Appendix 1

Coastal and Estuarine Planning Area Municipalities

Connecticut's Coastal and Estuarine Planning Area includes the following municipalities and their political subdivisions (or portions thereof shown in Figure 1) authorized to own land. Municipalities in **bold font** are 'coastal municipalities' defined by the Connecticut Coastal Management Act and highlighted here to indicate that the Coastal and Estuarine Planning Area is significantly larger than the area defined by the boundaries of Connecticut's 36 coastal cities and towns.

Branford
Bridgeport
Chester
Clinton
Cromwell
Darien
Deep River
East Haddam
East Hampton
East Hartford
East Haven
East Lyme
East Windsor
Enfield
Essex
Fairfield
Glastonbury
Greenwich
Groton
Guilford
Haddam
Hamden
Hartford
Ledyard
Lyme
Madison
Middletown
Milford
Montville
New Haven
New London
North Haven
North Stonington
Norwalk
Norwich
Old Lyme
Old Saybrook
Orange
Portland
Preston
Rocky Hill
Shelton
South Windsor
Stamford
Stonington
Stratford
Suffield
Waterford
Westbrook
West Haven
Westport
Wethersfield
Windsor
Windsor Locks

Appendix 2

Connecticut's Coastal Resources
as defined in the Connecticut Coastal Management Act-
Connecticut General Statutes (CGS) Section 22a-93(7)

BEACHES AND DUNES

"Beaches and Dunes" means beach systems including barrier beach spits and tombolos, barrier beaches, pocket beaches, land contact beaches and related dunes and sandflats. CGS section 22a-93(7)(C)

BLUFFS AND ESCARPMENTS

"Coastal Bluffs and Escarpments" means naturally eroding shorelands marked by dynamic escarpments or sea cliffs which have slope angles that constitute an intricate adjustment between erosion, substrate, drainage and degree of plant cover. CGS section 22a-93(7)(A)

COASTAL HAZARD AREAS

"Coastal Hazard Areas" means those land areas inundated during coastal storm events or subject to erosion induced by such events, including flood hazard areas as defined and determined by the National Flood Insurance Act, as amended (U.S.C. 42 Section 4101, P.L. 93-234) and all erosion hazard areas as determined by the commissioner. CGS section 22a-93(7)(H)

COASTAL WATERS AND ESTUARINE EMBAYMENTS

"Coastal Waters" means those waters of Long Island Sound and its harbors, embayments, tidal rivers, streams and creeks, which contain a salinity concentration of at least five hundred parts per million under the low flow stream conditions as established by the commissioner. CGS section 22a-93(5)

"Nearshore Waters" means the area comprised those waters and their substrates lying between mean high water and a depth approximated by the ten meter contour. CGS section 22a-93(7)(K)

"Offshore Waters" means the area comprised of those waters and their substrates lying seaward of a depth approximated by the ten meter contour. CGS section 22a-93(7)(L)

"Estuarine Embayments" means a protected coastal body of water with an open connection to the sea in which saline sea water is measurably diluted by fresh water including tidal rivers, bays, lagoons and coves. CGS section 22a-93(7)(G)

DEVELOPED SHOREFRONT

"Developed Shorefront" means those harbor areas which have been highly engineered and developed resulting in the functional impairment or substantial alteration of their natural physiographic features or systems. CGS section 22a-93(7)(I)

FRESHWATER WETLANDS AND WATERCOURSES

"Freshwater Wetlands and Watercourses" means "wetlands" and "watercourses" as defined by CGS section 22a-38 and CGS section 22a-93(7)(F).

"Wetlands" means land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and flood plain by the National Cooperative Soil Survey, as may be amended from time to time, of the Soil Conservation Service of the United States Department of Agriculture. CGS section 22a-38(15)

"Watercourses" means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, public or private, which are contained within, flow through or border upon this state or any portion thereof, not regulated pursuant to sections 22a-28 to 22a-35, inclusive. CGS section 22a-38(16)

GENERAL RESOURCE

"Coastal Resources" means the coastal waters of the state, their natural resources, related marine and wildlife habitat and adjacent shorelands, both developed and undeveloped, that together form an integrated terrestrial and estuarine ecosystem. CGS section 22a-93(7)

INTERTIDAL FLATS

"Intertidal Flats" means very gently sloping or flat areas located between high and low tides composed of muddy, silty and fine sandy sediments and generally devoid of vegetation. CGS section 22a-93(7)(D)

ISLANDS

"Island" means land surrounded on all sides by water. CGS section 22a-93(7)(J)

ROCKY SHOREFRONT

"Rocky Shorefront" means shorefront composed of bedrock, boulders and cobbles that are highly erosion-resistant and are an insignificant source of sediments for other coastal landforms. CGS section 22a-93(7)(B)

SHELLFISH CONCENTRATION AREAS

"Shellfish Concentration Areas" means actual, potential or historic areas in coastal waters, in which one or more species of shellfish aggregate. CGS section 22a-93(7)(N)

SHORELANDS

"Shorelands" means those land areas within the coastal boundary exclusive of coastal hazard areas, which are not subject to dynamic coastal processes and which are comprised of typical upland features such as bedrock hills, till hills and drumlins. CGS section 22a-93(7)(M)

TIDAL WETLANDS

"Tidal Wetlands" means "wetland" as defined by CGS Section 22a-29. CGS section 22a-93(7)(E)

"Wetland" means those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters, and whose surface is at or below an elevation of one foot above local extreme high water; and upon which may grow or be capable of growing some but not necessarily all, of the following: (wetland vegetation - see CGS section 22a-29(2) for complete list of species).

Appendix 3

Coastal Land Assessment Methodology (CLAM) Results Summary

Coastal Land Assessment Methodology, or CLAM, is a computer assisted coastal land conservation planning tool developed to assist in identifying coastal Connecticut's larger remaining unprotected parcels with potentially significant conservation value. Approximately 28,000 tax parcels within a 105 square-mile study area, generally defined by a line 1,000 feet inland of coastal waters, were evaluated to identify significant parcels warranting further investigation (see Table 1 below for parcel evaluation criteria).

Table 1.
CLAM Parcel Evaluation Criteria

Criteria	Score
Waterfront (all water within coastal boundary)	1
Adjacent to Protected Open Space (POS)	1
<25% Developed	1
Adjacent to LIS Stewardship Inventory Area	1
Contains Sandy Beach	1
Adjacent to Tidal Wetland	1
Adjacent to Inland Wetland	1
Within NDDB (rare species) Area	1
Outstanding Natural Feature (e.g., gorge)	-
Total	*8*

The conservation value of parcels greater than 25 acres and less than 25 percent developed were initially classified using these criteria. Subsequently, the parcel's development potential and the opinions of DEP resource management specialists were used to further evaluate each parcel's conservation priority. Each parcel's conservation value has been preliminarily classified into one of three "tiers" as summarized in Table 2. As additional parcel information becomes available through consultation with municipal agencies, land trusts and others, a parcel's conservation value is reassessed.

Table 2.
Preliminary Assessment of CLAM Parcels' Conservation Value

Higher Conservation Value ----> Lower Conservation Value

Conservation Priority	Tier I	Tier II	Tier III	Total
# parcels	16	40	22	78

To date, 78 parcels greater than 25 acres have been identified as having conservation value of potential *statewide* significance. Only 25 parcels greater than 50 acres exist. Detailed tax parcel scale information is being collected to further assess these parcels' resource value, ownership, potential threats, and conservation priority. The CLAM project database also contains limited information for an additional 60 parcels identified as having *local* conservation value. Further investigation of these parcels' conservation value may be warranted at the local level.

Data collected through CLAM can be used to develop strategies to conserve the most significant remaining unprotected areas along Connecticut's coast. Developing a successful conservation strategy will require that state and federal natural resource management agencies partner with municipal conservation commissions, land trusts and other interested local conservation organizations. CT DEEP worked with land trusts and municipal commissions to learn more about parcels identified through CLAM and to develop partnerships to conserve the most significant remaining unprotected coastal areas in Connecticut. Project partners will develop conservation acquisition strategies only in cooperation with willing sellers**.** Other conservation strategies may be developed consistent with the objectives of municipal land use and conservation commissions.

Appendix 4

CELCP Project Area Municipalities*

Branford	Middletown
Bridgeport	Milford
Chester	Montville
Clinton	New Haven
Cromwell	New London
Darien	North Haven
Deep River	Norwalk
East Haddam	Norwich
East Hampton	Old Lyme
East Haven	Old Saybrook
East Lyme	Orange
Essex	Portland
Fairfield	Preston
Greenwich	Shelton
Groton City	Stamford
Groton Town	Stonington
Guilford	Stratford
Haddam	Waterford
Hamden	West Haven
Ledyard	Westbrook
Lyme	Westport
Madison	

* Includes municipal subdivisions authorized to hold title to land

Appendix 5

Excerpt from
Rare and Endangered Species of Connecticut and Their Habitats
By Joseph J. Dowhan and Robert J. Craig

State Geological and Natural History Survey of Connecticut

The Natural Resources Center
Department of Environmental Protection

1976

Report of Investigations No. 6

Eco-regions offer a useful means of describing and understanding the distribution and relationships of the biota and physical landscapes of Connecticut, especially so with regard to rare species. This publication defines an "eco-region" as *an area characterized by a distinctive pattern of landscapes and regional climate as expressed by the vegetation composition pattern and the presence or absence of certain indicator species and species groups*. Connecticut's eastern and western coastal eco-regions are principally defined by a vegetation composition pattern dominated by coastal hardwoods including red, white and black oak, hickories, tulip poplar, black cherry and sassafras. Several species of vines, including green brier, poison ivy, Virginia creeper, and the non-native Asiatic bittersweet and Japanese honeysuckle, form dense tangles in these coastal forests. (For purposes of Connecticut's CELCP Plan, Connecticut's eastern and western coastal eco-regions were combined and shown as a single coastal eco-region in Figure 6.)

This publication is available in hard copy only. To order a copy of *Rare and Endangered Species of Connecticut and Their Habitats* see: http://www.ct.gov/dep/cwp/view.asp?a=2701&q=323434&depNav_GID=1641

Appendix 6

Connecticut Statewide Comprehensive Outdoor Recreation Plan (SCORP)

The Connecticut Department of Energy and Environmental Protection's federally-approved Statewide Comprehensive Outdoor Recreation Plan (SCORP) 2011-2016 assesses the demand for and the supply of natural resource-based outdoor recreational facilities in Connecticut. Using the recommendations and data obtained through the preparation of the SCORP, CT DEEP and cooperating municipalities are able to more effectively plan for meeting the State's outdoor recreational needs. Connecticut's approved SCORP enables the State of Connecticut to to participate in federal Land and Water Conservation financial assistance programs offered through the National Park Service to acquire, develop and improve outdoor recreational facilities that meet the outdoor needs described in Connecticut's SCORP.

Connecticut's 2011-2016 SCORP can be accessed at:
http://www.ct.gov/deep/lib/deep/outdoor_recreation/scorp/scorp_2011_webversion.pdf

Additional background data not included in the current Connecticut SCORP that still applies to Connecticut's natural resource-based outdoor recreation needs is available through Connecticut's 2005-2010 SCORP that can be accessed at:
http://www.ct.gov/deep/lib/deep/outdoor_recreation/scorp/scorp_2005_webversion.pdf

Questions regarding Connecticut's SCORP should be directed to Douglas Jann of CT DEEP's Division of State Parks at douglas.jann@ct.gov or (860) 424-3471.

The Green Plan *

Guiding Land Acquisition and Protection in Connecticut
2007-2012

Connecticut Department of Environmental Protection
Gina McCarthy, Commissioner
www.ct.gov/dep
September 2007

* As of February 2015, *The Green Plan* is being revised. See the **Plan's revision web site** for updates

CT DEP ADA Publication Statement

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These requests may be made directly to Marcia Z. Bonitto, ADA Coordinator, via e-mail: Marcia.Bonitto@po.state.ct.us

The Green Plan

Guiding Land Acquisition and Protection in Connecticut
2007-2012

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The Green Plan:
Guiding Land Acquisition and Protection in Connecticut
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BACKGROUND/OVERVIEW

Historically, undeveloped open space was common in Connecticut and its preservation was not a public priority. As time passed, Connecticut, like the rest of the country, grew economically and its population increased. The development that had been concentrated in key areas, generally along waterways, spread out as roads were built and cars became the preferred mode of transportation. Suburban development replaced rural lands and today all of Connecticut is under increasing development pressure. Poorly controlled growth (also known as sprawl) has become a significant threat to open space as areas that used to be open, undeveloped or part of our agricultural heritage are being converted to other uses, primarily residential development. With careful planning, it is possible to have economic and population growth while protecting valuable open spaces. Connecticut's citizens have both an opportunity and responsibility to decide the future of the State's landscape by permanently protecting certain undeveloped areas as open space. This plan sets forth a strategy for approaching such significant decisions.

Why Protect Open Space?

Although each protected parcel has its own unique value, open space as a whole provides a wealth of valuable "services" to Connecticut's citizens. While the full list of benefits is too extensive to include here, these services include options for outdoor play, activity, and environmental education. Forested areas are especially adept at removing carbon from the atmosphere, which helps to minimize global climate change, and floodplains, coastal waterfront and adjacent uplands provide opportunities to respond to the anticipated effects of climate change. Other valuable open space services are the provision and preservation of scenic beauty, contributions to local sustainable economy from wood, food and fiber production, and maintenance of the diversity of Connecticut's landscape. Open space also can provide a variety of specific ecological functions such as preserving biodiversity, habitat for rare species, streamflow and water supply protection, and flood control. Open space protection will play an expanding role in Connecticut's economic future as businesses increasingly consider quality of life in making decisions on where to locate and expand.

"The Green Plan: Guiding Land Acquisition and Protection in Connecticut 2007-2012" is an update of the original *Green Plan* (2001). The updated plan: 1) identifies the State's future open space goals; 2) summarizes land acquisition and protection efforts to date; 3) discusses threats and challenges to open space protection; 4) identifies priorities for acquisition and protection; 5) describes the programs and funding available; and 6) outlines the process. This document is a strategic plan for land acquisition and protection for the State of Connecticut through 2012. As such, it provides general guidance for program managers, is a tool for those who want to work with the State in preserving land, and offers a basic overview for the public of the State's land acquisition and protection program.

The Vision

A diverse landscape of protected open space that offers outdoor recreation to Connecticut's citizens, protects water supplies, preserves natural communities and habitats for plants and animals, offers green spaces accessible to all residents, whether residing in urban, suburban or rural communities, and provides a working natural landscape for the harvest of farm and forest products.

The Goal

To acquire or otherwise permanently protect land to meet the diverse needs expressed in Connecticut General Statutes (CGS) section 23-8(b) and in various plans regarding open space protection prepared by the State of Connecticut and our open space partners at a rate consistent with achieving the overall statutory goal of protecting 21% of Connecticut's land area by 2023.

In 1997, the general assembly set a goal of preserving 21 percent of the land area of Connecticut for open space for public recreation and natural resource conservation and preservation. With a total of 3,205,760 acres in Connecticut, 673,210 acres must be preserved to meet the goal. In addition to the overall goal, CGS section 23-8 sets targets for both the State and its land protection partners (municipalities, private non-profit land conservation organizations, and water utilities, whose Class I and II watershed lands count towards this goal). This statutory goal is:

- 10 percent (or 320,576 acres) be acquired and held by the State of Connecticut, and
- 11 percent (or 352,634 acres) be acquired and held by our partners.

At the time, it was recognized that the threat of loss of open space to development was substantial and that preservation activities had to be pursued while there was still appropriate land available for open space so a time line was set with an end date of 2023.

The authority, requirements and procedures for open space land acquisition is set forth in several sections of the Connecticut General Statutes (CGS). Open space acquisition by the State is governed by CGS sections 23-8 and 23-73 through 23-99 which places that authority with the DEP. State supported acquisition by municipalities, private non-profit land conservation organizations, and water utilities is governed by CGS sections 7-131d et. seq.

In addition to the statutory goals, the specific characteristics of individual parcels of protected land can contribute to the implementation of a variety of other State and local plans. The list of State plans that require land protection to achieve open space and/or environmental objects is lengthy, starting with the *Conservation and Development Policies Plan of Connecticut 2005–2010* (State C&D Plan) which contains six growth principles including:

- Conserve and restore the natural environment, cultural and historical resources, and traditional rural lands
- Protect and ensure the integrity of environmental assets critical to public health and safety.

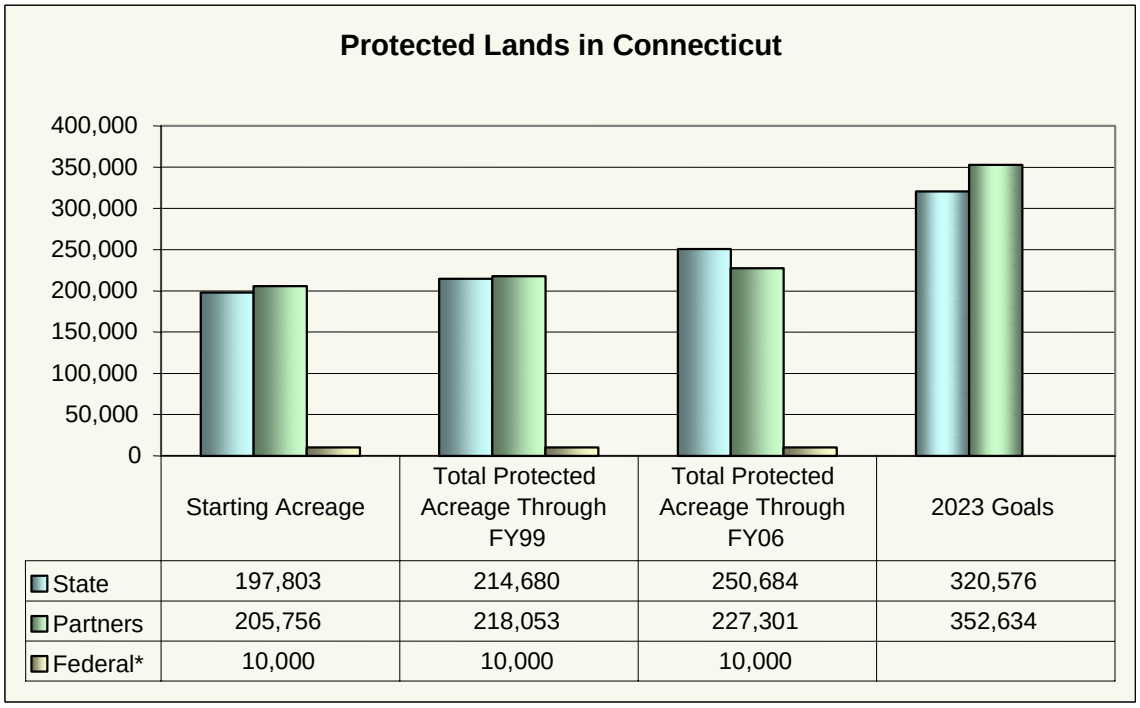
The DEP also has several plans that support the intent of increasing both outdoor public recreation and the preservation and conservation of natural resources. These plans require or would benefit from land protection for implementation; a list of these plans and a description of their relationship to land protection can be found in Appendix I. Land protection efforts are also an essential component to implementing local plans for open space preservation.

Open Space Status

Fortunately, the State and its partners were not starting from square one. The State has been working since 1901 to acquire open space. Our partners have also been protecting land for a long time. As of January 1, 2007, the State has acquired a total of 251,001 acres for its system of parks, forests, and wildlife, fishery and natural resource management areas. This is 78 percent of the 320,576 acres of open space land targeted for State acquisition.

With 169 cities and towns, approximately 116 land conservation organizations, and 85 water companies serving 1,000 people or more, as well as numerous smaller ones, the State of Connecticut is fortunate to have a wealth of open space partners. Exact acreage of open space protected by DEP's partners has not yet been compiled. The statistics presented below include the estimate made in the original Green Plan updated only by the acreage that DEP assisted in protecting through the Open Space and Watershed Grant Program. It is assumed that our partners actually hold significantly more acreage than reported below.

To gain a better understanding of how much land is actually protected, the DEP is currently undertaking a research project to inventory all open space parcels in the State. Once this Protected Open Space Mapping (POSM) Project is complete, DEP will revisit this section of the plan and make changes as warranted. Until then, it is our best estimate that municipalities own ±74,971 acres of land; nonprofit land conservation organizations own ±57,327 acres; and water companies own ±97,500 acres Class I and Class II lands. Together, open space acreage held by these partners is 229,798 acres, which is 65 percent of their statutory open space goal. There is no requirement that non-State partners report their land protection efforts and, as explained above, these numbers may underestimate the actual holdings of our partners.



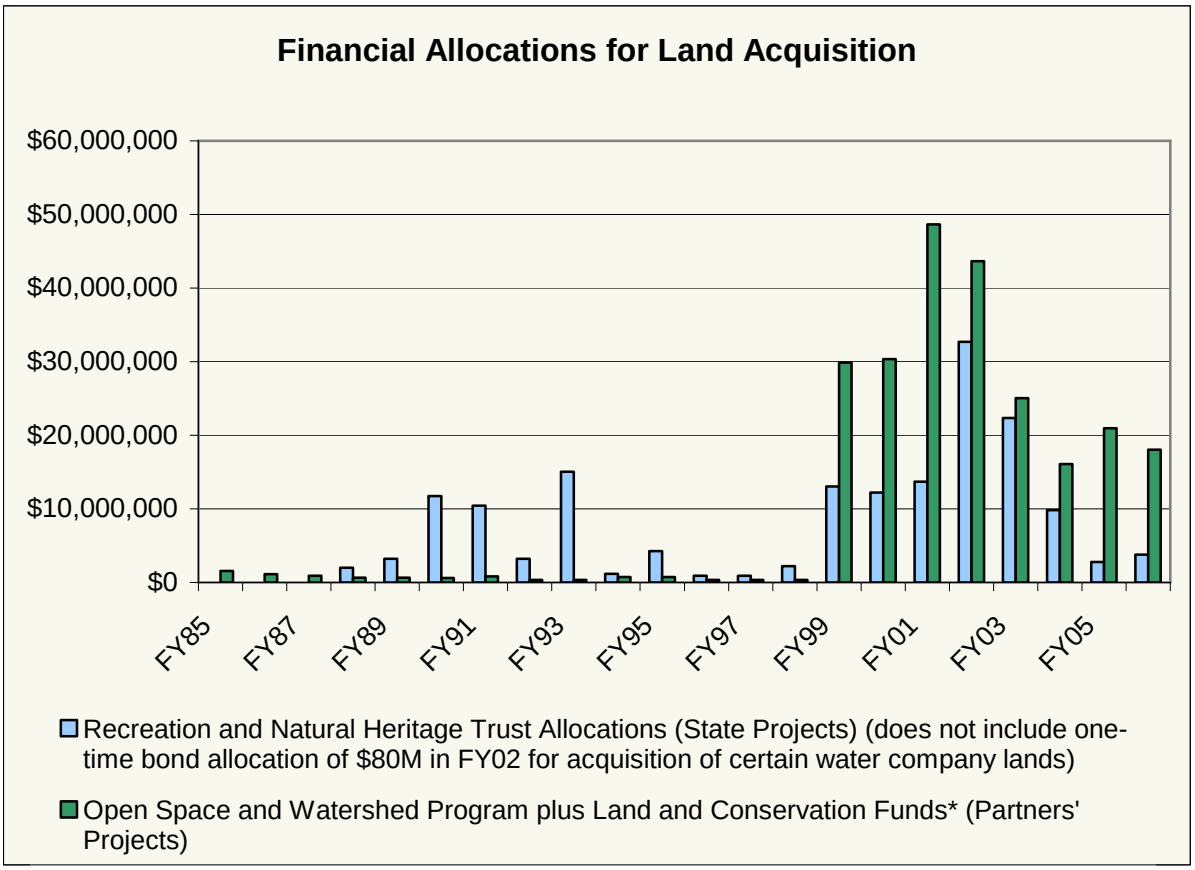
	Starting Acreage	Total Protected Acreage Through FY99	Total Protected Acreage Through FY06	2023 Goals
State	197,803	214,680	250,684	320,576
Partners	205,756	218,053	227,301	352,634
Federal*	10,000	10,000	10,000	

* The acreage of Federal protected lands estimated here includes hiking trails, wildlife preserves, flood control projects and a national historic park. While these amenities are appreciated and enjoyed by the citizens of Connecticut, by statute the federally-held acreage does not count towards the land protection goal. A more accurate accounting of this acreage will be determined through the POSM project explained above.

Due to variations in funding and resources, land offerings and opportunities, and other factors, new land acquisition and protection does not occur at a steady pace. To achieve the statutory goal for open space acquisition, on average from the beginning of the program in 1999 until 2023, every five years the State needs to acquire 21,600 acres and to encourage our non-State partners to acquire nearly 25,000 acres. From FY00 through FY06, the State acquired 34,001 acres, including some Class I and Class II watershed lands that were at risk, thus permanently preserving their protected status. During that same period, our municipal partners protected approximately 17,600 acres through the Open Space and Watershed Lands Grant Program. To meet the goals set forth in statute and this report, the State of Connecticut must acquire nearly 70,000 additional acres by the end of 2023 and encourage the acquisition of approximately 125,000 additional acres by municipalities, private nonprofit land conservation organizations and water companies (the actual number of acres necessary to protect to meet the statutory requirement may be less than this number; however, this is our best estimate to date pending completion of the POSM project). This plan continues to set a strategic course to meet these acquisition goals.

Challenges and Threats

There are several challenges to meeting the statutory goals. There also are threats to open space, even when it has been acquired. Perhaps the greatest challenge is posed by development and economic pressures which are pushing many landowners to convert their open lands to uses such as housing, commercial, office space or other uses incompatible with open space. This pressure places an urgency on all aspects of land protection, from securing funding, to surveying and appraising potential parcels, to the negotiating and closing of transactions to ensure that the long-term protection goals are met before desirable properties are converted to other uses. The challenge posed by development pressures is compounded by issues related to future funding and other resources for open space protection.



* The lands protected through the Land and Conservation Funds program have not been separated into State and Partners' lands. They are listed here under Partners as the vast majority of this funding has been expended on local non-State protection efforts.

Securing continual funding to achieve the acreage goals by acquiring the most appropriate lands is also a challenge. Per acre costs for land protection (fee simple and easement acquisition) vary significantly based on a number of variables including: landowner's financial flexibility, location; character and size of parcel; current property values at the time of the sale/donation. Some property transfers can be accomplished with minimal per acre cost, while other are much more expensive. In general, per acre costs paid over recent years have ranged between $4,500 and $7,000. Using an average per acre cost of $6,000 which is slightly more than the average of the range, and given the ±295,000 acres needed to meet the overall statutory goal (see above), the total funding needs would equate to $420 million for the Recreation and Natural Heritage (State acquisition) Program and $736.6 million for the Open Space and Watershed (partner's) Program between now and 2023 (both numbers are in 2006 dollars unadjusted for inflation/land price escalation). Again, acreage to be acquired under the Open Space and Watershed

Program will be re-evaluated upon completion of the POSM project which will provide us with significantly more accurate land protection statistics.

Another challenge is planning and providing for long term stewardship or management of protected lands. As part of this Green Plan update, the Department is adopting a new policy requiring funds be set aside for maintenance of protected lands acquired by DEP[1], especially when the land is intended for habitat protection.

For our partners, amendments to CGS section 7-131e made in 2007, allow for using up to five percent of Open Space and Watershed Grant Program funds for administrative expenses of the program; however these funds are limited to pre-acquisition/protection expenses such as evaluation of grant proposal, appraisals and appraisal reviews and the preparation of legal and other documents. These funds cannot be used for staff salaries, nor for open space planning or management. There is currently no specific funding source identified that we can offer to our partners for open space planning, management and long-term stewardship.

In addition to the challenges described above, development pressures are threatening open space already acquired or otherwise protected. Increasingly there is pressure to convert certain existing protected open spaces to other uses. While initially pressure for conversion was primarily an urban issue, there have been recent efforts to convert other areas of open space to commercial use. The second significant threat is the prevalence of encroachments into protected open space. Recent legislation[2]defines open space encroachment and sets civil penalties for unauthorized encroachment on open space land or land held under a conservation easement. The penalties for encroachment are substantial; up to five times the cost of restoration. This new legislation provides a more effective tool for the Department in pursuing encroachment situations and is expected to become a deterrent to future encroachment.

Executive Order 15 Regarding Responsible Growth

On October 6, 2006, Governor M. Jodi Rell issued Executive Order 15 creating an Office of Responsible Growth "to coordinate state initiatives to control rampant, ill-conceived development that threatens Connecticut's special character." The Executive Order required that the "Green Plan" for Connecticut be updated "to better identify sensitive ecological areas and unique features, guide acquisition and preservation efforts, support local build-out maps and assessments, and make these and other maps accessible to state agencies, regional planning agencies, local communities and nongovernmental organizations through geographic information systems (GIS)."

This plan identifies sensitive ecological areas and unique features that merit protection. These are discussed in the section below on "Protection Considerations." To guide acquisition and preservation efforts, the categories of acquisition and protection considerations will be weighted and the individual considerations will be ranked based on the needs expressed in this and other plans as discussed above as well as changes in the protected status of individual ecological types or uses. Examples of such changes include recent land acquisitions or other protection activities, and legislative changes that affect the status (e. g., provide additional protection) of specific ecological types or uses. The weighting and ranking will be reviewed annually and will be included in the Commissioner's annual report to the legislature (see below).

[1] In accordance with CGS section 23-79, an amount not to exceed 20 percent of the fair market value of a property to be protected can be set aside for long-term management; however, discussions with the State Treasurer's Office have revealed that no more than 5 percent of such funds can be set aside for this purpose.

[2] PA 06-89, codified at CGS section 52-560a, (effective October 1, 2006).

A geographic information system (GIS), as mentioned in Executive Order 15, is a powerful tool to aid in identifying and visualizing existing and proposed conditions. It can be used in the planning process to determine where development would have the least adverse environmental impacts and most beneficial social impacts, and what areas should be preserved for their ecological and cultural values. The Department of Environmental Protection is currently active in supporting the use of GIS in several ways including participating in the Geospatial Information Systems (GIS) Council established by Public Act 05-03, and by providing data layers that are used to develop maps. In addition to continuing to participate in the GIS Council and providing new and updated data layers, the DEP will explore means to improve regional and local capacity for GIS utilization. An example of an on-going GIS effort is the multi-year Protected Open Space Mapping (POSM) project which is mapping, town-by-town, all existing protected open space. Finalizing the POSM project and making the data available to municipalities, land trusts and other non-governmental land preservation organizations and individuals will aid in future land protection efforts at all levels.

