

Conservation Plan for
Lighthouse Point Park Important Bird Area
New Haven, CT

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Prepared under the authority of the City of New Haven Department of Parks, Recreation, and Trees, and in partnership with the New Haven Bird Club, and the Connecticut Butterfly Association.

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The following conservation plan was written under the authority of the City of New Haven Department of Parks, Recreation, and Trees, the sole landowner of Lighthouse Point Park. The primary contacts and consultants representing the City of New Haven were Dan Barvir, Terry McCool, and Martin Torresquintero. The following recommendations were developed to be consistent with the City of New Haven's current and planned uses for the park. It is recognized that the City has full and final authority on any and all activities implemented as a result of this conservation plan.

Executive Summary

This conservation plan is written for Lighthouse Point Park, a popular, city-owned urban park located in New Haven, Connecticut. Lighthouse Point, widely regarded as one of the nation's premier avian stopover areas, attracts droves of nature enthusiasts from all parts of the region during the fall migratory season. Every fall, 10,000-15,000 raptors are recorded by a long-running hawkwatch as they pass over the park as part of their southward journey to distant wintering grounds. The hawkwatchers at Lighthouse Point have established themselves as significant, long-term contributors to ornithology and raptor conservation by collecting valuable data on the migratory movements of raptors since 1974. The park is additionally noted for its exceptional concentrations of migratory landbirds. Every fall, the unique geography of the area funnels thousands of southbound landbirds directly over the park, while the park's stopover habitat acts as a trap for thousands more. During this time, nature enthusiasts from around New England converge on the park to seek out extraordinary and memorable bird, butterfly, and dragonfly watching experiences. This frequent correlation of the ecological and recreational value of the park was an important, reoccurring theme during the development of this conservation plan. Accordingly, a primary focus of this plan is how best to encourage this unique situation, especially in regards to the park's unmatched potential for education and outreach.

Lighthouse Point is officially recognized as an "Important Bird Area" (IBA) by Audubon Connecticut because the park is known to satisfy the following IBA Connecticut Criteria:

4. Sites where significant numbers of birds concentrate for breeding, during migration, or in winter, including:
 - (4e) Raptors: The site is a "bottleneck" or migration corridor for >5,000 migratory raptors (seasonal total).*
 - (4f) Landbirds: The site is an important migratory stopover or seasonal concentration site for migratory landbirds.*

The park most likely satisfies the following additional IBA Connecticut Criteria, however, the data necessary to officially assign these designations is presently lacking.

1. Sites important to endangered or threatened species in Connecticut.
4. Sites where significant numbers of birds concentrate for breeding, during migration, or in winter, including:
 - (4a) The site regularly supports 500 or more waterfowl in the winter and/or 1,000 or more waterfowl during migration.*
5. The site is important for long-term research and/or monitoring projects that

contribute substantially to ornithology, bird conservation, and/or education.

Lighthouse Point is also a potential Long Island Sound Stewardship Site. The park satisfies both the recreational and ecological value criteria for inclusion, but was, however, overlooked during the final Inaugural Stewardship Areas designation process. Recognition as a Stewardship Area would result in increased visibility, making the park more attractive to potential funding sources.

The following conservation goals were identified to guide the development of specific recommendations.

- Maximize the amount of available habitat for migrants using the existing park footprint.
- Maximize the educational value of the park through the enhancement of existing and the development of additional outreach activities, as well as through habitat enhancement/restoration.
- Promote the park's opportunities for scientific research.
- Use the park to promote the IBA Program and other New Haven IBAs through educational materials and activities.
- Build stakeholdership among local organizations or organize a Site Support Group.
- Use monitoring, of both visitors and wildlife, to determine appropriate measures of success.

The most realistic and effective conservation actions were chosen and prioritized by considering ease of implementation and potential to provide lasting contributions to the value of the park. It is expected that the landowner will assume a role of leadership when partnering with other stakeholders, as they have the final authority regarding any actions at the park. The recommended actions are:

- **Maximize research opportunities and encourage the involvement of local scientists in research activities at the park.** Specifically, an organized, more inclusive monitoring scheme for birds, insects, and humans, as well as the centralization of collected data is recommended. Also, research focused on bird habitat should be encouraged as independent projects for students of New Haven universities.
- **Identify and use funding opportunities to implement recommended conservation actions.** Specifically, the recognition of Lighthouse Point as a stewardship site of the Long Island Sound Stewardship Act could result in the availability of a significant amount of federal funding for the park until the year 2013. Other funding sources such as the Long Island Sound Futures Fund, Long Island Sound License Plate Program, and the Sound Conservancy Grant Program should be used for smaller projects, while the American Lighthouse Foundation or the New England Lighthouse Lovers should be considered as funding sources for restorations to the lighthouse.
- **Promote the site as an ecotourism destination through the advertisement of special activities at local establishments and the City of New Haven and Town of East Haven Chambers of Commerce.** Relationships with local

businesses should be fostered to encourage reciprocal promotional benefit, especially during the months immediately preceding the migration festival.

- **Support habitat and facilities enhancement and management through the appropriate funding sources.** The management recommendations for this conservation plan are categorized as habitat enhancements, habitat and facilities restorations, or modifications to current management practices. Enhancements and management modifications should be given top priority, as they provide the greatest contribution while using a minimum of the available resources. Restorations should be handled on a project-by-project basis, as the appropriate resources, such as funding or volunteer labor, become available. Specifically, this plan seeks to address the controversy surrounding a possible marsh restoration, encouraging a progression towards action-oriented research in the near future.
- **Realize the park's potential for unequaled educational programming.** The educational aspects of all research and management activities at the park should be recognized and efforts should be made to include the public in these activities whenever possible. Also, additional educational programming should be developed to compliment existing activities.
- **Identify and pursue land acquisition opportunities in the area.** Use materials provided in this plan to prioritize acquisition opportunities. Work with the New Haven Land Trust and the City of New Haven to augment existing protected land.

A more detailed summary of recommended actions can be found in Appendix VI.

INTRODUCTION

The successful conservation of avian species is based on a three-part approach to recognize and protect important breeding, non-breeding, and migratory stopover habitat for high priority species. One of the most challenging aspects of bird conservation is the identification and protection of stopover habitat, due in part to the tremendous distances (encompassing regional, continental, and global geographic scales) that migratory birds traverse en route to their breeding or non-breeding grounds. Consequently, any site that is known to be important to migratory birds should be recognized for its potential to host unique conservation activities and meaningful scientific research.

A conservation plan is an effective tool that can guide conservation and management activities for any site that would benefit from such actions. Conservation plans outline the key abiotic and biotic resources present at a particular site, historic and current land uses of the immediate and adjacent areas, current conservation activities, potential threats to the site, and opportunities to improve or restore the habitats or other features of the site. This information is then used to identify the unique needs of a particular site, and allows for a knowledge-based approach to determine appropriate management solutions. Finally, methods for monitoring success are developed to assess the effectiveness of any implemented conservation activities, allowing for opportunities to adapt if efforts are not achieving the desired result.

Conservation planning is an integral part of Audubon Connecticut's Important Bird Areas (IBA) Program. An IBA conservation plan is a critical step toward ensuring the long-term preservation of sites in Connecticut that have been recognized as being of importance to birds. This IBA conservation plan is written for Lighthouse Point Park, a popular urban park in New Haven. This 84-acre park is located on the east shore of New Haven Harbor and the north shore of Long Island Sound. Lighthouse point is a valuable recreational resource, as it increases access to and contributes to education concerning the conservation of Long Island Sound. As a result, the park was initially considered as an Inaugural Stewardship Area of the Long Island Sound Stewardship Site Initiative and has also received funding from the Long Island Sound Futures Fund, a grant program of the National Fish and Wildlife Foundation and Long Island Sound Study, which funded the development of this conservation plan.

Lighthouse Point has been recognized as an IBA for the exceptional concentrations of raptors and landbirds that pass through the park in the late summer and fall, as well as the stopover, rest and foraging opportunities the park's habitat provides for these migrants. On average, the park has the highest fall raptor count of any hawkwatch site northeast of Cape May, New Jersey. Raptor species that regularly pass over the park include the state-endangered Northern Harrier, Sharp-shinned Hawk, Bald Eagle, and Peregrine Falcon; as well as the state-threatened American Kestrel. Landbirds that typically pass through the park include large numbers of Bobolinks, listed as a species of special concern in Connecticut, the state-endangered, and Audubon WatchList Red-headed Woodpecker, as well as other species of conservation concern.

The unique issues surrounding the conservation of stopover sites (which will be discussed in more detail later) have the potential to complicate the conservation planning process. The challenges of developing management recommendations for stopover sites will be addressed in this conservation plan. Specifically, this plan will seek to explore the underlying reasons behind the park's significance as a stopover site, which will provide information to better guide decisions regarding potential improvements. Potential areas for future research will include exploring the park's connection to the surrounding landscape. Included in this landscape are other New Haven IBA's and potential IBA's such as East Rock Park, West Rock Ridge State Park, Sandy Point, the forest surrounding Lake Gaillard, New Haven Harbor, Sleeping Giant State Park, and the Quinnipiac River Tidal Marsh.

Migratory stopover sites, and indeed the mysteries of bird migration in general, captivate natural historians and the public alike. It is this curiosity that makes Lighthouse Point Park an invaluable resource for conservation education and outreach. The park's potential as a center for education, tourism, and research will be a primary focus of this conservation plan.

MIGRATION IN CONNECTICUT

Despite its small size, Connecticut is an important area for migratory birds because of its location along the Atlantic flyway. A great number of the birds of eastern North America, as well as some western North American species, migrate along this general flight corridor down the east coast of the United States (Brooke and Birkhead 1991).

Although migrating birds can be found across most habitat types in the state, and despite the fact that the exact migratory routes are constantly changing, some sites are consistently more important to certain species (Hutto 2000). The exact cause, or causes, of any stopover site's continued importance to migratory birds is not always immediately clear. Both intrinsic and extrinsic factors may contribute to a site's importance as stopover habitat. A higher potential for food acquisition is a factor that commonly makes one site more important than surrounding sites. Nevertheless, factors unrelated to food acquisition, such as geographic convenience and/or low predation rates, may have overriding significance in certain locations. For example, a particular configuration of habitat at a regional scale might result in a distinct patch of land that migrants find attractive when compared to the surrounding landscape (Hutto 2000).

In the case of Lighthouse Point, it is likely that geographic convenience is the driving force behind its significance as a stopover site. For example, many migrants travel west along Connecticut's coast during the fall migration, and it is likely that the park acts as the last stop for migrants as they prepare to cross Long Island Sound or continue across New Haven Harbor and down the Connecticut coastline. The park's position in the surrounding landscape is another potential source of geographic convenience. Lighthouse Point and Morris Creek are immediately surrounded by the highly urbanized landscape of the greater New Haven area. Human-altered habitat has a greater potential than naturally occurring habitat to act as an ecological trap (Hutto 2000), and it is therefore possible that

Lighthouse Point is more attractive to migrants when compared with its highly modified surroundings. Whether corridors of open space and natural areas (including areas such as Morris Creek, Tweed/New Haven Airport, Lake Saltonstall, Branford Supply Ponds, Lake Gaillard, and forest blocks along the Bolton Range in the central part of the state), and their degrees of connectivity, are factors that attract large numbers of migrant birds to the park still needs to be determined. In the case of migrant raptors, it is also a possibility that prey availability, most notably migrant songbirds, contribute to the heavy use of the park by raptors in the fall (Taylor 1994).

It is likely that a combination of some, or all, of the factors mentioned above can be attributed to the exceptional concentrations of migrating raptors and landbirds at Lighthouse Point Park, and that there is a type of stopover ecosystem in place. More research is needed to determine the exact cause of the observed concentration of fall migrants.

THE IMPORTANT BIRD AREAS PROGRAM

BirdLife International started the Important Bird Areas (IBA) Program in the late 1980's in an effort to identify and protect sites that are important for maintaining populations of wild birds. Since its inception, the IBA program has protected millions of acres of habitat as part of a now global effort linking sites that are most important for birds. The National Audubon Society, an official partner of BirdLife International, initiated its IBA Program for the United States in 1995. Currently, 46 states have an IBA Program, including Connecticut. These statewide IBA programs have produced more than 1800 identified IBAs, encompassing over 69 million acres of habitat. Connecticut currently has 26 recognized Important Bird Areas, two of which are recognized as being of global importance.

To qualify as an IBA, a site must meet at least one of a set of standardized criteria. These criteria address the population sizes, distributions, and habitat uses of certain species. All sites that meet the criteria qualify as an IBA, regardless of size, current level of protection, or landownership. More specific criteria are set at the statewide level (see "Relevant IBA Criteria"). The generalized categories for the criteria are as follows:

- Species of conservation concern: species listed as threatened or endangered at the state level.
- Species with restricted ranges.
- Species that are concentrated in one general habitat type or biome.
- Species, or groups of similar species, that form congregations.

Statewide conservation priorities are set by determining appropriate actions to maximize the benefit to birds. Target birds include birds of global, national, or regional conservation concern, as well as birds that are important for preserving Connecticut's avifauna. Target species are identified by considering many priority lists, including Audubon's WatchList. These lists, in order of priority, include:

- The International Union for the Conservation of Nature (IUCN) List of Globally Threatened Species.

- Partners in Flight Regional Priorities for Southern New England and Connecticut.
- Audubon Watchlist, species for which Connecticut has a reasonable responsibility.
- USFWS Birds of National and Continental Conservation Concern.
- USFWS Birds of Regional Conservation Concern in the Northeast.
- State-listed Species
- Connecticut DEP's Comprehensive Wildlife Conservation Strategy

The IBA program is a cooperative effort of many key conservation organizations. Audubon has formed partnerships with such groups as BirdLife International and the North American Bird Conservation Initiative (NABCI) to identify and promote IBA's. The IBA program has also been used as a key component of many conservation plans, including the North American Waterbird Management Plan (NAWMP), the U.S. Shorebird Conservation Plan (USSCP), as well as plans developed by Partners in Flight (PIF).

Effective advocacy and stewardship are essential components of any plan to ensure the long-term success of conservation actions implemented at any IBA. The most effective tool available for promoting advocacy and stewardship at IBAs and Long Island Sound Stewardship Sites are Site Support Groups (SSGs). An SSG is a group of local stakeholders that work with landowners towards the development and implementation of conservation and educational activities. These activities include appropriate habitat acquisition and easement, fundraising, species monitoring, and education and outreach. SSGs allow interested locals to get excited about participating in an international conservation program at the community level while simultaneously ensuring that Connecticut IBAs remain as important areas for birds.

SITE BACKGROUND

Site description

Lighthouse Point Park is bounded by New Haven Harbor to the west, Long Island Sound to the south, and Morris Creek and the Town of East Haven to the east. The park is a part of Partners in Flight's Physiographic Region 9 and the North American Bird Conservation Initiative's Bird Conservation Region 30. The elevation of the park and surrounding area ranges from 18 feet above mean sea level (MSL) in the upland areas to approximately 4 feet MSL near Morris Creek and the surrounding salt marshes. Morris Creek forms the boundary of New Haven and East Haven, and is the source of one of the largest marsh systems in New Haven.

Most of this city-owned 84-acre IBA is a popular urban park; the remaining area is comprised of dredging spoils fill and fragments of mixed oak-hickory uplands. The fill area is five acres of an irregular mix of sumac stands, mixed herbs, and marsh. The recreational area is comprised of sandy beaches, a bath house, a ranger station, picnic groves, recreational features for children (including a splash pad), a boat launch ramp, parking areas, a historic carousel, and the popular lighthouse. A grassy lawn, 200 Yd X 200 Yd, serves as a convenient area to gather and observe raptors in the fall.

The park receives heavy use by beachgoers in the summer as well as local birding groups, university ornithology classes, and butterfly and dragonfly enthusiasts in the fall. Every September, the park is host to the annual New Haven Migration Festival, a Saturday dedicated to the celebration of the park's migrant visitors. Morris Creek has been the subject of much scientific research in the past, and is one of the New Haven area's few remaining natural landscapes.

Site History/Historical Land Use

Prior to colonial settlement, the Quinnipiac and Momaugin Native Americans occupied the lands surrounding Lighthouse Point Park, including the surrounding Morris Creek marsh. During this time period, the area was used primarily for hunting and fishing.

In 1638, the Puritans chose to settle the area of present-day New Haven because of its close proximity to a sheltered harbor. Julius Morris purchased the land that would become Lighthouse Point Park from the City of New Haven in the mid-to-late seventeenth century. The Morris family subsequently built access roads in the upland areas, and used the marsh for cattle grazing. The land was overgrazed and mown for *Spartina patens* (which was harvested for livestock feed) for many years. Extensive farming resulted in soil runoff and loss of nutrients, and heavy animal use resulted in compaction of the soils. Even in this pre-development era, many factors contributed to the alteration of the marsh, resulting in a significant disruption of its natural development.

During the American Revolution, Lighthouse Point was the site of a battle in which American riflemen thwarted the efforts of the British to invade New Haven. British Ensign and Assistant Adjutant Watkins was buried at the site. In 1805, Amos Morris, Jr. sold the land to the Federal Government, which in turn erected a lighthouse.

The Federal Government retained ownership of the park until 1922, when the land was transferred to the State of Connecticut. The City of New Haven purchased the land for \$11,180 in 1924, and opened Lighthouse Point Park. The park quickly became a popular tourist destination, offering ferryboat rides to Savin Rock, a swimming beach, track meets, football games, and baseball leagues. The park's popularity, as well as the newly built grandstand ballpark, attracted baseball legends Babe Ruth and Ty Cobb to the Sunday afternoon games. During this period of heavy use, portions of Morris Creek marsh were filled to accommodate a trolley line. In the early 1930's, a hill in the northwest section of the park was excavated and the resulting sand, gravel, and traprock deposited in the five acres of marsh to create another ball field. The ball field was never used, however, as the area was too poorly drained.

In 1938, a hurricane devastated the New Haven area, destroying many of buildings and trees at the park. Restorations to the parks facilities would not be made until 1950, when a new bathhouse, first aid station, and concession stand were built. Also around this time, there was another substantial filling of the marsh as part of a program by the U.S. Army Corps of Engineers. Dredge spoils from New Haven Harbor were deposited over the five acres of marsh, and a dike was built along the entire south and east property lines,

completely restricting any tidal flow from Morris Creek. The complete loss of tidal flow coupled with the four to five feet of dredging spoils dramatically changed the vegetation structure of this once typical New England salt marsh. Most of the area, once dominated by native *Spartina* grasses, was overtaken by invasive strains of the Common Reed, *Phragmites australis*. Some of the areas of higher elevation have come to support stands of sumac, (*Rhus typhina*) and other mixed herbaceous, fruit bearing plants.

In the early 1970's, oysters were placed in Morris Creek by the State Department of Agriculture, Aquaculture division. The introduction was successful, and the oysters have thrived, contributing to the seed-oyster industry of New Haven Harbor.

Current Land Use

Since the 1920's, the area surrounding the park, including Morris Creek salt marsh, has seen slow but steady development for residential housing. Residential development has slowed in the past two decades. In recent decades, decision makers and conservation organizations have recognized the value of the marshes surrounding Morris Creek; however, the landscape had already been irreversibly altered. Morris Creek presently exists as a natural area surrounded by a highly urbanized landscape.

Lighthouse Point Park is a popular tourist destination, receiving over 100,000 visitors yearly. The site is increasing in popularity with birdwatchers and nature enthusiasts, as the park becomes widely known for its exceptional numbers of migrants. The park hosts the annual Migration Festival in the fall, as well as the Easter Seal's Festival of Lights during the winter holiday season. In addition to the recreational uses for the park, a section of the five acres of filled marsh is used by the City of New Haven as staging area for brushy waste. This area is currently a mix of *Phragmites*, sumac, and herbs, and receives substantial stopover usage by migratory songbirds.

The History of the Lighthouse and Carousel

In the early 1800's, New Haven was prospering as a port city. In 1805, New Haven's first lighthouse was built at Lighthouse Point Park to safely guide ships into the bustling New Haven Harbor. This original lighthouse was a 30-foot octagonal wooden tower, known as Five Mile Point Lighthouse because of its location exactly five miles from the center of downtown New Haven.

In 1847, the original lighthouse was replaced by the current facility, which came to be known as New Haven Light. The walls of this lighthouse were built from brownstone (quarried in the town of East Haven) and lined with brick, while ascending spiral staircase was made entirely of granite; the cost of construction was \$10,000.

In 1877, a new lighthouse was built on the easternmost breakwater, approximately one mile offshore. This new construction, which would come to be known as the Southwest Ledge Light, assumed the role of New Haven Harbor's lighthouse not long thereafter, and remains in use to this day. New Haven Light and its keeper's house are still intact, although not in service, and exist exclusively as a historically important structure and tourist attraction.

The carousel was purchased from the East Shore Amusement Company in 1928. In 1975, budget cuts eventually forced its closure, and this unique example of American folk art was dismantled and put into storage. In 1981, a local group, known as the Friends of the Lighthouse Point Carousel, was assembled to restore the carousel to an operable and authentic condition. The City of New Haven contributed to the restoration by refurbishing the carousel housing. The newly renovated carousel was placed on the National Register of Historic Places in 1983, and reopened to the public two years later.

Stakeholder Identification

Lighthouse Point Park is owned and managed by the City of New Haven Department of Parks, Recreation, and Trees. Various private individuals own the parcels of land adjacent to the park, several of which, along Meadow View Street and Meadow View Terrace, are owned by developers. The New Haven Land Trust has acquired twelve parcels (mostly high marsh) along Cart Road, Marion Street, Meadow View Street, Lighthouse Point Terrace, and South End Road; unfortunately not all of the Land Trust's holdings are contiguous. The City of New Haven also owns some sparsely distributed parcels along Marion Street, Lighthouse Point Terrace, Uriah Street, Doty Place, and Cart Road.

Lighthouse Point offers a great diversity of natural and educational resources, and consequently there are many diverse organizations that may be interested in stewardship of the park. Many organizations already play an active role in stewardship activities. For example, the New Haven Bird Club (NHBC) coordinates the annual hawkwatch and participates in the Migration Festival. The members of the NHBC have also kept some of the best records of the park's avian species. Other organizations, such as the Connecticut Ornithological Association, Connecticut Butterfly Association, Audubon Connecticut, as well as the City of New Haven and the East Shore Ranger Station all contribute essential services that make the continuance of the annual Migration Festival possible. Also, as mentioned above, the Friends of Lighthouse Park Carousel have also generously volunteered their time to ensure the preservation of the historic carousel.

Connecticut birding clubs, butterfly clubs, and academic institutions may be interested in making a contribution, or increasing their current level of contribution, to stewardship activities at Lighthouse Point. Specifically, local birding organizations that might have an interest include additional and continued bird-related activities the New Haven Bird Club, Connecticut Ornithological Association, and Menunkatuck Audubon Society. Local butterfly clubs that may have an interest in additional and continued butterfly-related activities at the park include the Connecticut Butterfly Atlas Project, North American Butterfly Monitoring Project, North American Butterfly Association (CT chapter), and the Connecticut Butterfly Association. Academic institutions that may use the park for educational or research purposes include Yale University (Ecology and Evolutionary Biology, the School of Forestry, and the Urban Resources Initiative), the University of New Haven, Albertus Magnus College, the Sound School, Southern Connecticut State University, and the University of Connecticut.

Stakeholder input is a critical component of conservation planning, as one of the criteria for a successful plan is to address the concerns of everyone involved. In order to ensure that any person or group with an interest in the park may voice their opinions or ideas, a stakeholder survey was sent to all of the organizations listed above. Additionally, surveys were sent to the New Haven Land Trust, Easter Seals Goodwill Industries, Department of Environmental Protection, the City of East Haven, the City of New Haven, and the New Haven City Plan Commission (Conservation Commission). Copies of the survey were also posted online and distributed at local bird club meetings.

Table 1. Current list of stakeholders and their contacts.

<u>Stakeholder</u>	<u>Contact</u>	<u>Contact Information</u>
Albertus Magnus College	http://www.albertus.edu/about/contacts.html	700 Prospect Street New Haven, Connecticut 06511 (203) 773-8550 or (800) 578-9160
The City of East Haven		250 Main Street East Haven, CT 06512
Easter Seals Goodwill Industries		95 Hamilton Street New Haven, CT 06511 (203) 777-2000
New Haven Land Trust	Lauren Brown preserves@newhavenlandtrust.org	205 Whitney Avenue New Haven, CT 06511 (203) 562-6655
Peabody Museum of Natural History		Yale University P.O. Box 208118 New Haven, CT 06520-8118
The Sound School	soundschool@hotmail.com	Regional Vocational Aquaculture Center 60 South Water Street New Haven, CT 06519
The University of New Haven	Roman N. Zajac Professor & Coordinator Graduate Program in Environmental Science Dept. Biology & Environmental Science	300 Orange Ave. West Haven, CT 06516 (203) 932-7114 rzajac@newhaven.edu

Yale University School of Forestry and Environmental Studies (Urban Resources Initiative)	Colleen Murphy-Dunning	205 Prospect Street New Haven, CT 06511 (203) 432-6570 colleen.murphy- dunning@yale.edu
Yale University Department of Ecology and Evolutionary Biology	Richard Prum	Osborn Memorial Labs Yale University P. O. Box 208106 165 Prospect Street New Haven, CT 06520- 8106
Yale University School of Forestry and Environmental Studies (Center for Coastal and Watershed Systems)		205 Prospect Street New Haven, CT 06511 (203) 432-3026 martha.smith@yale.edu
The City of New Haven		165 Church Street New Haven, CT 06510
The City of New Haven Department of Parks, Recreation, and Trees	Dan Barvir, Terry McCool	720 Edgewood Avenue New Haven, CT 06515 (203) 946-8027 or (203) 946-6071
Connecticut Audubon Society	Milan Bull	2325 Burr Street, Fairfield, CT 06824, (203) 259-6305
Connecticut Butterfly Association	Dori Sosensky, Carol Lemmon	Ask-us@ctbutterfly.org P.O. Box 9004 New Haven, CT 0652- 0004
Connecticut Ornithological Association	Milan Bull, President	2325 Burr Street, Fairfield, CT 06824, (203) 259-6305
Hartford Audubon Society	Ann Shapiro, President	P.O. Box 270207 West Hartford, Connecticut 06127-0207 (860) 282-BIRD (2473)
New Haven Bird Club	Dori Sosensky, Vice President	ask- us@newhavenbirdclub.org P.O. Box 9004 New Haven, CT 0652-

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Menunkatuck Audubon Society		National Audubon Society 700 Broadway New York, NY 10003 LOCAL CHAPTER Menunkatuck Audubon Society P.O. Box 214 Guilford, CT
Southern Connecticut State University	Dwight Smith	501 Crescent Street New Haven, CT 06515 1-888-500-SCSU
Connecticut DEP		The Department of Environmental Protection, 79 Elm Street, Hartford, CT 06106-5127
Connecticut DEP Environmental Equity Program (Formerly Urban and Community Ecology)		(860) 424-3001

NATURAL RESOURCE INVENTORY

Designation as an IBA

For a site to qualify as an IBA of continental or global importance, it must meet at least one of a set of standardized criteria. Sites that qualify as an IBA at the state-level are subject to an additional set of criteria set by the IBA programs of that state. The following is a list of the standardized criteria, the criteria for a state-level IBA in Connecticut, as well as summaries of the global and continental criteria.

