Habitat and Resource Panel Final Report

PREPARED FOR Governor's Narragansett Bay and Watershed Planning Commission

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March 4, 2004

HABITAT AND RESOURCE PANEL
FINAL REPORT

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TABLE OF CONTENTS

SECTION **PAGE**

TABLES

APPENDICES

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EXECUTIVE SUMMARY

PANEL CHARGES

- By 2008, restore 100 acres of coastal wetlands, plus an additional 100 acres by 2015;
- By 2008, restore 400 acres of anadromous fish habitat, plus an additional 1140 acres by 2015;
- By 2008, protect 100 acres of eelgrass habitat and restore 50 acres, restore an additional 100 acres by 2015;
- By 2008, restore 25 miles of riparian buffer, plus an additional 50 miles by 2015 and by 2008, restore 100 acres of coastal buffer, plus an additional 250 acres by 2015;
- By 2010, protect an additional 5000 acres of sensitive coastal and riparian resource areas, including wetlands; and
- By 2010, protect and restore those areas around the Bay identified as critical fish habitats.

KEY RECOMMENDATIONS

- Establish a Habitat Restoration Program with dedicated staff at RIDEM and CRMC, which will allow for enhanced state-wide planning, coordination, and support of restoration projects.
- Fund CRMC Coastal and Estuary Habitat Restoration Trust Fund established by legislature in 2002, which will allow the state to leverage over $1 million of available matching federal funds.
- Use 2004 Bond measure for additional capital funding for restoration in the amount of $2 million, which will allow the state to better meet the above long-term restoration goals and provide critical non-federal match.
- Establish a state status and trends for coastal habitats program, which will allow the state and other entities to assess habitat changes, impacts, and protection/restoration progress over time and to effectively direct funding programs addressing habitat protection and restoration.
- Update coast-wide wetland and seagrass mapping, which will allow improved restoration and conservation planning and enhanced wetland enforcement.
- Improve rivers protection regulations, which will benefit riverine vegetated buffers, coastal water quality, and fish and wildlife habitat.
- Enforce prohibition on out-of-basin transfers of groundwater to protect flows to rivers and coastal embayments.
- Improve management of dams for fish passage, which will increase our river herring populations.
- Fund coastal and riparian buffer restoration site identification projects, which is a crucial first step in restoring riverine habitats, improving riverine and coastal water quality and is a requirement for federal funding.
- Develop incentives for private property owners to participate in habitat restoration projects.
- Assist and encourage communities to adopt and implement conservation development which will protect sensitive habitats.
- Fund additional Greenspace Protection projects which will identify and map critical areas for protection; support ongoing prioritization efforts and land acquisition

RECOMMENDED SHORT TERM ACTIONS: KEY PROJECTS

- Salt Marsh Restoration: Town Pond-Portsmouth, Allin's Cove-Barrington, Walker's Farm-Barrington, Gooseneck Cove-Newport
- Anadromous Fish Restoration: Ten Mile River, Pawtuxet River, Woonasquatucket River, Kickemuit River, Wood-Pawcatuck River
- Seagrass Restoration: Narragansett Bay and Salt Ponds
- Sensitive Coastal and Riparian Resource Protection: Fund Greenspace Protection studies, support ongoing prioritization efforts and land acquisition
- Riparian and Coastal Buffer Restoration: Fund riparian restoration and wetland site identification plan on Blackstone River
- Critical Fish Habitats: Fund the development and implementation of a critical fish habitat identification and mapping program

1.0 INTRODUCTION

1.1 Purpose of the Habitat and Resource Panel

As outlined in the Governor's Executive Order 03-16 and the Governor's December 15, 2003 letter providing guidance to the Commission, the short term charges of the Habitat and Resource Panel area as follows:

"By March 2004, as part of the Phase I Strategic Plan, determine the best means for advancing Rhode Island's coastal habitat protection and restoration programs. An initial step would be finalizing a state coastal habitat restoration plan that includes a prioritized project list developed using scientific analysis tools as well as best professional judgment and community desires."

In addition to the Governor's short-term charges, the Habitat and Resource Panel addresses the need to characterize and prioritize sensitive coastal habitats for protection.

1.2 Purpose of This Report

The purpose of this report is to make recommendations for the protection and restoration of Rhode Island's coastal habitats, and to identify gaps—in knowledge, capacity, or funding—necessary to carry out such recommendations. Specifically, the report outlines the initial steps necessary to meet the following long-term goals, which were set forth in the above-referenced Executive Order:

- By 2008, restore 100 acres of coastal wetlands, plus an additional 100 acres by 2015;
- By 2008, restore 400 acres of anadromous fish habitat, plus an additional 1140 acres by 2015;
- By 2008, protect 100 acres of eelgrass habitat and restore 50 acres, restore an additional 100 acres by 2015;
- By 2008, restore 25 miles of riparian buffer, plus an additional 50 miles by 2015 and by 2008, restore 100 acres of coastal buffer, plus an additional 250 acres by 2015;
- By 2010, protect an additional 5000 acres of sensitive coastal and riparian resource areas, including wetlands; and
- By 2010, protect and restore those areas around the Bay identified as critical fish habitats.

The report identifies the coastal and riverine habitat loss in Rhode Island watersheds and what current state programs exist that are working to restore these habitats. An appendix provides background as necessary on the state's coastal habitats and current restoration and monitoring programs. The analysis section indicates the steps that need to be taken to meet the long-term goals of the Governor's Executive Order.

2.0 COASTAL HABITAT LOSS IN RHODE ISLAND

Rhode Island is home to an array of coastal habitats, including salt marshes, seagrass beds, freshwater wetlands and river systems. These habitats support a wide variety of fish and wildlife, contribute greatly to the state's biological integrity and diversity, and help support the state's economy: $75 million in

commercial fishery landings; a recreational fishery valued at $150 million; and tourism and outdoor recreation industry valued at $2 billion on Narragansett Bay alone.

Despite their exceptional importance and value, Rhode Island's coastal habitats have suffered from several hundred years of human impacts – development activities that have destroyed or degraded many habitats. Salt marshes and freshwater wetlands have been drained, diked, ditched, and filled. More than 500 dams have been built on our rivers and streams. Seagrass beds have succumbed to coastal development and declines in water quality. The importance of each of these habitats is detailed in Appendix A., as are the impacts of human activity upon them.

The loss and degradation of Rhode Island's coastal habitats are principal causes of declines in commercial and recreational fisheries and shellfisheries, along with other kinds of wildlife on Narragansett Bay and the coastal ponds. Destruction of salt marshes impacts species as diverse as blue crabs, striped bass, great blue herons, and salt marsh sparrows, all of which forage in marshes. Dams block annual runs of river herring, which in turn affects gamefish in both salt and fresh water that feed on herring. The decline of seagrass in Narragansett Bay and the coastal ponds has resulted in the complete loss of a once-vital bay scallop fishery in Greenwich Bay, the coastal ponds, and elsewhere.[1]

In recent decades, there has been a growing awareness of the impact of coastal habitat loss throughout the country, along with a concerted effort to reverse the trend by restoring coastal habitats. Federal and state government, non-governmental organizations, and academic institutions have devoted resources to the problem, and the technology of coastal habitat restoration has grown by leaps and bounds. Today, examples of successful restoration of salt marshes, seagrass beds, and anadromous fish runs can be seen throughout the country. The U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, and other federal agencies have programs that provide states with funding and technical support to undertake such projects.

3.0 BACKGROUND AND STATUS INFORMATION ON HABITAT RESTORATION

3.1 State Restoration Programs

3.1.1 Coastal Habitat Restoration

Since the 1998 the Rhode Island Habitat Restoration Team (RIHRT) has worked towards developing a framework for providing resources and technical support to complete habitat restoration projects in Rhode Island and Massachusetts. These efforts built on many previous federal and state initiatives including the US Fish and Wildlife Service, NOAA, Save The Bay, RIDEM Fish and Wildlife, RIDEM Mosquito Abatement etc.

[1] In 1880, Narragansett Bay alone produced more than 300,000 bushels of bay scallops. At current prices, that catch would have a wholesale value of $33 million dollars, six times the value of today's quahog harvest. But in recent years, the scallop harvest throughout the state has been virtually zero. Most of the bay scallops sold today in New England fish markets are farmed in China.

