areas.

Although fish ladders will usually consist of removal and replacement of the facilities in their original disturbed footprint, there exists the possibility for new disturbance associated with construction in the surrounding area. For this reason, NRCS will have an archaeologist perform file research and reconnaissance surveys. Where disturbance is expected outside the previously disturbed footprint, an archaeologist will perform phase 1 surveys on all fish passage projects.

When project funds are received for detailed planning, NRCS will consult with your office as required under NHPA. Additional NEPA documentation, including Section 106 consultation, will be done for each individual site as it considered for funding. NRCS looks forward to working with you on this project in the years to come.

If you have any questions or comments, please call Rudy Chlanda, Cultural Resources Coordinator and Geologist at 413-253-4364 Thank you.

Sincerely,

CECIL B. CURRIN
State Conservationist

Cc: Carl Gustafson, SCE, USDA-NRCS, Amherst, MA
Rudy Chlanda, Geologist, USDA-NRCS, Amherst, MA
David Skinas, Archeologist, USDA-NRCS, Vermont
Donald Liptack, DC, USDA-NRCS, Barnstable, MA

Enc.

USDA NRCS
Natural Resources Conservation Service

United States Department of Agriculture

Natural Resources Conservation Service

451 West Street
Amherst,
Massachusetts
01002-2995

413-253-4351

March 22, 2006

Ms. Cheryl Andrews-Maltais
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head Aquinnah
20 Black Brook Road
Aquinnah, MA 02535

RE: Cape Cod Water Resources Restoration Project

Dear Ms Maltais:

The purpose of this letter is to bring the Cape Cod Water Resources Restoration Project to your attention. Our approach for compliance with Section 106 is described below. We would appreciate your concurrence with our approach or suggestions as to how to improve the process.

The project, located in Barnstable County will consist of three components with the expressed purposes of 1) Restoring salt marshes and their aquatic ecosystems through enlarging or replacing culverts where they are causing tidal restrictions 2) Replacing failed fish passage structures in anadromous fish runs and, 3) Restoring and protecting shellfish beds by treating stormwater runoff through the construction of wetlands, dry wells, and other infiltration structures. The website below and the enclosed brochure explain the project in greater detail.

http://www.capecodcd.org/Cape_Cod_Water_Resources.pdf

NRCS wants to provide you with advance notice of this effort with the anticipation that funding will follow to implement the work. A Draft EIS is being prepared for NRCS by EA Engineering Science and Technology Incorporated. We expect the DEIS will be sent out for comment in July. The DEIS will address Section 106 in a general fashion since the sequence of installation and exact locations of the projects have not been determined at this time.

This is an exciting and innovative endeavor for NRCS and our partners. Over the last several years, data gathering and prioritization has been done to locate and prioritize areas where ecosystems have been compromised.

Salt marsh restoration projects consist of removing existing culverts beneath highways which restrict tidal flow to the marsh. These projects will nearly all involve the excavation of existing roadways and installation of larger culverts in previously disturbed

soils. NRCS will review all these projects for their potential to affect cultural resources, though we expect most, if not all, to have no effect.

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Where infiltration basins will be installed off the paved roads, NRCS will perform archaeological reconnaissance. If a location is determined to be undisturbed, a phase 1 archaeological investigation will be performed. NRCS anticipates that less than 10% of the stormwater projects will be located off existing highways.

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Although fish ladders will usually consist of removal and replacement of the facilities in their original disturbed footprint, there exists the possibility for new disturbance associated with construction in the surrounding area. For this reason, NRCS will have an archaeologist perform file research and reconnaissance surveys. Where disturbance is expected outside the previously disturbed footprint, an archaeologist will perform phase 1 surveys on all fish passage projects.

When project funds are received for detailed planning, NRCS will consult with your office as required under NHPA. Additional NEPA documentation, including Section 106 consultation, will be done for each individual site as it considered for funding. NRCS looks forward to working with you on this project in the years to come.

If you have any questions or comments, please call Rudy Chlanda, Cultural Resources Coordinator and Geologist at 413-253-4364 Thank you.

Sincerely,

CECIL B. CURRIN
State Conservationist

Cc: Carl Gustafson, SCE, USDA-NRCS, Amherst, MA
Rudy Chlanda, Geologist, USDA-NRCS, Amherst, MA
David Skinas, Archeologist, USDA-NRCS, Vermont
Donald Liptack, DC, USDA-NRCS, Barnstable

Enc.

CAPE COD COMMISSION

3225 MAIN STREET
P.O. BOX 226
BARNSTABLE, MA 02630
(508) 362-3828
FAX (508) 362-3136
E-mail: frontdesk@capecodcommission.org

Cecil Currin, State Conservationist
USDA Natural Resources Conservation Service
451 West Street
Amherst, MA 01002-2995

Dear Mr. Currin,

Please accept this letter as an expression of support for the Cape Cod District's draft Watershed Plan and Areawide Environmental Impact Statement for the Cape Cod Water Resources Restoration Project (or, the plan). The plan compiled by staff at the District Office is distinct in its comprehensive assessment of impacted resources, and for its strategic approach to the remediation and restoration of these sites.

The Cape Cod Commission has not reviewed specific project plans pertaining to work that may be conducted during the course of individual restoration projects. The extent to which a particular project is consistent with Regional Policy Plan Minimum Performance Standards may require future Cape Cod Commission review. However, the principle of restoring degraded natural resources and improving the function and resiliency of the Cape's environment comports with the goals of the Cape Cod Commission's Regional Policy Plan for Barnstable County.

Barnstable County has been among the most rapidly growing counties in the nation for several decades, and the influx of seasonal visitors creates additional pressures on natural resources. Natural attributes that are already degraded by development or that have deteriorated through neglect or deferred maintenance, continue to worsen and exacerbate the loss of environmental services. The Cape Cod District's plan, if funded, represents a practical approach to the restoration of many of the Cape's environmental attributes. We encourage your support of the plan and of efforts to secure funding to accomplish the work described therein.

Sincerely,

Margo Fenn,
Executive Director

United States Department of the Interior

NATIONAL PARK SERVICE
Cape Cod National Seashore
99 Marconi Site Road
Wellfleet, MA 02667
508.349.3785
508.349.9052 Fax

JUN 12 2006

IN REPLY REFER TO:
N2221

June 8, 2006

Cecil B. Currin
State Conservationist
NRCS
451 West Street
Amherst, MA 01002

Subject: Support for NRCS Cape Cod Water Resources Restoration Project

Dear Mr. Currin: CBC

We are pleased to offer our strong support for the NRCS Cape Cod Water Resources Restoration Project to restore salt marshes, migratory fish runs and shellfish water quality on the Cape over the next decade, enhancing tidal hydrology to over 1,500 acres at a projected cost of $13.5 million. Indeed, the largest salt-marsh restoration project on the NRCS list, Wellfleet's Herring River comprising 1100 of the 1500-acre Cape-wide total, is largely within Cape Cod National Seashore and the subject of a presently intense multi-agency planning effort. We of course welcome NRCS participation, in terms of both technical expertise and funding, in this large and complicated project.

Under a recently executed Memorandum of Understanding between the Town of Wellfleet and the Seashore, a Technical Committee has been formed and is working diligently to develop a comprehensive restoration plan for Herring River. Stephen Speer of the Cape NRCS office is a regular member of that committee. It would be appropriate and very helpful for Steve to describe the new NRCS Restoration Project, and how it relates to Herring River, at the Technical Committee's next meeting on 22 June.

We understand that NRCS will soon be releasing a formal draft EIS proposing to complete 28 salt marsh restoration projects on Cape Cod over the next decade, and look forward to that review. Clearly, this project will have a very significant effect on coastal restoration activities Cape-wide over the next 10 years, We look forward to active collaboration with NRCS on Herring River and other outer Cape Cod coastal restoration projects.

Please contact Ecologist John Portnoy (508-487-3262 ext. 107; email: john_portnoy@nps.gov) of my staff for technical information and updates on tidal restoration projects here.

Sincerely,

George E. Price, Jr.
Superintendent

cc: Tim Smith, MCZM
Donald Liptak, NRCS
Gordon Peabody, Herring River Technical Team Chair

Barnstable County's
Cape Cod Cooperative Extension
Marine Program

Deeds and Probate Building
Railroad Avenue, P.O. Box 367
Barnstable, MA 02630-0367
(508) 375-6701 - (508) 362-4518 fax

JUN 23 2006

June 20, 2006

Mr. Cecil Curran
State Conservationist
USDA Natural Resources Conservation Service
451 West Main St.
Amherst, MA. 01002

Dear Mr. Curran:

I'm writing to convey my full and wholehearted support for the proposed Cape Cod Water Resources Restoration Project-Watershed Plan, which will be presented to you shortly for final review. Don Liptak and other staff members at the Hyannis NRCS office have spent hundreds of hours working on this effort, consulting with local towns, State and County agencies, environmental groups and the public. The draft plan underwent recent review and was well received, indicating the level of depth and ongoing involvement and commitment of so many individuals.

The Cape's marine environment has suffered ongoing decline over the years, largely due to residential and commercial development with its associated roadways and pavement. Runoff, blocked fish ways, and tidal restrictions, have both impacted important natural resources such as shellfish and diadromous fish and have degraded thousands of acres of vital salt marsh habitat. Good examples of these impacts are the River Herring (alewives and bluebacks). These fish are in such a state of decline that the Massachusetts Division of Marine Fisheries recently placed a three year moratorium on the harvest or possession of these species. Deterioration of fish passages and ladders is one of several reasons for this decline, and this plan incorporates a good deal of restoration work on these fish passages. It is also envisioned to correct drainage and runoff problems which impact and sometimes force the closure of shellfish growing areas; and the correction of tidal restrictions, such as undersized culverts, is also a goal of the plan. This effort alone will restore approximately 1500 acres of lost salt marsh habitat.

The plan is ambitious, but this overall watershed approach has been well thought out, well developed and as noted above completed with a broad audience of participation. It is my hope that the plan will meet final approval, and that the much needed funding for this work will soon be available to make this vision of restoration a reality.

Sincerely,

William Burt, Marine Resources Specialist

cc: Don Liptak, District Conservationist

MASSACHUSETTS BAYS PROGRAM
251 Causeway St., Suite 900, Boston, MA 02114-2151
(617) 626-1200 / Fax (617) 626-1240
website: www.massbays.org

30 June 2006

Cecil Currin, State Conservationist
USDA Natural Resources Conservation Service
451 West Street
Amherst, MA 01002-2995

Dear Mr. Currin,

I am pleased to submit this letter of support for the Cape Cod District's draft Watershed Plan and Areawide Environmental Impact Statement for the Cape Cod Water Resources Restoration Project (or, the plan) on behalf of the Cape Cod region of the Massachusetts Bays Program. The plan compiled by staff at the District Office is distinct in its comprehensive assessment of impacted resources, and for its strategic approach to the remediation and restoration of these sites.

The Environmental Protection Agency's (EPA) National Estuary Program (NEP) was established by Congress in 1987 to improve the quality of estuaries of national importance. Initially launched in 1988 and officially accepted as an estuary of national significance in 1990 the Massachusetts Bays Program is one of 28 NEPs in the country. While the program generally emphasizes work within the Bays, our comprehensive approach to environmental problems and our regional structure lend themselves to the support and encouragement sound practices in adjacent areas.

The towns within the Cape Cod Region of the Massachusetts Bays National Estuary Program are among the most rapidly growing communities in the nation for several decades, and the continued crush of coastal development and tourism exacerbates pressures on fragile natural resources. Attributes that are already degraded by development or that have deteriorated through neglect or deferred maintenance; continue to worsen resulting in reduced water quality, loss of habitat and other impacts to public trust resources. The Cape Cod District's plan proposes a body of work that is consistent with the goals, priorities and recommended actions codified in the Comprehensive Conservation and Management Plan developed for bays. It represents a practical approach to the restoration of many of the Cape's most important environmental characteristics, and I encourage your support of the.

Sincerely,

Steven Tucker

Steven Tucker,
Cape Cod Regional Staff

The Massachusetts Bays Program is sponsored by the Massachusetts Executive Office of Environmental Affairs through the Coastal Zone Management Office and the U.S. Environmental Protection Agency, Region1, One Congress St., Suite 1100, Boston, MA 02114

Program for Women, Infants and Children, and the Commodity Supplemental Food Program. The agenda items will include a discussion of general program issues. Meetings of the Council are open to the public. Members of the public may participate, as time permits. Members of the public may file written statements with the contact person named above, before or after the meeting.

Dated: June 15, 2005.

Roberto Salazar,

Administrator.

[FR Doc. 05–12479 Filed 6–23–05; 8:45 am]

BILLING CODE 3410–30–P

DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service

Cape Cod Water Resources Restoration Project, Barnstable County, Massachusetts

AGENCY: Natural Resources Conservation Service, USDA.

ACTION: Notice of intent to prepare an environmental impact statement.

SUMMARY: Pursuant to section 102(2)(C) of the National Environmental Policy Act of 1969; the Council on Environmental Quality Guidelines (40 CFR part 1500); and the Natural Resources Conservation Service Guidelines (7 CFR part 650); the Natural Resources Conservation Service, U.S. Department of Agriculture, give notice that an environmental impact statement is being prepared for the Cape Cod Watershed, Barnstable County, Massachusetts.

FOR FURTHER INFORMATION CONTACT: Cecil B. Currin, State Conservationist, Natural Resources Conservation Service, 451 West Street, Amherst, MA 01002, 413–253–4351.

SUPPLEMENTARY INFORMATION: The environmental assessment of this federally assisted action indicates that the project may cause significant local, regional, or national impacts on the environment. As a result of these findings, Cecil B. Currin, State Conservationist, has determined that the preparation and review of an environmental impact statement is needed for this project.

Area: Barnstable County, excluding Federal lands.

Sponsors: Barnstable County Commissioners and the Cape Cod Conservation District.

Partners: Massachusetts Division of Marine Fisheries, Massachusetts Coastal Zone Management, all towns on Cape Cod.

Project purposes are watershed protection and fish and wildlife development. Sponsors objectives are to (1) improve water quality for shellfish beds, (2) restore degraded salt marshes and (3) restore anadromous fish passages. Alternatives under consideration to reach these objectives include but are not limited to:

Objective 1: Constructed wetlands, infiltration basins or trenches, dry wells, and sand filters.

Objective 2: Enlarging existing culverts to restore marsh hydrology to pre-restriction conditions; marsh and pit development to provide fish pools in marshes.

Objective 3: Water level control structures, fish ladders, and obstruction removals.

A draft environmental impact statement will be prepared and circulated for review by agencies and the public. The Natural Resources Conservation Service invites participation and consultation of agencies and individuals that have special expertise, legal jurisdiction, or interest in the preparation of the draft environmental impact statement. Further information on the proposed action may be obtained for Cecil B. Currin, State Conservationist, at the above address and telephone.

Signed in Amherst, Massachusetts on June 15, 2005.

Cecil B. Currin,

State Conservationist.

(This activity is listed in the Catalog of Federal Domestic Assistance under No. 10.904—Watershed Protection and Flood Prevention—and is subject to the provisions of Executive Order 12372 which requires intergovernmental consultation with State and local officials.)

[FR Doc. 05–12591 Filed 6–23–05; 8:45 am]

BILLING CODE 3410–16–P

COMMITTEE FOR PURCHASE FROM PEOPLE WHO ARE BLIND OR SEVERELY DISABLED

Procurement List; Additions

AGENCY: Committee for Purchase From People Who Are Blind or Severely Disabled.

ACTION: Additions to Procurement List.

SUMMARY: This action adds to the Procurement List products and services to be furnished by nonprofit agencies employing persons who are blind or have other severe disabilities.

EFFECTIVE DATE: July 24, 2005.

ADDRESSS: Committee for Purchase From People Who Are Blind or Severely Disabled, Jefferson Plaza 2, Suite 10800, 1421 Jefferson Davis Highway, Arlington, Virginia 22202–3259.

FOR FURTHER INFORMATION OR TO SUBMIT COMMENTS CONTACT: Sheryl D. Kennerly, Telephone: (703) 603–7740, Fax: (703) 603–0655, or e-mail *SKennerly@jwod.gov.*

SUPPLEMENTARY INFORMATION: On April 15, and April 29, 2005, the Committee for Purchase From People Who Are Blind or Severely Disabled published notice (70 FR 19924, and 22297/22298) of proposed additions to the Procurement List.

After consideration of the material presented to it concerning capability of qualified nonprofit agencies to provide the products and services and impact of the additions on the current or most recent contractors, the Committee has determined that the products and services listed below are suitable for procurement by the Federal Government under 41 U.S.C. 46–48c and 41 CFR 51–2.4.

Regulatory Flexibility Act Certification

I certify that the following action will not have a significant impact on a substantial number of small entities. The major factors considered for this certification were:

1. The action will not result in any additional reporting, recordkeeping or other compliance requirements for small entities other than the small organizations that will furnish the products and services to the Government.

2. The action will result in authorizing small entities to furnish the products and services to the Government.

3. There are no known regulatory alternatives which would accomplish the objectives of the Javits–Wagner–O'Day Act (41 U.S.C. 46–48c) in connection with the products and services proposed for addition to the Procurement List.

End of Certification

Accordingly, the following products and services are added to the Procurement List:

Products

Adhesive Roller Mop
NSN: M.R. 1095—Refill
NSN: M.R. 1085—Mop
NPA: Winston-Salem Industries for the Blind, Winston-Salem, North Carolina.
Contracting Activity: Defense Commissary Agency (DeCA), Fort Lee, Virginia.

Services

Service Type/Location: Cleaning Service—

Dated: June 21, 2006.

Dale N. Bosworth,

Chief.

[FR Doc. E6–12310 Filed 7–31–06; 8:45 am]

BILLING CODE 3410–11–P

DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service

Environmental Statements, Availability

AGENCY: Natural Resources Conservation Service, USDA.

ACTION: Notice of availability.

SUMMARY: The Natural Resources Conservation Service (NRCS) has prepared a Draft Areawide Environmental Impact Statement consistent with the National Environmental Policy Act of 1969, as amended, to disclose potential effects to the human environment.

The Watershed Plan and Areawide Environmental Impact Statement (EIS) for the Cape Cod Water Resources Restoration Project are combined into a single document. The purposes of the Project are to restore degraded salt marshes, restore anadromous fish passages, and improve water quality for shellfishing areas. Specifically, sponsors wish to:

1. Improve tidal flushing in salt marshes where man-made obstructions (i.e., road culverts) have restricted tidal flow. This will help restore native plant and animal communities in salt marshes, and improve biotic integrity.

2. Restore fish ladders and other fish passages that have deteriorated. This will allow greater numbers of anadromous fish (which spend most of their adult lives in salt water and migrate to freshwater streams, rivers, and lakes to reproduce; for example, alewife, blueback herring) to gain access to spawning areas, and support greater populations of other species (for example, striped bass, bluefish, weakfish, largemouth bass, chain pickerel) that depend on them for food.

3. Maintain and improve water quality affecting shellfish beds by treating stormwater runoff. This will help ensure that shellfish beds which are threatened with closure remain open, and maintain or extend the current shellfishing season for beds whose use is restricted during certain times of year.

This Project is needed because human activity on Cape Cod has degraded its natural resources, including salt marshes, anadromous fish runs, and water quality over shellfish beds. The development of Cape Cod has required the construction of extensive road and railroad networks. Along the coast, culverts or bridges were needed for these networks to cross tidal marshes, and many of the openings through these structures are not large enough to allow adequate tidal flushing. When the culverts or bridges constrict flow, the tidal regime changes, which results in vegetation changes over time; what was once a thriving salt marsh can become a brackish or fresh water wetland dominated by invasive species. Together with funding from the Massachusetts Office of Coastal Zone Management (CZM), the Cape Cod Commission and the Buzzards Bay Project National Estuary Program identified over 182 sites where salt marshes have been altered by human activity.

Human activity on Cape Cod has also resulted in damming or diverting streams, causing anadromous fish to lose access to spawning grounds. In addition, water flow may have been altered by cranberry growers and other farmers. Fish ladders and other fish passage facilities have been built to help ensure that fish get access to spawning areas, but these structures deteriorate over time (end of design life), or they may be of obsolete design and need replacement to function properly. The Massachusetts Division of Marine Fisheries (DMF) identified 93 fish passage obstructions on Cape Cod.

Cape Cod's economy depends on good water quality. Shellfishing, a multi-million dollar industry on the Cape, is only allowed in areas with excellent water quality. As land is developed, and more areas are paved, stormwater runoff may become contaminated with nutrients, metals, fertilizers, bacteria, etc. This runoff may carry enough fecal coliform bacteria to affect water quality in shellfishing areas, thus leading to closure of shellfishing areas, or restrictions on the periods when the beds can remain open. DMF and town officials identified over 160 stormwater discharge points into shellfishing areas. By controlling sources of runoff, separating clean water from contamination sources, and capturing and treating the most heavily contaminated runoff through a variety of measures (e.g., infiltration, constructed wetlands).

Two alternatives were considered: Proposed Action/Recommended Plan and the No action alternative.

No Action would continue the declining trend of water quality of shellfish waters, impaired anadromous fish runs and degraded salt marshes.

The recommended plan is the Proposed Action (Cape Cod Water Resources Restoration Project) because it maximizes ecological benefits and is the National Ecosystem Restoration (NER) Plan. The Recommended Plan achieves the desired level of improvement for the least cost. For each project type (shellfish, fish passage, and salt marsh), the Restoration Project would provide a greater number of habitat units and greater other environmental benefits than the No Action Alternative. NRCS has developed a list of 76 projects that will meet the sponsors' objectives. All of these projects have received a planning-level analysis to ensure that they appear feasible and capable of providing the habitat benefits sought through this areawide Project. When the Project is authorized and funded, the sponsors will propose specific projects to NRCS. NRCS will review each project in more detail to determine the most cost-effective practice for that site and to verify that the habitat objectives will be achieved.

The recommended plan would help to maintain or improve water quality in up to 26 shellfish areas affecting 7,300 acres of shellfish beds. Current laws and regulations require stormwater management for all new developments, which prevents or minimizes new development from causing the same water quality impairments that occurred in the past. The Project is expected to improve tidal flushing at 26 sites enhancing 1,500 acres of salt marsh. Current design guidelines prevent or minimize road or railroad construction from causing the same hydrological restrictions that occurred in the past. And through this Project it is expected that 24 fish passages on Cape Cod would be restored to full function improving access to 4,200 acres of spawning habitat.

Written comments regarding this Draft Areawide EIS should be mailed to: Cecil B. Currin, Cape Cod Water Resources Restoration Project EIS, USDA–NRCS, 451 West Street, Amherst, MA 01002. Comments may also be submitted by sending a facsimile to (413) 253–4395 or by e-mail to *cecil.currin@ma.usda.gov.* Please include CCWRRP in the subject line.

Project information is also available on the Internet at *http://www.ma.nrcs.usda.gov/programs/CCWRRP.*

DATES: Comments must be received no later than 45 days after this notice is published.

FOR FURTHER INFORMATION CONTACT: Cecil B. Currin, State Conservationist, USDA Natural Resources Conservation Service, 451 West Street, Amherst, MA

01002, (413) 253–4350. Project information is also available on the Internet at: *http://www.ma.nrcs.usda.gov/programs/CCWRRP.*

SUPPLEMENTARY INFORMATION: Copies of the Draft EIS are available by request at the address above. Basic data maybe viewed by contacting Carl Gustafson, State Conservation Engineer, USDA Natural Resources Conservation Service, 451 West Street, Amherst, MA 01002, (413) 253–4362, *carl.gustafson@ma.usda.gov.*

Signed in Amherst, Massachusetts, on July 19, 2006.

Bruce Thompson,

Acting State Conservationist.

[FR Doc. E6–12354 Filed 7–31–06; 8:45 am]

BILLING CODE 3410–16–P

DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service

Construction in the Matanuska River of Spur Dike #5, at Circleview Estates, Palmer, AK

AGENCY: Natural Resources Conservation Service, USDA.

ACTION: Notice of a finding of no significant impact.

SUMMARY: Pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969; the Council on Environmental Quality Guidelines (40 CFR part 1500); and the Natural Resources Conservation Service (formerly the Soil Conservation Service) Guidelines (7 CFR part 650); the Natural Resources Conservation Service, U.S. Department of Agriculture, Robert Jones, State Conservationist, finds that neither the proposed action nor any of the alternatives is a major federal action significantly affecting the quality of the human environment, and determine that an environmental impact statement is not needed for the Construction in the Matanuska River of Spur Dike #5, at Circleview Estates, Palmer, AK.

FOR FURTHER INFORMATION CONTACT: Mr. Robert Jones, State Conservationist, Natural Resources Conservation Service, Alaska State Office, 800 West Evergreen Avenue, Suite 100, Palmer, AK 99645–6539; Phone: 907–761–7760; Fax: 907–761–7790.

SUPPLEMENTARY INFORMATION: The environmental assessment of this Federally assisted action indicates that the project will not cause significant local, regional, or national impacts on the environment. As a result of these findings, the preparation and review of an environmental impact statement are not needed for this project.

The Matanuska River is a glacially fed river system with highly braided channels. Severe bank erosion in the Circle View Estates area has been addressed previously through the installation of rock and earthen spur dikes. Erosion has continued downstream of the dikes, threatening adjacent bank and personal property (homes, buildings, appurtenances) and public infrastructure. The purpose of the project is to protect river bank, private homes and public infrastructure from loss to the erosive forces of the river at this subdivision site.

The preferred alternative is to install a barb-head spur dike, having river-directing flow features, which is believed to be potentially more fish-friendly than the previous adjacent dike designs. Completion of the project will reduce the risk of personal property loss, extend downstream protection of the existing four dikes, reduce emergency requests and response (as well as associated capital expenditures) by local government units, reduce potential harm or loss of human life, and protect public infrastructure in the area of influence of the dikes protection.

The Notice of a Finding of No Significant Impact (FONSI) has been forwarded to the Environmental Protection Agency and other interested parties. A limited number of copies of the Environmental Assessment and the FONSI are available to fill single copy requests at the above address. Basic data developed during the environmental assessment are on file and may be reviewed by contacting Robert Jones.

No administrative action on implementation of the proposal will be taken until 30 days after the date of this publication in the **Federal Register**.

Finding of No Significant Impact for the Construction of the Matanuska River, Spur Dike #5 at Circle View Estates, Palmer, AK

Introduction

The Construction of the Matanuska River, Spur Dike #5 at Circle View Estates, Palmer, AK is a Federally assisted action authorized through funding under the Watershed Protection and Flood Prevention Act (PL–83–566) 1954. An environmental assessment was undertaken in conjunction with the development of the implementation plan. This assessment was conducted in consultation with local, State, and Federal agencies as well as with interested organizations and individuals. Data developed during the assessment are available for public review at the following location: U.S. Department of Agriculture, Natural Resources Conservation Service, Alaska State Office, 800 West Evergreen Avenue, Suite 100, Palmer, AK 99645–6539, Phone: 907–761–7760, Fax: 907–761–7790.

Recommended Action

The Matanuska River is a glacially fed river system with highly braided channels. Severe bank erosion in the Circle View Estates area has been addressed previously through the installation of rock and earthen spur dikes. Erosion has continued downstream of the dikes, threatening adjacent bank and personal property (homes, buildings, appurtenances) and public infrastructure. The purpose of the project is to protect river bank, private homes and public infrastructure from loss to the erosive forces of the river at this subdivision site.

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Alternatives

Two alternatives were not carried forward for additional development. These are nonstructural and combined actions. The nonstructural approach cannot be achieved by the proposed project as this requires state and/or local public policy changes. As the nonstructural approach is not being brought forward, the combined actions alternative cannot be further evaluated either.

Two alternatives were brought forward for further development. These are the bank protection alternative and no action alternative.

The preferred alternative selected is the installation of the barb-headed version of an additional spur dike. The proposed spur dike with barb head is a composite structure, consisting of a spur dike shank with the head of the dike designed as an overtopping barb. This design incorporates the overtopping feature of the barbs that work well in small streams and is considered more fish-friendly than the round-headed spur dike that has been shown to

Swordfish, and Shark and the Atlantic Billfish Fishery Management Plan, Implementation, Atlantic Coast, Caribbean and Gulf of Mexico.

Summary: EPA does not object to the proposed action.

Dated: August 8, 2006.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E6–13160 Filed 8–10–06; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–6678–1]

Environmental Impact Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–7167 or *http://www.epa.gov/compliance/nepa/.*

Weekly receipt of Environmental Impact Statements

Filed 07/31/2006 Through 08/04/2006 Pursuant to 40 CFR 1506.9.

EIS No. 20060326, Final EIS, BOP, NH, Berlin, Coos County, Proposed Federal Correctional Institution, Construction and Operation, City of Berlin, Coos County, NH, Wait Period Ends: 09/11/2006, Contact: Pamela J. Chandler 202–514–6470.

EIS No. 20060327, Final Supplement, AFS, CA, Empire Vegetation Management Project, Additional Information to Clarify Previous Analysis, Vegetation, Fire/Fuels/Air Quality, Wildlife, Watershed, and Botanical Resource/Noxious Weeds, Mount Hough Ranger District, Plumas National Forest, Plumas County, CA, Wait Period Ends: 09/11/2006, Contact: Gary Rotta 530–283–0555.

EIS No. 20060328, Draft EIS, NRS, MA, Cape Cod Water Resources Restoration Project, Restore Degraded Salt Marshes, Restore Anadromous Fish Passages, and Improve Water Quality for Shellfishing Area, Cape Cod, Barnstable County, MA, Comment Period Ends: 09/25/2006, Contact: Carl Gustafson 413–253–4302.