Global Criteria

[A1](#) - Species of Global Conservation Concern

[A2](#) - Assemblage of Restricted-range species

[A3](#) - Assemblage of Biome-restricted species

[A4i](#) - $\geq 1\%$ of the biogeographic (Northern American) population of a waterbird simultaneously; $\geq 5\%$ over a season

[A4ii](#) - $\geq 1\%$ of the global population of a seabird or terrestrial species simultaneously; $\geq 5\%$ over a season

[A4iii](#) - $\geq 20,000$ waterbirds/ $\geq 10,000$ seabirds [*not currently applied in the U.S.*]

[A4iv](#) - aerial bottleneck where $\geq 5\%$ of the North American population of a migratory waterbird, or $\geq 5\%$ of the global population of a migratory seabird or terrestrial species passes during a season

Continental Criteria

B1- Species of Continental Conservation Concern

B2- [Not applicable at regional level]

B3- Assemblage of individuals/species concentrated in a Bird Conservation Region

B4i- $\geq 1\%$ of the flyway/subspecies population of a waterbird simultaneously; $\geq 5\%$ over a season

B4ii- $\geq 1\%$ of the biogeographic (North American) population of a seabird or terrestrial species simultaneously; $\geq 5\%$ over a season

B4iv- aerial bottleneck where $\geq 5\%$ flyway/subspecies population of a migratory waterbird, or $\geq 5\%$ of the North American population of a seabird or terrestrial species passes during a season

Connecticut Criteria

1. Sites important to endangered or threatened species in Connecticut.
2. Sites important to species of high conservation priority in Connecticut. (Including WatchList species, species considered of high priority for our region by Partners in Flight, State Special Concern Species and species for which Connecticut supports a significant percentage of the global or continental population.)
3. Sites that contain rare or unique habitats within the state/region or an exceptional representative of a natural habitat and that hold important species or species assemblages largely restricted to a distinctive habitat type.
4. Sites where significant numbers of birds concentrate for breeding, during migration, or in winter, including:
 - (4a) Waterfowl: The site regularly supports 500 or more waterfowl in winter and/or 1,000 or more waterfowl in migration (staging).
 - (4b) Gulls and Terns: The site regularly supports 100 or more terns or 500 or more gulls in a season.
 - (4c) Shorebirds: The site regularly supports 500 or more shorebirds (over a short period) at any time of the year.
 - (4d) Wading Birds: The site regularly supports 25 or more breeding pairs of wading birds or 100 or more individuals feeding or in migration.
 - (4e) Raptors: The site is a “bottleneck” or migration corridor for $>5,000$ migratory raptors (seasonal total).
 - (4f) Landbirds: The site is an important migratory stopover or seasonal concentration site for migratory landbirds.
 - (4g) Single-species Concentrations: The site regularly supports significant concentrations of a congregating species but may not meet the thresholds above. Such sites should support a higher proportion of a species statewide population ($>1\%$, if known) than other similar areas.
5. The site is important for long-term research and/or monitoring projects that contribute substantially to ornithology, bird conservation, and/or education.

Lighthouse Point does not meet any continental or global criteria and is therefore a state-level IBA. The two satisfied Connecticut criteria are:

Connecticut Criterion 4e: *5000+ raptors*. Lighthouse Point acts as a migratory corridor for well over 5,000 raptors every fall. In a typical migratory season, 15,000-20,000 raptors will be counted as they pass over the park. On average, the raptor counts are higher than any reporting sight northeast of the Cape May hawkwatch. The park also has the highest Merlin counts of any site except for Fire Island, a Long Island barrier beach located due south of New Haven.

Connecticut Criterion 4f: *Exceptional concentrations of migratory landbirds. Thousands of landbirds pass over the park every fall, and many stop to rest and forage*. The five acres of marsh/dredging spoils attract significant numbers of migrant sparrows, and the upland forest fragments attract significant numbers of warblers, vireos, and flycatchers. Other species that can be seen passing over the park include, Bobolinks, Cedar Waxwings, Blue Jays, American Robins, Tree Swallows, and a variety of icterids. Ruby-throated Hummingbirds frequent the park's nectar feeders and gardens well in to the fall season, and the recent addition of additional bird and butterfly gardens will increase the potential for western rarities such as *Selasphorus* species hummingbirds.

Potential IBA Criteria Met

Lighthouse Point has only been officially recognized as meeting Connecticut criterion 4, however, it is likely that the park could meet at least three other Connecticut criteria. These criteria, and a justification for why the park might qualify for each are listed below.

Connecticut Criterion 1: *Sites important to endangered or threatened species in Connecticut*. Although the park is not currently a significant breeding area for any state-listed birds, it is important to a great number of state-listed species in the migratory and non-breeding seasons; and as previously mentioned, successful bird conservation is based on the protection of breeding, as well as non-breeding and migratory stopover habitat. It is not known, however, whether or not the species present at Lighthouse Point in the fall are of a Connecticut population. Species that use the park during migration, and that are on Connecticut's Endangered, Threatened, and Special Concern list, include the endangered Sharp-shinned Hawk, Bald Eagle, and Peregrine Falcon; as well as the threatened American Kestrel. Lighthouse Point is also the last site in Connecticut where the Red-headed Woodpecker regularly occurs. This species is listed as endangered in Connecticut, Near Threatened by the International Union for the Conservation of Nature (IUCN), and is also listed on Audubon's WatchList (yellow).

Connecticut Criterion 4a: *The site regularly supports 500 or more waterfowl in the winter and/or 1,000 or more waterfowl during migration*. New Haven Harbor and Morris Creek are important areas for numerous waterfowl species, including species of high conservation priority, in the non-breeding season. Although New Haven Harbor is not officially within the IBA boundary, many of the birds attracted to the harbor can be found along the park's shore and Morris Creek. For example, The Audubon WatchList (yellow) American Black Duck can be found along the banks of Morris Creek, and the Audubon WatchList (yellow) Brant can be found along the park's rocky shore. Inventory efforts in

migration and the winter might be necessary to determine if this category is warranted, and will be discussed in more detail later.

Connecticut Criterion 5: The site is important for long-term research and/or monitoring projects that contribute substantially to ornithology, bird conservation, and/or education. Lighthouse Point has tremendous potential as a center for conservation education and ornithological research. The park is currently underused by researchers and/or educators. The only active monitoring effort is the annual hawkwatch, which has been continuous since 1974. The implementation of long-term monitoring, research, and educational activities would result in substantial contributions to ornithology, bird conservation, and conservation education. Suggested activities (i.e., landbird monitoring, utilization of Morris Creek marsh as a natural educational exhibit) will be discussed in detail in the “Recommended Actions” section of the plan. The realization of the park’s full potential for conservation, education, and research would establish Lighthouse Point as one of eastern North America’s premiere stopover sites and as a model for other stopover sites, urban parks, and IBAs.

Potential Long Island Sound Stewardship Act Criteria Met

According to the Long Island Sound Stewardship Act of 2006, stewardship sites of the Long Island Sound Stewardship Initiative will be identified by the following criteria.

In general, potential stewardship sites are:

- natural resource-based recreation areas; or
- are exemplary natural areas with ecological value; and
- best promote the purposes of the Long Island Sound Stewardship Act (“... to establish the Long Island Sound Stewardship Initiative to identify, protect, and enhance sites within the Long Island Sound ecosystem with significant ecological, educational, open space, public access, or recreational value through a bi-State network of sites best exemplifying these values.”)

The stewardship act also defines a “stewardship site” by the following technical definition.

The term “stewardship site” means a site that--

- (A) qualifies for identification by the Committee under section 8; and
- (B) is an area of land or water or a combination of land and water--
 - (i) that is in the Region; and
 - (ii) that is--
 - (I) Federal, State, local, or tribal land or water;
 - (II) land or water owned by a nonprofit organization; or
 - (III) privately owned land or water.

Lighthouse Point satisfies all aspects of the stewardship site criteria, and therefore would be a worthwhile addition to the initiative. The purpose and goals of the IBA program and this conservation plan are consistent with those of the Long Island Sound Stewardship

Act, and recognition of Lighthouse Point as an official stewardship site would certainly promote these shared purposes.

Abiotic Features

Water Features

The only water features that lie within the IBA boundary are the five acres of dredging spoils (historical water feature) and small sections of Morris Creek. The distinguishing features of an estuarine system are dependent on surface elevation (Root and Garnett 1995). As a result of the many modifications to the elevation of the park’s estuarine system, the cycles of regular tidal flushing have been disrupted, and consequently, the park’s five acres of dredging spoils have transformed from native salt marsh to a mix of *Phragmites* and sumac. The current elevations of the dredging spoils field will have implications for any future restoration schemes.

Table 2. Current elevation of existing vegetation stands (National Geodetic Vertical Datum). Source: Root and Garnett 1995

<i>Spartina alterniflora</i>	3.04’ NGVD (2.22 to 2.67)
<i>Spartina patens</i>	3.92’ NGVD (3.77 to 4.02)
High marsh pan	3.38’ NGVD (1 spot only)
<i>Iva frutescens</i>	4.36’ NGVD (1 spot only)
<i>Phragmites australis</i>	4.58’ NGVD (1 spot only)

New Haven Harbor consists of an outer harbor, approximately four miles wide at the entrance to Long Island Sound, and an inner harbor, only about a quarter of a mile wide. The Mill River and Quinnipiac River, two of the harbor’s three major tributary rivers, meet at northernmost point of the inner harbor. The third tributary, the West River, empties into the northwestern section of the outer harbor. New Haven Harbor receives more maritime commerce than any port in New England, with the exception of the harbors of Boston, Massachusetts and Providence, Rhode Island. To accommodate heavy use, breakwaters were created between the harbor and Long Island Sound. Four breakwaters were originally slated for construction, however, only three were completed.

The water depths of New Haven Harbor closest to the IBA range from two to six feet. Further into the harbor, in the direction of the breakwater, the water depths average about 12 feet. Past the breakwater, towards the center of the harbor, depths reach about 18 feet. Towards the center of the harbor from the west shore of Lighthouse Point, the water depths range from 15 to 19 feet. The average water depth of Long Island Sound is a shallow 64 feet.

The mean high tide elevation for New Haven Harbor (as measured by the U.S. Government in 1999) is about 7.3 ft. In 1995, the heights of 109 high tides were measured at Morris Creek and compared to the heights predicted by the U.S. Government. The following is a summary of the results.

Table 3. Predicted versus actual high tides at Morris Creek. Source: Root and Garnett 1995.

<u>Tidal Datum</u>	<u>Morris Creek</u>	<u>Predicted</u>
NGVD	0.0 ft	0.0
Mean High Tide	+3.9 ft	+3.8 ft
Mean Spring High Tide	+5.4 ft	+4.2 ft

Water Quality

Surface Water and Ground Water

Table 4. Surface water quality. Source: CT Department of Environmental Protection (Water Quality Standards and Criteria)

<u>Location</u>	<u>Water Class</u>	<u>Designated Uses</u>	<u>Discharge Restrictions</u>
Morris Creek	SA/SB	Marine fish, shellfish and wildlife habitat, shellfish harvesting for direct human consumption, recreation and all other legitimate uses including navigation.	Discharges from public or private drinking water treatment systems, dredging and dewatering, emergency and clean water discharges.
Mosquito Ditches/Morris Creek	A	Potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply and other legitimate uses including navigation.	Discharges from public or private drinking water treatment systems, dredging and dewatering, emergency and clean water discharges.

The ground water of Lighthouse Point has been classified as GB. According to the CT Department of Environmental Protection’s Water Quality Standards and Criteria, the designated uses of this water class are: Industrial process water and cooling waters; baseflow for hydraulically connected surface water bodies; presumed not suitable for human consumption without treatment. Discharges are restricted to: Discharges from public or private drinking water treatment systems, dredging and dewatering, emergency and clean water discharges.

Morris Creek

The water composition of Morris Creek has not been studied in detail, however, the fact that residential housing surrounds the entirety of the wetland (and that these areas could be sources of runoff and pollution) warrants further research. Trash from these surrounding areas (including garbage, plastic and glass bottles, and cans) is common in Morris Creek and along its banks. An additional potential threat to the water quality of Morris Creek is the backflow of contaminants from New Haven Harbor.

The salinity profile of the portions of Morris Creek within the parks boundary were studied in the 1994, and the results are summarized in the following graph.

Table 5. Salinity profile of Morris Creek. Source: Root and Garnett 1995

<u>Depth (feet)</u>	<u>Salinity (PPT)</u>
1	19.5
2	19.8
3	19.9
4	20.0
5	20.2
6 (bottom)	20.2

New Haven Harbor

According to the City of New Haven, the two greatest causes of decline in water quality for New Haven Harbor are non-point sources of pollution and sewer overflows. In a two-year storm event, 54% of all wastewater is left untreated and discharged directly into the West, Mill, and Quinnipiac Rivers. In response to this problem, the City of New Haven formed the Combined Sewer Overflow project. It is predicted that this project will eventually eliminate wet weather overflows into the harbor. Additionally, the Water Pollution Control Authority has developed a secondary treatment for wastewater, known as biological nutrient removal (BNR), and is using this technology at their East Shore Facility. The East Shore is currently the only source of wastewater that is taking advantage of this technology.

Evidence that there has indeed been a general increase in water quality is a decline in nutrient loading in the receiving waters of harbor over the last decade. The recent improvements in the apparent health of the harbor can be attributed, in part, to the watershed associations for the West, Mill, and Quinnipiac Rivers. These associations perform a valuable educational service, and also contribute to the protection of natural areas and corridors in the New Haven area. Further assessments of water quality and additional efforts to improve water quality are still warranted, as the harbor is such a heavily used, yet biologically productive area.

Long Island Sound

The water quality of Long Island Sound has been extensively studied by many research organizations including the United States Geological Survey, the Connecticut Department of Environmental Protection (DEP), and many Connecticut universities. The DEP's Long Island Sound Water Quality Monitoring Program continues to monitor the Sound on a yearly basis. The Sound is especially susceptible to pollution and contaminants because of the immense size of its watershed, which extends into Canada and includes about 16,000 square miles. The concentration of contaminants is greatest in western Long Island sound, with a gradual reduction in concentration towards ocean waters. The main causes of this gradient are the location of pollutant sources as well as the westward flow of pollutants associated with fine-grained particles. A similar pattern exists for the occurrence of hypoxia, a shortage of dissolved oxygen in the lower levels of water. The

primary cause of hypoxia is excessive levels of nitrogen associated with fertilizer runoff, which is most prevalent in western Long Island Sound. New Haven and Lighthouse Point Park fall within the intermediate zone of both gradients.

Geological History

Tens of millions of years ago, the valley that would eventually become Long Island Sound was carved by an ancient river. Many of the bays and harbors that now line the coast of New York and Connecticut, including New Haven Harbor, were most likely tributaries to this large river. The sound has been covered by glacier at least twice in the last 150,000 years. The last of these glaciers arrived about 23,000 years ago and started retreating 2,000 years after its arrival. The retreating glacier formed Glacial Lake Connecticut, which spanned from New York to Martha's Vineyard. The eroding walls of the lake eventually allowed for complete draining, resulting in a dry valley from about 16,000 years ago to 15,000 years ago. Rising sea levels eventually refilled the valley with seawater, forming Long Island Sound. Erosion and the constant advancement of the sea have continued to shape the sound. Most of the coastal features, including Lighthouse Point Park, were not recognizable until about 4,000 years ago.

The surficial geology of the park has been largely shaped by glacial activity. The majority of sediment is the compact, non-sorted depositions of glacial ice, which may include small areas of stratification. The underlying sediments of the entire of the south and east boundaries of the park have been covered with artificial fill. Exposed bedrock is sparsely distributed throughout the park, with the greatest concentrations of exposed areas, as well as the greatest extent of exposure, occurring along the west shore.

The park is situated on billion-year-old granite bedrock, separated from the rest of New Haven by the Great Fault. This fault line extends from the south shore of Morris Cove, passing under interstate 95, to the east side of the central valley of Connecticut.

Soil Types

The soil composition of the majority of the park consists of gently sloping, well-drained soils on outwash terraces. The surface terrain is heavily influenced by the underlying bedrock. Typically, this soil has a dark reddish brown silt loam surface layer that is usually 8 inches thick. The subsoil is 16 inches thick, and also consists of reddish brown silt loam. The substratum, a reddish brown gravel, can be found to a depth of 60 inches. This soil type covers the central portion of the park, and extends into the oak-hickory woodlands.

Portions of Morris Creek within the park boundary have soils that are classified as well drained sandy loam to silt loam. This soil type can also be found along the eastern and southern boundaries of the park, including areas where Morris Creek forms the park boundary. This soil type is typical of areas that have received fill, and accordingly can be found in the five acres of dredging spoils. The soil is 45.8% clay, 40.4% silt, and 13.8% sand. There is also a layer of gravel and traprock that is irregularly distributed in the areas of the park that contain this soil type. The layer is approximately 2.0 to 2.5 feet above sea

level (NGVD), and seems to be found in the highest concentration in the northern and western sections of the dredging spoils field.

The soils of the west shore, and a small section of upland straddling the north side of the dredging spoils and south side the oak hickory woodlands, are excessively drained soils, typical of woodlands. The surface terrain is heavily influenced by the underlying bedrock, which is often exposed along the west shore. Both of the locations are able to support trees, the smaller section being almost completely forested.

The southern end of the central patch of oak-hickory woodlands is a unique soil type classified as Penwood loamy sand. Typically, this soil has a dark brown loamy sand surface layer reaching depths of 8 inches. This soil type has low water capacity and is usually found in very small patches.

The only other major soil type found at the park is sandy beach. The beach at Lighthouse Point is mainly concentrated along the southern shore, but there are also some sandy areas, interspersed with bedrock, along the west shore. The beach consists of deep gravel and sand derived from gneiss, schist, granite, sandstone, conglomerate shale, and basalt.

Soil Quality

There have only been preliminary tests of soil quality in the Morris Creek salt marsh, or more specifically, the dredging spoils field. The soil quality of the dredging spoils field is of interest because it is the most biologically productive area of the park, as well as the area most likely to leach pollutants into Morris Creek and New Haven Harbor. The soils were found to have relatively low levels of chromium, mercury, lead, zinc, nickel, and copper. Levels of cadmium and arsenic, two of the most toxic metals, were below detectable limits. Both tetraethyl lead and derivatives of naphthalene (components of petroleum) have accumulated in the peat; the exact levels of tetraethyl lead are not known, the levels of naphthalene derivatives are low. Research concerning soil quality, sources of contamination, and potential for leaching are warranted. The fertility of the soil is summarized in the following table.

Table 6. Soil fertility of the dredging spoils field. Source: Root and Garnett 1995.

Values based on dry weight.

Parameter	Value
Organic Matter	3.56%
Total Carbon	1.95%
Total Nitrogen	0.21%
pH	6.8
Calcium	4,000 lbs/acre = 2,000 ppm
Magnesium	500 lbs/acer = 250 ppm
Phosphorous	3 lbs lab/acre = 1.5 ppm
Potassium	520 lbs/acre = 260 ppm

Land Cover

The most recent land cover evaluation of Lighthouse Point is available through *Connecticut's Changing Landscape*, a project of the University of Connecticut's Center for Land use Education and Research (CLEAR). This statewide project offers an interactive map of Connecticut's most current (2002) land cover condition. The map was produced according to the levels of radiation emitted by the land (sensed by the Landsat satellite series), rather than satellite imagery, resulting in a land cover image with a resolution of about .25 acres. A regional assessment of this type can be useful for assessing land connectivity and changes in land cover in the larger Morris Creek landscape; however, it is not recommended for site-level analysis (such resolution is not adequate for Lighthouse Point, which is less than 90 acres in size). Also, the Landsat method of land cover analysis has produced significant inaccuracies in the interpretation of the land cover of the park. Detailed estimates of land cover (based on satellite imagery) are warranted for the land within the park boundary. Recruiting a Geographic Information Systems (GIS) student at a Connecticut university would be the most economical way to obtain this data.

The following estimates are based on the data displayed by *Connecticut's Changing Landscape*. The predominant land cover types are Developed, Turf & Grass, and Deciduous Forest. These land cover types are represented, respectively, by the parking lots and facilities, the dredging spoils field, and the fragments of oak-hickory woodlands. Other secondary land cover types include Agriculture and Other Grasses (it is not clear what this classification refers to in terms of the park), and Barren, represented by sandy beach and exposed bedrock.

Biotic Features

Vegetation

The flora of Lighthouse Point is varied, as there are many stages of succession represented. The complex stages of succession are summarized here. The eastern and southeastern sections of the park, including the five acres of dredging spoils, are comprised of a disturbed marsh ecosystem and plant communities dominated by stands of sumac (*Rhus typhina*). Included in this general community are numerous, dense stands of *Phragmites australis*. Other less dominant species are: Northern Catalpa (*Catalpa speciosa*), Norway Maple (*Acer platanus*), White Ash (*Fraxinus americana*), Red Mulberry (*Morus rubra*), Autumn Olive (*Eleagnus augustifolia*), Cherry sp. (*Prunus species*), Multiflora Rose (*Rosa multiflora*), Limber Honeysuckle (*Lonicera dioica*), Goldenrod sp. (*Solidago species*), and New England Aster (*Aster Novae-angliae*).

The plant community found in the higher elevations of the northeastern section of the park is dominated by Black Locust (*Robinia pseudoacacia*). Other species in this community are: New England Aster (*Aster novae-angliae*), Goldenrod sp. (*Solidago species*), Limber Honeysuckle (*Lonicera dioica*), Red Mulberry (*Morus Rubra*), Multiflora Rose (*Rosa multiflora*), Eastern Poplar (*Populus deltoides*), Birch sp. (*Betula species*), Elm sp. (*Ulmus species*), Norway Maple (*Acer platanus*), American Linden (*Tilia americana*), Cherry sp. (*Prunus species*), Dogwood sp. (*Cornus species*), and Pussy Willow (*Salix discolor*).

The most mature plant communities are the fragments of oak-hickory woodlands. These communities are dominated by White Oak (*Quercus alba*), Red Oak (*Quercus borealis*), Black Oak (*Quercus velutina*), Pignut Hickory (*Carya glabra*), and Mockernut Hickory (*Carya tomentosa*).

Of the species listed above, five are considered non-native and invasive. All of these species are typical of disturbed, successional habitats.

- **Black Locust** is an invasive tree that thrives in sunny, disturbed habitats that can grow to 40-60 feet in height, potentially blocking the views of the horizon that are used by hawkwatchers.
- **Norway Maple** is an invasive tree that can reach heights of 40-50 feet.
- **Autumn Olive** is an invasive, deciduous shrub that is primarily dispersed by birds.
- **Multiflora Rose** is a dense perennial shrub that can produce over 500,000 seeds per plant; seeds can remain viable in a seed bank for 10-20 years.
- **Common Reed**, also known as *Phragmites*, is a persistent grass that is commonly 2-4 meters tall. Potential invasive plant control and removal solutions will be discussed later.

Before the historic salt marsh habitat was disturbed, and the natural process of succession allowed to takeover, it was comprised of a mix of common, native plants typical of New England's salt marshes. These plants include, Saltwater Cordgrass (*Spartina alterniflora*), Salt-Meadow Grass (*Spartina patens*), Spike Grass (*Distichlis spicata*), Marsh Elder (*Iva frutescens*), and Sea Lavender (*Limonium carolinianum*). Without intensive restorations, there is little possibility to restore the marsh to this natural composition because the area has experienced substantial subsidence (lowering of the peat layer). The average lowering is about 0.64 feet per foot of dredging spoils, which is equivalent to an average of 3.66 feet of subsidence throughout the marsh, with some areas experiencing as much as 5.3 feet of subsidence (Root and Garnett 1995). The most likely cause of this drastic loss of elevation is the restriction of tidal flow. Regular flooding is essential for both sediment input and the prevention of aerobic decomposition of the marsh peat, which can cause further compression. Simple compaction of the peat layer, a result of the weight of the dredging spoils, is also a possibility. One implication of adjusted elevation is that the restoration of tidal flow to the area will not restore the vegetation to the historical composition unless it is preceded by the addition of a new layer of substrate. Without this added sediment, the resulting habitat will tend towards exposed mudflats and low marsh (*Spartina alterniflora*).

Key Current Avian Species

Over 260 species of bird have been sighted at Lighthouse Point. The park has well kept records, especially in comparison to other important ecological sites, because it receives such heavy use by birders. Many of these birders, especially individuals from the New Haven Bird Club and Connecticut Ornithological Association, have kept records of varying levels of completeness over many years. Unfortunately, this data is scattered, and not readily available to the scientific community or to the public. The centralization of

this information into a database that can be updated and viewed by the public will be discussed later. The most complete avian records are a result of the hawkwatch, which has been continuous since 1974. Data from the hawkwatch are reported to a public database (HawkCount.org). There have been several other intensive studies of the use of the park by diurnal migrants, most notably Granton 1986 and 1987, and Hanisek 1995. The latter produced about 250 hours of coverage during the fall migration. These studies, coupled with the hawkwatch data, form the body of the park's avian species information. A current, comprehensive list of the park's avian species has recently been created by the New Haven Bird Club.

Seasonal raptor totals fluctuate from year to year, and are at least partially dependent on the extent of observer coverage for any given hawkwatch season. The average total number of raptors counted at Lighthouse Point is about 15,000-20,000 per season. In some years, the hawkwatchers document well over 25,000, and in others the total does not reach 10,000. The following table is a list of the average yearly totals broken down by species.

Table 7. Average yearly raptor totals, yearly high/low totals. Source: New Haven Bird Club hawkwatch. (21 years of data, 1978-1998).

<u>Common Name</u>	<u>Scientific Name</u>	<u>Avg. Yearly Total</u>	<u>High</u>	<u>Low</u>
Turkey Vulture	<i>Cathartes aura</i>	126	261	0
Osprey	<i>Pandion haliaetus</i>	1714	4036	438
Bald Eagle	<i>Haliaeetus leucocephalus</i>	15	41	0
Northern Harrier	<i>Circus cyaneus</i>	603	1054	259
Sharp-shinned Hawk	<i>Accipiter striatus</i>	8753	13973	5171
Cooper's Hawk	<i>Accipiter cooperii</i>	732	2191	47
Northern Goshawk	<i>Accipiter gentilis</i>	13	36	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	73	474	0
Broad-winged Hawk	<i>Buteo platypterus</i>	2570	9330	236
Red-tailed Hawk	<i>Buteo jamaicensis</i>	267	658	0
Rough-legged Hawk	<i>Buteo lagopus</i>	3.6	13	0
Golden Eagle	<i>Aquila chrysaetos</i>	2	6	0
American Kestrel	<i>Falco sparverius</i>	3318	4619	1652
Merlin	<i>Falco columbarius</i>	365	1382	19
Peregrine Falcon	<i>Falco peregrinus</i>	36	95	0
Unidentified Raptor	n/a	467	1182	0

The most common diurnal migrants, based on Granton 1987 and Hanisek 1995, are usually, in no particular order, Red-winged Blackbird (*Agelaius phoeniceus*), Common

Grackle (*Quiscalus quiscula*), Cedar Waxwing (*Bombycilla cedrorum*), Blue Jay (*Cyanocitta cristata*), Tree Swallow (*Tachycineta bicolor*), American Robin (*Turdus migratorius*), and Brown-headed Cowbird (*Molothrus ater*). For these seven trademark species, enormous and dramatic diurnal movements are commonplace. The following estimates are based on Granton 1987 and Hanisek 1995, the most recent and intensive studies of the parks non-raptor diurnal migrants. It is important to note that populations of birds fluctuate from year to year and that a species' pattern of usage of a certain area, especially for unpredictable species like the Cedar Waxwing, can vary greatly from year to year.