A competitive grant awarded by the NOAA Coastal Services Center enabled the Rhode Island Coastal Resources Management Council (CRMC) and the RIHRT to develop the Rhode Island Habitat Restoration Portal (Portal) which provides a central database of projects identified state-wide and in Massachusetts for seagrass, riverine, and salt marsh habitat restoration (Figure 1).

In addition to the efforts of the RIHRT, the Rhode Island Legislature passed legislation in 2002 establishing *The Coastal and Estuary Habitat Restoration Program and Trust Fund* (Program and Trust Fund) (RIGL §46-23.1). The purposes of the Program and Trust Fund are to provide restoration planning and technical expertise and to implement measures to restore coastal and estuary habitats.

State Estuary and Coastal Habitat Restoration Strategy

The Rhode Island Habitat Restoration Team, pursuant to the Coastal and Estuary Habitat Restoration Program and Trust Fund, drafted and adopted the State Estuary and Coastal Habitat Restoration Strategy. The legislation mandates that a strategy be established with "comprehensive public, agency, legislative and stakeholder participation." (RIGL § 46-23.1-5).

In so doing, the Team, comprised of public, agency, legislative and stakeholder participation, developed a CRMC approved strategy that incorporates the following elements: a description of the state's coastal and estuarine habitats, restoration goals, inventory of restoration projects, projected comprehensive budget and timeline to complete the goals, funding sources, an outreach element, and provisions for updating the plan and project inventory. The Team conducted meetings beginning on June 2, 2002 on a regular basis during FY03 to assess potential, as well as on-going, restoration projects throughout Rhode Island based on the adopted Strategy.

According to the Strategy, habitat restoration grant monies are dispersed in accordance with § 46-23.1-5(2) which allocates funding for design, planning, construction or monitoring. Eligible applicants include cities and towns; any committee, board, or commission chartered by a city or town; nonprofit corporations; civic groups, educational institutions; and state agencies. Please refer to Appendix XX for more details on the decision criteria and evaluation process.

On October 6, 2002, the Team reviewed applications submitted to CRMC and selected eight habitat restoration projects to receive funding for FY03 based on the factors to be considered for the purposes of granting monies for estuary and coastal habitat restoration activities as stated in the legislation. Funding for the Program and Trust Fund was appropriated in FY2003 in the amount of $250,000 from the Oil Spill Prevention, Administration and Response Fund (OSPAR). Efforts to reinstate the funding in perpetuity have failed; yet members of the General Assembly continue to lobby in order to secure future funding. For more information on the Trust Fund and Strategy please refer to Appendix B.

3.1.2 Freshwater Wetland Restoration

Although the panels focus is on coastal wetland protection and restoration, the hydrologic connection with inland wetlands on major river systems and tributaries is an integral part of Rhode Island's coastal wetland ecosystems and water quality in Narragansett Bay and coastal ponds.

Very few proactive freshwater wetland restoration projects have been undertaken in Rhode Island. In 1999, the Rhode Island Department of Environmental Management (RIDEM); the U.S. Environmental Protection Agency (EPA), Region 1; and the University of Rhode Island's (URI) Department of Natural Resources Science began collaboration on a project to develop a freshwater wetland restoration strategy for Rhode Island. Phase I of this project was designed to develop a technical framework for identifying and prioritizing freshwater wetland restoration opportunities; a preliminary version of this methodology was tested in the Woonasquatucket River watershed (Miller and Golet, 2001). The objective of Phase II was to use this basic methodology to develop a comprehensive freshwater wetland restoration plan for the entire watershed.

The Wetland Restoration Plan for the Woonasquatucket Watershed, Rhode Island (Golet, Myshrall, Miller, and Bradley, 2002) is a joint effort of RIDEM, EPA, and URI, in partnership with the Woonasquatucket River Watershed Council and municipal officials from the six cities and towns in the watershed. The study identified 77 potential wetland restoration sites averaging 1.49 acres in size and 239 potential buffer restoration sites in the watershed. Eleven of the 77 sites are publicly owned and 66 are on private land. Restoration could contribute to habitat improvement as well as water quality improvement, flood abatement, and heritage values in the watershed. Implementation is challenged by the high percentage of sites that are privately owned. Strong incentives for landowner participation or means to purchase private lands with high restoration potential are needed.

A Woonasquatucket Watershed Restoration Team has been formed to coordinate implementation of the wetland and riparian plans and the NRCS has been identified as the keystone agency for restoration in the watershed. The Woonasquatucket Watershed Council, municipal officials, RIDEM, URI, and EPA, Region 1 continue to participate.

It is premature to establish statewide freshwater wetland restoration goals because outside of the Woonasquatucket River watershed, opportunities for freshwater wetland and buffer restoration are not identified and widely known. To further our understanding of freshwater wetland opportunities and ultimately to restore wetland functions and values on a watershed basis, a similar identification and prioritization project should be considered for the Blackstone River watershed, which is also a nationally recognized American-Heritage River.

3.2 Federal Restoration/Protection Programs

In order to receive federal monies for restoration, a project is required to have non-federal match which could be state or private funds and/or some portion of in-kind services. Every year, there are projects that are not completed in Rhode Island due to unmatched federal dollars for habitat restoration and protection. In 2004 for instance, based on the amounts requested through the Coastal and Estuary Habitat Trust Fund, the loss to the state from unmatched federal dollars was $3 million.

4.0. ANALYSIS SECTION

In many respects, Rhode Island has been a leader in coastal habitat restoration. The Galilee Salt Marsh Restoration in Narragansett, R.I., is one of the largest and best-documented marsh restoration projects in the Northeast. The project used innovative tide gates to protect coastal property, and resulted in major improvements to the state's fish and wildlife habitat. Scientists at the University of Rhode Island are pioneering a method of planting seagrass from seeds—which will be used to restore seagrass beds in Narragansett Bay and the coastal ponds. State agencies and non-governmental organizations are working together to protect our remaining coastal habitats and restore salt marshes, seagrass beds, riparian areas and anadromous fish runs.

With respect to funding and institutional capacity, Rhode Island lacks a restoration program with dedicated personnel and a consistent source of non-federal funding to match available federal grants. The result is inconsistent planning for projects and loss of federal dollars to complete projects. As an example, the Coastal and Estuary Habitat Restoration Trust Fund requests were $565,000 for 2004; a loss of an estimated three million dollars in unmatched federal funds to the state.

In 1998, the Narragansett Bay Estuary Program established the Rhode Island Habitat Restoration Team, an interdisciplinary technical team co-chaired by the Bay Program, CRMC and Save the Bay. The Team meets bi-monthly to coordinate restoration planning and projects. In 2004, the Team completed a web-based restoration plan and information resource, the R.I. Coastal Habitat Restoration Portal **(www.edc.uri.edu/restoration)** The Portal includes a list of restoration project opportunities, as well as tools for agencies, organizations and individuals interesting in pursuing restoration projects.

In 2002, the Rhode Island General Assembly established the Coastal and Estuary Habitat Restoration Program and Trust Fund. The legislation established a state restoration program administered by CRMC with technical assistance from a Technical Advisory Committee and the Rhode Island Habitat Restoration Team. The program was funded initially with $250,000 from the state's Oil Spill Protection and Restoration (OSPAR) trust fund. The CRMC, working with the Team, developed a state coastal habitat restoration plan – the State Estuary and Coastal Habitat Restoration Strategy. The Team develops a priority list every year through an open process, with review by state and federal experts. The program was not funded in subsequent years. As a result, non-federal match is lacking for state/federal restoration projects. The Panel estimates that approximately 3 million federal dollars went unmatched in 2004.

Significant opportunities exist to improve coordination between and among state agencies engaged in restoration, regulation, enforcement, and construction. The Panel believes that much more could be accomplished to protect and restore Rhode Island's coastal habitats, at negligible additional cost, simply by improving state policies that impact coastal habitat restoration and by further improving coordination among state programs.

The following sections present the process and targeted projects that are recommended by the Habitat and Resource Panel to meet each of the long-term goals as proposed by the Governor.