ACQUISITION AND PROTECTION CONSIDERATIONS

Important Conservation Areas

Three categories of land qualities should be considered when evaluating potential land protection projects. These are the ecological values of the property, the uses that the property can provide or protect, and the location of the site. Each of these is briefly discussed and an unranked list of protection considerations is provided below. These considerations will be used to prioritize the properties that come to the State's attention for potential protection. The existing list of properties approved for acquisition or protection will also be evaluated based on these priorities and properties and re-ranked as appropriate.

Ecological Values

The ecological values provided by an individual site are a major consideration for the Department when evaluating a proposal for land acquisition or protection. Properties containing sensitive ecological communities, outstanding or representational examples of ecological communities or certain water resources, as listed below, will receive higher scores during evaluation. These are the ecological communities most valuable for maintaining biological integrity and diversity in Connecticut. While some of these independently provide wildlife habitat for certain species, viable habitat for other species may include a complex of more than one of these ecological types. Also of particular interest is select farmland, particularly non-active farmland that can be managed for early successional habitat or blocks of farmland abutting existing protected open space property. Large blocks of unfragmented forest or forest blocks abutting existing protected unfragmented forestland are similarly desirable. The following lists are unranked.

Specific ecological communities (parcels containing, abutting or providing buffers to)

- Coastal communities
  - Beaches
  - Dunes
  - Bluffs or escarpments
  - Coastal plain ponds
  - Offshore islands
- Sand plain grasslands
- Pitch pine/scrub oak barrens

- Calcareous (limestone-based) uplands
- Calcareous (limestone-based) fens and associated wetlands
- Grassy glades and balds
- Traprock ridges and associated communities
- Atlantic white cedar swamps
- Bogs
- Riverine islands
- Colonial waterbird complexes
- High-yielding, stratified drift aquifers that contribute high quality water for base stream flow
- Reference sites for scientific monitoring
- Landscape sensitive to disturbance (e.g., steep slopes, erodible soils, shallow depth to bedrock, with sparse groundcover)

Water Resources (parcels containing, abutting or providing buffers to)

- Large rivers and associated riparian communities
- Free-flowing (undammed) streams and rivers
- Natural lake shoreline habitat
- Predominantly undeveloped coastal coves and embayments
- Upland buffers around high quality wetlands
- Tidal wetlands (includes saline, brackish and freshwater tidal wetlands)
- Relatively undeveloped coves or embayments on Long Island Sound or Connecticut's rivers
- Estuarine embayments with extraordinary aquatic habitat value (e.g., shellfish beds, areas of submerged aquatic vegetation)
- Vernal pools
- Headwater streams
- Surface springs, cold headwater springs and seeps
- Wild trout or cold water streams
- Significant diadromous fish runs

Long Island Sound coastal systems

- Outstanding examples of coastal systems, habitats or landscapes
- Typical or representative coastal ecological areas

Use Needs

In addition to protecting the ecological types listed above, the DEP will work to protect properties that can provide certain uses that benefit the public. These public uses, which on an individual basis may or may not include public access, are presented, but not ranked, here.

Wildlife habitat as identified by the above list of ecological types especially

- Habitat that supports one or more species of greatest conservation need as identified in the *Connecticut Wildlife Conservation Strategies*
- Habitat that supports, enhances or protects biodiversity

Riparian and littoral buffers (see list of water resource types above)

Floodplain protection

- As habitat
- To protect or improve water quality
- To preserve natural flood storage or function (to the 500 year flood level)

Streamflow protection

- Properties that can have a notable augmentation of flow based on basin size or other factors
- Protection of groundwater recharge areas and headwater streams

Protection of large areas of unfragmented forest

- Large parcels of unfragmented forest
- Key parcels whose protection would prevent fragmentation of a large protected forest tract

Recreation

- Coastal or inland properties that provide water-based recreational opportunities including swimming, fishing, boating, hunting, or other water-access
- Coastal or inland properties that offer significant cultural heritage value
- Trail-based activities. These include:
  - Multi-use trail development (provision of new or enhancement of existing) as part of an existing or planned greenway, trail or linear park, particularly in areas of significant or unique geologic or biologic interest;
  - Elimination of gaps in individual trails or within the state's trail network;
  - Connectivity of trail systems; and
  - Trailhead facilities including sufficient parking, restroom facilities
- Recreational areas capable of providing wildlife observation-especially birding sites
- Sites that have historically been used for recreation with existing recreational and/or supporting infrastructure (e.g., swimming beach, hiking trails, established camping sites and/or established parking)
- Other recreational areas capable of providing opportunities for underserved recreational demands.

Location Concerns

In addition to the ecological types and use priorities identified above, the relative location of a property to be acquired or protected is also important. Also, there are certain site-specific conditions that can enhance the value of a potential acquisition or protection opportunity.

- Parcels proximate to existing protected open space if capable of being used for: expansion of recreation opportunities, buffering for sensitive resources; and/or corridors for wildlife and/or or seed dispersal
- Parcels providing protected corridors that link critical protected open space hubs
- Additions to existing DEP holdings that will create greenways or improved access to state parks, forests, or wildlife management areas
- Parcels proximate to urban areas or public transportation that will further environmental justice/environmental equity goals
- In-holdings within DEP properties if it will increase the efficiency of management by DEP and/or eliminate potential conflicts between user groups and in-holding owners
- Parcels under threat of development that meet one or more identified needs
- Lands containing significant archeological, cultural or historic resources
- Property adjacent to greenways or other transportation opportunities that may be of particular interest for its recreation and transportation values.

<u>General Evaluation Considerations</u>

In addition to the land qualities discussed above, several general evaluation considerations are important in any land protection decision by the Department on where best to spend state land acquisition and protection dollars. These include:

- The size and functionality of a parcel under consideration
- Whether the property contains significant amounts of contaminants, widespread invasive species, or other impediments to providing or maintaining optimum ecological value
- The degree to which a property can accommodate multiple uses with minimal conflict and optimize the extent to which recreational demands can be met
- Whether the property can advance other DEP plans and protection efforts
- The threat of development to areas specifically identified as important for their ecological characteristics or use values, or both.

THE ACQUISITION AND PROTECTION PROCESS

Partners

The ambitious target for land acquisition and protection established by the legislature requires the cooperation of many partners including municipalities, private nonprofit land conservation organizations, water companies, the State of the Connecticut and interested private property owners.

The **Commissioner of Environmental Protection** is charged with developing the strategy for achieving the open space acquisition goal. The Commissioner is responsible for acquiring State lands for open space purposes and submits a report annually to the General Assembly's Environmental Committee regarding the strategy and progress being made toward achieving the State's open space land acquisition goals. The Commissioner also provides technical assistance and grants to facilitate the acquisition of open space lands by municipalities, private nonprofit land conservation organizations and water companies.

The Natural Heritage, Open Space and Watershed Land Acquisition Review Board, established by statute[3], assists and advises the Commissioner. The Board provides comments on the selection criteria, policies and procedures, and on applications for funding. It also provides general guidance and reviews land protection strategies. The Board also plays a major role in promoting public participation in the acquisition program and submits an annual report on the acquisition program. The Board makes recommendations to the Commissioner on funding specific grant projects. Please see Appendix II for a description of the Board's make-up.

Municipalities, private nonprofit land conservation organizations and water companies are encouraged to cooperatively pursue the acquisition of land to meet the open space goal set forth in the statutes. The State seeks out and works with partners to help in acquisition of state-owned open space land. Land trusts in particular have been key allies in land protection efforts in Connecticut. They have not only directly acquired land and easements, but have also assisted the State in protecting properties. Municipalities, private nonprofit land conservation organizations, and water companies are eligible to receive funds through the Open Space and Watershed Land grant program for the acquisition of open space lands.

The **individual landowners** interested in protecting their land are perhaps the most critical partners in this effort. Often, these individuals have exhibited careful stewardship of their land and have demonstrated a concern for the Connecticut landscape or are otherwise interested in transferring their property for protection purposes. Without them, the Department would be unable to meet the land protection goals set by the legislature.

[3] Connecticut General Statutes 7-131e, see Appendix II

Methods

The land protection process can occur through donation or purchase in several ways including fee simple, easements for access, use and/or conservation, or acquisition of development rights. While there are other land protection methods available, including purchase options, the right of first refusal, and the transfer of development rights, these are less frequently used by the Department.

Tools

The DEP has two programs available to assist in realizing the vision and achieving the goal: the Recreation and Natural Heritage Trust Program and the Open Space and Watershed Land Acquisition Grant Program

The Recreation and Natural Heritage Trust Program

This program acquires lands to add to the State's system of parks, forests, and wildlife, fishery and natural resource management areas for the beneficial use and enjoyment of the public. The purpose of the program is to acquire land that represents the ecological diversity of Connecticut, including natural features such as rivers, mountains, coastal systems, and other natural areas, in order to ensure the preservation and conservation of such land for recreational, scientific, educational, cultural and aesthetic purposes.

An innovative, though rarely used, provision of the program allows partners, usually municipalities or private, nonprofit organizations, to assist the State in the purchase of properties. Where the DEP and an outside group identify mutual interest in the protection of a piece of land, but neither group can commit to the whole purchase price, cost sharing allows each party to leverage available funding to meet a common goal. The responsibility for managing properties acquired in this manner is negotiated between the Department and the partner/s involved in the transaction; however, the property is owned by the Department.

The Open Space and Watershed Land Acquisition Grant Program

This program provides financial assistance to municipalities and nonprofit land conservation organizations to acquire land for open space and to water companies to acquire land to be classified as Class I or Class II water supply property. In accordance with CGS section 7-131d(b), grants under this program are for land purchases that meet one or more of the following criteria:

(1) Protects land identified as being especially valuable for recreation, forestry, fishing, conservation of wildlife or natural resources;
(2) Protects land which includes or contributes to a prime natural feature of the state's landscape, including, but not limited to, a shoreline, a river, its tributaries and watershed, an aquifer, mountainous territory, ridgelines, an inland or coastal wetland, a significant littoral or estuarine or aquatic site or other important geological feature;
(3) Protects habitat for native plant or animal species listed as threatened or endangered or of special concern, as defined in section 26-304;
(4) Protects a relatively undisturbed outstanding example of a native ecological community which is now uncommon;
(5) Enhances and conserves water quality of the state's lakes, rivers and coastal water;
(6) Preserves local agricultural heritage; or
(7) In the case of grants to water companies, protects land which is eligible to be classified as Class I land or Class II land after acquisition.

Conditions that apply to these grants include:

- The acquired land must be protected by a permanent conservation easement requiring that the property remain forever predominately in its natural and open condition;

- Any improvements or change to the property must support the purpose for which the land was acquired; and
- The easement includes a provision that the property be made available to the general public for recreational purposes[4].

In all cases, the grant applicants must provide a substantial match for the grant funds requested. Maximum DEP contributions are set by statute and summarized here.

In addition to land acquisition or protection, distressed municipalities or targeted investment communities, as defined in CGS section 32-9p, have other opportunities under the Open Space And Watershed Land Acquisition Grant Program. Qualified municipalities can use grant monies for restoration or protection of natural features or habitats on open space already owned by the municipality. Such restoration can, include, but is not limited to, wetland, wildlife, or plant habitat restoration, restoration of other sites to a more natural condition, or replacement of vegetation. However, the DEP cannot commit more than twenty percent of the total amount of grants made in any fiscal year to these purposes.

Required Matches

The Connecticut General Statutes set forth the potential grant matches for land acquisition or protection. As of July 1, 2007, the DEP contributions for land acquisition, based on fair market value, are as follows:

Municipalities	Up to 65%
Nonprofit Land Conservation Organizations	Up to 65%
Water Companies	Up to 65%
Distressed Communities or Target Investment Communities	Up to 75%

Other tools used by our partners in land acquisition and protection include purchase options, the right-of-first-refusal and the regulatory authority of local land use agencies who can establish open space set asides and open space zoning districts.

Funding

The Recreation and Natural Heritage Trust Program is funded through State bonds. Funding for the Open Space and Watershed Land Acquisition Grant Program predominantly comes through a combination of State bonds and monies collected under the Community Investment Act (CIA).[5] Corporate and private donations for this program are also accepted. There are several additional sources of funding utilized by DEP's land acquisition and protection efforts. These include: Land & Water Conservation Fund from the U.S. Department of the Interior, used for both state and municipal open space development and acquisition projects; the George Dudley Seymour Trust Fund, which provides approximately $250,000 annually that is used to supplement the Recreation and Natural Heritage Trust Program; and the Forest Legacy Program from the U.S. Department of Agriculture Forest Service, used to purchase conservation

[4] CGS section 7-131d provides that an exception to the public access provision may be made at the discretion of the Commissioner of Environmental Protection when provision for public access would be unreasonably detrimental to the wildlife or plant habitat or other natural features of the property. Exceptions may also be made where development rights have been purchased for agricultural purposes or for land acquired for watershed protection which will be classified as Class I or Class II watershed land if access is inconsistent with farming or the provision of pure drinking water, respectively.

[5] The Community Investment Act (CIA) requires a $30 fee for the recording of all documents on the municipal land records. This fee is distributed as follows: $1 to the municipal clerk for management and related costs; $3 to the municipality for local capital improvement projects fund; and the remaining $26 is distributed among four state agencies for specific purposes. In addition to the DEP, these agencies are: the Department of Agriculture, the Connecticut Commission on Culture and Tourism, and the Housing Finance Authority. The DEP's portion of this funding goes to the Open Space and Watershed Land Acquisition Grant Program.

easements. Finally, for the first time the Department anticipates receiving funding through the Highlands Conservation Act, which is administered by the US Fish and Wildlife Service.

Process

The DEP purchases lands from willing landowners. In many cases, these owners contact the Department. In other instances, the DEP or conservation organizations initiate contact. Typically there are more properties offered for protection than there are financial resources and so the Department has to evaluate and rank the offerings. The process for selection is described in Appendix III. Currently there are multiple scoring sheets used in the evaluation and ranking process. Each scoring sheet was developed by experts in and tailored to the individual focus areas identified in the previous Green Plan (e.g., forest lands, ecological habitats, urban green spaces). This allows the individual programs to evaluate a potential protection site based on their specific responsibilities. The rating system will be reviewed and modified and streamlined as part of the implementation of this plan update.

Various tools, in addition to statutory criteria, are used for evaluating properties and their attributes. These tools include documented site characteristics including information regarding history, geology, soils, ecology, water quality and other environmental concerns and landownership supplemented by individual staff knowledge. Currently, some of this data is available in an in-house GIS toolkit, which aids in the evaluation of potential protection sites by providing the available data on a site-by-site basis in both visual and verbal formats. However, there is a substantial amount of information that has yet to be integrated into this system, which has resulted in a pressing need to improve the DEP's GIS capabilities. To address this, the Department is working on several new projects. The first, as previously discussed, is a statewide map of all protected open-space, including holdings by municipalities, land trusts and water companies. The second is a new GIS project to provide additional data regarding ecosystems. The DEP is also exploring ways to support enhanced GIS capabilities by our land protection partners.

An Example of an Innovative Land Protection Approach

DEP has encouraged cooperating on projects with municipalities and nonprofit land organizations.

Most recently, DEP entered into an agreement with the Town of Oxford to preserve an approximate 45 acre parcel of land located adjacent to Southford Falls State Park in the Town of Oxford.

The Town of Oxford will contribute $100,000 towards the $500,000 purchase price for the property. In addition, the Town of Oxford will construct an entry road and parking lot for improved access to the park by the General Public.

A New Approach

DEP land acquisition and protection efforts have been primarily reactive, i.e., the Department has generally relied on landowners, land conservation groups and municipalities to identify land protection opportunities. As development pressures have continued, the importance of proactively identifying properties that provide exceptional value for habitat or public use is becoming critical. As part of the implementation of the Green Plan update, the Department will evaluate how best to develop a more proactive approach to land protection.

This new proactive approach would rely heavily on developing additional data and tools to support appropriate outreach to our land protection partners. The additional data and tools necessary to support this effort include the completion of the Protected Open Space Mapping Project, described above, continued support of enhanced GIS capabilities available to both DEP and our partners, and the inventorying and mapping of significant ecological areas. Improved outreach includes enhancing efforts to provide information on innovative land protection techniques to DEP's land acquisition and protection partners, and engaging the partners in both identifying potential acquisition or protection sites, and in initiating discussions with owners of high priority lands.

AGRICULTURAL LAND AND OPEN SPACE

Agricultural lands are integral to the quality of Connecticut's landscape and essential to the character of many towns. Working farms, pasture, tilled acreage, and associated forest are critical complements to the open space protection efforts outlined in this plan. While the Department of Agriculture has the primary role in preserving farmland (see box), the DEP has a role in protecting certain agricultural lands, generally either through out-right acquisition or the purchase of conservation easements. For lands so protected, it is not uncommon for arrangements to be made so that the farmer can continue to work the land. In some instances, modification of existing farm practices can both provide important habitat and produce marketable crops. For example, altering the schedule for mowing hay fields can preserve grassland habitat during the bird nesting season and still provide a hay crop. Future efforts by DEP will include the development of lease language to encourage farmers to maintain portions of their properties in a manner that provides wildlife habitat.

The DEP recognizes that certain farm practices can enhance the quality of habitat and provide ecological protection. Farmers are encouraged to utilize farming methods that protect the environment and provide quality habitat wherever practical. Additional outreach by the DEP to provide farmers the information necessary to consider such farm practices would be beneficial. Despite having to exclude preserved agricultural land from the total open space tally, one focus of the grant programs discussed in this document is the preservation of local agricultural heritage for scenic and open space amenities. Protected agricultural land preserves a "sense of place" in our more rural towns and, in many ways, the State's open space and farmland preservation programs complement each other.

Farmland for Food Production

Securing farmland land to maintain food production capability is done by the Connecticut Department of Agriculture (DOAG) through their Purchase of Development Rights Program. Because the primary purpose of the program is to maintain food production capability, eligible properties must be at least 30 acres in size.

Lands where the DOAG has acquired development rights remain in private ownership and these lands are not generally available to the public for use without further agreement from the individual farm owner. Without a specific public access/recreation or wildlife habitat component, these lands cannot counted towards the 21 percent open space goal.

However, these efforts fulfill an important role by protecting food and fiber producing land resources. In addition to providing fresh, locally grown foods, farmland can also offer important environmental benefits including providing wildlife habitat and flood control.

GOING FORWARD

It will take time and adequate funding to meet the statutorily-required land acquisition and protection goals. The DEP is committed to a long-term effort to reach the goals identified in statute and to encourage and provide assistance to cities and towns, non-governmental organizations and other entities to succeed with acquiring and protecting open space that satisfies the various needs of Connecticut. Although there is overlap, these actions generally fall into five categories: operations, data and tools, criteria and standards, outreach, and project evaluation and update. What follows are the steps DEP will take.

Operations

- Fill vacancies and reinvigorate the Review Board
- Implement other DEP plans as they relate to land protection, including moving forward aggressively with the Grassland Habitat Initiative

- Improve coordination with other State agencies, especially with the Department of Agriculture, the Connecticut Commission on Culture and Tourism, and the Housing Finance Authority which receive funding through the Community Investment Act, to integrate land protection actions, where practical, for maximum overall benefit
- Increase use of techniques other than fee simple purchase, such as purchase or transfer of development rights and acquisition of access, use or conservation easements
- Develop and implement a more proactive approach to land acquisition and protection. This would include engaging land trust, towns, and others in identifying potential acquisition or protection sites and approaching landowners. It would also include providing information on innovative land protection techniques to DEP's land acquisition and protection partners

Data and Tools

- Complete the Protected Open Space Mapping (POSM) project
- Inventory and map significant ecological areas and provide that information as GIS data layers available both internally and to our land protection partners
- Continue to provide data for GIS users and explore means to improve regional and local capacity for GIS utilization
- Develop lease language to manage agricultural land for habitat purposes

Criteria and Standards

- Assess the criteria used to review potential land acquisition and protection projects and amend these criteria as necessary to reflect this update of The Green Plan
- Develop a system to better weight the identified priorities to focus acquisition and protection activities

Outreach

- Enhance outreach to municipalities, land trusts and water companies regarding land protection. Specifically, the outreach should include the value of open space acquisition and land preservation and management techniques to enhance efforts to meet the State's goals
- Enhance outreach to private owners of priority lands to educate them about the opportunities for and benefits of permanently protecting their land from development
- Enhance and deliver outreach to the agricultural community on farming practices that protect the environment and provide wildlife habitat

Project Evaluation and Update

- Provide an annual statement of implementation priorities
- Review and update the Green Plan on a regular basis.

FOR MORE INFORMATION…

…about the Department of Environmental Protection's land acquisition and protection efforts,
see web page: www.ct.gov/dep/openspace
or contact:

Land Acquisition and Management
Department of Environmental protection
79 Elm Street
Hartford, CT 06106-5127
Phone: 860-424-3016

…about the Department of Agriculture's Farmland Preservation program,
see web page: www.ct.gov/doag
or contact:

Farmland Preservation Program
Connecticut Department of Agriculture
165 Capitol Avenue
Hartford, CT 06106
Phone: 860-713-2511

…about efforts of our non-State partners, contact:

your municipal officials including conservation commissions, inland wetlands commissions, recreation departments and chief elected officials;
your local land trust;
your local watershed association, or
your local water company.

APPENDIX I
DEP PLANS RELATED TO OPEN SPACE

The DEP has a variety of plans, developed by a wide range of programs, that have some relationship to open space. They are identified and their relationship to open space is described below.

- The Connecticut Statewide Forest Resource Plan (CSFRP) is clearly linked to the Green Plan. Historically, a majority of the land acquisition and protection efforts undertaken by the State have affected forest lands. The CSFRP includes general recommendations on forest land protection and management. The protection of key forested parcels and improved management of all publicly owned parcels (State and municipal) will be consistent with both the CSFRP and the Green Plan update.
- The Connecticut Climate Change Action Plan (CCAP) includes recommended actions to reduce greenhouse gas emissions which cause global climate change, which, in turn, if left unchecked will alter the ecosystems in Connecticut and perhaps replace the environment that we currently enjoy with one more representative of areas significantly south of here. The preservation of forested lands will aid in the sequestration of carbon, which is a recommendation of this plan. Also , and the preservation and expansion of recreational trails may support travel choices and reduce vehicle miles traveled, another recommendation of the CCAP.
- The Connecticut Comprehensive Wildlife Conservation Strategies identifies species of greatest conservation need and their affiliated habitats as well as priority research needs and conservation actions necessary to address problems facing these species and habitats. Protection of lands containing the identified habitats will aid in ensuring long-term protection of these species.
- The Connecticut Recreational Trails Plan contains the DEP's policy for the development and use of statewide recreational trails and helps guide decisions made regarding grant awards for trail projects. Protection of lands upon which the trails lie or that can provide connections between trails, extensions of trails or support facilities (especially parking) will advance this plan.
- The Natural Hazard Mitigation Plan identifies long-term measures to reduce losses from future natural disasters. The protection of floodplain areas, including areas within the 500-year and the 100-year flood boundaries, as well as within stream channel encroachment lines, will help mitigate future flood damage. The protection of lands prone to coastal erosion will mitigate future erosion damage and provide opportunities to respond to the anticipated effects of climate change.
- The Statewide Comprehensive Outdoor Recreation Plan (SCORP) will guide state investments and resource allocations for meeting the outdoor recreational needs of Connecticut and it is a requirement for participation on the Federal Land and Water Conservation Fund program. Because the SCORP focus is on outdoor recreation, there is significant overlap between meeting its needs and meeting the statutory requirements for the Green Plan which includes public access/recreation as a significant component.
- The Coastal and Estuarine Land Conservation Program Plan (CELCP) is required to be eligible for federal Coastal and Estuarine Land Conservation Program competitive grant funds. Such funds can be used to acquire or otherwise protect priority coastal land conservation needs as identified in the plan. In general, the acquisition and protection of coastal lands is more costly than inland properties. These funds will provide a significant boost to the State's ability to protect environmentally sensitive coastal areas and properties that can provide public access to coastal waters. All priority acquisitions identified in the Draft CELCP are included, some in more general form, in the Green Plan update.

APPENDIX II

NATURAL HERITAGE, OPEN SPACE AND WATERSHED LAND ACQUISITION REVIEW BOARD MAKE-UP*

APPOINTEE	APPOINTED BY	LENGTH OF TERM
(2 total) Chair Bonding Subcommittee	By Statute	Standing appointment
(2 total) Ranking Member Bonding Subcommittee	By Statute	Standing appointment
Member Environment Committee	Speaker House of Representatives	Standing appointment
Member Planning & Development Committee	President Pro Tempore of Senate	Standing appointment
Secretary, Office of Policy and Management	By Statute	Standing appointment
Business Community Representative	Governor	3 year
Representative of Persons with Disabilities	Governor	3 year
Representative of Investor-owned Water Utility	Minority Leader of Senate	3 year
Representative of Municipal Water Utility	Minority Leader of House	3 year
Representative of Regional Water Authority	Minority Leader of Senate	3 year
Realtor or Attorney	Speaker of the House	3 year
Construction Industry or Land Development	President Pro Tempore of Senate	3 year
(2 total) Conservation of River Watershed Regional Interest Group	(1) Majority Leader of House (1) Majority Leader of Senate	3 year 3 year
(3 total) Nonprofit Environmental Protection or Natural Resources Conservation Organization	(1) Governor (1) Speaker of House (1) President Pro Tempore of Senate	3 year 3 year 3 year
Chief Elected Official of Town (less than 20,000 population)	Governor	3 year
Chief Elected Official of Town (greater than 20,000 population)	Governor	3 year

* Review Board make-up is dictated by CGS section 7-131e

APPENDIX III
STATE AND GRANT PROPERTY SELECTION PROCESS

The review procedure and decision process for the rating system consists of the following steps.

1. Identification. Submissions must include preliminary information and a map of the parcel.

2. Data distributed to DEP evaluation team. Information on each potential open space project is collected and distributed to the relevant DEP resource experts (forestry, wildlife, fisheries, botany, endangered species, geology, parks, boating, water resources, air resources, and landscape stewardship). The open space lands grant applications may receive additional review from the departments of agriculture or public health depending on whether agricultural or watershed land is involved.

3. Evaluation team ratings and comments. Resource experts evaluate the properties using criteria established for each of focus areas identified in the Green Plan (e.g., forest lands, ecological habitats, urban green spaces). Each resource expert may assign a numerical point rating based on critical factors or characteristics of a property.

4. Evaluation results compiled. A summary report is generated for each property. Based on the summary report, the Division of Land Acquisition and Management makes a recommendation to the DEP Commissioner regarding acquisition or protection of each property. Proposals received for consideration through the grant program are presented to the Natural Heritage, Open Space and Watershed Land Acquisition Review Board, which makes funding recommendations to the Commissioner.

   Decisions to pursue acquisition or protection are based on the scores and comments received, as well as other considerations which in the past have included such things as: cost; fulfillment of resource need; geographic distribution; availability of partners to assist in protection; proximity to urban areas or areas with a deficiency of protected public open space; statewide interest relative to DEP programs; availability of a gift or bargain sale; stewardship needs and management constraints; proximity to other preserved open space; compatibility with the Conservation and Develop Policies Plan for Connecticut and other state environmental plans, policies, goals and objectives; compatibility with local and regional plans; identification by DEP as having multiple resource values under the Connecticut Resource Protection project; and fiscal benefits and burdens. Once this plan is finalized, this list will be reviewed and modified as warranted during the review of the selection criteria.

5. Properties selected for acquisition. Each property selected for acquisition or protection is assigned to a property agent. The DEP encourages and works cooperatively with private nonprofit land conservation organizations, municipalities, and water companies to promote land protection. In complex real estate negotiations, the Department may seek assistance from private nonprofit organizations such as the Nature Conservancy and the Trust for Public Land to help expedite the transaction.

   Grant recipients are responsible for implementing approved grant projects. This includes negotiating price, survey, title search, preparation of documents, and recording of transfer documents.

6. Review by The Natural Heritage, Open Space and Watershed Land Acquisition Review Board. The Review Board reviews selection criteria, policies, and procedures and provides guidance and review of land protection strategies. Specific comments and recommendations are presented in an annual report. The Board also reviews and makes recommendations to the Commissioner on funding grant proposals.

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Long Island Sound Stewardship Initiative

INTRODUCTION

The Long Island Sound Stewardship Initiative is a public/private partnership created by the Long Island Sound Study to identify, protect, and enhance places along the Sound of greatest ecological value. The goals of the Stewardship Initiative are to:

- Preserve representative examples of native plant and animal communities;
- Protect threatened and endangered plants and animals and their natural habitats;
- Preserve the Sound's unique habitats;
- Preserve sites that are important for long-term scientific research and education;
- Improve coastal reource-based recreation and public access opportunities;
- Enhance public awareness, visibility, and support for the Sound resources; and
- Strengthen citizens' personal connections to and identification with the Sound.

For the purposes of this Initiative, "stewardship" means land acquisition, land conservation agreements, site planning, plan implementation, land and habitat management, public access improvements, site monitoring, and other activities designed to enhance and preserve the Sound's ecological health, functions and sustainable public use. The Long Island Sound Stewardship Initiative is designed to accomplish this by:

- Identifying sites or site complexes with significant recreational and/or ecological values;
- Facilitating funding for protection and stewardship of these sites or site complexes;
- Providing a link to technical support and assistance for improved resource stewardship;
- Linking together sites that are important for the long-term ecological health and public enjoyment;
- Collaborating with related public and private entities
- Fostering voluntary partnerships to leverage limited public funds available for land conservation, public access, management, and other activities designed to maintain and enhance the ecological health of the Sound.

1. BACKGROUND

The Long Island Sound Study's Comprehensive Conservation and Management Plan (CCMP) calls for the conservation of natural resources and increased public access around the Sound. The Long Island Sound Study (LISS) began implementing the CCMP in 1994, and has since made significant improvements to the Sound's water quality.

However, critical elements of the Long Island Sound CCMP, including open space and natural resource protection still require significant attention.

To bring attention to these needs, in 2000, Audubon, the Regional Plan Association (RPA), and Save the Sound (STS) organized the *Listen to the Sound* Campaign. The Campaign was an initiative to gain citizen input on strategies to advance the ecological resource and land-use goals outlined in the CCMP. There was strong public sentiment regarding the urgent need to focus on restoring and protecting the Sound's coastal habitats that sustain its fisheries and other wildlife, and preserving the few unprotected signficant natural areas remaining along the shore that are under intense development pressure. The public supported the development of a strategy connecting people to the Sound while protecting the remaining outstanding unprotected aeas. Development of this strategy was adopted as a commitment of the LISS in the 2003 Long Island Sound Agreement that builds upon the goals of the CCMP.