EIS No. 20060329, Final EIS, NRS, MO, East Locust Creek Watershed Revised Plan, Installation of Multiple-Purpose Reservoir, Flood Prevention and Watershed Protection, Sullivan and Putnam Counties, MO, Wait Period Ends: 09/11/2006, Contact: Roger A. Hansen 573–876–0901.

EIS No. 20060330, Draft EIS, NOA, CA, Channel Islands National Marine Sanctuary (CINES) Project, Establishment of No-Take and Limited-Take Marine Zones, Protection of Sanctuary Biodiversity, CA, Comment Period Ends: 10/10/2006, Contact: Chris Mobley 805–966–7107.

EIS No. 20060331, Final EIS, FRC, WA, Rocky Reach Hydroelectric Project, (FERC/DEIS–0184D), Application for a New License for the Existing 865.76 Megawatt Facility, Public Utility District No. 1 (PUD), Columbia River, Chelan County, WA, Wait Period Ends: 09/11/2006, Contact: Todd Sedmak 1–866–208–FERC.

EIS No. 20060332, Final Supplement, NOA, 00, Amendment 26 to the Gulf of Mexico Reef Fish Fishery Management Plan, Proposed Individual Fishing Quota (IFQ) Program to Reduce Overcapacity in the Commercial Red Snapper Fishery, Wait Period Ends: 09/11/2006, Contact: Roy E. Crabtree 727–824–5308.

EIS No. 20060333, Draft EIS, USA, MD, U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), Construction and Operation of New USAMRIID Facilities and Decommissioning and Demolition and/or Re-use of Existing USAMRIID Facilities, Fort Detrick, MD, Comment Period Ends: 09/25/2006, Contact: Dave Hand 410–962–8154.

EIS No. 20060334, Final Supplement, UAF, 00, Realistic Bomber Training Initiative, Addresses Impacts of Wake Vortices on Surface Structures, Dyess Air Force Base, TX and Barksdale Air Force Base, LA, Wait Period Ends: 09/11/2006, Contact: Sheryl Parker 757–764–9334.

Amended Notices

EIS No. 20060318, Draft EIS, FHW, NC, Greenville Southwest Bypass Study, Transportation Improvements to NC 11 and U.S. 264 Business, U.S. Army COE Section 404 Permit, Pitt County, NC, Comment Period Ends: 09/18/2006, Contact: John F. Sullivan, III 919–856–4346. Revision of FR Notice Published in 08/04/2006: Correction to State from NY to NC.

Dated: August 8, 2006.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E6–13207 Filed 8–10–06; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–8208–6; Docket ID No. EPA–HQ–ORD–2004–0002]

Draft Toxicological Review of Dichlorobenzenes: In Support of Summary Information on the Integrated Risk Information System (IRIS)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Extension of Public Comment Period and Rescheduled External Peer Review Panel Meeting.

SUMMARY: The EPA is extending the public comment period and rescheduling an external peer review panel meeting to review selected sections of the final draft document titled, ''Toxicological Review of Dichlorobenzenes: In Support of Summary Information on the Integrated Risk Information System (IRIS)'' (EPA/635/R–03/015), related to the inhalation reference concentration (RfC) and inhalation cancer assessment for 1,4-dichlorobenzene. The document was prepared by the National Center for Environmental Assessment (NCEA) within EPA's Office of Research and Development.

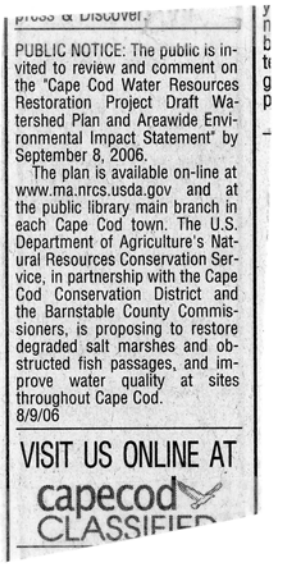
On July 11, 2006, EPA published a **Federal Register** notice (71 FR 39113) announcing a comment period that ended August 9 and an external peer review panel meeting that was scheduled for August 16. EPA is extending the public comment period to October 10, 2006, in response to requests. The external peer review panel meeting will be held on October 30, 2006.

As previously stated in 71 FR 39113, EPA is releasing this draft document solely for the purpose of pre-dissemination peer review under applicable information quality guidelines. This document has not been formally disseminated by EPA. It does not represent and should not be construed to represent any Agency policy or determination. EPA will consider any public comments submitted in accordance with this notice when revising the document.

DATES: The period for submission of comments on the final draft document will end on October 10, 2006. Technical comments should be in writing and must be received by EPA by October 10, 2006. Comments submitted to the EPA by October 10, 2006, will be provided to the external peer review panel prior to the teleconference meeting. The peer review panel meeting will be conducted on October 30, 2006, by teleconference

CAPE COD TIMES
PROOF OF PUBLICATION

Date: 8/9/06



press & Discover.

PUBLIC NOTICE: The public is invited to review and comment on the "Cape Cod Water Resources Restoration Project Draft Watershed Plan and Areawide Environmental Impact Statement" by September 8, 2006.

The plan is available on-line at www.ma.nrcs.usda.gov and at the public library main branch in each Cape Cod town. The U.S. Department of Agriculture's Natural Resources Conservation Service, in partnership with the Cape Cod Conservation District and the Barnstable County Commissioners, is proposing to restore degraded salt marshes and obstructed fish passages, and improve water quality at sites throughout Cape Cod.
8/9/06

VISIT US ONLINE AT
capecod
CLASSIFIED

United States Department of Agriculture
Natural Resources Conservation Service

Massachusetts State Office
451 West Street, Amherst, MA 01002
413-253-4350, fax 413-253-4375
www.ma.nrcs.usda.gov

NEWS RELEASE

FOR IMMEDIATE RELEASE August 4, 2006

CONTACT: Diane Baedeker Petit
Public Affairs Specialist
(413) 253-4371

Carl Gustafson
State Conservation Engineer
(413) 253-4362

Proposed watershed restoration project will benefit Cape Cod, according to report

Draft environmental impact statement available for public review and comment

AMHERST, Mass. -- A major water resources restoration project proposed for Cape Cod will have long-term beneficial effects on the region and no significant detrimental effects, according to a draft environmental impact statement released by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

The public is invited to review and comment on the draft statement by September 8, 2006. The "Cape Cod Water Resources Restoration Project Draft Watershed Plan and Areawide Environmental Impact Statement" is available on-line at www.ma.nrcs.usda.gov. Copies have also been sent to the public library main branch in each Cape Cod town.

NRCS, in partnership with the Cape Cod Conservation District and the Barnstable County Commissioners, is proposing the Cape Cod Water Resources Restoration Project to restore degraded salt marshes and obstructed fish passages, and improve water quality at sites throughout Cape Cod.

The proposed project will restore 1,500 acres of degraded salt marsh, improve fish access to 4,200 of spawning habitat, and improve water quality for 7,300 acres of shellfish beds. Short-term economic benefits are expected, as well, from the creation of construction jobs.

Only minor short-term adverse impacts are anticipated, which could include noise at construction sites and traffic disruptions. Construction periods at specific sites would be short, ranging from a week to a couple of months.

An estimated $15-20 million in federal planning, technical and cost-share assistance will be provided through NRCS's Small Watershed Program, which targets watersheds less than 250,000 acres. Local communities will share in construction costs. The plan and environmental impact statement, prepared by the Cape Cod Conservation District with assistance by NRCS, will require final approval by Congress before federal assistance is authorized.

-- MORE --

"Shellfish beds on the Cape are often closed for extensive periods during the year because of poor water quality," said Lee Davis, chair of the Cape Cod Conservation District. "Storm water runoff is a significant source of pollution. Salt marsh degradation and barriers that interfere with the migration of fish are also a concern."

"The watershed plan includes conservation improvements to be implemented over a period of years," said Donald Liptack, District Conservationist for the local NRCS office in Hyannis. "We need public input to ensure that the plan is physically, environmentally, socially and economically sound."

The Cape Cod Conservation District and Barnstable County Commissioners are the lead sponsors of the project, working in partnership with federal, state and local agencies, as well as all Barnstable County towns. NRCS will be the lead technical assistance agency.

# # #

Company	Business Phone	Business Fax	E-mail
Associated Press	(617) 357-8100	(617) 338-8125	
Associated Press Providence	(401) 274-2270	(401) 272-5644	
Barnstable Patriot	(508) 771-1427	(508) 790-3997	Editor@barnstablepatriot.com
Boston Globe	(617) 929-3112	(617) 929-3186	allen@globe.com
Boston Globe	(617) 929-3043	(617) 929-8329	b_daley@globe.com
Boston Globe South	(781) 826-1053		estes@globe.com
Boston Herald	(617) 426-3000	(617) 542-1315	
Boston Herald	(617) 426-3000	(617) 426-1865	
Bourne Enterprise	(508) 548-4700	(508) 540-8407	news@capenews.net
Cape Cod Chronicle	(508) 945-2220	(508) 945-2579	twood@capecodchronicle.com
Cape Cod Independent	(508) 759-7703	(508) 759-7703	
Cape Cod Times	(508) 862-1155	(508) 771-3292	news@capecodonline.com
Cape Cod Times	(617) 775-1200	(508) 771-3292	ppronovost@capecodonline.com
Cape Codder	(508) 255-2121	(508) 247-3201	capecodder@cnc.com
Ch. 04, WBZ-TV	(617) 787-7000	(617) 787-5969	4news@wbz.com
Ch. 05, WCVB TV	(781) 449-0400	(781) 449-6681	wcvbnews@thebostonchannel.com
Ch. 06, WLNE-TV	(401) 453-8000	(401) 453-8092	jmarshall@abc6.com
Ch. 07, WHDH-TV	(617) 725-0777	(617) 227-4782	
Ch. 10, WJAR-TV	(401) 751-5700	(401) 455-9140	wjarnews@nbc.com
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Ch. 25, WFXT-TV	(781) 326-8825	(781) 467-7213	
Ch. 56, WLVI-TV	(617) 282-0938	(617) 287-2872	smmartin@tribune.com
Falmouth Enterprise	(508) 548-4700	(508) 540-8407	enterprise@cape.com
Harwich Oracle	(508) 398-0123	(508) 760-3387	harwich@cnc.com
Providence Journal	(508) 674-8401	(508) 676-6140	massbureau@projo.com
Upper Cape Codder			uppercapecodder@cnc.com
WBUR-FM	(617) 353-1159	(617) 353-4747	rgotbaum@wbur.bu.edu
WBUR-FM	(617) 353-1159	(617) 353-4747	dbecker@wbur.bu.edu
WCIB 102 Hyannis	(508) 778-2888	(508) 790-4967	larry@cool102.com
WFCC 107.5 W. Yarmouth	(508) 790-3772		mail@wfcc.com
WKPE 104.7 Yarmouth	(508) 790-3772	(508) 790-3773	
WOCN FM 104 Hyannis	(508) 771-1224	(508) 775-2605	wqrcnews@cape.com
WOMR 92.1 Provincetown	(508) 487-2619	(508) 487-5524	info@womr.org
Yarmouth Register	(508) 375-4990	(508) 375-4901	ghritt@cnc.com

Cape Cod Water Resources Restoration Project Draft EIS distribution list

Title	First Name	Last Name	Company / Organization	City	State
Mr.	John	O'Neill		Madbury	NH
Mr.	Greg	Smead		Barrington	NH
Mr.	Christian	Spies		Pequabuck	CT
			Advisory Council on Historic Preservation	Washington	DC
			Bourne Library	Bourne	MA
			Brewster Library	Brewster	MA
Mr.	Alan	Platt	Cape Cod Commission	Barnstable	MA
Mr.	Lee	Davis	Cape Cod Conservation District	Barnstable	MA
Mr.	William	Burt	Cape Cod Cooperative Extension	Barnstable	MA
Mr.	Willam	Clark	Cape Cod Cooperative Extension	Barnstable	MA
			Chatham Library	Chatham	MA
Mr.	Hunt	Drurey	Coastal Zone Management	Boston	MA
Mr.	Tim	Smith	Coastal Zone Management	Boston	MA
Ms.	Susan	Snow-Cotter	Coastal Zone Management	Boston	MA
The Honorable	Mitt	Romney	Commonwealth of Massachusetts	Boston	MA
			Dennis Library	Dennis	MA
			Department of Commerce	Washington	DC
			Department of Housing and Urban Development	Washington	DC
The Honorable	Dirk	Kempthorne	Department of the Interior	Washington	DC
			Department of Transporation	Washington	DC
Mr.	Jim	Fair	Division of Marine Fisheries	E. Sandwich	MA
Mr.	Ken	Reback	Division of Marine Fisheries	Plymouth	MA

Title	First Name	Last Name	Company / Organization	City	State
Mr.	Dave	Whittaker	Division of Marine Fisheries	Pocasset	MA
Mr.	Michael	Armstrong	Division of Marine Fisheries - Annisquam River Marine Fis	Gloucester	MA
Mr.	Philip	Brady	Division of Marine Fisheries (fish)	Pocasset	MA
Mr.	Michael	Hickey	Division of Marine Fisheries (shellfish)	Pocasset	MA
			Eastham Library	Eastham	MA
Mr.	Edward	Reiner	Environmental Protection Agency Region 1	Boston	MA
			Environmental Protection Agency Regional Office	Boston	MA
Ms.	Kathleen	Baskin	Executive Office of Environmental Affairs	Boston	MA
Secretary	Stephen	Pritchard	Executive Office of Environmental Affairs	Boston	MA
			Falmouth Library	Falmouth	MA
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			Hyannis Library	Hyannis	MA
			Mashpee Library	Mashpee	MA
Commissioner	Robert	Golledge	Mass. Dept. of Environmental Protection	Boston	MA
Ms.	Joan	Kimball	Mass. Dept. of Fish and Game, Riverways Program	Boston	MA
			Mass. Div. of Fish and Wildlife, Natural Heritage	Westborough	MA
Mr.	Henry	Barbaro	Mass. Highway Department	Boston	MA
Mr.	Bob	Wallace	Massachusetts Aquaculture Association	North Eastham	MA
			Massachusetts Audubon Society	Lincoln	MA
Ms.	Brona	Simon	Massachusetts Historical Commission	Boston	MA
The Honorable	Demetrius	Atsalis	Massachusetts House of Representatives	Boston	MA
The Honorable	Susan	Gifford	Massachusetts House of Representatives	Boston	MA
The Honorable	Shirley	Gomes	Massachusetts House of Representatives	Boston	MA
The Honorable	Matthew	Patrick	Massachusetts House of Representatives	Boston	MA
The Honorable	Jeffrey	Perry	Massachusetts House of Representatives	Boston	MA

Title	First Name	Last Name	Company / Organization	City	State
The Honorable	Eric	Turkington	Massachusetts House of Representatives	Boston	MA
The Honorable	Cleon	Turner	Massachusetts House of Representatives	Boston	MA
The Honorable	Therese	Murray	Massachusetts Senate	Boston	MA
The Honorable	Robert	O'Leary	Massachusetts Senate	Boston	MA
Mr.	Christopher	Boelke	National Oceanic and Atmospheric Administration	Gloucester	MA
Mr.	Eric	Hutchins	National Oceanic and Atmospheric Administration	Gloucester	MA
Mr.	John	Portnoy	National Park Service	Wellfleet	MA
			National Wildlife Federation	Reston	VA
			Natural Resources Defense Council	New York	NY
			Office of Advocacy and Enterprise	Boston	MA
			Office of Environmental Project Review	Boston	MA
			Provincetown Library	Provincetown	MA
			Sandwich Library	Sandwich	MA
Mr.	William	Walton	SE MA Aquaculture Center	Barnstable	MA
			Sierra Club	Boston	MA
			Snow Library	Orleans	MA
Ms.	Linda	Zuern	Town of Bourne	Buzzards Bay	MA
Ms.	Dyanne	Cooney	Town of Brewster	Brewster	MA
			Town of Buzzards Bay	Buzzards Bay	MA
Mr.	Robert	Duncanson, PH.D.	Town of Chatham	Chatham	MA
Mr.	David	Whitcomb	Town of Chatham	Chatham	MA
Mr.	Don	Trepte	Town of Dennis	So. Dennis	MA
Ms.	Linda	Burt	Town of Eastham	Eastham	MA
Mr.	Carey	Murphy	Town of Falmouth	Falmouth	MA
Mr.	Robin	Wilkins	Town of Harwich	Harwich	MA

Title	First Name	Last Name	Company / Organization	City	State
Mr.	Donald	Grisson	Town of Hyannis	Hyannis	MA
Mr.	Wayne	Taylor	Town of Mashpee	Mashpee	MA
Mr.	Jon	Fuller	Town of Orleans	Orleans	MA
Dr.	Cheryl	Andrews	Town of Provincetown	Provincetown	MA
Mr.	Randal	Hunt	Town of Sandwich	Sandwich	MA
Mr.	Alfred	Gaechter	Town of Truro	No. Truro	MA
Mr.	Dale	Donovan	Town of Wellfleet	Wellfleet	MA
Mr.	James	Saben	Town of Yarmouth, c/o Town Admin. Office	S. Yarmouth	MA
			Truro Public Library	North Truro	MA
The Honorable	William	Delahunt	United States House of Representatives	Quincy	MA
The Honorable	Edward	Kennedy	United States Senate	Boston	MA
The Honorable	John	Kerry	United States Senate	Boston	MA
Mr.	William	Hubbard	US Army Corps of Engineers	Concord	MA
Mr.	Marvin	Moriarty	US Fish and Wildlife Service Regional Office	Hadley	MA
Ms.	Sandra	Adams	USDA Farm Service Agency	Amherst	MA
Mr.	David	Tuttle	USDA Rural Development	Amherst	MA
Mr.	Dan	Barnett	USDA-NRCS	W. Wareham	MA
Mr.	Larry	Boutiette	USDA-NRCS	Holden	MA
Mr.	Rudy	Chlanda	USDA-NRCS	Amherst	MA
Mr.	Richard	Coombe	USDA-NRCS	Washington	DC
Mr.	Rick	DeVergilio	USDA-NRCS	Amherst	MA
Mr.	Carl	Gustafson	USDA-NRCS	Amherst	MA
Mr.	Andy	Lipsky	USDA-NRCS	Warwick	RI
Mr.	Don	Liptack	USDA-NRCS	Hyannis	MA
Mr.	Marc	MacQueen	USDA-NRCS	W. Wareham	MA

Title	First Name	Last Name	Company / Organization	City	State
Ms.	Barbara	Miller	USDA-NRCS	Amherst	MA
Mr.	John	O'Neill	USDA-NRCS		
Ms.	Diane	Petit	USDA-NRCS	Amherst	MA
Mr.	Greg	Snead	USDA-NRCS		
Mr.	Keith	Admire	USDA-NRCS NWMC	Washington	DC
Ms.	Jackie	Davis-Slay	USDA-NRCS WPD	Washington	DC
Mr.	Terry	Atwood	USDA-NRCS, National Water Management	Little Rock	AR
Mr.	Tim	Sweeney	USDA-NRCS, National Water Management	Little Rock	AR
Ms.	Cheryl	Andrews-Maltais	Wampanoag Tribe of Gay Head Aquinnah	Aquinnah	MA
			Wellfleet Library	Wellfleet	MA
			West Yarmouth Library	West Yarmouth	MA

Commonwealth of Massachusetts
Division of Fisheries & Wildlife
MassWildlife

Wayne F. MacCallum, *Director*

September 5, 2006

Natural Resources Conservation Service
Attn: Cecil Currin
451 West Street
Amherst, MA 01002

Re: Cape Cod Water Resources Restoration Project Draft Watershed Plan and Area wide Environmental Impact Statement (EIR)
Barnstable County, MA
NHESP Tracking No. 06-19857

Dear Cecil Currin:

Thank you for submitting the above EIR to the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for review. We have reviewed this EIR and would like to offer the following comments.

The above project sites all fall within NHESP *Priority Habitat* (PH) and *Estimated Habitat* (EH) regulatory polygons (for a complete rare species list, please see the rare species information request response letter from the NHESP dated 5/19/2006).

As stated in the above referenced EIR (section 3.10 titled "Threatened and Endangered Species"), MA state-listed rare species are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). Therefore, this project will require a formal MESA filing with the NHESP. For information on the MESA, including an application checklist, please visit our website at: www.nhesp.org under the "Regulatory Review" tab. On a case by case basis, field surveys and habitat assessments may be required as part of the MESA review process in order to locate rare species on the project site, and to determine their patterns of distribution and habitat use.

Also, please note that the management of anadromous runs of river herring in Massachusetts falls under the jurisdiction of the Division of Marine Fisheries. They should be consulted for information on proposed improvements to the fish runs.

Division of Fisheries and Wildlife
Field Headquarters, North Drive, Westborough, MA 01581 (508) 792-7270 Fax (508) 792-7275
An Agency of the Department of Fish and Game

The NHESP would like to thank the NRCS for taking into account state-listed rare species concerns in the preparation of this EIR. If you have any questions regarding this review please call Jon Regosin, Senior Endangered Species Review Biologist, at (508) 792-7270, ext. 316.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

September 5, 2006

Engineering/Planning Division
Evaluation Branch

Cecil B. Currin
State Conservationist
Natural Resources Conservation Service
451 West Street
Amherst, Massachusetts 01002

Dear Mr. Currin:

The purpose of this letter is to provide review comments from New England District, Corps of Engineers (Corps) for the Natural Resources Conservation Service efforts under the Cape Cod Water Resources Restoration Project (CCWRRP) Draft Watershed Plan and Area-wide Environmental Impact Statement. These comments are provided under our National Environmental Policy Act authorities. As you know, Mr. William A. Hubbard of our Evaluation Branch has participated in the steering committee for the CCWRRP. As stated at steering committee meetings, the Corps finds the ecological and economic outputs of the CCWRRP to justify the investments. As the project proceeds into design, the Corps is willing to provide technical assistance within time and funding constraints. Additionally, we will investigate our own aquatic habitat restoration authorities to implement any sites identified as suitable for US Army Corps of Engineers programs.

It appears that these projects may involve activities that require a permit from the Corps of Engineers. A Corps of Engineers permit is required under Section 10 of the Rivers and Harbors Act of 1899 for all work seaward of mean high water (MHW) in navigable waters of the United States. In New England, for purposes of Section 10, navigable waters of the United States are those subject to the ebb and flow of the tide and a few of the major waterways used to transport interstate or foreign commerce. Permits are also required under Section 404 of the Clean Water Act for discharges of dredged or fill material into all waters of the United States, including navigable waters, inland rivers, lakes, streams, and wetlands, as well as the excavation/grading within these waters/wetlands. On the coastline our jurisdiction extends landward to the high tide line (HTL) (i.e., the highest predictable tide) or to the landward limit of any wetlands, whichever is more extensive. In interior waters our jurisdiction extends landward to the ordinary high water (OHW) mark or to the landward limit of any wetlands, whichever is more extensive. Pro-active restoration projects are potentially eligible for expedited permit review through the Corps Massachusetts Programmatic General Permit.

Pre-application coordination is encouraged; please contact Karen K. Adams at (978) 318-8828 to initiate permitting coordination during preliminary design of each project.

We look forward to continued collaboration on this important water resources project. Our point of contact remains as Bill Hubbard at (978) 318-8552.

Sincerely,

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division

CAPE COD COMMISSION

3225 MAIN STREET
P.O. BOX 226
BARNSTABLE, MA 02630
(508) 362-3828
FAX (508) 362-3136
E-mail: frontdesk@capecodcommission.org

SEP 11 2006

September 8, 2006

Mr. Cecil Currin, State Conservationist
USDA/Natural Resources Conservation Service
451 West Main St
Amherst, MA 01002

Dear Mr. Currin,

Thank you for the opportunity to review and comment on the Area-wide Environmental Impact Statement for the Cape Cod District's Watershed Plan (Plan/EIS). While the Cape Cod Commission has not formally reviewed the document, Commission staff offer the following comments. Additional review by the Cape Cod Commission may be required of individual projects that exceed thresholds in the Cape Cod Commission Act for review of Developments of Regional Impact.

The Plan/EIS presents a comprehensive overview of some of the environmental challenges confronting communities on Cape Cod and their historical origins. The Plan/EIS provides conceptual discussions of measures to be installed to address degraded resources, and a preliminary quantification of the affected area likely to be improved by the project. Commission staff believe that the document accurately identifies the potential environmental improvements and demonstrates the need for the project.

The Plan/EIS analysis consists solely of the proposed work and the no-action alternative. Establishing a baseline for the proposed work alternative required the identification of specific approaches likely to yield improvements at each site, and the use of some assumptions about improvements to habitat characteristics. Commission staff believe that this analysis is adequate for evaluating the decision to fund the proposal. However, a more complete analysis of different designs should be completed through future "environmental evaluations" filed under the final tiered EIS. Alternative designs that include additional maintenance and monitoring provisions and mitigation strategies should be evaluated when work is contemplated. As such, funding should be tied to environmental results identified as the three objectives identified in the document, and should not be constrained by the particular technologies described in the Plan/EIS. Commission staff believe that specific projects will require a more robust diagnosis of environmental degradation, a broader discussion of project alternatives to address the cause of the degradation, and a full treatment of post-project monitoring and long-term maintenance of the project.

If approved and funded, the work described in the Plan/EIS will result in significant improvement to the Cape's coastal environment. The staff of the Cape Cod Commission support the approval and funding of the Plan/EIS, and look forward to working with the NRCS and project partners as specific mitigation projects are designed and implemented.

Thank you for the opportunity to comment on this important undertaking.

Sincerely,

for Margo Fenn

Margo Fenn,
Executive Director

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
408 Atlantic Avenue – Room 142
Boston, Massachusetts 02210-3334

September 13, 2006

9043.1
ER 06/764

Cecil B. Currin,
State Conservationist
451 West Street
Amherst, MA 01002

Dear Mr. Currin:

The U.S. Department of the Interior has reviewed the Draft Watershed Plan and Areawide Environmental Impact Statement (EIS) for the Cape Cod Water Resources Restoration Project, Barnstable County, Massachusetts. We have no comments on the Plan or EIS.

Thank you for the opportunity to review and comment on the proposed project. Please contact me at (617) 223-8565 if I can be of assistance.

Sincerely,

Andrew L. Raddant
Regional Environmental Officer

Sent: Thursday, September 14, 2006 2:39 PM
To: Currin, Cecil - Amherst, MA
Subject: Cape Cod Water Resources Restoration Project

The Barnstable Association for Recreational Shellfishing has been given the opportunity to review the Draft Watershed Plan and Areawide Enviromental Impact Statement. BARS finds that the goals and objectives expressed are totally consistant and in phase with those expressed in the BARS mission statement. As such we support and encourage others to support this meaningfull proposal.

BARS is a volunteer organization formed in 2001 to aid in all aspects of improving all of the shellfish assets of the Town of Barnstable. We started with less than 10 folks -- now number in excess of 150 and growing. We continue work closely with and in conjunction with Tom Marcotti and Kris Clark of the Barnstable Dept. of Natural Resources. Please get in touch with any thoughts or requests of how we could further support your efforts.

Sincerely, Stan Negus BARS President

APCC
Association to
Preserve Cape Cod
3010 Main St., P.O. Box 398
Barnstable, MA 02630-0398
Margaret Geist, Executive Director

Phone 508-362-4226
Toll-free 877-955-4142
Fax 508-362-4227
E-mail info@apcc.org
Web www.apcc.org

September 15, 2006

Mr. Cecil B. Currin
State Conservationist
USDA Natural Resources Conservation Service
451 West Street, Amherst, MA 01002

Re: Comment Letter, Environmental Impact Statement for
Cape Cod Water Resources Restoration Project (CCWRRP)
Federal Register: August 1, 2006, Vol. 71, No. 147, [Notices],
Pages 43438-43439

Dear Mr. Currin:

The Association to Preserve Cape Cod (APCC) is writing this letter to express our strong support for the restoration project being proposed by the Natural Resources Conservation Service (NRCS). The Cape Cod Water Resources Restoration Project (CCWRRP) represents one of the boldest and most important restoration efforts ever proposed on Cape Cod. In the CCWRRP, the NRCS is proposing to undertake up to 76 projects to restore and improve salt marshes, fish runs and shellfish beds throughout the Cape. These projects include:

- Restoration of tidal flow to 26 tidally-restricted salt marsh sites, which will restore and improve 1,500 acres of salt marsh;
- Improvements to 24 impaired fish passages, which will allow herring and other anadromous and catadromous fish to better access 4,200 acres of fish spawning areas in coastal and freshwater ponds; and
- Remediation of stormwater discharges at up to 26 sites, which will open or improve up to 7,300 acres of shellfish beds.

The CCWRRP will remediate stormwater discharges at up to 26 sites where untreated stormwater runoff is currently being discharged into Cape Cod's coastal waters. Untreated stormwater is a significant source of pollution to coastal waters, because runoff frequently contains bacteria, metals, hydrocarbons, suspended sediments, nutrients, and other harmful pollutants. Stormwater pollutants have caused closures of public beaches and shellfishing areas, with huge impacts on the local economy and public health. The stormwater remediation proposed in the CCWRRP will benefit shellfishing areas, recreational and commercial shellfishing, beach water quality, and the local economy.