- **Red-winged Blackbird.** The number of individuals recorded in a season can vary from thousands to hundreds of thousands. Blackbirds occur throughout the migratory season, as early as August and as late as December.
- **Common Grackle.** The number of individuals recorded in a season can also vary in a given season from thousands to hundreds of thousands. Grackles occur in the highest numbers in the latter half of the migratory season, from October to November.
- **Brown-headed Cowbird.** This species is not seen in the same numbers as other icterids, but does share the same general timing of migration with grackles.

During days of exceptional icterid flights, flocks of well over a hundred thousand individuals (comprised of all three species) can be seen in a single morning.

- **Tree Swallow.** The number of individuals recorded in a season can reach the tens of thousands, with large flights taking place anytime from August through November.
- **Cedar Waxwing.** The number of individuals recorded can also number in the tens of thousands, although the timing of large flights is highly irregular.
- **Blue Jay.** The total number of individuals can vary from about one thousand to tens of thousands.
- **American Robin.** The total number of individuals is commonly in the tens of thousands, the timing of large flights concentrated mostly in the latter half of the migratory season.

There is a significant number of other, sometimes less conspicuous, species that regularly make use of the park, but in much smaller numbers. Many of these species are of conservation concern in Connecticut, and several in the wider regional or continental context. For example, 57 Common Loons (*Gavia immer*), listed as a species of special concern in Connecticut, were observed from the park in 1994. It is likely that this species uses New Haven Harbor during the wintering and migratory seasons as well. Two other species of special concern in Connecticut that also make regular use of the park in the migratory season are Eastern Meadowlark (*Sturnella magna*) and Bobolink (*Dolichonyx oryzivorus*). Despite the fact that Connecticut state-lists are based solely on nesting status, the preservation of migratory routes would be an important component of a statewide or regional conservation strategy for each, as they are of conservation concern in the northeast (the Bobolink is included as a priority species for the southern New England physiographic area by Partner's in Flight). The number of individual Bobolinks

documented per season is consistently in the thousands, although the actual number of individuals that pass through the park may be even greater as significant numbers of this species migrate before monitoring begins in late August.

Lighthouse Point Park remains as the only known site in Connecticut that regularly supports the Red-headed Woodpecker (*Melanerpes erythrocephalus*) in migration. This charismatic species is listed as Near Threatened by the International Union for the Conservation of Nature, endangered in Connecticut, and is also on the Audubon WatchList (yellow). The exact reasons for the park's continued importance to Red-headed Woodpeckers are not immediately clear. One possible explanation is geographic convenience. For example, it is known that populations of the woodpecker migrate south along the Connecticut coastline (Smith et al. 2000). Also, the woodpeckers could potentially be attracted to the general landscape of open space and scattered trees, a preferred habitat type. The specific species composition of trees might also cause the woodpeckers to commonly stop to forage at the park, as opposed to strictly passing through. It is known that the movement patterns of these birds are largely dependent on the availability of mast, i.e. acorns and other tree nuts (Smith 1986). There are numerous mast producing oak trees in the park's woodlands as well as many Common Sassafras (*Sassafras albidum*) trees in the more disturbed, successional areas. The woodpeckers are most commonly seen on or around the Common Sassafras (Frank Gallo pers. comm.).

The park's importance to nocturnal migrants remains unknown due to the difficulties in monitoring not only at night, but also at a fall stopover site where the most common vocalizations will be short flight calls, rather than recognizable songs. There are likely exceptional concentrations of nocturnal landbirds throughout the migratory season. Many of these species can be seen lingering at the park in the early morning hours. More extensive and intense monitoring efforts, for example efforts targeting species migrating earlier or later in the season than the scheduled hawkwatch (currently, the only regular monitoring program) will be discussed in greater detail later. Some nocturnal migrants that can already be seen in great numbers during the daylight hours and that deserve further attention at night include the state-endangered Common Nighthawk (*Chordeiles minor*), and the state-special concern Savannah Sparrow (*Passerculus sandwichensis*). Diurnal species that deserve attention earlier in the season (early to mid August) include the Osprey (*Pandion haliaetus*) and Bobolink. It is also likely that the park commonly supports significant concentrations of warblers, vireos, flycatchers, and *Catharus* thrushes; however, information for these species is severely lacking.

Every fall there are hosts of rare species that make an appearance at the park. Connecticut may not be a high priority area for many of these species, but they contribute to the impressive amount of tourism both at Lighthouse Point, and other New Haven IBAs. The park is the best place in Connecticut to see the rare Dickcissel (*Spiza americana*). An abbreviated list of other rare species that have appeared at the park includes: Connecticut Warbler (*Oporornis agilis*), Lark Sparrow (*Chondestes grammacus*), White-winged Crossbill (*Loxia leucoptera*), Red Crossbill (*Loxia curvirostra*), American White Pelican (*Pelecanus erythrorhynchos*), Barrow's Goldeneye (*Bucephala islandica*), King Eider (*Somateria spectabilis*), Buff-breasted Sandpiper (*Tryngites subruficollis*), Western

Kingbird (*Tyrannus verticalis*), Boreal Chickadee (*Poecile hudsonica*), Boat-tailed Grackle (*Quiscalis major*), and Tropical Kingbird (*Tyrannus melancholicus*). There is also growing potential for western hummingbird species, such as *Selasphorus* species, to make an appearance at the park's hummingbird feeders and butterfly gardens. In the beginning of December of 2006, a Calliope Hummingbird (*Stellula calliope*), a Connecticut first state record, appeared and stayed long enough for birders from all corners of Connecticut and even out of state to see it feed from a feeder in the butterfly garden. The rare event was covered in local and national media outlets, receiving press in the Hartford Courant, New Haven Register, and the New York Times and airtime on local news channels. The bird was measured and banded at the butterfly garden.

New Haven Harbor might very well qualify as an IBA for the impressive concentrations of arctic waterfowl that winter in its sheltered waters. Lighthouse Point offers some the broadest views available of the harbor, and consequently is one of the best places in Connecticut for winter waterfowl observation. Many waterfowl species, such as the Audubon WatchList (yellow) Brant, and the Audubon WatchList (yellow) American Black Duck are commonly seen along the immediate shoreline of the park. Lighthouse Point also has great concentrations of migratory waterfowl in the fall. Waterfowl use during this season is in need of accurate quantification.

Table 8. Species of conservation concern regularly recorded at Lighthouse Point.
Sources: Granton 1987, Hanisek 1995

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status</u>	<u>Use of Park</u>	<u>Season</u>	<u>Abundance</u>
Common Loon	<i>Gavia immer</i>	State-listed (Special Concern)	Flyover and use of adjacent waters as stopover/winter habitat.	Winter/Migration	unknown
Blue-winged Teal	<i>Anas discors</i>	State-listed (Threatened), for breeding population only	Flyover and use of adjacent waters/marsh as stopover/winter habitat.	Migration	1-2 per season
American Black Duck	<i>Anas rubripes</i>	Audubon WatchList (Yellow)	Use of Morris Creek as breeding and winter habitat.	Breeding/Winter	1-2 pairs
Sharp-shinned Hawk	<i>Accipiter striatus</i>	State-listed (Endangered), PIF	Flyover and stopover for rest/hunting.	Migration	5,000-15,000 per season

		Regional Priority			
Northern Goshawk	<i>Accipiter gentilis</i>	PIF Regional Priority	Flyover and stopover for rest/hunting.	Migration	10-20 per season
Northern Harrier	<i>Circus cyaneus</i>	State-listed (Endangered), PIF Regional Priority	Flyover and stopover for rest/hunting.	Migration	100-1000 per season
Red-shouldered Hawk	<i>Buteo lineatus</i>	PIF Regional Priority	Flyover and stopover for rest/hunting.	Migration	10-500 per season
Peregrine Falcon	<i>Falco peregrinus</i>	State-listed (Endangered), PIF Regional Priority	Flyover and stopover for rest/hunting.	Migration	10-100 per season
Bald Eagle	<i>Haliaeetus leucocephalus</i>	State-listed (Endangered)	Flyover and stopover for rest/hunting.	Migration	100+ per season
American Kestrel	<i>Falco sparverius</i>	State-listed (Threatened)	Flyover and stopover for rest/hunting.	Migration	1,000-10,000 per season
Common Nighthawk	<i>Chordeiles minor</i>	State-listed (Endangered)	Flyover and foraging.	Migration	unknown
Chimney Swift	<i>Chaetura pelagica</i>	PIF Regional Priority	Flyover and foraging.	Migration/foraging in nesting season.	1,000-2,000 per season
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	IUCN RedList (Near Threatened), State-listed (Endangered), Audubon WatchList (Yellow), PIF Regional Priority	Flyover and stopover for rest/hunting.	Migration	unknown
Horned Lark	<i>Eremophila alpestris</i>	State-listed (Endangered), PIF Regional Priority	Flyover and stopover for rest/foraging, some winter usage.	Migration/winter	unknown

Purple Martin	<i>Progne subis</i>	State-listed (Special Concern), PIF Regional Priority	Flyover and stopover for rest/hunting. Potential nester with proper management.	Migration, Potential for Breeding	unknown
Savannah Sparrow	<i>Passerculus sandwichensis</i>	State-listed (Special Concern)	Flyover and stopover for rest/foraging, some winter usage.	Migration/ winter	unknown
Bobolink	<i>Dolichonyx oryzivorus</i>	State-listed (Special Concern), PIF Regional Priority	Primarily flyover with some potential stopover for rest/foraging,	Migration	5,000-20,000 per season
Eastern Meadowlark	<i>Sturnella magna</i>	State-listed (Special Concern)	Primarily flyover with some potential stopover for rest/foraging,	Migration	unknown
Dickcissel	<i>Spiza americana</i>	Audubon WatchList (Yellow)	Primarily flyover.	Migration	unknown

Desired Additional Avian Species

All populations of Purple Martins (*Progne subis*) east of the Rockies are entirely dependent on man-made nesting structures (www.purplemartin.org). This species thrives in open urban areas because of the relative safety from predators that colonizing houses close to human habitation can provide. Devoted martin enthusiasts actively protect many colonies of Purple Martins from invasive nest competitors and potential predators. The open urban park habitat of Lighthouse Point would be ideal for attracting this state-threatened species if a group of motivated volunteers capable of maintaining such a colony could be assembled. This would be an ideal activity for a Site Support Group, the logistics of which will be discussed in more detail later. The presence of such a sought after species during the breeding season would extend the birding season of the park for nature enthusiasts, as well as provide other visitors to the park with a convenient wildlife observation opportunity of a captivating species.

The extension of the birding season at the park could also be achieved by providing food and shelter for wintering songbirds. The addition of seed and berry producing plants, vegetation that would offer cover from the wind and cold temperatures, and more feeding stations could increase the use of the park by wintering species such as the White-

throated Sparrow (*Zonotrichia albicollis*), Fox Sparrow (*Passerella iliaca*), Dark-eyed Junco (*Junco hyemalis*), American Tree Sparrow (*Spizella arborea*), and several northern finches including the Pine Siskin (*Carduelis pinus*), Common Redpoll (*Carduelis flammea*), and Evening Grosbeak (*Coccothraustes vespertinus*). Also, the addition of feed plots along the current dredging spoils field and other lightly used areas of the park could dramatically increase the use of the park by a number of species during the fall migration and winter including Song Sparrow (*Melospiza melodia*), White-throated Sparrow (*Zonotrichia albicollis*), White-Crowned Sparrow (*Zonotrichia leucophrys*), Chipping Sparrow (*Spizella passerina*), Lincoln's Sparrow (*Melospiza lincolni*), Savannah Sparrow (*Passerculus sandwichensis*), Grasshopper Sparrow (*Ammodramus savannarum*), Vesper Sparrow (*Pooecetes gramineus*), as well as rarities such as Lark Sparrow (*Chondestes grammacus*) and Dickcissel (*Spiza americana*).

Morris Creek is a historical stopover area for Wilson's Phalaropes (*Phalaropus tricolor*). Degradation of appropriate habitat is the most likely cause of the absence of this species in recent years. Appropriate restorations to the dredging spoils field to reintroduce open water and mudflats could potentially reverse this trend and result in the return of this most desirable species. The return of phalaropes would also result in the return of many birders, as the park would be one of the only places in Connecticut to experience this mostly western species.

In recent years, Brown Thrasher (*Toxostoma rufum*), a species of special concern in Connecticut, have nested in the emerging scrub habitat of the dredging spoils field. If this habitat is allowed to mature, and is managed as early successional habitat, it may be possible to continue to attract this species as well as other early successional species, such as the state-endangered Yellow-breasted Chat (*Icteria virens*). This possibility will be discussed further in the "Restorations" section of the plan.

Mammals

Small mammals are prey for migrating raptors; therefore, knowledge of the composition and abundance of mammals at the park is essential for both short-term and long-term management decisions. Unfortunately, however, there have been no previous mammal trapping efforts at the park. An incomplete list of the mammal species that have been seen in the Morris Creek area include Meadow Vole (*Microtus pennsylvanicus*), Eastern Chipmunk (*Tamias striatus*), Gray Squirrel (*Sciurus carolinensis*), Eastern Cottontail Rabbit (*Sylvilagus floridanus*), Field Mouse (*Peromyscus maniculatis*), Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), White-tailed Deer (*Odocoileus virginianus*), and Opossum (*Didelphis marsupialis*).

Invertebrates

The invertebrate species composition of the Morris Creek area is typical of New England estuarine systems. Although there have been no formal studies of the invertebrates at Lighthouse Point, there are many common species that are known to inhabit the intertidal areas of the park. This list includes mostly mud, sand, and gravel dwelling species including the Mud Snail (*Nassarius obsoletus*), Rough Periwinkle (*Littorina saxatilis*), Ribbed Mussel (*Modiolus demissus*), Blue Crab (*Callinectes sapidus*), Green Crab

(*Carcinus maenas*), Mud Crab (*Eurypanopeus depressus*), Fiddler Crab (*Uca pugnax*), and Soft-shelled Clam (*Mya arenaria*). There are also extensive beds of American Oyster (*Crassostrea virginia*) between the beach and the eastern breakwater. After harvest, these Oysters must be transplanted to cleaner waters for detoxification.

Reptiles

The reptile and amphibian composition of the water features of the park is not well known. It is known, however, that Eastern Box Turtles (*Terrapene c. carolina*), a species of special concern in Connecticut, breed around the dredging spoils field. More research is needed to determine if other species of conservation priority can be found in the area.

Fish

There is no information available on the fish of Lighthouse Point or the surrounding Morris Creek area. Some expected fish species typical of New England estuarine systems include the Silverside (*Menidia menidia*), Common Mummichog (*Fundulus heteroclitus*), Striped Mummichog (*Fundulus majalis*), Winter Flounder (*Pseudopleuronectes americanus*), and Fourspine Stickleback (*Apeltes quadracus*).

The fishing pier at Lighthouse Point is regularly used to access the numerous species of game fish that are present in New Haven Harbor. Common, or historically common, species include Striped Bass (*Morone saxatilis*), Weakfish (*Cynoscion regalis*), sea robin spp., skate spp., Scup (*Stenotomus chrysops*), Summer Fluke (*Paralichthys dentatus*), and Bluefish (*Pomatomus saltatrix*).

Insects

There are a variety of butterflies and moths, Lepidoptera, that use the park during the spring, summer, and fall seasons. Accordingly, both Lighthouse Point Park and East Rock Park are popular destinations for butterfly watching. Both parks are designated as official Monarch Waystations (www.monarchwatch.org). The Connecticut Butterfly Association (CBA) operates this Monarch tagging station during the Migration Festival. Despite the park’s popularity with butterfly watchers, comprehensive lists of the species seen or accounts of seasonal use do not exist. Possible management recommendations concerning Lepidoptera (including mowing schedules, butterfly gardens, and monitoring efforts) will be discussed later.

The Connecticut Butterfly Atlas Project (CBAP) is the principle provider of information concerning Connecticut’s Lepidoptera species, and the source most applicable to Lighthouse Point. The primary goal of this five-year study was to map the distribution of CT’s butterfly species. The maps were based on the United States Geological Survey topographic map quadrangle series. The following species were documented as occurring in Quadrangle 095 (New Haven area). There are no state-listed species on this list.

Table 9. Butterfly species occurring in Quadrangle 095 (New Haven area). Source: Connecticut Butterfly Atlas, additions based on recent records.

<u>Common Name</u>	<u>Scientific Name</u>
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Pipevine Swallowtail	<i>Battus philenor</i>
Black Swallowtail	<i>Papilio polyxenes</i>
Eastern Tiger Swallowtail	<i>Papilio glaucus</i>
Cabbage White	<i>Pieris rapae</i>
Falcate Orangetip	<i>Anthocaris midea</i>
Clouded Sulfur	<i>Colias philodice</i>
Orange Sulfur	<i>Colias eurytheme</i>
American Copper	<i>Lycaena phlaeas</i>
Coral Hairstreak	<i>Satyrium titus</i>
Edwards' Hairstreak	<i>Satyrium edwardsii</i>
Banded Hairstreak	<i>Satyrium calanus</i>
Striped Hairstreak	<i>Satyrium liparops</i>
Brown Elfin	<i>Incisalia augustinus</i>
Juniper (Olive) Hairstreak	<i>Mitoura grynea</i>
Gray Hairstreak	<i>Strymon melinus</i>
Eastern Tailed Blue	<i>Everes comyntas</i>
Spring Azure	<i>Celastrina ladon</i>
Variegated Fritillary	<i>Euptoieta claudia</i>
Great Spangled Fritillary	<i>Speyeria cybele</i>
Pearl Crescent	<i>Phyciodes tharos</i>
Question Mark	<i>Polygonia interrogationis</i>
Compton Toroiseshell	<i>Nymphalis vau-album</i>
Mourning Cloak	<i>Nymphalis antiopa</i>
American Lady	<i>Vanessa virginiensis</i>
Painted Lady	<i>Vanessa cardui</i>
Red Admiral	<i>Vanessa atalanta</i>
Red-spotted Purple/White Admiral	<i>Limenitis arthemis</i>
Viceroy	<i>Limenitis archippus</i>
Appalachian Brown	<i>Satyroides appalachia</i>
Little Wood Satyr	<i>Megisto cymela</i>
Common Ringlet	<i>Coenonympha tullia</i>
Common Wood Nymph	<i>Cercyonis pegala</i>
Monarch	<i>Danaus plexippus</i>
Silver-spotted Skipper	<i>Epargyreus clarus</i>
Hoary Edge	<i>Achalarus lyciades</i>
Northern Cloudwing	<i>Thorybes pylades</i>
Dreamy Duskywing	<i>Erynnis icelus</i>
Juvenal's Duskywing	<i>Erynnis juvenalis</i>
Wild Indigo Skipper	<i>Erynnis baptisae</i>
Least Skipper	<i>Ancyloxypha numitor</i>
European Skipper	<i>Thymelicus lineola</i>
Cobweb Skipper	<i>Hesperia metea</i>
Tawny-edged Skipper	<i>Polites themistocles</i>
Crossline Skipper	<i>Polites origenes</i>
Long Dash	<i>Polites mystic</i>

Little Glassy Wing	<i>Pompeius verna</i>
Delaware Skipper	<i>Atrytone logan</i>
Hobomok Skipper	<i>Poanes hobomok</i>
Zabulon Skipper	<i>Poanes zabulon</i>
Broad-winged Skipper	<i>Poanes viator</i>
Dun Skipper	<i>Euphyes vestries</i>
Leonard's Skipper	<i>Hesperia leonardus</i>
Fiery Skipper	<i>Hylephila phyleus</i>
Sachem Skipper	<i>Atalopedes campestris</i>

Many species of dragonfly, Odonata, are migratory. There are numerous dragonfly and damselfly species that pass through the park during the breeding and migratory seasons. In general, the dragonfly diversity of Lighthouse Point has been largely unstudied. There are dragonfly watchers in attendance at the hawkwatch every season; however, there are no organized records of species use or abundance. The timing of the Odonate migration (August-October) coincides closely with that of with migratory birds (The North American Dragonfly Migration Project 1992). In fact, many parallels between dragonfly and bird migration have been identified. For example, the migratory patterns of both groups are thought to be influenced similarly by weather phenomena and topographic features (Princeton Weekly Bulletin 2006). Lighthouse Point is an ideal location to monitor migratory dragonfly species because dragonfly flights are likely to coincide with flights of songbirds and raptors, and there would likely be knowledgeable volunteers on site during large movements. Dragonflies do not make return trips; therefore, traditional mark/recapture methods are not applicable. Alternative monitoring methods will be discussed later.

Table 10. Species of migratory Odonata recorded in New Haven County. Sources: The University of Connecticut Biological Collections (CT Dragonfly Flight Records), The North American Dragonfly Migration Project.

<u>Common Name</u>	<u>Scientific Name</u>
Common Green Darner	<i>Anax junius</i>
Swamp Darner	<i>Epiaeschna heros</i>
Twelve-spotted Skimmer	<i>Libellula pulchella</i>
Painted Skimmer	<i>Libellula semifasciata</i>
Bar-winged Skimmer	<i>Libellula axilena</i>
Great Blue Skimmer	<i>Libellula vibrans</i>
Variegated Meadowhawk	<i>Sympetrum corruptum</i>
Wandering Glider	<i>Pantala flavescens</i>
Spot-winged Glider	<i>Pantala hymenaea</i>
Black Saddlebags	<i>Tramea lacerata</i>
Carolina Saddlebags	<i>Tramea carolina</i>

CONSERVATION CONCERNS AND THREATS

Immediate Threats

Currently, there are relatively few threats or concerns that have the potential to reduce Lighthouse Point's significance as a migratory stopover area. This is partly because the park's value as an important area for birds is not wholly dependent on the health and integrity of the habitat; rather it is most likely a result of some form of geographic convenience. This fact, however, should not imply that habitat is not a contributing factor, nor that improvements to habitat features would not enhance the park's potential to act as a stopover site. Instead, the relatively low threat level will allow for resources to be focused on opportunities to enhance the habitat and other features of the park, rather than having to react to various threats as they arise, thus optimizing the use of available resources.

Potential Threats

Development

Until fairly recently, the importance of landscape connectivity had been widely overlooked by conservation biologists (Defenders of Wildlife 1991). The concept of establishing or maintaining corridors of natural areas to allow for the natural movement of organisms has finally been widely accepted as an essential aspect of conservation biology. Currently, Lighthouse Point is connected by a narrow avenue of open space to what may be among the largest corridors of relatively undeveloped land in New England, the Bolton Range/trap rock ridge system of Central Connecticut and Massachusetts. Comprising this connecting avenue are (from west to east) Morris Creek and its associated salt marsh, Farm River and its associated salt marsh, Lake Saltonstall, and Lake Gaillard. Only Route 142, Route 1, and Interstate 95 interrupt this band of open space. The larger swath of relatively unfragmented land extends north along the Bolton Range, through central Connecticut and into areas of northern New England. This larger corridor emits relatively low amounts of light pollution (see Figure 1), and therefore might be important to nocturnal migrants (which often use the stars to navigate). It is also possible that the narrow avenue of open space acts as a natural funnel for migrants traveling along this larger corridor.

Any major disruption to the continuity of these corridors could pose a threat to the park's continued importance. Recently, there have been no major developments in sections of the corridor closest to the park. The last major development occurred in East Haven, along Route 337, in the late 1980's and early 1990's. However, as previously mentioned, many parcels along Meadow View Street and Meadow View Terrace are owned by developers, and it is not known whether or not there are plans for development in the future.

Feral Cats

Domestic cats, both feral and free-roaming pets, kill millions of birds every year. These cats can introduce significant stresses to populations of native, wild birds that are already under stress because of habitat loss and degradation (American Bird Conservancy). The effect of predation by cats at Lighthouse Point is unknown, however, the park's close proximity to highly populated areas suggests that cats could potentially pose a threat to

the thousands of energetically compromised birds that stopover to rest and forage every year. Potential precautions to help safeguard migrant birds will be discussed later.

Recreational Use

The times of heaviest recreational use of the park are in the summer months, a time of year when there is relatively little avian usage of the park. Recreational use of the park poses a relatively minor threat to the birds and other wildlife of the park during these months. Certain areas of the park that currently receive little human use, for example the fragments of oak-hickory woodlands in the north section of the park, could become more sensitive to disturbance in the fall if general recreational activities were to increase in the future. An additional potential threat is the development of wild areas of the park for recreation. Such development would not only diminish the ecological importance of the park, but also the recreational value, as wildlife observation is an essential component of the park's potential for tourism.

If completed, proposed tourism trails and greenways pose a potential threat by promoting excessive recreational use during times of the year (fall and winter) when overuse may not be compatible with important ecological aspects of the park. There are many unknowns regarding proposed greenways, as it is difficult to predict the consequences of the improved accessibility until they are completed and the situation can be monitored. These greenways will be discussed further in ensuing sections of this plan.

Dumping

Areas of Morris Creek are currently being used illegally as a dumping ground for solid waste by private landowners. The Maintenance Division of the City of New Haven Department of Parks, Recreation, and Trees stores brushy, natural waste near the eastern boundary of the park. The continued deposition of materials (including garbage, dredging spoils, and natural waste) near wetland areas could cause further subsidence, making any future restoration efforts impossible or extremely costly.

Overgrowth/Succession

Hawkwatchers have commented that the trees of the northeast end of the park have become tall enough to block views of migrating raptors. This condition could potentially obstruct certain views of the horizon as succession continues along the eastern edge of the park. The potential climax heights of the existing tree species that are most likely to become obstructions are summarized in the following table. If succession becomes a problem in the future, inventories to determine existing vegetation height, estimates for potential future vertical growth, and standards limiting height of the trees in this area are warranted.

Table 11. Climax heights of common tree species along the eastern boundary of the park. Source: University of Illinois Extension, <http://www.urbanext.uiuc.edu/treeselector>

<u>Common Name</u>	<u>Scientific Name</u>	<u>Climax height</u>
Northern Catalpa	<i>Catalpa speciosa</i>	50-80 ft
Norway Maple	<i>Acer platanus</i>	40-50 ft

White Ash	<i>Fraxinus americana</i>	50-80 ft
Black Locust	<i>Robinia psuedocacacia</i>	40-60 ft
American Linden	<i>Tilia americana</i>	60-80 ft

CURRENT CONSERVATION ACTIVITIES

Recreation

Currently, the time of heaviest recreational use is in the summer months, when the swimming beach, splash pad, picnic areas and historic lighthouse attract the large crowds of visitors to the park. Other seasonal activities, like the Festival of Lights, and fall birding season maintain the park’s value as recreational destination in the off-season. While recreational uses may not contribute directly to the conservation of the park, it’s popularity, due to year-round recreational activities and access to Long Island Sound, establish the park as a prime candidate for the Long Island Sound Stewardship Initiative, the funding from which will be highly influential in determining what will be possible in terms of future conservation activities.

The Hawkwatch

Every fall since 1974, the New Haven Bird Club has organized and operated a hawkwatch. The hawkwatch is operational every day in the fall from September 1 to the end of November, when the stream of migrants trickles out. The data from this important monitoring effort are reported to the Hawk Migration Association of North America and the Northeast Hawkwatch.