With this mandate in hand, the LISS formed the Stewardship Work Group to coordinate efforts to identify sites with ecological and/or recreational resources and to develop a strategy to protect and enhance these important areas. The Stewardship Work Group is a collaborative effort including a broad range of agencies and organizations interested in protecting the Sound. Work Group members.

2. A USEFUL MODEL

The Stewardship Initiative is modeled on the successful approach used by the LISS Habitat Restoration Initiative to identify degraded habitats where restoration is critical to support the living resources of the Long Island Sound ecosystem. The LISS Habitat Restoration Initiative, launched in 1996, is a bi-state, multi-organization effort to restore and enhance degraded coastal habitats in Connecticut and New York.

Led by a work group comprised of agency officials and nonprofit organizations, the goals of the LISS Habitat Restoration Initiative are to restore the ecological functions of degraded and converted habitats; to restore at least 2,000 acres of habitat and 100 miles of riverine migratory corridors by 2008; and to use partnerships to accomplish the restoration objectives and leverage limited state, local, and federal funds. To accomplish these goals, the LISS Habitat Restoration Team identified potential restoration sites, solicited additional site nominations from the public, compiled a list of potential restoration sites using Geographic Information Systems (GIS) technology, and then ranked them according to a set of criteria in three major categories: ecological value; technical viability; and public benefit. Additional factors such as the presence of a local sponsor, an existing design plan, or available funding were also considered.

While the LISS Habitat Restoration Initiative focuses on restoring altered or degraded sites, the LIS Stewardship Initiative focuses on preserving and enhancing sites still in good condition that are critical to supporting the Sound's ecological and recreational resources.

3. STEWARDSHIP INITIATIVE STRATEGY

The strategy for developing the Stewardship Initiative requires work in two distinct phases. The first phase is a planning phase to inventory the ecological and recreational resources located throughout the Sound, identify the inaugural priority sites or site complexes, and document the threats and opportunities at these special places. The second phase focuses on implementation of on-the-ground stewardship actions. Implementation will be coordinated by a Stewardship Coordinating Committee (formed by expanding the current work group), and progress will be evaluated against goals and measures of success. A feedback loop will take new information gained from the process to review and update the list of priority sites. The flow chart shown in Figure 1 illustrates the proposed strategy for the LIS Stewardship Initiative and identifies the section of this document that provides the details on each step.

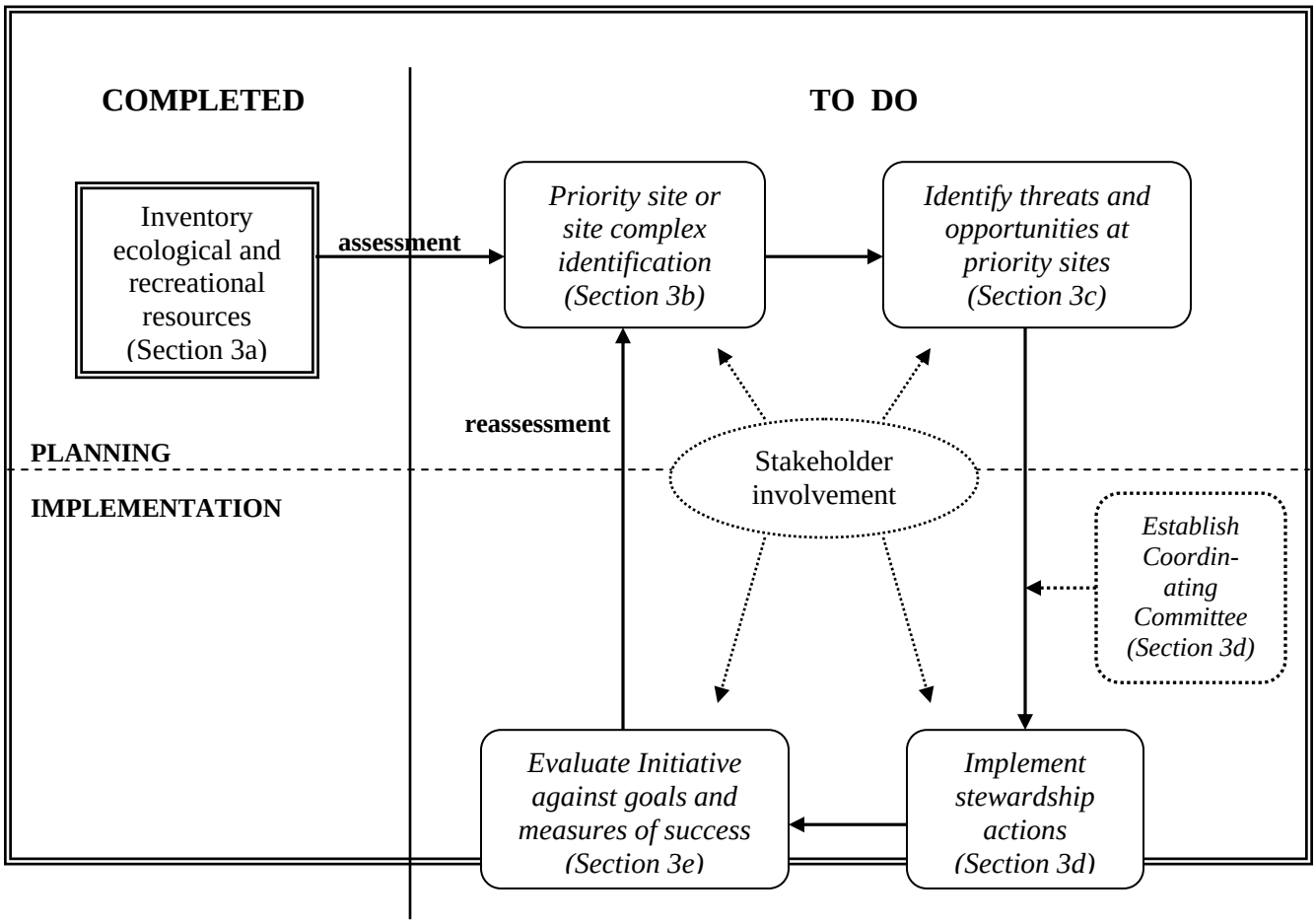


Figure 1: Proposed strategy for the planning and implementation phases of the LIS Stewardship Initiative.

3a. Inventory of Key Recreational and Ecological Resources

Following the LISS Habitat Restoration model, the first step of the LIS Stewardship Initiative was to establish a boundary defining the area within which a detailed inventory and analysis would be conducted. Figure 2 illustrates the boundary used for the Stewardship Initiative, which is similar to the one used for the Habitat Restoration Initiative.

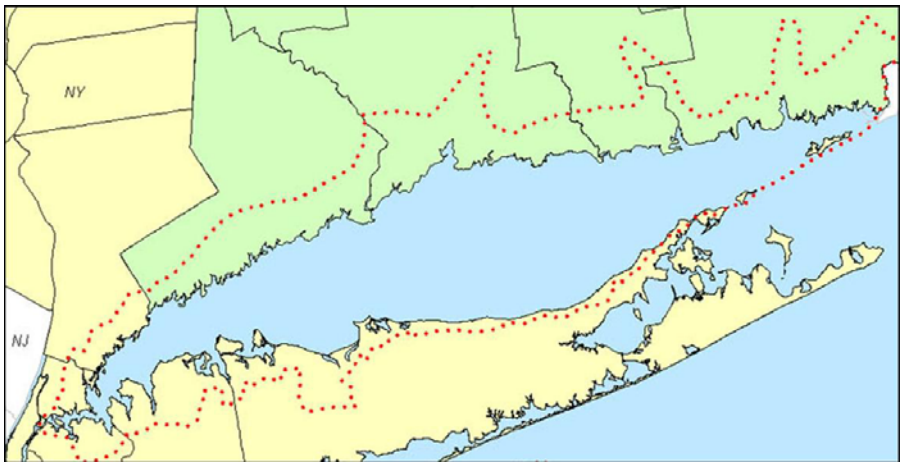


Figure 2: The Stewardship Initiative boundary, shown as a dotted line, encompasses the immediate coastal areas of the Sound.

As a basis for identifying the high value areas throughout the Sound, a comprehensive inventory of the Sound's coastal resources was conducted within the boundary area. These early inventories of coastal recreational resources important ecological areas are currently being updated. Key criteria for these earlier inventories are listed in Table 1.

Table 1: Key Criteria for the Comprehensive Inventory of the Sound's Coastal Resources

Criteria for Recreational Resources	Criteria for Ecological Resources
Public access to the water	Ecological uniqueness
Water resource protection	Species viability
High recreational need	Habitat diversity
Social equity	Size
Environmental justice	Quality
Special needs groups (children/elderly)	Connectivity to existing protected areas or open space
Open space resources	Land cover
Connectivity/adjacency to protected areas	Scientific research or educational value
Scenic views	
Cultural/historical areas	
Educational opportunities	

The inventory data and the preliminary areas identified by the work groups as having significant value were illustrated on maps and displayed at a series of public meetings in early 2004. Eight public meetings were held around the Sound to solicit input regarding the accuracy and completeness of the recreational and ecological resource inventories, as well as to identify a preferred approach for the protection and enhancement of these special places. his summary, which is available to the public on the LISS website, includes a list of the groups that attended each meeting, questions that were asked, and the results of the survey distributed at the meetings. Overall, there was strong support for the goals of the Stewardship Initiative. The public expressed great concern over the speed with which these special places throughout Long Island Sound are disappearing or becoming degraded, and stressed the need for the LISS to act quickly in implementing a strategy to improve the stewardship of the Sound's resources.

Comments on the maps and site suggestions received during the meetings were incorporated to ensure the completeness and accuracy of the inventories. A database of sites of exemplary ecological significance and maps of the showing the general locations of these sites is in production.

This resource inventory focused on the coastal and intertidal areas of Long Island Sound. While there are also significant resources in the Sound's underwater areas, data limitations for these subtidal areas has precluded production of a comprehensive inventory of such areas. As a result, mapping the Sound's benthic environment and bringing key stakeholders together to discuss stewardship of the Sound's underwater resources are long-term needs, and this strategy considers only nearshore and coastal sites.

3b. Identification of Priority Sites

With the forthcoming completion of terrestial and intertidal resource inventories, the next step for the Stewardship Initiative is to develop a list of priority sites or site complexes throughout the Sound. The site identification process will use a systematic approach to develop a priority list that highlights the most valuable ecological areas throughout the Sound. The current existing list of Stewardship sites/site complexes focuses on existing publicly owned facilities and other existing protected open space. A description of the Stewardship sites is available at the U.S. EPA's Long Island Sound Study's tewardship web pages: http://longislandsoundstudy.net/issues-actions/stewardship/stewardship-areas-atlas/

The ecological inventory and site identification process employs existing resource information and professional resource expertise. The USFWS Coastal Program collected available species and habitat use data layers using GIS. The USFWS then met with work groups of Connecticut and New York specialists to agree on significant resource categories (listed in Table 1) and definitions and review the maps of existing data. These technical work groups outlined polygons on the maps and developed notes that explained which category(ies) a site fit best. The inventory of sites is being evaluated by the work groups to develop a list of the priority ecological sites in New York and Connecticut.

Once the ecological priority site lists have been developed, the Stewardship Initiative Work Group will evaluate a draft list of sites to determine if and how an integrated list of high priority places around the Sound can be developed. The Stewardship Work Group will also evaluate whether identifying individual sites or grouping sites together as complexes best captures the Sound's ecological resources.

The resulting list of priority sites will highlight places that are important for wildlife, the last large areas of natural habitat around the Sound, and sites that provide recreational and access opportunities for people to enjoy and learn about Long Island Sound. The priority sites are not intended to become preserves set aside from economic activity. While some areas may warrant such protection, many others will accommodate multiple uses as determined by landowners, local communities, and appropriate agencies.

Owners and managers of the potential priority sites will be notified about the identification of their property and given the option to accept or decline inclusion on the site list. Identification of a site as a priority site will not override any existing management requirements or statutory or regulatory dictates. Ownership, as well as use and access decisions, will remain in the hands of the property owners or resource managers. Sites that are not included on the priority list may be considered for stewardship efforts or partnerships, provided that the site has significant ecological or recreational value and is located within the Stewardship Initiative boundary.

The Stewardship Work Group will hold a series of public meetings to solicit feedback on the draft list of priority areas and input on the issues affecting these special places. After incorporating these comments, the Stewardship Work Group will present the list of priority sites to the LISS Management Committee and Policy Committee for approval. Upon approval by the LISS, the site list will be made available to the public, along with documentation on the values of and threats to these sites or site complexes.

3c. Identification of Threats and Opportunities

Along with the site identification process, the ecological values of the initial Stewardship sites and threats to those sites will be evaluaed. Public input on the issues affecting these special places will be solicited at the public meetings. Additional information regarding the threats and conservation opportunities at these sites will be identified.

3d. Implementation

The Stewardship Initiative will be implemented as a program of the LISS. However, as with the LISS Habitat Restoration Initiative, a variety of organizations and agencies are expected to provide funding and partnership opportunities for implementation. Upon completion of the initial site identification process, the existing work group will be expanded and formally constituted as the Long Island Sound Stewardship Coordinating Committee. The Committee will be comprised of agency staff and stakeholder organizations representing diverse environmental and economic interests, and will include representatives from New York and Connecticut. The EPA Long Island Sound Office (EPA LISO), in coordination with the LISS Management Committee, will make appointments to the Committee. The Coordinating Committee's responsibilities will include the following:

1. ***Facilitate Funding for Stewardship Projects:*** Evaluate proposals requesting funding for stewardship actions and recommend projects for funding to the LISS Management Committee. Identify and secure additional resources to accomplish Initiative goals.
2. ***Develop Measurable Goals for the Stewardship Initiative:*** Define key indicators of success for this Initiative, establish a timeline for meeting these goals, evaluate ongoing activities, and provide annual reports on progress toward meeting established goals. Amend process based on results if necessary. Preliminary example indicators include the following:

    - Improve and enhance access at XX sites throughout Long Island Sound.
    - Protect XX acres of coastal habitat and open space. (Protect = improve management, acquire, easement)
    - Guide and assist XX number of sites with funding for stewardship activities.

3. ***Communicate the Goals of the Stewardship Initiative:*** Develop and distribute materials to describe the Initiative and highlight its importance. Continue the dialogue with interested organizations around the Sound. Communicate and collaborate with other agencies and organizations working on stewardship issues to avoid duplication of efforts and build partnerships.

The Stewardship Work Group has recommended that the LISS provide funding for a Stewardship Initiative Coordinator, as the LISS has done with the Habitat Restoration Initiative. The Stewardship Initiative Coordinator will act as the liaison between the Coordinating Committee and the property owners or resource managers involved with the

Initiative, and will assist the Coordinating Committee with the tasks detailed above. In addition, the Stewardship Initiative Coordinator will be responsible for organizing Committee meetings and producing reports and other deliverables for the LISS Management Committee, EPA and others. The Stewardship Initiative Coordinator will be housed in the EPA LISO and will report to the Director of the EPA LISO.

3e. Evaluation of the Stewardship Initiative

In order to evaluate the effectiveness of the Stewardship Initiative, the Initiative Coordinator will work with the Coordinating Committee to develop a set of measurable goals, as described in Section 3d. Periodic evaluation of the Initiative will help ensure that stewardship goals are being realized and will provide an opportunity to review and update, if necessary, the list of priority sites. The Coordinating Committee will establish a process by which to update the list of priority sites. This process will include criteria for evaluating information on potential additions to the list and methodology for soliciting and incorporating feedback from the public.

4. BENEFITS

The LIS Stewardship Initiative is envisioned as a collaborative effort among a wide range of public and private partners. These voluntary partnerships will help protect and improve stewardship at sites important for maintaining the long-term ecological health and public enjoyment of the Sound, while building public visibility and support for the Sound. Another benefit of the LIS Stewardship Initiative is that the data gathered through the comprehensive inventory are an information resource for landowners, government agencies, land trusts, and others interested in restoring and protecting the Sound. This information, coupled with the list of priority sites, can help focus agencies and groups on where to direct limited resources and can assist in the establishment of stewardship priorities.

Upon completion of the priority site list, identification as a stewardship site will enhance an application's ranking for possible funding through the LIS Futures Fund – a joint program of the LISS and the National Fish and Wildlife Foundation – to assist with acquisition, planning, management, or public access improvements consistent with the goals and principles of the Stewardship Initiative. Participating landowners and managers will also have access to technical support to assist with stewardship efforts. The Stewardship Coordinator will work with these landowners and managers to identify and secure funding to develop and implement stewardship actions, by facilitating partnerships and assisting with grant applications. If desired, participants may display a logo designating their site as a LIS Stewardship Area on signage at the site, as well as on printed materials and on their web sites. Further information about the logo concept will be developed.

5. FUNDING

Significant financial resources will be necessary to initiate and sustain the Stewardship Initiative. Funding will be needed for the acquisition and protection of lands, to facilitate effective site planning, management, enhancement, and public access improvements, and to allow the Stewardship Coordinating Committee to effectively carry out its duties. The preliminary list of potential sources of funding for the LIS Stewardship Initiative includes:

Identifying New Funding Sources

- Proposed Federal Legislation establishing a Long Island Sound Stewardship Act would authorize $40 million per year in funding for the Stewardship Initiative
- Potential sources of new state and local funding to assist with stewardship
- Potential new sources of Foundation and other private support
- Proposed federal legislation such as the American Outdoors Act and extension and enhancement of the Land and Water Conservation Fund
- NOAA's Coastal and Estuarine Land Conservation Program

Leveraging Existing Funding Sources

- Federal Land and Water Conservation Fund
- Other Federal sources, such as North American Wetlands Conservation grants
- LIS Futures Fund, a joint program of the LISS and the National Fish & Wildlife Foundation (NFWF)

- State open space programs (CT Recreation and Natural Heritage Trust Program; CT Municipal Open Space and Watershed Grants Program; CT Farmland Preservation Program; the New York Open Space Program)
- Municipal sources, such as the New Drinking Water Protection Program of Suffolk County, New York and the New York Community Preservation Act

Appendix 9

Connecticut Coastal Access Survey Results

Connecticut Department of Environmental Protection
Office of Long Island Sound Programs

November 2004

From February 2004 to July 2004 Connecticut DEP's Office of Long Island Sound Programs distributed three coastal recreation access surveys to better understand the public's coastal recreation habits and to assess public demand for access to Connecticut's coast for the following popular coastal recreation activities: (1) Saltwater Fishing and Waterfowl Hunting; (2) Coastal Boating; and (3) Wildlife Observation. The data obtained from the three surveys are summarized here.

Survey Distribution and Response

Total surveys distributed: 1,069

Total surveys returned: 419

Response Rate: 39%

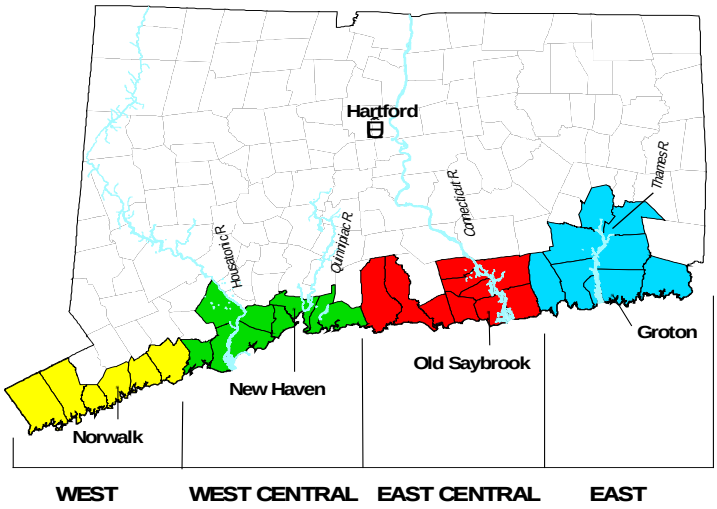
Total # of Wildlife surveys distributed: **356**
Total # of Wildlife surveys returned: **166**
Response Rate: **47 %**

Total # of Saltwater Fishing and Waterfowl Hunting surveys distributed: **368**
Total # of Saltwater Fishing and Waterfowl Hunting surveys returned: **141**
Response Rate: **38%**

Total # of Boating surveys distributed: **345**
Total # of Boating surveys returned: **112**
*Response Rate: **32%***

Demographics of Survey Respondents

Connecticut's Coastal Regions



Respondents were from the following regions:

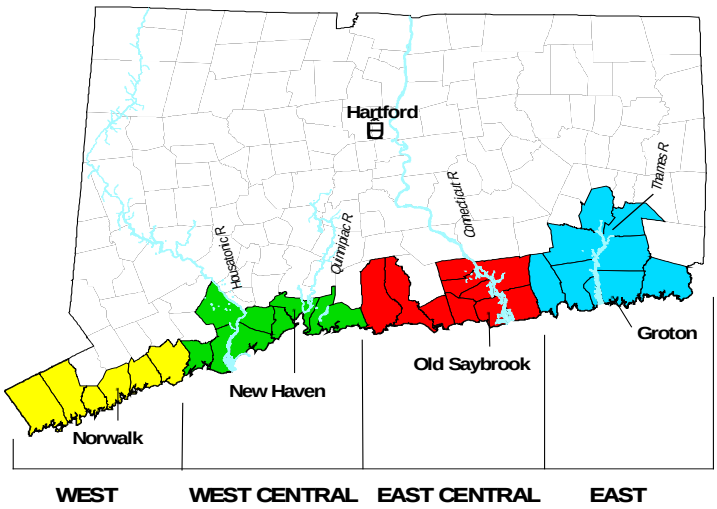
Percent for regions (coastal regions outlined in the above map)

Other-	**46%**
East Central	**15%**
Eastern	**16%**
West Central	**13%**
Western	**7%**
Did not respond	**4%**

BOATING ACCESS SURVEY RESULTS

Demographics of Survey Respondents

Connecticut's Coastal Regions



Respondents were from the following regions:

Percent for regions (coastal regions outlined in the above map)

Other-	**47%**
East Central	**16%**
Eastern	**16%**
West Central	**11%**
Western	**5%**
Did not respond	**5%**

Percent of respondents that use the following vessels:

Powerboat over 26 feet long	6%	Canoe	18%
Powerboat under 26 feet long	35%	Kayak	27%
Personal Watercraft	3%	Rowing Skull/Shell	2%
Registered Sailboat	3%	Windsurfer	0%
Unregistered Sailboat	4%	Other (specify)_____	2%_

1. Are boaters coastal waters access needs being met at public access facilities?

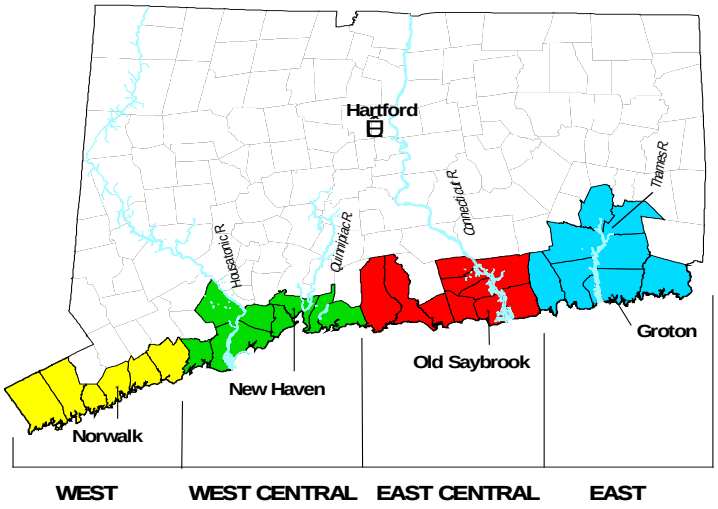
83% - believe additional public boating sites are needed

6% - believe no additional public boating sites are needed

8% - had no opinion

3% - did not respond

2. Where are additional **public boating access facilities most needed?**



Region	New **car-top launch**	New **trailered launch**
East Central Coastal Region (RED)	31%	36%
Eastern Coastal Region (BLUE)	26%	30%
Western Coastal Region (YELLOW)	24%	20%
West Central Coastal Region (GREEN)	19%	14%

2b. Towns where new **boating access sites are most needed:**

New car-top launches		**New trailered launches**	
1. Stonington	**9%**	1. Stonington	**7%**
2. Branford and Madison	**6%**	2. Clinton and Westbrook	**6%**
3. Guilford and Greenwich	**5%**	3. Greenwich, Madison, East Lyme, New London	**5%**

3. Facilities requested at new **boat launches**:

Facilities requested at new carry-in **boat launches:**

soft bottom ramp	**39%**
toilet	**33%**
public dock at boat launch	**8%**
hard-bottom ramp	**2%**
parking	**2%**
other	**1%**

Facilities requested at **new trailered** boat launches:

hard-bottom ramp	**33%**
public dock at boat launch	**27%**
toilet	**29%**
other	**8%**
parking	**3%**

4. How should **existing** public boat access facilities be improved or managed to better meet the public's boating access needs?

The following **additional** facilities should be provided at **existing** boating access sites:

additional parking	**24%**
ramp	**20%**
improved water depths	**15%**
other	**10 %**
public dock	**9%**
permanent toilets	**8%**
portable toilets	**7%**
lighting	**3%**
improved services for the mobility impaired	**3%**
did not respond	**1%**

The following facilities should be improved **at** existing **boating access sites:**

public dock	**20%**
portable toilets	**17%**
additional parking	**15%**
improved water depths	**11%**
permanent toilets	**10%**
did not respond	**8%**
other	**7%**
lighting	**6%**
improved services for the mobility impaired	**2%**
fresh water hose	**2%**
trash cans	**2%**

5. Facilities improvements at specific boating access sites:

What **existing** public boating access sites are most in need of **additional** facilities?

• East River State Boat Launch **6%**
• Great Island State Boat Launch **5%**
• Barn Island State Boat Launch **5%**

(major facility improvements completed at Barn Island State Boat Launch post survey)

• Saugatuck River State Boat Launch **4%**

What were the facilities requested at these sites?
Site# 149 East River State Boat Launch - additional parking, improved water depths, lighting, portable toilets and a public dock.
Site# 186 Great Island State Boat Launch - additional parking, carry-in access improved water depths permanent toilets and a public dock.
Site# 258 Barn Island State Boat Launch - a fresh water hose, improved water depths, lighting, permanent toilets and a public dock.
Site# 53 Saugatuck River State Boat Launch - additional parking, improved water depths, permanent toilets, portable toilets, a public dock and separate carry-in access point for manually-propelled vessels.

What sites had the highest percentage of requests for facility **improvements**?

• Barn Island State Boat Launch **9%**

(major facility improvements completed at Barn Island State Boat Launch post survey)

• Niantic River State Boat Launch **7%**
• Branford River State Boat Launch **7%**
• Bayberry Lane State Boat Launch **7%**

What were the facility improvements requested at these sites?
Site# 258 Barn Island State Boat Launch - additional parking, improved water depths, permanent toilets, a public dock, rock removal, improve bottom for small boat landing, smooth access road and a soft-bottom ramp (sand).
Site# 197 Niantic River State Boat Launch - additional parking, improved water depths, more frequent cleaning of portable toilets, permanent toilets and a ramp.

Site# 140 Branford River State Boat Launch - additional parking, improved services for mobility impaired, lighting, a public dock and a ramp.
Site# 226 Bayberry Lane State Boat Launch - additional parking, improved water depths, permanent toilets, public dock and a ramp.

6. a. Should boat launch ramps be managed to allow uses **other than boating access** (e.g., bird watching, fishing, etc.)?

Yes 47%
No **53%**

b. If other non-boating uses are permitted at boat launches, what types of uses should be permitted?

fishing **34%**
wildlife observation platforms **34%**
picnicking **29%**
other- all others no more than **1%**

7. New boating access design considerations:

How far from a parking area are car-top boaters willing to carry their vessels (eg. canoes/kayaks) to a launch site?

0 feet - 50 ft **20%**
50 ft - 100 ft **34%**
100 ft -150 ft **9%**
More than 150 ft **17%**
Did not respond **21%**

8. What types of coastal environments would boaters visit more often if they could land their vessels nearby? Beaches and Islands for all four coastal regions.

Percent respondents that would visit certain coastal environments more often if they could land their boat there:

Rank	Coastal Environments	Coastal Region			
		West	West Central	East Central	East
1	islands	24%	27%	26%	24%
2	beaches	20%	22%	21%	23%
3	marsh (carry-in vessels only)	13%	15%	16%	15%
4	parks	14%	11%	14%	15%
5	historic sites	11%	13%	8%	10%
6	downtown areas (town centers)	9%	9%	9%	8%
7	shopping (service areas)	4%	2%	4%	3%
8	other	5%	1%	2%	2%

other (specify)
East- tackle shops, rivers, camping area and coves
East Central- dredging, rivers and tackle shops
West Central- restaurants
West- rivers for rowing and restaurants

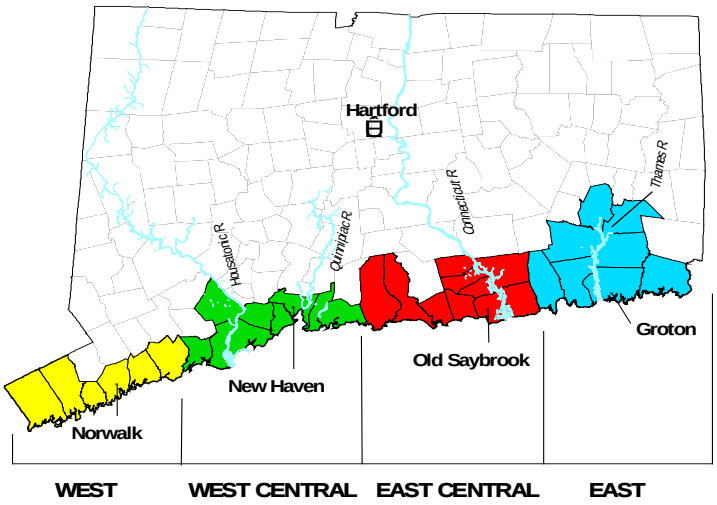
9. Temporary vessel "tie-up" facilities:
Temporary tie-up facilities allow short term boater access to the land from the water.

a. 47% of respondents use temporary tie-ups

Preferred method (or facility) for temporarily securing boats:

- transient/temporary dock space **55%**
- informal haul-out area **21%**
- dinghy dock **13%**
- mooring **11%**

b. Where are temporary tie-ups most needed (percentage of responses for each region)?