The CCWRRP will restore seawater flows to 1,500 acres of salt marsh, which have been impacted by reduction of seawater flows. Healthy salt marshes provide habitat for shellfish, fish, birds, and other wildlife, including commercially and recreationally important fish and shellfish species. Salt marshes are important to humans as well, because marshes filter out pollutants and help to minimize flooding of inland properties during storm surges. Much of Cape Cod's beauty depends upon wide vistas of salt marsh. However, healthy salt marshes require regular doses of seawater from tidal flows. Tidal restrictions due to road construction, inadequate tidal culverts or no culverts, and diking eventually cause salt marshes to die. The CCWRRP will thereby benefit shellfish, fish and wildlife habitat and restore the beautiful salt marsh vistas so characteristic of Cape Cod.

Finally, the NRCS has identified 24 priority fish run restoration sites. Fish runs allow anadromous fish such as herring, alewives, shad and others to travel from the sea to freshwater ponds and lakes where they breed and spawn. Catadromous fish, such as American eels, breed in the ocean and migrate into freshwater where they spend much of their lives. Such fish species are globally important for their ecological, commercial and historical values. Their populations in the Northeast have declined drastically in recent years. This project will improve fish access to 4,200 acres of freshwater habitat for anadromous and catadromous fish and will help to protect habitat for these fish.

The CCWRRP will provide enormous benefits to both the environment and the economy. Our coastal economy relies heavily upon seasonal tourism, which in turn depends upon clean coastal waters and healthy coastal ecosystems. Our shellfish beds, salt marshes, fisheries, and coastal habitat provide valuable economic, ecological and aesthetic values. Furthermore, the significant scale of restoration that is proposed represents a cost-effective approach to restoration, because it will address the key causes of impairment.

APCC also supports this project because it will help to achieve many of the goals of the Massachusetts Bays Program (MBP) for Cape Cod. The MBP focuses on protecting and restoring living resources of Cape Cod Bay and Massachusetts Bay in order to maintain healthy coastal ecosystems that are also usable by humans. As the new host organization for MBP on Cape Cod, APCC feels the CCWRRP will address these goals.

Thank you for the opportunity to provide these comments.

Sincerely,

Maggie Geist
Executive Director

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

Cecil Currin, State Conservationist
USDA-NRCS
451 West Street
Amherst, MA 01002

September 15, 2006

Dear Mr. Currin:

The Massachusetts Office of Coastal Zone Management (CZM) and its Wetlands Restoration Program (WRP) strongly support the Natural Resources Conservation Service's Cape Cod Water Resources Restoration Project and respectfully encourage Congress to authorize the project. Cape Cod is a truly unique landscape with regionally significant coastal habitats and ecological resources. Historic human activities have caused widespread degradation of these habitats through restricted tidal flows to salt marshes, blocked fish passages, and pollution of shellfish beds from stormwater runoff. The proposed NRCS project will build on the work of state, local, regional and federal partners to greatly accelerate habitat restoration progress across the Cape over the next decade.

The restoration sites proposed in the EIR Final Watershed Plan will re-establish critical habitat functions and human services that have been lost due to historic degradation of Cape Cod's coastal areas. Restored habitats will enhance recreational and commercial fisheries, protect people and property from flooding, improve water quality, and raise property values. They are an integral part of a healthy coastal environment that supports the region's economy, safety, and overall quality of life.

CZM and WRP are committed to working with the Executive Office of Environmental Affairs and the other project sponsors to help raise the required twenty-five percent non-federal matching funds for project implementation. We are also committed to working closely with the towns, regional organizations, NRCS, and other partners to help facilitate the development and completion of individual restoration projects. We have a wealth of experience helping communities complete these types of projects, and we look forward to offering our expertise and assistance in support of this important restoration initiative. We hope that the Congress will also recognize the importance and value of this project and show its support through the authorization of the Final Watershed Plan.

Sincerely,

Bruce K. Carlisle
Assistant Director
Office of Coastal Zone Management

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOUTHEAST REGIONAL OFFICE
20 RIVERSIDE DRIVE, LAKEVILLE, MA 02347 508-946-2700

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

ROBERT W. GOLLEDGE, Jr.
Secretary

ARLEEN O'DONNELL
Commissioner

September 20, 2006

Cecil B. Currin, State Conservationist
USDA-NRCS
c/o Carl Gustafson
451 West Street
Amherst, MA 01002,

RE: Cape Cod Water Resources Restoration Project – Draft Watershed Plan – Areawide Environmental Impact Statement (EIS), August 2006

Dear Mr. Currin:

MassDEP is pleased to offer this letter of support for the Natural Resources Conservation Service's (NRCS) Cape Cod Water Resources Restoration Project. MassDEP has met with staff from NRCS and has attended public information meetings for this project and is impressed with its goals and the thoroughness with which it has been developed.

Addressing stormwater runoff, restoring anadromous fish passages and opening artificially restricted tidal inlets are all laudable goals in the important work of maintaining and restoring estuarine resources. MassDEP sees this project as complementing our efforts in the Massachusetts Estuaries Project and serves as a perfect example how working cooperatively and in parallel our two agencies can further advance environmental protection and resource restoration.

MassDEP looks forward to continuing our cooperative relationship and eagerly anticipates the improvements to be realized from this project. If you have any questions regarding this letter, please contact Brian Dudley of my staff at (508) 946-2753. MassDEP SERO appreciates the opportunity to review this Environmental Impact Statement.

Very truly yours,

Gary S. Moran
Regional Director

GM/BD/SS
NRCS Support letter.doc

Cc: DEP/SERO
ATTN: David Terry
Deputy Regional Director

Jonathan Hobill
Regional Engineer
Bureau of Resource Protection

Brian Dudley
Chief, Water and Nutrient Management

Elizabeth Kouloheras
Team Leader, Cape Cod Watershed
Chief, Wetlands and Waterways

Sharon Stone
Coordinator, Cape Cod Watershed
SERO/MEPA Coordinator

Richard Keith
Chief, Municipal Services

Cc: DEP/Boston
ATTN: Richard Lehan
Acting Deputy Associate Commissioner/Operations

1 Cecil
2 Carl
3 Kara

The Commonwealth of Massachusetts

HOUSE OF REPRESENTATIVES
STATE HOUSE, BOSTON 02133-1054

DEMETRIUS J. ATSALIS
REPRESENTATIVE
2ND BARNSTABLE DISTRICT

ROOM 26, STATE HOUSE
TEL. (617) 722-2080
FAX (617) 722-2339
E-Mail:
Rep.DemetriusAtsalis@hou.state.ma.us

Committees:
Vice Chairman, Election Laws
Labor and Workforce Development
Economic Development and Emerging Technologies

DISTRICT OFFICE
TEL. (508) 771-5422
FAX (508) 790-8755

September 20, 2006

Cecil Currin
State Conservationist, USDA-NRCS
451 West Street
Amherst, MA 01002

Dear State Conservationist Currin,

I am writing this letter today to express my support of the "Cape Cod Water Resources Restoration Project". I have reviewed the draft plan for the project and I would like to emphasize the importance of this project to the health of our watershed.

The "Cape Cod Water Resources Restoration Project" will restore approximately 400 acres of degraded salt marsh to benefit fish and wildlife, in addition to restoring fish passages to improve 3,500 acres of spawning area. It will also restore and protect over 7,000 acres of shellfish beds by treating stormwater runoff and improving water quality.

Thank you for your time and consideration of this matter.

Sincerely,

Demetrius J. Atsalis
STATE REPRESENTATIVE
2nd Barnstable District

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

OFFICE OF THE
REGIONAL ADMINISTRATOR

September 21, 2006

Cecil B. Currin
State Conservationist
USDA-NRCS
451 West Street
Amherst, Massachusetts 01002

Re: Draft Watershed Plan and Areawide Environmental Impact Statement for the Cape Cod Water Resources Restoration Project, Barnstable County, Massachusetts (CEQ # 20060328)

Dear Mr. Currin:

The Environmental Protection Agency-New England Region (EPA) has reviewed the United States Department of Agriculture's (USDA) Draft Watershed Plan and Areawide Environmental Impact Statement (DEIS) for the Cape Cod Water Resources Restoration Project for various watershed protection and fish and wildlife development projects in Barnstable County, Massachusetts. We submit the following comments on the Draft Environmental Impact Statement (DEIS) in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act.

According to the DEIS the Cape Cod Water Resources Restoration Project is intended to restore degraded saltmarsh, restore anadromous fish passage, and improve water quality in shellfishing areas. The project is comprised of a total of 76 projects (26 saltmarsh restoration projects, 26 obstruction remediation projects to restore fish passage, and 26 stormwater remediation projects) that would be carried out over a ten year construction period. As each project is advanced by a local sponsor it will be reviewed through a more detailed environmental evaluation tiered from the original EIS. EPA does not object to this approach and supports the USDA's recommended plan described in the EIS. We encourage the USDA to promote close coordination with the EPA, Massachusetts Coastal Zone Management Office Wetland Restoration Program Staff, the Massachusetts Division of Marine Fisheries and other state offices as individual projects are proposed. We also suggest early coordination with our wetlands section (Ed Reiner, 617-918-1692) and the United States Army Corps of Engineers for any projects which will require permitting under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899.

We appreciate the opportunity to comment on the DEIS. Based on our review of the DEIS we have rated the DEIS "LO-1—Lack of Objections-Adequate" in accordance with EPA's national rating system, a description of which is attached to this letter. Please contact Timothy Timmermann (617-918-1025) of EPA's Office of Environmental Review with any comments or questions about this letter.

Sincerely,

Elizabeth A. Higgins, Director
Office of Environmental Review

Attachment

Summary of Rating Definitions and Follow-up Action

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

Town of Barnstable
Regulatory Services
Thomas F. Geiler, Director
Conservation Division
Robert W. Gatewood, Administrator
200 Main Street, Hyannis, MA 02601
E-mail: conservation@town.barnstable.ma.us

Office: 508-862-4093 Fax: 508-778-2412

October 2, 2006

Mr. Cecil Curran, State Conservationist
USDA-NRCS
451 West St.
Amherst, MA 01002

Dear Mr. Curran:

I am writing to express my unqualified support for the proposed Cape Cod Water Resources Restoration Project, a project which the Town of Barnstable sees as essential to preserving and bringing back its nearshore resources.

As designed, the Cape Cod Water Resources Restoration Project will achieve the following goals:

1. Restore salt marshes to benefit fish and wildlife.
2. Measures to restore fish passage on existing anadromous (born in fresh water, live in the ocean migrating back to fresh to spawn) fish runs.
   Examples of structural measures include:
   - Water control structures, fish ladders and fish passages.
   - Culvert enlargement or replacement for tidally restricted salt marshes.
3. Restore and protect shellfish beds by treating storm water runoff.
   Examples of improvements include:
   - Constructed wetlands, infiltration basins or trenches
   - Dry wells and sand filters
   - Vegetative filters

The project payoff would be of enormous economic and environmental benefit to our region. It would restore approximately 1,500 acres of degraded salt marsh. It will restore 4,200 acres of spawning and nursery habitat for anadromous fish, and improve the water quality for over 7,300 acres of shellfish beds by treating storm water runoff.

I wish you every success with this timely and innovative proposal, and pledge to lend whatever assistance I can on behalf of the Town to see it implemented.

Sincerely,

Rob Gatewood, Conservation Administrator

Cc: Sen. Kennedy, Sen. Kerry, Rep. Delahunt, Barnstable Conservation District

Town of Dennis
P.O. Box 2060, South Dennis, MA 02660-2060
Telephone: 508-394-8300, Fax: 508-394-8309

October 10, 2006

Cecil Currin, State Conservationist
USDA Natural Resources Conservation Service
451 West Street
Amherst, MA 01002-2995

Dear Mr. Currin:

Please accept this letter from the Dennis Board of Selectmen as our expression of support for the proposed Cape Cod Water Resources Restoration Project (Restoration Project).

The peninsula of Cape Cod is an environmentally fragile area consisting of numerous estuaries, and thousands of acres of wetlands, salt marshes, fish and shellfish habitats. It also happens to be one of the most popular tourist destination locations on the eastern seaboard as well as one of the fastest growing counties in Massachusetts, and as such, Cape Cod's marine environment is under constant threat of degradation. The Restoration Project is a ten (10) year action plan that includes salt marsh restoration projects, fish passage obstruction remediation projects and stormwater remediation projects in the fifteen (15) communities of Cape Cod. The development of the Restoration Project has been years in the making. It has had broad input and involvement from representatives of the Cape communities, Barnstable County officials, private sector environmental and business communities, and lastly, widespread public support throughout Cape Cod.

We hope you agree that this ambitious, comprehensive plan will yield significant improvements to our marine wildlife, fish and shellfish habitats, and we ask your support for the Restoration Project. Thank you for your consideration in this matter.

Respectfully yours,

Donald P. Trepte, Chairman
Dennis Board of Selectmen

DPL/rfc

cc: Donald Liptak, District Conservationist
Dennis Conservation Commission

United States Department of the Interior

NATIONAL PARK SERVICE
Cape Cod National Seashore
99 Marconi Site Road
Wellfleet, MA 02667
508.349.3785
508.349.9052 Fax

IN REPLY REFER TO:
L7619

October 10, 2006

Cecil B. Currin
State Conservationist
Natural Resource Conservation Service
451 West Street
Amherst, Massachusetts 01002

Subject: Review of the Draft Environmental Impact Statement for the Cape Restoration Project

Dear Mr. Currin:

As indicated in my letter of June 6, 2006, the Cape Cod National Seashore (Seashore) is pleased to support the Natural Resource Conservation Service's (NRCS) Cape Cod Water Resources Restoration Project to restore salt marshes, migratory fish runs and shellfish water quality on the Cape over the next decade, and offers these review comments on the Draft Environmental Impact Statement (EIS) for this project.

We note that East Harbor (Pilgrim Lake), in Truro was not included in the list of prioritized sites, despite the fact that that 1) the entire 720-acre salt-marsh estuary is diked, and 2) tidal restoration would satisfy all three objectives of the NRCS Cape Project: tidal restoration, bacteriological water-quality improvement, and the restoration of migratory fish passage. We understand that ongoing work by others, in this case the US Army Corps of Engineers, is a criterion for rejecting a project; however, given the NRCS goals detailed in the draft plan, to mitigate pollution of road runoff, this seems like an ideal (and highly visible) project for NRCS support. Route 6 parallels East Harbor for over two miles, with all west-bound runoff flowing directly into the waters of East Harbor. Over the past few years, with partial tidal restoration, dense shellfish beds (principally soft-shell clams) have reestablished, but under current road-runoff management, will likely remain polluted indefinitely. In addition, with the restoration of salinity, but continuance of poor tidal flushing, the lagoon system suffers from dense macroalgae blooms and occasional summertime hypoxia. Please reconsider NRCS involvement in this project.

The Water Quality section should indicate that tidal restrictions are not only an environmental problem in and of themselves, but can also exacerbate fecal pollution due to reduced flushing (see: Portnoy, J.W. & J. R. Allen, 2006, Effects of tidal restrictions and potential benefits of tidal restoration on fecal coliform and shellfish-water quality. J. Shellfish Research 25:609-617) as well as impeding migratory fish passage. Also note that the water quality of Wellfleet's Herring River is listed as impaired per Section 303(d) of the Clean Water Act, for acidity and metals, both due to diking and drainage.

Section 3.9 (Salt Marshes) should cite the water-quality effects of diking and marsh drainage. See, for example, Portnoy, J.W. 1999. Salt marsh diking and restoration: Biogeochemical implications of altered wetland hydrology. Environmental Management 24:111-120, and references cited therein.

Page 4-1. The quote from the Cape Cod Atlas has a misleading statement that should not be propagated. *Phragmites* is not so much " more tolerant of brackish conditions" as it is a better competitor than salt marsh grasses under low-salinity (<20 ppt) conditions.

Table 5-1. Given the public comment that the Herring River (Wellfleet) Technical Committee has recently received, we are surprised that saltwater intrusion into supply wells was not mentioned as a public concern.

Table 6-1. For better reference, this table should give place names of restoration sites, using place names on current USGS Quad Sheets.

Table 6-2. As mentioned above for East Harbor, projects that contribute to all three objectives of the NRCS program, i.e. restoring salt marshes, shellfish beds and fish runs, should be given especially high priority scores.

Tables 6-1 and 6-3. Replacement of Wellfleet's Herring River dike with a bridge is included in both tables, with cost estimates of $4 and $2.5 million, respectively. However, this is the same construction project. It just accomplishes both tidal-restoration and fish-passage objectives. Is the total cost the sum of these two estimates?

Page 6-28 This section should mention that increased (restored) tidal flushing would dilute and reduce concentrations of fecal coliform over shellfish beds.

Otherwise, we found the draft well organized and written.

Please contact Ecologist John Portnoy (508-487-3262 ext. 107; email: john_portnoy@nps.gov) of my staff for technical information and updates on tidal restoration projects here.

Sincerely,

George E. Price, Jr.
Superintendent

cc: Carl Gustafson, NRCS, Amherst
Tim Smith, MCZM, Boston
Donald Liptak, NRCS, Barnstable
Gordon Peabody, HRTC, Wellfleet

The Town of Barnstable
Office of Town Manager

367 Main Street, Hyannis MA 02601
www.town.barnstable.ma.us

Office: 508-862-4610
Fax: 508-790-6226
Email: john.klimm@town.barnstable.ma.us

John C. Klimm, Town Manager

October 10, 2006

Mr. Cecil Curran, State Conservationist
USDA-NRCS
451 West St.
Amherst, MA 01002

Dear Mr. Curran:

My environmental staff recently briefed me on NRCS' proposed Cape Cod Water Resources Restoration Project. I was impressed by the scope of the project and its focus on the pressing natural resource issues affecting Barnstable and Cape Cod. I sincerely believe that if implemented, the project will have a far-reaching impact across our region. In restoring and protecting our near-shore assets, the project will go a long way in preserving the quality of life for Cape Codders and its many, many visitors.

As designed, the Cape Cod Water Resources Restoration Project will achieve the following goals:

1. Restore salt marshes to benefit fish and wildlife.
2. Measures to restore fish passage on existing anadromous (born in fresh water, live in the ocean migrating back to fresh to spawn) fish runs.
   Examples of structural measures include:
   - Water control structures, fish ladders and fish passages.
   - Culvert enlargement or replacement for tidally restricted salt marshes.

1. Restore and protect shellfish beds by treating storm water runoff.
   Examples of improvements include:
   - Constructed wetlands, infiltration basins or trenches
   - Dry wells and sand filters
   - Vegetative filters

The project payoff would be of enormous economic and environmental benefit to our region. It would restore approximately 1,500 acres of degraded salt marsh. It will restore 4,200 acres of spawning and nursery habitat for anadromous fish, and improve the water quality for over 7,300 acres of shellfish beds by treating storm water runoff.

I wish you every success with this timely and innovative proposal, and lend it my unqualified support.

Sincerely,

John C. Klimm
Town Manager

Cc: Sen. Kennedy, Sen. Kerry, Rep. Delahunt, Barnstable Conservation District

Board of Selectmen
Town Administrator

2198 Main Street
Brewster, Massachusetts 02631-1898
(508) 896-3701
FAX (508) 896-8089

BREWSTER BICENTENNIAL 1803 2003

Mr. Cecil Currin
USDA Natural Resources Conservation Service
451 West Street, Suite 1
Amherst, MA 01002

RE: Cape Cod Water Resources Restoration Project

October 11, 2006

Dear Mr. Currin;

We are writing in support of the Cape Cod Water Resources Restoration Project. We understand that this project is really the coordination of various smaller projects targeted to restore degraded salt marshes, reduce direct storm-water run-off, improve fish access to spawning habitat and improve water quality in shellfish beds. In light of the recent findings of the Pleasant Bay TMDL Report that close to 45% of the nitrogen load in Pleasant Bay is attributed to sediments, we hope that dredging and flushing improvement projects will not be dismissed as infeasible, too expensive, or too disruptive. Clearly, if nitrogen loads and eutrophication are to be addressed, the water resource restoration project should consider all methods that could enhance flushing rates or slow and retain storm-water run-off to reduce sediment build-up.

Thank you for your thoughtful consideration.

Sincerely,

Dyanne F. Cooney

Dyanne F. Cooney
Brewster Board of Selectmen

Cc: Keith Johnson
Don Liptack

TOWN OF YARMOUTH

1146 ROUTE 28 SOUTH YARMOUTH MASSACHUSETTS 02664-4492
Telephone (508) 398-2231, Ext. 271, 270 — Fax (508) 398-2365

BOARD OF SELECTMEN

TOWN ADMINISTRATOR
Robert C. Lawton, Jr.

October, 11 2006

Mr. Cecil B. Currin
State Conservationist
USDA Natural Resources Conservation Service
451 West Street, Amherst, MA 01002

Re: Letter of Support for Cape Cod Water Resources Restoration Project (CCWRRP)

The Town of Yarmouth wishes to express our unqualified support for the proposed "Cape Cod Water Resources Restoration Project". This project, proposed by the Natural Resources Conservation Service, represents one of the most important environmental restoration projects ever proposed for Cape Cod. The project will restore 1,500 acres of degraded salt marsh, improve fish access to 4,200 acres of spawning habitat in our coastal ponds and lakes, and improve water quality for 7,300 acres of shellfish beds through structural improvements and stormwater treatment. It has been designed to benefit the entire Cape Cod watershed, its habitat and human residents alike.

The Cape Cod Water Resources Restoration Project will not only improve our environment, but will also provide long-term benefits to the Cape's tourist-based economy, which depends heavily on clean water, clean beaches, abundant shellfish and fish, and healthy coastal ecosystems. Local construction jobs that will be created in the short term will also benefit our economy.

We urge our legislators to support this project and to pass the federal funding bill that will make this project a reality. We look forward to the approval and implementation of this project. Our town pledges to support this project over its lifetime and will work closely with the NRCS to ensure full success of the project.

Thank you for the opportunity to provide this letter of support.

Sincerely,

Robert C. Lawton Jr.
Town Administrator

cc: Senator Kennedy
Senator Kerry
Congressman Delahunt
Don Liptack, NRCS District Conservationist
State Senator Robert O'Leary
State Representative Cleon H. Turner
State Representative Demetrius J. Atsalis

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

October 12, 2006

Cecil B. Currin
State Conservationist
Natural Resources Conservation Service
451 West Street
Amherst, MA 01002

RE: Letter of Support for the Cape Cod Resources Restoration Project

Dear Mr. Currin:

This letter serves to document the NOAA Restoration Center Northeast Region's support for your planned Cape Cod Water Resources Restoration Project. As you know, the Restoration Center is very active in restoring degraded coastal areas on Cape Cod, and welcomes the efforts of the NRCS to become involved with Cape Cod projects to restore salt marshes, provide fish passage, and improve water quality for shellfish.

Restoration Center staff have provided input to your Cape Cod Resources Restoration Project by participating in the development of the salt marsh assessment methodology and commenting on the draft Environmental Impact Statement. We look forward to continuing to work with NRCS as you move from this planning stage to prioritizing and implementing restoration projects.

Sincerely,

John G. Catena
Northeast Regional Supervisor
NOAA Restoration Center

cc: Carl Gustafson, NRCS
Steve Block, NOAA
Eric Hutchins, NOAA

TOWN OF BOURNE
Town Administrator
24 Perry Avenue
Buzzards Bay, MA 02532
Phone 508-759-0600 x304 – Fax 508-759-0620

THOMAS M. GUERINO
email: tguerino@townofbourne.com

October 17, 2006

Mr. Cecil Curran, State Conservationist
USDA-NRCS
451 West Street
Amherst, MA 01002

Re: Letter of Support for NRCS Cape Cod Water Resources Restoration Project (CCWRRP)

Dear Mr. Curran:

I am writing to express my unqualified support for the proposed Cape Cod Water Resources Restoration Project, which the Town of Bourne sees as essential to preserving and restoring our coastal resources.

The Cape Cod Water Resources Restoration Project will achieve the following important goals:

1) Restore salt marshes to benefit fish and wildlife. Examples of structural restoration measures include enlargement or replacement of culverts to improve tidal flow in tidally restricted salt marshes.

2) Restore fish passage on existing anadromous fish runs. Anadromous fish are born in fresh water ponds and lakes, migrate to the ocean via fish runs, then return as adults along the same runs to breed in their pond or lake of origin. Examples of structural improvements to restore fish runs include water control structures, fish ladders and fish passages.

3) Restore and protect shellfish beds by treating stormwater runoff. Examples of structural measures to treat stormwater include constructed wetlands, infiltration basins and trenches; dry wells and sand filters; and vegetative filters.

The project would be of enormous economic and environmental benefit to our region. It would restore approximately 1,500 acres of degraded salt marsh, 4,200 acres of spawning and nursery habitat for anadromous fish, and improve the water quality of over 7,300 acres of shellfish beds by treating stormwater runoff.

I wish you success with this timely and innovative proposal, and pledge to lend whatever assistance I can on behalf of the Town to see it implemented.

Sincerely,

Thomas M. Guerino
Town Administrator

cc: Senator Kennedy
Senator Kerry
Congressman Delahunt
State Representative Williams-Gifford
State Representative Perry
State Representative Patrick
Donald Liptack, NRCS District Conservationist

The Commonwealth of Massachusetts
House of Representatives
State House, Boston 02133-1054

JEFFREY DAVIS PERRY
REPRESENTATIVE
5th BARNSTABLE DISTRICT

93 ROUTE 6A
POST OFFICE BOX 1435
SANDWICH, MA 02563
TEL: (508) 888-2158
Rep.JeffreyPerry@hou.state.ma.us

ROOM 136, STATE HOUSE
(617) 722-2800 ext. 8743
FAX. (617) 722-2819

October 20, 2006

Cecil Currin, State Conservationist
USDA-NRCS
451 West Street
Amherst, Massachusetts 01002

Re: Cape Cod Water Resources Restoration Project

Dear Ms. Currin:

Please allow this to serve as a letter of support for the proposed "Cape Cod Water Resources Restoration Project." My office has been working with the Cape Cod Conservation District on this project and we have seen first hand the tremendous work they perform.

In reviewing the "Cape Cod Water Resources Restoration Project" draft proposal, I can tell you that that I am in full support of these efforts to restore our natural habitats here on Cape Cod. As you know, this project is slated to restore fish passages, restore access to salt marshes, and protect shellfish beds. All of these measures are to ensure that Cape Cod's fragile ecosystems are protected and restored to their fullest potential.

I ask for your favorable consideration of this project. Please feel free to contact me should you have any questions concerning this letter. I can be reached at (508) 888-2158 or (617) 722-2800 extension 8743.

Regards,

Jeffrey Davis Perry
State Representative
5th Barnstable District

cc: Cape Cod Conservation District, Lee C. Davis - Chair

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Appendix B

INVESTIGATION AND ANALYSIS REPORT

Appendix B. Investigation and Analysis Report

This section presents information that supports the formulation, evaluation and conclusions of the watershed plan. Items of a routine nature are not included; however citations are included throughout the Watershed Plan and Areawide Environmental Impact Statement text for appropriate manuals, handbooks, research and other references. Supporting data developed for this study are on file at the Natural Resources Conservation Service State Office in Amherst, Massachusetts.

The Project began as a single purpose project to address improving water quality for shellfish beds because of the high demand for NRCS technical assistance. It was expanded to include restoration of degraded salt marshes and restoring anadromous fish runs after scoping meetings identified these objectives as important to project sponsors and residents.

The Natural Resources Conservation Service (NRCS) staff worked with other federal, state, and local agencies, individual watershed residents, private professional services consultants, and the Project Sponsors throughout the planning process. Interdisciplinary teams were utilized in the assessment and evaluation of present, Future Without-Project, and Future With-Project conditions.

This coordinated planning effort produced a forecasted Without-Project condition that permitted the consideration of several alternatives. Consideration of these alternatives led to the selection of a cost-effective alternative that was socially, politically, and economically acceptable.

Several state and local planning and implementation programs have demonstrated that degraded salt marshes and anadromous fish runs can be restored, and that stormwater remediation measures cane improve water quality for shellfish beds. The Massachusetts Office of Coastal Zone Management's Coastal Pollution Remediation Program, EPA's Section 319 grants, Massachusetts Division of Marine Fisheries, the Town of Chatham and USDA's Wildlife Habitat Incentives Program and Wetland Restoration Program are some examples. Over 435 individual project sites were evaluated to select the 76 priority sites.

Field visits were made to each priority site to re-affirm need and basic feasibility, develop a preliminary cost estimate, sponsor interest, and that the proposed practice should produce the estimated habitat benefits. The Massachusetts Division of Marine Fisheries provided the analysis for the anadromous fish runs and the shellfish beds. The Massachusetts Office of Coastal Zone Management's Wetland Restoration Program assisted in the analysis for salt marsh restoration.

Chapters 4 (Watershed Problems and Opportunities) and Chapter 6 (Formulation and comparison of alternatives) provide more detail for the Project investigations and analyses. They are presented in the text of the plan to aid a reader who is not familiar with the watershed to understand the problems, opportunities and rational for the Project. Tables summarizing the site ranking and screening process follow (Tables B-1 – B-4).