The Hawk Migration Association of North America (HMANA) is a not-for-profit, all volunteer organization founded to “advance the knowledge of raptor migration across continents; to help establish a rational basis for future monitoring of raptor populations; and to provide, through the use of standard reporting forms and procedures, a data bank on migrations for the use of professional and amateur ornithologists.” The counts of numerous hawkwatch sites across North American are reported to this organization and displayed on a website designed as part of their *Raptors Online* program, www.hawkcoun.org. Lighthouse Point’s seasonal raptor counts also constitute a significant contribution to the Raptor Population Index (RPI) project. The RPI “is intended to determine annual raptor populations and trends based on analysis of count data collected throughout the United States, Canada, and Central America.” This collaborative effort of Hawkwatch International, the Hawk Migration Association of North America, and Hawk Mountain Sanctuary Association is still in the early stages of development.

The Northeast Hawkwatch is a local, not-for-profit organization dedicated to “promoting hawkwatching, and the study of hawk migration throughout New England, eastern New York, and northeastern New Jersey.” Lighthouse Point’s seasonal raptors counts are included in this organization’s annual report.

Table 12. North American hawkwatch organizations and contacts.

<u>Organization</u>	<u>Contact Information</u>
Hawk Migration Association of North America	http://www.hmana.org/ , http://www.hawkcount.org
Northeast Hawkwatch	http://www.battaly.com/nehw/
Hawkwatch International	http://www.hawkwatch.org/
Hawk Mountain Sanctuary Association	http://www.hawkmountain.org/

The Annual Migration Festival

One of the park's most popular special events is the annual New Haven Migration Festival, previously known as the New Haven HawkFest. This collaborative celebration, first organized by The City of New Haven and, in 2003, joined by Audubon Connecticut, the New Haven Bird Club, the Connecticut Butterfly Association, the Connecticut Ornithological Association and the Connecticut Audubon Society, is held in September, during the peak of the hawk migration. The purpose of the festival is to celebrate, enjoy, and learn about the many migrants (birds, butterflies, and dragonflies) that visit the park each fall. There are numerous activities associated with the event including a hawk flight ID workshop, butterfly tagging, bird banding, bird, butterfly and dragonfly walks for all ages, tours of the lighthouse, carousel rides and a popular live raptor show presented by Wind over Wings. Festival attendance has been increasing each year; this trend is expected to continue.

Bird Walks

Lighthouse Point is host to many annual bird walks held by East Shore Ranger Station as well as local birding organizations, such as the New Haven Bird Club (NHBC). The NHBC organizes several walks to Lighthouse Point in the fall and early spring seasons of every year. Most of the walks are focused on the fall raptors and landbirds; however, the park is also used as a convenient vantage point of the waterfowl and gulls wintering in New Haven harbor. In addition to walks geared towards birders, the NHBC organizes educational bird walks for children during the fall season.

Bird and Butterfly Gardens

The first butterfly garden at Lighthouse Point was created through a partnership between the Connecticut Butterfly Association and the City of New Haven in 2004. Since the creation of this initial garden, the New Haven Bird Club and the Menunkatuck Audubon Society have contributed towards its enhancement and expansion. This garden, located under a stand of Elm trees, along the main road of the park, consists of perennial and annual shrubs and herbs, specifically chosen to optimize the use of the park by butterflies, songbirds, and hummingbirds. Currently, there are three existing beds, and three under construction. New additions will include a central area designed for handicap accessible picnic tables as well as easily accessible *Buddleia* bushes (to facilitate Monarch tagging and butterfly observation). Grant money (from the South Central Regional Water Authority, Audubon Connecticut, and the Audubon Council) has been obtained to fund two interns to maintain the garden for an initial summer. The City of New Haven Department of Parks, Recreation, and Trees, the Connecticut Butterfly Association, and

the New Haven Bird Club will provide any additional volunteer service. Also, plant information signs to accompany plant species that are important to birds or insects are currently being installed.

New Haven Coastal Area Planning

The City of New Haven has recently updated their Coastal Area Planning guide, which is currently available for public review. Lighthouse Point's governing plan identifies \$8.2 million in renovations and restorations to the park's facilities, including the lighthouse and carousel. The Coastal Planning Guide states that these renovations are a top priority for the harbor's east shore. The successful addition of a splash pad to the park's growing list of recreational attractions is the most recent actualization of this planning guide.

East Shore Ranger Program

The East Shore Ranger Station, established at Lighthouse Point in 1985, serves as the headquarters of the park ranger programs for Lighthouse Point, Nathan Hale/Black Rock Fort, and East Shore Park. The East Shore Rangers organize numerous worthwhile educational programs, including in-classroom programs that focus on the biology and maritime history of Long Island Sound, with emphasis put on the ecological and recreational value of New Haven parks. The efforts of the East Shore Rangers have led to the recognition of Lighthouse Point as a valued destination for outdoor educational activities by many Connecticut school programs. In addition to activities geared towards school-aged children, the ranger program offers on-site nature related educational, and recreational activities for visitors of all ages. The majority of which are located at Lighthouse Point. For example, the ranger station houses a touch tank, featuring live specimens of wildlife from Long Island Sound, and a working, interactive sailing ship deck. Tours of the lighthouse (offering the best possible views of New Haven Harbor) are available on a group reservation basis. The park is also the location of the ranger's canoeing and kayaking programs. For example, a "paddle day" is held during the summer, offering visitors the opportunity to experience kayaking or canoeing along Morris Creek.

Recreational Activities

There are many recreational activities that might not directly contribute to the conservation of the park, but that promote the park as a tourist destination. For example, the park is included in many Connecticut tourist magazines because of the historic lighthouse, which is included in many guides to New England's lighthouses, and carousel, which is included in the National Registry of Historic Places. In the summer months, the park commonly hosts weddings and music festivals (such as the New Haven Jazz Festival), and is often the destination of New Haven bicycling tours. During the winter holiday season, Lighthouse Point is host to the Easter Seals Goodwill Industries' Festival of Lights, a drive-through holiday landscape of enormous light displays. This popular event, first held in 1994, is open from November 17 to December 31.

Tourism Trails

There are currently three tourism trails under construction that will include Lighthouse Point as a focal attraction when complete. Besides the obvious benefit of improved

accessibility, establishing these tourism trails would expand the possibilities for recreational activities, thereby attracting a more diverse group of visitors to the park. The first of these trails is a highway-based birding trail that will be known as the Connecticut Coastal Birding Trail. A project of the Wildlife Division of the Connecticut Department of Environmental Protection, this trail will connect popular sites along Interstate 95 in a network of accessible Connecticut birding destinations that will eventually be part of the Great American Trails system. The trail has been divided into four areas: “Coastal Fairfield County”, “Greater New Haven”, “Connecticut River Valley”, and “Mystic and more – Southeastern Connecticut.” Lighthouse Point has been nominated as a potential site for the Greater New Haven area. The park is an ideal location for the Connecticut Coastal Birding Trail because of its accessibility, relatively low sensitivity to disturbance, and large assemblages of birds during the appropriate seasons.

The two other proposed tourism trails are greenway trails that will eventually be connected to the East Coast Greenway (ECG). The ECG’s goal is “to connect all the major cities of the East Coast along a continuous, off-road path, spanning 2,950 miles from Calais, Maine to Key West, Florida.” The proposed trails that will establish the park’s connection to the ECG is the Shoreline Greenway Trail. The purpose of the Shoreline Greenway trail is to connect Lighthouse Point to Hammonasset State Park via a trail system composed of contiguous, multi-use avenues. This ambitious objective will be accomplished by constructing new trails, as well as restoring existing trails, in the towns of East Haven, Branford, Guilford, and Madison. This project is presently progressing; the first section of the trail opened in Branford in the spring of 2006.

The other proposed trail, known as the Harborside Trail, is a project of the City of New Haven. The goal of the Harborside Trail is to “enhance public access to the waterfront of New Haven Harbor, and link disparate and disjointed portions of the shoreline and reconnect the harbor with the rest of the City.” This mostly paved trail would have a trailhead at Lighthouse Point, extend via a network of multi-use trails around New Haven Harbor (offering many scenic views along the way), and end at Savin Rock in West Haven. Construction of this trail was proposed by the City of New Haven, and was accompanied by some preliminary design and planning. There is presently, however, no prospect of construction or further planning.

Land Acquisition

The New Haven Land Trust (NHLT) is actively identifying and acquiring land in the Morris Creek salt marsh. All NHLT properties, presently consisting of 12 parcels of salt marsh (mostly high marsh), in the Morris Creek area are collectively managed as a nature preserve. Not all of these parcels are contiguous, however, all are located in close proximity to Meadow View Street. Specifically, there are properties located on Cart Road, Marion Street, Lighthouse Point Terrace, and South End Road.

The Bolton Range/trap rock ridge system of Central Connecticut and Massachusetts has been recognized as the “Last Green Valley” by the Green Valley Institute. This non-regulatory organization is a partnership of the Quinebaug and Shetucket Valley Natural

Heritage Corridor, The University of Connecticut College of Agriculture and Natural Resources, and the University of Massachusetts Extension, among others. The goals of this organization are to improve the knowledge base that guides land management decisions in the area and to facilitate the protection of natural resources on a local scale. For more information refer to <http://thelastgreenvalley.org/gvi>.

Long Island Sound Stewardship

In 1985, Long Island Sound was one of the first estuaries identified under the National Estuary program. Numerous organizations, including regional offices of the EPA, the United States Fish and Wildlife Service, Audubon Connecticut and New York, Audubon's Clean Water/Jobs Coalition, Connecticut Fund for the Environment/Save the Sound, Long Island Sound Study, the Quebec-Labrador Foundation/Atlantic Center for the Environment, and the Regional Plan Association, are actively involved in the stewardship of the sound. This action-oriented interest in the preservation of the sound is manifested through various campaigns, management plans, and acts of congress. For example, Audubon New York and Audubon Connecticut, partnering with Connecticut Fund for the Environment/Save the Sound and the Regional Plan Association, launched their Listen to the Sound Campaign in 2000. This resulting citizens agenda is available at <http://ny.audubon.org/lts/lts2000.html>.

The Long Island Sound Study, a partnership of the EPA with New York and Connecticut state agencies, drafted the Sound's Comprehensive Conservation and Management Plan in 1994. The implementation of this plan resulted in legislation, introduced in 2004 that would establish the Long Island Sound Stewardship Initiative. This historic piece of legislation would allocate up to \$25 million annually (until 2013) to conservation activities along the Sound, including, land acquisition and easement, the restoration and protection of natural areas, as well as ways to increase access to the Sound. In April of 2006, the Long Island Sound Stewardship Act was introduced as a House bill. The bill was passed and became public law on October 16, 2006. The relevance of the Long Island Sound Stewardship Act to Lighthouse Point will be discussed in the *Funding* section of this plan.

CONSERVATION GOALS

During the 1970's, the eastern half of the park was designated as a bird sanctuary. Although it affords no legal protection, this official designation was a catalyst for many planned improvements to the park, including Purple Martin housing and an Osprey platform (Citizens Park Council of Greater New Haven, Proctor 1978). Unfortunately, improvements were either never realized or short-lived. In 1978, Dr. Noble Proctor noted that when improvements are complete, Lighthouse Point "will be one of the prime birding spots on the entire east coast." The following conservation goals suggested by this IBA conservation plan were developed with the intent of elevating the park to that deserved level of prominence.

- Maximize the amount of migratory stopover habitat available in the park within the existing park footprint, i.e. focusing efforts on areas that will not adversely impact existing human uses of the park and/or recreational needs.

- Maximize the educational value of the park through the enhancement of existing and the development of additional outreach activities, as well as through habitat enhancement/restoration.
- Promote the park as a center for scientific research.
- Use the park to promote awareness of other New Haven area IBAs and birding sites through educational materials and activities.
- Build stakeholdership among local organizations and organize those groups into an official Site Support Group.
- Use monitoring, of both visitors and wildlife, to determine appropriate measures of success.

The following sections are recommended as the most realistic and effective conservation actions for realizing the goals mentioned above. Specifically, recommended actions were chosen and prioritized by ease of implementation and potential to result in lasting contributions to the value of the park.

RECOMMENDED ACTIONS

Site Support Group

Lighthouse Point is perhaps unique in that there is already a high level of stakeholdership from local citizens, as well as local and statewide conservation groups. Currently, there are many disparate organizations involved in conservation and or outreach activities at the park. The association of these separate organizations, as well as any other interested individuals, into one unified coalition (in this case known as a Site Support Group) is recommended. The benefit of such a coalition would be a more organized plan of action for the park, with enough individuals possessing the desired diversity skills to effectively implement this plan. It is noted that because there are so many stakeholders and potential conservation actions, it is essential that Audubon Connecticut continue to provide funding and logistical support.

A Site Support Group (SSG) is “a group of local stakeholders working for the conservation of an IBA as part of a national and global IBA safeguard network.” These semi-autonomous groups are essential to the long-term preservation of IBA’s. Participation in a SSG allows interested individuals to develop creative and exciting programs and activities for their local IBA, with the benefit of contributing to a meaningful, global conservation program. Specifically, the duties of a SSG at Lighthouse Point can include, but are not limited to:

- **Habitat acquisition and easement.** Work with the New Haven Land Trust and the City of New Haven to identify and act on land acquisition or easement opportunities in the immediate and surrounding areas.
- **Habitat restoration and enhancement.** Work with park rangers on invasive plant removal/control, trail maintenance/creation, or platform construction. Advocate a more favorable mowing schedule. Work with the City of New Haven to enact habitat enhancements that will maximize the park’s value to migrating and wintering birds and enhance bird and butterfly related recreational opportunities.

- **Monitoring.** Continue to implement existing and recommended future monitoring efforts; develop additional monitoring schemes.
- **Public policy and advocacy.** Advocate the construction of the Harborside Trail, the East Haven section of the Shoreline Greenway Trail, and the Connecticut Coastal Birding Trail. Advocate the inclusion of Lighthouse Point as a site of recreational and ecological importance in the Long Island Sound Stewardship Initiative.
- **Education and outreach.** Participate in existing and develop new educational activities at the park. Play a large role in the Migration Festival.
- **Fundraising.** Identify grant opportunities for habitat enhancement, for example, additional butterfly/songbird gardens.

A SSG should be a key player in any conservation activities at the park. The suggestions listed above will be discussed in more detail in the ensuing sections of the plan. Any of the following recommendations would be a suitable project for a SSG. Existing stakeholders that might be interested in actualizing the following recommendations will also be identified.

Research

Lighthouse Point is an ideal location to conduct meaningful scientific research. The park's potential to become the focus of a great diversity of research projects is a direct result of the parks accessibility and position as one of the nation's premier stopover sites. One of the main goals of this conservation plan is to realize the park's potential as a center for scientific research. Listed below are suggestions to guide research ideas in directions that will produce answers to the larger questions concerning migration, while simultaneously providing City staff with useful information on how to best manage the park. The following suggestions are encouraged as projects for undergraduate or graduate students at Connecticut and New Haven area universities.

- The role of natural land corridors, specifically in relation to the migratory patterns of avian and insect species, as well as the effects of development (and the consequential degradation and loss of connectivity) of these land corridors.
- The importance of small natural oases in highly urbanized landscapes. Specifically, the importance of Lighthouse Point Park and East Rock Park to migratory species, as well as comparisons of a fall and spring stopover site.
- The effects of pollutants from New Haven Harbor on New Haven area saltmarshes, specifically the Morris Creek and Farm River saltmarshes. Also, the effects of stormwater runoff at these same marshes.
- The extent of New Haven wastewater discharge into New Haven Harbor, and the possible negative consequences of this discharge for both humans and local estuarine habitat.
- The specific extent of marsh subsidence in the dredging spoils field, and any implications to possible restoration schemes. Also, the identification of economical restoration solutions as they relate to bird habitat.
- The specific habitat requirements of Red-headed Woodpeckers in the migratory season; specifically, the occurrence of this species in Connecticut.

- Continue research into the correlations of large numbers of songbirds and raptors at migratory stopover sites as well as the feeding rate/successful capture rate of raptors at these sites. Also, explore any alternative explanations for documented correlations, for example weather patterns.
- The initiation of monitoring efforts (discussed in detail below).

Monitoring

The implementation of a long-term fall monitoring scheme at Lighthouse Point would yield valuable information on the movement patterns of birds, butterflies, and dragonflies. Some of these monitoring programs would require the services of trained and experienced individuals; others would require nothing more than enthusiastic children with minimal experience. The need for a diverse range of skills to properly operate a successful monitoring scheme illustrates the need for a diverse group of individuals to participate in a Site Support Group for the park. For a prioritization of the following recommendations refer to Appendix X.

Examples of truly long-term biological monitoring programs are rare. The hawkwatch at Lighthouse Point is an example of a successful (i.e. continuous) long-term monitoring program because it has collected data on raptor migration every fall for over three decades. The data from long-term monitoring programs are often used by researchers to extrapolate population trends or explore other aspects of a taxonomic group's biology, such as population structure, behavior, or timing of key life history events. However, the applicability of hawkwatch data to studies of migration biology (especially the extrapolation of population trends) and the merit of results obtained by such applications have often been challenged (Svensson 1978, Newton 1979, Fuller and Mosher 1981, Smith 1985, Kerlinger and Gauthreaux 1985, Craig 1986, Bednarz et al. 1990). Common cited weaknesses of hawkwatch data include lack of standardization among and within years, observer bias and fatigue, and lack of standardization of effort, both in terms of coverage time and number of observers (Hussel 1985, Kochenberger and Dunne 1985, Sattler and Bart 1985, Titus et al. 1989, Bednarz et al. 1990). Also, regional and local weather patterns can influence the behavior of migrants and result in potentially misleading data (Haugh 1972, Alerstam 1978, Richardson 1978, Hussel 1985, Bednarz et al. 1990). Some sources of bias, for example weather, cannot be controlled. Standardizing variables that can be controlled, such as observer effort, can reduce the number of unknowns and improve the power and resolution of the data (Bednarz and Kerlinger 1989).

Weaknesses in the hawkwatch data collected at Lighthouse Point should be addressed and compensated for, as resources allow, enabling the use this data by researchers interested in specific questions about raptor migration. Accordingly, the objective of hawk counting at the park should be to quantify as complete a sample of the species present during a set time interval as possible, rather than to achieve the highest raptor totals possible. With this purpose in mind, the proportion of missed raptors becomes less of a concern (Hussel 1985, Smith 1985) and it becomes advantageous to standardize the number of official observers or the official counting time periods, which will in turn facilitate accurate and defensible comparisons. Modifications to the existing monitoring

protocol should only be considered if they provide significant improvements while using a minimum of the available resources (hawkwatchers), and no modifications should be considered that are not compatible with the current use of the data by HMANA and the NorthEast Hawk Watch.

The involvement of other local groups, such as the Menunkatuck Audubon Society or a Site Support Group, to help distribute the current responsibilities of volunteers is recommended. A larger volunteer base will facilitate the expansion of the monitoring efforts at the park, including an organized monitoring scheme for non-raptor diurnal migrants. For convenience, this monitoring should follow the same schedule as the hawkwatch. Diurnal monitoring (both raptors and non-raptors) should begin a week earlier to ensure that species that migrate early, such as the Osprey, Bobolink, and Purple Martin, receive proper coverage.

There are many trained and experienced passerine bird banders in Connecticut. Any trained individuals that might be interested in participating in a long-term passerine mist-netting and banding station at Lighthouse Point should be recruited. This banding station should operate on a regular schedule from late August to early November. A regular banding regimen is one effective method for monitoring nocturnal migrants in the fall. These birds, with the exception of often indistinguishable flight calls, will be silent during fall migration. To ensure that nocturnal migrants receive adequate coverage, efforts should be made to have mist-nets open in the pre-dawn hours. Other recommendations include the utilization of multiple nets to accommodate the large concentrations of birds, and the placement of these nets in all representative habitats to ensure the capture of a representative sample of the park's fall avian diversity. Appropriate locations for mist nets include the historic bird banding area, located in the center of the dredging spoils field, and the trails located in the oak-hickory woodlands. All banding efforts should follow proper United States Geological Survey banding protocol.

Listening stations offer the potential to provide the most complete representation of an area's nocturnal migrants. Listening stations are created using a variety of designs, but all share a common objective: capturing (on tape) the flight calls of nocturnal migrants. These recorded flight calls can then be analyzed, assigned to a species, and entered into a database. Stations vary in the amount of time and effort needed for successful operation. The creation of a listening station requiring the minimum possible requisite level of maintenance is recommended for Lighthouse Point. The creation of an autonomously operating sound trap has been made possible by recently developed computer software. The recommended software programs for this project are *Tseep*, *Thrush*, and *Dick*, all of which are available for free download at <http://www.oldbird.org/analysis.htm>. These programs will sort through audio as it is recorded to the computer, saving only those files that meet the frequency and duration requirements of avian flight calls. The software program *Glassofire* will sort and classify the spectrograms of any captured flight calls (available at the address listed above). Instructions for building an inexpensive, yet functional, microphone are available at http://www.oldbird.org/mike_home.htm. If possible, a higher quality parabolic microphone should be acquired. The ranger station is

the ideal location for this listening station, as the recommended system requires the use of a computer. The microphone should be mounted on the roof of the ranger station, away from any insect noise, and should ideally be connected to the computer via an inexpensive pre-amplifier. References that should be used during the construction and operation of this listening station are www.oldbird.org and the *Flight Calls of Migratory Birds* (CD-ROM), by William R. Evans and Michael O'Brien.

All possibilities concerning the resumption of a raptor banding station should be explored. Such an operation would likely be more intensive than that of a passerine banding station, in part because there are relatively few individuals trained and experienced in raptor banding. Despite potential difficulties, putting a regular, long-term raptor banding regimen into practice is certainly warranted, as the park has one of the highest concentrations of raptors in eastern North America in the fall season. Specific methods that have been successfully implemented at other hawkwatch sites, such as at nearby Cape May, include the use of appropriately sized mist nets, baited bow nets, or a combination of both (Bub 1991).

As more butterfly and hummingbird gardens are created, more migrant and vagrant hummingbirds will use the park as stopover from early to late fall. A regular hummingbird banding station should be established to contribute to the study of the movements of this poorly understood bird family. This recommendation is supported by the recent apparent increase of western hummingbird species in the east and lack of a well-supported explanation.

The exact number of Common Nighthawks that pass over the park during the migratory season remains unknown in part because these crepuscular birds are not often seen in daylight, but also because peak movement occurs well before regular observation at the hawkwatch begins. Preliminary monitoring to determine the presence or absence of significant concentrations of nighthawks is warranted. The most productive time period would most likely be the last two hours of daylight of every day in the last week of August (Project Nighthawk). If this preliminary monitoring reveals significant numbers of nighthawks, a regular, organized monitoring effort should be implemented. The recommended duration for nighthawk monitoring is August 17th through September 5th. Observation hours should be concentrated in the last two hours of daylight, but also during already in progress diurnal monitoring. Results should be submitted to *Project Nighthawk*, a volunteer organization formed with the purpose of monitoring the migration of Common Nighthawks across the United States (<http://members.localnet.com/~risinger>).

Lighthouse Point is an official Monarch Waystation of the University of Kansas' Monarch Watch (www.monarchwatch.org). Monarchs are tagged annually at the Migration Festival, and irregularly other days during the Monarch migration. A regular (more frequent) monarch tagging program will increase the chances that Monarchs tagged at Lighthouse Point will be recaptured elsewhere. Such a program could be a joint venture of a Site Support Group and the Connecticut Butterfly Association. Additionally,

increased tagging efforts will increase the educational and outreach value of the park by offering even more opportunities for the public to become involved and engaged.

A dragonfly tagging program is not recommended, not only because dragonflies make one way trips, but also because there is no one organization that oversees dragonfly banding activities, and therefore there is no standardized protocol. However, efforts should be made to document flights of dragonflies at the park, and the records generated should be submitted to the North American Dragonfly Migration Project. An example of accepted monitoring protocol can be found at http://www.ent.orst.edu/ore_dfly/guides.htm#top. Potential participants in dragonfly monitoring efforts include hawkwatchers as well as members of the Connecticut Butterfly Association.

The mammal composition of the Lighthouse Point, particularly that of small mammals, has conceivable conservation implications. For example, the park's small mammals are a potential food resource for migrating raptors. Taking this possibility into consideration, any knowledge of the current use of the dredging spoils field by mammals could guide decisions regarding a potential marsh restoration, which will be discussed later. Preliminary small mammal trapping is recommended for the dredging spoils field and surrounding salt marsh.

Efforts should be made to monitor and document visitor use of the park. Information such as where people are traveling from and the purposes of their visits should be documented whenever possible. This task could be accomplished by hawkwatchers, as well as by city employees at the entrance gate. A basic record of visitation has implications for evaluating measures of success, which will be discussed later, but also for demonstrating the economic value of the park as tourist destination for outdoor recreation, a \$730 billion industry (Kauffman 2006).

Organization of Data

Annual hawkwatch data is stored in the Hawk Migration Association of North America's database, and much of it is available to the public through www.HawkCount.org. These data are also summarized in the Northeast Hawkwatch's annual newsletter; however, this newsletter is only available to members. Currently, there is no forum to display or view the park's non-raptor species information, thus the centralization of all of the park's avian species information into an easily accessible database, available to both scientists and the public, is recommended. The benefits of a complete, long-term record include the ability to extrapolate long-term trends as well as the availability of a standard to which comparisons can be made (providing a means to assess the effectiveness of newly implemented conservation activities). A web-based database also presents a convenient opportunity for birders to report sightings, a feature that carries the added benefit of improving the knowledge of avian species use of the park outside of the fall season. Two existing databases are www.ebird.org and www.avianknowlegde.net.

eBird is a joint project of the National Audubon Society and the Cornell Lab of Ornithology. Observations can easily be reported to a central database that can be viewed

by all registered users. The database can be searched for previously observed species by location or time period. The Avian Knowledge Network (AKN) is a similar project, but with greater capabilities for analysis. The AKN collects observational data from individuals, but also from other databases (such as eBird). eBird is the recommended database at this time. This recommendation is based on the relative simplicity of both the deposition and retrieval of data.

Funding

An important part of the recent wave of interest in the restoration of Long Island Sound was the establishment of multiple grant programs. The goals of these grant programs are often consistent with those outlined in this conservation plan, for example, increased access, the preservation of important natural areas, the establishment of research and educational activities, and the enhancement of recreational activities. The potential for Lighthouse Point to meet these goals, while maintaining its current level of recognition and contribution to the economy of Long Island Sound, result in the park being a prime candidate to receive grant funding. The grant programs most relevant to Lighthouse Point are discussed below. An additional list of grant opportunities (that vary in their availability) can be found at <http://www.longislandsoundstudy.net/grants/index.htm>.

Long Island Sound Stewardship Act

As previously mentioned, the Long Island Sound Stewardship Act will allocate up to \$25 million annually (until 2013) to conservation activities along the sound, including, as mentioned above, land acquisition and easement, the restoration and protection of natural areas, as well as ways to increase access to the sound. This bill also established the Long Island Sound Stewardship Initiative, which will direct the allocation of these funds by identifying and protecting sites of ecological and recreational importance along the sound. Over 800 sites were initially identified, however, only 32 were included in the final inventory. Lighthouse Point was included in the initial list, but was not included on the final list. It is recommended that the park be included in the Long Island Sound Initiative as both a recreational and ecological site, the justification for which has been discussed in detail throughout this plan. Inclusion in the initiative will result in the availability of essential funding opportunities.