Region	New temporary tie-ups
East Central Coastal Region (RED)	37%
Eastern Coastal Region (BLUE)	28%
Western Coastal Region (YELLOW)	28%
West Central Coastal Region (GREEN)	7%

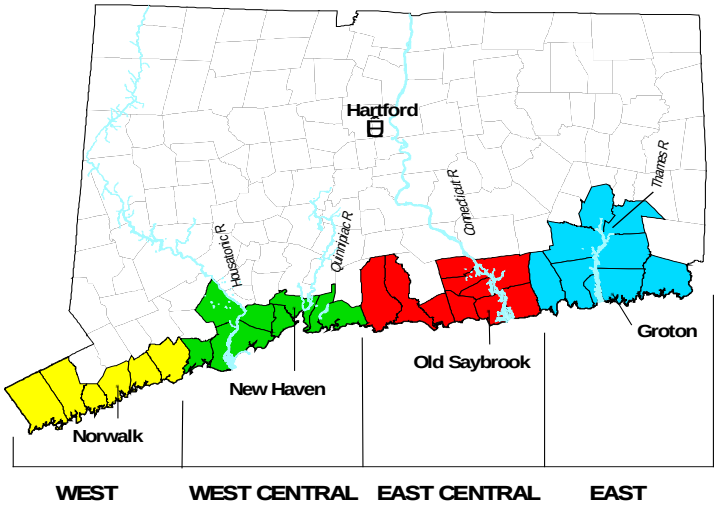
Towns where new **temporary tie-ups are most needed:**

1. **Greenwich and Clinton -- all with 8%**
2. **Madison - 7%**
2. **Darien, Waterford, Stonington -- all with 6%**

SALTWATER FISHING AND WATERFOWL HUNTING RESULTS

Demographics of Survey Respondents

Connecticut's Coastal Regions



Respondents were from the following regions:
Percent for regions (coastal regions outlined in the above map)

Other-	**43%**
Eastern	**19%**
East Central	**16%**
West Central	**11%**
Western	**6%**
did not respond	**6%**

Percentage of respondents that participate in saltwater shore fishing: 45%

Percentage of respondents that participate in saltwater boat fishing: 45%

Percentage of respondents that participate in waterfowl hunting: 10%

Fishing:

How far are fishermen willing to travel to use a fishing site?

Less than 10 miles-	**7%**
Greater than 10 but less than 50 miles-	**55%**
Greater than 50 miles-	**35%**

Popularity of CT's Coastal regions for shore-based fishing:

East Central- **39%**

Eastern- *38%*

Western- *11%*

West Central- 9%

1. The role of private lands in providing shore-based fishing access:

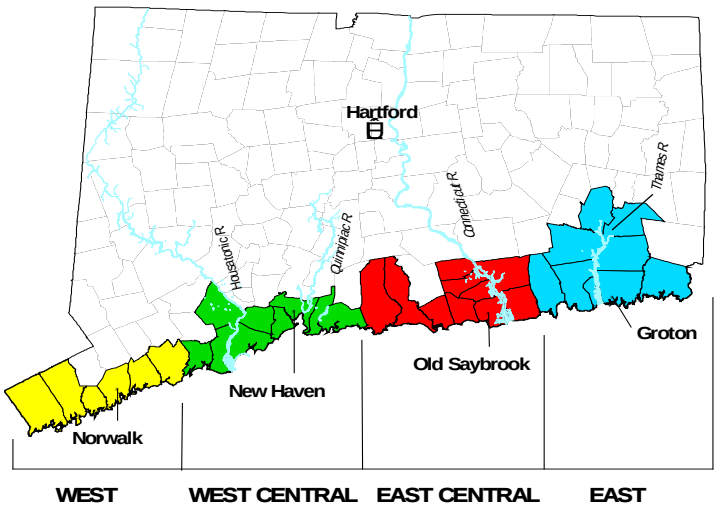
36% Percent of respondents had to cross private land to access a fishing site:

Of those indicating a need to cross private land, **76%** felt the DEP should acquire the land

Specific sites that are providing a significant shore-based fishing opportunity where the public has to cross private land:

- Cornfield Point, Old Saybrook **6%**
- Griswold Point, Old Lyme **3%**
- Seaside Point, Waterford **2%**
- Norwich State Hospital, Preston **2%**

2. Where are additional fishing access opportunities most needed along CT's coast?



a. Additional public **shore-based fishing access** opportunities are most needed:

Region	Shore Fishing Access
East Central Coastal Region (RED)	38%
Eastern Coastal Region (BLUE)	26%
Western Coastal Region (YELLOW)	21%
West Central Coastal Region (GREEN)	15%

b. Additional public **boat fishing access** opportunities are most needed:

Region	Boat Fishing Access
East Central Coastal Region (RED)	35%
Eastern Coastal Region (BLUE)	33%
Western Coastal Region (YELLOW)	14%
West Central Coastal Region (GREEN)	18%

Hunting:

Popularity of CT's Coastal regions for waterfowl hunting:

Eastern- 34%
East Central- 31%

West Central- 17%

Western- 17%

*note: only 21% of the Saltwater Fishing and Waterfowl Hunting survey respondents answered this question

1. The role of private lands in providing waterfowl hunting access:

a. **4%** Percent of respondents had to cross private land to access waterfowl hunting sites.

Of those who need to cross private lands, **33%** felt the DEP should acquire the land

b. Specific sites that are providing a significant waterfowl hunting opportunity where the public has to cross private land:

- Greenwich
- Manersa Power Plant Land and Salt Marsh, Norwalk
- Darien

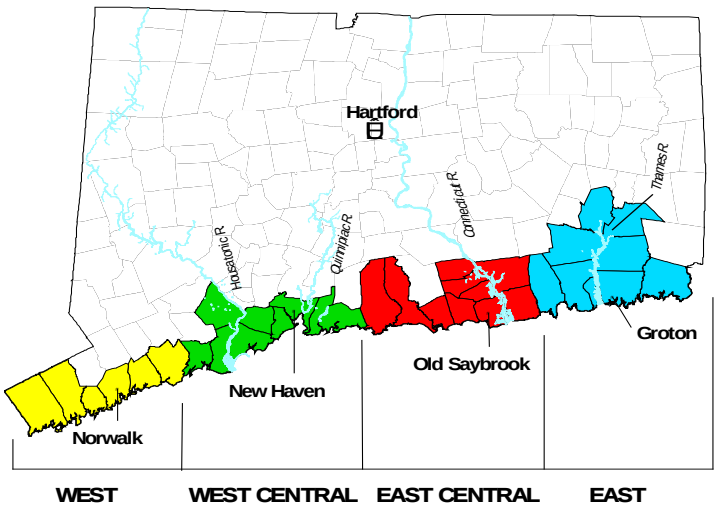
2. Facilities that are most needed at **existing** waterfowl hunting access sites:

- Most frequently requested facility: Toilets

Toilets	**20%**
Trailered Ramp	**18%**
Carry-In Boat Launch	**17%**
Access Pier	**17%**
Parking area improvements	**17%**
Other	**9%**

- Most frequently mentioned access site: Four Mile River State Boat Launch, Old Lyme
- Public access site that needed the most new facilities: Four Mile River State Boat Launch, Old Lyme

3. Where are additional waterfowl hunting opportunities most needed along CT's coast?

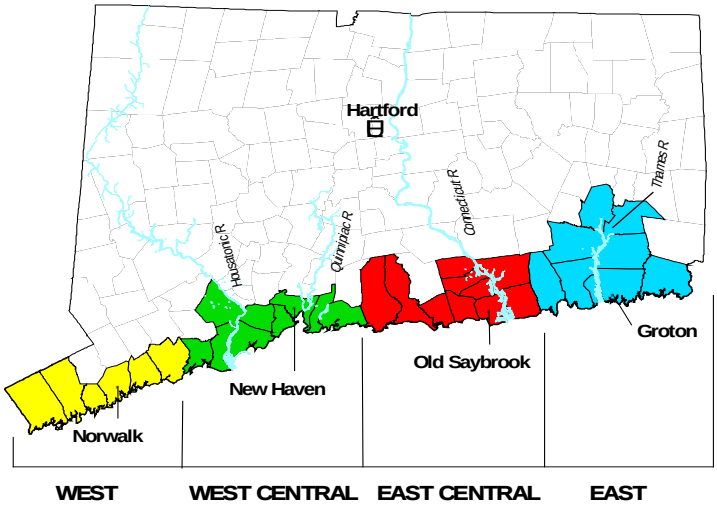


Region	Waterfowl Hunting Access
East Central Coastal Region (RED)	28%
Eastern Coastal Region (BLUE)	36%
Western Coastal Region (YELLOW)	21%
West Central Coastal Region (GREEN)	15%

WILDLIFE ACCESS SURVEY RESULTS

Demographics of Survey Respondents

Connecticut's Coastal Regions



Respondents were from the following regions:

Percent for regions (coastal regions outlined in the above map)

Other-	47%
West Central	17%
Eastern	13%
East Central	12%
Western	8%
Did not respond	3%

1. a. Are wildlife observation public access needs being met? No

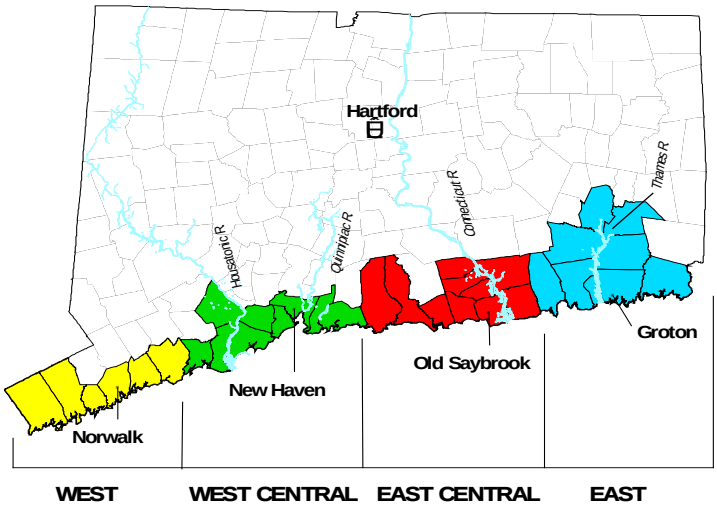
81% **believe additional wildlife observation areas are needed**

10% **had no opinion**

6% **did not respond**

3% **believe no additional wildlife observation areas are needed**

b. Where are additional wildlife observation opportunities most needed along CT's coast?



Region	Wildlife Observation Access
East Central Coastal Region (RED)	36%
Eastern Coastal Region (BLUE)	16%
Western Coastal Region (YELLOW)	21%
West Central Coastal Region (GREEN)	27%

2. Are there specific sites that DEP should investigate acquiring to meet the needs of the wildlife observation public?

Areas with the highest percentage of responses:

- Area on the Quinnipiac River in New Haven, North Haven and Hamden
- Area in and around Great Meadows, Stratford
- Griswold Point, Old Lyme
- Oswegatchie Hills, East Lyme
  - Area adjacent to Hammonasset State Park, Madison
  - Quaker Hill, Waterford

3. Are additional facilities needed at existing wildlife observation areas?

54% believe additional types of facilities are needed at existing sites
25% believe no additional types of facilities are needed at existing sites
21% had no opinion

4. a. Facilities that need to be added to **existing** wildlife observation areas to make them more useful:

Observation platform	**21%**
Observation blind	**14%**
Toilets	**30%**
Parking area improvements	**19%**

Other (boat kayak launch 2%, Osprey nest platforms 2%) 16%

b. Most frequently mentioned sites requiring facilities improvements (highest percentage of responses):

Sandy Point Bird Sanctuary, West Haven	**6%**
Sandy Point, West Haven	**4 %**
Barn Island Wildlife Management Area, Stonington	**4%**

Facilities most frequently requested at the above sites:

Sandy Point Bird Sanctuary, West Haven - observation blind, observation platform, parking improvements (also in the summer months) and toilets.

Sandy Point, West Haven - observation blind, observation platform, parking improvements and toilets.

Barn Island Wildlife Management Area, Stonington - observation blind, observation platform, toilets and trail maps – area info.

5. a. Is DEP adequately operating coastal access sites to meet the needs of the wildlife observation public?

41% believe existing DEP coastal access properties are operated to meet their needs:
45% believe existing DEP coastal access properties are not operated to meet their needs:
14% had no opinion

b. The most significant operational obstacles to meeting the needs of the wildlife observation public at existing DEP coastal access areas:

Increased hours of access	**50%**
Improve maintenance/trash pick-up	**19%**
Improve parking facilities	**17%**
Other- (dogs on leash 2%, dog feces 2%)	**14%**

c. Most frequently mentioned sites (highest percentage of responses):

- Hammonasset Beach State Park, Madison **28%**
- Silver Sands State Park, Milford **9%**
- Sherwood Island State Park, Westport **4%**

Facilities most frequently requested at the above sites:

- Hammonasset Beach State Park, Madison - increase hours of access
- Silver Sands State Park, Milford - increase hours of access
- Sherwood Island State Park, Westport - increase hours of access

6. Conflicting uses at wildlife observation sites:

52% have encountered conflicting recreational uses at access sites
36% have not encountered conflicting recreational uses at access sites
11% had no opinion

a. The most common types of conflicting uses at wildlife observation sites:

Unleashed dogs disturbing nesting birds
Walkers disturbing nesting birds
Motor powered vehicles (including ATV's, jet-skis, boats) disturbing nesting birds

b. The three sites where conflicts most often occurred (percentages):

Hammonasset Beach State Park, Madison **15%**
Sandy Point, West Haven **9%**
Stewart B. McKinney National Wildlife Refuge-Milford Point Unit **6%**

Appendix 10

go to: http://nctc.fws.gov/resources/knowledge-resources/pubs5/necas/begin.htm

for

FINAL REPORT

NORTHEAST COASTAL AREAS STUDY:
SIGNIFICANT COASTAL HABITATS
OF SOUTHERN NEW ENGLAND
AND PORTIONS OF LONG ISLAND, NEW YORK

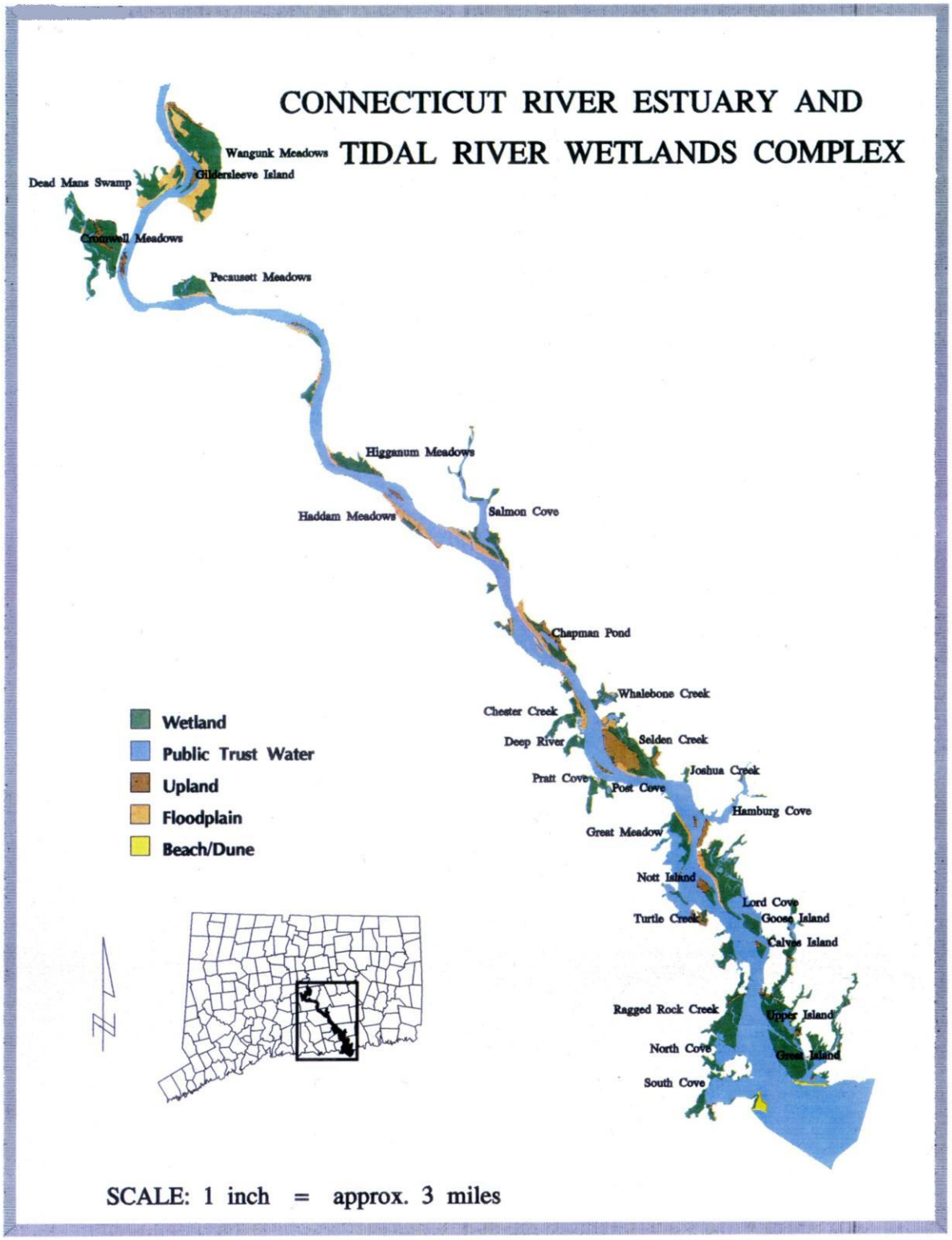
Submitted to

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON APPROPRIATIONS
AND
U.S. SENATE
COMMITTEE ON APPROPRIATIONS

August 1991

PREPARED BY:
U.S. FISH AND WILDLIFE SERVICE
Southern New England - Long Island Sound Coastal and Estuary Office
Box 307
Charlestown, Rhode Island 02813

Appendix 11


CONNECTICUT RIVER ESTUARY AND
TIDAL RIVER WETLANDS COMPLEX
Wangunk Meadows
Gildersleeve Island
Dead Mans Swamp
Cromwell Meadows
Pecausett Meadows
Higganum Meadows
Haddam Meadows
Salmon Cove
Chapman Pond
Whalebone Creek
Chester Creek
Deep River
Selden Creek
Pratt Cove
Joshua Creek
Post Cove
Hamburg Cove
Great Meadow
Nott Island
Lord Cove
Turtle Creek
Goose Island
Calves Island
Ragged Rock Creek
Upper Island
North Cove
Great Island
South Cove
Wetland
Public Trust Water
Upland
Floodplain
Beach/Dune
SCALE: 1 inch = approx. 3 miles

Appendix 12

Criteria for Inclusion - Ramsar Wetlands of International Importance

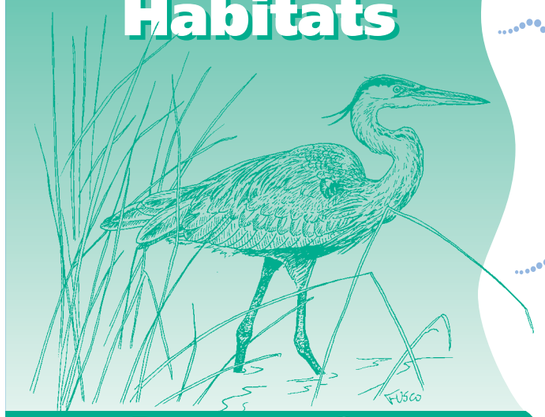
Article 2(2) of the Ramsar Convention specifies that the selection of wetlands for the List of Wetlands of International Importance (List) should be based on their international significance in terms of ecology, botany, zoology, limnology, or hydrology. Member countries to the Ramsar Convention adopted general criteria and expanded guidelines at the Conferences of the Parties at Heiligenhafen (1974), Regina (1987), and Montreux (1990) for nominating wetland sites for the Ramsar List. The three categories for selecting internationally significant wetlands are: 1) representative or unique wetlands in a region; 2) wetlands using plants and animals as indicators of importance, especially rare and endangered species; and 3) wetlands of particular value to waterfowl. According to the Convention, a wetland is considered suitable for inclusion on the List if it meets any of the established criteria.

Appendix 13

Connecticut River Estuary and Tidal Wetlands Complex Core Sites

(1) Connecticut River Mainstem - All tidal waters and submerged lands below mean high water of the mainstem of the Connecticut River.
(2) Great and Upper Island Complex (Old Lyme) - An extensive system of salt and brackish meadow marshes, including Griswold Point, an important barrier beach and dune complex at the mouth of the river.
(3) Ragged Rock Creek and South Cove Complex (Old Saybrook) - Brackish marsh system including Lynde Point, a coastal barrier with one of the most extensive sandflat communities in Connecticut.
(4) Turtle Creek (Essex, Old Saybrook) - Brackish reed marsh with some wild rice.
(5) Lord Cove Complex (Lyme) - An extensive area of brackish reed marsh and floodplain forest. Includes Nott, Goose, and Calves Islands.
(6) Great Meadows (Essex) - A brackish reed marsh.
(7) Hamburg Cove (Lyme) - A tidally-influenced freshwater cove noted for its ecologically important intertidal flats and diversity of submerged aquatic vegetation.
(8) Pratt and Post Coves (Deep River) - Well-developed freshwater tidal marshes dominated by dense stands of wild rice on low marsh and diverse forb communities on the high marsh.
(9) Selden Creek and Joshua Creek (Lyme) - Area consists of Selden Neck (bedrock island), Selden Cove, and Selden Creek, extensive freshwater tidal marshes and alluvial wetlands, and a narrow upland slope. Numerous creeks flow into the cove from the surrounding uplands.
(10) Chester Creek and Deep River Complex (Chester, Deep River) - Extensive freshwater tidal wild rice marsh.
(11) Whalebone Creek and Cove (Lyme) - One of the most extensive freshwater tidal wild rice marshes in the state, surrounded by forested uplands.
(12) Chapman Pond (East Haddam) - A 24-hectare (60 acre) tidal freshwater pond connected to the Connecticut River by two narrow inlets.
(13) Salmon Cove and River (East Haddam) - A complex of high-quality freshwater tidal marshes, intertidal flats, floodplain forest, and alluvial swamp bounded by forested uplands.
(14) Haddam Meadows State Park (Haddam) - Alluvial wetlands and floodplain
(15) Higganum Meadows (Haddam) - Freshwater tidal marshes, alluvial wetlands and floodplain
(16) Pecausett Meadows (Portland) - High quality freshwater tidal marsh.
(17) Cromwell Meadows (Cromwell, Middletown) - Freshwater tidal and alluvial marsh.
(18) Dead Mans Swamp (Cromwell) - An alluvial floodplain, swamp, and marsh system with well-developed vegetation characteristic of the upper tidal Connecticut River.
(19) Gildersleeve Island (Cromwell) - Sandy island and sand bar system and floodplain forest on west side of upper tidal Connecticut River.
(20) Wangunk Meadows (Portland, Glastonbury) - A large complex of floodplain forest and alluvial marsh east of Gildersleeve Island.

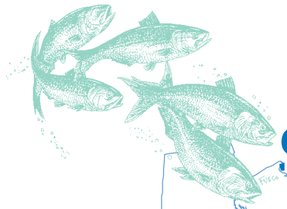
Restoring Long Island Sound's Habitats

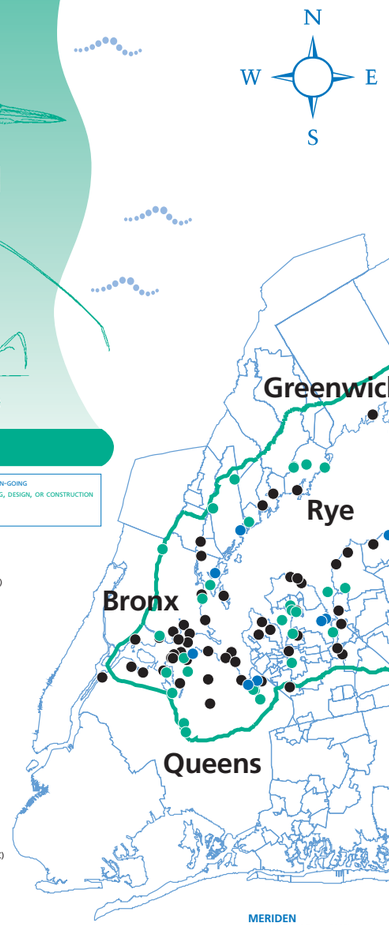


2002

Restoration Sites

Blue indicates Completed Site – Construction on the project is finished, but monitoring may be on-going
Green indicates In Progress Site– some phase of the project is underway, e.g. applying for funding, design, or construction
Black indicates Potential Site – a restoration project has been identified, no action taken yet
Boldface in all colors indicates high-ranked sites





Connecticut

BRANFORD
Branford River STP (TW)
Branford R./Christopher Rd. (TW)
Branford R./St. Agnes Cemetery (TW)
Branford R./Hickory Rd. (TW)
Branford R. tributary/Mill Creek (TW)
Farm River (TW)
Farm R. tributary/Pent Rd. (TW)
Farm R. tributary/Cynthia Ct. (TW)
Flying Point/Prospect Hill Rd. (TW)
Juniper Point (TW)
Lindsey Cove east (TW)
Lindsey Cove west/Castle Rock (TW)
Pages Cove north (Short Beach) (TW)
Pages Cove (Killan's Point) (TW)
Pine Orchard golf course (TW)
Sybil Creek (TW)
Tabor Drive Marsh (TW)
Three Elms Rd. (TW)
Tilcon Wetland (TW)
Ward's Millpond/Branford River W.M.A. (RMC/FW)
West Point Road (TW)

BRIDGEPORT
Ash Creek/Rooster River (TW)
Bunnells Pond (RMC)
Grover Hill (TW)
Pleasure Beach (BD)
Yellow Mill Channel to Stillman Pond (RMC)

CHESTER
Carini Preserve (RMC)

CLINTON
Chapman's Pond Dam (RMC)
Clinton Harbor (SAV/SR/TW)
Hammock River (TW)
Hammonasset River tributary (TW)
Indian River (TW)
Indian River south of RR track (TW)
Upper Mill Pond Dam (RMC)

CROMWELL
Cromwell Meadows (RMC)

DARIEN
Five Mile River Marsh (TW)
Gorhams Pond (EE/RMC)
Holly Pond (RMC/EE)
Noroton River at I-95 (RMC)
North Scott Cove-Arrowhead Way (TW/EE)

DEEP RIVER
Piano Works Dams (RMC)
Pratt Cove (TW)

EAST HADDAM
Chapman Pond (TW)
Salmon River (RMC)

EAST HAVEN
Caroline Creek between Minor and Stanton Rds. (TW)
Caroline Creek/Cosey Beach (TW)
Farm River (TW)
Farm River tributary/Edgemere Rd. (TW)
Morris Creek/Sibley Lane (TW)
New Haven Airport (TW)

EAST LYME
Brides Brook Culvert (RMC/TW)
Crescent Park/Manwaring Rd. (TW)
Fourmile River Dam (RMC)
Indian Pond (EE)
National Guard camp (TW)
Old Black Point Spit (BD/F)
Upper Pattagansett River (TW)
Niantic River (SAV)

EAST WINDSOR/ENFIELD
Scantic River (RMC)

ESSEX
Dennison Pond Dam (RMC)
Great Meadows (TW)
Thatchbed Island (TW)

FAIRFIELD
Ash Creek, Rooster River (TW)
Lower Ash Creek/Kenard St. (TW)
Fairfield Creek/Grasmere (TW)
Mill River/Samp Mortar Lake Dam (RMC)
Mill River/Tide Mill Dam (RMC)
Penfield and Beach Roads (FW)
Penfield Reef (SR)
Perrys Millpond (TW)
Pine Creek East (TW)
Sasco Brook Dam (RMC)
South Pine Creek/Par 3 golf course (TW)
West of marina/Turney Road (TW)

GREENWICH
Greenwich Cove Dr. (TW)
Greenwich Point Park (TW)
Mead Point Dr. (TW)

GROTON
Birch Plain Creek (TW)
Bluff Point Natural Area Preserve (F)
Bluff Point Coastal Reserve (TW)
Bluff/Bushy Point Beach (BD)
Haley Farm (G)
Hyde Pond Dam (RMC)
Mumford Cove (BD)
Mystic River (SAV)
Noyes Property (TW)
Spencer Point (TW)
Willow Point (TW)

GUILFORD
East River (TW)
Grass Island (TW)
Landon Dam (RMC)
Leetes Island (TW)
Lost Lake (TW)
Old Quarry Rd./Hoadley Neck (TW)
Seaside Avenue (TW)
Sluice Creek (TW)
Vineyard Haven (TW)
West River (RMC)
Upper West River (TW)

HADDAM
Higganum Creek (RMC)
Rutty Creek (TW)
Salmon River (RMC)

HAMDEN
Quinnipiac River marshes (TW)
West bank of Mill River (RMC/FW)

LEDYARD
Poquetanuck Cove (TW/F)

LYME
Ed Bills Pond Dam (RMC)
Hamburg Cove (SAV)
Nott Island (TW)
Lord Cove (TW)
Lower Pond Dam (RMC)

MADISON
Bailey Creek (TW)
Fence Creek (TW)
Seaview Beach (TW/BD)
Hammonasset River north (TW)
Hammonasset S.P./Tom's Creek (TW)
Hammonasset S.P./filled wetland (TW)
Kelsey Place (TW)
Neck River/Garnet Park Rd. (TW)
Neck R. tributary (TW)
Selden Neck (TW)
Windy Brook Lane (TW)
Windy Brook Lane/east of golf course (TW)

MERIDEN
Hanover Pond Dam (RMC)

MIDDLETOWN
Lower Mill Pond Dam (RMC)
Savage Mill Dam (RMC)
Starr Millpond/Coginchaug River (RMC)

MILFORD
Beaver Brook (TW/FW)
Calf Pen Meadow Creek (TW)
Charles Island (F)
Clark Pond Dam (RMC)
Dredge mining sites (RMC)
Fowler Island (TW)
Great Creek/Marsh (TW)
Great Flat (TW)
Hilldale Road area (TW)
Howard Ct./Morehouse Ave. (TW)
Indian River between I-95 and railroad track (TW)
Milford Point (BD)
Oyster River (TW)
Rogers Ave./Milford Harbor tributary (TW)
Seabreeze Ave./Merwin Ave. (TW)
Turkey Hill Brook (TW)
Welches Point Rd. (TW)
Wheeler Marsh (TW)
West of sand and gravel company (TW)
West side of Gulf Pond (TW)

MONTVILLE
Trading Cove Brook (RMC)

NAUGATUCK
Union City Dam (RMC)

NEW HAVEN
Hemingway Creek (TW)
Long Wharf Flats (IF)
Mill River east bank/south of RR tracks (TW)
Mill River, north of I-91 (RMC/EE/TW)
Morris Creek/Lighthouse Pt. (TW)
Nathan Hale Park/Forbes Bluff (CB)
New Haven Airport (TW)
Pond Lily Dam (RMC)
Quinnipiac River Marsh (TW)
West River Salt Marsh (TW)