Table B-1. Cape Cod Water Resources Restoration Project - Marsh Rankings by Ecological Factors

Site Number[(a)]	Ecological Ranking Score Total	Size of upstream affected area (salt marsh acres/ total affected acres)	Score	Is the upstream affected area contiguous to protected open space (ownership)?	Score	Does this tidal channel support a shellfish resource area?	Score	Is the channel or system part of an anadromous fish pathway?	Score	Does the affected area include Priority Habitat of Rare Species (PH) or Estimated Habitat of Rare Wildlife (WH)?	Score	Local Interest	Others Addressing Site
BN-SM-09	14	83.2	11	yes	1	yes	1	yes	1	no	0		No
BN-SM-10	14	84.2	11	yes	1	yes	1	yes	1	no	0		No
BN-SM-14	14	70	11	yes	1	no	0	yes	1	yes	1		No
BN-SM-33	14	46.3	11	yes	1	no	0	yes	1	yes	1	H	No
HA-SM-1	14	205.62 / 420.27	10	YES (municipal)	1	YES	1	YES	1	YES (PH, WH)	1	H	Done
HA-SM-2	14	192.28 / 406.93	10	YES (municipal)	1	YES[1]	1	YES	1	YES (PH, WH)	1	H	No
SA-SM-10	14	211.80 / 258.76	10	YES	1	YES	1	YES	1	YES (PH)	1	H	No
WE-SM-6	14	0.81 / approx. 1000 acres[2]	10	YES (municipal, state, federal)	1	YES	1	YES	1	YES (PH, WH)	1	H	No
BA-SM-13	13	56.26 / 81.33	10	YES (municipal; BA Land Trust)	1	YES	1	YES	1	NO	0	L	No
BR-SM-5	13	12.25 / 31.56	10	NO	0	YES	1	YES	1	YES (PH, WH)	1	H	No
BR-SM-6	13	12.25 / 31.56	10	NO	0	YES	1	YES	1	YES (PH, WH)	1	H	No
DE-SM-11	13	85.44 / 112.36	10	YES (municipal)	1	YES	1	YES	1	NO	0	L	No
DE-SM-12	13	46.62 / 72.71	10	YES (municipal)	1	YES	1	YES	1	NO	0	L	No
FA-SM-3	13	34.17 / 35.78	10	YES (municipal)	1	YES	1	YES	1	NO	0	No	Yes
TR-SM-3	13	0.0 / 152.38	10	YES (federal)	1	YES	1	YES*	1	NO	0	H	No
TR-SM-4	13	0.0 / 152.38	10	YES (federal)	1	YES	1	YES*	1	NO	0	No	No
TR-SM-6	13	0.0 / 322.05	10	YES (federal)	1	NO	0	YES	1	YES (PH, WH)	1	H	Yes

(a) shaded cells indicate selected priority sites

Table B-1. Cape Cod Water Resources Restoration Project - Marsh Rankings by Ecological Factors

Site Number[(a)]	Ecological Ranking Score Total	Size of upstream affected area (salt marsh acres/ total affected acres)	Score	Is the upstream affected area contiguous to protected open space (ownership)?	Score	Does this tidal channel support a shellfish resource area?	Score	Is the channel or system part of an anadromous fish pathway?	Score	Does the affected area include Priority Habitat of Rare Species (PH) or Estimated Habitat of Rare Wildlife (WH)?	Score	Local Interest	Others Addressing Site
TR-SM-7	13	0.0 / 322.05	10	YES (federal)	1	NO	0	YES	1	YES (PH, WH)	1	H	Yes
YA-SM-11/ DE-SM-13	13	19.54 / 31.71	10	YES[3] (municipal)	1	YES	1	YES	1	NO	0	H	No
YA-SM-11/ DE-SM-13	13	19.54 / 31.71	10	YES[1] (municipal)	1	YES	1	YES	1	NO	0	H	No
YA-SM-9	13	21.11 / 35.18	10	YES (municipal)	1	YES	1	YES	1	NO	0	H	Yes
BA-SM-5	12	32.82 / 38.21	10	YES (BA Land Trust)	1	YES	1	NO	0	NO	0	Done	Done
CH-SM--6	12	0.0 / 34.58	10	YES (private)	1	NO	0	YES	1	NO	0	H	No
FA-SM-7	12	53.78 / 55.27	10	YES (municipal)	1	YES	1	NO	0	NO	0	No	Yes
MA-SM-6/ BA-SM-9	12	11.07 / 29.77	10	No	0	YES	1	YES	1	NO	0	Done	Done
MA-SM-6/ BA-SM-9	12	11.07 / 29.77	10	NO	0	YES	1	YES	1	NO	0	Done	Done
SA-SM-12	12	17.89 / 33.89**	10	NO	0	YES	1	NO	0	YES (PH)	1	H	done
SA-SM-13 / BA-SM-1	12	17.89 / 33.89**	10	NO	0	YES	1	NO	0	YES (PH)	1	H	Yes
SA-SM-13/ BA-SM-1	12	17.89 / 33.89	10	NO	0	YES	1	NO	0	YES (PH)	1	L	No
DE-SM--5	11	10.99 / 42.16	10	NO	0	YES	1	NO	0	NO	0	H	No
EA-SM-1	11	9.71 / 11.56	7	YES (municipal)	1	YES	1	YES	1	YES (PH,WH)	1	H	No
SA-SM-9	11	0.0 / 79.71	10	NO	0	YES	1	NO	0	NO	0	H	No
BA-SM-12	10	0.0 / 10.06	7	NO	0	YES	1	YES	1	YES (PH & WH)	1	H	No

(a) shaded cells indicate selected priority sites

Table B-1. Cape Cod Water Resources Restoration Project - Marsh Rankings by Ecological Factors

Site Number[(a)]	Ecological Ranking Score Total	Size of upstream affected area (salt marsh acres/ total affected acres)	Score	Is the upstream affected area contiguous to protected open space (ownership)?	Score	Does this tidal channel support a shellfish resource area?	Score	Is the channel or system part of an anadromous fish pathway?	Score	Does the affected area include Priority Habitat of Rare Species (PH) or Estimated Habitat of Rare Wildlife (WH)?	Score	Local Interest	Others Addressing Site
EA-SM--9	10	6.31 / 16.51	7	YES (private)	1	YES	1	NO	0	YES (PH,WH)	1	M	No
HA-SM-9/ CH-SM-7	10	2.73 / 18.07	7	YES (municipal)	1	YES	1	YES	1	NO	0	H	No
HA-SM-9/ CH-SM-7	10	2.73 / 18.07	7	YES (municipal)	1	YES	1	YES[4]	1	NO	0	H	No
SA-SM-1	10	13.48 / 24.96	7	YES (municipal)	1	NO	0	YES	1	YES (PH)	1	H	Yes
SA-SM-2	10	12.31 / 23.25	7	YES (municipal)	1	NO	0	YES	1	YES (PH)	1	H	Yes
WE-SM-3	10	4.16 / 17.33	7	YES (federal, private)	1	YES	1	NO	0	YES (PH, WH)	1	H	No
BA-SM-18	9	12.11 / 12.11	7	YES	1	YES	1	NO	0	NO	0	H	No
BN-SM-15	9	8	6	yes	1	yes	1	no	0	yes	1		No
BN-SM-43	9	10.3	8	yes	1	no	0	no	0	no	0	H	No
BR-SM-4	9	8.39 / 21.29	7	YES (municipal)	1	NO	0	YES	1	NO	0	H	Yes
EA-SM-4	9	0.0 / 10.18	7	NO	0	YES	1	NO	0	YES (PH)	1		Yes
FA-SM-6	9	18.10 / 19.59	7	NO	0	YES	1	YES[1]	1	NO	0	No	Yes
FA-SM-8	9	1.66 / 6.46	5	YES (municipal)	1	YES	1	YES	1	YES (PH)	1	No	Yes
HA-SM-4	9	0.0 / 13.84	7	NO	0	YES	1	NO[3]	0	YES (PH, WH)	1	H	No
TR-SM-1	9	0.0 / 16.19	7	YES (federal)	1	YES	1	NO	0	NO	0	M	No
TR-SM-2	9	0.0 / 13.13	7	NO	0	YES	1	NO	0	YES (PH)	1	M	No
WE-SM-5	9	0.0 / 19.33	7	YES (municipal, private)	1	YES	1	NO	0	NO	0	H	No
BA-SM-19	8	0.0 / 20.19	7	NO	0	YES	1	NO	0	NO	0	H	No
BA-SM-4	8	8.54 / 9.43	5	NO	0	YES	1	YES	1	YES (PH & WH)	1	L	No

(a) shaded cells indicate selected priority sites

Table B-1. Cape Cod Water Resources Restoration Project - Marsh Rankings by Ecological Factors

Site Number[(a)]	Ecological Ranking Score Total	Size of upstream affected area (salt marsh acres/ total affected acres)	Score	Is the upstream affected area contiguous to protected open space (ownership)?	Score	Does this tidal channel support a shellfish resource area?	Score	Is the channel or system part of an anadromous fish pathway?	Score	Does the affected area include Priority Habitat of Rare Species (PH) or Estimated Habitat of Rare Wildlife (WH)?	Score	Local Interest	Others Addressing Site
BA-SM-8/ YA-SM-1	8	15.10 / 19.20	7	NO	0	YES	1	NO	0	NO	0	H	No
BA-SM-8/ YA-SM-1	8	15.10 / 19.20	7	NO	0	YES	1	NO	0	NO	0	L	No
BN-SM-38	8	8.2	6	yes	1	no	0	yes	1	no	0	H	No
EA-SM-2	8	0.72 / 6.87	5	NO	0	YES	1	YES	1	YES (PH,WH)	1	H	No
EA-SM-7	8	1.71 / 6.93	5	YES (federal, state)	1	YES	1	NO	0	YES (PH,WH)	1	M	No
FA-SM-1	8	0.99 / 9.57	5	YES (municipal, private)	1	YES	1	YES	1	NO	0	H	Yes
BN-SM-24	7	5.5	6	yes	1	no	0	no	0	no	0	M	No
DE-SM-7	7	5.85 / 5.58	5	YES (municipal)	1	NO	0	NO	0	YES (PH)	1	L	Done
HA-SM-6	7	8.87 / 9.77	5	YES (municipal)	1	NO	0	YES	1	NO	0	No	No
HA-SM-7	7	5.54 / 5.54	5	YES (municipal)	1	NO	0	YES	1	NO	0	No	No
OR-SM-3	7	0.0 / 7.69	5	NO	0	YES	1	NO	0	YES (PH, WH)	1	H	Yes
WE-SM-4	7	0.0 / 6.69	5	NO	0	YES	1	NO	0	YES (PH, WH)	1	H	No
BA-SM-6	6	0.0 / 5.39	5	YES (BA land Trust)	1	NO	0	NO	0	NO	0	H	No
BN-SM-12	6	1.7	4	yes	1	no	0	no	0	yes	1		No
BN-SM-13	6	0.9	4	yes	1	no	0	yes	1	no	0		No
BN-SM-28	6	1	4	yes	1	no	0	no	0	yes	1	H	No
BN-SM-32	6	8.1	6	no	0	no	0	no	0	no	0	H	No
CH-SM-4	6	4.77 / 5.51	5	NO	0	YES	1	NO	0	NO	0	H	No
DE-SM-8	6	5.85 / 5.85	5	NO	0	NO	0	NO	0	YES (PH)	1	L	Done
DE-SM-9	6	5.85 / 5.58	5	NO	0	NO	0	NO	0	YES (PH)	1	L	Done

(a) shaded cells indicate selected priority sites

Table B-1. Cape Cod Water Resources Restoration Project - Marsh Rankings by Ecological Factors

Site Number[(a)]	Ecological Ranking Score Total	Size of upstream affected area (salt marsh acres/ total affected acres)	Score	Is the upstream affected area contiguous to protected open space (ownership)?	Score	Does this tidal channel support a shellfish resource area?	Score	Is the channel or system part of an anadromous fish pathway?	Score	Does the affected area include Priority Habitat of Rare Species (PH) or Estimated Habitat of Rare Wildlife (WH)?	Score	Local Interest	Others Addressing Site
EA-SM-5	6	1.13 / 1.13	3	YES (municipal)	1	YES	1	NO	0	YES (PH,WH)	1	M	No
HA-SM-8/ CH-SM-1	6	3.0 / 3.0	3	YES (private)	1	YES	1	YES	1	NO	0	L	No
HA-SM-8/ CH-SM-1	6	3.0 / 3.0	3	YES (private)	1	YES	1	YES	1	NO	0	L	No
MA-SM-1	6	0.0 / 0.73	3	Yes (Municipal, State)	1	YES	1	NO	0	YES (PH, WH)	1	L	No
PR-SM-1	6	5.22 / 5.22	5	YES (federal)	1	NO	0	NO	0	YES (PH, WH)	1	H	No
SA-SM-4	6	3.81 / 5.88	5	NO	0	NO	0	YES	1	NO	0	H	done
WE-SM-1	6	0.0 / 3.94	3	YES (federal, private)	1	YES	1	NO	0	YES (PH, WH)	1	L	No
YA-SM-5	6	1.06 / 1.06	3	YES (municipal)	1	YES	1	NO	0	YES (PH)	1	H	No
BA-SM-14	5	0.0 / 3.25	3	NO	0	YES	1	YES	1	NO	0	H	No
BA-SM-15	5	2.52 / 5.56	5	NO	0	NO	0	NO	0	NO	0		No
BN-SM-02	5	2.5	4	no	0	yes	1	no	0	no	0	M	No
BN-SM-06	5	4.9	4	yes	1	no	0	no	0	no	0	H	No
BN-SM-11	5	3.4	4	no	0	no	0	no	0	yes	1		No
BN-SM-16	5	3.7	4	no	0	yes	1	no	0	no	0	H	No
BN-SM-17	5	0.4	4	yes	1	no	0	no	0	no	0	M	No
BN-SM-21	5	0.3	4	yes	1	no	0	no	0	no	0	H	No
BN-SM-26	5	1.4	4	no	0	no	0	no	0	yes	1		No
BN-SM-34	5	0.8	4	yes	1	no	0	no	0	no	0		No
BN-SM-35	5	0.8	4	yes	1	no	0	no	0	no	0		No
BN-SM-39	5	4	4	no	0	no	0	no	0	yes	1	H	No
BN-SM-40	5	1.6	4	no	0	no	0	no	0	yes	1	H	No
BN-SM-44	5	0.5	4	yes	1	no	0	no	0	no	0		No

(a) shaded cells indicate selected priority sites

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CH-SM-5	5	4.32 / 4.87	3	YES (municipal, private)	1	YES	1	NO	0	NO	0	H	No
DE-SM-10	5	5.47 / 5.47	5	NO	0	NO	0	NO	0	NO	0	L	No
FA-SM-2	5	0.75 / 1.64	3	NO	0	YES	1	NO	0	NO	1	M	No
OR-SM-2	5	0.0 / 0.96	3	NO	0	YES	1	NO	0	YES (PH, WH)	1	L	No
SA-SM--6	5	5.50 / 6.97	5	NO	0	NO	0	NO	0	NO	0	H	No
SA-SM-7	5	4.21 / 5.86	5	NO	0	NO	0	NO	0	NO	0	L	No
YA-SM-2	5	2.55 / 6.08	5	NO	0	NO	0	NO	0	NO	0	M	No
BN-SM-07	4	1.7	4	no	0	no	0	no	0	no	0	H	No
BN-SM-08	4	1.3	4	no	0	no	0	no	0	no	0	H	No
BN-SM-25	4	0.7	4	no	0	no	0	no	0	no	0		No
BN-SM-27	4	0.9	4	no	0	no	0	no	0	no	0	M	No
BN-SM-29	4	4.6	4	no	0	no	0	no	0	no	0		No
BN-SM-30	4	4.6	4	no	0	no	0	no	0	no	0	M	No
BN-SM-36	4	0.6	4	no	0	no	0	no	0	no	0		No
BN-SM-37	4	0.6	4	no	0	no	0	no	0	no	0		No
BR-SM-2	4	0.83 / 4.94	3	NO	0	NO	0	NO	0	YES (PH)	1	H	Yes
BR-SM-3	4	0.0 / 3.75	3	NO	0	NO	0	NO	0	YES (PH)	1	H	No
CH-SM-2	4	0.0 / 3.24	3	NO	0	YES	1	NO	0	NO	0	No	No
DE-SM-3	4	3.14 / 4.11	3	NO	0	YES	1	NO	0	NO	0	L	Done
DE-SM-4	4	0.0 / 3.56	3	YES (municipal)	1	NO	0	NO[2]	0	NO	0	L	Done
DE-SM-6	4	1.67 / 3.72	3	NO	0	YES	1	NO	0	NO	0	H	No
EA-SM-8	4	1.71 / 4.51	3	NO	0	YES	1	NO	0	NO	0	H	No
FA-SM-5	4	0.99 / 0.99	3	NO	0	YES	1	NO	0	NO	0	M	No
HA-SM-3	4	Unable to determine	0	YES (municipal)	1	YES	1	YES	1	YES (PH, WH)	1	L	No

(a) shaded cells indicate selected priority sites

Table B-1. Cape Cod Water Resources Restoration Project - Marsh Rankings by Ecological Factors

Site Number[(a)]	Ecological Ranking Score Total	Size of upstream affected area (salt marsh acres/ total affected acres)	Score	Is the upstream affected area contiguous to protected open space (ownership)?	Score	Does this tidal channel support a shellfish resource area?	Score	Is the channel or system part of an anadromous fish pathway?	Score	Does the affected area include Priority Habitat of Rare Species (PH) or Estimated Habitat of Rare Wildlife (WH)?	Score	Local Interest	Others Addressing Site
MA-SM-3	4	2.26 / 4.38	3	YES (Municipal, State)	1	NO	0	NO	0	NO	0	H	No
SA-SM-11	4	1.37 / 2.43	3	NO	0	YES	1	NO	0	NO	0	H	No
SA-SM-5	4	0.0 / 2.07	3	NO	0	NO	0	YES	1	NO	0	H	No
TR-SM-5	4	1.55 / 1.55	3	NO	0	YES	1	NO	0	NO	0	No	No
WE-SM-2	4	0.55 / 0.55	3	NO	0	YES	1	NO	0	NO	0	L	No
YA-SM-3	4	2.90 / 3.92	3	NO	0	YES	1	NO	0	NO	0	H	No
YA-SM-6	4	1.38 / 1.38	3	YES (private)	1	NO	0	NO	0	NO	0	H	Yes
YA-SM-7	4	2.49 / 4.37	3	YES (municipal)	1	NO	0	NO	0	NO	0	H	Yes
BA-SM-11	3	1.95 / 2.26	3	NO	0	NO	0	NO	0	NO	0	H	No
BA-SM-16	3	0.0 / 3.04	3	NO	0	NO	0	NO	0	NO	0	L	No
FA-SM-4	3	0.60 / 0.60	3	NO	0	NO	0	NO	0	NO	0	L	No
HA-SM-5	3	0.0 / 1.85	3	NO	0	NO	0	NO	0	NO	0	No	No
OR-SM-7	3	1.99 / 3.74	3	NO	0	NO	0	NO	0	NO	0	H	No
SA-SM-3	3	0.0 / 0.20	3	NO	0	NO	0	NO	0	NO	0	H	No
YA-SM-8	3	0.0 / 1.06	3	NO	0	NO	0	NO	0	NO	0	NO	No
CH-SM-3	2	Unable to determine	0	YES (private)	1	YES	1	NO	0	NO	0	No	No
BN-SM-03	1	na	0	no	0	no	0	no	0	yes	1		No
BN-SM-04	1	na	0	no	0	no	0	no	0	yes	1		No
MA-SM-2	1	Unable to determined	0	NO	0	YES	1	NO	0	NO	0	L	No
BN-SM-01	0	0	0	no	0	no	0	no	0	no	0		No

(a) shaded cells indicate selected priority sites

Table B-2. Cape Cod Water Resources Restoration Project - Ranking of Fish Passages

Site Number[(a)]	Town	River	Obst. Name	Total	Obst. #	Acreage	Existing Pop.	Stream Flow	Public Access	Water Quality Issues	Conflicting Water Usage
BR-FP-SB-3	Brewster	Stoney Brook	Connecting Stream	34	-6	12	15	0	5	0	0
	Brewster	Stoney Brook	Elevation Change	29	-6	12	15	0	5	0	0
	Brewster	Stoney Brook	Mill Pond Dam	29	-6	12	15	0	5	0	0
BO-FP-MR-2	Bourne	Monument R.	Benoits Pond Dam	28	-12	12	15	0	5	0	0
BO-FP-MR-3	Bourne	Monument R.	Beals Pond Dam	28	-12	12	15	0	5	0	0
WE-FP-HR-1	Wellfleet	Herring River	Tide Gate	27	-3	12	10	-2	3	0	0
BA-FP-SanR-1	Barnstable	Santuit River	Rt. 130 Bog Sluice	26	-6	12	12	0	0	0	-4
HA-FP-HR-3	Harwich	Herring River	Long Pond Outlet	25	-9	12	12	-2	5	0	-1
	Mashpee	Mashpee River	First Bog Sluice	25	-9	12	15	-1	5	0	0
	Mashpee	Mashpee River	Rt. 130 Dam	25	-9	12	15	-1	5	0	0
	Mashpee	Mashpee River	Mashpee Pond outlet	25	-9	12	15	-1	5	0	0
	Falmouth	Oyster Pond	Oyster Pond Control	24	-3	9	8	0	5	0	0
	Falmouth	Coonamesset R.	Pond 14 Dam	24	-9	12	12	0	5	0	0
	Bourne	Monument R.	Gr. Herring Pd. Outlet	23	-12	12	15	0	5	0	0
DE-FP-SC-1	Dennis	Sesuit Creek	Scargo Lake Outlet	22	-3	9	6	-2	5	0	0
	Falmouth	Coonamesset R.	Bog Flume	22	-9	12	12	-2	5	0	0
	Falmouth	Coonamesset R.	Coonamessett Pond	22	-9	12	12	-2	5	0	0
	Sandwich	Mill Creek	Upper Shawme Dam	21	-6	6	5	0	5	-1	0
YA-FP-WB-1	Yarmouth	Whites Brook	Matthews Pond Outlet	21	-3	6	8	0	5	0	0
BA-FP-MMR-2	Barnstable	Marston Mills R.	Mill Pond Dam	21	-12	12	12	-5	5	0	0
EA-FP-HR-1	Eastham	Herring River	Herring Pond Control	20	-3	6	6	-1	5	0	0
	Bourne	Monument River	Canal Culvert	20	-12	12	15	0	5	0	0
	Dennis	Weir Creek	None	20	0	6	8	0	5	0	0
	Harwich	Herring River	West Reservoir Dam	20	-9	12	12	-2	5	0	-1
	Harwich	Herring River	Hinckleys Pond Dam	20	-9	12	12	-2	5	0	-1
	Eastham	Herring Brook	Outlet Control	20	-3	12	8	-1	2	0	0
MA-FP-SR-2	Mashpee	Santuit River	Santuit Pond Dam	19	-6	12	12	0	0	0	-4
FA-FP-ChR-2	Falmouth	Childs River	Johns Pond Outlet	18	-6	12	3	-2	0	0	0
BO-FP-RB-1	Bourne	Red Brook	Railroad Culvert	18	-6	3	8	0	3	0	0
FA-FP-CL-1	Falmouth	Cedar Lake Ditch	Bay Road Culvert	18	-6	6	5	0	2	0	0
BO-FP-RB-2	Bourne	Red Brook	Red Brook Pond Dam	16	-6	3	8	0	3	0	0
MA-FP-QR-7	Mashpee	Quashnet River	Johns Pond Outlet	16	-12	12	12	-2	5	0	-5
	Barnstable	Marston Mills R.	Elevation Change	16	-12	12	12	-5	5	0	0
	Barnstable	Marston Mills R.	Bog Sluice	16	-12	12	12	-5	5	0	0
	Yarmouth	Mill Creek	Mill Pond Dam	15	-3	3	10	0	3	0	0
	Yarmouth	Town Brook	Culvert above Mill Pd	15	-3	3	10	0	3	0	0
	Barnstable	Little River	Lovells Pond Outlet	14	-6	9	0	-6	5	0	0
BA-FP-WL-1	Barnsatble	Wequaquet Lake	Lake Control Structure	14	-3	12	10	-6	1	0	-3
	Falmouth	Childs River	Carriage Shop Dam	13	-6	12	3	0	1	0	0
	Yarmouth	Parkers River	Seine Pond Inlet	13	-12	9	10	0	3	0	0
	Yarmouth	Parkers River	Road Culvert	13	-12	9	10	0	3	0	0
	Yarmouth	Parkers River	Second Road Culvert	13	-12	9	10	0	3	0	0
	Yarmouth	Parkers River	Long Pond Control	13	-12	9	10	0	3	0	0
	Falmouth	Salt Pond	None	12	0	9	2	0	1	0	0
BA-FP-MMR-5	Barnstable	Marston Mills R.	Middle Pond Control	12	-12	12	12	-5	5	0	-2
OR-FP-PL-1	Orleans	Pilgrim Lake	Elevation Change	12	-6	6	5	0	5	0	0
	Truro	Pilgrim Lake	Pilgrim Lake Control	12	-6	6	5	0	5	0	0
	Mashpee	Quashnet River	Golf Course Bridge	11	-12	12	12	-2	5	0	-5

(a) shaded cells indicate selected priority sites; only priority sites have site numbers

Table B-2. Cape Cod Water Resources Restoration Project - Ranking of Fish Passages

Site Number[(a)]	Town	River	Obst. Name	Total	Construction Difficulty	Environmental Benefits	Existing Funding	Community Support	Need	Comments
BR-FP-SB-3	Brewster	Stoney Brook	Connecting Stream	34	0	0	0	3	5	Needs bank stabilization between headwater ponds
	Brewster	Stoney Brook	Elevation Change	29	0	0	0	3	0	Passage adequate
	Brewster	Stoney Brook	Mill Pond Dam	29	0	0	0	3	0	Passage adequate
BO-FP-MR-2	Bourne	Monument R.	Benoits Pond Dam	28	0	0	0	3	5	Repair hole below pool and reline swinmming pool
BO-FP-MR-3	Bourne	Monument R.	Beals Pond Dam	28	0	0	0	3	5	Barrier dam in bypass channel needed
WE-FP-HR-1	Wellfleet	Herring River	Tide Gate	27	-5	2	0	0	10	Remove tide gate
BA-FP-SanR-1	Barnstable	Santuit River	Rt. 130 Bog Sluice	26	0	0	0	2	10	Install more efficient fishway
HA-FP-HR-3	Harwich	Herring River	Long Pond Outlet	25	0	0	0	3	5	Extend outlet structure into Long Pond
	Mashpee	Mashpee River	First Bog Sluice	25	0	1	0	2	0	Passable when adjusted properly
	Mashpee	Mashpee River	Rt. 130 Dam	25	0	1	0	2	0	Passable
	Mashpee	Mashpee River	Mashpee Pond outlet	25	0	1	0	2	0	Passable
	Falmouth	Oyster Pond	Oyster Pond Control	24	0	2	0	3	0	Passable
	Falmouth	Coonamesset R.	Pond 14 Dam	24	0	1	0	3	0	Passable
	Bourne	Monument R.	Gr. Herring Pd. Outlet	23	0	0	0	3	0	Passable when adjusted properly
DE-FP-SC-1	Dennis	Sesuit Creek	Scargo Lake Outlet	22	0	0	0	2	5	Replace road culverts
	Falmouth	Coonamesset R.	Bog Flume	22	0	1	0	3	0	Passable when adjusted properly
	Falmouth	Coonamesset R.	Coonamessett Pond	22	0	1	0	3	0	Passable
	Sandwich	Mill Creek	Upper Shawme Dam	21	-5	0	0	2	15	Repair dam and include new fishway
YA-FP-WB-1	Yarmouth	Whites Brook	Matthews Pond Outlet	21	0	0	0	0	5	Replace deteriorating ladder with permanent structure
BA-FP-MMR-2	Barnstable	Marston Mills R.	Mill Pond Dam	21	0	1	0	3	5	Replace deteriorating ladder
EA-FP-HR-1	Eastham	Herring River	Herring Pond Control	20	0	0	0	2	5	Needs outlet retention structure
	Bourne	Monument River	Canal Culvert	20	-3	0	0	3	0	Inefficent passage
	Dennis	Weir Creek	None	20	0	1	0	0	0	No action needed
	Harwich	Herring River	West Reservoir Dam	20	0	0	0	3	0	Passage adequate
	Harwich	Herring River	Hinckleys Pond Dam	20	0	0	0	3	0	Passage adequate
	Eastham	Herring Brook	Outlet Control	20	0	0	0	2	0	Passage adequate
MA-FP-SR-2	Mashpee	Santuit River	Santuit Pond Dam	19	-2	0	0	2	5	Repair dam and install permanent fishway
FA-FP-ChR-2	Falmouth	Childs River	Johns Pond Outlet	18	-5	0	0	1	15	Install outlet screen to prevent juvenile escapement
BO-FP-RB-1	Bourne	Red Brook	Railroad Culvert	18	-3	0	0	3	10	Install fishway
FA-FP-CL-1	Falmouth	Cedar Lake Ditch	Bay Road Culvert	18	0	0	0	1	10	Replace deteriorated fishway
BO-FP-RB-2	Bourne	Red Brook	Red Brook Pond Dam	16	0	0	0	3	5	Repair fishway
MA-FP-QR-7	Mashpee	Quashnet River	Johns Pond Outlet	16	0	1	0	0	5	Install outlet retention structure
	Barnstable	Marston Mills R.	Elevation Change	16	0	1	0	3	0	Passage adequate
	Barnstable	Marston Mills R.	Bog Sluice	16	0	1	0	3	0	Passage adequate
	Yarmouth	Mill Creek	Mill Pond Dam	15	0	0	0	2	0	Passage adequate
	Yarmouth	Town Brook	Culvert above Mill Pd	15	0	0	0	2	0	Passage adequate
	Barnstable	Little River	Lovells Pond Outlet	14	-3	0	0	0	15	Consider surface outlet for Little Pond
BA-FP-WL-1	Barnsatble	Wequaquet Lake	Lake Control Structure	14	-2	0	0	0	5	Install outlet retention structures
	Falmouth	Childs River	Carriage Shop Dam	13	-3	1	0	0	5	Repair dam and fishway
	Yarmouth	Parkers River	Seine Pond Inlet	13	0	0	0	3	0	Passage adequate
	Yarmouth	Parkers River	Road Culvert	13	0	0	0	3	0	Passage adequate
	Yarmouth	Parkers River	Second Road Culvert	13	0	0	0	3	0	Passage adequate
	Yarmouth	Parkers River	Long Pond Control	13	0	0	0	3	0	Passage adequate
	Falmouth	Salt Pond	None	12	0	0	0	0	0	No action needed
BA-FP-MMR-5	Barnstable	Marston Mills R.	Middle Pond Control	12	-2	1	0	3	5	Install outlet retention structure
OR-FP-PL-1	Orleans	Pilgrim Lake	Elevation Change	12	0	0	0	2	5	Install outlet retention structure
	Truro	Pilgrim Lake	Pilgrim Lake Control	12	0	0	0	2	0	High salinities have reduced potential for development
	Mashpee	Quashnet River	Golf Course Bridge	11	0	1	0	0	0	Passable when properly adjusted