4.1 Salt Marsh Restoration

By 2008, restore 100 acres of coastal wetlands, plus an additional 100 acres by 2015

The following table lists projects that are now funded and being completed:

Project Name	Acres	Project Costs
Mussachuck Creek, Barrington	25 acres salt marsh/102 acres river herring spawning habitat	140K tide gate installation – (62K federal), Marsh Treatment 25K (17k fed), (engineering design 150K federal) Course Regrading 300K (private)-New Bridges (200K private) Inlet Dredging (30K + engineering 20K-Private)-RIDOT Bridge (fed. 50K + 200K state)
Allin's Cove, Barrington	4.3	$615,000 (FED)/$205,000 (nonFED)
Town Pond, Portsmouth	20	$2,250,000 (FED)/$750,000 (nonFED)
TOTAL	**96**	

The following table lists the projects that the Habitat Resource Panel is recommending for funding to meet the coastal wetland restoration goals.

2008 List for Funding Project Name	Acres	Funding Needed/Year
Salt Marsh Restoration		
Gooseneck Cove, Newport	75	One million total (state match - $500,000 ?) 05-06
Silver Creek, Bristol	20	$500,000
Walker's Farm, Barrington	20	$30,000, 04-05
Cormorant Point, Block Island	10	$15,000
Sachuest Point, 3rd beach phase 3, Middletown	4-acres phragmites/hydrologic restoration AND hydrologic analysis and excavation for connection of landfill marsh and existing marsh system	$40,000 – 4 acre restoration $500,000 – hydrologic analysis and excavation
Total	**129**	

2015 List Project Name	Acres	Funding Needed/Year
Allins Harbor, North Kingstown	~20 acres	Not determined yet
Calf Pasture Point, North Kingstown	~12 acres	Not determined yet
*MA Project, Mount Hope Bay: Taunton River / Somerset / The Creek & Town Skating Pond		Not determined yet
*MA Project, Mount Hope Bay: Assonet River / Berkley / Chamberlain Farm Shooting Preserve		Not determined yet
*MA Project, Mount Hope Bay: Taunton River / Dighton / Broad Cove		Not determined yet
*MA Project, Mount Hope Bay: Palmer River/Swansea/ Swansea Country Club Impoundment		Not determined yet
Seapowet Marsh, Sakonnet River, Tiverton	~30 acres to restore (phragmites) (150 acres salt marsh, 230 acres of estuarine habitat)	Not determined yet
TOTAL		Not determined yet

*These sites are *potential* restoration opportunities and require feasibility studies and local / landowner support to determine viability as restoration projects.

4.2 Seagrass Restoration

By 2008, protect 100 acres of eelgrass habitat and restore 50 acres; restore an additional 100 acres by 2015.

The following table lists projects that are now funded and being completed:

Project Name	Acres	Funding/Year
Ninigret Pond Eelgrass Restoration, Charlestown	40	$2,700,000 (FED)/$1,460,000 (nonFED)
Narragansett Bay Eelgrass Restoration	7	$325,000
TOTAL	**47**	

The following table lists the projects that the Habitat Resource Panel is recommending for funding to meet the seagrass restoration goals.

2008 Project List	Acres	Funding/Year
Narragansett Bay Seagrass Restoration	50	$1,350,000
TOTAL	**50**	**$1,350,000**

2015 Project List	Acres	Funding/Year
Quonochontaug Pond (eelgrass)	5	$800,000 (fed)/ $430,000 (nonfed)
Winnapaug Pond (eelgrass)	12	$1,057,000 (fed)/ $570,000 (nonfed)
TOTAL	**17**	**$1,857,000 fed/nonfed $1,000,000**

4.3 Anadromous Fish Restoration

By 2008, restore 400 acres of anadromous fish habitat, plus an additional 1000 (1140) acres by 2015;

The following table lists projects that are now funded and being completed:

Project	Acres	Project Costs
Cross Mills Pond	30	$355,000 (FED)/$198,000 (nonFED)

2008 List Anadromous Fish Restoration	Acres	Project Costs
Omega Dam (Ten Mile River/Hunt River/Turner Reservoir	314	~1,040,000 (Fed)/$560,000 (non fed) (04/05)
Pawtuxet River	54	~$50,000 04/05 (non fed)
Wood Pawcatuck River Projects	Repairs /Feasibility	~$150,000 fed /$50,000 (non fed)
Kickemuit River	27	~$250,000 fed/~$75,000 (non fed)
Woonasquatucket River	Feasibility	~$150,000/$54,350 (non fed)
TOTAL	395	$789,350 non fed

Please refer to Table 1 for more details on anadromous fish restoration projects for 2008 and 2015.

4.4 Riparian and Coastal Buffer Restoration

By 2008, restore 25 miles of riparian buffer, plus an additional 50 miles by 2015 and by 2008, restore 100 acres of coastal buffer, plus an additional 250 acres by 2015.

Currently, the state does not have a buffer restoration program, although these types of projects can be considered under the Estuary and Coastal Habitat Restoration Strategy RIDEM has placed a new emphasis on identifying sites for riparian restoration. A riparian site identification plan was completed for the Woonasquatucket River Watershed in 2001. This work was funded through a US Forest Service grant to RIDEM. Currently the Woonasquatucket Watershed is the focus of a special riparian restoration project by the Natural Resources Conservation Service (NRCS) primarily because the funding for restoration is available and the Woonasquatucket is the only watershed with a restoration plan. In addition wetland buffer opportunities have been identified in the Woonasquatucket watershed (Golet, Myshrall, Bradley, and Miller, 2002) some of which are associated with the mainstem and tributaries to the river. The Pawtuxet River Watershed Council received funding in 2004 to complete a riparian buffer restoration project through the Clean Water Act 319 program administered through RIDEM'S Non-Point Program. In addition, RIDEM just received notice that the US Forest Service will fund an additional Riparian study, this time in the watersheds surrounding Greenwich Bay. This area includes the Greenwich Bay watershed, Buckeye Brook Watershed, and the Maskerchugg River. In order to realize the goals identified below, it will necessary to complete similar site identification studies in all of the Bay's subwatersheds. Education of riparian landowners is also extremely important as most of the potential restoration sites are on privately owned property.

4.5 Sensitive Coastal and Riparian Resource Protection

By 2010, protect an additional 1500 acres of sensitive coastal and riparian resource areas, including wetlands.

There are a number of open space and land preservation programs in the state that protect sensitive coastal and riparian resources as a result of their land purchases. However, these programs do not necessarily focus on sensitive coastal and riparian resource areas, or include them as criteria when selecting projects. For the purposes of the Habitat and Resource Panel, sensitive coastal resource areas are habitats identified in Appendix A and should be prioritized based on the following characteristics:

- Nutrient sensitive waters (poorly flushed coves, embayments, marshes, coastal lagoons etc.)
- Adjacent to already protected lands
- Properties within and including 200 feet of a coastal feature
- Properties within and including 100 feet of a riparian buffer
- Waters classified at Type 1 and Type 2 by the RI Coastal Resources Management Program (CRMP)
- Tier 1 wetland restoration opportunities identified in a watershed-based restoration plan, such as that completed for the Woonasquatucket River watershed.

Assessing how many sensitive coastal and riparian resource areas have been purchased would involve a review of specific programs and parcels. Rough estimates indicate that over the last 10 years the state through the Open Space Bond Fund has protected 6,000 acres within 5 miles of the coast (Paul Jordan, Personal communication, 2004). Approximately 1,300 acres of the total 6,000 acres are adjacent to or within coastal habitats identified by the Narragansett Bay Estuary Program in 1996.

The following table indicates the goals of major land preservation efforts in the state and an estimate of the types of habitats they will protect. In RI, funds for State Open Space have been matched with other funds at an average rate of 3:1 (private to state funds).

Summary of estimates of protection to 2010 (RI Land Trust Council & The Nature Conservancy, 2004)

Organization	Total Funds needed	Public Funds Needed (various grants)	Private Funds (Match)	Rough estimate of acres	Type of habitat
DEM-estimate of coastal protection only	*@$15,000 /acre = $45 million* *@20,000/ acre = $60 million*	*12 mil* *15 mill*	*34 mill* *45 mill*	*3000 acres*	*Coastal lands and riparian buffers on key tributaries to Bay.*
Local Needs – 5 Municipal Land Trusts	$40 million	$10 million	$30 million	~3000 acres acquisition & easement	*Estimate for coastal areas and riparian*
The Nature Conservancy (not including areas targeted jointly with DEM or Land Trusts)	$70 million	$10 million	$10 million	~ 4000 acres (not including joint projects included under DEM or Land Trusts)	*Estimate for coastal areas, islands and riparian habitat on Bay tributaries*
TOTAL coastal protection estimate	**$155 to 170 million**	**$32 to 35 million**	**$74 to 85 million**	**10,000 acres**	***Coastal and riparian to key tributaries to bay***

The total above includes a broad definition of coastal lands. For the Habitat & Resource Panel goal of protecting Sensitive Coastal & Riparian Resource Areas, a ballpark estimate was chosen of 5,000 acres to protect by 2010.