NEW LONDON
Mitchell College (BD)

NORTH HAVEN
Quinnipiac River north (TW)
Quinnipiac River south (TW)

NORWALK
Chimon Island (F)
Flock Process Dam (RMC)
Harborview (TW)
Indian River (RMC)
NE Wilson Cove (TW)
Norwalk River/Perry Ave. flood gate (RMC)
Oyster Creek (TW)
Sheffield Island (BD)
Sheffield/Plains/Shea Island Complex (F)
Silvermine R./Perry & Timber ponds (RMC)
Village Creek (RMC/TW)

OLD LYME
Big Pond (TW)
Black Hall River (TW)
Calves Island (TW)
Duck River (TW)
Finnegan Farm Lane (TW)
Fourmile River Dam (RMC)
Goose Island (TW)
Great & Upper Islands (TW)
Griswold Point (BD)
Lieutenant River (TW)
Lord Cove (TW)
Lower McColloch Dam (RMC)
Pond Road/Soundview (TW)
Rogers Lake (RMC)
Saltworks Point (TW)
Upper Mill Pond Dam (RMC)
White Sands Beach, west (TW)

OLD SAYBROOK
Ayers Road (TW)
Beamon Creek (TW)
Chalker Millpond Dam (RMC)
Cold Spring Brook /Chalker Beach (TW)
Ferry Rd. east (TW)
Ferry Rd. north (TW)
Fishing Brook Dam (RMC)
Hagar Creek (TW)
Knollwood (TW)
Lynde Point (TW)
Lynde Point (BD)
Mill Meadows (TW)
North Cove (TW)
Otter Cove (TW)
Ragged Rock/Ferry Rd. (TW)
Ragged Rock Creek (TW)
South Cove (EE/SAV)
South Cove, north section (TW)

ORANGE
Housatonic River/sand & gravel pits (RMC)

PRESTON
Hallville Pond Dam (RMC)
Poquetanuck Cove (F/TW)
Route 2A bridge (TW)

SEYMOUR
Kinneytown Dam (RMC)
Tingue Dam (RMC)

SHELTON
Derby Dam (RMC)
Housatonic River/sand & gravel pits (RMC)
Farmill River (RMC)

SPRAGUE
Versailles Pond Dam (RMC)

STAMFORD
Holly Pond (RMC/EE)
Kosciuszco Park (TW/IF)
Main Street Dam (RMC)
Noroton River at I-95 (RMC)
Stamford Marine Center/Magee Ave (TW)

STONINGTON
Collins Rd. Marsh (TW)
Little Narragansett Bay (SAV)
Lords Point (TW)
Mystic River (SAV)
Quiambog Cove (TW)
Ram Island (F)
Velvet Mills (TW)

STRATFORD
Avco-Lycoming field (TW)
Bridgeport Airport (TW)
Carting/Peacock Islands (TW)
East Johnson Creek/north Lewis Gut mouth (TW)
Farmill River (TW)
Ferry Creek (TW)
Frash Pond (EE)
Great Meadows/north of Lordship Blvd.(TW)
Great Meadows/south of Lordship Blvd.(TW)
Long Island (TW)
Long Beach (BD)
Peck's Millpond (FW)
Pope Island (TW)
Russian/Lordship Beach (BD)
Sikorsky and Ryders Lane marshes (TW)

WALLINGFORD
Upper Quinnipiac River Dam (RMC)
Wallace Dam/Community Lake Dam (RMC)
Wharton Brook State Park (F/G)

WATERBURY
Anaconda Dam (RMC)
Freight Street Dam (RMC)

WATERFORD
Alewife Cove (EE/SAV)
Gardner Pond north (TW)
Goshen Cove (EE)
Harkness Memorial State Park (TW)
Jordan Millpond Dam (RMC)
Millers Pond Dam (RMC)
Niantic Bay Barrier (BD)
Niantic Bay northeast (TW)
Niantic River (SAV)
Quaker Hill north (TW)
River Street (TW)
White Point (TW)

WEST HAVEN
Club Creek (TW)
Cove River (TW)
Old Field Creek (TW)
Oyster River/north of New Haven Ave. (TW)
Sandy Point (BD)
Sewage Treatment Plant wetland (TW)
West River (TW/RMC)

WESTBROOK
Chapmans Pond Dam (RMC)
Hammock River (TW)
McVeagh Dam (RMC)
Menunketesuck Island (BD)
Menunketesuck River (TW)
Patchogue River (TW)
Quotonset Beach (TW)
Westbrook Town Beach (BD)

WESTPORT
Cockenoe Island (F)
Greens Farm Brook (TW)
Grove Point/Sherwood Millpond (TW)
Lees Pond (RMC)
North of Sherwood Millpond and I-95 (TW)
Sasco Brook (TW)
Sasco Brook Dam (RMC)
Saugatuck River Dam (RMC)
Saugatuck River north of Route 1 (TW)
Sherwood Millpond (EE/TW)

WILTON
Cannondale Dam (RMC)
Merwin Meadows (RMC)

WINDSOR
Rainbow Dam (RMC)

New York

BRONX
Bronx Oyster Reefs (SR)
Bronx River mouth (TW/F/RMC)
Bronx River Trailway (TW/FW/F/RMC)
City Island Marsh (TW)
Eastchester Bay (TW)
Ferry Point Park (G/BD)
Ferry Point Park Shoreline (TW)
Hutchinson River/DOT property (TW)
Oak Point Freightyards (TW/IF/fisheries habitat)
Palmer Inlet (TW)
Pelham Bay Park Lagoon (TW/F)
Pugsley Creek (TW)
Rice Stadium Wetlands (TW/G/F)
Seton Falls Park (FW/F/CB)
Soundview Park (TW)
Turtle Cove (TW)
Weir Creek (TW)
Westchester Creek (TW)

BROOKHAVEN
Aunt Amy's Creek (FW/TW)
Cedar Beach (BD)
Cedar Beach boat ramp, east side (BD/TW/IF)
Crystal Brook Inlet (TW/FW)
Former Old Man's Boatyard site (TW)
Hagerman Landing Road Groin (BD/CB/IF)
McAllister County Park (FW/BD/FW/IF)
Mount Sinai Harbor (TW/EE/IF)
North Shore Horse Showgrounds (TW/IF)
Pipe Stave Hollow/Chandler Estate Swale (TW/FW/CB/F/IF)
Port Jefferson Village Beaches (BD)
Satterly Landing (TW)
Setauket Mill Pond (FW/F/IF/TW)
Shoreham Plant Wetlands (TW/BD)
Shoreham Point (TW)
Stony Brook Creek & Pond (TW/FW)
Stony Brook Harbor (TW)
Unnamed Creek & Pond (FW)
Wading River (TW/F/FW/BD/IF)
Wading River Wetland #W7 (FW)
Wading River Wetland #W9 (FW)
West Meadow Beach (BD)
West Meadow Creek (TW/IF/EE)

HUNTINGTON
Betty Allen Nature Park (FW/TW)
Centerport Ponds (TW/FW/IF)
Cold Spring Harbor (TW/BD/F/CB/IF)
Cold Spring Ponds (Huntington Wetland #H-1) (TW/IF/FW)
Crab Meadow (TW/FW/BD/IF)
Fresh Pond (FW/F/BD)
Hecksher Park Pond (FW)
Lloyd Harbor Wetland #L17 (FW)
Mariner's Inn (TW/BD)
Tidal Basin on Lloyd Neck (TW/BD)
Twin Ponds Park (TW/FW)

MAMARONECK
Greacen Point (TW/IF)
Hommock Marsh (TW)

MOUNT VERNON
Glover Field (FW)

NEW ROCHELLE
Echo Bay (TW/SR/IF/RI)
Former Dickerman's Pond (FW)
Nature Study Woods (F/FW)
Pryer Manor Marsh (TW)

NORTH HEMPSTEAD
Baxter Estates Pond (FW)
Hempstead Harbor (EE/IF/TW)
Lake Success (FW)
Leed's Pond (FW)
Manhasset Bay (EE/TW/IF)
Mitchell Creek (TW)
Mott's Cove (TW)
Sheets Creek (TW)
Whitney Pond Park (FW)

OYSTER BAY
Bayville Wetland #B-7 (TW/FW)
Beaver Brook/Shu Swamp (FW)
Beaver Lake (FW)
Beekman Beach (BD/TW/IF/SAV)
Centre Island Beach (BD/TW)
Cold Spring Ponds (Huntington Wetland #H-1) (TW/IF/FW)
Glen Cove Creek (TW)
Hicksville Mill Pond (FW)
Hempstead Harbor (EE/IF/TW)
Huntington Wetlands #H2-H7 (FW)
Mill Pond (FW)
Oyster Bay Mill Pond (FW)
Oyster Bay NWR (TW)
Prospect Point to Sands Point Preserve (BD)
Red Spring Point Bluffs (CB)
Sudders Pond (FW)
Stehli Beach / Frost Creek Wetlands (TW/BD/IF)
West Pond (TW)

PELHAM
Glover Field (TW)

QUEENS
Alley Pond Park (FW/TW)
Aurora Pond (FW/F)
Bowery Bay (TW)
College Point Creek (TW)
College Point tidal creek (TW)
Cronheron Park (G)
Flushing Airport (FW/G/F)
Flushing Bay Timber Structures (fisheries habitat)
Flushing Bay/Flushing Creek (TW)
Flushing Meadow-Corona Park- Willow Lake (TW/FW/CB)
Forest Park Shrub Swamp (FW)
Fort Totten (TW/FW/CB/IF)
Hallets Cove (TW)
Kissena Park (G)
Powell's Cove Shoreline (TW/BD)
Steinway Creek Enhancement (TW)
Tallman Island (TW)
The Alley@Alley Pond Park (FW/F/TW/CB/IF)
Western College Point creeks (TW)

RIVERHEAD
Baiting Hollow (TW/FW/RMC)
Mattituck Wetland #MT-1 (FW)
Shoreham Point (TW)
Wading River (TW/RMC/F/FW)
Wading River Wetland #W7 (FW)

RYE
Beaver Swamp Brook (FW)
Beaver Swamp Brook/Cowperwood site (FW)
Blind Brook (FW)
Edith G. Read Wildlife Sanctuary (TW/F/EE/FW)
Marshlands Conservancy (TW/F/IF)

SMITHTOWN
Callahan's Beach (CB)
Fresh Pond (FW/F/BD)
Harrison Pond Town Park (FW/RMC/TW/F)
Landing Avenue Town Park (TW)
Long Beach (BD)
Nissequogue River/Riviera Dr., Kings Park (TW/FW/RMC)
Nissequogue River/Village of Nissequogue (TW/FW/RMC)
Schubert Beach (BD)
St. James Wetland #SJ16 (FW)
Stony Brook Harbor (TW/IF)
Sunken Meadow Creek (TW/BD/IF)
Sweetbriar Nature Center (G/TW/FW)
Young's Island (TW/IF)

SOUTHOLD
Bailey's Beach Park (BD/TW)
Clark's Beach/Inlet Pond (BD/CB)
Darby Cove (TW)
Goldsmith Inlet Beach (BD/TW/F/IF)
Great Pond (FW)
Greenport Wetland #GP11 (FW)
Mattituck Creek (TW/IF)
Mattituck Hills Wetlands #MH1& MH2 (FW)
Mattituck Wetland #MT20 (FW)
Orient Point Park (G/F/CB/RI)
Orient Wetland #O1 (FW)
Orient Wetland #O14 (FW)
Peconic Dunes Wetland Complex (FW)
Southold Wetland #SO28 (FW/F)
Southold Wetland #SO30 (FW/F)
Wolf Pit Lake (FW)

Types of Habitats

BD	Beaches and Dunes
CB	Cliffs and Bluffs
EE	Estuarine Embayments
F	Coastal and Island Forests
FW	Freshwater Wetlands
G	Coastal Grasslands
IF	Intertidal Flats
RI	Rocky Intertidal
RMC	Riverine Migratory Corridors
SAV	Submerged Aquatic Vegetation
SR	Shellfish Reefs
TW	Tidal Wetlands

Restoring Long Island Sound's Habitats

WHO ARE THE PARTNERS INVOLVED?

- US Environmental Protection Agency
- US Fish and Wildlife Service
- US Army Corps of Engineers
- NOAA National Marine Fisheries Service
- USDA Natural Resources Conservation Service
- Connecticut Department of Environmental Protection
- Connecticut Sea Grant
- New York State Department of Environmental Conservation
- New York Department of State
- New York Sea Grant
- New York City Department of Environmental Protection
- New York City Department of Parks and Recreation
- Audubon New York
- Save the Sound, Inc.

A partnership of concerned agencies and organizations working together to improve the Sound for the living resources that depend on it.

WHY ARE WE CONCERNED ABOUT LONG ISLAND SOUND'S HABITATS?

The coastal habitats of Long Island Sound form a unique and highly productive ecosystem that supports a diverse array of living resources. These living resources range from microscopic plants and animals that drift with the currents to economically important finfish, shellfish, and crustaceans. Other animals such as birds, sea turtles, and marine mammals spend all or part of their lives in the Sound, on its shores, or in its watershed. While there is still healthy habitat in and around Long Island Sound, there is little doubt that the overall abundance and diversity of habitats have been diminished by incompatible human uses of the Sound and its resources.

Present-day habitat conditions are very different from those observed by the first colonists. One third of all tidal wetlands in the Sound have been lost since the 1700s. Most of the remaining tidal wetlands have been altered by mosquito ditching. Once plentiful, eelgrass beds disappeared from the western and central portions of the Sound in the 1930s. Terrestrial habitats have been lost by clearing and filling for development. For example, 70 percent of Connecticut's original forested area was clear cut by the late 1800s. In the nearly 400 years since European settlers arrived, the radical alteration of the landscape has played a role in the decline of the Sound.

In the latter half of the twentieth century, scientists began to study the link between healthy habitat and healthy populations of fish and wildlife. Not only do we need adequate acreage of habitats, but those habitats must be healthy and functioning properly to support a diverse and resilient population of the Sound's living resources. To address these concerns, the Long Island Sound Study Habitat Restoration Initiative was created.

HOW DOES THE LONG ISLAND SOUND STUDY HABITAT RESTORATION INITIATIVE WORK?

As recommended in the Long Island Sound Study's Comprehensive Conservation and Management Plan, habitat restoration is being coordinated through the Long Island Sound Study Habitat Restoration Initiative, a partnership of concerned agencies and organizations working together to improve the Sound for the living resources that depend on it. With funding from the EPA Long Island Sound Office, the Connecticut Department of Environmental Protection and the New York State Department of Environmental Conservation are taking lead responsibility for implementing the Initiative.

The work of the Initiative is implemented by the Habitat Restoration Workgroup, a group of technical staff with expertise in habitat restoration from all of the agencies and organizations listed to the left. The following goals for habitat restoration were developed by the Habitat Restoration Workgroup and adopted by the Policy Committee of the Long Island Sound Study:

- Restore the ecological functions of degraded and lost habitats
- Restore at least 2000 acres and 100 river miles of habitats between 1998 and 2008
- Use partnerships to accomplish the restoration objectives and to leverage limited state, local, and federal funds

Workgroup partners meet several times a year to set priorities, discuss technical issues, and review work products. Each state has a habitat restoration coordinator who is funded by EPA and coordinates the activities of the Habitat Restoration Workgroup. The coordinators are also responsible for assisting partner agencies, local government and other groups with habitat restoration issues relevant to the Sound.

The Habitat Restoration Workgroup, in cooperation with the public and staff of concerned agencies, developed a database of potential restoration sites, then ranked them in order to set restoration priorities for the partners in seeking funds and undertaking projects. A map listing the potential restoration projects and their current status appears on the reverse side of this page. The projects are ranked based on ecological value, public benefit, and technical viability. The site ranking is used to help Habitat Restoration Workgroup members set funding and staffing priorities for restoration projects within the partner agencies. However, the Workgroup will assist any concerned group or local government with a restoration project, regardless of its rank.

WHAT TYPES OF HABITAT ARE BEING RESTORED?

The Initiative has targeted twelve important habitat types in the Sound for their support of living resources and water quality. Descriptions of the habitat types are found below. The abbreviations found after the names of the habitat types are used to denote which habitat types are found at the potential restoration sites listed on the other side of this page. The abbreviations are also used in the charts that track our progress.

BEACHES AND DUNES (BD) are the transitional sandy or cobble shoreline area between the land and the Sound. These dynamic systems are in a constant state of erosion and deposition due to tidal action, currents, and wind. Dunes can protect adjacent low-lying properties from flooding. Many rare plants and animals, such as prickly-pear cactus, golden-aster, beach heather, piping plover, and horned lark occur on this habitat complex.

CLIFFS AND BLUFFS (CB) are steep coastal slopes of glacial sands and till that are created through long-term wave erosion and sea-level rise. Rare plant communities, such as New York's dwarf beech forest, may be found here.

COASTAL AND ISLAND FORESTS (F) located in the project area may be dominated by species such as maple, oak, cedar, pine, and beech. No virgin tracts of old growth forest remain. Animals that may use this habitat include owls, bald eagles, and osprey. Forest stands on islands are of particular importance to nesting colonial water birds, such as egrets and herons, because they are relatively free of predators. Forests provide shade and oxygen, and help influence the local climate.

COASTAL GRASSLANDS (G) are open glacial outwash plains dominated by tall grasses, such as little bluestem and switchgrass. They often have diverse wildflower communities as well. These areas are critical habitat for many rare and endangered species, such as the grasshopper sparrow and regal fritillary butterfly. Grasslands are also important to birds of prey like the short-eared owl.

FRESHWATER WETLANDS (FW) are the transitional zone between the land and fresh water. These are areas where the water table is at, or near, the surface of the soil and there is no tidal influence. They are very diverse and may be dominated by trees, such as red maple, and shrubs, such as swamp azalea, or herbs such as cattail. These wetlands aid in groundwater recharge and store flood waters. They are also critical habitat to many rare plant and animal species.

ESTUARINE EMBAYMENTS (EE) are confined areas of the Sound that have narrow inlets and significant freshwater inflow. They are generally more shallow than the open Sound, and the restricted flow causes greater sedimentation. These areas are important nurseries for finfish and are concentration sites for wildlife. The best bay scallop production occurs in estuarine embayments.

INTERTIDAL FLATS (IF) are shallow areas of bays and harbors that lay between the spring high- and low-tide marks. These flats contain no rooted vegetation. The sediments may be muddy to sandy and support important species, such as juvenile flounder, clams, and crabs.

RIVERINE MIGRATORY CORRIDORS (RMC) are river systems that drain to the Sound. They are often bordered by flood plain trees and wetlands. Migratory species, such as Atlantic salmon, shad, and herring use these rivers to travel to fresh waters miles away from Long Island Sound to spawn. Recreational and commercial fisheries benefit when river corridors remain healthy and passable to migratory fish.

ROCKY INTERTIDAL ZONES (RI) are areas of exposed bedrock characterized by attached species such as barnacles, algae, and mussels. These zones fall between extreme high- and low-tides, which results in frequent exposure of the plant and animal residents to the air. The species which attach themselves to this habitat help filter nutrients from the water, and are a food source for other marine species.

SHELLFISH REEFS (SR) are formed by clusters of oysters and blue mussels. The reef structure sits on top of soft sediments and provides habitat and shelter for a variety of other finfish and invertebrate species. The shellfish are able to filter algae and particulate matter in the water column thereby improving water clarity.

SUBMERGED AQUATIC VEGETATION (SAV) beds are comprised of rooted plants, such as eelgrass and widgeon grass, which grow on shallow bay bottoms below the spring low-tide mark. These grassy beds provide vital refuge for juvenile fish and lobsters. The plants also trap sediments and use nitrogen from the water column, thereby improving water quality.

TIDAL WETLANDS (TW) are the transitional zone between the land and submerged systems. These areas are dominated by rooted plants that are flooded by the tide. Healthy wetlands help trap sediments, store flood waters, and reduce wave energy during storms. In addition, two thirds of all marine species depend on tidal wetlands for a portion of their life cycle.

HOW ARE SITES PRIORITIZED?

The Initiative partners developed ranking criteria based primarily on the potential ecological value of the degraded sites. Other factors, such as likelihood of success and public benefits of the project, are taken into consideration as well. The site ranking list is not the only criterion that determines the order in which projects are completed. Factors like available funding, local sponsors, and advanced project planning can make it much easier to complete a project, regardless of its rank. However, it is the site ranking list which helps direct the Initiative partners' efforts from year to year. The ranking criteria are listed below.

ECOLOGICAL CRITERIA:

- Size of the site to be restored
- Benefits of the restoration to trust species
- Potential to restore ecological functions at the site
- Potential to restore a diverse plant and animal community at the site

TRUST SPECIES are those species that are protected or managed by law, such as endangered and threatened species, managed fisheries, and game mammals.

OTHER CRITERIA CONSIDERED INCLUDE:

- Probability of success
- Community support for project
- Cost per acre of project
- Public access opportunity and open space value of site
- Potential surface and groundwater improvements associated with project

HOW ARE PROJECTS FUNDED?

Project funding comes from several sources. The Initiative partners use the prioritized list of candidate restoration sites to match projects to existing grant programs. Examples of federal grant programs include the US Environmental Protection Agency's 5-Star Challenge Grant Program, the US Fish and Wildlife Service's Partners for Wildlife Program, Natural Resource Conservation Service's Wildlife Habitat Improvement Program, and National Marine Fisheries Service's Community Based Habitat Restoration Grants. Examples of state-funded programs include Connecticut's Coves and Embayments Restoration Program and the Long Island Sound License Plate Fund, and New York's Clean Water, Clean Air Bond Act and Environmental Protection Fund. Private grants from charitable institutions and the Connecticut Corporate Wetland Partnership may also be used to complete projects. In some cases, agency staff may be able to simply add the needed work to their annual schedule of activities and complete the project with little or no additional cash funds. There are nearly as many funding scenarios as there are projects to be done. It is the job of the State Habitat Restoration Coordinators and the rest of the Habitat Restoration Workgroup to help get all the projects planned and funded, and they are available to answer questions about funding.

PROGRESS TO DATE:

A great deal of progress has been made toward the habitat restoration goals since they were adopted in 1998. In May of 2000, the Initiative partner agencies signed a Memorandum of Understanding (MOU) which states that they all agree to work toward the goals of the Initiative and share the responsibility for reaching those goals. A copy of the MOU can be found on the Long Island Sound Study web site at:
http://www.epa.gov/region01/eco/lis

Substantial physical progress toward the habitat restoration goals has been made as well. Since 1998, 336 acres and 39 river miles of Long Island Sound's habitat have been restored (Tables 1 & 2). Many of these projects have received grant funds due to the efforts of the Habitat Restoration Initiative partners. Increasing public awareness of the importance of healthy habitat has resulted in many local governments and non-governmental organizations taking part in habitat restoration projects. Many more projects addressing water quality improvements have been completed that will have an important indirect benefit on the Sound's habitat.

Table 1: ACRES OF HABITAT RESTORED, 1998 – 2001

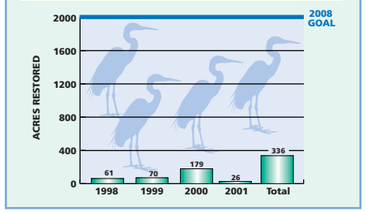
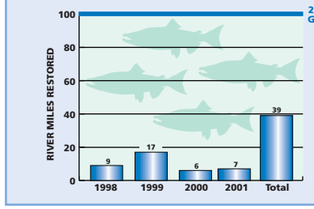


Table 2: MILES OF RIVERINE HABITAT RESTORED, 1998 – 2001



HOW DO PROJECTS GET DONE?

Each potential restoration project listed on the reverse side of this sheet represents a discrete location around Long Island Sound's shore or in the Sound's watershed. The sites represent a variety of habitat types, landowners, and varying levels of complexity. High priority projects are targeted by the state and federal agencies in the annual work planning process. The descriptions of a few projects which have been completed are summarized below. Each description will show the steps involved in restoration projects.

GRASSLAND RESTORATION SOUTHOLD, N.Y

Project Description: Orient Point County Park is owned by the Suffolk County Department of Parks and Recreation. The park displayed favorable soil conditions to restore the old agricultural fields on site to a coastal grassland community. Work on the 50-acre parcel was divided into 3 phases of about 17 acres each. During each phase, U.S. Fish and Wildlife Service staff used chainsaws and brush mowers to remove woody vegetation in the spring, then plowed and disked the soil using standard farm tractors. Once the soil was properly prepared, a specialized seed drill was used to plant a warm season grass mix. The principle species planted were little bluestem, big bluestem, indian grass, and switchgrass. Restoration work on the site was completed in 2000, but annual mowing is anticipated to continue indefinitely. The project is expected to benefit grassland nesting birds like the eastern meadowlark, raptors like the short-eared owl, and small mammals like the eastern cottontail rabbit. Migrating monarch butterflies were observed using the site in the fall of 2001.

Partners: US Fish and Wildlife Service (lead), Town of Southold, Suffolk County Department of Parks and Recreation, US Environmental Protection Agency (grant award), New York State Department of Environmental Conservation

RIVERINE MIGRATORY CORRIDOR RESTORATION LYME, CT

Project Description: Along the Eightmile River, a tributary to the Connecticut River, a dam was obstructing fish passage at Ed Bill's Pond. A steeppass fishway was constructed underneath a town bridge. This fishway, the second on the Eightmile River system, provides access to extensive spawning and nursery habitat for various anadromous species including Atlantic salmon, alewife, blueback herring, and sea-run brown trout.

Partners: CT DEP Fisheries Division (co-lead), Connecticut River Watershed Council (co-lead), USDA Natural Resources Conservation Service, Lyme Land Conservation Trust, and Connecticut Corporate Wetlands Restoration Partnership.

ANADROMOUS FISH are those that spend the adult phase of their lives in salt water, but move up streams and rivers to spawn in freshwater. Barriers on coastal streams and rivers prevent these fish species from reaching their natural spawning habitat and reduces their reproductive success

TIDAL WETLAND RESTORATION MADISON, CT

Project Description: During the late 1950s, a portion of the wetlands at Hammonasset State Park was used as a disposal area for sandy sediment that was dredged from nearby Clinton Harbor. Some of the filled wetland was converted to upland supporting grasses and red cedar, while part became degraded salt marsh. More recently, the invasive non-native genotype of the plant common reed *(Phragmites australis)* colonized most of the degraded wetland portions.

Restoration of approximately 5 acres of tidal wetland was accomplished through the removal of 1 to 3 feet of sandy dredged sediment. Four ponds were constructed and a network of meandering creeks was installed to provide adequate tidal flushing. A portion of the excavated sands was placed and graded on the adjacent upland and then planted with warm season grasses, such as little bluestem. The restoration work was completed in 2000. The site now supports marsh vegetation, and numerous egrets, shorebirds, and ducks are using the ponds.

Partners: US Fish & Wildlife Service, CT DEP Wetland Habitat and Mosquito Management, CT DEP Office of Long Island Sound Programs, EPA Long Island Sound Study and 319 Program, Ducks Unlimited, and Connecticut Waterfowlers Association.

TIDAL WETLAND RESTORATION OLD SAYBROOK, CT

Project Description: This 17-acre restoration site was first identified through a Coastal America partnership project with CT DEP and CT DOT. The investigation determined that the culvert connecting this wetland to the Oyster River was undersized and was causing a depression of the high water elevation by over one foot. CT DEP applied for Intermodal Surface Transportation Efficiency Act funds through CT DOT for design and construction. The project consisted of the installation of a second culvert (30" diameter) to complement the flows through the existing (24" diameter) culvert. A new concrete vault chamber was built to house an adjustable slide/flap gate. The gate can be manually lowered in advance of a forecast coastal flood to minimize tidal flooding of low-lying properties.

Partners: Funding for the project was provided by CT DOT's ISTEA Enhancement Funds (80%) and CT DEP's Long Island Sound Cleanup Account. Partners include the Town of Old Saybrook, CT DOT, EPA Long Island Sound Study, CT DEP OLISP and Inland Water Resources Management Division, and Coastal America. The project had the support of all adjacent property owners.

FRESHWATER WETLAND RESTORATION QUEENS, NY

Project Description: A natural glacial depression wetland in Forest Park was filled in 1966 to create two ball playing fields. The site hydrology made the ball fields prone to persistent flooding. In 2001, restoration of 6 acres of the site to freshwater wetland, and stabilization of the surrounding hillsides with native vegetation was completed.

Partners: New York City Department of Parks and Recreation (lead), New York State Department of Environmental Conservation (grant)

DUNE RESTORATION RYE, NY

Project Description: A flood protection berm created in Edith Read Sanctuary following the December 1992 nor'easter had become dominated by *Phragmites australis.* The berm was converted to a coastal dune system by the addition of clean sand and planted *Ammophila breviligulata,* and serves to enhance the educational opportunities at the site as well as to protect a newly restored adjacent marsh from wave action.

Partners: Westchester County Department of Planning, Westchester County Department of Parks, Recreation, and Conservation, and USDA Natural Resources Conservation Service

WHAT CAN I DO TO HELP RESTORE LONG ISLAND SOUND'S HABITATS?

- Sponsor or support local restoration projects
- Volunteer for citizen monitoring efforts
- Sponsor or participate in clean-up projects on vacant lots, public beaches, and roadsides
- Adopt "Sound Gardening" practices - Contact New York Sea Grant at 631-727-3910 or Connecticut Sea Grant at 203-432-5188 for more information
- Support habitat restoration and protection funding through license plate funds, federal and state duck stamp programs, and tax form check-offs
- Take photos of restoration sites near you to document site conditions over time
- Talk to your neighbors about the importance of habitat restoration

WHERE CAN I LEARN MORE ABOUT HABITAT RESTORATION AND LONG ISLAND SOUND?

Please visit these web sites:

Society for Ecological Restoration
www.ser.org/definitions.htm

Association of State Wetland Managers
www.aswm.org/wetlinks.htm

Restore America's Estuaries
www.estuaries.org

National Marine Fisheries Service
www.nmfs.gov/habitat/restoration/nspage.html

USDA Stream Corridor Restoration Page
www.usda.gov/stream_restoration/ newgra.html

Save the Sound, Inc.
www.savethesound.org/mb_habitat.htm

Or contact the offices listed below:

EPA Long Island Sound Office
Stamford Government Center
888 Washington Blvd.
Stamford, CT 06904-2152
203-977-1541 in Connecticut
631-632-9216 in New York
www.epa.gov/region01/eco/lis

New York State Department of Environmental Conservation
Bureau of Marine Resources
205 North Belle Meade Road; Suite 1
East Setauket, NY 11733
631-444-0469
www.dec.state.ny.us

Connecticut Department of Environmental Protection
Office of Long Island Sound Programs
79 Elm Street
Hartford, CT 06106-5127
860-424-3034
www.dep.state.ct.us

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Appendix 15

Connecticut's Comprehensive Wildlife Conservation Strategy*

Connecticut's Comprehensive Wildlife Conservation Strategy (CWCS) has been completed and was approved by the U.S. Fish & Wildlife Service in January 2006. The CWCS is available for download in two ways. You may download the entire **CWCS in one large zip file** (8,286k 11 files) or you may download individual sections. If you choose to download and save the CWCS files on your computer, you should save all of the files in the same folder. By saving all of the files in the same folder, the bookmarks in each file are preserved and you will be able to easily navigate among the different sections.