(a) shaded cells indicate selected priority sites; only priority sites have site numbers

Table B-2. Cape Cod Water Resources Restoration Project - Ranking of Fish Passages

Site Number[(a)]	Town	River	Obst. Name	Total	Obst. #	Acreage	Existing Pop.	Stream Flow	Public Access	Water Quality Issues	Conflicting Water Usage
	Mashpee	Quashnet River	First Bog Sluice	11	-12	12	12	-2	5	0	-5
	Mashpee	Quashnet River	Second Bog Sluice	11	-12	12	12	-2	5	0	-5
	Mashpee	Quashnet River	Third Bog Sluice	11	-12	12	12	-2	5	0	-5
	Sandwich	Mill Creek	Grist Mill Dam	11	-6	6	5	0	5	-1	0
BA-FP-LE-1	Barnstable	Red Lily Pond	Lake Elizabeth Dam	9	-3	3	2	0	1	0	0
	Falmouth	Flax Pond	John Parker Road	9	-6	6	2	0	1	0	0
CH-FP-LL-1	Chatham	Lovers Lake	Elevation Change	9	-12	9	5	0	0	0	0
CH-FP-LL-2	Chatham	Lovers Lake	Stillwater Pd Control	9	-12	9	5	0	0	0	0
CH-FP-LL-4	Chatham	Lovers Lake	Lovers Lake Control	9	-12	9	5	0	0	0	0
	Dennis	Swan Pond River	None	9	0	12	2	0	0	-5	0
	Falmouth	Cedar Lake Ditch	Elevation Change	8	-6	6	5	0	2	0	0
	Falmouth	Herring Brook	Herring Brook Dam	7	-3	6	5	-2	1	0	0
	Harwich	Skinequit Pond	Elevation Change	6	-3	3	5	0	0	0	0
	Dennis	Quivett Creek	Pond Outlet	5	-3	0	2	0	5	0	0
	Falmouth	Wild Harbor River	Dam Pond Culvert	4	-3	3	2	0	2	0	0
	Falmouth	Siders Pond	Shivericks Pond Dam	4	-3	3	2	0	2	0	0
CH-FP-LL-1A	Chatham	Lovers Lake	Lovers Lake Culvert	4	-12	9	5	0	0	0	0
	Falmouth	Flax Pond	Flax Pond Outlet	3	-6	6	2	0	0	0	0
	Dennis	Fresh Pond	Overgrown Channel	3	-3	6	0	0	0	0	0
	Barnstable	Mill Pond	Pond Outlet	0	-3	6	2	0	0	0	0
	Harwich	Andrews River	None	0	0	6	0	-6	0	0	0
	Truro	Pilgrim Lake	Outlet Pipe	0	-9	12	2	0	2	-3	0
	Truro	Pilgrim Lake	Tide Gate	0	-9	12	2	0	2	-3	0
	Truro	Pilgrim Lake	Lake Control Structure	0	-9	12	2	0	2	-3	0
	Barnstable	Rushy Marsh Pd.	Culvert	-1	-3	3	0	0	0	0	0
	Barnstable	Skunknett River	Road Culvert	-2	-3	3	0	0	0	0	0
	Barnstable	Skunknett River	Lumbert Pond Dam	-2	-3	3	0	0	0	0	0
	Barnstable	Stewarts Creek	Aunt Betty Pd Control	-2	-3	3	0	0	0	0	0
	Brewster	Cobbs Pond	Outlet Pipe	-3	-3	6	0	-1	0	0	0
	Barnstable	Little River	Road Culvert	-4	-3	9	0	-6	1	0	-2
	Falmouth	Mill Pd/Green Pd	Mill Pond Dam	-5	-3	3	0	0	0	0	0
	Barnstable	Halls Creek	Road Culvert	-5	-3	0	0	0	0	0	0
	Chatham	Muddy Creek	None	-5	0	0	0	0	0	-5	0
	Barnstable	Bumps River	Bumps River Rd Dam	-6	-6	0	0	0	0	0	0
	Truro	Pamet River	Tide Gate	-7	-3	0	1	0	0	0	0
	Eastham	Rock Harbor Crk	Road Culvert	-7	-6	3	2	-2	0	0	0
	Barnstable	Bumps River	Road Culvert	-8	-6	0	0	0	0	0	0
	Dennis	Bass River	Ms Thatchers Pd Dam	-8	-3	3	0	-5	0	0	0
	Bourne	Pocasset River	Lower Mill Pond Dam	-13	-12	3	0	-1	0	0	0
	Bourne	Pocasset River	Upper Mill Pond Dam	-13	-12	0	0	0	0	0	0
	Bourne	Pocasset River	County Road Dam	-16	-12	0	0	0	1	0	0

(a) shaded cells indicate selected priority sites; only priority sites have site numbers

Table B-2. Cape Cod Water Resources Restoration Project - Ranking of Fish Passages

Site Number[(a)]	Town	River	Obst. Name	Total	Construction Difficulty	Environmental Benefits	Existing Funding	Community Support	Need	Comments
	Mashpee	Quashnet River	First Bog Sluice	11	0	1	0	0	0	Passable when properly adjusted
	Mashpee	Quashnet River	Second Bog Sluice	11	0	1	0	0	0	Passable when adjusted properly
	Mashpee	Quashnet River	Third Bog Sluice	11	0	1	0	0	0	Passable when adjusted properly
	Sandwich	Mill Creek	Grist Mill Dam	11	0	0	0	2	0	Passage adequate
BA-FP-LE-1	Barnstable	Red Lily Pond	Lake Elizabeth Dam	9	0	0	0	1	5	Install more permanent fishway
	Falmouth	Flax Pond	John Parker Road	9	0	0	0	1	5	Install more permanent fishway
CH-FP-LL-1	Chatham	Lovers Lake	Elevation Change	9	0	0	0	2	5	Road culvert collapsing
CH-FP-LL-2	Chatham	Lovers Lake	Stillwater Pd Control	9	0	0	0	2	5	Replace with more efficient fishway
CH-FP-LL-4	Chatham	Lovers Lake	Lovers Lake Control	9	0	0	0	2	5	Replace with more efficient fishway
	Dennis	Swan Pond River	None	9	0	0	0	0	0	Passage adequate
	Falmouth	Cedar Lake Ditch	Elevation Change	8	0	0	0	1	0	Passage adequate
	Falmouth	Herring Brook	Herring Brook Dam	7	0	0	0	0	0	Passage adequate
	Harwich	Skinequit Pond	Elevation Change	6	0	0	0	1	0	Passage adequate
	Dennis	Quivett Creek	Pond Outlet	5	0	0	0	1	0	Passage adequate
	Falmouth	Wild Harbor River	Dam Pond Culvert	4	0	0	0	0	0	Passage adequate
	Falmouth	Siders Pond	Shivericks Pond Dam	4	0	0	0	0	0	Little opportunity for improvement
CH-FP-LL-1A	Chatham	Lovers Lake	Lovers Lake Culvert	4	0	0	0	2	0	Passage adequate
	Falmouth	Flax Pond	Flax Pond Outlet	3	0	0	0	1	0	Passable with new structure
	Dennis	Fresh Pond	Overgrown Channel	3	0	0	0	0	0	Stream clearing needed
	Barnstable	Mill Pond	Pond Outlet	0	-5	0	0	0	0	Should be stocked with adult alewives
	Harwich	Andrews River	None	0	0	0	0	0	0	Low flow and no defined channel
	Truro	Pilgrim Lake	Outlet Pipe	0	-5	1	0	0	0	Increased salinities have reduced potential production
	Truro	Pilgrim Lake	Tide Gate	0	-5	1	0	0	0	Increased salinities have reduced potential production
	Truro	Pilgrim Lake	Lake Control Structure	0	-5	1	0	0	0	Increased salinities have reduced potential production
	Barnstable	Rushy Marsh Pd.	Culvert	-1	-2	1	0	0	0	New outlet must be established to restore alewives
	Barnstable	Skunknett River	Road Culvert	-2	-2	0	0	0	0	Habitat size doesn't justify fishway construction
	Barnstable	Skunknett River	Lumbert Pond Dam	-2	-2	0	0	0	0	Habitat size doesn't justify fishway construction
	Barnstable	Stewarts Creek	Aunt Betty Pd Control	-2	-2	0	0	0	0	Low flow and little potential habitat
	Brewster	Cobbs Pond	Outlet Pipe	-3	-5	0	0	0	0	Difficult access problem
	Barnstable	Little River	Road Culvert	-4	-3	0	0	0	0	Low flows limit potential for development
	Falmouth	Mill Pd/Green Pd	Mill Pond Dam	-5	-5	0	0	0	0	Difficult construction issues
	Barnstable	Halls Creek	Road Culvert	-5	-2	0	0	0	0	Insufficient habitat to justify fishway construction
	Chatham	Muddy Creek	None	-5	0	0	0	0	0	High salinity and lack of habitat
	Barnstable	Bumps River	Bumps River Rd Dam	-6	0	0	0	0	0	Potential habitat doesn't justify fishway construction
	Truro	Pamet River	Tide Gate	-7	-5	0	0	0	0	Increased salinities have reduced available habitat
	Eastham	Rock Harbor Crk	Road Culvert	-7	-5	1	0	0	0	Construction difficulties at Rt6 reduce potential
	Barnstable	Bumps River	Road Culvert	-8	-2	0	0	0	0	Potential habitat doesn't justify fishway construction
	Dennis	Bass River	Ms Thatchers Pd Dam	-8	-3	0	0	0	0	Lack of flow negates development to this point
	Bourne	Pocasset River	Lower Mill Pond Dam	-13	-3	0	0	0	0	Lack of sufficient habitat to justify fishways
	Bourne	Pocasset River	Upper Mill Pond Dam	-13	-1	0	0	0	0	Lack of sufficient habitat to justify fishways
	Bourne	Pocasset River	County Road Dam	-16	-5	0	0	0	0	Lack of sufficient habitat to justify fishways

(a) shaded cells indicate selected priority sites; only priority sites have site numbers

Table B-2. Cape Cod Water Resources Restoration Project - Ranking of Fish Passages

Site Number[(a)]	Town	River	Obst. Name	Total	Obst. #	Acreage	Existing Pop.	Stream Flow	Public Access	Water Quality Issues	Conflicting Water Usage
	Yarmouth	Plashes Brook	Winslow Gray Rd Dam	-20	-21	6	0	0	0	0	-5
	Yarmouth	Plashes Brook	First Bog Sluice	-20	-21	6	0	0	0	0	-5
	Yarmouth	Plashes Brook	Second Bog Sluice	-20	-21	6	0	0	0	0	-5
	Yarmouth	Plashes Brook	Third Bog Sluice	-20	-21	6	0	0	0	0	-5
	Yarmouth	Plashes Brook	Plashes Pd Dam	-20	-21	6	0	0	0	0	-5
	Yarmouth	Plashes Brook	Fourth Bog Sluice	-20	-21	6	0	0	0	0	-5
	Yarmouth	Plashes Brook	Fifth Bog Sluice	-20	-21	6	0	0	0	0	-5
	Yarmouth	Plashes Brook	Pump House Dam	-20	-21	6	0	0	0	0	-5

(a) shaded cells indicate selected priority sites; only priority sites have site numbers

Table B-2. Cape Cod Water Resources Restoration Project - Ranking of Fish Passages

Site Number[(a)]	Town	River	Obst. Name	Total	Construction Difficulty	Environmental Benefits	Existing Funding	Community Support	Need	Comments
	Yarmouth	Plashes Brook	Winslow Gray Rd Dam	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions
	Yarmouth	Plashes Brook	First Bog Sluice	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions
	Yarmouth	Plashes Brook	Second Bog Sluice	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions
	Yarmouth	Plashes Brook	Third Bog Sluice	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions
	Yarmouth	Plashes Brook	Plashes Pd Dam	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions
	Yarmouth	Plashes Brook	Fourth Bog Sluice	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions
	Yarmouth	Plashes Brook	Fifth Bog Sluice	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions
	Yarmouth	Plashes Brook	Pump House Dam	-20	0	0	0	0	0	Stream is highly altered by cranberry bog diversions

(a) shaded cells indicate selected priority sites; only priority sites have site numbers

Table B-3. Cape Cod Water Resources Restoration Project - Initial List of Stormwater Remediation Sites for Shellfish Restoration

NRCS Site Number	Town	Local Site ID Name/Number
BA-SW-1	Barnstable	West Bay
BA-SW-2	Barnstable	Centerville
BA-SW-3	Barnstable	Inner Harbor
BA-SW-4	Barnstable	Kalmus Beach
BA-SW-5	Barnstable	Millway Beach
BA-SW-6	Barnstable	Rendezvous Lane
BO-SW-1	Bourne	Hen Cove
Brew S-1AB	Brewster	Consodine Ditch
Brew SW-1C	Brewster	Consodine Ditch
Brew SW-2	Brewster	Paines Creek
Brew SW-3	Brewster	Stoney Brook Rd
Chat SW-1	Chatham	Cha 7 - Old Stage Harbor Rd and Champlain Rd
Chat SW-2	Chatham	Cha 8 - Bridge St
Chat SW-3	Chatham	Cha 9 - Eliphamets Lane
Chat SW-4	Chatham	Cha 10 Oyster Pond Furlong
Chat SW-5	Chatham	Cha 11, 12 - Stage Harbor Road and Pond St
Chat SW-6	Chatham	Cha 14 - Holway Street
Chat SW-7	Chatham	Cha 16 - Bar Cliff Ave Ext
Chat SW-8	Chatham	Cha 17 - Cow Yard Landing
Chat SW-9	Chatham	Cha 18 - Rt 28 at Ryders Cove 1
Chat SW-10	Chatham	Cha 20, 21,30 - Rt 28 at Ryders Cove 2
Chat SW-11	Chatham	Cha 22 - Rt 28 at Muddy Creek
Chat SW-12	Chatham	Cha 23 - Fox Hill Road
Chat SW-13	Chatham	Cha 6 - Sears Road
Chat SW-14	Chatham	Rt 28 Contribution to Oyster Pond Furlong
Chat SW-15	Chatham	Rt 28 Contribution to Stage Harbor Rod
DE-SW-1	Dennis	D2/S3 - Sesuit Harbor Marina
DE-SW-2	Dennis	S39 - Mayfair Boat Yard
DE-SW-3	Dennis	D17/S41 - Follins Rd. Boat Ramp
DE-SW-4	Dennis	D19/S35 - Fishermans Landing
DE-SW-5	Dennis	S35A - Leif Erickson Rd
DE-SW-6	Dennis	D36/S21 - Cove Road Landing
DE-SW-7	Dennis	S47 - Aunt Julia Mooring Area
DE-SW-8	Dennis	D57/S68 - Bass River Marina
DE-SW-9	Dennis	D56/S74 - Boat Landing and Retail Area
DE-SW-10	Dennis	D57/S68 - Sundancers Lounge
DE-SW-11	Dennis	D51/S3 - Wrinkle Point
DE-SW-12	Dennis	S6 - West Dennis Yacht Club
DE-SW-13	Dennis	D47/S8 - Weir Creek on Lower County Rd
DE-SW-14	Dennis	Baxter Road
DE-SW-14	Dennis	Sesuit Creek
EA-SW-1	Eastham	Rt. 6 Salt Pond
EA-SW-2	Eastham	Salt Pond Boat Ramp
EA-SW-3	Eastham	Rt. 6 Fort Hill
EA-SW-4	Eastham	Fort Hill Area, Gov. Prence Rd. Mary Chase Rd.
EA-SW-5	Eastham	Thumpertown Landing
EA-SW-6	Eastham	Campground Landing
EA-SW-7	Eastham	Massoit Road and Wellfleet Drive In
EA-SW-8	Eastham	Hemenway landing
EA-SW-9	Eastham	Town line Elio Rd.
EA-SW-10	Eastham	Town Landing
FA-SW-1	Falmouth	Garnet Ave
FA-SW-2	Falmouth	Megansett Harbor
FA-SW-3	Falmouth	Great Pond

Table B-3. Cape Cod Water Resources Restoration Project - Initial List of Stormwater Remediation Sites for Shellfish Restoration

NRCS Site Number	Town	Local Site ID Name/Number
FA-SW-4	Falmouth	Wild Harbor
FA-SW-5	Falmouth	Eel Pond
HARW-SW-1	Harwich	Hulse Point Road
HARW-SW-2	Harwich	Bridge Lower Cnty Rd at Allens Harbor
HARW-SW-3	Harwich	Wychemere Harbor West
MA-SW-1	Mashpee	Captain's Row
MA-SW-2	Mashpee	Shoestring Bay
MA-SW-3	Mashpee	New Seabury
Orle - SW-1	Orleans	Champlain Road
Orle - SW-2	Orleans	Pricilla Road
Orle - SW-3	Orleans	High Tide Lane - Nauset Marina
Orle - SW-4	Orleans	Gilman Lane - Pochet Inlet
Orle - SW-5	Orleans	Barley Neck Road
Orle - SW-6	Orleans	River Road
Orle - SW-7	Orleans	Ares Pond
Orle - SW-8	Orleans	Quanset Landing
Orle - SW-9	Orleans	Skaket Beach Park Lot
Prov - SW-1	Provincetown	P1 - Provinetown Inn
Prov - SW-2	Provincetown	P2 - Point Street
Prov - SW-3	Provincetown	P3 - West End Parking Lot
Prov - SW-4	Provincetown	P4 - Mechanic Street
Prov - SW-5	Provincetown	P6 - Coast Guard Outfall
Prov - SW-6	Provincetown	P7 - Atlantic Avenue
Prov - SW-7	Provincetown	P8 - Court Street
Prov - SW-8	Provincetown	P9 - Post Office
Prov - SW-9	Provincetown	P13B - End Arch Street
Prov - SW-10	Provincetown	P14 - Pearl Street
Prov - SW-11	Provincetown	P15 - Dyer Street
Prov - SW-12	Provincetown	P16 - 435 Commercial
Prov - SW-13	Provincetown	P17 - 458 Commercial
Prov - SW-14	Provincetown	P18 - Cooks Street
Prov - SW-15	Provincetown	P19 - Howland Street
Prov - SW-16	Provincetown	P20 - Kendall Lane
Prov - SW-17	Provincetown	P21 - Conway Street
Prov - SW-18	Provincetown	P22 - 605 Commercial St.
Prov - SW-19	Provincetown	P23 - 619 Commercial St.
Prov - SW-20	Provincetown	P24 - 647 Commercial St.
SA-SW-1	Sandwich	Shawme Lake
SA-SW-2	Sandwich	6A at Mill Creek
SA-SW-3	Sandwich	Scorton Cr. At Town Line
SA-SW-4	Sandwich	Scorton Cr. at Jones Lane
Trur - SW-1	Truro	County Road & Mill Pond Road
Trur - SW-2	Truro	Mill Pond Road
Trur - SW-3	Truro	Pamet Harbor Parking Lot
Trur - SW-4	Truro	Meetinghouse Road
Trur - SW-5	Truro	Pamet River
Trur - SW-6	Truro	High Head Road
Trur - SW-7	Truro	Rt 6 At Stotts Crossing
Well - SW-1	Wellfleet	Chequessett Neck Road at Herring River
Well - SW-2	Wellfleet	Chequessett Neck Road
Well - SW-3	Wellfleet	Chequessett Neck Road - Town Landing
Well - SW-4	Wellfleet	Kendrick Avenue
Well - SW-5	Wellfleet	Holbrook Avenue
Well - SW-6	Wellfleet	Commercial Street 1

Table B-3. Cape Cod Water Resources Restoration Project - Initial List of Stormwater Remediation Sites for Shellfish Restoration

NRCS Site Number	Town	Local Site ID Name/Number
Well - SW-7	Wellfleet	Main St 1
Well - SW-8	Wellfleet	Main St 2
Well - SW-9	Wellfleet	Rt 6 at East Commercial Street
Well - SW-10	Wellfleet	Paine Hollow Rd Town Landing
Well - SW-11	Wellfleet	Arrow Head Town Landing
YA-SW-1	Yarmouth	Hallett Mill Pond Outlet
YA-SW-2	Yarmouth	Cummaquid Inn
YA-SW-3	Yarmouth	Mill Lane
YA-SW-4	Yarmouth	Thatcher Shore Road
YA-SW-5	Yarmouth	Mill Pond Outlet @ Rt. 28
YA-SW-6	Yarmouth	Route 28 @ Cosey Home Terr
YA-SW-7	Yarmouth	Rte 28 @ Standish Way
YA-SW-8	Yarmouth	Standish Wy @ Massassoit Rd
YA-SW-9	Yarmouth	Standish Wy @ Alden
YA-SW-10	Yarmouth	Standish Wy @ Windemere Rd
YA-SW-11	Yarmouth	Webster Rd@ 90 deg. bend
YA-SW-12	Yarmouth	Webster Rd@ so. End Tanglewood Dr
YA-SW-13	Yarmouth	Webster Rd. @ n. end Tanglewood Dr.
YA-SW-14	Yarmouth	Canary St. @ Swan Pond
YA-SW-15	Yarmouth	Robin St. @ Swan Pond
YA-SW-16	Yarmouth	Winslow Gray Rd. @ unnamed trib
YA-SW-17	Yarmouth	Parker River @ Rt. 28
YA-SW-18	Yarmouth	Neptune Lane @ Pawkanawkut
YA-SW-19	Yarmouth	Parker River @ Kearsarge
YA-SW-20	Yarmouth	So. Shore Dr. @ Little Dipper Lane
YA-SW-21	Yarmouth	Run Pond Outlet @ South St. (WD1)
YA-SW-22	Yarmouth	Trib to Run Pond s. of Alden Rd.
YA-SW-23	Yarmouth	Trib to Run Pond @ Misty Ln.
YA-SW-24	Yarmouth	Breezy Point Rd. @ Melva & Grove Sts.
YA-SW-25	Yarmouth	Breezy Point Rd. @ Willow St.
YA-SW-26	Yarmouth	Smuggler's Beach Boat Ramp @ Bass River
YA-SW-27	Yarmouth	Aunt Jane's Road @ Bass River
YA-SW-28	Yarmouth	North Cove Landing @ Bass River
YA-SW-29	Yarmouth	Packet's Landing (south of Rt. 28 bridge)
YA-SW-30	Yarmouth	Route 28 Bridge over Bass River
YA-SW-31	Yarmouth	Highbank Road Bridge @ Bass River
YA-SW-32	Yarmouth	Susan Rd.
YA-SW-33	Yarmouth	Aunt Dorah's Lane @ Follins Pond
YA-SW-34	Yarmouth	Follins Pond Boat Ramp
YA-SW-35	Yarmouth	Longview Rd. @ Follins Pond
YA-SW-36	Yarmouth	Surfside Terrace @ Bass River
YA-SW-37	Yarmouth	Charles Road @ Bass River
YA-SW-38	Yarmouth	Snug Harbor Development
YA-SW-39	Yarmouth	Grandview Drive
YA-SW-40	Yarmouth	#200 Blue Rock Road
YA-SW-41	Yarmouth	#148 Blue Rock Road
YA-SW-42	Yarmouth	Mayflower Terrace by Wild Rose
YA-SW-43	Yarmouth	# 96 Mayflower Terrace
YA-SW-44	Yarmouth	#146 Mayflower Terrace
YA-SW-45	Yarmouth	Merchant Ave
YA-SW-46	Yarmouth	Paved Swales on Susan Road
YA-SW-47	Yarmouth	# 149 Macomber Drive

Table B-4. Cape Cod Water Resources Restoration Project -Ranking of Stormwater Remediation Sites

Site Number[(a)]	Total Score	Town	Local Site ID Name/Number	Remediation Measures Results				Number of user-days available for harvesting without remediation	Growing Area	Shellfish Classification * = close to downgrade [(c)]
				Potential Impact on Classification high prob.=5 moderate =3 low prob. =1	Acreage of Affected Growing Area	Types of shellfish [(b)]	Will remediation measures affect swimming beach? Yes=3 No=0			
BA-SW-18	66	Barnstable	Scudder Lane	3	2092	SSC,O	0	365	CCB31	A
BA-SW-13	64	Barnstable	Bay Shore Rd.	3	46	Q, SSC, O	3	365	SC28.1	P
BA-SW-1	62	Barnstable	Cotuit Town Pier	3	536	Q	3	365	SC21	A
CHAT-SW-11	59	Chatham	Muddy Creek	1	31	SSC	3	182	SC58	CA
WE-SW-5	59	Wellfleet	Holbrook Ave.	3	247	O, Q	0	182	CCB13	CA
BA-SW-11	58	Barnstable	Snow's Creek	1	17	Q, SSC	3	212	SC28.8	CA
BA-SW-n09	58	Barnstable	Calves Pasture Lane	1	2092	SSC	0	365	CCB31	A
WE- SW-6	57	Wellfleet	Commercial St. 1	3	247	O	0	182	CCB13	CA
BA-SW-2	56	Barnstable	Cotuit Old Shore Rd.	3	536	Q	0	365	SC21	A
BO-SW-7	55	Bourne	Queen Sewell Cove	3	98	SSC, Q	0	0	BB44.7	P
DE-SW-4	55	Dennis	Fisherman's Landing	5	298	Q, SSC	0	165	SC35	CA
BA-SW-c04	54	Barnstable	Cotuit - Cross St.	1	536	Q	0	365	SC21	A
BA-SW-9	54	Barnstable	East Bay Boat Ramp	3	157	Q, SSC	0	0	SC24	R
FA-SW-2	54	Falmouth	Curley Blvd.	5	16.9	Q, O, SSC	0	0	BB52.3	P
PR-SW-1	54	Provincetown	Provincetown Inn	3	131	Q, O, SSC	3	0	CCB4.3	A
BO-SW-4	53	Bourne	Cohasset Narrows	3	221	Q, SSC	3	0	BB44.3	CA
DE-SW-11	53	Dennis	Wrinkle Point	3	204	Q, SSC, O	0	182	SC33	CA
DE-SW-5	53	Dennis	Leif Ericson	5	298	Q, SSC	0	165	SC35	CA
EA-SW-1	53	Eastham	Salt Pond	3	22	Q, SSC	0	365	OC6	A
EA-SW-4	53	Eastham	Fort Hill	3	416	Q, SSC	0	0	OC4.1	A *
BA-SW-c05	52	Barnstable	Cotuit Oyster	1	536	Q, O	0	365	SC21	A
ORL-SW-9	52	Orleans	Skaket Beach Lot	1	3261	Q, SSC, RC	3	150	CCB17.1	CA
EA-SW-9	51	Eastham	Ellis Rd. Town Line	1	416	Q	0	365	OC4	A *
ORL-SW-3	51	Orleans	High Tide Lane - Marina	3	314	Q, SSC	0	181	SC63.4	CA
ORL-SW-7	51	Orleans	Arey's Pond	1	314	SSC	0	365	SC63	A
BA-SW-6	50	Barnstable	Rendezvous Lane	1	1801	SSC, O, Q	3	365	CCB31.0	A
BA-SW-5	50	Barnstable	Millway Beach	1	51	SSC	3	274	CCB31.2	CA *
YA-SW-5	50	Yarmouth	Mill Creek@28	3	25.5	Q	3	212	SC28.5	CA
HAR-SW-1	49	Harwich	Hulse Pt.	3	19	Q, SSC	0	181	SC39	CA
MA-SW-2	49	Mashpee	Shoestring Bay	5	102	SSC,Q	0	90	SC20.3	CA *
WE-SW-1	49	Wellfleet	Herring River	1	208	O	0	90	CCB12	CA
YA-SW-45	49	Yarmouth	Merchant Ave 2	3	298	Q, SSC	0	165	SC35	CA
FA-SW-1	48	Falmouth	Falmouth Inner Harbor	1	33	Q	0	0	SC9	P

(a) shaded cells indicate selected priority sites

Table B-4. Cape Cod Water Resources Restoration Project -Ranking of Stormwater Remediation Sites