Organization	Total Funds needed	Public Funds Needed (various grants)	Private Funds (Match)	Rough estimate of acres	Type of habitat
Panel's Protection Goal for 2010	**$78 to $85 million**	**$16 to $18 million**	**$37 to $43 million**	**5,000 acres**	***Sensitive Coastal & Riparian Resource Areas***

To truly identify sensitive coastal and riparian habitats that should be protected, further mapping would need to be done. Currently the RI Coastal Resources Management Council and the URI Coastal Resources Center are developing a prioritization scheme through the Coastal and Estuarine Land Conservation Program and are expected to be completed this year. This prioritization will make Rhode Island eligible for land protection funds and can guide other efforts. These estimates will not cover riparian habitats, but would provide areas within the coastal zone. The Woonasquatucket and South County Greenspace Plans do identify other sensitive areas and could serve as a starting point

for future mapping identification projects. These projects also support the smart growth development techniques outlined in the South County Design Manual and the Rhode Island Conservation Development Manual. Where land acquisition or purchase of development rights is not practical, these techniques will be instrumental in further protecting sensitive coastal resources. It is estimated that acquisition of properties in coastal areas for the purpose of resource protection, will only be a viable option for the next five years. This is due to the fact the area is nearing complete buildout. Therefore, it has become imperative for communities to adopt conservation development ordinances in order to effectively protect these critical resources. The panel recommends that commission support similar Greenspace Protection studies in other areas of the Narragansett Bay Watershed and assist communities to adopt the techniques outlined in the aforementioned manuals.

The Open Space Bond fund includes criteria for Critical Habitat, including: Estuarine Intertidal Wetlands, Freshwater Tidal Wetlands, Coastal Plain Pond and/or Pond shore, and Maritime/Inland Dune System. It further specifies that shellfish beds and migratory bird stopover sites should be prioritized for resource protection. These criteria should be amended to include the definitions stated above.

Although there are no specific land protection goals for the Taunton River watershed or Mount Hope Bay/Narr Bay watershed, land protection goals should be compatible or consistent with the Wild and Scenic River's Management Plan and the Mount Hope Bay/Narragansett Bay Open Space Management Plan.

4.6 Critical Fish Habitat Protection and Restoration

By 2010, protect and restore those areas around the Bay identified as critical fish habitats.

Currently, the state does not have a definition of critical fish habitats or identification process for mapping these habitats. Further information is provided in Appendix C regarding a definition of critical fish habitat. The following are habitats that are considered CFH for various life history stages of a number of species in Narragansett Bay:

1. Deep Channels – certain species (e.g. winter flounder) use the deep channels of the bay for movement in and out of the bay and for movement to the upper bay spawning areas. E.g. Lower East Passage from Gould Is south.
2. Deep Depressions – these areas appear to be important to a number of species (cold water refugia). E.g. Warwick Light, Sakonnet R. off Fogland Pt., N. of Mt. Hope Bridge, hole SW of Hog Is.
3. Shallow Water – Many species utilize shallow areas of the bay (<5meters) especially quiet coves for spawning and nursery areas. E.g. Wickford Harbor, coves of the Providence River, Ohio Ledge, around Fox Is., Barren Ledge south of Conimicut Pt.
4. River Mouths – Certain areas around river mouths where fresh and marine waters mix appear to be important to many species. E.g. mouth of the Warren River is an important nursery area.

5. Submerged Aquatic Vegetation (SAV) – Predominately eelgrass (*Zostera marina*), is an important spawning, nursery, refugia, and feeding habitat.
6. Rocky Habitat – These habitats with their associated attached rockweed is important to many species. E.g. tautog & cunner.
7. Kelp Beds – very important for some species like dogfish and skates. E.g. Lower West Passage from Bonnet south, mouth of Sakonnet R. off Sachuest Pt.
8. Salt Marshes – Very important as spawning and nursery areas. Habitat contiguous to salt marshes is also important.
9. Shell Habitat – These areas both living and dead are important to many species.
10. Mud Flats – These areas include the intertidal down to the 1meter contour where there is at least 75% mud. The areas are particularly important to many species of shellfish. E.g. Oakland Beach, Nausauket Beach.

The above are habitat types that may be considered critical for certain life history stages of particular species. It should also be noted that these constitute only the physical habitat, other parameters like dissolved oxygen and nutrient loading are also important "habitat" factors to consider when protecting or restoring critical habitat.

For many species and life history stages what constitutes critical habitat is known. However, the spatial distribution and aerial extent of these habitat types in Narragansett Bay is either not adequately mapped or not mapped at all. In order to implement a program to protect, manage and restore Critical Fish Habitat in Narragansett Bay a comprehensive effort to identify and map these habitat types must be implemented.

The State should initiate a study to identify and map where Critical Fish Habitats currently exist, where restoration efforts should focus and define areas not considered critical fish habitat. Second, better protection of these habitats is needed. Finally, the state needs to look at a framework for how we should be managing Critical Fish Habitats. A model for this effort might be taken form a report done for the state of Maine entitled: *Maine's Coastal Wetlands: I. Types, Distribution, Ranking, Functions and Values* by Alison E. Ward, DEPLW1999-13, Bureau of Land & Water Quality Division of Environmental Assessment, Augusta, ME. September 1999. Once these habitats types are mapped, protection and restoration of Critical Fish Habitat should be a priority for State funding.

The Panel proposes the following process to meet these objectives:

1. Identify funding necessary to develop Critical Fish Habitat (CFH) maps for Narragansett Bay.
2. Develop a Request for Proposal (RFP) including cost estimates to identify and map Critical Fish Habitat (CFH) based on the definitions proposed in this report and applicable existing programs.
3. Once CFH has been identified and mapped initiate a program to fund and monitor other parameters like dissolved oxygen and nutrients to assess their impacts to critical fish habitats.
4. Develop the map resources through existing programs as follows:
5. URI EDC to complete mapping

6. Involve a stakeholder group to review proposed critical fish habitat areas and modify as necessary
7. Identify protection measures which might include the following:
    a. Regulations
    b. Restoration actions
    c. Sanctuary areas/Estuarine Managed or Protected Areas
    d. Direct purchase of riparian rights from water front property owners.
    e. Purchase of conservation easements over a riparian area.
8. Once areas are identified, overlay with restoration projects database and fund restoration projects
9. Fund ongoing seagrass restoration and mapping initiatives (see costs under salt marsh restoration program)

5.0 RECOMMENDED ACTIONS

1. Fully fund CRMC restoration program at $250,000/year USING OSPAR
2. Establish 2 dedicated staff positions—in DEM & CRMC—to coordinate restoration
3. Use 2004 bond measure for additional capital funding for restoration--$2 million
4. Improve coordination within existing programs and between agencies for habitat related management (i.e., wetlands enforcement, wetland permitting and mitigation, waste permitting etc.).
5. The state needs to look into condemning dams that are in disrepair as necessary for habitat restoration
6. There needs to be better coordination between the RIDEM Dam Safety Office and restoration efforts to ensure that fish passage is incorporated into dam repairs as applicable. Dam repairs should consider fishway improvements.
10. The Open Space Bond Fund should include the criteria " potential to protect sensitive coastal habitats" and "includes a coastal feature".
11. Improve river protection working within existing freshwater wetland regulations and programs at CRMC and RIDEM including standards within the 100 and 200 foot riverbank areas. The legal framework already exists within the Wetlands Act. Provisions of the Massachusetts Rivers Protection Act should be reviewed for appropriate application.
12. Consider a "River Restoration bill" that mandates riparian restoration on properties, urban especially, that are being redeveloped. The area to be restored could be proportional to property size and the area being redeveloped or something similar and easy to interpret.
13. Improve coordination between Supplemental Environmental Projects (SEP) program and restoration in order to bring SEP funding to bear on restoration projects.
14. The land protection goals for Narragansett Bay watershed in Massachusetts should be compatible or consistent with the Wild and Scenic River's Management Plan and the Mount Hope Bay/Narragansett Bay Open Space Management Plan.
15. Incorporate requirements of the Estuary Habitat Restoration Act's estuary habitat restoration strategy into the State's Estuary and Coastal Habitat Restoration Strategy. Please refer to Appendix D.