Introduction (*PDF* 253k 25pp): Contains the the Title Page, Table of Contents, Acknowledgements, an Executive Summary, a Guide to the Elements used in developing the CWCS and the Introduction.
Chapter 1 (*PDF* 1,120k 26pp): Information on the distribution and abundance of Connecticut's wildlife and the process used to select species of greatest conservation need (GCN species).
Chapter 2 (*PDF* 1,582k 18pp): An overview of Connecticut's landscapes and waterscapes and the process used to select 12 key habitats of greatest conservation need.
Chapter 3 (*PDF* 254k 6pp): Describes threats affecting GCN species or their habitats.
Chapter 4 (*PDF* 2,283k 89pp): Describes the status of the 12 key habitats, the GCN species that use these habitats, threats, conservation actions and research needs.
Chapter 5 (*PDF* 39k 4pp): Describes the biological monitoring efforts for GCN species and key habitats, how the effectiveness of conservation actions will be measured, and how the strategy will incorporate adaptive management.
Chapter 6 (*PDF* 22k 1p): Describes the process that Connecticut will use to revise and update the CWCS.
Chapter 7 (*PDF* 31k 3pp): Describes how DEP coordinated the development of the CWCS with federal, state, local, and tribal partners.
Chapter 8 (*PDF* 37k 4pp): Describes efforts to seek stakeholder and public participation in the development of the CWCS.
Literature Cited (*PDF* 183k 32pp): List of publications and references used in the development of the CWCS.
Appendices (*PDF* 3,078k 473pp): Appendices for each chapter (except chapters 5 and 6) that provide supporting and supplemental information regarding each of the required elements.

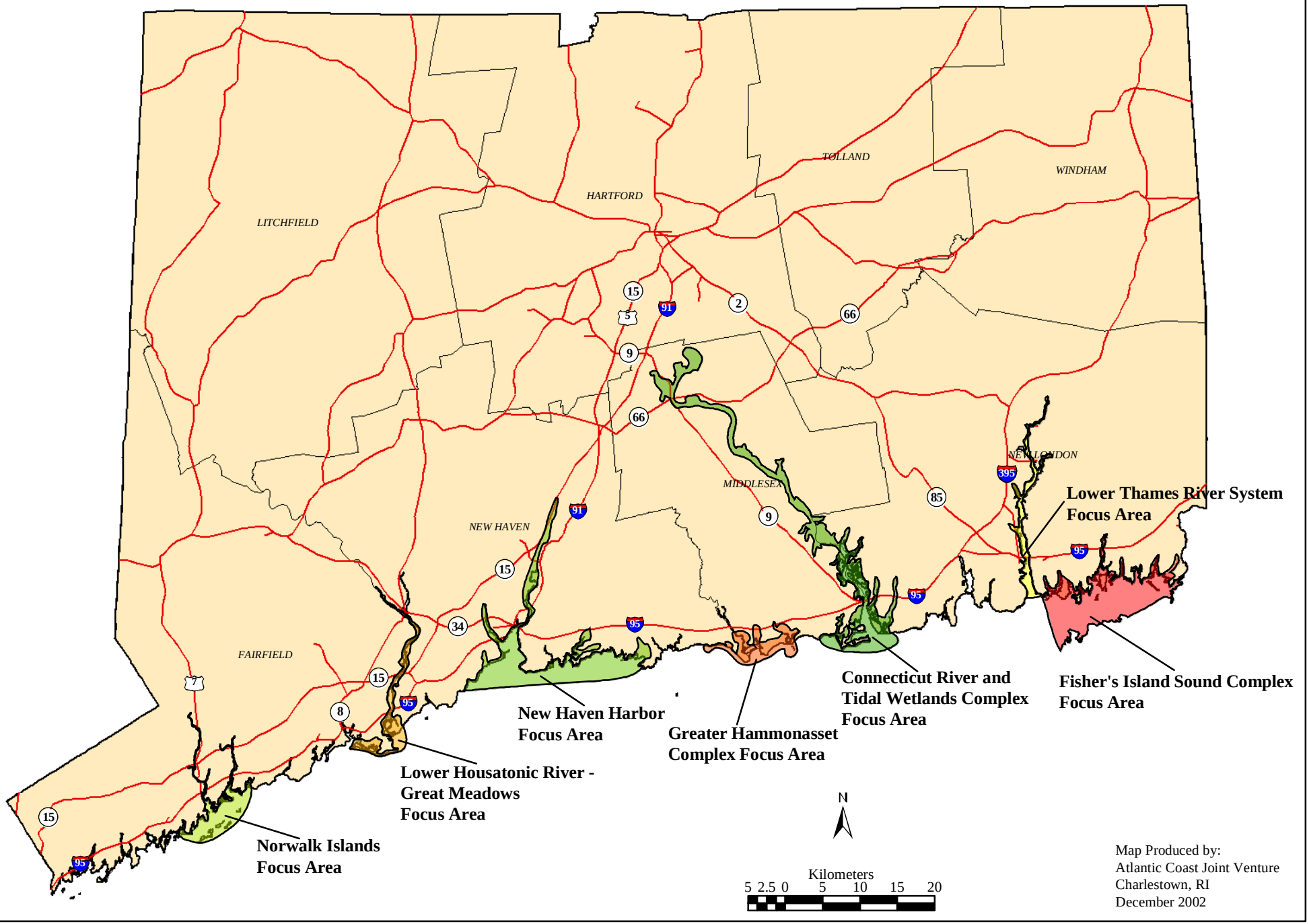
Appendix 16
Responses to CELCP Conservation Needs Survey

Coastal Conservation Need	Threat Sought to be Addressed	Number of Responses for this Need
PUBLIC ACCESS		
1. Greenways along rivers and LIS	Diminished public access do to development; Development of river shorelines	2
2. Protect views to and from CT River estuary	Degraded and diminished views of river due to development	1
3. Trailered boat launch access to LIS and parking for cars/ trailers	Limited open space for launch development. Increased opposition from local residents to boat launch development; The continuing loss of coastal property and subsequent public access has constrained the ability for projects of this nature to develop.	2
4. Car-top boat launch access	Paddlesport boating on the rise, few sites available; development of remaining open spaces along estuaries; 1) Lack of public access to LIS west of Milford, Connecticut for small boat operators. Increased access to accommodate the burgeoning paddle sports in the area.	3
5. Shore based boating access for car-top vessels	Privatization of the shoreline makes it difficult for boaters to get to shore; access points are limited, especially in backwaters; urbanization	3
6. Walking trails	development of remaining open spaces along estuaries	1
7. Protect local shellfishing (including commercial oyster fishery)	Siltation and non-point source pollution	1
8. More beach access (for swimming, etc.)	Development of beach front parcels for private use; need for public access to LIS	2
9. Public crabbing opportunities	Loss of habitat & public access for fishing	1
10. Kayaking access to rivers and estuaries	Development along shorelines of rivers and estuaries in Connecticut.	1
11. Shore-based access for marine anglers	Loss of coastal property and public access due to urbanization and private ownership	1
12. Shore-based fishing platforms (e.g. piers) with adequate parking space for marine recreational anglers of all ages and abilities to safely fish.	The continuing loss of coastal property and subsequent public access has constrained the ability for projects of this nature to develop.	1
13. Public access to Connecticut River (for recreational opportunities)	Need for public access to CT river	1

RESOURCE PROTECTION		
14. Foraging habitat for waterbirds, shorebirds, and waterfowl	Areas free of human disturbance and pollution; development of remaining open spaces along estuaries; coastal and upstream development	3
15. Brackish and tidal freshwater wetlands (including buffers to the riparian areas)	Unique habitats suffer from being desirable for human recreation and adjacent habitation	1
16. High salt marsh	Disappearing, encroached by sea level rise and erosion, and from upland development	1
17. *Native grasslands and sand plains*	Loss of habitat due to development and suppression of natural disturbance regimes	1
18. Shorebird foraging and nesting habitat	Degradation and development of vital shorebird nesting habitat (in some cases for species of global and continental conservation concern); areas free of mammalian and human disturbance that can cause abandonment or limit productivity; development of remaining open spaces along estuaries; coastal and upstream development; urbanization	7
19. Protection/acquisition of undeveloped coastal islands	Development and degradation of vital wildlife habitat; Loss and//or degradation of nesting habitat for state-listed species; Importance of creating public access to remaining offshore islands to create increased tourism; urbanization	5
20. Tidal marsh habitat and surrounding buffer area	Development and degradation of vital wildlife habitat (in some cases for species of global and continental conservation concern); development of coastline, privately held habitat/buffers continue to decline	3
21. Undeveloped coastal forest or shrubland habitat (capable of supporting migratory landbirds)	Development and degradation of vital wildlife habitat (in some cases for species of regional conservation concern); coastal and upstream development	3
22. Waterways capable of supporting anadromous/catadromous fish runs	Degradation of water quality, existing obstructions of migratory fish.	2
23. Tidal flats (sand, mud)	Degradation from shoreline development and dredging related to cross-Sound energy cables and pipelines	1
24. *Protection of inland coves, freshwater lakes in the Birch Plain Creek area of Southeast CT*	Residential waterfront development	1
25. CT River Estuary habitat protection	Loss of estuarine wetlands, important for wildlife and water quality.	1
26. Wading bird nesting habitat	Development and human-use of off-shore islands and coastal mudflats.	1
27. Wetland bird nesting habitat	Development and degradation of habitats.	1

28. Salt marsh sharp tailed sparrow habitat	Development and degradation of marsh habitat	1
29. Protection of buffers around critical nesting areas		1
30. Protection of riverine sandy beaches		1
OTHER		
-streamside buffer regulation	Nonpoint source pollution to streams, marshes and LIS	
-correct unprotected channelized streams next to roads	Road pollutants, sand, nutrients, go to LIS	
-minimize steep slope development impacts upstream	Clearing of slopes up to 25% grade, poor maintenance of detention basins, purchase uplands	
-acquire riparian lands, conservation easements along riparian corridors	Protect LIS water quality, shellfishing, wildlife habitat, etc.	
-reduce human disturbance during critical breeding season		
-continued restoration of saltmarsh habitat- both low and high.		
-maintenance and enhancement of existing submerged aquatic vegetation		
-control of exotic, invasive species		

Appendix 17. Atlantic Coast Joint Venture ConnecticutWaterfowl Focus Areas



Connecticut River, Connecticut
Sub-Focus Areas: None

Area Description:

This wetlands and river focus area consists of over 20 individual tidal wetland units and river islands of various sizes occurring along a 40-mile (64 km) stretch of the lower Connecticut River from Old Saybrook to Cromwell. Taken as a whole, this focus area represents a gradation of tidal wetlands from a very narrow zone of relatively high salinity marshes at the mouth of the Connecticut River where it enters Long Island Sound, through an intermediate zone of brackish, lower salinity wetlands, to extensive freshwater tidal marshes and floodplain forests beginning at Deep River and extending upriver to Cromwell.

Ownership/Protection:

Of the 23 wetland/island units comprising this focus area, at least 14 (61%) are in need of protection and/or management, either wholly or in part. While some are entirely privately owned, many have some form of protective ownership. Several of these areas contain individual parcels owned and managed by the Connecticut Department of Environmental Protection or by conservation groups such as The Nature Conservancy, Connecticut River Gateway Commission and various Town conservation and land trusts.

Acreage to Conserve:

Approximately 468 ha (1,157 acres) of tidal wetlands within the focus area require acquisition and/or enhancement. Of this figure, approximately 364 ha (900 acres) are privately owned and could be considered in jeopardy and in need of acquisition. New programs in place, such as the Landowner Incentive Plan, could allow for the restoration and enhancement of many of these privately owned wetlands. Statewide, no estimate of wetlands in need of acquisition and/or enhancement is available.

Since 1988, approximately 193 ha (479 acres) of wetland habitat within the focus area have been enhanced. Enhancement has been achieved through the use of open marsh water management techniques. An additional 191 ha (474 acres) have undergone intensive vegetation control (Phragmites control). Statewide, in areas outside of ACJV focus areas, approximately 187 ha (463 acres) of inland wetlands have undergone either enhancement or restoration activities. An additional 182 ha (452 acres) have been controlled for exotic vegetation.

Special Recognition:

From a regional standpoint, there are no areas in the Northeast that support such extensive or high quality fresh and brackish tidal wetland systems as those in the Connecticut River estuary. The lower Connecticut River is a RAMSAR designated site. In addition, 4 areas within the focus area (Pratt/Post, Seldon Island, Whalebone Creek, and Chapman's Pond) are designated as Important Bird Areas (IBA) by the National Audubon Society.

Waterfowl:

The freshwater coves and tidal saltmarshes at the mouth of the river contain some of the most important areas for migrating and wintering waterfowl in the state. The remaining wild rice marshes within the focus area provide excellent food sources for breeding, staging, and wintering

waterfowl. In addition, large concentrations of American Black Ducks, Green-winged Teal, Mallard, and American Wigeon utilize the Great Island complex at the mouth of the river. Significant numbers of Greater Scaup, Canvasback, Ruddy Duck, and Atlantic Brant winter within the focus area.

Table 1. Waterfowl species identified in the Connecticut River Focus Area.

Species	**Breeding**	**Migration**	**Wintering**
American Black Duck	X	X	X
Green-winged Teal	X	X	X
Mallard	X	X	X
American Wigeon		X	X
Greater Scaup		X	X
Canvasback		X	X
Ruddy Duck		X	X
Atlantic Brant		X	X

Other Migratory Birds:

The lower Connecticut River constitutes the core of breeding Osprey in the state. In addition, the mudflats of the river and Great Island provide foraging habitat for a myriad of shorebirds, including; Willets, Red Knots, various species of sandpiper, Ruddy Turnstones, and Whimbrels. Griswold Point at the mouth of the river hosts nesting populations of the federally threatened Piping Plover as well as Least Tern. The tidal marshes in the lower river support globally significant populations of nesting Saltmarsh Sharp-tailed Sparrow, listed as 'near threatened' by BirdLife International, and historic populations of nesting Black Rails. The lower river also supports nesting and wintering concentrations of Bald Eagles.

Threats:

Although wetlands in Connecticut are regulated by State and Federal laws, such areas and the species which depend upon them continue to be adversely impacted by various types of human disturbances and activities (e.g. burning, mowing, mosquito ditching) and habitat alteration of upland borders and tributaries. In addition, illegal fills and activities occur over the area. The threat of oil spills and toxic contamination of the river are constant. Dredging, dredge spoil disposal, land fills, marina development, stormwater discharges, non-point source pollution and increased sediment loads pose significant problems for living resources in and along the river. There have also been various proposals to impound certain marshes, to locate a sewage treatment plant at the mouth of the river and to divert water from the river to supply water to Boston. Invasive species such as Mute Swan, common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) threaten the typical marsh vegetation of numerous wetlands in the complex.

Conservation Recommendations:

A substantial portion of this nationally significant tidal marsh complex remains unprotected and/or is not being effectively managed so as to maintain its high species and habitat diversity and to optimize fish and wildlife productivity. The current complicated ownership pattern necessitates establishment of cooperative management and conservation agreements among all parties in order to protect this valuable ecosystem in its entirety rather than by any piecemeal approach. Such an arrangement could include zoning ordinances and other restrictions to maintain or enhance existing land uses. Aggressive management of invasive species such as the Mute Swan and common reed need to be pursued. Habitat degradation of protected areas is occurring due to lack of aggressive management. Acquisition of adjacent upland habitats should be actively pursued to provide buffers to existing wetlands.

Fishers Island Sound, Connecticut
Sub-Focus Areas: None

Area Description:

This major estuary complex encompasses all of Fishers Island Sound and Little Narragansett Bay, including the coastline of southeastern Connecticut from the mouth of the Thames River to Watch Hill, Rhode Island, and the north shore of Fishers Island, NY. This large, estuary-dominated complex includes all of the waters and adjacent shorelines of Fishers Island Sound, or that body of water lying between Fishers Island (New York) and the southeastern coast of Connecticut, and enclosed within the area east of a boundary line drawn from the mouth of the Thames River at Avery Point (Groton) to the western end of Fishers Island, and north of a line drawn from the eastern end of Fishers Island to and including Napatree Point (Rhode Island) and Little Narragansett Bay. This area is approximately 13 miles (21 km) long in a southwest-northeast direction, and from 2 to 5 miles (3-8 km) in width in a north-south direction between the mainland and Fishers Island.

Ownership/Protection:

This complex has a mixed ownership pattern of Public Trust waters, several State-owned areas, Town parks and extensive private residential lands. State of Connecticut-owned areas include Bluff Point Coastal Preserve and State Park, Haley Farm State Park, Sixpenny Island Wildlife Area and Barn Island Wildlife Management Area. The Town of Westerly, Rhode Island, owns Napatree Point.

Acreage to Conserve:

Approximately 103 ha (256 acres) of tidal wetlands within the focus area need acquisition and/or enhancement. Of this figure, approximately 80 ha (200 acres) are privately owned and could be considered in need of acquisition. New programs in place, such as the Landowner Incentive Plan, could allow for the restoration and enhancement of many of these privately owned wetlands. Statewide, no estimate of wetlands in need of acquisition and/or enhancement is available.

Since 1988, approximately 19 ha (47 acres) of wetland habitat within the focus area have been enhanced. Enhancement has been achieved through the use of open marsh water management techniques. An additional 3.6 ha (9 acres) have undergone intensive vegetation control (Phragmites control). Statewide, in areas outside of ACJV focus areas, approximately 187 ha (463 acres) of inland wetlands have undergone either enhancement or restoration activities. An additional 182 ha (452 acres) have been controlled for exotic vegetation.

Waterfowl:

Fishers Island Sound is a high quality, shallow estuarine environment with extensive eelgrass beds, supporting regionally significant seasonal concentrations and populations of waterfowl and shorebirds, important finfish nursery and spawning areas and substantial commercial and recreational shellfish beds. Over-wintering and migrating flocks of waterfowl of special emphasis occurring in significant numbers in the coves and open water environments here include Atlantic Brant, American Black Duck, Canada Goose, Common Goldeneye, Bufflehead and Hooded, Common, and Red-breasted Mergansers. This area is especially

important as a breeding area for American Black Duck, with lesser numbers of Mallard and Canada Goose.

Table 1. Waterfowl species identified in the Fisher's Island Sound Focus Area.

Species	**Breeding**	**Migration**	**Wintering**
American Black Duck	X	X	X
Atlantic Brant		X	X
Canada Goose	X	X	X
Common Goldeneye		X	X
Bufflehead		X	X
Hooded Merganser	X	X	X
Common Merganser		X	X
Red-breasted Merganser		X	X
Mallard	X	X	X

Other Migratory Birds:

Ospreys nest in several places along the Connecticut shoreline and on Fishers Island, and appear to be increasing in this area, as is also American Oystercatcher which breeds on several offshore island beaches. Ram Island is an important rookery for several species of colonial wading birds, including Black-crowned Night-Heron, Snowy Egret, Glossy Ibis, Great Egret, and Little Blue Heron, as well as such problem species as Double-crested Cormorant, Great Black-backed Gull and Herring Gull. These last three species seem to be increasing their numbers and populations everywhere along the coast, often displacing nesting terns and Piping Plovers. Common, Least and Roseate terns and Piping Plovers commonly nested on several area beaches in the recent past, but in the past several years essentially only the Least and Common Tern still breed, and even then only at a very few localities, such as small offshore islets and on Fishers Island. Roseate Tern and Piping Plover, U.S. Endangered and Threatened species, respectively, have not nested on area beaches in the Connecticut portion of this complex in several years (although Piping Plovers still nest on Napatree Beach, Rhode Island) even though suitable habitat appears available. Human-related disturbances and perhaps displacement by gulls are likely responsible for the abandonment of these sites. Marshes in this complex, particularly those at Barn Island, provide nesting habitat for American Bittern, Least Bittern, Black Rail and Seaside Sparrow, all regional species of special emphasis.

Threats:

Increased residential and marina development in the area, with consequent runoff of chemicals and fertilizers, increased turbidity and sedimentation, and discharges of sewage, stormwaters, and wastes, potentially threatens water quality throughout the rivers, coves and waters of Fishers Island Sound, to the detriment of habitat quality for the area's significant fish and wildlife resources. This area also receives heavy recreational use, especially boating and

beach activities, which can adversely impact wildlife populations during certain times of the year. Of particular concern are human-related disturbances to colonial nesting waterbirds. Nesting populations of terns and Piping Plovers are highly vulnerable to human intrusions into nesting areas during the critical nesting season (mid-April to August), and stray pets can pose serious hazards to eggs and young birds. In several areas within this complex there are considerable problems with invasive species such as common reed, Japanese honeysuckle (*Lonicera japonica*), Asiatic bittersweet (*Celastrus orbiculatus*) and Mute Swans, and also with dense concentrations of white-tailed deer (*Odocoileus virginianus*).

Conservation Recommendations:

The apparent abandonment of several area nesting beaches of terns and Piping Plovers as a result of human disturbances is of particular concern, and requires intensive efforts to protect both currently-occupied sites as well as recent historical localities by all available means, including beach closures, fencing, predator/pet removal, posting, beach warden patrols and public education. Habitat improvement and restoration of degraded or abandoned nesting beaches using dredging spoils should be considered. Efforts should be made to identify and implement those tasks and objectives of the piping plover and roseate tern recovery plans that may be applicable to areas within this complex. Opportunities should be sought to develop cooperative management and conservation programs between various governmental agencies, private conservation organizations and private landowners to best manage and protect for the long term the living resources of this significant estuarine complex. Protection and maintenance of water quality and wetlands throughout this complex through monitoring and regulation are necessary to ensure the continued high value of this area to fish, wildlife and plant populations dependent on them.

Greater Hammonasset Complex, Connecticut
Sub-Focus Areas: None

Area Description:

This complex is located along the central coast of Connecticut on the north shore of Long Island Sound, between the Towns of Madison and Westbrook. The boundary of this complex extends west to east from the nearshore area of Tuxis Island and the adjacent Connecticut mainland to Menunketesuck Island, a distance of about 12 miles (19 km), and inland to the limits of anadromous fish passage up the Hammonasset, Indian, Menunketesuck and Patchogue Rivers. In addition to those areas mentioned, the following areas are also included within this complex: Tuxis Island, Hammonasset State Park and marshes, Cedar Island, Clinton Harbor, Harbor View Beach, Hammock River wetlands, Indian River wetlands and Duck Island.

Ownership/Protection:

Ownership is a mixed pattern of public lands and waters and private lands, including Hammonasset State Park and Natural Area Preserve, Hammock River Marsh Wildlife Area, Black Pond Wildlife Area, Salt Meadow Unit of the Stewart B. McKinney National Wildlife Refuge and Duck Island Wildlife Area (CT DEP). Menunketesuck Island is privately owned; Tuxis Island is owned by the Town of Madison.

Acreage to Conserve:

Approximately 142 ha (353 acres) of tidal wetlands within the focus area need acquisition and/or enhancement. Of this figure, approximately 121 ha (300 acres) are privately owned and could be considered in need of acquisition. New programs in place, such as the Landowner Incentive Plan, could allow for the restoration and enhancement of many of these privately owned wetlands. Statewide, no estimate of wetlands in need of acquisition and/or enhancement is available.

Since 1988, approximately 44 ha (109 acres) of wetland habitat within the focus area have been enhanced. Enhancement has been achieved through the use of open marsh water management techniques. An additional 19 ha (47 acres) have undergone intensive vegetation control (Phragmites control). Statewide, in areas outside of ACJV focus areas, approximately 187 ha (463 acres) of inland wetlands have undergone either enhancement or restoration activities. An additional 182 ha (452 acres) have been controlled for exotic vegetation.

Special Recognition:

The Salt Meadow Unit of Stewart B. McKinney NWR, Hammonasset State Park, and Menunketesuck and Duck islands are recognized by the National Audubon Society as an Important Bird Areas (IBA) for migratory birds.

Waterfowl:

The estuarine marshes of this complex, including Hammonasset and Menunketesuck marshes, are important areas for wintering waterfowl, especially American Black Duck, Green-winged Teal, Red-breasted Mergansers, and Bufflehead. The offshore waters are important wintering and migratory stopover areas for sea ducks and diving ducks, scoters and Oldsquaw in particular.

Table 1. Waterfowl species identified in the Hammonassett Complex Focus Area.

Species	**Breeding**	**Migration**	**Wintering**
American Black Duck	X	X	X
Green-winged Teal	X	X	X
Red-breasted Merganser		X	X
Bufflehead		X	X
Oldsquaw		X	X
Scoter			X

Other Migratory Birds:

Several of the beaches and islands (Tuxis, Menunketesuck and Duck) have nesting colonies of Piping Plover, a U.S. Threatened species, Roseate Tern, a U.S. Endangered species, Common Tern, Least Tern and American Oystercatcher. Menunketesuck Island previously contained one of the two largest nesting colonies of Least Tern in Connecticut, a species that has suffered greatly in the past from human disturbance. Only a few pairs nest now. Common Terns presently nest here. Significant intertidal mudflats adjacent to Menunketesuck Island are an important stopover area for migratory shorebirds, including, Ruddy Turnstone, Red Knot, Sanderling, Dunlin, and Purple Sandpiper. The area is perhaps the primary wintering area for shorebirds in Connecticut. The offshore waters often host significant numbers of migratory water birds, including Common and Red-throated Loons, Horned Grebe and Northern Gannet. Duck Island hosts a significant colony of long-legged wading birds and the tidal marshes in the area are key foraging areas for these birds. Globally-significant numbers of Saltmarsh Sharp-tailed Sparrow, listed as 'near-threatened' by BirdLife International, nest in the marshes at Hammonasset, the Hammock River Marsh, and Salt Meadow Unit of Stewart B. McKinney NWR. Hammonasset Beach State Park and the Salt Meadow Unit of Stewart B. McKinney NWR are key stopover areas for migratory songbirds in spring and particularly fall migration. Hammonasset is an important stopover and wintering area for Northern Harrier and to a lesser degree Short-eared Owls. Salt Meadow Unit has relatively unfragmented forest habitats for coastal Connecticut and hosts nesting populations of several species of concern, including Wood Thrush and Worm-eating Warbler. Significant early successional habitats also exist at Salt Meadow Unit, providing important habitat for species of conservaiton concern, including, American Woodcock, Blue-winged Warbler, and Eastern Towhee.

Threats:

Disturbances to nesting colonies of Piping Plover and terns on beaches and islands in this complex should be given high priority among resource issues. These colonies are extremely vulnerable to human-related disturbances ranging from trampling of eggs and nests by beach-walkers and picnickers and deliberate vandalism to predation by unrestrained dogs and cats and other mammalian predators. With increasing shoreline and marina development in the area, resulting in some instances in outright destruction of habitat, there are also serious potential threats to the water quality of rivers and nearshore waters from discharges of pesticides, road runoff, farmland fertilizers, and sewage discharges, which can greatly reduce habitat quality for the many significant populations and seasonal concentrations of fish and wildlife species using this area. Increased turbidity and alterations of channels and tidal currents due to dredging are also issues of concern, including deposition of spoils on inappropriate areas, although such materials can also be used for improving beach habitats of nesting birds. Erosion of sand dunes and bluffs in the Hammonasset area due to unregulated pedestrian access is a problem in this area. Development of upland edges of saltmarshes threatens the loss of important buffer zones for these fragile habitats. Forest fragmentation due to development threatens the integrity of forest habitats at Salt Meadow Unit, as well as migratory corridors leading to this important land bird stopover area. Early succession habitats at Salt Meadow Unit are in need of active management to prevent succession into mature forest habitats.

Conservation Recommendations:

Piping Plover and tern nesting areas need to be afforded maximum protection, employing all available means to prevent the intrusion of humans and stray animals into these areas during the critical nesting season (mid-April to August), including fenced exclosures, posting, beach warden patrols, predator removal and public education. Efforts should also be made to identify and implement those tasks and objectives of the Piping Plover and Roseate Tern recovery plans that may be applicable to nesting areas in this complex, particularly those involving habitat restoration and enhancement of degraded areas. Protection of nesting areas on private property should be accomplished to the greatest extent practicable and feasible through the use of cooperative agreements and conservation easements. There are numerous opportunities and challenges throughout this complex for various governmental agencies, private conservation organizations and private landowners to work cooperatively in conserving and protecting this valuable complex of fish, wildlife and plant habitats.

Certain privately-owned parcels in the Menunketesuck area should be considered for acquisition by the Federal government as additions to the National Wildlife Refuge System (Salt Meadow National Wildlife Refuge) so as to protect and manage them for their significant regional biological values, undeveloped upland areas adjacent to important marsh habitats should be considered for acquisition by federal or state agencies (e.g. Griswold Airport, properties adjacent and proximal to Salt Meadow Unit). Increased funding is necessary for habitat management of early successional habitats at Salt Meadow Unit.

Lower Housatonic River/Great Meadows, Connecticut
Sub-Focus Areas: None

Area Description:

This marsh/barrier beach/river focus area is located on the southwestern Connecticut shoreline of western Long Island Sound between the mouth of the Housatonic River and Bridgeport Harbor. Portions of the lower Housatonic River are also included. The area boundary includes all of Long Beach, Pleasure Beach and Great Meadows Marsh, just east of Bridgeport Harbor, eastward to Lordship Beach, the mouth of the Housatonic River, Milford Point, Charles Island, and the Charles E. Wheeler State Wildlife Area (Nells Island marshes) and from there northward up the river to Derby Dam.

Ownership/Protection:

Most of the Great Meadows marsh is in public ownership. The majority of the marsh is owned by the United States Fish and Wildlife Service (Stewart B. McKinney NWR). Long Beach is owned by the Town of Stratford. There is a colony of beach cottages at the western end of Long Beach that is leased from the Town. The Town cooperates with State personnel in managing the shorebird nesting area on Long Beach. Milford Point includes Federal (Stewart B. McKinney National Wildlife Refuge) and privately-owned (CT Audubon) parcels. The CT Audubon leases this piece of Milford Point from the CT DEP. Nells Island/Wheeler State Wildlife Management Area and several marshy islands upstream are owned and managed by the Connecticut Department of Environmental Protection.