LIS Futures Fund

The Long Island Sound Futures Fund is a grant program, administered by the National Fish and Wildlife Foundation (and many partnering organizations), founded with the mission of restoring and protecting the health and living resources of Long Island Sound. Projects that are eligible for funding must have goals that are consistent with the following objectives (Source: Long Island Sound Study).

- Stimulate restoration of important habitats;
- Encourage locally-based projects that improve water quality and protect water resources;
- Support communities in developing and implementing watershed management plans;
- Encourage environmentally sensitive development and land-use planning;

- Develop the capacity of state and local governments, citizens groups, educational, and other organizations to promote community based stewardship;
- Increase public access to water and open space;
- Provide opportunities for direct educational experiences with the Sound; and
- Promote a greater understanding of the estuary and the interrelationship between the health of the Sound and the condition of local watersheds.

The Futures Fund offers both large grants (\$10,000 - \$75,000) and small grants (\$1,000 - \$5,000). The latter category is a potential funding source for habitat enhancements and restorations, as well as for educational activities at Lighthouse Point. For more information refer to <http://www.longislandsoundstudy.net/futurefund.htm>.

Long Island Sound License Plate Program

The Connecticut Department of Environmental Protection offers funding for select projects through the Long Island Sound License Plate Program. To qualify for eligibility, a project must fall under one of the following categories: outreach and education, public access, habitat restoration, and research. For more information refer to <http://dep.state.ct.us/olisp/licplate/licplate.htm>.

The Sound Conservancy Grant Program

The Quebec-Labrador Foundation/Atlantic Center for the Environment is a non-profit organization dedicated to conservation and education activities in Eastern Canada and the New England maritime region. This organization created the Sounds Conservancy Grant Program, which supports conservation and education projects that benefit the six sounds of southern New England. This grant program partially funded work on this conservation plan, and should be a potential source of funding for other research activities at the park in the future.

ALF/NELL

There are several organizations dedicated to the preservation of North America's lighthouses. The most notable is the American Lighthouse Foundation (ALF). This foundation's mission statement is as follows:

To encourage the historic preservation and restoration of lighthouse, lightship and lifesaving station artifacts and documents throughout America, while endeavoring to foster and support local lighthouse initiatives and organizations through public information and advisory services; and to improve public awareness and appreciation of and access to all of America's lighthouses.

The ALF is responsible for the stewardship of many lighthouses across the country. Currently, the ALF and its local chapters are involved with only one Connecticut Lighthouse, the Avery Point Lighthouse, supported by the Avery Point Lighthouse Society. It is recommended that a similar local stewardship chapter (associated with the ALF) be assembled for the New Haven Light. The ALF National Chapter Agreement is available for download at www.lighthousefoundation.org.

Another active lighthouse stewardship organization is the New England Lighthouse Lovers (NELL), an affiliate of the ALF. This organization will fund a lighthouse restoration program if the following set of criteria are satisfied:

1. *The lighthouse must be in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island or Vermont.*
2. *If there is an identified restoration/preservation project requiring funding?*
3. *If there is an active preservation/support group in charge of the project?*
4. *If there is an opportunity to fund a specific element of the project for which NELL can receive contributing recognition?*

A funding request form can be found at <http://www.nell.cc/preservationfund.htm>.

Promotion

In the fall, nature enthusiasts from around the country visit Lighthouse Point. During their visits they support local food establishments and use local accommodations. The formation of partnerships with these local businesses is recommended. For example, involving these local businesses in the advertisement of park activities, especially the Migration Festival, should be considered. Local vendors should also be invited to the Migration Festival. The high volume of visitors, the potential to attract even greater numbers of visitors, and the variety of activities that park has to offer should be brought to the attention of the Greater New Haven Chamber of Commerce and the East Haven Chamber of Commerce.

During the fall season, the park and its hawkwatch should be promoted by birding weather reports. Giving the public notice when large movements are expected would increase the chances of more first-time birders visiting the park. Local winds and weather patterns should be considered in conjunction with regional weather patterns (e.g. cold fronts) to ensure reports are as accurate as possible. Potential outlets include the Weather Channel, WTNH-TV, or public access television.

Table 13. Local businesses and potential advertising outlets in the east shore and Greater New Haven area.

<u>Establishment</u>	<u>Address/Contact</u>
The Sandpiper Restaurant	161 Cosey Beach Ave, East Haven, CT (203) 469-7544
Beachhead Restaurant	3 Cosey Beach Ave, East Haven, CT (203) 469-5450
Krauszer’s	25 Townsend Ave, New Haven, CT (203) 467-9209
Our Oasis	664 Coe Ave, East Haven, CT (203) 466-2747
Little Italy	453 Short Beach Rd, East Haven, CT (203) 466-050
Fbucci’s	3 Cosey Beach Ave, East Haven, CT (203) 469-5450

Quality Inn East Haven	30 Frontage Road, East Haven, CT (203) 469-2544
Debonair Motel	295 Beach St, West Haven, CT (203) 937-5350
Residence Inn New Haven	3 Long Wharf Dr, New Haven, CT (203) 777-5337
Super 8 Motel	7 Kimberly Ave, West Haven, CT (203) 932-9000
Fairfield Inn	400 Sargent Dr, New Haven, CT (203) 562-1111
Peabody Museum of Natural History	Yale University P.O. Box 208118 New Haven, CT 06520-8118
Greater New Haven Chamber of Commerce	900 Chapel St # 1000 New Haven, CT 06510
East Haven Chamber of Commerce	157 Main St, East Haven, CT (203) 467-4305

Habitat and Facilities Management

The management recommendations for Lighthouse Point are separated into the following categories: enhancements, restorations, and continued management. Recommendations categorized as enhancements or continued management are to be given the highest priority at this time because they offer the maximum the benefit to the park, while using a minimum of the available resources. Restorations should be initiated at an appropriate time as resources, such as funding or volunteer labor, become available.

Enhancements

The addition of food plots and gardens is recommended, but should be handled on a project-by-project basis. Professional project-specific planning should continue to be a component of any future habitat enhancements, if resources will allow, assigning first priority to the northern edge of the hawkwatch lawn. The current uniform forest edge should be replaced by a stadium effect. A softened edge with various layers and heights of vegetation will be more attractive to migrant songbirds than the existing vertical condition; it is known that many migrants prefer stopover habitat with horizontal and vertical heterogeneity (Rodewald et al. 2004). Also, fruit bearing vegetation should be included whenever possible to attract migrant frugivores. Any plants considered for habitat enhancements should meet the following criteria:

- Plants should be native to the New England area and climate zone.
- Any non-native plants should have a long horticultural history of non-invasiveness.
- Fruit and seed producing plants should set in the fall and winter seasons, to maximize benefits to migrant and wintering species.
- Plants should not be capable of reaching heights that will obstruct the views from the hawkwatch area.

The successful addition of Purple Martin or Tree Swallow boxes is completely dependent on an appropriate level of commitment by volunteers, or in this case, a Site Support Group. Attracting and maintaining a colony Purple Martin should given top priority because of their status as a state-listed species. Instructions on how to properly maintain a colony are found at www.purplemartin.org. Creation of a bluebird trail along one of the parks walking trails is also recommended, assuming there is adequate volunteer commitment.

Any enhancements to the habitat of the park, especially those that will increase wildlife observation opportunities, should be accompanied by increased access to those areas. The creation of observation platforms and trails through the park's natural areas could provide this desired accessibility. Specific recommendations include the re-establishment of the dike trail around the dredging spoils field and also the construction of observation platforms in the same area following any habitat restoration.

Continued Management

In the interest of promoting use of the park by Lepidoptera, a mowing schedule that is more conducive to the life cycle of these popular insects is recommended. Mowing of the lawn should occur in early spring and late autumn, rather than during the summer, thus increasing the habitat available to migrant butterflies, but also preserving any butterflies that may breed in the grasses once they are allowed to grow. If this recommended mowing cycle is not consistent with the current recreational uses of the lawn, then alternatively, select areas (possibly around existing trees and shrubs) should be protected from mowing. Currently, a small area north of the hawkwatch is designated as a "no mow zone" from Labor Day weekend to after the Migration Festival. This area should be expanded to compliment the additional recommended no mow zones around trees and shrubs.

If it is decided that the invasive plants along the disturbed areas of the park are in need of control, the following guidelines should be given consideration:

- Plant removal should not have a detrimental effect on the migrant use of the park.
- The restoration of tidal flow is a passive means of invasive control. This method is a possibility for the control of *Phragmites* in the dredging spoils field.
- The control of Black Locust is not recommended because most methods are ineffective, time consuming, and often encourage the growth of new sprouts (Converse 1984).
- Glyphosate has been proven effective in the control Multiflora Rose, however, any control efforts must be continued over a period of many years, as this invasive is an extremely rapid regenerator (Eckdard 1987).
- Glyphosate has been proven effective in the control of Autumn Olive. The recommended method of application to cut the main stem, apply glyphosate to the stump. Cutting should always be accompanied by the use of an herbicide, as cutting alone will stimulate this invasive to resprout (Sather 1987).

The use of synthetic pesticides and fertilizers should be discouraged out of concern for the health of visitors to the park (Sunding 2000, Cropper 1994), as well as the health and integrity of the surrounding wetlands. Currently, the Department of Environmental Protection is preparing informational materials concerning organic solutions for maintaining recreational lawns. When complete, these materials should be used to guide changes in lawn care at the park, and distributed in the residential areas surrounding the park and Morris Creek. Potential alternatives to synthetic pesticide use can be found at http://www.audubon.org/bird/at_home/IPM_Alternatives.html. The successful application of Audubon at Home's landscaping methods would establish the park as an example for other urban parks and private landowners by demonstrating organic pesticide and fertilizer use that is healthy for both humans and the environment.

The existing trails throughout the fragments of oak-hickory woodlands are not in need of restoration or expansion at this time. It is recommended that the current labyrinth of trails be simplified by allowing overgrowth to select trail segments. The simplification of this trail system would allow for easier maintenance, while simultaneously ensuring that exhausted migrant songbirds are not excessively disturbed during times of heavy use.

Restorations

Marsh Restoration

As previously mentioned, one of the primary goals of this conservation plan is to maximize opportunities for educational recreation at the park. Outdoor, natural living-exhibits have tremendous potential to capture people's interests and provide them with a memorable, educational experience. Restoring the dredging spoils field will create this one of a kind experience at Lighthouse Point.

The potential negative effects of a restoration must be considered before any such efforts are initiated. One common concern is that the area is important for small mammals (as previously mentioned, small mammal trapping is recommended), and is therefore an important area for migrant raptors that rely on these small mammals as prey. Decisions concerning the final state of the restoration should not be made before the following issues are resolved.

- The habitat that is emerging as a result of succession may support avian species of high conservation priority, such as Brown Thrasher and Yellow-breasted Chat.
- The area may support non-avian species of high conservation priority (for example, dragonflies are found in their greatest concentrations in the fill area, and Eastern Box Turtles may nest in or around the fill area).
- The layer of traprock under the dredging spoils could potentially create complications for certain restoration schemes.
- There has been considerable subsidence in most areas of the dredging spoils field.
- Most restoration schemes will necessitate the removal of dredging spoils, which would have to be properly and economically relocated.
- Certain restoration schemes could meet resistance by adjacent landowners, especially schemes that will promote insect breeding.

Three restoration schemes that were developed following intensive research at the site are available in a report prepared by William Root and Catherine Garnett entitled *Lighthouse Point Park Salt Marsh Restoration Project*. This report, completed in 1995, outlines the abiotic and biotic resources present in the immediate area and offers three possible plans to restore the historic salt marsh condition.

Other alternatives may be more economical. For example, due to the considerable subsidence of the marsh peat, restoration of tidal flow would likely result in the natural reversion of the area to open water, mudflats, and low marsh, creating ideal shorebird habitat. This alternative is less costly, and less time intensive, than depositing sediment to restore the historical elevation of the peat layer and subsequently devising re-vegetation schemes. This alternative also has the benefit of extending the birding season at the park substantially to include the shorebird migration. Another restoration possibility is the creation of a meadow of native wildflowers and food plants, which has the benefit of not necessitating the removal of the dredging spoils. Finally, not attempting any restoration, but instead allowing the area to revert to early successional coastal scrub would be an economical solution but would, however, require seasonal management. Action should be taken before the area is allowed to revert to forest, as any of the alternatives mentioned above would result in habitat that is more valuable (both in terms of educational value, and importance to species of high conservation priority) than five acres of coastal forest.

The immediate recommendation at this time is to determine the importance of the area to small mammals, in order to develop the baseline knowledge necessary to assess the value of the area as a stopover feeding area for raptors. The re-establishment of the Dike Trail will allow for the raptor use of this area to be safely monitored. When restoration action is deemed appropriate, a qualified individual or team of individuals should be recruited to research potential restoration schemes. The natural resource inventory in the *Lighthouse Point Park Salt Marsh Restoration Project* is adequate. Accordingly, further research should use and build upon the knowledge provided by this report, focusing on restoration solutions rather than duplicating its results.

Facilities Restoration

The funding opportunities mentioned above should be explored in order to support a comprehensive architectural/structural study of the lighthouse. The knowledge gained from this study will resolve the appropriate actions for ensuring the long-term preservation of this surviving piece of New Haven history. A restoration of the keeper's house to a museum or visitors center, with exhibits focused on the natural and human history of Long Island Sound, New Haven, and Lighthouse Point is highly recommended.

Improvements to the East Shore Ranger Station are also recommended because the ranger station will potentially serve as an informational center for Lighthouse Point, the IBA program, and other New Haven parks/IBAs. Specific improvements should include, but are not limited to, new doors and a covered foyer (for weather protection and fuel conservation), a solar heating auxiliary system, re-pointing of bricks on the inside walls, and additions/expansions to accommodate additional educational programming. Brochures containing maps and information regarding recreational activities should be

developed to complement the brochure available from the carousel function coordinator, as well as the upcoming avian species list. A book for birders and butterfly watchers to record and share sightings at the park is also highly recommended. These brochures and the sightings book should be collectively made available outside of the ranger station. The possibility of including a kiosk as part of an expansion of the ranger station should be explored.

Land Acquisition

The majority of actions outlined in this conservation plan were developed and recommended specifically for the 84 acres of City-owned land within the park boundaries. A specific plan of action for Morris Creek and its surrounding saltmarsh is not within the scope of this plan, however, land acquisition in these areas should still be considered a powerful and relevant conservation tool. Land acquisition and conservation easement in the areas immediately surrounding the park will ensure the continued availability of saltmarsh habitat for migratory and wintering species, and will also aid in the preservation of land connectivity and corridors of open space.

As previously mentioned, the key player in land acquisition activities in the Morris Creek area is the New Haven Land Trust. This organization should be regarded as an informational source as well as a potential partner in future acquisition activities. Contact information for the land trust can be found in Table 1. The prioritization of acquisition activities is complicated by inconsistencies and the incomplete nature of the publicly available landowner information for the City of New Haven and the Town of East Haven. A list of known landowners for adjacent parcels, as well as parcels in the surrounding Morris Creek saltmarsh (categorized by street), is available in Appendix I. The parcels for which the information is available have been further categorized as developed or undeveloped, as well as spatially represented on a stakeholder map. This appendix should serve as a preliminary guide to land acquisition opportunities in the area until the missing pieces of information are made available. Land acquisition in the remaining natural areas of eastern New Haven should be an area of further research.

Education and Outreach

Many of the activities mentioned above (if implemented) will be important contributions to the educational value of the park. For example, passerine and raptor banding can be a captivating and educational experience for visitors, especially those who would not normally be exposed to wild birds. Accordingly, every effort should be made to ensure that these activities are accessible when appropriate. As mentioned above, a Monarch tagging program could provide visitors of all ages with unforgettable hands-on experience. The Migration Festival should continue, and every effort should be made to expand the festival every year (attracting a greater diversity of visitors) by introducing new activities.

BioBlitz

Lighthouse Point is the ideal location to host a future BioBlitz. The purpose of a BioBlitz, a program of the Center for Conservation and Biodiversity and Connecticut State Museum of Natural History, is to bring scientists (from the University of Connecticut)

and citizens together with the single goal of identifying as many species as possible, at a selected urban park, in a 24-hour biological survey. Besides the benefit of uncovering information regarding the species composition of Connecticut's urban parks, BioBlitzes promote interest and excitement, in children and adults alike, about science and the biodiversity of their local parks. It is recommended that the City of New Haven Department of Parks, Recreation, and Trees, or a Site Support Group advocate Lighthouse Point as a future selection, as a new park is visited every year. Information on how to organize an independent BioBlitz can be found at <http://web.uconn.edu/mnh/bioblitz/BioBlitzLinks.html>.

Feral Cats

As discussed earlier, feral cats are a potential threat to migrating songbirds using the park as stopover. The American Bird Conservancy has addressed the threats posed by outdoor cats by creating the *Cats Indoors!* campaign. *Cats Indoors!* is an educational campaign that offers and promotes informational material about the benefits, to both the cats and wild birds, of keeping cats indoors. More detailed information regarding this campaign can be found at <http://www.abcbirds.org/cats>. A complete offering of informational material can be found at <http://www.abcbirds.org/cats/downloads.htm>. Included in this list are brochures, fact sheets, teacher's aids, and an article outlining the appropriate steps to bring an outdoor cat indoors. The Humane Society of the United States (HSUS) has also launched a campaign stressing the dangers and health risks of letting pet cats roam outdoors. An article released by the HSUS concerning cat safety and the benefit of keeping cats indoors is available at www.hsus.org/pets/pet_care/cat_care. These materials should be used, and educational activities organized, if it is determined that cats are posing a significant threat to the songbirds at Lighthouse Point. Stakeholders should ensure that no sanctioned feral cat colonies are allowed in the area.

Signage

Currently, educational signage at the park is limited. It is recommended that educational signs be installed wherever appropriate, and that these signs be UV-protected and durable (signs at East Rock Park serve as a positive example), as Lighthouse Point is a heavily used urban park. Some suggested locations that would benefit the most from the addition of signs are the hawkwatch area, the butterfly gardens, areas of sandy beach, the lighthouse, the west shore, Morris Creek, and anywhere restoration is taking place, or has been completed.

- Signs for the hawkwatch could explain the significance of the park during the fall season, and the importance of the information gained by counting (and potentially banding) raptors. Additional signs could display hawk silhouettes to help novice birders, or non-birders, identify some of the species passing overhead and keep a running total of the raptors sighted in the current season.
- Signs located at the butterfly gardens could explain the methods and benefits of Monarch tagging.

- Signs near sandy beaches and intertidal zones could contain information describing the ecology and history of Long Island Sound and New Haven Harbor and could include illustrations or pictures of common invertebrate or fish species.
- Signs in the general area of the lighthouse could summarize the history of New Haven Light and Five Mile Point Light. The long and fascinating history of the park also deserves some form of public display.
- Signs placed along the west shore, preferably near any exposed bedrock that offers unobstructed views of New Haven Harbor, could provide information about the unique geologic and glacial history of the park, the harbor, and Long Island Sound.
- Signs for an accessible section of Morris Creek could offer a simplified description of salt marsh ecology and brief life histories of some of the common species.
- Some form of educational signage should accompany any enhancements to the habitat of the park. For example, the addition of Purple Martin, Eastern Bluebird, or Tree Swallow houses should be followed by the addition of visual descriptions and brief natural history summaries for each species. If marsh restorations are initiated, temporary signs describing the relevant management activities and natural processes at work during the intermediate phases of the restoration (most likely a period several years) will help maintain the educational value of the area until the final restoration is complete.

Establishing Connectivity

Nearly a quarter of Connecticut's recognized IBAs are located in the New Haven area. Of these, Lighthouse Point is one of the most accessible, and certainly one of the most popular. It is recommended that some level of connectivity among these IBAs be established and that Lighthouse Point be treated as the nucleus of this New Haven IBA network. The East Shore Ranger Station is an ideal location for an informational center, offering information about the IBA program and other nearby IBAs and potential IBAs such as Sandy Point, East Rock Park, Quinnipiac River Tidal Marsh, West Rock State Park, New Haven Harbor, and Sleeping Giant State Park. Physical connections should be established by taking advantage of any natural land corridors that are currently protected by the various watershed coalitions in the area, or utilizing completed greenways for non-motorized travel between IBAs. If the proposed greenways discussed above are completed, Lighthouse Point, East Shore Park, the Quinnipiac River Tidal Marsh, Long Wharf Park, New Haven Harbor, and Sandy Point will be linked along what will surely be an immensely popular multi-use trail. This route will essentially function as a New Haven IBA tour, as the trail will connect and increase access to three IBAs (Lighthouse Point, Sandy Point, and the Quinnipiac River Tidal Marsh) and one potential IBA (New Haven Harbor). The Shoreline Greenway Trail will also connect all of the sites mentioned above to Hammonasset State Park, an immensely popular and globally important IBA. These greenways should be supported and promoted when appropriate. Specifically, a Site Support Group could provide support for these greenways by fundraising, route-identification and development, or leading bird walks along the east shore. Site Support Group involvement is necessary to ensure that proposed greenways do not pose threats to the natural resources of any of the New Haven area's IBAs. Volunteer

interest forms, with a complete list of support activities, is available at <http://shorelinegreenwaytrail.org/helping/9/getting-involved>.

EVALUATION/MEASURES OF SUCCESS

The immediate measure of success is the universal satisfaction with and acceptance of this conservation plan by the City of New Haven, Audubon Connecticut, New Haven Bird Club, Connecticut Butterfly Association and all other interested stakeholders. Long-term success will be determined by the continued acceptance and eventual implementation, of the plan. The ultimate measure of success will be an increase in the number of migrants documented per season, increased visitation to the park's special events, as well as increased visitation throughout the year. Accurate determination of ultimate success is dependent on the implementation of an organized monitoring scheme, which consequently should be given immediate priority.

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Figure 1. The Last Green Valley. Source: The Green Valley Institute,
<http://thelastgreenvalley.org/gvi/>



Figure 2. Park features map I.

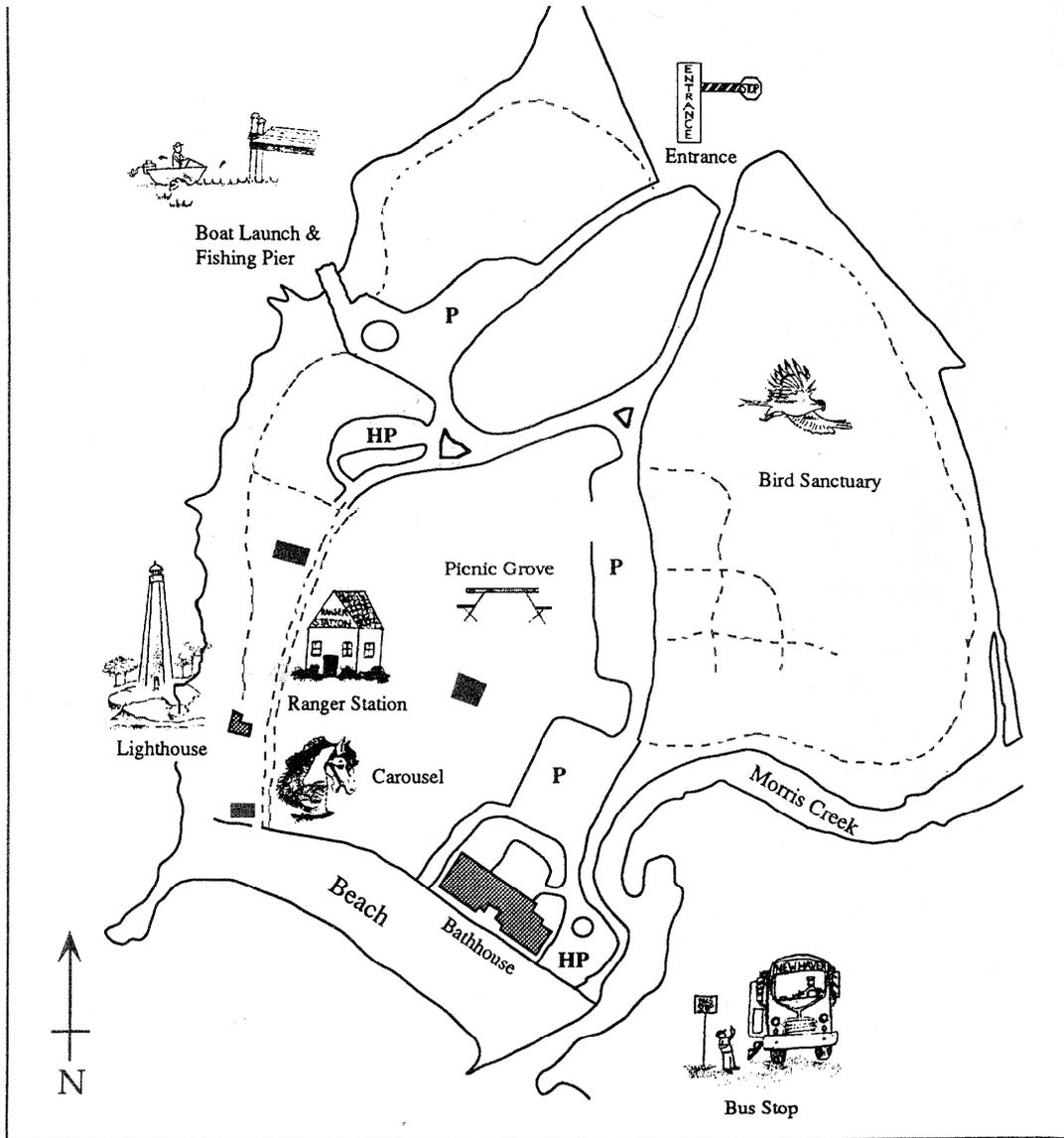


Figure 3. Park features map II, from New Haven Park's: a guide to the City's Parks. Source: Citizens Park Council of Greater New Haven.