Site Number[(a)]	Total Score	Town	Local Site ID Name/Number	Remediation Measures Results				Number of user-days available for harvesting without remediation	Growing Area	Shellfish Classification * = close to downgrade [(c)]
				Potential Impact on Classification high prob.=5 moderate =3 low prob. =1	Acreage of Affected Growing Area	Types of shellfish [(b)]	Will remediation measures affect swimming beach? Yes=3 No=0			
YA-SW-7	48	Yarmouth	Mill Creek @ Bogs	3	25.5	Q	3	212	SC28.5	CA
EA-SW-6	47	Eastham	Campground Landing	1	18285	Q	3	365	CCB9	A
HAR-SW-2	47	Harwich	Lower County Rd.	3	19	Q	0	181	SC39	CA
YA-SW-33	47	Yarmouth	Aunt Dorahs	3	298	Q, SSC	0	165	SC35	CA
YA-SW-35	47	Yarmouth	Longview	3	298	Q, SSC	0	165	SC35	CA
YA-SW-32	47	Yarmouth	Merchant Ave 1	3	298	Q, SSC	0	165	SC35	CA
BA-SW-ce01	45	Barnstable	South Main St.	1	32	SSC, O	0	0	SC28.1	P
YA-SW-47	45	Yarmouth	Macomber Drive	1	298	Q, SSC	0	165	SC35	CA
BA-SW-1	43	Barnstable	West Bay	1	332	SSC, Q, O	0	365	SC22	A
BA-SW-2	43	Barnstable	Centerville S. Main St.	1	157	O, Q	0	0	SC24	R
BA-SW-4	43	Barnstable	Veteran's Memorial Park	1	17	Q, BS	3	180	SC28.8	CA
BA-SW-4	43	Dennis	Baxter Rd.	1	164	SSC	0	0	SC36	P
DE-SW-14	41	Truro	High Head Rd	1	314	Q, SSC	0	0	CCB4.5	P
TRU-SW-6	41	Yarmouth	96 Mayflower Terrace	1	298	Q, SSC	0	165	SC35	CA
YA-SW-43	41	Yarmouth	Mayflower Terrace	1	298	Q, SSC	0	165	SC35	CA
YA-SW-44	41	Yarmouth	Mayflower 3	1	298	Q, SSC	0	165	SC35	CA
BO-SW-8	40	Bourne	Grey Gables	1	1	Q, BS	0	0	BB43.3	P
BO-SW-9	37	Bourne	Taylor's Point	1	1	Q, SSC, O	0	0	BB43.5	P
MA-SW-1	37	Mashpee	Mashpee River	1	24	SSC, Q	0	90	SC20.1	CA

(b) Q = Quahog Clams, SSC = Soft Shelled Clams, O = Oysters, RC = Razor Clams

(c) A = Approved, CA = Conditionally Approved, R = Restricted, P = Prohibited

(a) shaded cells indicate selected priority sites

Table B-5
Effects of the recommended plan on resources of national recognition

Types of resources	Principal sources of national recognition	Measurement of effects
Air quality	Clean Air Act, as amended (42 U.S.C. 7401 et seq.)	No areas (0 square miles) where state air quality classifications would change
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.)	No adverse effects on the coastal zone; beneficial effects for marshes, anadromous fish, and water quality, as detailed below
Endangered & threatened species critical habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	No areas (0 acres) of critical habitat gained or lost; Section 7 consultation to be completed for each project in site-specific Environmental Assessment
Fish & wildlife habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	Full access restored to 4,200 acres of spawning habitat for anadromous fish 1,500 acres of salt marsh habitat restored
Flood plains	Executive Order 11988, Flood Plain Management	No floodplain (0 acres) gained or lost
Historic & cultural properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec. 470 et seq.)	No known effects; Section 106 consultation to be completed for each project in site-specific Environmental Assessment
Prime & unique farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act; Farmland Protection Policy Act of 1981	No areas (0 acres) of prime or unique farmland gained or lost
Water quality	Clean Water Act of 1977 (33 U.S.C. 1251 et seq.)	Water quality protected or improved in 7,300 acres of tidal waters currently listed as impaired and/or closed or potentially closed for shellfish harvesting
Wetlands	Executive Order 11990, Protection of Wetlands; Clean Water Act of 1977 (33 U.S.C. 1251, et seq.); Food Security Act of 1985	1,500 acres salt marsh wetland gained
Wild & scenic rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 et seq.)	No wild or scenic rivers (0 miles) gained or lost

Appendix C
SUPPORTING INFORMATION

CONTENTS

Table C-1 - Stormwater Improvement Construction - Emissions Calculations

Equipment	Quantity	Use (hrs)	Horsepower	Emission Factor (lb/hp-hr) CO	NOX	PM10	SO2	Emissions (lbs) CO	NOX	PM10	SO2
Installing standard Catch basins or drywells - 1 day											
Loader	1	24	315	0.00668	0.031	0.0007	0.00205	50.5008	234.36	5.45076	15.498
Backhoe	1	40	110	0.00668	0.031	0.0007	0.00205	29.392	136.4	3.1724	9.02
10-wheel Dump Truck	1	32	350	0.00668	0.031	0.0007	0.00205	74.816	347.2	8.0752	22.96
Pickup Truck	2	8	150	0.00668	0.031	0.0007	0.00205	16.032	74.4	1.7304	4.92
Flat-bed Hauler	1	16	315	0.00668	0.031	0.0007	0.00205	33.6672	156.24	3.63384	10.332
Installing larger structures for sand filters, leaching galleys, oil-grit separators, or swirl concentrators - 3 days over a week + 1 day for piping											
Backhoe	1	56	110	0.00668	0.031	0.0007	0.00205	41.1488	190.96	4.44136	12.628
10-wheel Dump Truck	1	48	350	0.00668	0.031	0.0007	0.00205	112.224	520.8	12.1128	34.44
Loader	1	40	315	0.00668	0.031	0.0007	0.00205	84.168	390.6	9.0846	25.83
Pickup Trucks	2	16	150	0.00668	0.031	0.0007	0.00205	16.032	148.8	3.4608	9.84
								457.981	**2199.76**	**51.1622**	**145.468**

Table C-2 - Salt Marsh Construction - Emissions Calculations

Equipment	Quantity	Use (hrs)	Horsepower	Emission Factor (lb/hp-hr) CO	NOX	PM10	SO2	Emissions (lbs) CO	NOX	PM10	SO2
Excavator	1	40	268	0.00668	0.031	0.0007	0.00205	71.6096	332.32	7.72912	21.976
Loader	1	40	216	0.00668	0.031	0.0007	0.00205	57.7152	267.84	6.22944	17.712
Skidsteer	1	40	62	0.00668	0.031	0.0007	0.00205	16.5664	76.88	1.78808	5.084
15 yrd Dump	1	40	350	0.00668	0.031	0.0007	0.00205	93.52	434	10.094	28.7
3 Ton Pickup	1	40	250	0.00668	0.031	0.0007	0.00205	66.8	310	7.21	20.5
1/2 Ton Pickup	1	40	150	0.00668	0.031	0.0007	0.00205	40.08	186	4.326	12.3
								346.291	**1607.04**	**37.3766**	**106.272**

Appendix C-1. Air Quality Conformity Analysis

Calculation Procedures for Determining Air Emissions

In order to evaluate the applicability of this Clean Air Act statute, annual air emissions were calculated for each of the three mitigation tasks. Air emissions were estimated based on equipment types, engine sizes, and estimated hours of operation. The calculations made were of a "screening" nature using factors provided for diesel engines in the USEPA AP-42 Emission Factor document (EPA 1995). The emission factors used were expressed in lb/hp-hr. The factors utilized were as follows:

- 0.00668 lb CO/hp-hr
- 0.031 lb NOx/hp-hr
- 0.00072 lb PM10/hp-hr
- 0.00205 lb SO2/hp-hr

Emissions were calculated by simply multiplying the usage hours by the equipment horsepower and then by emission factor. To be complete, emissions were calculated for the four primary internal combustion engine related air pollutants. Total project emissions were calculated by adding the number of specific projects anticipated over a given 12-month period. In order to be conservative, all equipment was assumed to be at 100% load.

As mentioned in the air quality section of the report, the only regulatory program that would regulate such activities is a provision under the Clean Air Act referred to as General Conformity. General Conformity applies if the total of direct and indirect emissions from a proposed Federal Action in a nonattainment area (such as Barnstable County) exceed the thresholds specified in §93.153(b)(1). For this region, the only pollutant of concern would be NOx. The annual threshold established for emissions of NOx is 100 tpy.

Tables C-1 through C-3 present the emissions associated with each of the three task areas. Table C-4 provides the roll-up of annual emissions from all tasks and individual projects. NOx emissions were determined to be low. Assuming 4 stormwater projects, 4 salt marsh projects, and 3 fish passage project per year, the resulting NOx emissions would be approximately 9 tons/year. Obviously, at this level of activity, the General Conformity regulation would not apply to the Cape Cod project. In fact, the individual annual project activity could increase by 10-fold and still remain under the NOx significance threshold.

References

U.S. Environmental Protection Agency. 1995. *Compilation of Air Pollutant Emission Factors (AP-42).* Volume I, Fifth Edition. January.

Table C-3 - Fish Passage Construction - Emissions Calculations

				Emission Factor (lb/hp-hr)				Emissions (lbs)			
Equipment	**Quantity**	**Use (hrs)**	**Horsepower**	**CO**	**NOX**	**PM10**	**SO2**	**CO**	**NOX**	**PM10**	**SO2**
Excavator (med-lg)	1	32	345	0.00668	0.031	0.0007	0.00205	73.7472	342.24	7.728	22.632
10-wheel truck	1	32	350	0.00668	0.031	0.0007	0.00205	74.816	347.2	7.84	22.96
Loader	1	32	315	0.00668	0.031	0.0007	0.00205	67.3344	312.48	7.056	20.664
Medium Capacity Pumps	2	32	30	0.00668	0.031	0.0007	0.00205	12.8256	59.52	0.672	1.968
Pickup Truck	1	32	150	0.00668	0.031	0.0007	0.00205	32.064	148.8	3.36	9.84
								260.787	**1210.24**	**26.656**	**78.064**

Table C-4 - Emissions Summary

Stormwater				
	Emissions Per Project (lbs)	**Projects Per Year**	**Emissions Per Year (lbs)**	**Emissions Per Year (tons)**
CO	458	4	1832	0.916
NOX	2200	4	8799	4.400
PM10	50	4	199	0.099
SO2	73	4	291	0.145
Salt Marsh				
	Emissions Per Project (lbs)	**Projects Per Year**	**Emissions Per Year (lbs)**	**Emissions Per Year (tons)**
CO	346	4	1385	0.693
NOX	1607	4	6428	3.214
PM10	36	4	145	0.073
SO2	106	4	425	0.213
Fish Passages				
	Emissions Per Project (lbs)	**Projects Per Year**	**Emissions Per Year (lbs)**	**Emissions Per Year (tons)**
CO	261	3	782	0.391
NOX	1210	3	3631	1.815
PM10	27	3	80	0.040
SO2	78	3	234	0.117
Total				
	Emissions Per Year (tons)		**Threshold Value (tons/year)***	
NOX	9.429		100	

* http://www.epa.gov/air/genconform/deminimis.htm

Appendix C-2. Massachusetts Category 5 Waters, "Waters Requiring a TMDL"

NAME	SEGMENT ID	DESCRIPTION	SIZE	POLLUTANT NEEDING TMDL [EPA APPROVAL DATE/DOCUMENT CONTROL NUMBER]
Cape Cod				
Ashumet Pond (96004)	MA96004_2004	Mashpee	203 acres	-Metals
Barnstable Harbor (96901)	MA96-01_2004	From the mouths of Scorton and Spring Creeks east to an imaginary line drawn from Beach Point to the western edge of the Mill Creek estuary, Barnstable.	3.3 sq mi	-Pathogens
Bass River (9662200)	MA96-12_2004	Route 6 to mouth at Nantucket Sound, Dennis/Yarmouth.	0.67 sq mi	-Pathogens
Boat Meadow River (9661450)	MA96-15_2004	Headwaters east of old railway grade to mouth at Cape Cod Bay, Eastham.	0.04 sq mi	-Pathogens
Bournes Pond (96925)	MA96-57_2004	west of Central Avenue, to Vineyard Sound, Falmouth.	0.24 sq mi	-Nutrients -Pathogens
Bucks Creek (9662025)	MA96-44_2004	Outlet from Harding Beach Pond (locally known as Sulfur Springs) to confluence with Cockle Cove, Chatham.	0.02 sq mi	-Pathogens
Bumps River (9662600)	MA96-02_2004	From outlet of pond at Bumps River Road through Scudder Bay to South Main Street bridge (confluence with Centerville River), Barnstable.	0.07 sq mi	-Pathogens
Centerville River (9662575)	MA96-04_2004	From headwaters in wetland west of Strawberry Hill Road to confluence with Centerville Harbor, including East Bay, Barnstable.	0.25 sq mi	-Pathogens
Chase Garden Creek (9661225)	MA96-35_2004	Source west of Route 6A, Dennis to mouth at Cape Cod Bay, Dennis/Yarmouth.	0.16 sq mi	-Pathogens
Cotuit Bay (96926)	MA96-63_2004	From North Bay at Point Isabella oceanward to a line extended along Oyster Harbors Beach, Barnstable.	0.85 sq mi	-Nutrients -Pathogens
Crows Pond (96049)	MA96-47_2004	To Bassing Harbor, Chatham.	0.19 sq mi	-Nutrients
Crystal Lake (96050)	MA96050_2004	Orleans	33.1 acres	-Organic enrichment/Low DO
Duck Creek (9661625)	MA96-32_2004	Source west of Route 6 to Wellfleet Harbor (at a line from Shirttail Point to Taylor Road), Wellfleet.	0.15 sq mi	-Pathogens
Falmouth Inner Harbor (96908)	MA96-17_2004	Waters included north of Inner Falmouth Harbor Light, Falmouth.	0.05 sq mi	-Pathogens
Frost Fish Creek (9661900)	MA96-49_2004	Outlet from cranberry bog northwest of Stony Hill Road to confluence with Ryder Cove, Chatham.	0.02 sq mi	-Nutrients -Pathogens
Great Harbor (96909)	MA96-18_2004	The waters north of an imaginary line drawn east from Penzance Point to Devils Foot Island and southeast from Devils Foot Island to Juniper Point (excludes Eel Pond), Falmouth.	0.31 sq mi	-Pathogens
Great Pond (96115)	MA96115_2004	Eastham	109 acres	-Nutrients -Organic enrichment/Low DO
Great Pond (96922)	MA96-54_2004	From inlet of Coonamessett River to Vineyard Sound (excluding Perch Pond), Falmouth	0.40 sq mi	-Nutrients -Pathogens
Great River (9662825)	MA96-60_2004	From inlet of Abigails Brook to Waquoit Bay (excluding Jehu Pond), Mashpee.	0.17 sq mi	-Nutrients
Green Pond (96923)	MA96-55_2004	east of Acapesket Road, outlet to Vineyard Sound, Falmouth.	0.21 sq mi	-Nutrients -Pathogens
Hamblin Pond (96126)	MA96126_2004	Barnstable	113 acres	-Metals
Hamblin Pond (96127)	MA96-58_2004	From inlet of Red Brook to outlet of Little River and inlet/outlet of Waquoit Bay west of Meadow Neck Road, Falmouth/Mashpee.	0.19 sq mi	-Nutrients -Pathogens

Appendix C-2. Massachusetts Category 5 Waters, "Waters Requiring a TMDL"

NAME	SEGMENT ID	DESCRIPTION	SIZE	POLLUTANT NEEDING TMDL [EPA APPROVAL DATE/DOCUMENT CONTROL NUMBER]
Harding Beach Pond (96128)	MA96-43_2004	locally known as Sulfur Springs (northeast of Bucks Creek), Chatham.	0.07 sq mi	-Pathogens
Herring River (9661650)	MA96-33_2004	South of High Toss Road to Wellfleet Harbor (at an imaginary line drawn due north from the eastern tip of Great Island to the opposite shore), Wellfleet.	0.39 sq mi	-Pathogens
Herring River (9661650)	MA96-67_2004	From outlet of Herring Pond to south of High Toss Road, Wellfleet.	3.6 miles	-Metals -pH
Herring River (9662150)	MA96-22_2004	Outlet of Herring River Reservoir west of Bells Neck Road to mouth at Nantucket Sound, Harwich.	0.07 sq mi	-Pathogens
Hyannis Harbor (96903)	MA96-05_2004	The waters from the shoreline to an imaginary line drawn from the light at the end of Hyannis breakwater to the point west of Dunbar Point, Barnstable.	0.68 sq mi	-Pathogens
Jehu Pond (96153)	MA96-59_2004	Mashpee.	0.09 sq mi	-Nutrients
Johns Pond (96157)	MA96157_2004	Mashpee	317 acres	-Metals
Lewis Bay (96917)	MA96-36_2004	Includes portion of Pine Island Creek and Uncle Roberts Cove to confluence with Nantucket Sound, Barnstable/Yarmouth (excluding Hyannis Inner Harbor, Barnstable/Yarmouth and Mill Creek, Yarmouth).	1.8 sq mi	-Pathogens
Little Harbor (96910)	MA96-19_2004	The waters north of an imaginary line drawn from Juniper Point east to Nobska Beach, Falmouth.	0.07 sq mi	-Pathogens
Little Namskaket Creek (9661400)	MA96-26_2004	Source to mouth at Cape Cod Bay, Orleans.	0.01 sq mi	-Pathogens
Little Pond (96924)	MA96-56_2004	west of Vista Boulevard, outlet to Vineyard Sound, Falmouth.	0.07 sq mi	-Nutrients
Little River (9662875)	MA96-61_2004	From outlet of Hamblin Pond to the Great River, Mashpee.	0.03 sq mi	-Nutrients -Pathogens
Long Pond (96183)	MA96183_2004	Brewster/Harwich	715 acres	-Organic enrichment/Low DO
Lower Mill Pond (96188)	MA96188_2004	Brewster	44.2 acres	-Nutrients -Noxious aquatic plants -Turbidity
Maraspin Creek (9661100)	MA96-06_2004	From headwaters just south of Route 6A to confluence with Barnstable Harbor at Blish Point, Barnstable.	0.03 sq mi	-Pathogens
Mashpee Pond (96194)	MA96194_2004	Mashpee/Sandwich	375 acres	-Metals
Mashpee River (9662775)	MA96-24_2004	Quinaquisset Avenue to mouth at Shoestring Bay (formerly to mouth at Popponesset Bay), Mashpee.	0.09 sq mi	-Nutrients -Pathogens
Mill Creek (9661125)	MA96-37_2004	From Keveny Lane/Mill Lane north to confluence with Cape Cod Bay, Barnstable/Yarmouth.	0.05 sq mi	-Pathogens
Mill Creek (9662075)	MA96-41_2004	Outlet of Taylors Pond to confluence with Cockle Cove, Chatham.	0.03 sq mi	-Pathogens
Mill Pond (96203)	MA96-52_2004	including Little Mill Pond (PALIS # 96174), Chatham.	0.06 sq mi	-Nutrients
Muddy Creek (9661875)	MA96-51_2004	Outlet of small unnamed pond south of Countryside Drive and north-northeast of Old Queen Anne Road to mouth at Pleasant Bay, Chatham.	0.05 sq mi	-Pathogens
Namskaket Creek (9661375)	MA96-27_2004	From outlet of unnamed pond north of Route 6A in Orleans to mouth at Cape Cod Bay, Brewster/Orleans.	0.02 sq mi	-Pathogens

Appendix C-2. Massachusetts Category 5 Waters, "Waters Requiring a TMDL"

NAME	SEGMENT ID	DESCRIPTION	SIZE	POLLUTANT NEEDING TMDL [EPA APPROVAL DATE/DOCUMENT CONTROL NUMBER]
North Bay (96928)	MA96-66_2004	From Fox Island to just south of Bridge Street and separated from Cotuit Bay at a line from Point Isabella southward to the opposite shore (including Dam Pond), Barnstable.	0.47 sq mi	-Nutrients -Pathogens
Oyster Pond (96234)	MA96-45_2004	Including Stetson Cove, Chatham.	0.21 sq mi	-Nutrients -Pathogens
Oyster Pond (96235)	MA96-62_2004	east of Fells Road, Falmouth.	0.10 sq mi	-Pathogens
Oyster Pond River (9662000)	MA96-46_2004	Outlet of Oyster Pond to confluence with Stage Harbor, Chatham.	0.14 sq mi	-Nutrients -Pathogens
Pamet River (9661725)	MA96-31_2004	Route 6 to mouth at Cape Cod Bay (including Pamet Harbor), Truro.	0.14 sq mi	-Pathogens
Parkers River (9662325)	MA96-38_2004	Outlet Seine Pond to mouth at Nantucket Sound, Yarmouth.	0.04 sq mi	-Pathogens
Perch Pond (96921)	MA96-53_2004	Connects to northwest end of Great Pond, west of Keechipam Way, Falmouth.	0.03 sq mi	-Pathogens
Peters Pond (96244)	MA96244_2004	Sandwich	123 acres	-Metals
Popponesset Bay (96918)	MA96-40_2004	From line connecting Ryefield Point, Barnstable and Punkhorn Point, Mashpee to inlet of Nantucket Sound (including Ockway Bay and Pinquickset Cove), Mashpee/Barnstable.	0.67 sq mi	-Nutrients
Popponesset Creek (9662800)	MA96-39_2004	All waters west of Popponesset Island (from Popponesset Island Road bridge at the north to a line extended from the southeastern most point of the island southerly to Popponesset Beach), Mashpee.	0.04 sq mi	-Pathogens
Prince Cove (96904)	MA96-07_2004	Includes adjacent unnamed cove east of Prince Cove to North Bay at Fox Island, Barnstable.	0.14 sq mi	-Nutrients -Pathogens
Provincetown Harbor (96915)	MA96-29_2004	The waters northwest of an imaginary line drawn northeasterly from the tip of Long Point, Provincetown to Beach Point Beach, Truro.	4.3 sq mi	-Pathogens
Quashnet River (9662925)	MA96-20_2004	Just south of Route 28 to mouth at Waquoit Bay, Falmouth. Also known as Moonakis River.	0.07 sq mi	-Nutrients -Organic enrichment/Low DO -Pathogens
Quivett Creek (9661325)	MA96-09_2004	Outlet of unnamed pond just south of Route 6A to the mouth at Cape Cod Bay, Brewster/Dennis.	0.03 sq mi	-Pathogens
Red Lily Pond (96257)	MA96257_2004	Barnstable	3.8 acres	-Nutrients -Pathogens -Noxious aquatic plants
Rock Harbor Creek (9661425)	MA96-16_2004	Outlet Cedar Pond, Orleans to mouth at Cape Cod Bay, Eastham/Orleans.	0.02 sq mi	-Pathogens
Ryder Cove (96920)	MA96-50_2004	Chatham.	0.17 sq mi	-Nutrients -Pathogens
Ryder Pond (96268)	MA96268_2004	Truro	18.0 acres	-Nutrients -Organic enrichment/Low DO
Santuit Pond (96277)	MA96277_2004	Mashpee	164 acres	-Nutrients -Noxious aquatic plants
Saquatucket Harbor (96913)	MA96-23_2004	South of Route 28 to confluence with Nantucket Sound, Harwich.	0.02 sq mi	-Pathogens

Appendix C-2. Massachusetts Category 5 Waters, "Waters Requiring a TMDL"

NAME	SEGMENT ID	DESCRIPTION	SIZE	POLLUTANT NEEDING TMDL [EPA APPROVAL DATE/DOCUMENT CONTROL NUMBER]
Scorton Creek (9660800)	MA96-30_2004	Jones Lane to mouth at Cape Cod Bay, Sandwich (including several tributaries).	0.07 sq mi	-Pathogens
Seapuit River (9662650)	MA96-64_2004	south of Osterville Grand Island to Cotuit Bay and West Bay, Barnstable.	0.06 sq mi	-Pathogens
Sesuit Creek (9661300)	MA96-13_2004	From Route 6A to mouth at Cape Cod Bay, Dennis.	0.06 sq mi	-Pathogens
Sheep Pond (96289)	MA96289_2004	Brewster	138 acres	-Metals -Organic enrichment/Low DO
Shoestring Bay (96905)	MA96-08_2004	Quinaquisset Avenue to Popponesset Bay (line from Ryefield Point, Barnstable to Punkhorn Point, Mashpee, including Gooseberry Island), Barnstable/Mashpee.	0.31 sq mi	-Nutrients -Pathogens
Snake Pond (96302)	MA96302_2004	Sandwich	81.1 acres	-Metals
Stage Harbor (96907)	MA96-11_2004	From the outlet of Mill Pond (including Mitchell River) to the confluence with Nantucket Sound at a line from the southernmost point of Harding Beach southeast to the Harding Beach Point , Chatham.	0.58 sq mi	-Nutrients -Pathogens
Swan Pond River (9662175)	MA96-14_2004	Outlet of Swan Pond to confluence with Nantucket Sound, Dennis.	0.04 sq mi	-Pathogens
Taylors Pond (96311)	MA96-42_2004	Chatham.	0.02 sq mi	-Pathogens
Upper Mill Pond (96324)	MA96324_2004	Brewster	247 acres	-Nutrients -Organic enrichment/Low DO -Noxious aquatic plants -Turbidity
Wakeby Pond (96346)	MA96346_2004	Mashpee/Sandwich	353 acres	-Metals
Walkers Pond (96331)	MA96331_2004	Brewster	99.4 acres	-Nutrients -Noxious aquatic plants -Turbidity
Waquoit Bay (96912)	MA96-21_2004	From mouths of Seapit River, Quashnet River (also known as Moonakis River), and Great River to confluence with Vineyard Sound, Falmouth/Mashpee.	1.4 sq mi	-Nutrients -Organic enrichment/Low DO -Pathogens
Wellfleet Harbor (96916)	MA96-34_2004	The waters north of an imaginary line drawn east from the southern tip of Jeremy Point, Wellfleet to Sunken Meadow, Eastham excluding the estuaries of Herring River, Duck Creek, Blackfish Creek, and Fresh Brook, Wellfleet.	8.5 sq mi	-Pathogens
Wequaquet Lake (96333)	MA96333_2004	Barnstable	573 acres	-Metals -(Exotic species*)
West Bay (96927)	MA96-65_2004	south of the Bridge Street bridge to Nantucket Sound including Eel River, Barnstable.	0.52 sq mi	-Nutrients

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
American plaice	Eggs	GOME, GB and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass. Bay to Cape Cod Bay, MA	<12	-32	30 - 90	All year in GOME Dec - June on GB Peaks April & May both	Surface waters	
	Larvae	GOME, GB, Southern NE and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<14	-32	30-130	Between January and August, with peaks in April and May	Surface Waters	
	Juveniles	GOME and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<17	-32	45-150		Bottom habitats with fine-grained sediments or substrate of sand or gravel	(Strong concentrations inside and around 100m isobath in Western GOME; Major Prey: echinoderms, arthropods, annelids)
	Adults	GOME, GB and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<17	(34-20)	45-175		Bottom habitats with fine-grained sediments or a substrate of sand or gravel	
	Spawning Adults	GOME, GB and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<14	-32	<90	March through June	Bottom habitats of all substrate types	

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Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
Atlantic cod	Eggs	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Englishman/ Machias Bay to Blue Hill Bay; Sheepscot R., Casco Bay, Saco Bay, Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<12	32 - 33 (10 - 35)	<110	Begins in fall, peaks in winter and spring	Surface Waters	
	Larvae	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Penobscot Bay; Sheepscot R., Casco Bay, Saco Bay, Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<10	32 - 33	30-70	Spring	Pelagic waters	
	Juveniles	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<20	30 - 35	25 - 75		Bottom habitats with a substrate of cobble or gravel	HAPC - An area approximate of 300sq. nautical miles along the northern edge of GB and the Hague line containing gravel cobble substrate.
	Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<10	(29 - 34)	10-150		Bottom habitats with a substrate of rocks, pebbles, or gravel	(Major prey: fish crustaceans, decapods, amphipods)

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Spawning Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and following estuaries: Englishman/ Machias Bay to Blue Hill Bay; Sheepscot R., Mass Bay, Boston Harbor, Cape Cod Bay, MA	<10	(10 - 35)	10-150	spawn during fall, winter, and early spring	Bottom habitats with a substrate of smooth sand, rocks, pebbles, or gravel	
Atlantic halibut	Eggs	GOME, GB	7-Apr	<35	<700	Between late fall and early spring, peak Nov and Dec.	Pelagic waters to the sea floor	
	Larvae	GOME, GB		30 - 35			Surface waters	
	Juveniles	GOME, GB	>2		20 - 60		Bottom habitats with a substrate of sand, gravel, or clay	
	Adults	GOME, GB	<13.6	30.4-35.3	100-700		Bottom habitats with a substrate of sand, gravel, or clay	(Major prey: crustaceans, fish, cod, squid)
	Spawning Adults	GOME, GB	<7	<35	<700	Between late fall and early spring, peaks in Nov. and Dec.	Bottom habitats with a substrate of soft mud, clay, sand, or gravel; rough or rocky bottom locations along slopes of the outer banks	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
Atlantic herring	Eggs	GOME, GB and following estuaries: Englishman/ Machias Bay, Casco Bay,& Cape Cod Bay	<15	32 - 33	20 - 80	July through November	Bottom habitats with a substrate of gravel, sand, cobble, shell fragments & aquatic macrophytes. .	Eggs adhere to bottom forming extensive beds. Eggs most often found in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots (Egg beds can range from 4500 to 10,000 Km^2 on GB. Eggs susceptible to suffocation from high densities and siltation)
	Larvae	GOME, GB, Southern NE and following estuaries: Passamaquoddy Bay to Cape Cod Bay, Narragansett Bay, & Hudson R./ Raritan Bay	<16	32	50 - 90	Between August and April, peaks from Sept. - Nov.	Pelagic waters	
	Juveniles	GOME, GB, Southern NE and Middle Atlantic south to Cape Hatteras and following estuaries: Passamaquoddy Bay to Cape Cod Bay; Buzzards Bay to Long Island Sound; Gardiners Bay to Delaware Bay	<10	26 - 32	15-135		Pelagic waters and bottom habitats	
	Adults	GOME, GB, southern NE and middle Atlantic south to Cape Hatteras and following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Cape Cod Bay; Buzzards Bay to Long Island Sound; Gardiners Bay to Delaware Bay; & Chesapeake Bay	<10	>28	20-130		Pelagic waters and bottom habitats	(major prey: zooplankton)

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Spawning Adults	GOME, GB, southern NE and middle Atlantic south to Delaware Bay and Englishman/ Machias Bay Estuary	<15	32 - 33	20 - 80	July through November	Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, also on aquatic macrophytes	Herring eggs are spawned in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots
Atlantic salmon	Eggs	Rivers from CT to Maine: Connecticut, Pawcatuck, Merrimack, Cocheco, Saco, Androscoggin, Presumpscot, Kennebec,	<10	Fresh water	30-31 cm	Between October and April	Bottom habitats with a gravel or cobble riffle (redd) above or below a pool in rivers	need clean well-oxygenated freshwater
	Larvae	Sheepscot, Ducktrap, Union, Penobscot, Narraguagus, Machias, East Machias, Pleasant, St. Croix, Denny's, Passagassawaukeag Aroostook, Lamprey, Boyden, Orland Rivers, and the Turk, Hobart & Patten Streams; and the following estuaries for juveniles and adults: Passamaquoddy Bay to Muscongus Bay; Casco Bay to Wells Harbor; Mass Bay, Long Island Sound, Gardiners Bay to Great South Bay.	<10	Fresh water		Between March and June for alevins/fry	Bottom habitats with a gravel or cobble riffle (redd) above or below a pool in rivers	
	Juveniles	Sheepscot, Ducktrap, Union, Penobscot, Narraguagus, Machias, East Machias, Pleasant, St. Croix, Denny's, Passagassawaukeag Aroostook, Lamprey, Boyden, Orland Rivers, and the Turk, Hobart & Patten Streams; and the following estuaries for juveniles and adults: Passamaquoddy Bay to Muscongus Bay; Casco Bay to Wells Harbor; Mass Bay, Long Island Sound, Gardiners Bay to Great South Bay.	<25	Fresh water to Oceanic	10- 61 cm		Bottom habitats of shallow gravel/cobble riffles interspersed with deeper riffles and pools in rivers and estuaries Water velocities between 30 - 92cm/sec	As they grow, parr transform into smolts. Atlantic salmon smolts require access downstream to the ocean. Upon entering the ocean, post-smolts become pelagic and range from Long Island Sound north to the Labrador Sea.