Acreage to Conserve:

Approximately 111 ha (275 acres) of tidal wetlands within the focus area need acquisition and/or enhancement. Of this figure, approximately 81 ha (200 acres) are privately owned and could be considered in need of acquisition. New programs in place, such as the Landowner Incentive Plan, could allow for the restoration and enhancement of many of these privately owned wetlands. Statewide, no estimate of wetlands in need of acquisition and/or enhancement is available.

Since 1988, approximately 16 ha (41 acres) of wetland habitat within the focus area have been enhanced. Enhancement has been achieved through the use of open marsh water management techniques. An additional 10 ha (25 acres) have undergone intensive vegetation control (Phragmites control). Statewide, in areas outside of ACJV focus areas, approximately 187 ha (463 acres) of inland wetlands have undergone either enhancement or restoration activities. An additional 182 ha (452 acres) have been controlled for exotic vegetation.

Special Recognition:

Milford Point, Great Meadows, Charles Island, and Nell's Island are all designated as Important Bird Areas (IBA) by the National Audubon Society.

Waterfowl:

Great Meadows is of high regional significance in that it contains the largest block of un-ditched high salt marsh 91 ha (225 acres) left in the State of Connecticut. The marsh provides an important wintering, nesting and migration habitat for many waterfowl species, including

Atlantic Brant, American Black Duck, Green-winged Teal, American Wigeon, Gadwall, Canvasback, and Greater and Lesser Scaup. The near shore waters along the coast from Bridgeport to Milford often harbor large wintering flocks of scaup and scoters.

Table 1. Waterfowl species identified in the Housatonic-Great Meadows Focus Area.

Species	**Breeding**	**Migration**	**Wintering**
American Black Duck	X	X	X
Atlantic Brant		X	X
Green-winged Teal	X	X	X
American Wigeon		X	X
Gadwall	X	X	X
Canvasback		X	X
Greater Scaup		X	X
Lesser Scaup		X	X
Mallard	X	X	X

Other Migratory Birds:

The entire area is heavily used during migration by numerous species of shorebirds, especially the mud flats. Willet, Red Knot, various species of sandpiper, Ruddy Turnstone, and Whimbrel are prevalent in the area during migration. Wading birds breeding on the Norwalk Islands also utilize the mudflats around these marshes for feeding. The marsh is used as a feeding area by migrating and wintering raptors such as Northern Harrier, Osprey, Bald Eagle and Peregrine Falcon. Black-crowned Night-Heron, Green-backed Heron, American and Least Bittern and Pied-billed Grebe have been recorded as nesting in the Great Meadows marsh. Undisturbed portions of Long Beach support small nesting populations of Piping Plover, a U.S. Threatened species, American Oystercatcher, Common and Least Terns, Killdeer and Spotted Sandpiper. Roseate Tern, a U.S. Endangered species, historically nested in this area. During migration, upwards of 5000 shorebirds roost on the beaches above high tide. Some of the State's best examples of backdune sandflat communities occur on Long Beach and Pleasure Beach.

Threats:

Private development, storm water discharges, marine sand and gravel mining, marina construction and channel dredging are of immediate and potential threat to the habitats in this complex, particularly surrounding the Great Meadows marsh area, both in reducing available wildlife habitat area and increasing the level of human disturbance and the risk of contaminants and degraded water quality in the general area. Lead is a major contaminant in the vicinity of Lordship Point, the result of this area being a popular trap and skeet range for over 60 years.

During this time an estimated 4.8 million pounds of lead shot may have been deposited into the sediments around Lordship Point. Current remediation of the area, however, is underway. Further studies will be conducted to determine whether lead is still a potential problem to migratory birds. Non-point source pollution from the river watershed is thought to be a significant problem to the coastal waters in this area; studies are underway to further define this problem and to seek solutions. Human-related disturbances to colonial beach-nesting terns and Piping Plovers, whether unintentionally or the result of purposeful intrusions into nesting areas and acts of vandalism, or from stray animals and unleashed cats and dogs, are of major concern at all known nesting localities in this area. Populations of Piping Plover, Common and Least Terns and other shorebirds nesting on beaches in this complex are subject to disturbance by people passing through the area or sunbathing on or near the nesting areas, and by predation from stray or unleashed pets. Disturbance of roosting migratory shorebirds and lack of high tide foraging habitat for them are also key problems. There were significant tidal and freshwater pools at Stratford GM historically, and those have either been filled in or overgrown with *Phragmites.* Phragmites threatens to displace cordgrass (*Spartina alterniflora*) marsh vegetation in several areas.

Conservation Recommendations:

Acquisition of privately held salt marsh adjacent to publicly owned habitats should be aggressively pursued. Diverse partnerships between governmental and non-governmental groups need to be developed to pursue funding for acquisition and continued habitat restoration. It is essential that nesting beaches of piping plovers and terns in this complex be protected from human-related disturbances during the critical nesting season (mid-April to August), using all available methods to exclude people and stray animals from these areas. Fenced exclosures, posting, predator traps, beach warden patrols and public education should all be considered in a protection strategy. Efforts should be made to identify and implement those tasks and objectives of the piping plover recovery plan that may be applicable to these beaches, including opportunities to restore or enhance degraded beach habitat. State and Federal programs to protect and enhance water quality in Long Island Sound and adjacent waters should continue to focus on protecting tidal freshwater and brackish wetlands and coastal water quality through the regulatory process and in addressing the problems of hypoxia, oil spills, non-point source pollution, sewage and waste disposal and heavy metal contaminants in these waters to restore and maintain important fish and wildlife habitat.

New Haven Harbor, Connecticut
Sub-Focus Areas: None

Area Description:

This complex is centered primarily along the central coast of Connecticut on Long Island Sound in the New Haven Harbor area and areas to the east. The outer, shoreward boundary of this largely nearshore water and tidal flat-dominated complex extends from Merwin Point, just south of Woodmont (Milford) east to Sachem Head (Guilford), a distance of approximately 14.5 miles (23 km). Enclosed within this boundary are the east and west shoreline areas around New Haven Harbor to the limit of anadromous fish passage on the West and Quinnipiac Rivers, including the Quinnipiac Meadows wetlands area and the North Haven and Wallingford sand plains north of New Haven Harbor. To the east of New Haven Harbor, the boundary incorporates the Branford River, Leetes Island and Joshua Cove marshes and tidal flats and nearshore waters of Long Island Sound for a distance averaging 1-2 miles (2-3 km) south of the shoreline. A number of important wildlife islands in the Branford-Guilford vicinity are included within this nearshore water boundary, most notably The Thimbles and Kelsey Island.

Ownership/Protection:

A significant portion of this complex includes public coastal and river waters and wetlands, while the rest represents various mixtures of publicly and privately owned lands. Several of the islands are privately held, as is most of the sand plains area along the Quinnipiac River.

Acreage to Conserve:

Approximately 242 ha (598 acres) of tidal wetlands within the focus area need acquisition and/or enhancement. Of this figure, approximately 210 ha (520 acres) are privately owned and could be considered in need of acquisition. New programs in place, such as the Landowner Incentive Plan, could allow for the restoration and enhancement of many of these privately owned wetlands. Statewide, no estimate of wetlands in need of acquisition and/or enhancement is available.

Since 1988, approximately 5.6 ha (14 acres) of wetland habitat within the focus area have been enhanced. Enhancement has been achieved through the use of open marsh water management techniques. An additional 43 ha (107 acres) have undergone intensive vegetation control (Phragmites control). Statewide, in areas outside of ACJV focus areas, approximately 187 ha (463 acres) of inland wetlands have undergone either enhancement or restoration activities. An additional 182 ha (452 acres) have been controlled for exotic vegetation.

Special Recognition:

Sandy Point in West Haven and Lighthouse Point Park in New Haven are recognized by the National Audubon Society as an Important Bird Area (IBA) for migratory birds.

Waterfowl:

The open water areas and tidal flats in New Haven Harbor and the nearshore area south of Guilford, Branford and East Haven contain some of the largest and most important concentrations of wintering and migrating waterfowl along the Connecticut coast, especially

American Black Duck, Canvasback, American Wigeon, Greater and Lesser Scaup, Common Goldeneye and three species of scoter. The New Haven tidal flats are one of the most important wintering areas for American Black Duck in Connecticut. The Quinnipiac Marshes are extremely productive biologically, in spite of the heavy industrialization that lines its banks and its chemically polluted waters and soils, especially with heavy metals. Migratory waterfowl using these marshes for nesting include American Black Duck, Mallard and Gadwall.

Table 1. Waterfowl species identified in the New Haven Harbor Focus Area.

Species	**Breeding**	**Migration**	**Wintering**
American Black Duck		X	X
Canvasback		X	X
American Wigeon		X	X
Greater Scaup		X	X
Lesser Scaup		X	X
Common Goldeneye		X	X
Scoter		X	X
Gadwall		X	X

Other Migratory Birds:

The sand and mud flats at Long Wharf, City Point and Morse Point/Sandy Point in New Haven Harbor are regionally significant staging areas for large concentrations of migrating sandpipers, terns, including the federally endangered Roseate Tern, plovers, turnstones and other shorebirds and waterfowl that feed on these flats to sustain them on their long journeys southward or northward. Shorebird species of special note include Semi-palmated Sandpiper, Dunlin, Red Knot, Ruddy Turnstone, Least Sandpiper and Sanderling. Tidal flats in New Haven Harbor in the vicinity of Long Warf historically hosted thousands to tens of thousands of foraging migratory shorebirds, but shorebird use of this area has been much reduced since the 1970's. Jetties at the mouth of New Haven Harbor support regionally significant numbers of wintering Purple Sandpiper. Morse Point currently supports nesting populations of Piping Plover, a U.S. Threatened species, Least and Common terns and Black Skimmer. Lighthouse Point Park has been the site of a hawkwatch continuously since 1974. On average over 5000 raptors are counted from this location. Lighthouse Point Park is also an important stopover area for migratory landbirds in fall migration. The Quinnipiac River Tidal Marsh hosts nesting Saltmarsh Sharp-tailed Sparrow, which is listed as globally "near threatened" by BirdLife International, as well as nesting populations of Least Bittern, Pied-billed Grebe, Common Moorhen and Seaside Sparrow and is an important foraging area for long-legged wading birds.

Elsewhere in the complex, Common Terns nest on a few of the islands to the east of New Haven Harbor. Wading bird rookeries are established on a few of the outer Thimbles, mostly Snowy Egret, Great Egret and Black-crowned Night-Heron. The nearshore areas also contain abundant shellfish beds, particularly for American Oystercatcher (*Crassostrea virginica*) and hard-shelled clams (*Mercenaria mercenaria*).

Threats:

The large seasonal concentrations of wildlife utilizing the extensive tidal mud and sand flats and open waters of this complex are extremely vulnerable to an oil spill or hazardous chemical discharge, particularly in New Haven Harbor. Numerous other activities potentially threaten natural ecosystems and fish and wildlife populations in this industrialized zone, including waste and sewage disposal, storm water discharge, shoreline development, erosion control projects, channel dredging and wetland alterations. Heavy metal and PCB pollution of soils and waters is of special concern, as are contaminated sediments in portions of New Haven Harbor and Mill River due to storm water, sewage treatment plant and industrial discharges. Invasion of Phragmites is a serious problem in many areas of the Quinnipiac tidal marsh and in Old Field Creek marsh. In spite of it all, however, significant wildlife populations continue to persist in this area, albeit at much reduced levels from former levels of abundance. Human-related disturbances to colonial beach-nesting terns and Piping Plovers, whether unintentionally or the result of purposeful intrusions into nesting areas and acts of vandalism, or from stray animals and unleashed cats and dogs, are of major concern at all known nesting localities in this area. There are several historical, but presently unoccupied, localities for breeding birds in this area, particularly for Roseate Tern, a U.S. Endangered species. Such areas were likely abandoned due to disturbance.

Conservation Recommendations:

Protection of the nearshore waters and intertidal flats from catastrophic events such as an oil spill or hazardous chemical discharge needs to be given the highest priority among resource concerns in this area. Attention needs to be focused not only on formulating oil spill contingency plans, but developing the highest degree of readiness to respond to such an event, particularly during critical times of the year when wildlife populations are at their peak and most vulnerable, such as spring and fall migrations and winter. Measures should also be sought and instituted, whether by regulation, zoning, planning, cooperative agreements or full-scale restoration programs such as the National Estuary Program, to restore, maintain, enhance and protect aquatic and terrestrial resources in this complex. Opportunities should be identified to restore or enhance degraded wetlands, including control of common reed, and other coastal habitats in this complex to increase their value to fish and wildlife. In addition to wetland habitats, the New Haven sand plains should be given high priority by the State in identifying and implementing restoration opportunities for this unique ecosystem. Studies should be conducted into the reasons for the decline in the numbers of migratory shorebirds using the mudflats in the area of Long Wharf and possible remedial action to restore the value of this area as a shorebird foraging area. The Old Field Creek area has significant potential for restoration and creation of shorebird foraging habitat.

Disturbances to colonial nesting birds, whether sand beaches or island rookeries, need to be minimized or eliminated entirely. Human and stray animal intrusions into nesting areas during

the critical nesting season (mid-April to August) should be prevented using a variety of methods, including fenced exclosures, posting, beach warden patrols, trapping of animals and public education. Pertinent tasks and objectives of the Piping Plover recovery plan should be identified and implemented on area beaches, especially those aimed at habitat restoration, enhancement and protection. A regional or basin-wide conservation and management plan should be developed and implemented for protecting and enhancing wintering waterfowl populations in central and western Long Island Sound, in partnership with governmental agencies, private conservation groups and landowners.

Norwalk Islands, Connecticut
Sub-Focus Areas: None

Area Description:

The Norwalk Islands are located in western Long Island Sound, approximately one to one-and-a-half miles (2 km) offshore (south) of the city of Norwalk, along the southwest coast of Connecticut. The mainland portion of this focus area occurs between Rowayton and Sherwood Island State Park. This focus area includes all of the Norwalk Islands (Sheffield Island, Shea Island, Copps Island, Chimon Island, Betts Island, Long Beach Island, Grassy Island, Goose Island, Cockenoe Island and several smaller islands) and the mainland tidal wetlands and mudflats at Fivemile River, Village Creek (Hoyt Island), Norwalk Harbor (Harborview and Seaview Park), Shorehaven-Canfield Island, mouth of Saugatuck River, Compo Cove and Sherwood Millpond, as well as the intervening embayed waters of Long Island Sound. The length of this focus area in a southwest-northeast direction is approximately 6 miles (16 km), and 2 to 3 miles (3-5 km) in width. Also included in this focus area are the mainstem channels of the Norwalk River up to the vicinity of the Silvermine River, and the Saugatuck River to its confluence with the Aspetuck River, near Sipperly Hill.

Ownership/Protection:

Most of the larger islands are publicly-owned (Federal National Wildlife Refuge, Town), while many of the smaller ones are in private ownership. The waters and mudflats along the mainland are in the Public Trust (below mean high water). A few of the mainland wetland areas are privately-owned. Many of the larger islands are designated under the Coastal Barriers Resource Act.

Acreage to Conserve:

Approximately 64 ha (160 acres) of tidal wetlands within the focus area need acquisition and/or enhancement. Of this figure, approximately 61 ha (150 acres) are privately owned and could be considered in need of acquisition. New programs in place, such as the Landowner Incentive Plan, could allow for the restoration and enhancement of many of these privately owned wetlands. Statewide, no estimate of wetlands in need of acquisition and/or enhancement is available.

Since 1988, approximately 24 ha (60 acres) of wetland habitat within the focus area have been enhanced. Enhancement has been achieved through the use of open marsh water management techniques. An additional 23.8 ha (59 acres) have undergone intensive vegetation control (Phragmites control). Statewide, in areas outside of ACJV focus areas, approximately 187 ha (463 acres) of inland wetlands have undergone either enhancement or restoration activities. An additional 182 ha (452 acres) have been controlled for exotic vegetation.

Special Recognition:

None at the moment.

Waterfowl:

Both the waters and tidal flats around these islands as well as the mainland marsh and cove sites, particularly Five Mile River, Village Creek, Norwalk Harbor, Canfield Island and the

mouth of the Saugatuck River, are significant concentration areas for wintering waterfowl of special emphasis, especially American Black Duck, American Wigeon, Atlantic Brant, Greater and Lesser Scaup and Gadwall.

Table 1. Waterfowl species identified in the Norwalk Islands Focus Area.

Species	**Breeding**	**Migration**	**Wintering**
American Black Duck		X	X
American Wigeon		X	X
Atlantic Brant		X	X
Great Scaup		X	X
Lesser Scaup		X	X
Gadwall		X	X

Other Migratory Birds:

The Norwalk Islands are of high regional significance to breeding colonial wading birds. These rookeries are mostly dominated by Black-crowned Night-Heron, but also include Great Egret, Snowy Egret, Cattle Egret, Little Blue Heron, Yellow-crowned Night-Heron, Green-backed Heron and Glossy Ibis. A large colony of colonial waders is found on Cockenoe Island. These birds utilize the other islands, mainland marshes, and intertidal flats for feeding. The most important wading bird feeding areas in this focus area are the tidal flats around some of the islands and on the mainland at Village Creek-Hoyt Island, Norwalk Harbor, Shorehaven-Canfield Island, Saugatuck River mouth and Compo Cove-Sherwood Millpond. Birds from these islands also utilize the mudflats at Great Meadows (Stratford) for feeding. Small nesting colonies of herons and egrets occur on Shea and Grassy Islands and others. Also nesting on beaches on a few of the Norwalk Islands are Piping Plover, a U.S. Threatened species, Least Tern, Common Tern, and American Oystercatcher. Problem species also nesting in this area include large numbers of Great Black-backed Gulls and Herring Gulls and increasing numbers of Double-crested Cormorant. Roseate Tern, a U.S. Endangered species, historically nested on Goose Island.

Threats:

Although most of the Norwalk Islands are already in public ownership and are not likely to be developed, they are still subject to varying degrees of human disturbance, especially to the wading bird rookeries and nesting colonies of beach-nesting Piping Plovers and terns. Human

disturbances in the form of intrusions into nesting areas during the critical nesting and fledging season can cause colonies to be temporarily or even permanently abandoned. Predation of eggs and young birds by Norway rats (*Rattus norvegicus*), raccoons (*Procyon lotor*), and gulls are also a threat to these colonies. The heavily urbanized mainland shoreline in this area poses threats to water quality through chemical contamination, oil spills, sewage and storm water discharges, waste disposal, marina development, dredging and numerous other activities that potentially degrade both terrestrial and aquatic habitats of fish and wildlife resources. The waters of western Long Island Sound are subject to low oxygen levels (hypoxia) during the summer months, which can stress and even kill marine organisms if prolonged.

Conservation Recommendations:

The protection and management of colonial wading bird rookeries and colonies of beach-nesting terns and Piping Plover need to be given high priority in this area. Because these birds are very sensitive and vulnerable to human disturbances during the critical nesting season (mid-April to August), protective strategies and measures should be designed to prevent people and unleashed pets from entering these areas, using such measures as closed areas with fenced exclosures, posting, warden patrols, trapping and removal of pets or feral animals, rats, etc., and public education. Small mammal control should be pursued on these islands. Educational programs to inform the general public of the need for avoidance at certain critical time periods need to be initiated.

Lower Thames River System, Connecticut
Sub-Focus Areas: None

Area Description:

This area encompasses the lower tidal reaches of the Thames River in southeastern Connecticut from New London and Groton at the mouth to Norwich. The boundary of this site includes the river channel, waters and shoreline wetlands of the lower tidal reaches of the Thames River from the confluence of the Shetucket and Quinebaug Rivers a few miles north of Norwich to the mouth of the river at New London and Groton where it enters into the eastern end of Long Island Sound, a river length of approximately 19 miles (31 km). Specific areas of biological significance, in addition to the river itself, include the Mamacoke Island marshes, Horton Cove, Poquetanuck Cove marshes, Smith Cove, Greens Harbor and small rocky islands at the river mouth.

Ownership/Protection:

This area is primarily Public Trust waters and State and private conservation and research lands. Connecticut College owns and manages Mamacoke Island Natural Area.

Acreage to Conserve:

Approximately 20 ha (50 acres) of tidal wetlands within the focus area need acquisition and/or enhancement. All of these wetlands are privately owned and could be considered in need of acquisition. New programs in place, such as the Landowner Incentive Plan, could allow for the restoration and enhancement of many of these privately owned wetlands. Statewide, no estimate of wetlands in need of acquisition and/or enhancement is available.

Since 1988, no wetland acreage has undergone restoration or enhancement. Statewide, in areas outside of ACJV focus areas, approximately 187 ha (463 acres) of inland wetlands have undergone either enhancement or restoration activities. An additional 182 ha (452 acres) have been controlled for exotic vegetation.

Special Recognition:

Mamacoke Island, Smith Cove, and the adjacent coves are designated by the National Audubon Society as Important Bird Areas.

Waterfowl:

Several of the shallow tidal coves and associated brackish marshes in the lower Thames River contain regionally significant concentrations of wintering and migrating waterfowl, especially of several species not commonly found elsewhere or in similar concentrations in the region. These include relatively large numbers of Canvasback, American Wigeon, American Black Duck, Gadwall, Mallard, Redhead, Common Goldeneye and Hooded Merganser. Also found here are Common and Red-breasted Merganser, and Greater and Lesser Scaup.

Table 1. Waterfowl species identified in the Thames River Focus Area.

Species	Breeding	Migration	Wintering
American Black Duck	X	X	X
American Wigeon		X	X
Atlantic Brant		X	X
Great Scaup		X	X
Lesser Scaup		X	X
Canvasback		X	X
Gadwall		X	X
Mallard	X	X	X
Redhead		X	X
Common Goldeneye		X	X
Hooded Merganser	X	X	X
Red-breasted Merganser		X	X

Other Migratory Birds:

Osprey breed at several places along the river. Small rocky islets in the river mouth contain nesting populations of Common and Roseate Tern, the latter a U.S. Endangered species.

Threats:

Industrial, commercial and residential development along the river corridor impacts fish and wildlife populations and habitats largely through direct losses of habitat and degradations in habitat quality, particularly water quality. Heavy metal contamination, sewage, stormwater and waste discharges, shoreline marina development and dredging are all of concern in the Thames River aquatic environment. The river is reported to have significant water quality problems, particularly in certain upstream areas and at the mouth of the river.

Conservation Recommendations:

Particular attention needs to be focused on restoring and protecting the water quality of the Thames River and its high value to fish and wildlife populations, especially anadromous fish and overwintering waterfowl. Protective measures should include stringent regulatory overview and enforcement of existing Federal, State and local environmental regulations, as well as developing and implementing environmentally sound planning and zoning policies and restoration programs. Additionally, exotic species such as Mute Swan and Phragmites need to be aggressively managed in this focus area.

Appendix 19 – Process and Data Used to Identify CELCP Project 'Focus Areas'

Goal: To identify and map focus areas within Connecticut's larger CELCP Project Area that represent zones of ecological significance that can be used to help guide potential future coastal land acquisition strategies.

General Methodology:

After removing from further conservation consideration areas of existing protected open space and developed lands, a variety existing and derived ecological GIS data was used to first develop a weighted-sum scoring mechanism to evaluate the Project Area for zones of ecological significance. Then, using a spatial statistics algorithm, perform a clustering analysis to identify "hot-spots" representing concentrations of areas of high ecological value.

1. *Data Used:*

- 2006 UCONN CLEAR Land Use/Land Cover:
  - Depicts land cover classification for CT as of 2006.
- 2002 UCONN CLEAR Forest Blocks:
  - Depicts large blocks of unfragmented forest in Connecticut
- 2010 CTDEEP Natural Diversity Database (NDDB) Areas:
  - Represents known locations, both historic and extant, of state listed species and significant natural communities. State listed species are those listed as Endangered, Threatened or Special Concern under the Connecticut Endangered Species Act (Connecticut General Statutes, Section 26-303)
- 2009 CTDEEP Critical Habitat Areas:
  - provides the identification and distribution of a subset of important wildlife habitats identified in the Connecticut Comprehensive Wildlife Conservation Strategy
- 1999 Migratory Waterfowl Areas:
  - depicts the concentration areas of migratory waterfowl.
- *Proximity Zones Bounding Existing Protected Open Space and CT DEEP Property:* *****
  - Depicts areas in proximity to Protected Open Space or DEEP property at 1/3, 2/3, and 1 mile to provide a means for establishing linkages/connections to already protected property
- *Potential Advancement Zones for High Priority Coastal Marshlands:******
  - Identifies, based on simplified "bath-tub" inundation modeling, areas of upland that might support marsh migration based on a hypothetical 4 ft rise in sea-level (approximating a worst case scenario by 2100.) Created specifically for this effort.
- Coastal Estuarine Land Conservation Planning Project Area:
  - Political boundaries of 42 coastal/Riverine CT municipalities that define the extent of CELCP activities.

***** Derived specifically for this effort

2. <u>Creation of Derived Data Sets</u>:

Potential Advancement Zones for High Priority Coastal Marshlands

CT DEEP OLISP staff identified salt and estuarine marsh complexes exceeding 100 acres (see Table 1 above) and 'buffered' their upland boundary to extract elevation data from LiDAR data (circa 2000). Upland boundary elevation data for each marsh were averaged and a value of the average plus one standard deviation was used as a proxy for the system. A worst case scenario for sea level rise (Rahmstoff, 2007) was then added to the boundary proxy to arrive at a hypothetical elevation for a potential advancement zone. Once the hypothetical elevation was derived, a simple least-cost based inundation model was run for each system to determine the new marsh extent. The new extents were merged together and the original marsh extent was then subtracted creating a layer identifying just the potential advancement zone. Resulting data was converted to 500ft x500 ft raster grid covering the extent of the CELCP Project Boundary. Grid cells corresponding to advancement zones were coded as "1"; all other cells were coded as "0". No "No Data" were used. (Although more rigorously defined data for this topic exists, CT DEEP was unable to acquire it in time to use for this analysis.)

Table 1 -Salt and Estuarine Marsh Complexes Exceeding 100 Acres

Marsh Complex Name	Min_elev	Max_elev	Avg_elev	Std_Dev.elev	Bndry_val	SLR_factor	SLRbnd_val
(Elevation values in ft NAVD88)							
Barn Island	1	15	3.70	2.02	5.72	4	10.0
Black Hall River	1	16	3.77	2.15	5.92	4	10.0
Cromwell Meadows	2	16	5.17	1.90	7.07	4	11.0
East River	1	17	4.17	2.25	6.41	4	10.0
Essex Great Meadows	2	10	4.07	1.81	5.88	4	10.0
Ferry Point	1	10	3.07	1.47	4.54	4	9.0
Great Harbor	1	17	2.91	2.15	5.06	4	9.0
Great Island	1	9	3.68	1.42	5.10	4	9.0
Great Meadows Stratford	1	13	4.60	2.14	6.74	4	11.0
Gulf Pond/Indian River	1	11	4.59	1.63	6.23	4	10.0
Hammock River	1	9	2.55	1.28	3.84	4	8.0
Hammonasset Park/River	1	17	4.36	1.67	6.02	4	10.0
Hoadley Neck/Stony Creek	1	18	4.22	2.54	6.75	4	11.0
Lord Cove	1	17	3.77	1.97	5.74	4	10.0
Menunketesuck River	1	18	4.29	1.74	6.02	4	10.0
Nells Island	1	17	6.43	2.70	9.13	4	13.0
Pattangansett River	1	13	4.21	2.36	6.56	4	11.0
Plum Bank/Oyster River	1	11	3.28	1.72	5.01	4	9.0
Quinnipiac River	1	18	5.03	3.09	8.12	4	12.0
Ragged Rock Creek	1	13	4.02	2.18	6.21	4	10.0
Selden Creek	1	19	4.25	2.72	6.97	4	11.0
West River	1	19	4.81	2.28	7.09	4	11.0

P*roximity Zones Bounding Existing Protected Open Space and CT DEEP Property*

Protected Open Space (POS) including lands subject to conservation easements and lands held by U.S. Fish and Wildlife Service, land trust, and water companies were extracted from a master layer of POS lands and subsequently merged with an inventory of Connecticut Department of Energy and Environmental Protection land to create an integrated set of POS lands. These lands were then buffered with successive zones of 0 to 1/3 of a mile, 1/3 to 2/3 of a mile, and 2/3 to 1 mile to create a datalayer to score lands adjacent or proximate to existing protected property. Scores are weighted based on proximity to the existing POS with areas adjacent POS more favorable than land 1 mile away from POS areas. The 1-mile upper limit proximity threshold was selected based on best professional judgment. Resulting data was converted to 500 foot t x 500 foot raster grid covering the extent of the CELCP Project Area boundary. Grid density was selected to balance integrity of resource data with processing speed based on best professional judgment. Grid cells corresponding to the proximity zones reflected the weighted scores; all other cells were coded as 0. No "No Data" were used.

3. <u>GIS Data Layer Processing/Preparation:</u>

2006 UCONN CLEAR Land Cover:
This data set corresponds to the following UCONN CLEAR *Connecticut's Changing Landscape Project* land cover classes: Other Grasses, Agriculture, Deciduous Forest, Coniferous Forest, Non-forest wetlands, Forested wetland, Tidal wetland. This data excludes Developed & Turf Grasses land cover classes. The data was used in combination with the previously described POS data to define the area within the general CELCP Project Area boundary that represents the maximum extent of the Project Area available for potential acquisitions through CELCP. Resulting data was clipped to CELCP project area and re-gridded to a 500 0ft x 500 ft cell size. Grid density was selected to balance integrity of resource data with processing speed based on best professional judgment. Grid cells corresponding to the viable areas of land cover were coded as "1"; all other cells were coded as 0. No "No Data" were used.

2002 UCONN CLEAR Forest Blocks:
This data depicts areas of large (greater than 25 acres) blocks of unfragmented forest in CT. Data was extracted from original raster sources and provided to CT DEEP as polygon data. Data was further subset into distinct size categories:

- 25 to 100 acres
- 100 to 250 acres
- 250 to 500 acres
- Greater than 500 acres

Resulting data was clipped to CELCP Project Area and re-gridded to a 500ft x 500 ft cell size. Grid density was selected to balance integrity of resource data with processing speed based on best professional judgment. Grid cells corresponding to each of the forest block categories were coded as "1"; all other cells were coded as 0. No "No Data" were used.

2010 CTDEEP Natural Diversity Database (NDDB) Areas:
Represents known locations, both historic and extant, of state listed species and significant natural communities. State listed species are those listed as Endangered, Threatened or Special Concern under the Connecticut Endangered Species Act. Data was clipped to CELCP project area and regridded to a 500ft x 500 ft cell size. Grid density was selected to balance integrity of resource data with processing speed based on best professional judgment. Grid cells corresponding to NDDB areas were coded as "1"; all other cells were coded as 0. No "No Data" were used.