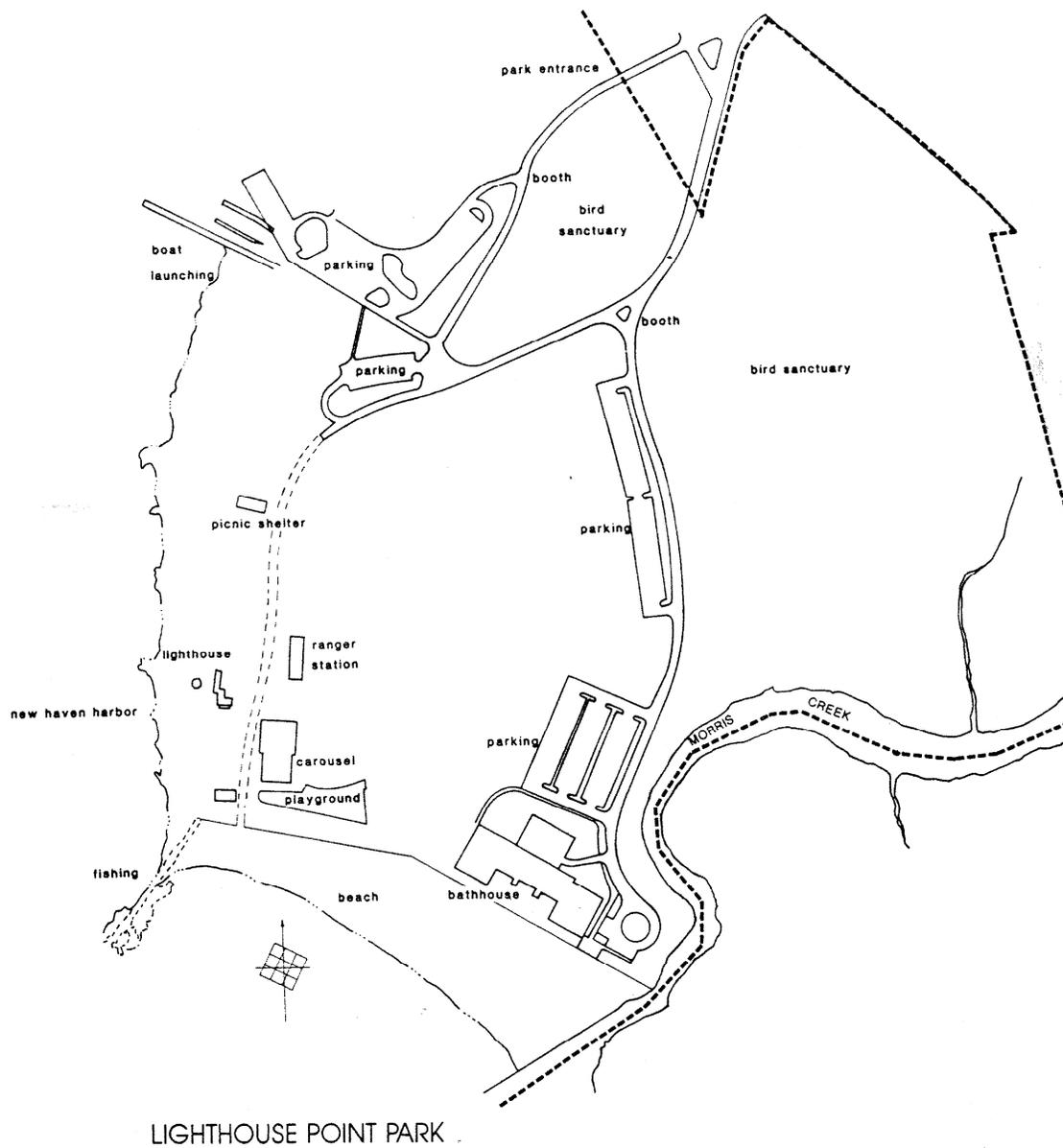


Figure 4. Surface Water Quality, Source: Connecticut Department of Environmental Protection.

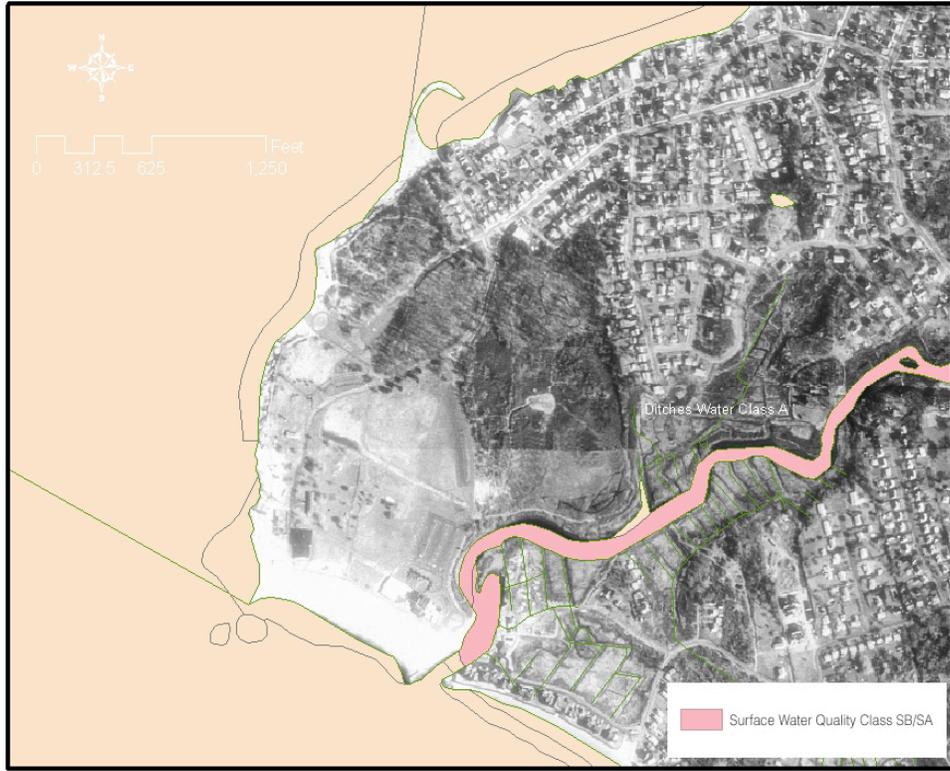


Figure 5. Ground Water Quality, Source: Connecticut Department of Environmental Protection.



Figure 6. FEMA Floodzones, Source: Connecticut Department of Environmental Protection.

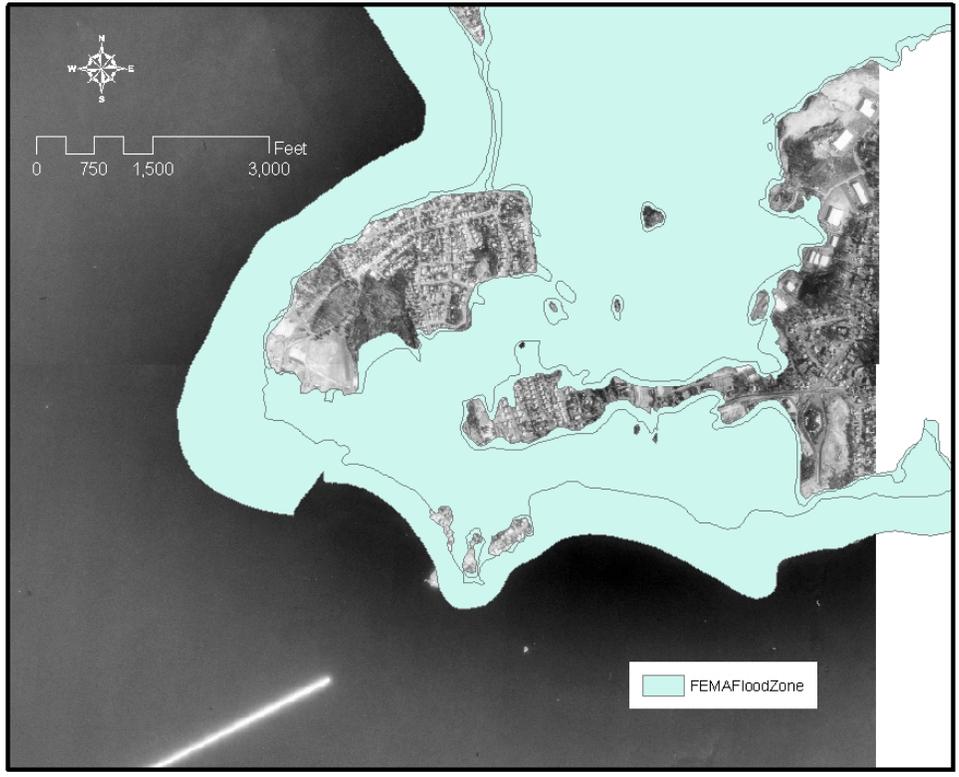


Figure 7. Natural Diversity Database areas, Source: Connecticut Department of Environmental Protection.

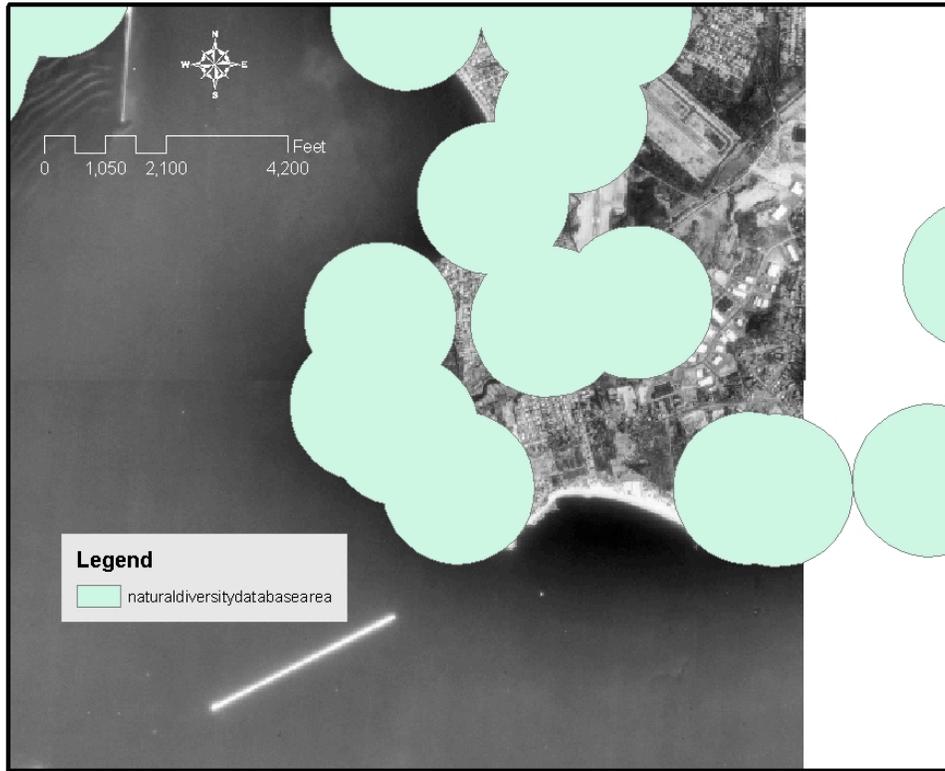


Figure 8. Locations of wastewater discharge in New Haven Harbor, Source: Connecticut Department of Environmental Protection.



Appendix I. Landowner information for Lighthouse Point and surrounding area and stakeholder map (Map No. corresponds to stakeholder map).

- | | | | |
|--------------------------------------|----------------------------------|--------------------------------------|--------------------------------|
| ■ | Land is known to be developed. | ■ | Current state of land unknown. |
| ■ | Land is known to be undeveloped. | | |

Cora Street, New Haven

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
	1	Private Owner	06512	035 0846 00100
1	7	Private Owner	06512	035 0846 00200
2	11	Private Owner	06512	035 0846 00300
3	19	Private Owner	06512	035 0846 00400
4	21	Private Owner	06512	035 0846 00500
5	27	Private Owner	06512	035 0846 00600

Doty Place, New Haven

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
		City of New Haven Department of Parks, Recreation, and Trees	06512	036 0847 00100
	1	Private Owner	06512	036 0847 00500
	5	Private Owner	06512	036 0847 00400
	6	Private Owner	06512	036 0847 01400
	7	Private Owner	06512	036 0847 00300
	9	Private Owner	06512	036 0847 00200
	10	Private Owner	06512	036 0847 01600
	16	Private Owner	06512	036 0847 01700
	24	Private Owner	06512	036 0847 01800
	32	Private Owner	06512	036 0847 01900

Cart Road, New Haven

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
6		New Haven Land Trust	06512	034 0850 00100
7		New Haven Land Trust	06512	034 0850 00600
8	52	Private Owner	06512	034 0850 00300
9	62	Private Owner	06512	034 0850 00400
10	68	City of New Haven	06512	034 0850 00500
11	190	Private Owner	06512	034 0850 00200

Lighthouse Road, New Haven

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
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	21	City of New Haven Department of Parks, Recreation, and Trees	06512	040 0845 00100
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Morris Avenue, New Haven

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
		Private Owner	06512	036 0847 00600
		Private Owner	06512	036 0855 00100
	10	Private Owner	06512	037 0848 00900
	16	Private Owner	06512	037 0847 02900
	24	Private Owner	06512	037 0847 02800
	28	Private Owner	06512	037 0847 00200
	32	Private Owner	06512	037 0847 02600
	33	Private Owner	06512	037 0847 00700
	36	Private Owner	06512	037 0847 02500
	38	Private Owner	06512	037 0847 00300
	39	Private Owner	06512	037 0847 00800
	40	Private Owner	06512	037 0847 02400
	44	Private Owner	06512	037 0847 02300
	45	Private Owner	06512	036 0855 00200
	46	Private Owner	06512	036 0847 02200
	48	Private Owner	06512	036 0847 02100
	54	Private Owner	06512	036 0847 02000
	58	Private Owner	06512	036 0847 01900
	59	Private Owner	06512	036 0856 00900
	66	Private Owner	06512	036 0847 00900
	69	Private Owner	06512	036 0856 01000
	70	Private Owner	06512	036 0847 01700
	71	Private Owner	06512	036 0856 00100
	76	Private Owner	06512	036 0847 01600
	80	Private Owner	06512	036 0847 00800
	88	Private Owner	06512	036 0847 00900
	92	Private Owner	06512	036 0847 00800
	100	Private Owner	06512	036 0847 00700
	105	Private Owner	06512	035 0857 00100
	106	City of New Haven	06512	036 0847 00201
	115	Private Owner	06512	035 0858 01500
	117	Private Owner	06512	035 0858 01400
	121	Private Owner	06512	035 0858 01500
	123	Private Owner	06512	035 0858 01600
	124	Private Owner	06512	035 0854 01300
	128	Private Owner	06512	035 0854 01200
	176	Private Owner	06512	035 0865 01200

Marin Road, New Haven

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
		City of New Haven Department of Parks, Recreation, and Trees	06512	036 0847 01000
		Private Owner	06512	036 0847 01100
		Private Owner	06512	036 0847 01200
		Private Owner	06512	036 0847 01300
		Private Owner	06512	036 0847 01400
	18	Private Owner	06512	036 0847 02000

Marion Street, New Haven

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
13		New Haven Land Trust	06512	034 0848 00200
14		City of New Haven	06512	034 0848 00700
15		New Haven Land Trust	06512	034 0848 00800
16		New Haven Land Trust	06512	034 0848 00900
13		City of New Haven	06512	034 0848 00200
17		Private Owner	06512	034 0849 00700
18		New Haven Land Trust	06512	037 0848 00100
27		New Haven Land Trust	06512	037 0848 00200
19		New Haven Land Trust	06512	037 0849 00200
20	5	City of New Haven	06512	034 0848 00600
21	40	New Haven Land Trust	06512	034 0849 00400
22	149	City of New Haven	06512	037 0849 01001
23	152	New Haven Land Trust	06512	037 0848 00500
24	155	City of New Haven	06512	037 0849 01000
25	156	City of New Haven	06512	037 0848 00400
26	159	Private Owner	06512	037 0849 00400
28	160	Private Owner	06512	037 0848 00300
29	165	Private Owner	06512	037 0849 00300
30	175	Private Owner	06512	037 0849 00100
31	179	City of New Haven	06512	034 0849 00100
32	180	City of New Haven	06512	034 0848 00100
33	187	City of New Haven	06512	034 0849 00300
34	196	City of New Haven	06512	034 0848 00300
35	202	City of New Haven	06512	034 0848 00400
36	203	City of New Haven	06512	034 0849 00600
37	206	City of New Haven	06512	034 0848 00500

38	215	City of New Haven	06512	034 0849 00800
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Meadow View Street

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
	3	Private Owner	06512	036 0848 00100
	9	Private Owner	06512	036 0848 00200
	10	Private Owner	06512	036 0855 00600
	15	Private Owner	06512	036 0848 00300
39	23	Private Owner	06512	037 0848 00901
40	105	Private Owner	06512	034 0848 00701
	143	Private Owner	06512	034 0848 01000

Lighthouse Point Terrace

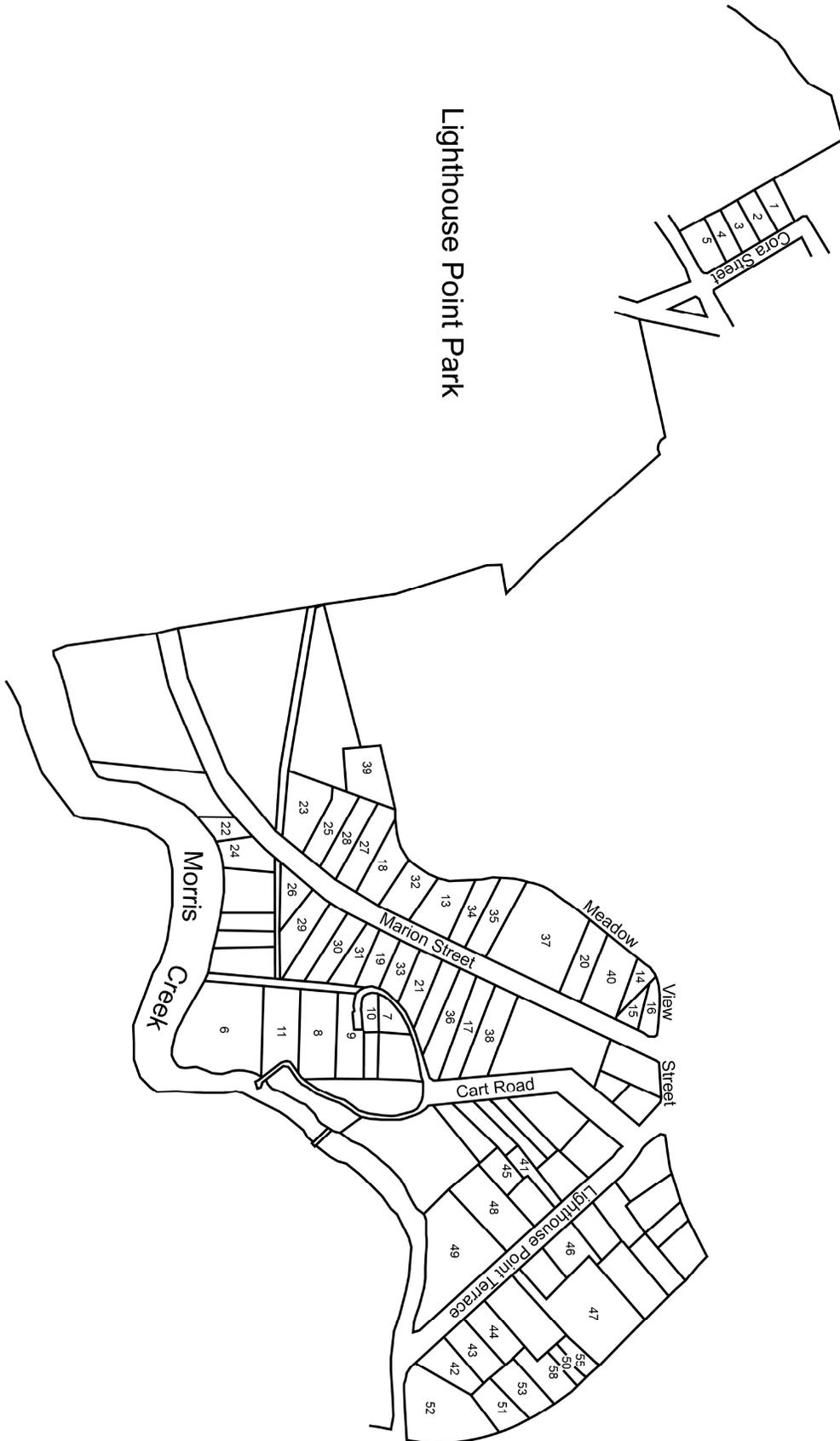
<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
41		Private Owner	06512	034 0851 00301
42		New Haven Land Trust	06512	034 0852 01400
43		Private Owner	06512	034 0852 01500
44		Private Owner	06512	034 0852 01600
45	14	Private Owner	06512	034 0851 00302
46	19	Private Owner	06512	034 0852 01800
47	21	Private Owner	06512	034 0852 00701
48	30	Private Owner	06512	034 0851 00400
49	40	City of New Haven	06512	034 0851 00500

South End Road

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
50		Private Owner	06512	034 0852 01000
51		Private Owner	06512	034 0852 01202
52		New Haven Land Trust	06512	034 0852 01300
53	44	Private Owner	06512	034 0852 01201
54	58	Private Owner	06512	034 0852 01100
55	66	Private Owner	06512	034 0852 00900

Uriah Street

<u>Map No.</u>	<u>Street Number</u>	<u>Owner</u>	<u>Postal Zip Code</u>	<u>City of New Haven Assessor's Parcel No.</u>
		City of New Haven (airport)	06512	014 0853 02700
		City of New Haven (airport)	06512	015 0875 00200
	11	Private Owner	06512	014 0853 00101
	20	Private Owner	06512	014 0863 03100
	24	Private Owner	06512	014 0863 03000
	32	City of New Haven	06512	014 0863 02800



Appendix II. Stakeholder Survey.

Dear Lighthouse Point Park Stakeholder,

In November of 2001, the City of New Haven's Lighthouse Point Park was recognized by Audubon Connecticut as one of Connecticut's 26 Important Bird Areas (IBA). Connecticut's IBA program is part of a global effort to identify the sites that are most important to birds and to work with landowners and other partners to conserve them, focusing on the factors that make each one important to birds. This City Park has been recognized as an IBA for its exceptional concentrations of migrating raptors and landbirds.

Audubon Connecticut has recently received funding to develop conservation strategies for Lighthouse Point Park from the National Fish and Wildlife Foundation's Long Island Sound Futures Fund. These strategies will be summarized in an IBA conservation plan that is currently being developed for the park. An important part of the conservation planning process is to engage stakeholders in the development of the plan.

We have attached a survey and information regarding an upcoming meeting to discuss the conservation plan and to address any questions, concerns, or suggestions you may have. We hope you will be able to join us.

Thank you very much for your participation in this exciting project and we look forward to working with you on the development and implementation of this plan.

Sincerely,

Patrick Comins, Director of Bird Conservation

Information Survey for the Lighthouse Point Park Conservation Plan

Lighthouse Point Park is an 84-acre recreational park owned and operated by the City of New Haven and located on the east shore of New Haven Harbor. Lighthouse Point was recognized as an Important Bird Area (IBA) by Audubon Connecticut in 2001 for its exceptional concentrations of migrating raptors and landbirds. Recognition of the park as an IBA makes it part of a global network of sites that have been recognized for their importance to birds.

A Conservation Plan is currently being developed for Lighthouse Point as part of the IBA program. The Conservation Plan will document the park's natural and recreational resources, identify threats to these resources, and identify opportunities for management, research, and education to conserve and enhance the park as an important area for birds, as well as a enjoyable place for people for years to come.

We would greatly appreciate input from anyone who has an interest in, or knowledge of, the park. Please respond only to the questions you feel comfortable answering by e-mail to Christopher.Field@huskymail.uconn.edu, fax (203)264-6332, or regular mail:

Christopher Field
Audubon Connecticut
185 East Flat Hill Road
Southbury, CT 06488

Please include your name and contact information, and the name of any organization(s) you represent.

We also invite you to a meeting to learn more about Lighthouse Point Park, the IBA Program and how you can become involved in the conservation planning process.

Lighthouse Point Park Conservation Plan Meeting
When: X
Where: X

What is your or your organization's interest in Lighthouse Point Park?

In your view, what recreational or educational resources of importance exist at the park?

Which of these resources are most important to bird conservation, general conservation, or nature-related educational or recreational opportunities at the park?

Do you know of any current or potential threats to these resources?

What key issues, improvements, or management strategies would you like to see included/addressed in the plan?

What additional educational and/or research activities would you like to see take place at the park?

Would you or your organization be interested in assisting with some aspect of the conservation planning process?

Would you or your organization be interested in participating in either current or future monitoring efforts at the park?

Is there any other role that you or your organization would like to play in implementing conservation or education projects at the park?

Aside from the groups listed in the attached distribution list, do you know of other local groups (Birding, Butterfly, Land Trust, etc.) that would be interested in the conservation activities at the park? Are there any other stakeholders that we should contact?

Do you have any other comments/questions regarding the plan or planning process?

You may attach additional sheets as necessary.

Attachment 1: IBA Information Sheet for Lighthouse Point Park

Lighthouse Point Park Haven, New Haven County **84 Acres** **72° 53' W**
41° 15' N

Status: Recognized IBA.

Ownership: City of New Haven

Habitats: Primary – Lawn. **Secondary** – Deciduous forest, marine, coastal dredging spoils field.

Land Use: Primary – Other recreation and tourism. **Secondary** – research.

Threats: Serious - Feral cats threat to migrating songbirds. **Potential** - Development of surrounding landscape could affect flyways

Site Description: The park features a swimming beach and bath house, a boat launch ramp, a large lawn (200 Yd X 200 Yd) and shady picnic groves, all on about half of the total park area. The other half is equally divided between oak woods and a dredging spoils field that is part *Phragmites* and part a rich tangle of berry bearing bushes and vines. The woods and spoils area are designated as bird sanctuaries on some park maps, but it is believed that this is an unofficial designation.

IBA Criteria: 5000+ raptors, Exceptional concentrations of migratory landbirds.

Birds: Counts of fall migrating raptors are, on average, higher than at any reporting site northeast of Cape May. Merlin counts are exceeded only by Fire Island. The count has been continuous since 1974. Thousands of Bobolinks, Cedar Waxwings, Blue Jays, American Robins, Tree Swallows, and icterids, and large numbers of many other species pass Lighthouse Point each fall. Great numbers stop for rest, protection and foraging.

Existing Conservation Measures: Managers balance use of the park to accommodate as many as possible activities without compromising safety or their governing plan. An annual hawk festival is held each year to raise awareness of this resource in the local community.

Nominator: Ron Bell

State-listed Species:

Species	Breeding	Winter	Migration	Dates
Northern Harrier, E			X	
Sharp-shinned Hawk, E			X	
Bald Eagle, E			X	
Peregrine Falcon, E			X	
American Kestrel, T			X	
Red-headed Woodpecker, E			X	

Attachment 2: Organizational Distribution List

1. Albertus Magnus College,
2. The City of New Haven,
3. The City of East Haven,
4. Connecticut Audubon Society,
5. Connecticut Butterfly Association,
6. Connecticut DEP,
7. Connecticut Ornithological Association,
8. Goodwill Industries/Festival of Lights,
9. Hartford Audubon Society,
10. New Haven Bird Club,
11. New Haven Land Trust,
12. Menunkatuck Audubon Society,
13. Northeast Hawkwatch, Peabody Museum,
14. The Sound School,
15. Southern CT State University,
16. The University of New Haven,
17. Yale University,
18. Yale School of Forestry.

Appendix III. Summary life history information for birds listed in Table 8.

All information was compiled using The Birds of North America Online. Cornell Laboratory of Ornithology and American Ornithologists Union.

<http://bna.birds.cornell.edu/BNA>

Common Loon (Account 313)

This well-known and adored loon species breeds on the forested lakes of the boreal region. This species feeds primarily on fish and aquatic invertebrates, captured and ingested while swimming underwater. The timing of spring migration varies from March through June, however, is greatly synchronized throughout the population. Fall migration usually takes place from September through December, although unsuccessful breeders may leave for their wintering grounds as early as July or August. Winters and migrates on coastal marine inlets and bays, but also stages on rivers and large lakes if open water is available.

Blue-winged Teal (Account 625)

This small dabbling duck breeds on shallow ponds with an abundance of invertebrates, which comprise the majority of its diet. This long-distance migrant leaves its South American wintering grounds in January or February, typically arriving on breeding grounds in mid-May. Fall departure from breeding grounds is varied, but typically early in the season; many individuals will arrive on wintering grounds by August. There is little information available on the migratory and wintering habitat requirements of birds from Northeastern populations.