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Adults	All aquatic habitats in the watersheds of the above listed rivers, including all tributaries to the extent that they are currently or were historically accessible for salmon migration.	<22.8	Fresh water to Oceanic			Oceanic adult Atlantic salmon are primarily pelagic and range from waters of the continental shelf off southern NE north throughout the GOME Dissolved oxygen above 5ppm for migratory pathway.	HAPC - Eleven rivers in Maine includes: St. Croix, Denny's, East Machias, Machias, Pleasant, Turk stream, Narraguagus, Penobscot, Ducktrap, Sheepscot, and Kennebec River.
	Spawning Adults		<10	Fresh water	30- 61 cm	October and November	Bottom habitats with a gravel or cobble riffle (redd) above or below a pool in rivers	Water velocity around 61cm per second
Atlantic sea scallop	Eggs	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Mass Bay, and Cape Cod Bay	<17			May through October Peaks in May and June in middle Atlantic area, and in Sept. and Oct. on GB and GOME	Bottom habitats	Eggs remain on sea floor until they develop into the first free-swimming larval stage.
	Larvae	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Mass Bay, and Cape Cod Bay	<18	16.9 - 30			Pelagic waters and bottom habitats with a substrate of gravelly sand, shell fragments, pebbles, or on various red algae, hydroids, amphipod tubes and bryozoans	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Juveniles	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	<15		18-110		Bottom habitats with a substrate of cobble, shells, and silt	(prey: filter feeders on phytoplankton; preferred substrates are associated with low concentrations of inorganics for optimal feeding)
	Adults	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	<21	>16.5	18-110		Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand	
	Spawning Adults	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Mass Bay, and Cape Cod Bay	<16	>16.5	18-110	May through October, peaks in May and June in middle Atlantic area, and in Sept. and Oct. on GB and in GOME	Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand	
Haddock	Eggs	GB southwest to Nantucket Shoals and coastal areas of GOME and the following estuaries: Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<10	34 - 36	50 - 90	March to May, peak in April	Surface waters	
	Larvae	GB southwest to the middle Atlantic south to Delaware Bay and the following estuaries: Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay, and Narragansett Bay	<14	34 - 36	30 - 90	January to July, peak in April and May	Surface waters	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Juveniles	GB, GOME, middle Atlantic south to Delaware Bay	<11	31.5 - 34	35-100		Bottom habitats with a substrate of pebble gravel	
	Adults	GB and eastern side of Nantucket Shoals, throughout GOME, *additional area of Nantucket Shoals, and Great South Channel	<7	31.5 - 35	40-150		Bottom habitats with a substrate of broken ground, pebbles, smooth hard sand, and smooth areas between rocky patches	*additional area more accurately reflects historic patterns of distribution and abundance
	Spawning Adults	GB, Nantucket Shoals, Great South Channel, throughout GOME	<6	31.5 - 34	40-150	January to June	Bottom habitats with a substrate of pebble gravel or gravelly sand	
Monkfish (Goosefish)	Eggs	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras, North Carolina	<18		15- 1000	March to September	Surface waters	(eggs contained in long mucus veils that float near or at the surface)
	Larvae	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras, North Carolina	15		25-1000	March to September	Pelagic waters	
	Juveniles	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, all areas of GOME	<13	29.9-36.7	25-200		Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Adults	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, outer perimeter of GB, all areas of GOME	<15	29.9-36.7	25-200		Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud	(Major prey: fish, shrimp, squid, crustaceans, mollusks)
	Spawning Adults	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, outer perimeter of GB, all areas of GOME	<13	29.9-36.7	25-200	February to August	Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud	
Ocean pout	Eggs	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay and Cape Cod Bay	<10	32-34	<50	Late fall and winter	Bottom habitats, generally hard bottom sheltered nests, holes, or crevices where they are guarded by parents	(eggs are laid in gelatinous masses and take 2-3 months to develop
	Larvae	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay and Cape Cod Bay	<10	>25	<50	Late fall to spring	Bottom habitats in close proximity to hard bottom nesting areas	
	Juveniles	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor and Cape Cod Bay	<14	>25	<80		Bottom habitats, often smooth bottom near rocks or algae	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor and Cape Cod Bay	<15	32 - 34	<110		Bottom habitats. (Dig depressions in soft sediments which are then used by other species)	(major prey: mollusks, crustaceans, echinoderms, sand dollars)
	Spawning Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, and Cape Cod Bay	<10	32 - 34	<50	Late summer to early winter, peaks in Sept. and October	Bottom habitats with a hard bottom substrate, including artificial reefs and shipwrecks	(internal fertilization)
Offshore hake	Eggs	Outer continental shelf of GB and southern NE south to Cape Hatteras, North Carolina	<20		<1250	Observed all year and primarily collected at depths from 110 - 270m	Pelagic waters	
	Larvae	Outer continental shelf of GB and southern NE south to Chesapeake Bay	<19		<1250	Observed all year and primarily collected at depths from 70 - 130m	Pelagic waters	
	Juveniles	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	<12		170- 350		Bottom habitats	
	Adults	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	<12		150 - 380		Bottom habitats	(major prey: fish - cannibalistic, shrimp, other crustaceans)
	Spawning Adults	Outer continental shelf of GB and southern NE south to the Middle Atlantic Bight	<12		330 - 550	Spawn all throughout the year	Bottom habitats	
Pollock	Eggs	GOME, GB and the following estuaries: Great Bay to Boston Harbor	<17	32 - 32.8	30-270	October to June, peaks in November to February	Pelagic waters	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Larvae	GOME, GB and the following estuaries: Passamaquoddy Bay, Sheepscot R., Great Bay to Cape Cod Bay	<17		10-250	September to July, peaks from Dec. to February	Pelagic waters	(migrate inshore as they grow)
	Juveniles	GOME, GB and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay to Waquoit Bay; Long Island Sound, Great South Bay	<18	29 - 32	0 - 250		Bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks	(Intertidal zone may be important nursery area. Juveniles present in shallow intertidal zone at all tide stages throughout summer. Subtidal marsh creeks such as Little Egg Harbor, NJ are also seasonally important as nursery)
	Adults	GOME, GB, southern NE, and middle Atlantic south to New Jersey and the following estuaries: Passamaquoddy Bay, Damariscotta R., Mass Bay, Cape Cod Bay, Long Island Sound	<14	31 - 34	15-365		Hard bottom habitats including artificial reefs	(major prey: crustaceans, fish, mollusks)
	Spawning Adults	GOME, southern NE, and middle Atlantic south to New Jersey includes Mass Bay	<8	32 - 32.8	15-365	September to April, peaks December to February	Bottom habitats with a substrate of hard, stony, or rocky bottom includes artificial reefs	
Red hake	Eggs	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras	<10	< 25		May to November, peaks in June and July	Surface waters of inner continental shelf	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Larvae	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and following estuaries: Sheepscot R., Mass Bay to Cape Cod Bay; Buzzards Bay, Narragansett Bay & Hudson R./ Raritan Bay	<19	>0.5	<200	May to December, peaks in Sept. and October	Surface waters	(newly settled larvae need shelter, including live sea scallps, also use floating or mid-water objects for shelter)
	Juveniles	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan Bay, & Chesapeake Bay	<16	31 - 33	<100		Bottom habitats with substrate of shell fragments, including areas with an abundance of live scallops	
	Adults	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan, Delaware Bay, & Chesapeake Bay	<12	33 - 34	10-130		Bottom habitats in depressions with a substrate of sand and mud	(major prey: fish and crustaceans)
	Spawning Adults	GOME, southern edge of GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and following estuaries: Sheepscott R., Mass Bay, Cape Cod Bay, Buzzards Bay, & Narragansett Bay	<10	>25	<100	May to November, peaks in June and July	Bottom habitats in depressions with a substrate of sand and mud	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
Redfish	Eggs	No EFH identification or description for this life history stage						Redfish are ovoviviparous (live bearers)
	Larvae	GOME, southern GB	<15		50-270	March to October, peak in August	Pelagic waters	
	Juveniles	GOME, southern edge of GB	<13	31 - 34	25-400		Bottom habitats with a substrate of silt, mud, or hard bottom	
	Adults	GOME, southern edge of GB	<13	31 - 34	50-350		Bottom habitats with a substrate of silt, mud, or hard bottom	
	Spawning Adults	GOME, southern edge of GB	<13	31 - 34	5 -350	April to August	Bottom habitats with a substrate of silt, mud, or hard bottom	copulation occurs between Oct-Jan. Fertilization is delayed until Feb-Apr
White hake	Eggs	GOME, GB, southern NE and the following estuaries: Great Bay to Cape Cod Bay				August to September	Surface waters	
	Larvae	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Mass Bay, to Cape Cod Bay				May -mid-Atlantic area Aug. & Sept. - GOME, GB area	Pelagic waters	
	Juveniles	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Cape Cod Bay	<19		5 - 225	May-Sep - pelagic	Pelagic stage - pelagic waters; Dermersal stage - Bottom habitat with seagrass beds or substrate of mud or fine-grained sand	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Adults	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Cape Cod Bay	<14		5 - 325		Bottom habitats with substrate of mud or fine-grained sand	(major prey: small fish, shrimp and other crustaceans)
	Spawning Adults	GOME, southern edge of GB, southern NE to middle Atlantic	<14		5 - 325	April to May - southern part of range; August - Sept.-northern part of range	Bottom habitats with substrate of mud or fine-grained sand in deep water.	
Whiting (Silver hake)	Eggs	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Merrimack R. to Cape Cod Bay	<20		50-150	All year, peaks June to October	Surface waters	
	Larvae	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Mass Bay to Cape Cod Bay	<20		50-130	All year, peaks July to September	Surface waters	
	Juveniles	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass Bay to Cape Cod Bay	<21	>20	20-270		Bottom habitats of all substrate types	
	Adults	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass Bay to Cape Cod Bay	<22		30-325		Bottom habitats of all substrate types	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Spawning Adults	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Mass Bay and Cape Cod Bay	<13		30-325		Bottom habitats of all substrate types	
Windowpane flounder	Eggs	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Delaware Inland Bays	<20		<70	February to November, peaks May and October in middle Atlantic July - August on GB	Surface waters	
	Larvae	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Delaware Inland Bays	<20		<70	February to November, peaks May and October in middle Atlantic July - August on GB	Pelagic waters	
	Juveniles	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Chesapeake Bay	<25	5.5 - 36	1 - 100		Bottom habitats with substrate of mud or fine grained sand	
	Adults	GOME, GB, southern NE, middle Atlantic south to Virginia - NC border and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Chesapeake Bay	<26.8	5.5 - 36	<70		Bottom habitats with substrate of mud or fine grained sand	(major prey: polychaetes, small crustaceans, mysids, small fish)

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Spawning Adults	GOME, GB, southern NE, middle Atlantic south to Virginia -NC border and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Delaware Inland Bays	<21	5.5 - 36	<70	February - December, peak in May in middle Atlantic	Bottom habitats with substrate of mud or fine grained sand	
Winter flounder	Eggs	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Delaware Inland Bays	<10	30-Oct	<5	February to June, peak in April on GB	Bottom habitats with a substrate of sand, muddy sand, mud, and gravel	* On GB, eggs are generally found in water temp < 8EC, and < 90m deep.
	Larvae	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Delaware Inland Bays	<15	30-Apr	<6	March to July, peaks in April and May on GB	Pelagic and bottom waters	* On GB, larvae are generally found in water temp < 8EC, and < 90m deep.
	Juveniles (age 1+)	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	<25	30-Oct	Jan-50		Bottom habitats with a substrate of mud or fine grained sand	* Young-of-year exist where water temp <28, depths 0.1 - 10m, salinities 5 - 33 (major prey: amphipods, copepods, polychaetes, bivalve siphons)
	Adults	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	<25	15 - 33	1 - 100		Bottom habitats including estuaries with substrate of mud, sand, gravel	(major prey: amphipods, polychaetes, bivalve siphons, crustaceans)

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Spawning Adults	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Delaware Inland Bays	<15	5.5 - 36	<6*	February to June	Bottom habitats including estuaries with substrate of mud, sand, gravel	*except on GB where they spawn as deep as 80m
Witch flounder	Eggs	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras	<13	High	Deep	March to October	Surface waters	
	Larvae	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras	<13	High	Deep	March to November, peaks in May - July	Surface waters to 250m	
	Juveniles	GOME, outer continental shelf from GB south to Cape Hatteras	<13	34 - 36	50-450 to 1500m		Bottom habitats with fine-grained substrate	(the upper slope is nursery area; major prey: crustaceans, polychaetes, mollusks)
	Adults	GOME, outer continental shelf from GB south to Chesapeake Bay	<13	32 - 36	25-300		Bottom habitats with fine-grained substrate	(major prey: polychaetes, echinoderms, crustaceans, mollusks, squid)
	Spawning Adults	GOME, outer continental shelf from GB south to Chesapeake Bay	<15	32 - 36	25-360	March to November, peaks in May-August	Bottom habitats with fine-grained substrate	
Yellowtail flounder	Eggs	GB, Mass Bay, Cape Cod Bay, southern NE continental shelf south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay to Cape Cod Bay	<15	32.4 -33.5	30 - 90	Mid-March to July, peaks in April to June in southern NE	Surface waters	

Appendix C-3. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Larvae	GB, Mass Bay, Cape Cod Bay, southern NE continental shelf, middle Atlantic south to Chesapeake Bay and the following estuaries: Passamaquoddy Bay to Cape Cod Bay	<17	32.4 -33.5	Oct-90	March to April in New York bight; May to July in south NE and southeastern GB	Surface waters	(largely an oceanic nursery)
	Juveniles	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass Bay to Cape Cod Bay	<15	32.4 -33.5	20 - 50		Bottom habitats with substrate of sand or sand and mud	
	Adults	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass Bay to Cape Cod Bay	<15	32.4 -33.5	20 - 50		Bottom habitats with substrate of sand or sand and mud	(major prey: annelids, arthropods, mollusks)
	Spawning Adults	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Mass Bay to Cape Cod Bay	<17	32.4 -33.5	10-125		Bottom habitats with substrate of sand or sand and mud	

Source: NOAA 2006

APPENDIX C-4. ESSENTIAL FISH HABITAT IMPACT ASSESSMENT

Essential Fish Habitat Programmatic Consultation between the National Marine Fisheries Service, Northeast Regional Office (New England/Mid-Atlantic) and Natural Resources Conservation Service, Cape Cod Water Resource Restoration Project

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) strengthened the ability of the National Marine Fisheries Service (NMFS) and the Councils to protect and conserve the habitat of marine, estuarine, and anadromous fish, mollusks, and crustaceans. This habitat is termed essential fish habitat (EFH). EFH is defined to include "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA 2006). The Magnuson-Stevens Act requires Councils to describe and identify the essential habitat for managed species, minimize adverse effects on EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH.

Purpose

Under Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), Federal agencies are required to consult with the Secretary of Commerce on any action that may adversely affect EFH. Consultation can be addressed programmatically to broadly consider as many adverse effects as possible through programmatic EFH conservation recommendations.

The programmatic consultation applies to the Natural Resources Conservation Service (NRCS) watershed plan for Cape Cod to restore salt marshes, restore fish passage on anadromous fish runs, and restore and protect water quality at shellfish beds by treating stormwater runoff.

Project Description

NRCS developed the Cape Cod Water Resources Restoration Project (CCWRRP) in coordination with local sponsors. The CCWRRP Project Area is located within Barnstable County, Massachusetts, and includes all of Cape Cod except the Massachusetts Military Reservation. The project area includes all or parts of the 15 communities on Cape Cod (Figure 1). The CCWRRP includes individual projects for:

- Altering stream crossings to improve tidal flushing at locations where a road has reduced the size of the tidal channel and affected upstream salt marsh hydrology;
- Repairing and upgrading fish passages to restore herring runs; and
- Treating the first flush of stormwater runoff to improve water quality in shellfish areas.

NRCS worked with Massachusetts Division of Marine Fisheries (DMF), Massachusetts Office of Coastal Zone Management (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 to be achieved from each project.

This Project is needed because human activity on Cape Cod has degraded its natural resources, including salt marshes, anadromous fish runs, and water quality over shellfish beds. The development of Cape Cod has required the construction of extensive road and railroad networks. Along the coast, culverts or bridges were needed for these networks to cross tidal marshes, and many of the openings through these structures are not large enough to allow adequate tidal flushing. When the culverts or bridges constrict flow, the tidal regime changes, which results in vegetation changes over time, and what was once a thriving salt marsh can become a brackish or fresh water wetland dominated by invasive species. Together with funding from the Massachusetts Office of Coastal Zone Management (CZM), the Cape Cod Commission and the Buzzards Bay Project National Estuary Program identified over 182 sites where salt marshes have been altered by human activity; through this program we expect to improve tidal flushing at 26 sites (Figure 2). Current design guidelines prevent or minimize road or railroad construction from causing the same hydrological restrictions that occurred in the past.

Human activity on Cape Cod has also resulted in damming or diverting streams, causing anadromous fish to lose access to spawning grounds. In addition, water flow may have been altered by cranberry growers and other farmers. Fish ladders and other fish passage facilities have been built to help ensure that fish get access to spawning areas, but these structures deteriorate over time (end of design life), or they may be of obsolete design and need replacement to function properly. The Massachusetts Division of Marine Fisheries (DMF) identified 93 fish passage obstructions on Cape Cod; through this program we expect to restore 24 fish passages on Cape Cod to full function (Figure 3).

Cape Cod's economy depends on good water quality. Shellfishing, a multi-million dollar industry on the Cape, is only allowed in areas with excellent water quality. As land is developed, and more areas are paved, stormwater runoff may become contaminated with nutrients, metals, fertilizers, bacteria, etc. This runoff may carry enough fecal coliform bacteria to affect water quality in shellfishing areas, thus leading to closure of shellfishing areas, or restrictions on the periods when the beds can remain open. DMF and town officials identified over 160 stormwater discharge points into shellfishing areas. By controlling sources of runoff, separating clean water from contamination sources, and capturing and treating the most heavily contaminated runoff through a variety of measures (e.g., infiltration, constructed wetlands), this Project will help to maintain or improve water quality in up to 26 shellfish areas affecting 7,300 acres of shellfish beds (Figure 4). Current laws and regulations require stormwater management for all new developments, which prevents or minimizes new development from causing the same water quality impairments that occurred in the past.

The plan was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16U.S.C 1001-1008) and in accordance with Section 102 (2)(c) of the National Environmental Policy Act of 1969 (NEPA), Public Law 9-190, as amended (42 U.S.C 4321 et. seq.). Responsibility for compliance with NEPA rests with NRCS as the implementing federal agency.

The CCWRRP is in the planning stage. Through the process described in this Plan-EIS, and with considerable support from local and state agencies, NRCS has developed a list of 76 projects that will meet the sponsors' objectives. All of these projects have received a planning-level analysis to ensure that they appear feasible and capable of providing the habitat benefits sought through this areawide Project. When the Project is authorized and funded, the sponsors will propose specific projects to NRCS. NRCS will review each project in more detail to determine the best practice for that site and to verify that the habitat objectives will be achieved.

The Magnuson-Stevens Fishery Conservation and Management Act

Section 303(a)(7) of the Magnuson-Stevens Act (16 U.S.C 1801 et. seq.), requires that Fishery Management Councils include provisions in their fishery management plans that identify and describe EFH, including adverse impacts and conservation and enhancement measures. These provisions are addressed in one generic amendment to Fishery Management Plans (FMPs) in New England.

New England EFH Amendment to Fishery Management Plans (FMP)

The EFH amendments (NEFMC, 1998) represent the New England Fishery Management Council's (New England Council) response to those requirements stated in Section 303(a)(7) of the Magnuson-Stevens Act (16 U.S.C. et. seq.) by serving as a generic amendment to the following FMPS:

- Fishery Management Plan for the Multispecies (groundfish) Fishery in New England
- Fishery Management Plan for the Atlantic Salmon Fishery in New England
- Fishery Management Plan for the Monkfish Fishery in New England/Mid Atlantic
- Fishery Management Plan for the Sea Scallop Fishery in New England
- Fishery Management Plan for the Atlantic Herring Fishery in New England
- Fishery Management Plan for the Small Mesh Multispecies Fishery in New England
- Fishery Management Plan for the Dogfish Fishery in New England/Mid/Atlantic
- Fishery Management Plan for the Red Crab Fishery in New England
- Fishery Management Plan for the Skate Fishery in New England

The generic EFH document amends eight existing and one proposed FMP of the New England Council. EFH is identified and described based on areas where the various life stages of 28 managed species occur. A summary of the EFH for the managed species that may be encountered during the CCWRRP is located in Table 1.

Fishery Management Plans of the Mid-Atlantic Region

Seven FMPs exist in the Mid-Atlantic region. The EFH sections within each amendment are summarized in the EFH Summary which serves as a guide and a cross-reference to facilitate EFH consultations with State and Federal agencies, NMFS and the Council. The EFH Summary reviews the Mid-Atlantic Fishery Management Council's (Mid-Atlantic Council) amendments to the following FMPs:

- Fishery Management Plan for Atlantic Mackerel, Squid & Butterfish Fishery in the Mid-Atlantic
- Fishery Management Plan for the Bluefish Fishery in the Mid-Atlantic
- Fishery Management Plan for the Spiny Dogfish Fishery in the Mid-Atlantic and New England
- Fishery Management Plan for Surf Clam & Ocean Quahog Fishery in the Mid-Atlantic
- Fishery Management Plan for Summer Flounder, Scup & Black Sea Bass Fishery in the Mid-Atlantic
- Fishery Management Plan for Tilefish Fishery in the Mid-Atlantic
- Fishery Management Plan for Monkfish Fishery in the Mid-Atlantic and New England

EFH is identified and described based on areas where various life stages of 13 managed species commonly occur. A summary of the EFH for managed species that may be encountered during the CCWRRP is located in Table 1.

Secretarial FMPs

Under the Magnuson-Stevens Act, the Secretary is empowered to prepare FMPs in the Atlantic and Gulf of Mexico for highly migratory species. FMPs were prepared for the Atlantic swordfish, Atlantic sharks, Atlantic billfish, and the Atlantic bluefin tuna fishery. Under the Magnuson-Stevens Act, federal jurisdiction of EFH for Highly Migratory Species and Atlantic Billfish spans the area between the Canadian border in the north and the Dry Torugas in the south as well as the Gulf of Mexico and the U.S. Caribbean (NMFS 2006).

The following sections address EFH for managed species that may be encountered during the restoration projects of the CCWRRP. Table 1 list the FMPs and species that have EFH designations and are likely to be encountered in the CCWRRP and Table 2 list the FMPs and species that will not likely to be encountered in the CCWRRP.

Table 1. Fishery Management Plans (FMPs) in New England and the Mid-Atlantic, species managed under each FMP and the reasons for *inclusion* under the CCWRRP EIS

Fishery Management Plan	Species	Life Stages					Reason for Inclusion
		Eggs	Larvae	Juveniles	Adults	Spawning Adults	
New England FMP for Multispecies	Pollock (*Pollachius virens*)		S	M,S	S		Found in bays, estuaries, and some rivers
	Red hake (*Urophycis chuss*)		S	M,S	S	S	
	Whiting (*Merluccius bilinearis*)			M,S	S	S	
	Windowpane flounder (*Scopthalmus aquosus*)	M,S	M,S	M,S	M,S	M,S	
	Winter flounder (*Pleuronectes americanus*)	M,S	M,S	M,S	M,S	M,S	
	Yellowtail flounder (*Pleuronectes ferruginea*)	S	S	S	S	S	
New England FMP for Atlantic Herring	Atlantic herring (*Clupea harengus*)	S	S	M,S	M,S		Found in bays, estuaries, and nearshore waters
New England and Mid-Atlantic FMP for Monkfish	Monkfish (*Lophius americanus*)						Nearshore waters, bays, and estuaries
New England FMP for Skate	Winter skate (*Leucoraja ocellata*)		n/a	M,S	M,S		Distributed along coast near tideline to depths exceeding 700m.
	Thorny skate (*Amblyraja radiate*)		n/a	M,S	M,S		
	Little skate (*Leucoraja erinacea*)		n/a	M,S	M,S		

Table 1. Fishery Management Plans (FMPs) in New England and the Mid-Atlantic, species managed under each FMP, and the reasons for *inclusion* under the CCWRRP EIS (Continued)

Fishery Management Plan	Species	Life Stages					Reason for Inclusion
		Eggs	Larvae	Juveniles	Adults	Spawning Adults	
Mid Atlantic FMP for Summer Flounder, Scup, Black Sea Bass	Summer flounder (*Paralicthys dentatus*)						Found in nearshore waters, shellfish and seagrass beds, sandy/shelly areas, and rough areas
	Scup (*Stenotomus chrysops*)			M,S	S		
	Black sea bass (*Centropristus striata*)						
Mid Atlantic FMP for Surf Clam and Ocean Quahog	Surf clam (*Spisula solidissima*)	n/a	n/a				Found from the beach out to approximately 65m deep, vertically in substrate to 1m depth
	Ocean quahog (*Artica islandica*)	n/a	n/a				
Mid-Atlantic FMP for Atlantic Mackerel, Squid and Butterfish	Atlantic mackerel (*Scomber scombrus*)	M,S	M,S	M,S	M,S		Demersal eggs found attached to aquatic vegetation or rocks in shallower water
	Long finned squid (*Loligo pealei*)	n/a	n/a				
	Short finned squid (*Illex illecebrosus*)	n/a	n/a				
	Atlantic butterfish (*Peprilus triacanthus*)	S		M,S	M,S		
Mid-Atlantic FMP for Bluefish	Bluefish (*Pomatomus saltatrix*)			M,S	M,S		Juveniles and adults found in estuarine and nearshore waters

Source: NOAA 2006

Notes:

S=The EFH designation for this species includes the seawater salinity zone (salinity>or = 25%)

M=The EFH designation for this species includes the mixing water/brackish salinity zone (0.5% < salinity < 25%)

n/a=The species does not have this lifestage in its life history, or has no EFH designation for this lifestage.

Table 2. Fishery Management Plans (FMPs) in New England, species managed under each FMP and the reasons for *exclusion* under the CCWRRP EIS

Fishery Management Plan	Species	Life Stages					Reason for Exclusion
		Eggs	Larvae	Juveniles	Adults	Spawning Adults	
New England FMP for Multispecies	Atlantic cod (*Gadus morhua*)	S	S	S	S	S	Found in bays and estuaries at depths greater than 5m
	Haddock (*Melanogrammus aeglefinus*)	S	S				
	Ocean pout (*Macrozoarces americanus*)	S	S	S	S	S	
	American plaice (*Hippoglossoides platessoides*)	S	S	S	S	S	
	White hake (*Urophycis tenuis*)	S	S	M,S	M,S		
	Redfish (*Sebastes fasciatus*)	n/a					
New England FMP for Atlantic Salmon	Atlantic salmon (*Salmo salar*)						Cape Cod is not within the geographic area for Atlantic salmon. There are no major river systems located within Cape Cod that support spawning
New England FMP for Sea Scallops	Atlantic sea scallop (*Placopecten magellanicus*)	S	S	S	S	S	Mainly found north of Cape Cod in nearshore bays and estuaries. Restricted to deeper cooler water in south.