16. Create new statewide wetland maps to update the RIGIS coverage (1988) for improved restoration and conservation planning as well as improved wetland regulatory enforcement. Please refer to Appendix E for further details.
17. Update CRMC seagrass mapping program/website and complete comprehensive seagrass mapping for the state. Please refer to Appendix F for further details.
18. The Rhode Island Capital Fund needs to fund fish passage and river restoration projects.
19. Enforce prohibition on out-of-basin transfers of groundwater to protect flows to rivers and coastal embayments.
20. Fund additional Greenspace Protection projects which will identify and map critical areas for protection; support ongoing prioritization efforts and land acquisition.

6.0 PANEL MEMBERSHIP

Please find the list of panel members in Appendix G.

Tables

Appendix A

Rhode Island Habitat Resource Overview

Appendix B

State Estuary and Coastal Habitat Restoration Strategy

Appendix C

Critical Fish Habitat Definition and Mapping

Appendix D

Estuary Habitat Restoration Act Strategy

Appendix E

Freshwater Wetlands Mapping

Appendix F

Recommendations for Mapping Seagrass Habitats

Appendix G

Panel Composition (Membership)

Appendix A – Rhode Island Habitat Resource Overview

Salt Marshes

Rhode Island salt marshes are found along the shores of salt ponds, the Narragansett Bay estuary, small embayments (such as Allin's Cove in Barrington), and estuarine rivers (such as the Narrow River estuary). Our salt marshes provide nursery grounds and foraging habitat for hundreds of species of fish, shellfish, birds, and mammals. Fish of all sizes, from mummichogs to striped bass, hunt in creeks and ponds. Quahogs and oysters live beneath the surface, while some mussel species, fiddler crabs, and snails occupy intertidal areas. Many kinds of birds visit the marsh to feed on the fish and invertebrates: osprey and herons, and a variety of ducks, and seaside sparrows that nest in the marsh. In addition to their habitat value, salt marshes serve as natural pollution treatment systems by filtering out pollutants before they reach our coastal waters. The location of salt marshes between our developed coastal communities and the waters of the state also provides a buffer during storms and flooding.

Seventy-five percent of commercial fish species depend on estuaries for their primary habitat, spawning grounds, and nursery areas. In Rhode Island, the role that salt marshes play in our economy is evidenced by our 75 million dollar commercial fishery and a recreational fishery valued at 150 million dollars. The sweeping vistas afforded by the low lying salt marsh landscape contribute immeasurably to the beauty and serenity of Rhode Island's coastline, as well as our tourism and outdoor recreation industry, which is valued at 2 billion dollars on Narragansett Bay alone.

It is estimated that 60% of Rhode Island's salt marshes have been filled with mud and sand dredged during navigation projects or waste material derived from upland sources (Save The Bay 2002). Downtown Providence was once known as the Great Salt Cove, prior to filling and conversion to uplands. Marshes can be completely filled or they can be partially filled, altering the tidal exchange of seawater, and impacting vegetation communities that rely on twice-daily flooding. Often the result of such changes in elevation and flooding is the invasion by undesirable species such as *Phragmites australis* (common reed). *Phragmites* is very tolerant of disturbed sites, and can rapidly overtake such areas.

Construction of dikes, roads and rail crossings has resulted in the degradation of many marshes in Rhode Island. Restriction of tidal flow by installation of small culverts or drainage pipes under roads and rail beds leads to changes in salinity and alteration of the natural vegetation community due to a reduction in duration and frequency of tidal flooding. *Phragmites*, which is tolerant of these altered conditions, especially reduced salinity, often invades rapidly in areas that have been culverted or diked. *Phragmites* out-competes native salt marsh vegetation, and reduces local biodiversity. Some 1200 of the existing 3700 acres of salt marsh in Narragansett Bay are impacted by *Phragmites* and other invasive plant species (Save The Bay 2002).

Summary Statistics for Narragansett Bay Marshes (Tiner et al. (2003))

- 4,021 acres in need of restoration
- 900 acres of converted coastal wetlands (saltwater to freshwater, wetland to upland)
- 2/3 of restoration sites occur on private land
- 50% of the restoration sites are impacted by off site stresses
- 80% of the restoration sites are smaller than 1 acre
- 56% of coastal wetlands do not have adequate buffer zones
    - 33% of Buffer Zone is Single Family homes/Lawn
    - 22% of Buffer Zone is Forest
    - 15% of Buffer Zone is Rangeland
    - 8% of Buffer Zone is Commercial

- 6% of Buffer Zone is Industrial

- 48% of Restoration Sites are Tidally Restricted

Anadromous Fish

Anadromous fish runs in Rhode Island occur in rivers, streams, and adjacent areas that drain into coastal ponds, Narragansett Bay, and Block Island Sound. Many of these systems are used by anadromous species for spawning and as nursery areas. River herring (alewife and blueback herring), Atlantic salmon, rainbow smelt, sturgeon, and American shad depend on unrestricted passage upstream to complete their life cycle. These species spawn in fresh water; where the eggs hatch and larvae grow into juveniles. Juveniles nursery in freshwater before migrating to salt water where they mature and spend most of their lives. As adults they return to their natal stream each spring to spawn.

Conversely, American eels are catadromous fish, living in lakes and ponds as adults. They migrate downstream and eventually far out into the Atlantic, where they spawn and die in the Sargasso Sea. Their newly born young, less than an inch long, travel on ocean currents back to their natal Rhode Island's rivers and streams to grow and live until they return to the ocean to spawn.

Many of Rhode Island's rivers are blocked or obstructed by dams, weirs, tide gates, highway structures and other water-control structures. In addition to unobstructed passage through the water, migratory fish need healthy riparian areas whose vegetation provides cover, bank stabilization, and temperature regulation. Riparian vegetation also provides detritus (leaf litter, wood, etc.), which forms the base of the riverine food chain. Recreational and commercial fisheries benefit when river corridors remain healthy and passable to migratory fish (Save the Sound, Inc. 1998).

Rhode Island once supported lucrative fisheries for Atlantic salmon, shad, and river herring (alewife and blueback herring). Prior to European colonization, Native Americans depended on the spawning runs of herring and salmon as staples. Accounts by Roger Williams, Verrazano, and other explorers and colonists describe the astounding productivity of the Bay's tributaries.

During colonial times, dams were constructed throughout Rhode Island to harness water power. The advent of the Industrial Revolution in the late 18th century resulted in an increased number of larger dams. By the early 20th century, over 500 dams had been constructed in Rhode Island streams and rivers, with disastrous effects on anadromous fish runs. The Atlantic salmon fishery was lost by 1870. The river herring harvest was significantly depleted by 1930. Although commercial fisheries for these species are not currently viable, some runs still persist (*e.g.*, Gilbert Stuart Brook and Annaquatuck River in North Kingstown).

Seagrass Beds

Rhode Island's primary seagrass is eelgrass, one of the most important habitats in our estuarine waters. Eelgrass provides many ecologically valuable functions. It produces organic material that becomes part of the marine food web; helps cycle nutrients; stabilizes marine sediments; and provides important habitat.

Many species of fish and wildlife depend on eelgrass. Eelgrass beds provide protection for bay scallops, quahogs, blue crabs and lobsters. Atlantic silverside (*Menidia menidia*) and other fish lay their eggs on the surface of eelgrass leaves, and young starfish, snails, mussels, and other creatures attach themselves

to the plant. Waterfowl such as brant feed on eelgrass. Studies in New England have documented the occurrence of 40 species of fish and 9 species of invertebrates in eelgrass beds.

Eelgrass was widespread in Narragansett Bay as late as the 1860s. Historical accounts record eelgrass beds in the lower Providence River, at the head of the Bay. During the 1930s wasting disease, a widespread infection partly attributed to the slime mold *Labryinthula zosterae* decimated Atlantic coast eelgrass populations (Short et al. 1987, 1988). Some recovery was documented up until the 1960's. Since 1960, there has been a 40% decline in Narragansett Bay's eelgrass beds. Approximately 200 acres of eelgrass remain in Narragansett Bay today (Save The Bay 2002).