Sharp-shinned Hawk (Account 482)

This specialized, bird-eating hawk of the genus *Accipiter* is one of the most familiar raptors at coastal hawkwatch sites. This species breeds in a variety of forest types, especially those containing conifers, and is also closely tied to forests (a preferred habitat for hunting) during the migratory and winter seasons. The exact timing of spring and fall migration is not known, however, fall migrants can appear at hawkwatch sites as early as August. Sharp-shinned hawks are usually solitary migrants, but can also be found in small, often interspecific groups, commonly with Red-tailed Hawks (*Buteo jamaicensis*), Broad-winged Hawks (*Buteo platypterus*), and American Kestrels (*Falco sparverius*).

Northern Goshawk (Account 298)

The largest of the North American accipiters, this powerful hunter is capable of taking a wide diversity of prey, including mammals (as large as hares), large passerines, game birds, woodpecker, corvids, and sometimes reptiles and insects. Although this species is known to inhabit a variety of forest types across North America in the breeding season, little or no information is available on habitat requirements in the migratory and winter seasons. North American populations are thought to be early spring migrants, however, the specific timing of the spring migration is poorly understood. Fall migration begins in August or September, with a peak in late September to mid-November, and usually ends by December.

Northern Harrier (Account 210)

The only North American representative of the worldwide genus *Circus*, this hawk's distinctive appearance and behavior makes it an unmistakable component of grassland and marsh ecosystems in the breeding season. Harriers locate and procure prey, mainly birds and small mammals, using low-coursing flight coupled with sound detection (facilitated by an owl-like facial disk). Little information is available on habitat requirements during the fall and spring migratory seasons; however, harriers are known to winter in areas containing habitat similar to breeding habitat. Hawkwatch data suggests protracted spring and fall migration periods, extending through the duration of both hawkwatch seasons.

Red-shouldered Hawk (Account 107)

The habitat generalist Red-shouldered Hawk can be found in a variety of forested habitats across North America during the breeding season. Also a generalist in diet, this species is known to consume birds, small mammals, reptiles, frogs, crayfish, and insects. Red-shouldered Hawks remain dependent on forested habitats during migration and winter, often favoring an open mix of woodlands during these seasons. Generally, only the northern half of the hawk's range is migratory, however, migratory behavior also seems to be related to prey availability. Immature birds commence fall migration in September, adults in October, with both groups continuing their passage throughout December. The peak of the spring migration is late February to early April.

Peregrine Falcon (Account 660)

Capable of some of the most impressive aerial maneuvers of any bird, the Peregrine Falcon has long impressed humans fortunate enough to witness these skilled acrobats in pursuit of prey. The diet of a specific population of peregrines is largely dependent on location, as this species has a worldwide distribution, however, commonly includes birds, bats, and rodents. This species can be found in any and all habitats throughout the year, from desert to forest to tundra. In eastern North America, peregrines usually concentrate at coastal hawkwatch sites during fall migration, juveniles often appearing before adults in the months of September and October. The timing of spring migration is variable depending on location, but usually concentrated in the months of April and May.

Bald Eagle (Account 506)

The intensively studied Bald Eagle, the national emblem of the United States, is a large scavenging, and often pirating, raptor that catches its own prey only as a last resort. This species preferred prey type is fish, but will commonly feed on the carrion of mammals and birds. The Bald Eagle breeds and winters on open bodies of water near forests. Habitat requirements during migration are poorly known, however, this species is known to traverse large areas of unsuitable habitat if necessary. The timing of fall migration is poorly understood. The timing of spring migration is based on food availability; eagles will return to their breeding grounds as soon as prey is available, usually from January to March.

American Kestrel (Account 602)

The smallest of the North American falcons, the colorful American Kestrel is an inhabitant of human-altered open spaces, such as farmlands, airports, and pastures during the breeding season. The kestrel's diet consists of insects and small birds, which are usually captured from the ground, but are occasionally taken on the wing. Wintering habitat is similar to breeding habitat. Kestrels, especially northern populations (which favor a more direct route), are often found in unsuitable patches of habitat during migration. Although, individuals exhibit much individual variation in migratory behavior, northern populations and juveniles are more likely to migrate than southern populations and adults. Flight lines of kestrels usually appear at hawkwatch sites during September and October. The timing of spring migration is poorly understood.

Common Nighthawk (Account 213)

The crepuscular Common Nighthawk is a resident of urban and rural areas where gravel rooftops, preferred nesting sites, are available. Distinguished from other nighthawks by its conspicuous courtship dives, this unusual bird is closely associated with human habitation, often hawking insects around artificial lights. Although little is known about nighthawk migration and winter habitat requirements, this species is thought to follow large bodies of water in passage to wintering and breeding grounds. The exact timing of migration is poorly understood. In the spring, nighthawks are one of the last migrants to arrive at their breeding grounds. In the fall, large groups of migrant nighthawks can be seen by July.

Chimney Swift (Account 646)

The Chimney Swift is a common resident of urban areas where suitable nesting sites, chimneys and abandoned buildings, are available. Swifts are most often seen capturing insects on the wing in quick flights, high above the ground. This species forms large flocks in the migratory season; foraging over forests, open terrain, as well as urban areas (where roosting chimneys can be found). This long-distance migrant can arrive on breeding grounds as late as mid-June. Departure for South American wintering grounds can be as early as July, the peak movement occurring in August and September.

Red-headed Woodpecker (Account 518)

The Red-headed Woodpecker is a conspicuous and pugnacious resident of open woodlands, urban parks, and pastures with scattered trees; however, the abundance of this species is highly erratic, varying greatly from year to year. The erratic nature of the Red-headed Woodpecker is most likely due to the availability of mast, the bulk of this species diet. During the migration and winter seasons, the occurrence of this species may be completely driven by the availability of mast. Spring migrants do not appear in New England, however, rare occurrences are possible between the months of April and June. Fall migrants depart breeding grounds in late August; migration peaks during September and ends by early November.

Horned Lark (Account 195)

The only North American representative of the family Alaudidae, the Horned Lark is a common and widespread resident of open country. In New England, this species is most

commonly seen foraging for seeds in open fields, lawns, airfields, beaches, and parking lots, in both migration and in winter. Spring migrants arrive on breeding grounds anytime between February and May, depending on location; only northern populations migrate. Fall migrants depart breeding grounds by September or October, arriving at wintering grounds from late October to early December

Purple Martin (Account 287)

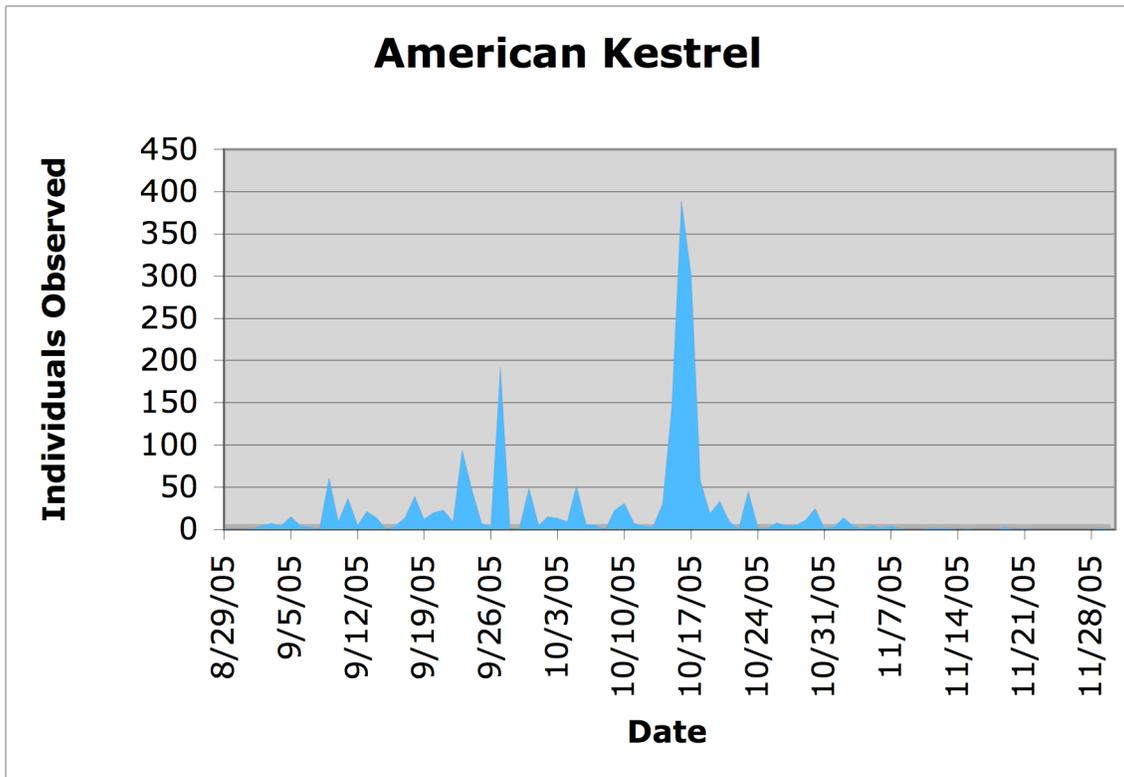
Purple Martins are more closely associated with humans than any other North American bird. Martins have relied almost exclusively on man-made houses for nesting since the start of the twentieth century. This species is thought to migrate over a variety of habitats, perhaps favoring coastal sites. In winter, this species feeds on the aerial insects of South American agricultural land and savanna. One of the earliest migrants in both spring and fall, the martin will depart from wintering grounds as early as December, returning as early as July (as early as mid-May in some locales).

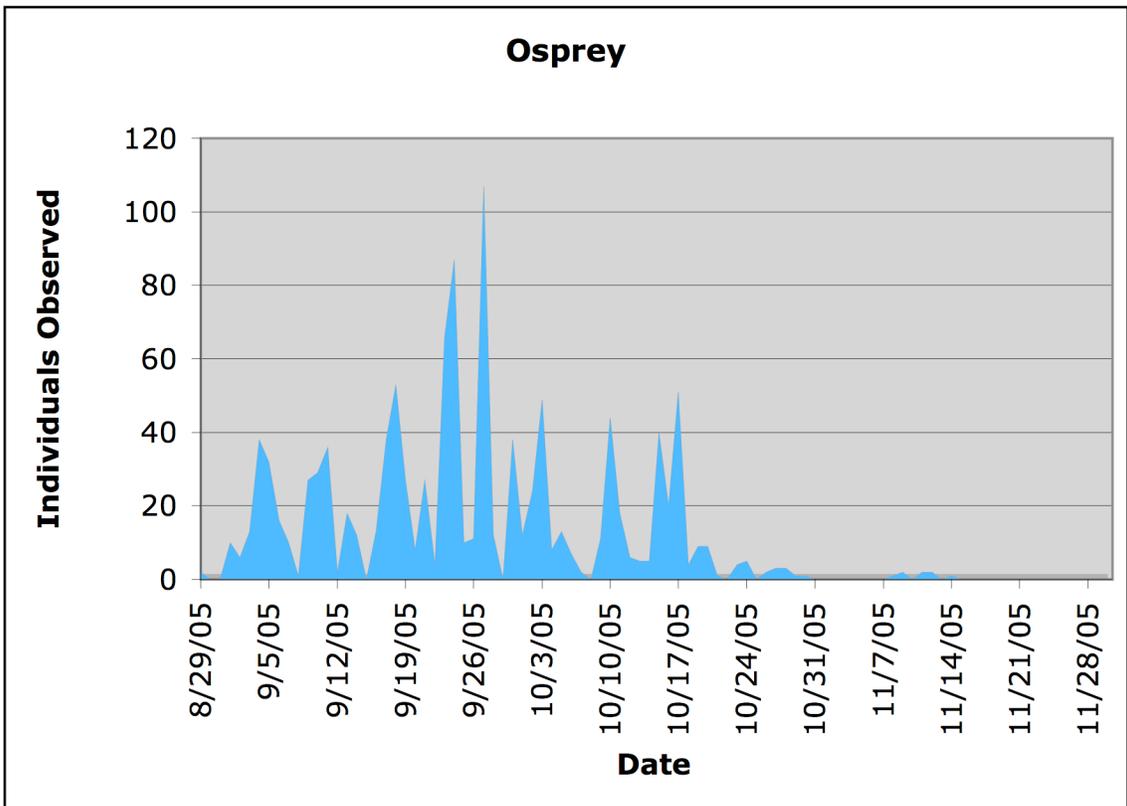
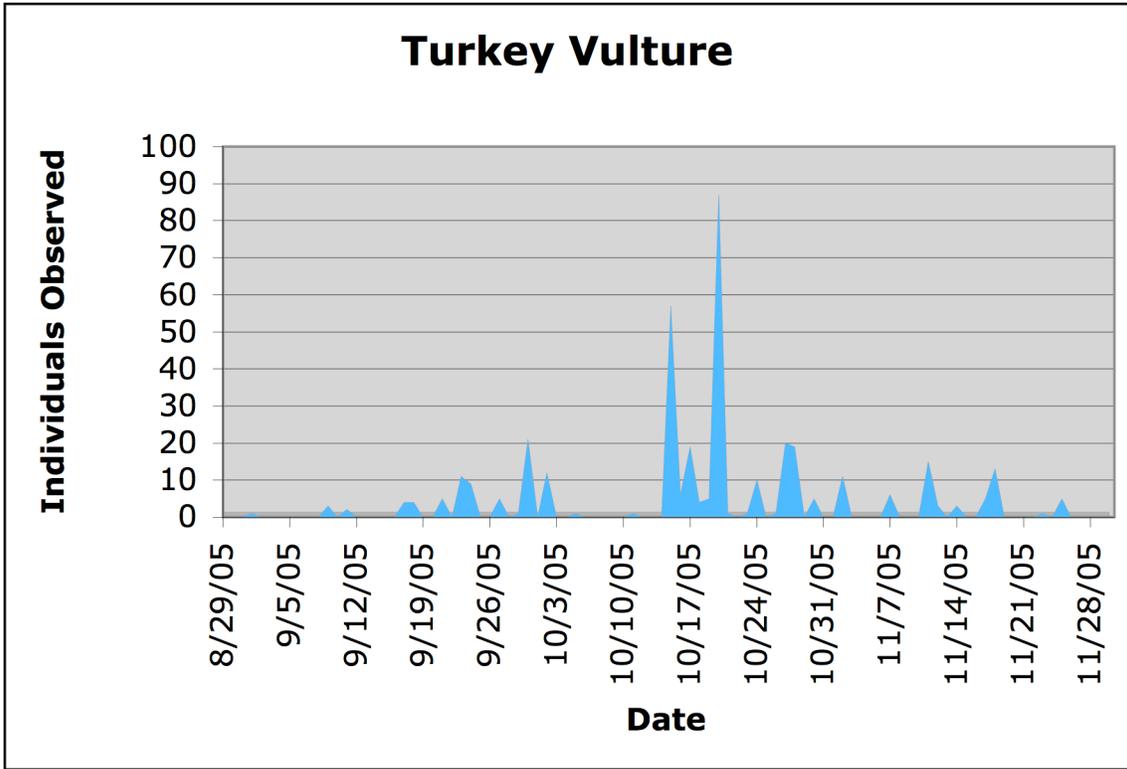
Savannah Sparrow (Account 45)

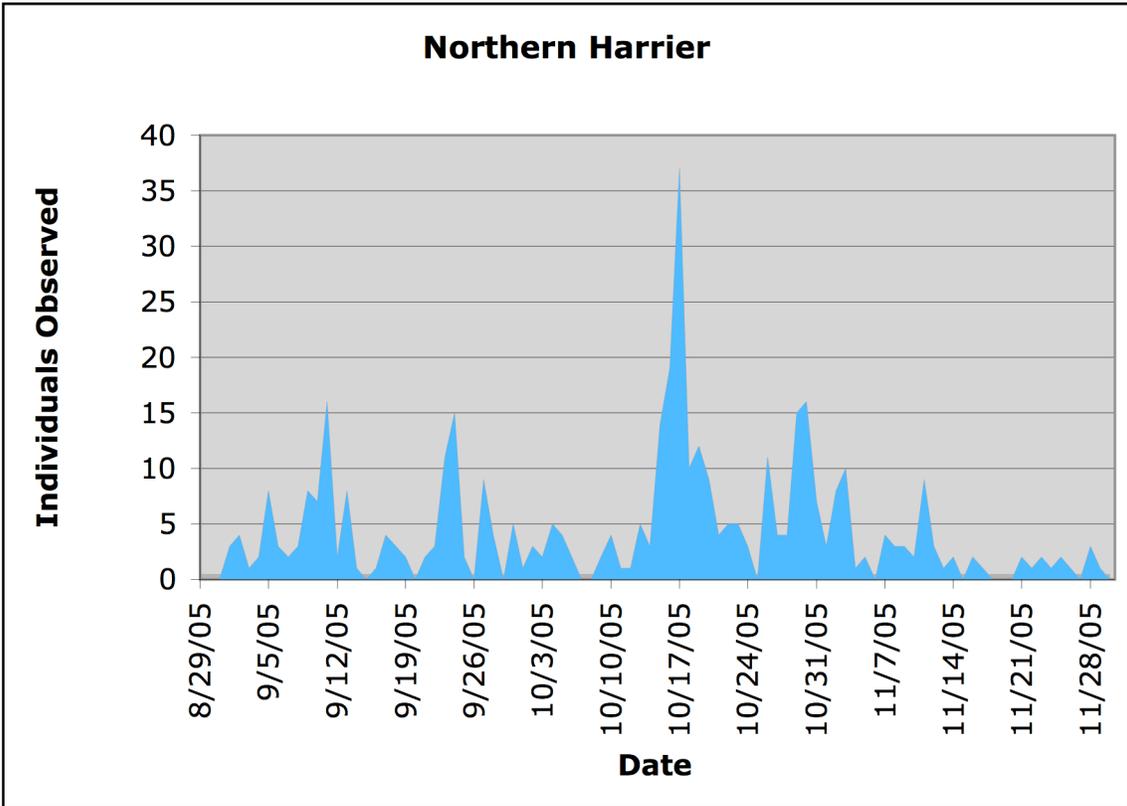
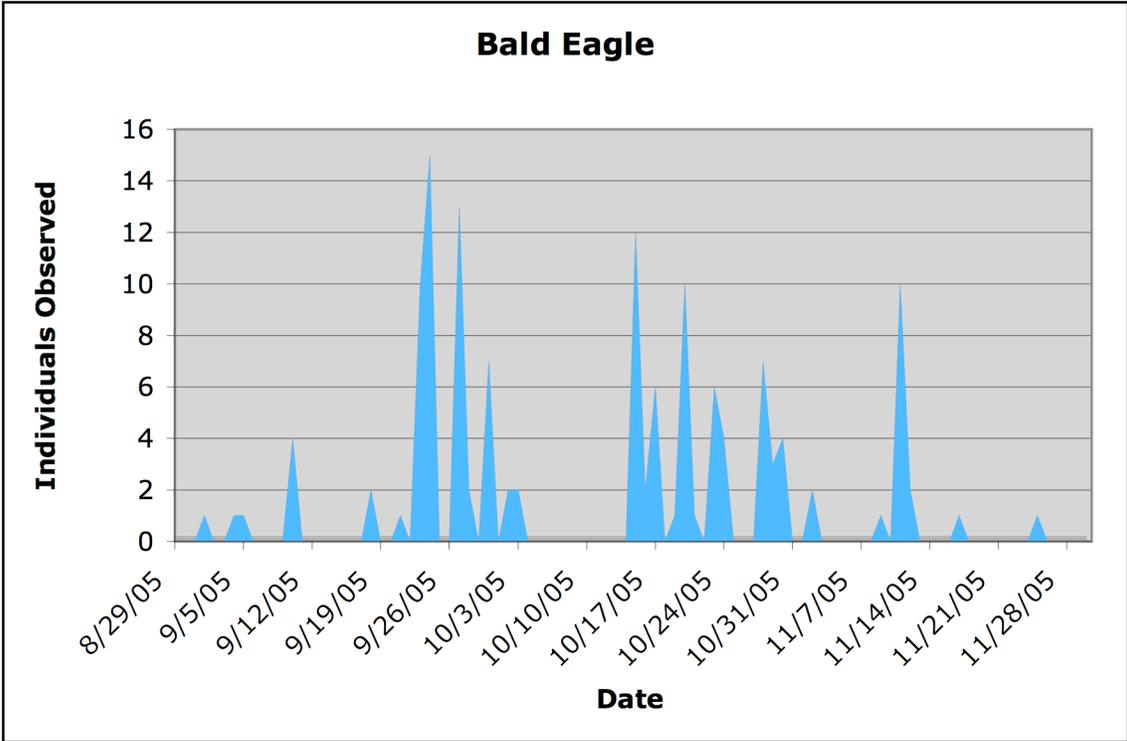
The widespread and abundant Savannah Sparrow breeds in pastures, agricultural land, meadows, tundra, and marshes across North America. This adaptable generalist is capable of feeding on a variety of insects, seeds, or fruit, depending on season and availability. During migration or winter, this species will frequent edges of any open country, including roadsides, sand dunes, sewage ponds, and marshes. Spring migration begins as early as February or as late as May. Fall migration peaks between the months of September and October, with some migrants lingering into November.

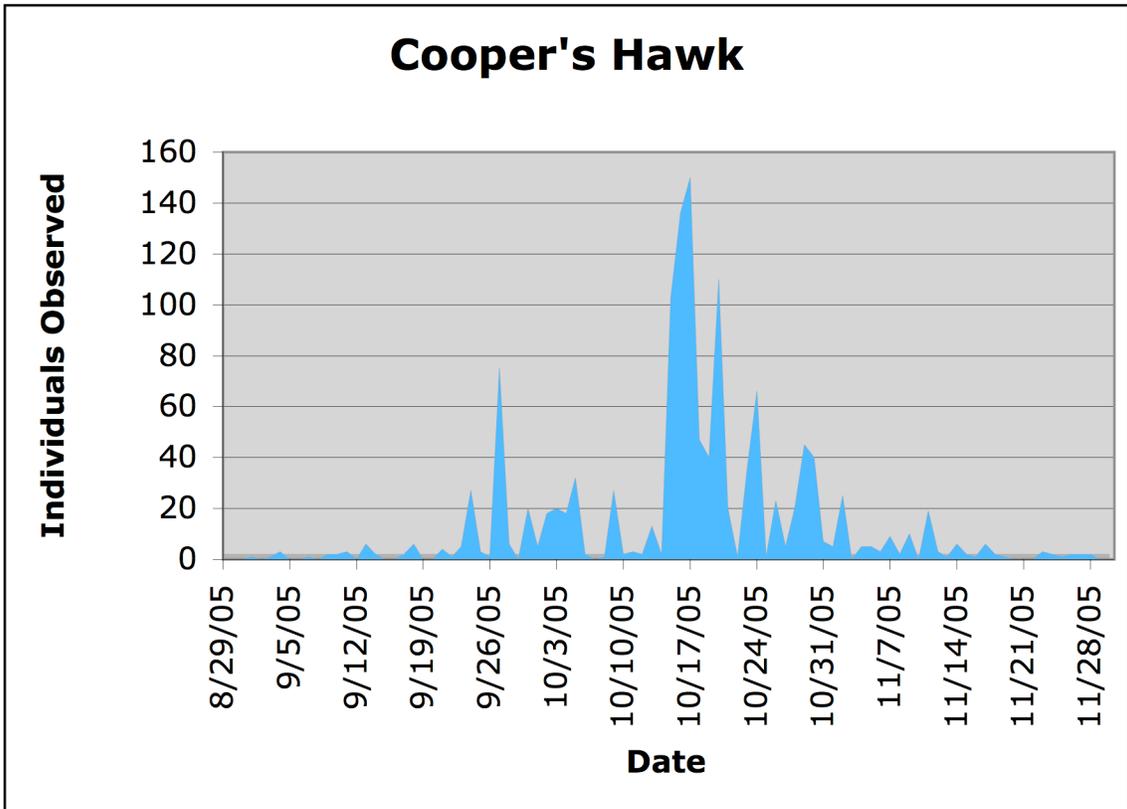
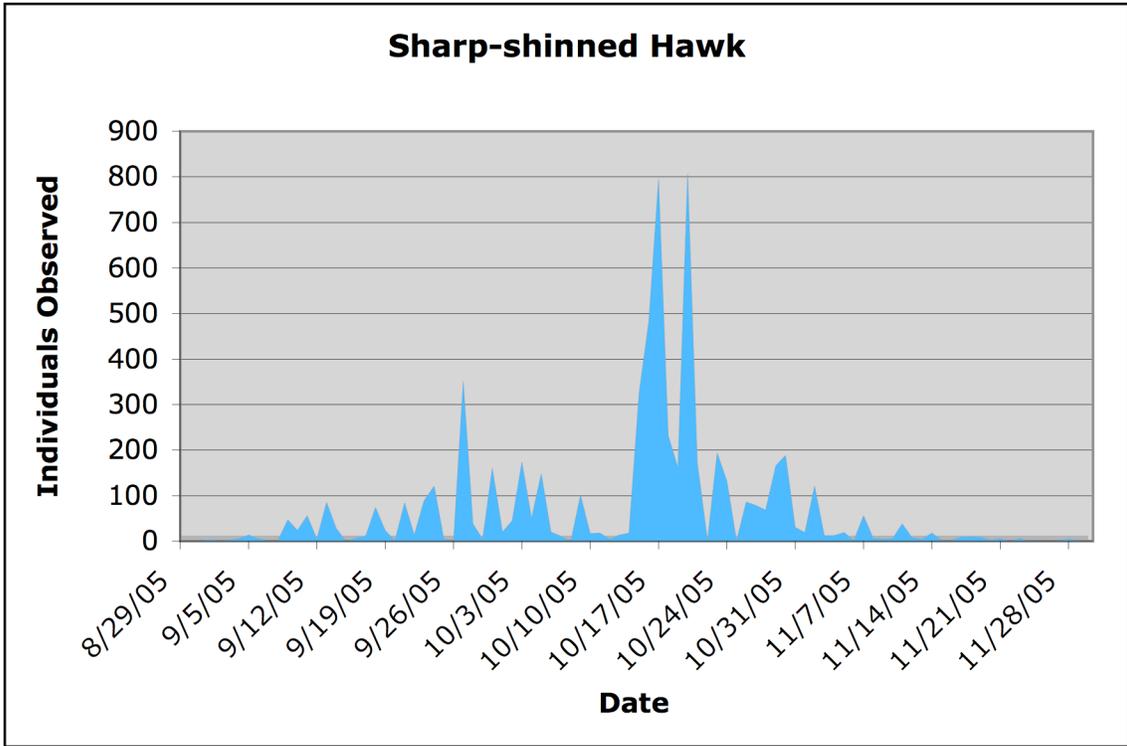
Appendix IV. Timing of fall raptor migration at Lighthouse Point Park (by species).