Table 2. Fishery Management Plans (FMPs) in New England, species managed under each FMP, and the reasons for *exclusion* under the CCWRRP EIS (Continued)

Fishery Management Plan	Species	Life Stages					Reason for Exclusion
		Eggs	Larvae	Juveniles	Adults	Spawning Adults	
New England FMP for Skate	Barndoor skate (*Dipturis laevis*)		n/a		S	S	Found at depts. From 18m to 874m. Most abundant between 110-457m
	Smooth skate (*Malacoraja senta*)		n/a		S	S	
	Clearnose skate (*Raja eglanteria*)		n/a		S	S	
	Rosette skate (*Leucoaja garmani*)		n/a		S	S	
New England and Mid-Atlantic FMP for Spiny Dogfish	Spiny dogfish (*Squalus acanthias*)	n/a	n/a				Found in warm waters over the continental shelf, depths greater than 5m
Mid-Atlantic FMP for Tilefish	Tilefish (*Lopholatilus chamaeleonticeps*)						Found on the outer continental shelf

Source: NOAA 2006

Notes:

S=The EFH designation for this species includes the seawater salinity zone (salinity>or = 25%)

M=The EFH designation for this species includes the mixing water/brackish salinity zone (0.5% < salinity < 25%)

n/a=The species does not have this lifestage in its life history, or has no EFH designation for this lifestage.

New England Council Policies

The New England Fishery Management Council's jurisdiction extends from Maine to southern New England, although some NEFMC-managed species range to the mid-Atlantic. Information presented in the EFH generic amendment (NEFMC, 1998) is consistent with and supports the Gulf Council's long-standing habitat policy. The policy, as set forth in the Council's Habitat Policy and Management Objectives, states:

> *Recognizing that all species are dependent on the quantity and quality of their habitat, it is the policy of the New England Fishery Management Council to promote and encourage the conservation, restoration and enhancement of the habitat upon which living marine resources depend.*

This policy shall be supported by four policy objectives which are to:

(1) Maintain and rehabilitate the current quantity and quality of habitats supporting harvested species, including their prey base.

(2) Restore and rehabilitate fish habitats which have already been degraded.

(3) Create and develop fish habitats where increased availability of fishery resources will benefit society.

(4) Modify fishing methods and create incentives to reduce the impacts on habitat associated with fishing.

These objectives are based on ensuring the sustainability of harvested species and optimizing the societal benefits of our marine resources.

The Council shall assume an active role in the protection and enhancement of habitats important to marine and anadromous fish. In support of the Council's habitat policy, the management objectives for the EFH amendment (NEFMC, 1998) are:

(a) To the maximum extent possible, to identify and describe all essential fish habitat for those species of finfish and mollusks managed by the Council;

(b) To identify all major threats to the essential fish habitat of those species managed by the Council; and

(c) To identify existing and potential mechanisms to protect, conserve, and enhance the essential fish habitat of those species managed by the Council, to the extent practicable.

Mid-Atlantic Council Policies

The Mid-Atlantic Council has jurisdiction over fisheries in federal waters which occur predominantly off the Mid-Atlantic coast. The Mid-Atlantic jurisdiction includes waters

off the coasts of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina.

Types of EFH Affected by the CCWRRP and Assessment of Effects on EFH

EFH is described and identified as habitat that is important to the managed species. In New England, the EFH determination is based on source document reports from NMFS for each species managed by the Councils (NEFMC, 1998). The reports consist of a description of the habitat associations and requirements for species across all life stages, including summary descriptions of relevant survey data that indicate the relative abundance of and range for each species. This information is used by the Council to develop appropriate EFH designations for all species that identify preferred geographic areas, substrate, and ideal ranges for water temperature, depth, and salinity. The text descriptions of EFH set the environmental parameters within which the map designations are considered. Text descriptions, map designations, and tables identifying bays and estuaries included in the EFH designations for the existing FMPs for each life stage are available in Section 3.4 of the New England EFH amendment or viewed on the internet site of the National Marine Fisheries Service, <http://www.nero.noaa.gov/hcd/index2a.htm>.

Because of the large variability in the types of species comprising living marine resources, a wide range of coastal regions and riparian systems along streams and rivers that support fish must be considered as EFH for marine species. Most of the restoration activities associated with the CCWRRP would not impact large areas of habitat as commercial fishing operations would. The purpose of the CCWRRP is watershed protection. The objectives are to (1) improve water quality for shellfish beds, (2) restore degraded salt marshes, and (3) restore anadromous fish passages. The restoration activities are aimed to restore 1,500 acres of degraded salt marsh, restore/improve access to 4,200 acres of spawning habitat for anadromous fish, and improve 7,300 acres of water quality for shellfish beds. Construction of each project could cause short-term, minor adverse impacts to air, noise, vegetation, water quality and soils at the construction site. Construction periods would be short, generally a few weeks to a few months. Long-term beneficial impacts of the projects include improved water quality, improved anadromous fish runs, and increased recreational and commercial shellfish harvesting.

Description of Habitat (EFH) Affected:

Essential fish habitat descriptions provided by the New England Council do not include detailed descriptions of riverine or riparian systems and their distribution within each of the management areas. Potential impacts to managed species from CCWRRP would be limited to species within estuarine habitats and along stream channels such as marsh edges.

For estuarine environments, EFH is described and identified as all estuarine waters and substrates (i.e., mud, sand, shell, rock, and biological communities), including the sub-tidal vegetation (i.e., submerged aquatic vegetation and algae) and adjacent inter-tidal

vegetation (i.e., marshes). These areas provide essential nursery habitat for the development of many anadromous fish, estuarine fish, marine fish, and invertebrates.

Marsh habitats vary with coastal geographic locations. Salt marshes exist on the transition zone between the land and the sea in protected low-energy areas, such as estuaries, lagoons, bays, and river mouths (Copeland 1998). Marsh ecosystems are a function of hydrology, soil, and vegetation. Tidal cycles allow salty and brackish water to inundate and drain the salt marsh, circulating organic and inorganic nutrients throughout the marsh. Marshes are influenced by tidal flushing and stream flow. The importance of marshes include (1) export vital nutrients to adjacent waters; (2) improve water quality; (3) absorb wave energy; and (4) serve an important role in nitrogen and sulfur cycling.

Potential impacts from restoration activities:

Salt Marsh

Tidal wetlands create the foundation of a coastal food web that supports a large variety of coastal fish and bird species. Coastal wetlands serve as important nursery and spawning grounds from many commercially and recreationally important fish and shellfish species. They play a critical role in maintaining water quality. Additional, tidal wetlands provide irreplaceable protection from the flooding associated with storm surges and other serious weather events.

The salt marsh projects are associated with transportation infrastructure (i.e., roads, bridges, culvers, and railroads) on Cape Cod. The proposed salt marsh projects include replacement if inadequately sized or failed culverts with larger culverts or bridges. Construction of the proposed salt marsh would temporarily disrupt aquatic life in the vicinity of the projects due to turbidity and physical activity in the water. The duration of in-stream impacts would be short, typically one or two days to one or two weeks. The salt marsh projects would have a long-term, major beneficial effect on aquatic organisms in the restored tidal marshes. The increased sizes of the marsh inlets would physically allow more movement in an out of the marshes by fish and some invertebrates. The increased volume of water and improved water quality in the marshes would increase the availability and quality of habitat for all trophic levels of aquatic organisms. These improvements would benefit fish that spend all or most of their life in salt marshes and use the marshes for primary spawning and nursery areas. Larger numbers of smaller, resident foraging fish in the marshes would provide an increased food source for larger predatory fish that would move more easily into and out of the marshes. Fish that prefer the existing fresh or low-salinity fringe marshes would lose habitat as salinity increases after the restriction is removed. Some of this displaced habitat may move upstream as the salt water floods a larger area.

The salt marsh restoration project could have an effect on EFH that would be present in the area during construction, although these effects would be negligible because the projects are small in size, limited in duration, and widely separated in time and location.

Improvements to tidal salt marshes would result in increased marsh habitat, increased populations of prey species, and increased production of organic materials entering the food web.

Fish Passage

Anadromous fish live in the sea but must enter freshwater rivers and streams to spawn. Massachusetts coastal systems support 16 species of anadromous fish. These species play an important role in recreational and commercial fisheries.

The proposed fish passage projects would have long-term, major benefits toward reversing the general decline of anadromous fish on Cape Cod over the last century. The restoration of full function to fish passage structures would allow river herring, in particular, to access new and former spawning and nursery habitats. In many cases, a partially functioning fishway now supports a small population of river herring in a stream. Improving access upstream would allow more fish to return to the spawning grounds each spring and promote growth of that stream's natural population. Large predator fish in the downstream bays and estuaries would benefit from this project. The increased number of eggs and juvenile fish in the spawning and nursery areas would also serve as increased food supply for locally resident fish, birds, mammals, and other predators.

The fish passage projects would not directly affect designated EFH. Improvements to fish passages would make more spawning and nursery habitat available to anadromous fish that are food sources for some of the fish covered by the FMPs, and therefore, indirectly contribute to improved populations of those fish.

Stormwater

Construction of the proposed Stormwater projects would have only minor effects on aquatic organisms. The construction would not directly affect receiving water biota in the short-term because the projects occur back off the shoreline, and runoff of sediment from the disturbed areas is minimized by erosion and sediment controls. In the long-term, the primary benefit of the Stormwater projects – removing fecal coliform bacteria – would provide better water quality within the nearby waters, improving the surrounding shellfish habitat, improving forage.

Mitigation

Best management practices will be employed at all construction sites to minimize impacts to water resources and aquatic organisms (e.g., erosion and sediment controls, turbidity curtains). Consultations will be conducted with U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and Massachusetts Division of Fish and Wildlife to ensure that habitat of sensitive plants and animals is avoided. Consultation with Massachusetts State Historic Preservation Office and the Wampanoag Tribe of Gay

Head (Aquinnah) Historic Preservation Office will be conducted to ensure historic and archaeological resources are not affected.

Conclusion

The potential adverse impacts from the CCWRRP would be associated with construction activities and would be short-term in duration and minor in magnitude. The construction of any single project would only take a few weeks up to a few months, and actual in-stream work would only take one or two weeks. Each project would disturb only a small area in the immediate vicinity of the project. The total number of projects is expected to be five to ten per year (salt marsh, fish passage, stormwater), and they would be widely scattered around Cape Cod. These projects, therefore, would make negligible adverse impacts on estuarine and aquatic resources on the Cape. There would be no long-term adverse impacts from the projects after construction is completed.

Restoration activities implemented under the CCWRRP will provide beneficial habitat to living marine resources in the long-term. The long-term positive benefits of the CCWRRP-improved salt marsh flushing and ecology, improved fish passage and herring runs, improved water quality and shellfishing-would mitigate historical adverse effects on the resources from human activity and development on Cape Cod. The projects would complement other marsh, fish passage, and water quality restoration and remediation projects that are being undertaken or planned by the towns and state and federal agencies.

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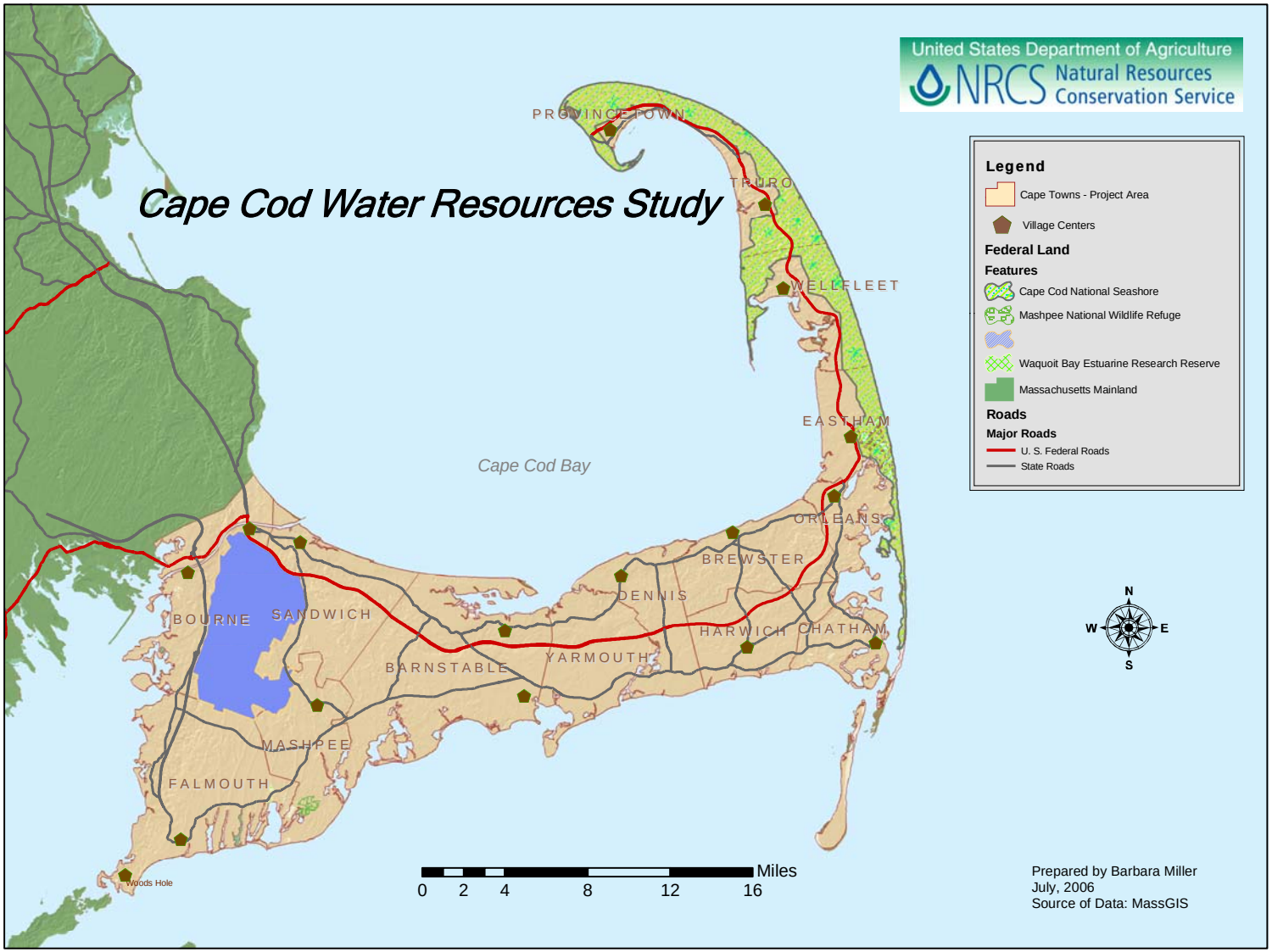

***Fig. 1.* Project Location Map**

Fig. 2. Priority Salt Marsh Sites

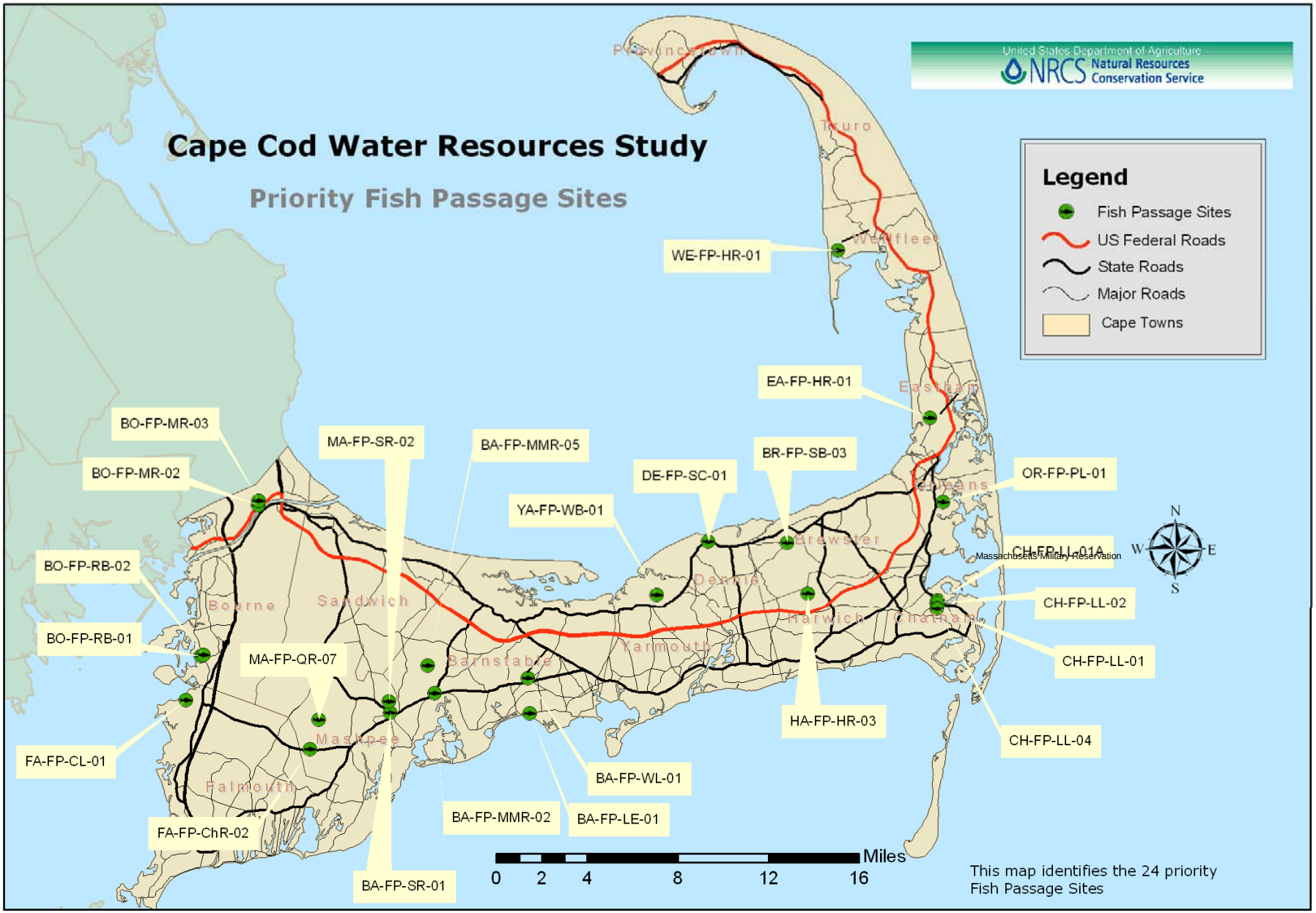

Fig. 3. Priority Fish Passage Sites

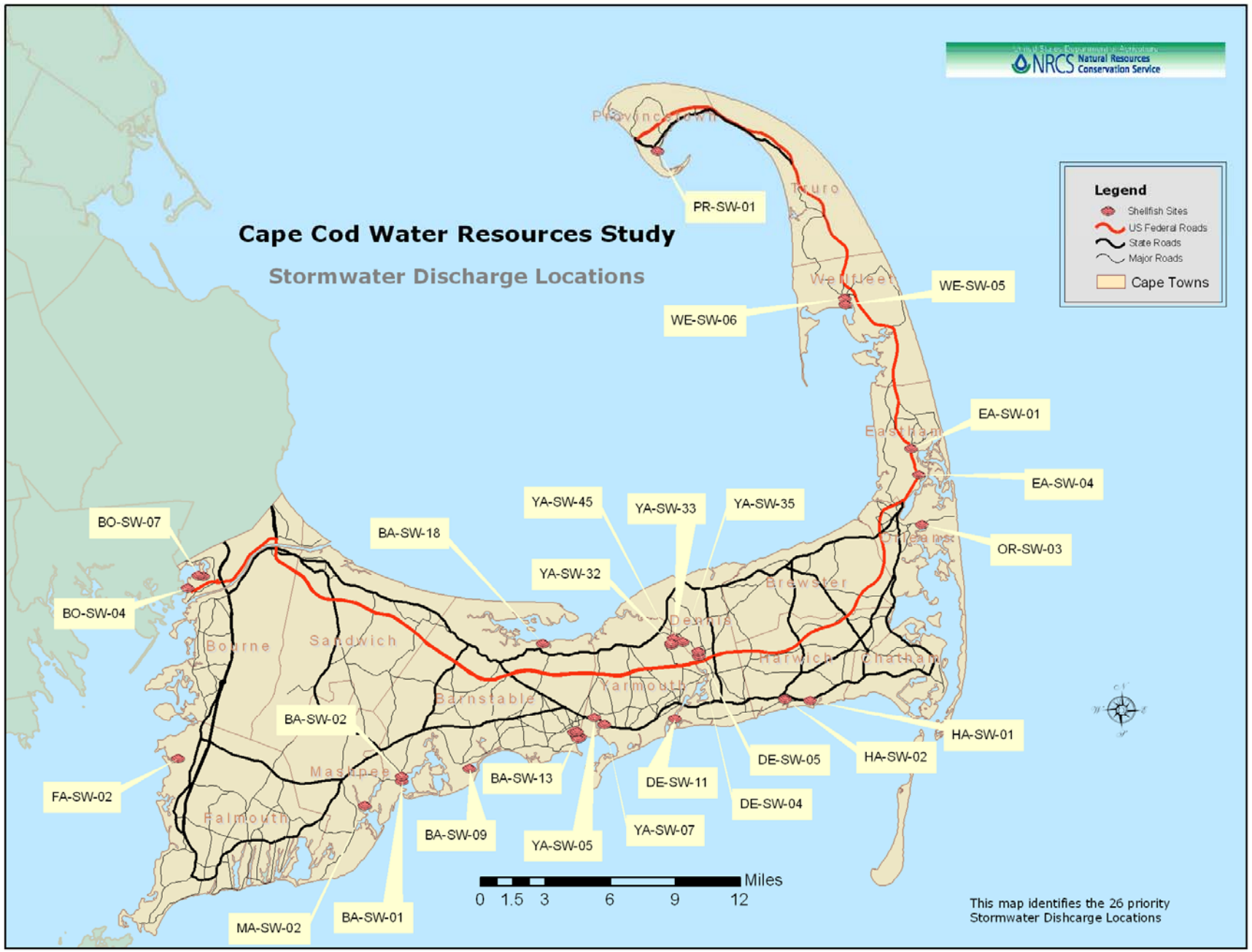

Fig. 4. Priority Stormwater Sites

Appendix C-5. Federal and State Listed Threatened and Endangered Species within Barnstable County or Adjacent Massachusetts Coastal Waters.

Scientific Name	Common Name	State Rank	Federal Rank	Most Recent Observation
Fish				
Acipenser brevirostrum	Shortnose sturgeon	E	LE	1871
Acipenser oxyrinchus	Atlantic sturgeon	E	LT, C	UNK
Lampetra appendix	American brook lamprey	T	---	1989
Amphibian				
Ambystoma opacum	Marbled salamander	T	---	1936
Scaphiopus holbrookii	Eastern spadefoot	T	---	1999
Reptile				
Malaclemys terrapin	Diamondback terrapin	T	---	2000
Lepidochelys kempi	Kemp's ridley turtle [1/]		LE	
Dermochelys coriacea	Leatherback turtle [1/]		LE	
Caretta caretta	Loggerhead turtle [1/]		LT	
Chelonia mydas	Green turtle [1/]		LT	
Bird				
Ammodramus savannarum	Grasshopper sparrow	T	---	2001
Asio flammeus	Short-eared owl	E	---	1985
Bartramia longicauda	Upland sandpiper	E	---	2001
Botaurus lentiginosus	American bittern	E	---	1965
Charadrius melodus	Piping plover	T	LE,LT	1997
Circus cyaneus	Northern harrier	T	---	2000
Haliaeetus leucocephalus	Bald eagle	E	LT, PDL	1905
Ixobrychus exilis	Least bittern	E	---	1993
Parula americana	Northern parula	T	---	1989
Podilymbus podiceps	Pied-billed grebe	E	---	1987
Pooecetes gramineus	Vesper sparrow	T	---	1996
Rallus elegans	King rail	T	---	1974
Sterna antillarum	Least tern	SC	LE	1998
Sterna dougallii	Roseate tern	E	LE, LT	1998
Mammal				
Eubalaena glacialis	Northern right whale	E	LE	1986
Megaptera novaeangliae	Humpback whale [1/]		LE	
Balaenoptera physalus	Fin whale [1/]		LT	
Balaenoptera borealis	Sei whale [1/]		LT	
Physter macrocephalus	Sperm whale [1/]		LT	
Dragonfly/Damselfly				
Aeshna mutata	Spatterdock darner	E	---	1999
Enallagma recuratum	Pine barrens bluet	T	---	1999
Gomphus abbreviatus	Spine-crowned clubtail	E	---	1878
Gomphus fraternus	Midland clubtail	E	---	1977
Butterfly/Moth				
Acronicta albarufa	Barrens daggermoth	T	---	1999
Cicinnu melsheimeri	Melsheimer's sack bearer	T	---	1998
Cycnia inopinatus	Unexpected cycnia	T	---	1998

Appendix C-5. Federal and State Listed Threatened and Endangered Species within Barnstable County or Adjacent Massachusetts Coastal Waters.

Scientific Name	Common Name	State Rank	Federal Rank	Most Recent Observation
Erynnis persius persius	Persius duskywing	E	---	1952
Faronta rubripennis	The pink streak	T	---	2001
Papaipema stenocelis	Chain fern borer moth	T	---	1981
Papaipema sulphurata	Water-willow stem borer	T	---	1996
Pieris oleracea	Eastern veined white	T	---	1949
Vascular Plant				
Aristida purpurascens	Purple needlegrass	T	---	1986
Asclepias purpurascens	Purple milkweed	T	---	2000
Asclepias verticillata	Linear-leaved milkweed	T	---	1915
Carex mesochorea	Midland sedge	E	---	1988
Carex oligosperma	Few-fruited sedge	E	---	1987
Carex striata var brevis	Walters sedge	E	---	1990
Claytonia virginica	Narrow-leaved spring beauty	E	---	1933
Crataegus bicknellii	Bicknell's hawthorn	E	---	1994
Dichanthelium mattamuskeetense	Mattamuskeet panic-grass	E	---	1989
Dichanthelium scabriusculum	Woolly rosette grass	T	---	1989
Eleocharis obtusa var ovata	Ovate spike-sedge	E	---	1994
Eupatorium aromaticum	Lesser snakeroot	E	---	1916
Eupatorium leucolepis var novae-angliae	New England boneset	E	---	1994
Gamochaeta purpurea	Purple cudweed	E	---	1924
Hydrocotyle verticillata	Saltpond pennywort	T	---	1980
Hypericum adpressum	Creeping St. John's-wort	T	---	1994
Isoetes acadiensis	Acadian quillwort	E	---	1989
Juncus debilis	Weak rush	E	---	1993
Leptochloa fascicularis var maritima	Saltpond grass	T	---	1985
Leymus mollis ssp mollis	Sea lyme-grass	E	---	1913
Linum medium var texanum	Rigid flax	T	---	1983
Lipocarpha micrantha	Smallflower halfchaff sedge	E	---	1999
Listera cordata	Heartleaf twayblade	E	---	1999
Malaxis bayardii	Bayard's green adder's-mouth	E	---	1997
Mertensia maritima	Oysterleaf	E	---	2001
Ophioglossum pusillum	Adder's-tongue fern	T	---	1999
Opuntia humifusa	Prickly pear	E	---	1999
Platanthera dilatata	Leafy white orchis	T	---	1988
Polygonum setaceum var interjectum	Strigose knotweed	T	---	1985
Prenanthes serpentaria	Lion's foot	E	---	1918
Rhexia mariana	Maryland meadow beauty	E	---	1995
Rynchospora inundata	Inundated horned-sedge	T	---	1988
Rhynchospora nitens	Short-beaked bald-sedge	T	---	1985
Rhynchospora torreyana	Torrey's beak-sedge	E	---	2000
Rumex pallidus	Seabeach dock	T	---	1994
Sabatia campanulata	Slender marsh pink	E	---	2001
Scleria pauciflora var caroliniana	Papillose nut-sedge	E	---	2001

Appendix C-5. Federal and State Listed Threatened and Endangered Species within Barnstable County or Adjacent Massachusetts Coastal Waters.

Scientific Name	Common Name	State Rank	Federal Rank	Most Recent Observation
Spartina cynosuroides	Salt reedgrass	T	---	1993
Sphenopholis pensylvanica	Swamp oats	T	---	2001
Spiranthes vernalis	Grass-leaved Ladies'-tresses	T	---	1989
Tipularia discolor	Cranefly orchid	E	---	1983
Triosteum perfoliatum	Broad tinker's-weed	E	---	2000
Utricularia striata	Fibrous bladderwort	T	---	1995

Source: Massachusetts DFW (2003) unless otherwise noted.

Key to Abbreviations used on Natural Heritage Resource Lists:

UNK=Unknown

State Rank: E=Endangered, T=Threatened, SC=Special Concern

Federal Status: LE=Listed Endangered, LT=Listed Threatened, C=Candidate, PE=Proposed Endangered, PT=Proposed Threatened, PS=Partial Status, PDL=Proposed for Delisting.

Combination values = Taxon has one status currently, but a more recent proposal has been made to change that status with no final action yet published.

[1/] Identified by the National Oceanic and Atmospheric Administration as known seasonally in coastal waters off Massachusetts (letter from M.A. Colligan, April 20, 2006).

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