Nine coastal ponds located along Rhode Island's South Shore were historically maintained as brackish systems through natural, seasonal breaches in the barrier beaches, which separate them from the open ocean. Permanent breachways were constructed at these five ponds (Point Judith, Ninigret, Winnapaug, Quonochontaug and Green Hill) during the 1950s and early 1960s. Construction of the permanent breaches has resulted in significant changes to the ecology of the ponds. Salinity has increased changing the ponds from a fresh/seasonally brackish system dominated by widgeon grass (*Ruppia maritima*) to a marine system dominated by eelgrass. Faunal changes have accompanied the changes in the submerged aquatic vegetation community and salinity regime. Sedimentation has increased as a result of the permanent breachways. Flood tidal shoals are expanding within the ponds, encroaching upon eelgrass and shellfish bed habitat. Natural flow regimes are present in three of the nine coastal salt ponds and continued support of natural conditions at these sites is recommended; conservation protection is ongoing at these sites.

Critical Fish Habitats

Information from the literature and field studies has helped identify and characterize what may be considered Critical Fish Habitat for various estuarine and marine fish species in Rhode Island waters. However, a comprehensive program to identify and map these habitats does not currently exist, making it difficult to evaluate the status of CFH in Rhode Island waters. What we do know is that certain types of CFH are more impacted than others as a result of certain human activities. These include: dredging, filling, marina & residential development, boating activity, utility development, shoreline changes, shading from structures, point source and non-point source discharges. Since most of these activities are associated with the shoreline and shallow water habitat, most adverse impacts to Critical Fish Habitats occur in the areas from the intertidal area seaward to a depth of around five meters, e.g. salt marshes, shallow water habitat and submerged aquatic vegetation (SAV). Other types of CFH are also impacted by human activities, many of which are a result of the shallow water activities mentioned above. In order to quantify the associated impacts of these activities on CFH it is necessary to first have good base maps that identify the spatial distribution and aerial coverage of these habitat types. Using these maps it will be possible to quantify of the status of Critical Fish Habitat in Rhode Island.

In summary, we know that populations of many estuarine and marine fish species are at historic lows. This is attributed to a number of environmental and human induced factors, over-fishing being one of them. Over the past years there has been a concerted and partially successful effort by fisheries managers to bring over-fishing under control. However, it is more difficult to quantify the negative impacts on fisheries resources from habitat loss or degradation. With a comprehensive critical habitat mapping effort it will be possible to assess the impacts of habitat degradation and loss on fish populations.

Freshwater Wetlands

The following text has been taken from (Golet, Myshrall, Bradley, and Miller, 2002) and (Miller and Golet, 2001).

Wetlands include a wide variety of areas that are intermediate in wetness between deep water and dry land; they are commonly known as marshes, swamps, bogs, fens, wet meadows, ponds, and streams (Cowardin et al. 1979). Some wetlands have shallow, permanent surface water; others have surface water only seasonally; and still others never have surface water, but have soil that is saturated for extended periods each year.
http://www.state.ri.us/dem/programs/benviron/water/wetlands/woonrest/files/P2.pdf

For more than 200 years, Americans drained, filled, polluted, or otherwise altered the wetlands of this country with little thought for the benefits that these ecosystems provide (Mitsch and Gosselink 2000). By the 1960s, we had begun to recognize both the values of wetlands and the hazards associated with living in or near them. Among the most widely recognized benefits of wetlands are flood storage and desynchronization, water quality improvement, fish and wildlife habitat, groundwater recharge and discharge, recreation, aesthetics, education, and open space (Greeson et al. 1979, Adamus et al. 1991, U.S. Army Corps of Engineers 1995). Recognition of the benefits and hazards of wetlands led to the passage of both the Rhode Island Freshwater Wetlands Act and the Rhode Island Coastal Resources Management Act in 1971. Since then, land use in and adjacent to our State's wetlands has been regulated by the Department of Environmental Management (and its predecessor, the Department of Natural Resources) and the Coastal Resources Management Council.
http://www.state.ri.us/dem/programs/benviron/water/wetlands/woonrest/files/P2.pdf

The vast majority of freshwater wetlands within the State are privately owned. Only 16.2% are protected by Federal, State, or municipal governments, or by nongovernmental conservation organizations such as land trusts, The Nature Conservancy, and the Audubon Society of Rhode Island. The Federal government owns only 239.4 acres of the State™s freshwater wetlands (less than 1%). These wetlands are concentrated in coastal watersheds (i.e., the Coastal Basin, Narragansett Bay Basin, and Point Judith Sub-basin of the Saugatucket River Basin). The State owns 60% of all protected wetlands (10,890.4 acres); each of Rhode Island™s watersheds contains State-owned freshwater wetlands. Freshwater wetlands owned by municipal governments and nongovernmental organizations also are found in each of the watersheds. Municipal governments own 4,528.3 acres of freshwater wetland; nongovernmental organizations own 2,423.0 acres.
http://www.state.ri.us/dem/programs/benviron/water/wetlands/pdfs/strategy.pdf

Fifty-one square miles in area, the Woonasquatucket River watershed is a microcosm of Rhode Island and of southern New England in general, both in terms of its natural resources and human land use. The watershed extends from the rural headwaters of North Smithfield and Glocester in the north and west to the urban landscapes of Johnston, North Providence, and Providence in the south and east; it ultimately discharges into the northern end of Narragansett Bay. The Town of Smithfield is contained almost entirely within the watershed and encompasses 46% of the watershed's total area. As of 1988, the Woonasquatucket River watershed contained 4,817 acres, or roughly 4%, of the State's freshwater wetlands (Miller and Golet 2001). Freshwater wetland covers 15% of the watershed's area (Fig. 1). Forested swamps and shrub swamps comprise 68% of the wetlands, lakes and ponds account for 24%, marshes comprise 4%, riverine wetlands make up less than 2%, and fens and bogs also comprise less than 2% (Miller and Golet 2001). Statewide, 16% of all freshwater wetland acreage is protected through ownership by federal, State, or municipal governments or nongovernmental conservation organizations (Miller and Golet 2001). In the Woonasquatucket River watershed, only 3.8% of the wetland area is so protected. In the Woonasquatucket, 61 acres of wetland are owned by the State, 68 acres are in

municipal ownership, and 56 acres are owned by nongovernmental conservation organizations; none of the wetlands are federally owned (Miller and Golet 2001). More than 4,600 acres of wetland are privately owned. http://www.state.ri.us/dem/programs/benviron/water/wetlands/woonrest/files/P2.pdf

There are no data on wetland losses in the Woonasquatucket River watershed; however, it is clear from a comparison of aerial photographs from the 1930's and the 1990's that wetland losses and degradation in the Woonasquatucket River watershed have been great. Some of the principal causes of wetland destruction include gravel mining and associated filling; highway construction; and residential, commercial, and industrial development. Urbanization and agriculture also have impacted existing wetlands by modifying the land and vegetation along their borders. These wetland alterations have adversely affected the entire watershed through water quality degradation, increased flooding, and the loss of valuable wildlife habitat.

http://www.state.ri.us/dem/programs/benviron/water/wetlands/woonrest/files/P2.pdf

Riparian Buffer Areas

A riparian forest buffer is an area of trees, shrubs, and other vegetation located adjacent to rivers, streams, lakes, ponds, and wetlands. These areas are important for protecting water quality and reducing flooding. Paved streets and parking lots, agricultural practices, urbanization, automobiles, lawns, and industrial operations, all contribute to the amount of runoff and harmful pollutants making their way into our surface waters and wetlands. Riparian forest buffers and forested wetlands act as natural filters to remove sediments and pollutants from water making its way through the watershed. These natural buffers improve overall water quality for drinking, fishing, and recreation. Values of Forest Buffers include:

- Filter out sediments, nutrients, pesticides, and other pollutants
- Provide habitat for plants and animals
- Absorb excessive stormwater and reduce streambank erosion
- Moderate water temperatures by providing shade
- Reduce the need for treatment facilities for drinking water
- Enhance aesthetics and provide recreational opportunities
- Provide areas to replenish groundwater
- Link parcels of open space, providing greenways between communities
- Provide opportunities for nature viewing and environmental education

Streamside forests are crucial for the protection and enhancement of water resources in Rhode Island. One of the key tools for preserving water quality in a watershed is by protecting key riparian areas from development. Greenspace protection projects, like those in the South County and Woonasquatucket watersheds, identify and map the natural assets in a watershed and develop a comprehensive plan to protect these resources. A number of options may be employed including purchase of development rights, using creative land use techniques to preserve meaningful open space, and the purchase of critical parcels. The ultimate goal is to use the planning process to protect the natural, cultural and recreational resources within a watershed. As a result of the South County Greenspace project, 495 acres of land identified by the project were protected through the last open space grant round totaling over $2 million.