2009 CTDEEP Critical Habitat Areas:
These data identify and show the distribution of a subset of important wildlife habitats identified in the Connecticut Comprehensive Wildlife Conservation Strategy for which data was available. Data was clipped to CELCP project area and re-gridded to a 500 foot x 500 foot cell size. Grid density was selected to balance integrity of resource data with processing speed based on best professional judgment. Grid cells corresponding to Critical Habitat areas were coded as "1"; all other cells were coded as 0. No "No Data" were used.

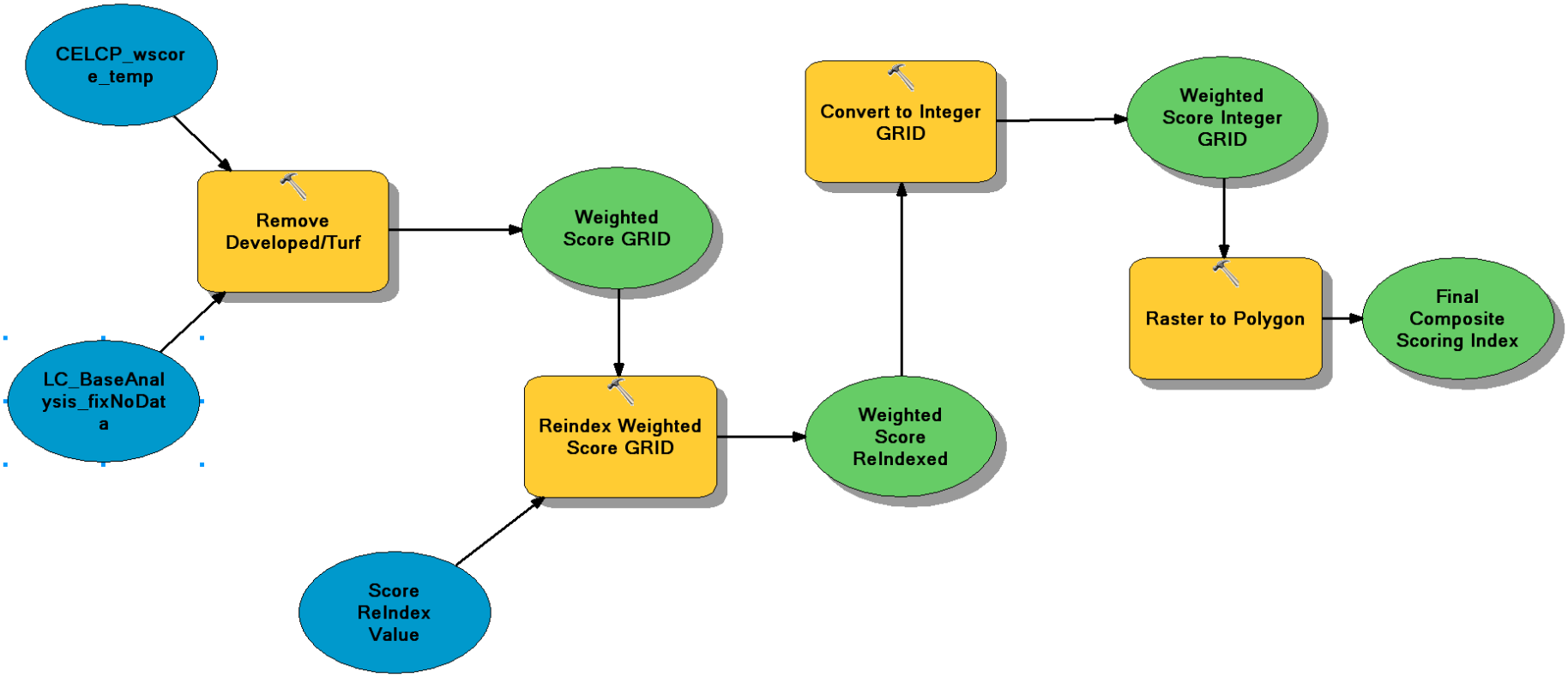
1999 Migratory Waterfowl Areas:
Depicts the concentration areas of migratory waterfowl. Data was clipped to CELCP project area and re-gridded to a 500ft x 500 ft cell size. Grid density was selected to balance integrity of resource data with processing speed based on best professional judgment. Grid cells corresponding to Migratory Waterfowl areas were coded as "1"; all other cells were coded as 0. No "NoData" were used.

4. Weighted Scoring

Each datalayer used to evaluate an area's ecological significance was assigned a weighting-factor that reflects its perceived value relative to other datalayers. Datalayers with higher weighting factors represent ecological value of greater significance for conservation acquisition purposes. These weighted values were employed in a geo-processing model that created a composite scoring index used to perform a clustering analysis explained in Section 6 that follows. Scores were iterated through several versions before settling on the following weighting-factors:

Layer	Weight
Forest Blocks <100	***4***
Forest Blocks 100-250	***8***
Forest Blocks 250-500	***12***
Forest Blocks >500	***20***
Proximity to POS Property	***15***
Marsh Advancement Zones	***14***
NDDB	***10***
Migratory Waterfowl	***6***
Critical Habitat	***10***
Land Use/Land Cover	***1***
Total	***100***

5. *Creating Composite Scoring Index:*



The above Geoprocessing model outlines the process to arrive at a final composite scoring index. It involves several intermediate steps to account for

- Removal of non-viable land areas (existing property, already developed lands/grasses.)
- Retention of scoring values when converting from floating point to integer grids. (Integer format is required to convert GRID to polygons for subsequent clustering analysis.)

6. Clustering Analysis:

The raw score values from the composite scoring index were derived using a process shown in the geo-processing model schematic on the preceding page. The resulting scores represent the potential relative ecological value of specific locations within the CELCP Project Area determined by a spatial statistics algorithm. Each location within the Project Area was evaluated by applying the algorithm within 500 feet x 500 feet grid cells distributed across the entire Project Area. This grid size was selected to balance the size of the input data with ease of processing. By aggregating neighboring individual grid cell values with similar characteristics, the resulting data could more readily be interpreted at the Project Area scale. That is, the individual grid cell aggregation process attempted to identify 'hot-spots' that represent areas of potentially significant conservation value. These areas are shown in 'hotter' colors (e.g., red, orange, yellow) in Figure 2 below. Conversely, areas of 'cold-spots' (depicted in royal blue, aqua blue, green in Figure 2) represent areas that are likely to be of less significant conservation value. To address questions associated with this type of processing, a geo-statistical pattern analysis was employed.

Most statistical tests begin by identifying a null hypothesis. The null hypothesis for the pattern analysis tools is Complete Spatial Randomness (CSR). The Z-scores and P-values returned by these tools tell you whether or not to accept or reject the null hypothesis. Z-scores are simply standard deviations; the P-value is the probability that the observed spatial pattern was created by some random process. When a feature pattern analysis tool yields small P-values and either a very high or a very low Z-score, this indicates it is unlikely that the observed spatial pattern reflects the theoretical random pattern represented by the null hypothesis (CSR). In other words, the results are not random – there is some underlying structure involved.

The ArcGIS Hot Spot Analysis tool calculates the Getis-Ord Gi* (pronounced G-i-star) pattern analysis statistic for each feature in the dataset based on its composite scoring value. (NOTE: any scoring values of zero - i.e., areas where no ecological data values were recorded - were eliminated from the subsequent analyses.) The resultant Z-scores (standard deviations) and P-values (probability of random chance) identify where features with either high or low values cluster spatially. The tool works by looking at each feature within the context of neighboring features. To be a statistically significant hot spot, a feature will have a high value and be surrounded by other features with high values as well. For statistically significant positive Z-scores, the larger the Z-score is, the more intense the clustering of high values (hot spots). For statistically significant negative Z-scores, the smaller the Z-score is, the more intense the clustering of low values (cold spots).

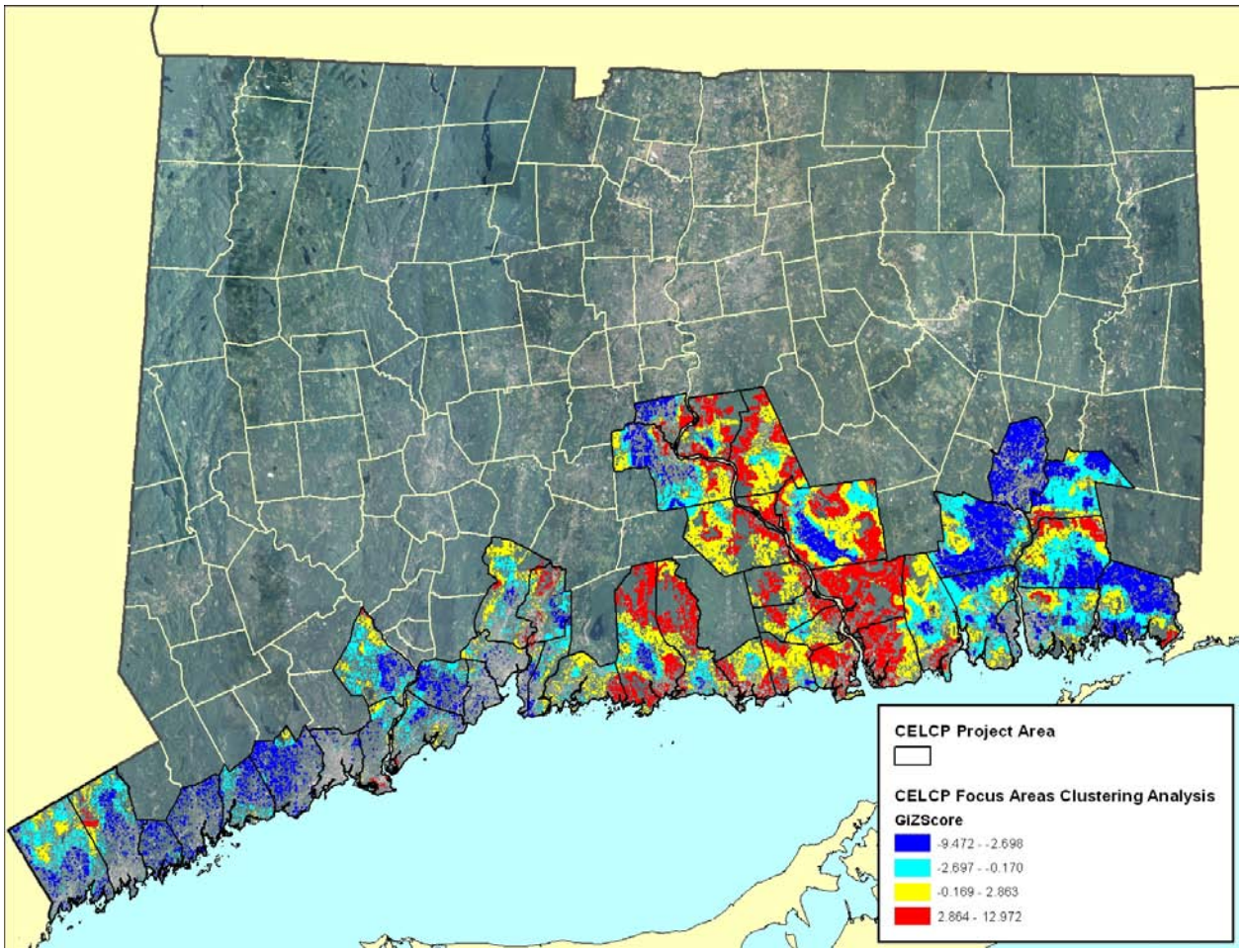
There are several ways to assess the neighboring features in the context of the tool. For simplicity, we use the default option, a fixed band distance. This approach uses a moving 'window-of-influence' based on a fixed distance. We began by using the default value (here ~5000 feet), the minimum distance to ensure all values had at least one neighboring feature) and evaluated successively larger values. Larger values were rejected based on the degree of clustering (i.e. larger values accounted for larger areas of clustering which failed to provide the level of granularity project mangers required), which was adequately provided by the default.

While it is helpful to consider the clustering analysis as a whole, it is more useful to classify the results into discreet 'bins' based on some useful criteria. The ways to classify are often based on subjective values such as "how many bins are useful to my goals" and "is an automated or manual process to set

the bin limits preferred." In this case it is most useful to describe the focus areas within a 4-bin context; thus representing areas of "High", "Medium-high" Medium-low" and Low" ecological value. Further, using a quartile approach to define the bin levels proved optimal as this process groups the same number of results into each bin. The net effect provides a scheme that breaks the project area into units of equal area (i.e., the items in the each bin represent the value of a grid cell) if all grid cells are distributed in equal number among the bins, thereby effectively segmenting the project area into 25% segments of successively increasing significance.

The clustering analysis provides a base level of data that identifies areas based on their ecological value that can be used to identify areas for targeted land acquisition. It is important to note that while the results of the analysis identify areas of "high" or "low" relative value these data should not be used in isolation make final acquisition decisions. For instance, if a parcel of land is within a "low" zone, it should not be construed to have little or no conservation value. While it may be of less comparative ecological value than other areas, if no alternative acquisition opportunity exists, then the parcel could still represent a viable acquisition opportunity and should be evaluated on its merits. The value of the analysis is that it provides a means to focus limited resources initially in high-value (Gi Z score) areas and to assist in comparative evaluations of multiple properties being evaluated for acquisition.

Figure 1. Clustered Composite Index Scoring Prior to Cluster Smoothing



7. Cartographic Output – Smoothed Clustering

While the composite scoring index and clustering analysis results are the most useful tools to evaluate specific areas conservation value, a more cartographically pleasing output was required to help convey the relative high/low ecological values for Connecticut's CELCP Plan. To address this, the clustering output was run through an interpolation algorithm to smooth out the hard breaks between each 'scoring zone' to produce a map that more clearly describes transitions from higher to lower zones of potential conservation interest. An Inverse Distance Weighted (IDW) approach was used on the Gi Z-score values and the resulting grid size was increased to 1000ft x 1000ft. The results were clipped to the CELCP Project Area and areas representing non-viable areas (existing property, already developed lands/grasses) were removed as shown in Figure 3. In order to show each focus areas at a scale that would be more useful from a regional perspective. Focus areas were segmented into four regions as shown in Figure 4 through Figure 7.

8. Caveats

The selected 'hot-spot' approach to identifying potential priority conservation zones or 'focus areas' is susceptible to 'edge effects' along on the Project Area boundary where no surrounding data outside the project area exist. Further, results are scale-dependent, based on the size of the grid cell. Smaller or larger cells may have modified results slightly.

Figure 2. Clustered Composite Index Scoring Post Cluster Smoothing

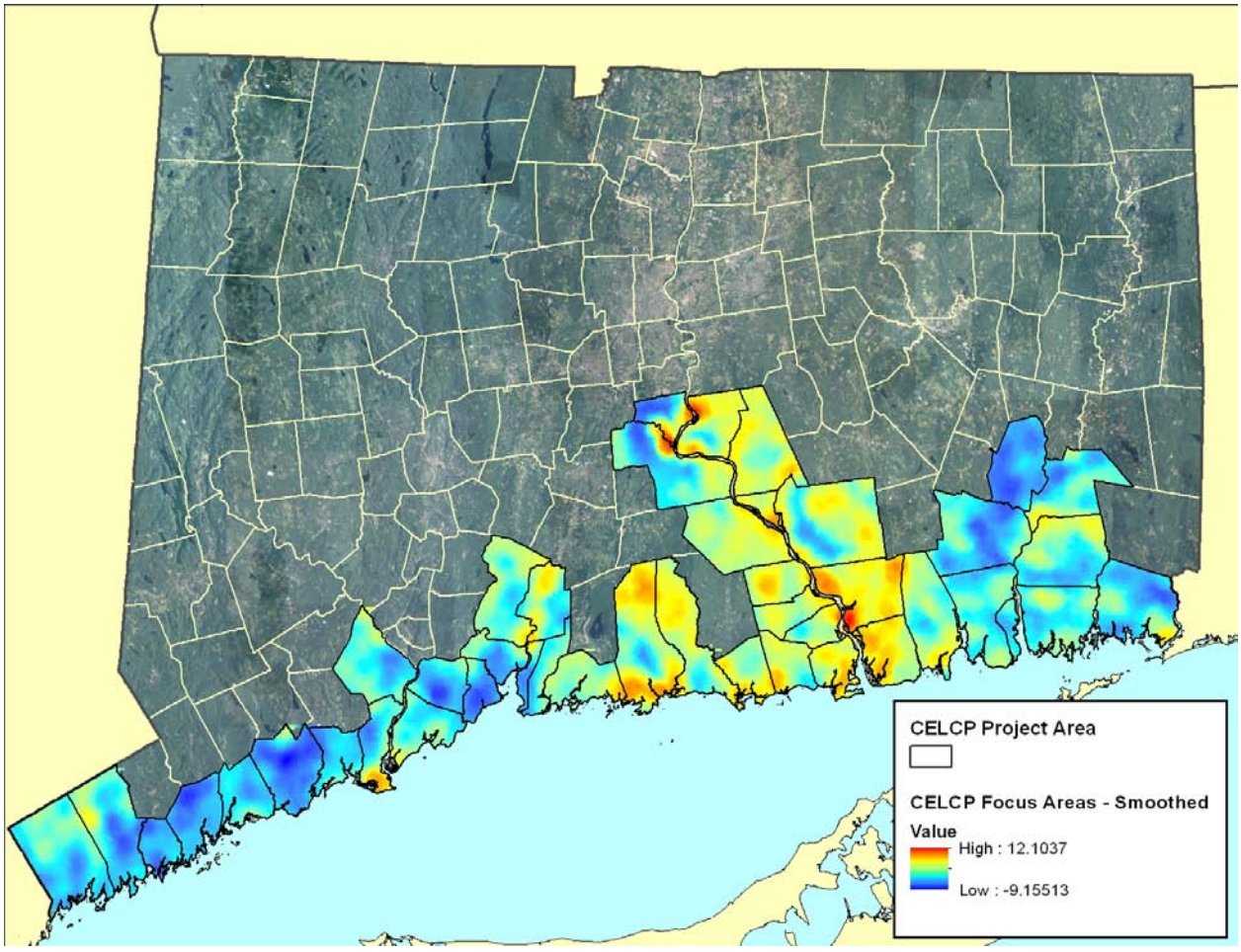


Figure 3. Clustered Composite Index Scoring Post Cluster Smoothing Excluding Developed and Protected Open Space Areas

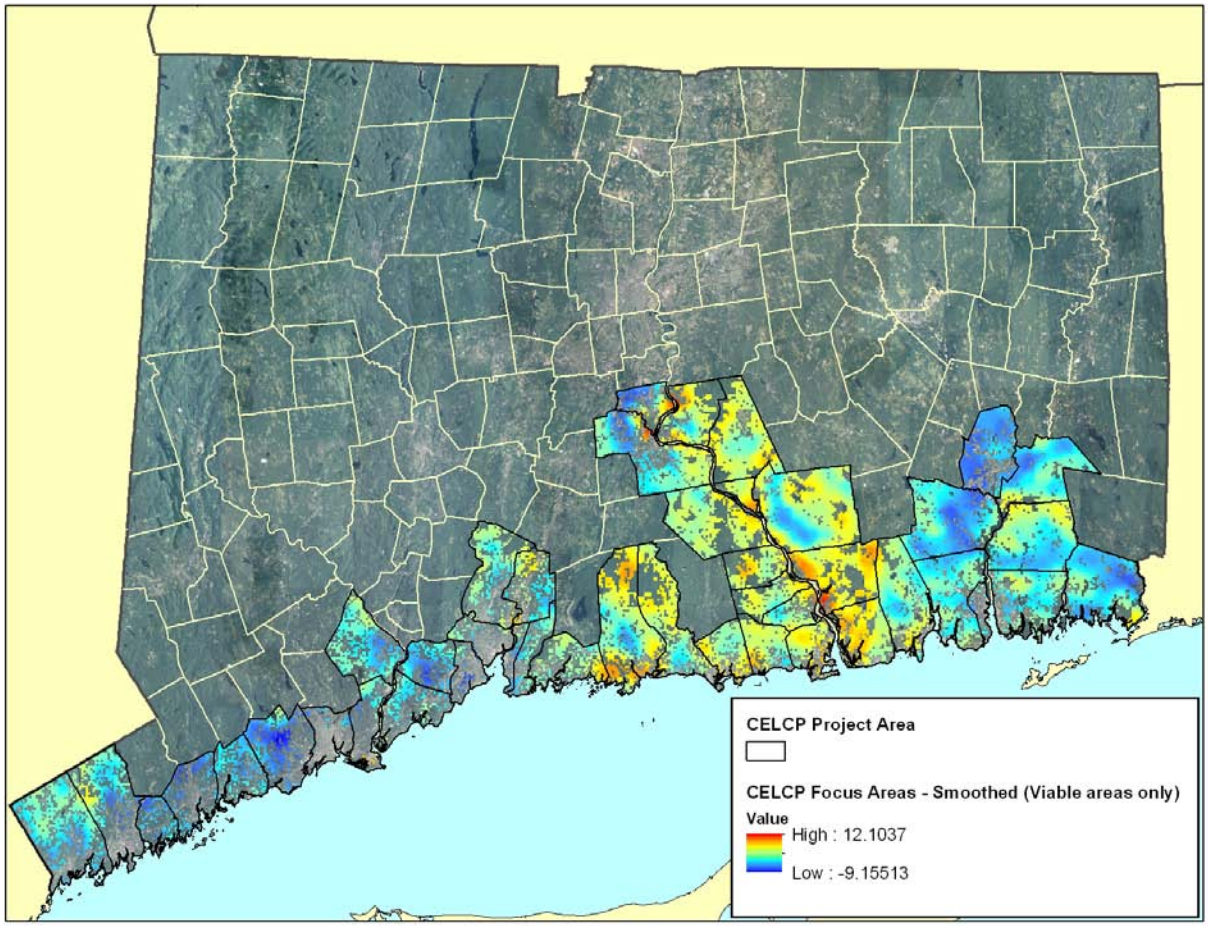


Figure 4. Western Coastal Focus Area

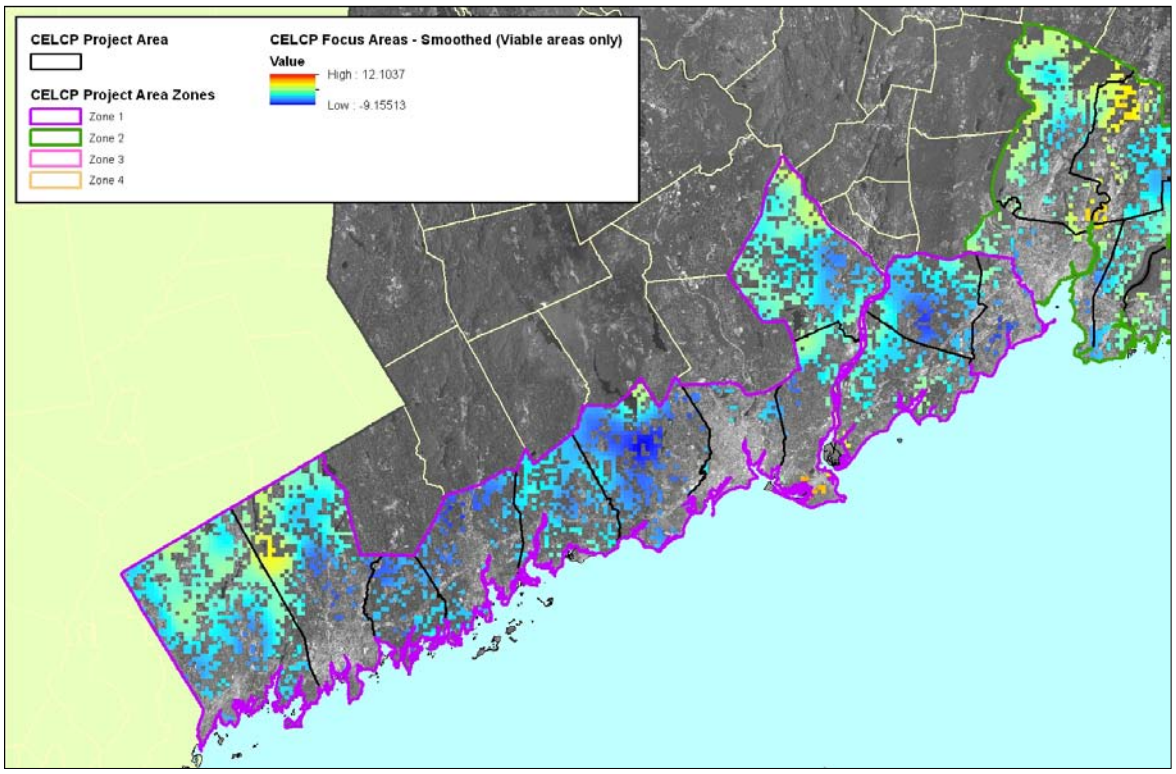


Figure 5. West Central Coastal Focus

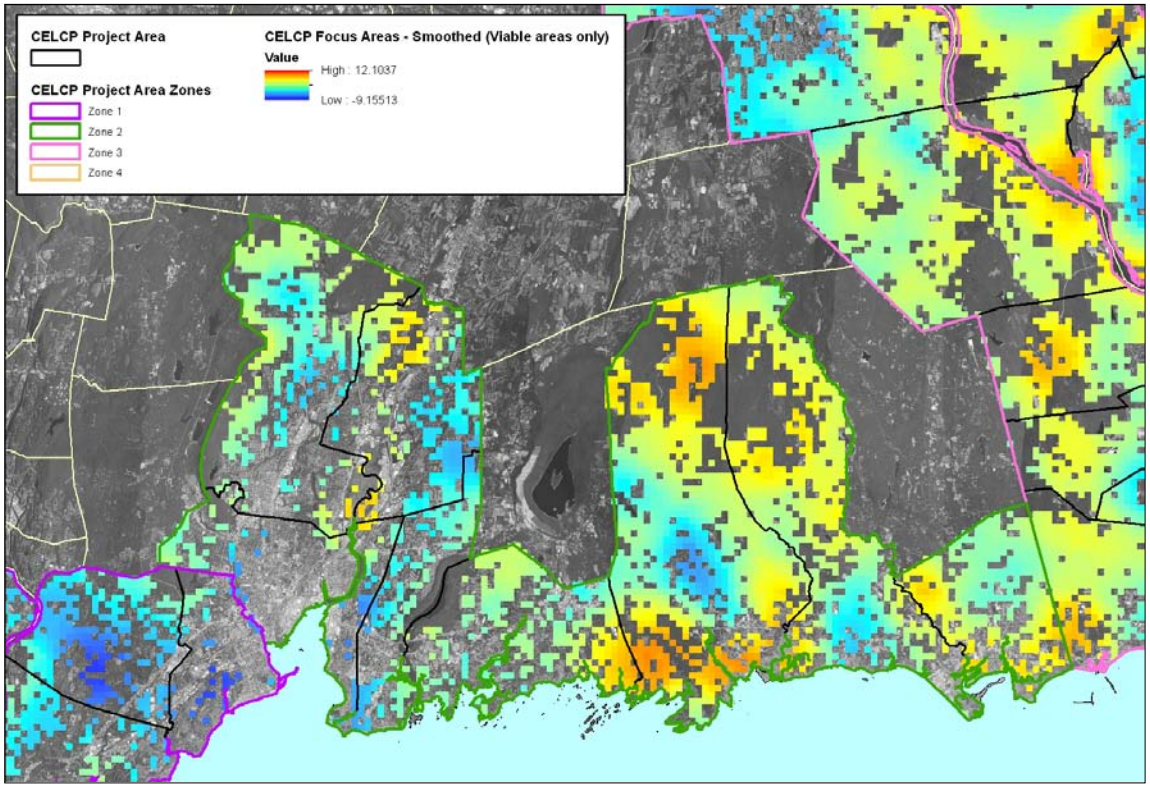


Figure 6. East Central Coastal Focus Area

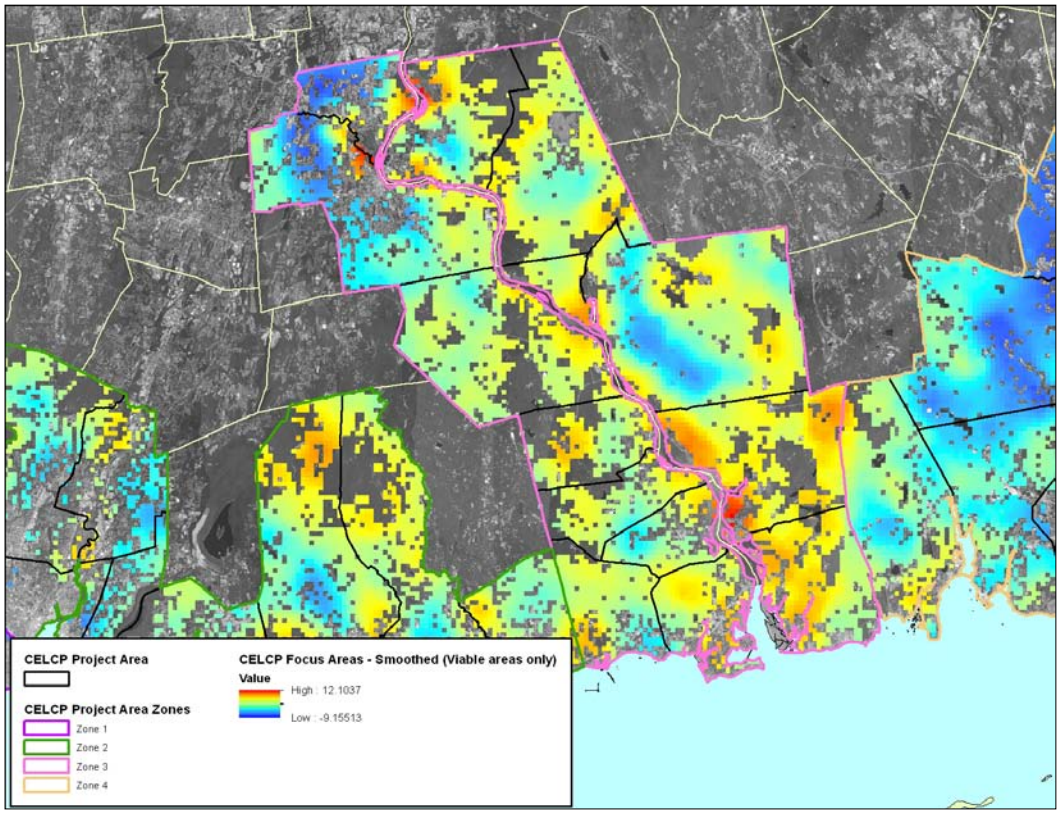


Figure 7. Eastern Coastal Focus Area