In areas where the buffer has been removed due to historic human impact, restoration should be considered wherever possible. As stated above, the state does not currently have a program for riparian restoration. However, the RIDEM has placed a new emphasis on identifying sites for riparian restoration. A riparian site identification plan was completed for the Woonasquatucket River Watershed. This work was funded through a US Forest Service grant to RIDEM. Currently the Woonasquatucket Watershed is the focus of a special riparian restoration project by the Natural Resources Conservation Service primarily because the funding for restoration is available and the Woonasquatucket is the only watershed with a restoration plan. RIDEM has recently awarded the Pawtuxet Water Authority a nonpoint grant to create a similar plan for that watershed. In addition, RIDEM just received notice that the US Forest Service will fund an additional Riparian study, this time in the watersheds surrounding Greenwich Bay. This area includes, the Greenwich Bay watershed, Buckeye Brook Watershed, and the Maskerchugg River.

Coastal Uplands

Undeveloped coastal uplands include rocky shores and bluffs, barrier beaches and dunes, coastal shrublands and woodlands. These support globally rare to uncommon natural communities (NatureServe 2003) such as maritime forests and coastal shrublands that occur only within a narrow band along the coast and that have suffered significant losses to development. These areas are also critical resting and refueling habitat for migratory songbirds. Studies on Block Island alone show that the island provides stopover habitat for tens of thousands of spring and fall migrant birds each year (Reinert et al. 2000). Likewise, undeveloped rocky and sandy shorelines are stopover habitat for migratory shorebirds. These coastal uplands are also critical buffer to the estuary habitats identified elsewhere in this plan; saltmarshes, eelgrass beds and fish habitats. Coastal uplands that support multiple functions towards conservation should be given higher priority for protection. *^^Add comment about the value to recreation, viewscape, like under saltmarsh section??? Here's a wild stab at that:* The undeveloped shorelines and coastlines offer spectacular views, provide recreational opportunities and access to the bay from on-shore and support a number of recreational and economic values associated with Bay activities. Looking across the bay towards shore, the marshes and the uplands of Prudence Island, the east shore of the Sakonnet River, Sachuest National Wildlife Refuge, Block Island and are among the most memorable views from the Bay.

NatureServe. 2003. Ecological systems of United States: Northeastern U.S. subset. Report generated Nov 17 2003 from the International Vegetation classification: Terrestrial Vegetation, NatureServe Central Databases, Arlington VA.

Reinert, S. E., E. Lapham and K. Gaffett. 2002. Landbird migration on Block Island: community composition and conservation implications for songbird stopover habitat. *pgs 151-163 in* P. Paton et al., editors. The Ecology of Block Island: Proceedings of the Rhode Island Natural History Survey Conference Oct 28 2000. RI Natural History Survey, Kingston RI.

Appendix B. State Estuary and Coastal Habitat Restoration Strategy

The Rhode Island Habitat Restoration Team, pursuant to the Coastal and Estuary Habitat Restoration Program and Trust Fund, drafted and adopted the State Estuary and Coastal Habitat Restoration Strategy. The legislation mandates that a strategy be established with "comprehensive public, agency, legislative and stakeholder participation." (RIGL § 46-23.1-5).

In so doing, the Team, comprised of public, agency, legislative and stakeholder participation, developed a CRMC approved strategy that incorporates the following elements: a description of the state's coastal and estuarine habitats, restoration goals, inventory of restoration projects, projected comprehensive budget and timeline to complete the goals, funding sources, an outreach element, and provisions for updating the plan and project inventory. The Team conducted meetings beginning on June 2, 2002 on a regular basis during FY03 to assess potential, as well as on-going, restoration projects throughout Rhode Island based on the adopted Strategy.

According to the Strategy, habitat restoration grant monies are dispersed in accordance with § 46-23.1-5(2) which allocates funding for design, planning, construction or monitoring. Eligible applicants include cities and towns; any committee, board, or commission chartered by a city or town; nonprofit corporations; civic groups, educational institutions; and state agencies.

Decision Criteria

The Decision Criteria used is detailed in RIGL § 46-23.1, and subsequently adopted within the State of Rhode Island Estuary and Coastal Habitat Restoration Strategy (Section D of the Strategy), and follows:

(1) consistency with the state estuary and coastal habitat restoration strategy, the Narragansett Bay comprehensive conservation and management plan, the state coastal nonpoint pollution control plan, the coastal resources management program, the department of environmental management regulations, the anadromous fish restoration plan, and pertinent elements of the state guide plan;
(2) the proposed timeline of the project (projects slated to begin sooner rather than later will be given greater preference);
(3) the ability of the applicant to provide adequate personnel funding, and authority to carry out and properly maintain the estuary and coastal habitat restoration activity;
(4) the proposed monitoring plan to ensure that short-term and long-term restoration goals are achieved; a final report given back to the TAC outlining what the project accomplished;
(5) the effectiveness of any nonpoint source pollution management efforts upstream and the likelihood of re-impairment;
(6) whether the estuary and coastal habitat restoration activity can be shown to improve or replace habitat losses that benefit fish and wildlife resources;
(7) potential water quality improvements;
(8) potential improvements to or replacements of fish and wildlife habitats for species which are identified as rare or endangered by the Rhode Island Natural History Survey or the federal Endangered Species Act;
(9) the level and extent of collaboration by partners (e.g., municipality, ngo, watershed council, federal agency, etc.);
(10) potential direct economic and educational benefits to a community or the state; and
(11) ability of applicant to secure matching funds, whether the funds be NGO, state or federal dollars.

Evaluation and Process

An open and competitive process solicited applications for restoration projects state-wide, ranging from salt marsh restoration to the construction of fish ladders in urban rivers. The applicants adhered to an application format developed by the Team where the applicant had to submit the following information to CRMC: a description of the project which included the type of restoration initiative to take place, the historical impact to the site, the natural resources benefited and impacted (target species), any physical, ecological, biological, cultural/historical, geological and survey data collected to date, a site map, any

available aerial photography and photographs of the site, preliminary restoration drawings, maps and engineering plans, and proof of property owner permission for the restoration activity to take place.

On October 6, 2002, the Team reviewed applications submitted to CRMC and selected eight habitat restoration projects to receive funding for FY03 based on the factors to be considered for the purposes of granting monies for estuary and coastal habitat restoration activities as stated in the legislation.

Appendix C. Critical Fish Habitat Definition and Mapping

In order to delineate critical fish habitat in Narragansett Bay, it first must be defined. A broad definition could use the NOAA Fisheries Essential Fish Habitat (EFH) definition used in the Magnuson-Stevens Act in the Sustainable Fisheries Act. The act defines EFH as "*…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."* To further provide guidance and ensure consistency in the interpretation of this definition *"Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate: "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species full life cycle.*

Using this definition all Rhode Island marine waters are considered EFH; protecting and/or managing these areas would be impractical. However, under EFH important habitats are further refined into Habitats Areas of Particular Concern or HAPCs.

HAPC's are discrete areas within EFH that provide important ecological functions and/or are especially vulnerable to degradation. The designation of HAPC's is a valuable way to recognize areas where we have detailed data on ecological function and/or habitat vulnerability that allows us to target these areas for protection and/or restoration. Critical Fish Habitat (CFH) and HAPCs could be defined similarly.

The above are habitat types that may be considered critical for certain life history stages of particular species. It should also be noted that these constitute only the physical habitat, other parameters like dissolved oxygen and nutrient loading are also important "habitat" factors to consider when protecting or restoring critical habitat.

For many species and life history stages what constitutes critical habitat is known. However, the spatial distribution and aerial extent of these habitat types in Narragansett Bay is either not adequately mapped or not mapped at all. In order to implement a program to protect, manage and restore Critical Fish Habitat in Narragansett Bay a comprehensive effort to identify and map these habitat types must be implemented.

To assist in this mapping effort there are existing resources that can be used to identify where these critical habitats are located and aid in their mapping. Two important resources are: The Rhode Island Marine Resources Use website at http://www.edc.uri.edu/fish/default.html, this site has good bathymetry maps; and the publication by Chinman, R.A. and S. W. Nixon. 1985. titled *Depth-area-volume relationships in Narragansett Bay*. NOAA/Sea Grant Marine Technical Report 87. 64p. Both provide good data on depth contours, their spatial distribution in the bay, the area of each and the volume of water overlaying each depth strata. These data will provide valuable baseline data for developing Critical Fish Habitat maps.

Appendix D. Estuary Habitat Restoration Act Strategy

Incorporate requirements of the Estuary Habitat Restoration Act's estuary habitat restoration strategy into the State's Estuary and Coastal Habitat Restoration Strategy The State Strategy should reflect the Estuary Habitat Restoration Strategy, 33 USC Sec. 2905, by including the following provisions:
(d) Elements of the strategy
The estuary habitat restoration strategy shall include proposals, methods, and guidance on -
(1) maximizing the incentives for the creation of new public-private partnerships to carry out estuary habitat restoration projects and the use of Federal resources to encourage increased private sector involvement in estuary habitat restoration activities;
(2) ensuring that the estuary habitat restoration strategy will be implemented in a manner that is consistent with the estuary management or habitat restoration plans;
(3) promoting estuary habitat restoration projects to -
(A) provide healthy ecosystems in order to support -
(i) wildlife, including endangered and threatened species, migratory birds, and resident species of an estuary watershed; and
(ii) fish and shellfish, including commercial and recreational fisheries;
(B) improve surface and ground water quality and quantity, and flood control;
(C) provide outdoor recreation; and
(D) address other areas of concern that the Council determines to be appropriate for consideration;
(4) addressing the estimated historic losses, estimated current rate of loss, and extent of the threat of future loss or degradation of each type of estuary habitat;
(5) measuring the rate of change for each type of estuary habitat;
(6) selecting a balance of smaller and larger estuary habitat restoration projects; and
(7) ensuring equitable geographic distribution of projects funded under this chapter.

When prioritizing potential habitat restoration projects, the [TEAM? Council?] shall give priority consideration to a project if, in addition to meriting selection based on the 11 selection factors the project occurs within a watershed in which there is a program being carried out that addresses sources of pollution and other activities that otherwise would re-impair the restored habitat; or
(B) the project includes pilot testing of or a demonstration of an innovative technology having the potential for improved cost-effectiveness in estuary habitat restoration.

Appendix E. Freshwater Wetlands Mapping

Recommendations for Mapping Freshwater Wetlands

At the request of the DEM Office of Water Resources, and with funding by the EPA, Region 1, the University of Rhode Island surveyed and assessed the needs of Rhode Island's wetland map users, and consulted with regional mapping experts to identify suitable methods to meet map users needs. The consensus among experts is that color-infrared (CIR) aerial transparencies are best for wetland mapping (Miller, Golet, and August, 2001). Most experts recommended 1: 12,000 or larger-scale photographs. The use of satellite imagery for wetland mapping was not recommended. The Digital Transfer scope, an instrument to register photo-interpreted delineations to a base map, is recommended. Most experts recommended creating new maps instead of improving the existing RIGIS dataset. All of the experts felt strongly that maps should never be used as the sole means for determining wetland regulatory

boundaries, regardless of map scale. A number of experts recommended modeling a RI wetland mapping projects after and ongoing project in Massachusetts.

Following are a series of options and recommendations for improving Rhode Island's wetland map data (Miller, Golet, and August, 2001).

1. We strongly recommend that the State undertake an effort to improve upon existing wetland map resources. This recommendation is based on widespread user dissatisfaction with existing maps and technical problems with those maps. Specifically, we recommend that:

- 1:12,000-scale, color-infrared aerial photography should be used as the source imagery. *****
  - If funds are available, 1:5,000-scale, color-infrared aerial photography could be used to create more accurate, detailed maps.
  - If funding is very limited, 1:24,000-scale, color-infrared aerial photography could be used as a substitute.
- Procedures should be modeled after current wetland mapping efforts in Massachusetts, with the addition of Digital Transfer Scope (DTS) technology.

2. If funding opportunities are extremely limited, and creation of new wetland maps is not feasible, the existing RIGIS wetland dataset should be improved by re-transferring the delineations from the 1988, 1:24,000-scale, black-and-white aerial photographs, using a DTS. However, because of the limitations of map data created from panchromatic, small-scale photography, it would be highly preferable to create new maps.

* Cost estimate provided by UMASS, NRAG (March 2003): $700,000.00 using 1: 12,000 scale CIR photographs and digital transfer scope technology.

Appendix F. Recommendations for Mapping Seagrass Habitats

Priority for Immediate Applications

- Remote sensing studies to re-map eelgrass beds in Rhode Island are necessary. Current distribution is now based upon seven year old data. This will be necessary in order to quantify eelgrass abundance trends in the state.
- Bathymetric mapping and re-sampling could be conducted on a statewide level
- using new technology, side scan sonar, especially focusing on near shore areas not covered by NOS surveys. This will improve the accuracy of the PTSI model and minimize chances of modelling intertidal or exposed areas.
- An eelgrass reference site monitoring program should be established to properly determine restoration site performance success in relation to naturally occurring eelgrass populations. This will allow us to answer the question of whether restoration success is due to a good year or bad year for eelgrass.

Long Term Research Questions

1. Light monitoring should be considered throughout RI state waters at fine spatial and temporal resolution – with a focus on measurements of light during the growing season—March through November
2. Updated PTSI models should be run and tested on existing eelgrass populations to test monitoring data thresholds and sites should be stratified by location. Eelgrass beds growing in different regions of the state are known to express phenotypic differences, such as the timing of flower initiation and seed release dates.
3. Subaquaous soil mapping should be conducted and an evaluation of the value of these data to restoration be undertaken. Soils are critical to the establishment of eelgrass plants and seeds, as stated in the first portion of this paper. Soil mapping units may provide a better understanding of water quality conditions as well, as high organic/anoxic sediment map units will invariably covary with areas of nutrient enrichment and poor potential seagrass habitat which may be difficult to quantitatively capture in the current habitat factors.
4. Macroalgae Population Monitoring: Drift algae and sessile forms should be assessed statewide to quantify the potential for macroalgal production. This can be done either by remote sensing or population sampling techniques. Again, the lack of any database to incorporate into the PTSI model required that field surveys be conducted and incorporated into the "expert testimony" data layer. Many of the test sites that failed were caused by macroalgal smothering. Many locations that were identified in the PTSI model met the light requirements for eelgrass but vast areas of these locations are severely impacted by macroalgae production, especially the drift algae *Ulva lactuca*. This data has the potential to vastly improve the ability of the PTSI model to select appropriate restoration sites.
5. Temperature monitoring data should be interpolated using remote sensing techniques similar to work performed by Dr. Jack Mustard, Brown University, to map seasonally high water temperature regions. This data will be very useful for the site selection process. Further testing of temperature and plant growth threshold limits should be conducted to validate the whether the 25 C temperature threshold is applicable to RI eelgrass populations.
6. Test sites need to be continually executed on a seasonal basis, ideally spring and fall test transplants should be conducted at sites over multiple years. This will assist restoration practitioners in a number of ways: to determine appropriate sites to invest in full scale restoration, to support further calibration and validation of the PTSI model, and to test whether certain locations are more suited for Fall or Spring transplanting

Water Current Speed Data layer, interpolated for RI coastal waters; will provide an important data set for site selection models. Again, current speed threshold values will need to be determined by empirical studies to develop a reasonable basis for site rejection and approval.

Appendix G. Panel Composition

Panel Membership:

Laura Ernst, ESS Group, Inc., Chairperson
Megan Higgins, RI Coastal Resources Management Council
Tom Ardito, Narragansett Bay Estuary Program
Fred Presley, RI Department of Environmental Management Sustainable Watersheds Office
Chris Powell, RI Department of Environmental Management Division of Fish and Wildlife
Phil Edwards, RI Department of Environmental Management Division of Fish and Wildlife
Tom Halavik, US Fish and Wildlife Service
Hunt Durey, Massachusetts Office of Coastal Zone Management, Wetlands Restoration Program
Wenley Ferguson, Save The Bay

Jim Turek, National Oceanic and Atmospheric Administration Restoration Center
Julie Lundgren, The Nature Conservancy
Chris Hatfield, Army Corps of Engineers
Andy Lipsky, Natural Resources Conservation Service