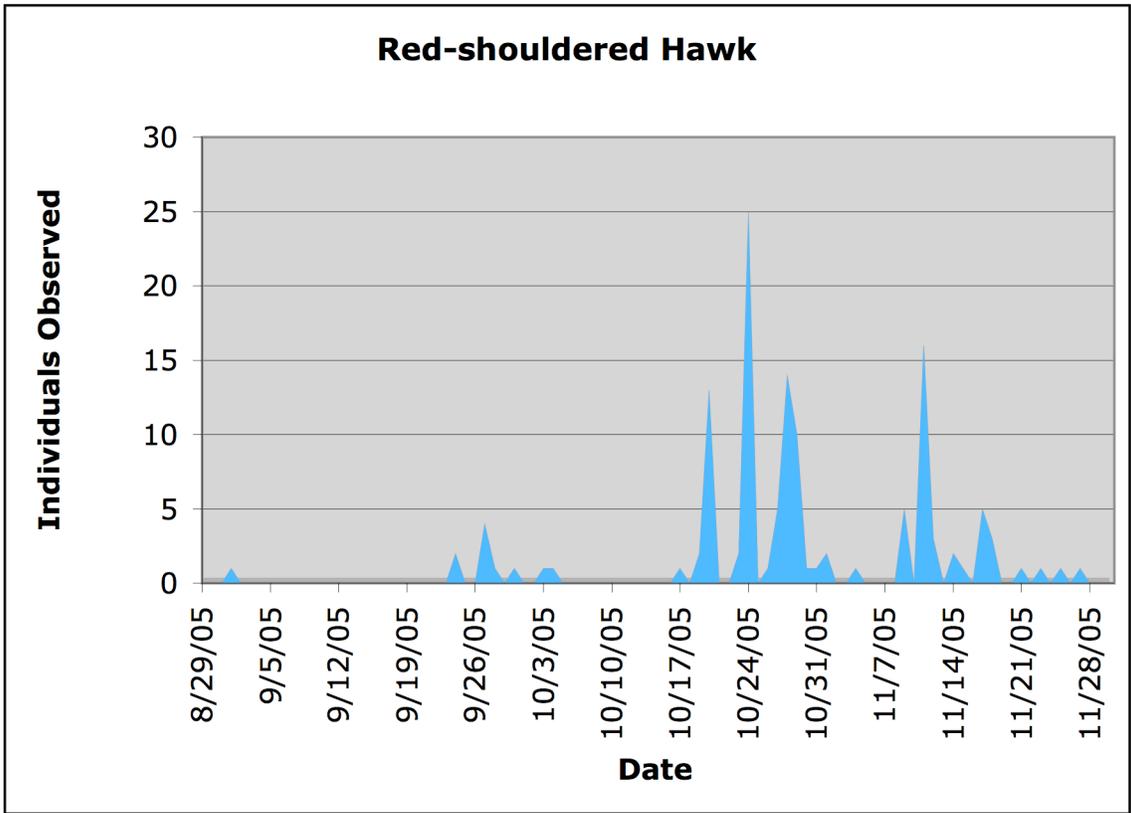
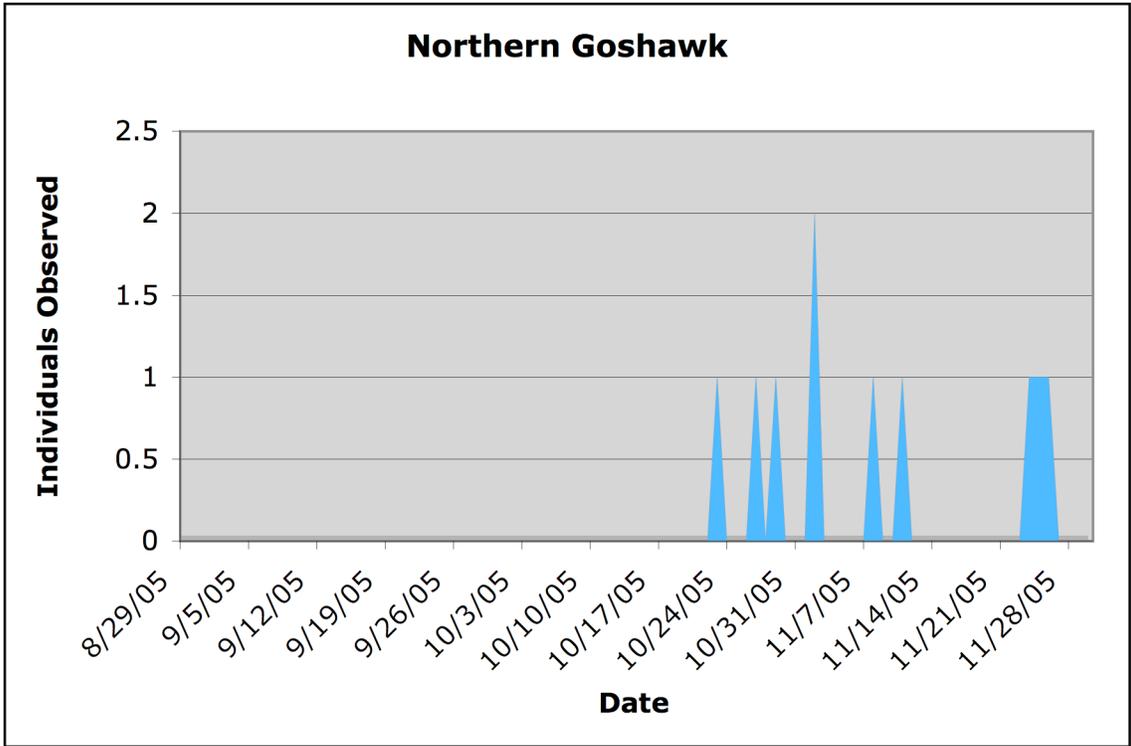
The following graphs were created using the hawkwatch dataset from 2005 (New Haven Bird Club, www.hawkcount.org), the only complete, electronic record. They are intended to illustrate the general timing of migration for the common raptor species; they are not intended as estimates of abundance. Values were not averaged, and no attempt was made to remove outliers or standardize for effort. The compilation of more accurate figures, utilizing the complete New Haven Bird Club hawkwatch catalogue, is warranted.

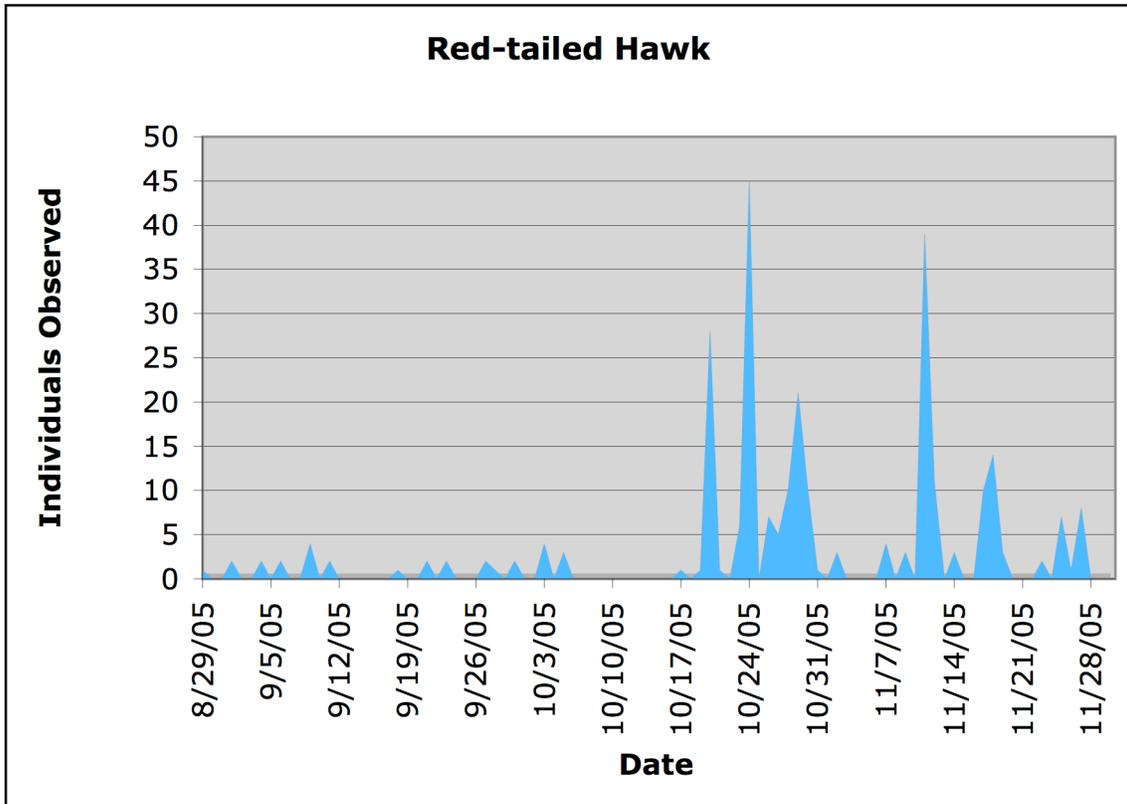
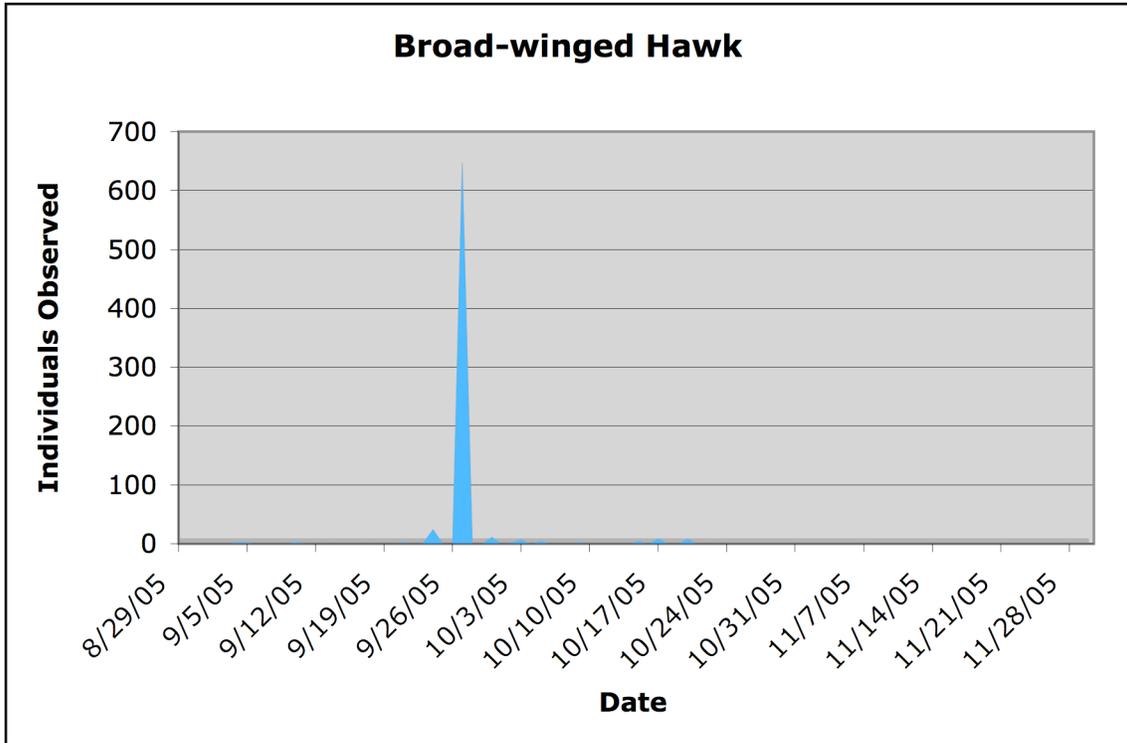


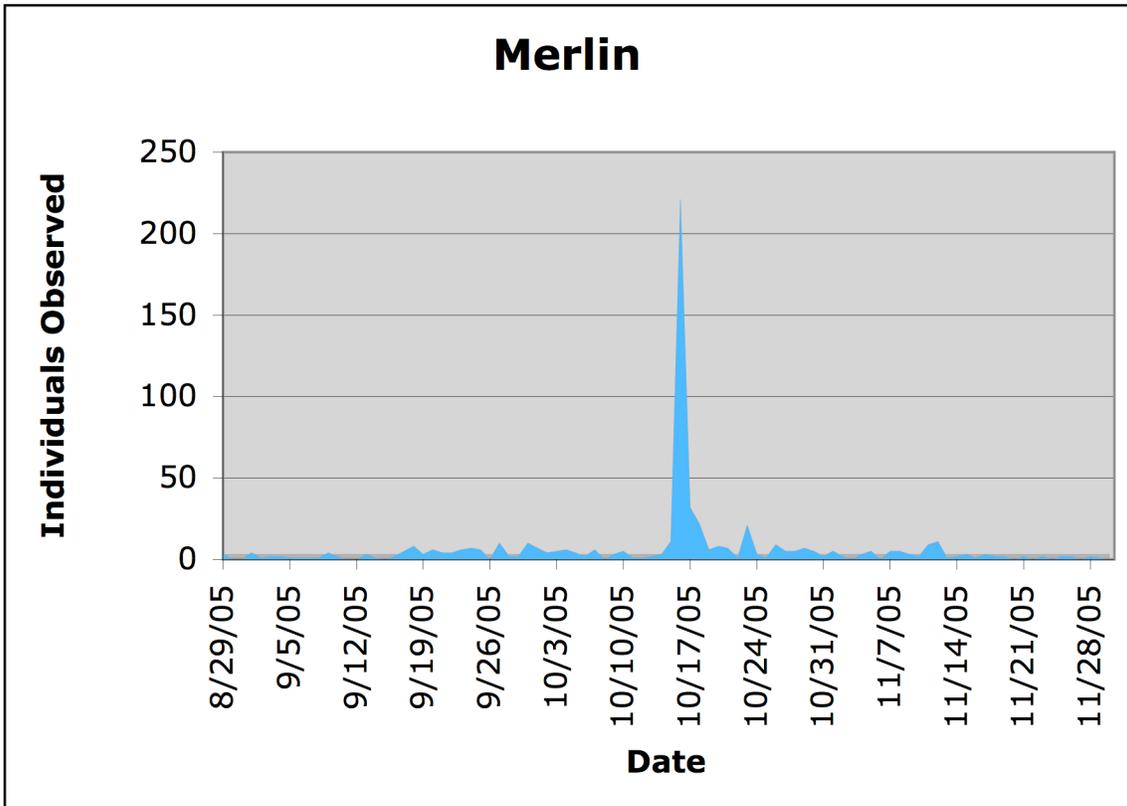
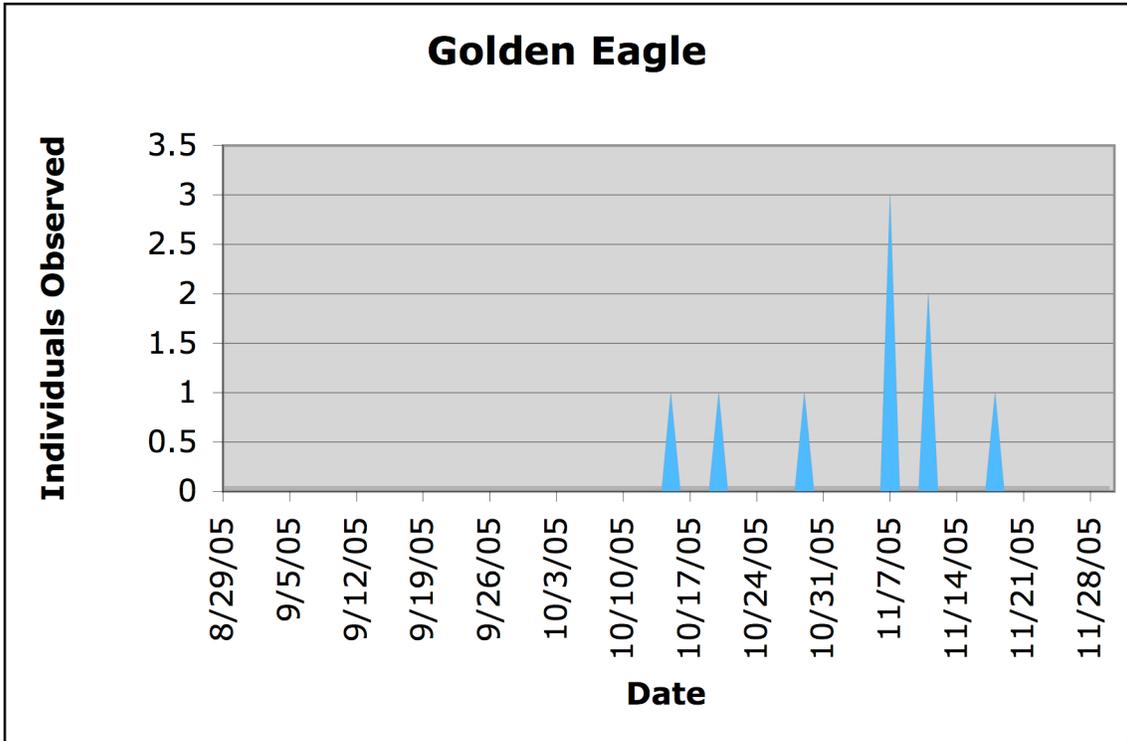


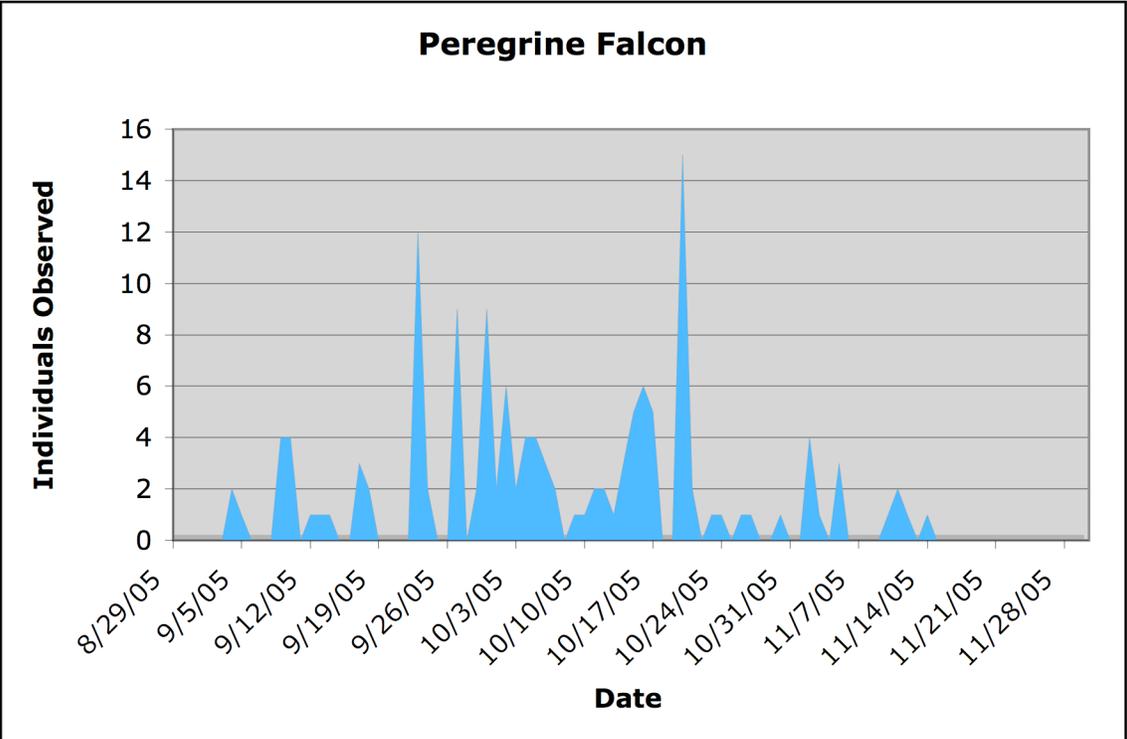












**Appendix V. Comprehensive list of bird species recorded at Lighthouse Point Park,
Source: New Haven Bird Club.**

- WOOD-WARBLERS**
 ___ Blue-winged Warbler
 ___ Tennessee Warbler
 ___ Orange-crowned Warbler
 ___ Nashville Warbler
 ___ Northern Parula
 ___ Yellow Warbler
 ___ Chestnut-sided Warbler
 ___ Magnolia Warbler
 ___ Cape May Warbler
 ___ Black-throated Blue Warbler
 ___ Yellow-rumped Warbler
 ___ Black-throated Green Warbler
 ___ Blackburnian Warbler
 ___ Pine Warbler
 ___ Prairie Warbler
 ___ Palm Warbler
 ___ Bay-breasted Warbler
 ___ Blackpoll Warbler
 ___ Black-and-white Warbler
 ___ American Redstart
 ___ Ovenbird
 ___ Northern Waterthrush
 ___ Connecticut Warbler
 ___ Common Yellowthroat
 ___ Wilson's Warbler
 ___ Canada Warbler
 ___ Yellow-breasted Chat
- TANAGERS**
 ___ Scarlet Tanager
- TOWHEES, SPARROWS**
 ___ Eastern Towhee
 ___ American Tree Sparrow
 ___ Chipping Sparrow
 ___ Field Sparrow
 ___ Vesper Sparrow
 ___ Lark Sparrow
 ___ Lark Bunting
 ___ Savannah Sparrow
 ___ Saltmarsh Sharp-tailed Sparrow
- FOX SPARROW**
 ___ Song Sparrow
 ___ Lincoln's Sparrow
 ___ Swamp Sparrow
 ___ White-throated Sparrow
 ___ White-crowned Sparrow
- JUNCOS & LONGSPURS**
 ___ Dark-eyed Junco
 ___ Lapland Longspur
 ___ Snow Bunting
- CARDINALS & GROSBEAKS**
 ___ Northern Cardinal
 ___ Rose-breasted Grosbeak
 ___ Indigo Bunting
 ___ Dickcissel
- BLACKBIRDS & ORIOLES**
 ___ Bobolink
 ___ Red-winged Blackbird
 ___ Eastern Meadowlark
 ___ Rusty Blackbird
 ___ Common Grackle
 ___ Boat-tailed Grackle
 ___ Brown-headed Cowbird
 ___ Orchard Oriole
 ___ Baltimore Oriole
- FINCHES**
 ___ Pine Grosbeak
 ___ Purple Finch
 ___ House Finch
 ___ Red Crossbill
 ___ White-winged Crossbill
 ___ Common Redpoll
 ___ Pine Siskin
 ___ American Goldfinch
 ___ Evening Grosbeak
- OLD WORLD SPARROW**
 ___ House Sparrow

This list of 255 species was compiled from the records of Richard English with additional submissions by Noble Proctor, Greg Hanisek, Ranger Dan Barvir and the many volunteers at the Hawk Watch.

This is an on-going project and additional sightings are welcome. Please send submissions to the NHBC or go to:
newhavenbirdclub.org

Photo by Dori Sosensky

**THE BIRDS OF
LIGHTHOUSE POINT PARK**



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 PO Box 9004, New Haven CT 06532

2006

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- LOONS**
 ___ Red-throated Loon
 ___ Common Loon
- GREES**
 ___ Pied-billed Grebe
 ___ Horned Grebe
 ___ Red-necked Grebe
- GANNETS**
 ___ Northern Gannet
- PELICANS**
 ___ American White Pelican
- CORMORANTS**
 ___ Great Cormorant
 ___ Double-crested Cormorant
- BITTERNS & HERONS**
 ___ American Bittern
 ___ Great Blue Heron
 ___ Great Egret
 ___ Snowy Egret
 ___ Little Blue Heron
 ___ Cattle Egret
 ___ Green Heron
 ___ Black-crowned Night-Heron
 ___ Yellow-crowned Night-Heron
- IBIS**
 ___ Glossy Ibis
- VULTURES**
 ___ Black Vulture
 ___ Turkey Vulture
- SWANS, GEESE & DUCKS**
 ___ Snow Goose
 ___ Canada Goose
 ___ Brant
 ___ Mute Swan
 ___ Wood Duck
 ___ Gadwall
 ___ Eurasian Wigeon
- ___ American Wigeon
 ___ American Black Duck
 ___ Mallard
 ___ Northern Shoveler
 ___ Northern Pintail
 ___ Green-winged Teal
 ___ Canvasback
 ___ Redhead
 ___ Greater Scaup
 ___ Lesser Scaup
 ___ King Eider
 ___ Common Eider
 ___ Black Scoter
 ___ Surf Scoter
 ___ White-winged Scoter
 ___ Long-tailed Duck
 ___ Buffhead
 ___ Common Goldeneye
 ___ Barrow's Goldeneye
 ___ Hooded Merganser
 ___ Common Merganser
 ___ Red-breasted Merganser
- KITES, EAGLES, HAWKS & FALCONS**
 ___ Bald Eagle
 ___ Northern Harrier
 ___ Sharp-shinned Hawk
 ___ Cooper's Hawk
 ___ Northern Goshawk
 ___ Red-shouldered Hawk
 ___ Broad-winged Hawk
 ___ Swainson's Hawk
 ___ Red-tailed Hawk
 ___ Golden Eagle
 ___ American Kestrel
 ___ Merlin
 ___ Gyrfalcon
 ___ Peregrine Falcon
- RAILS**
 ___ Clapper Rail
 ___ Virginia Rail
 ___ American Coot
- CRANES**
 ___ Sandhill Crane
- POULTERS**
 ___ Black-bellied Plover
 ___ American Golden Plover
 ___ Sandpalmated Plover
 ___ Killdeer
- OYSTERCATCHER**
 ___ American Oystercatcher
- SANDPIPERS**
 ___ Greater Yellowlegs
 ___ Lesser Yellowlegs
 ___ Solitary Sandpiper
 ___ Willet
 ___ Spotted Sandpiper
 ___ Upland Sandpiper
 ___ Hudsonian Godwit
 ___ Marbled Godwit
 ___ Ruddy Turnstone
 ___ Sanderling
 ___ Least Sandpiper
 ___ Pectoral Sandpiper
 ___ Purple Sandpiper
 ___ Dunlin
 ___ Short-billed Dowitcher
 ___ Common Snipe
 ___ American Woodcock
- GULLS**
 ___ Laughing Gull
 ___ Franklin's Gull
 ___ Black-headed Gull
 ___ Bonaparte's Gull
 ___ Ring-billed Gull
 ___ Herring Gull
 ___ Iceland Gull
 ___ Lesser Black-backed Gull
 ___ Great Black-backed Gull
- TERNS & SKIMMERS**
 ___ Caspian Tern
 ___ Roseate Tern
 ___ Common Tern
 ___ Forster's Tern
 ___ Least Tern
 ___ Black Skimmer
- PIGEONS & DOVES**
 ___ Rock Pigeon
 ___ White-winged Dove
 ___ Mourning Dove
- PARROTS**
 ___ Monk Parakeet
- CUCKOOS**
 ___ Black-billed Cuckoo
 ___ Yellow-billed Cuckoo
- OWLS**
 ___ Barn Owl
 ___ Great Horned Owl
 ___ Snowy Owl
 ___ Barred Owl
 ___ Long-eared Owl
 ___ Short-eared Owl
- GOATSUCKERS**
 ___ Common Nighthawk
- SWIFTS**
 ___ Chimney Swift
- HUMMINGBIRDS**
 ___ Ruby-throated Hummingbird
- KINGFISHERS**
 ___ Belted Kingfisher
- WOODPECKERS**
 ___ Red-headed Woodpecker
 ___ Woodpecker
 ___ Red-bellied Woodpecker
 ___ Yellow-bellied Sapsucker
 ___ Downy Woodpecker
 ___ Hairy Woodpecker
- ___ Northern Flicker
 ___ Pileated Woodpecker
- TYRANT FLYCATCHERS**
 ___ Olive-sided Flycatcher
 ___ Eastern Wood-Peepee
 ___ Willow Flycatcher
 ___ Least Flycatcher
 ___ Eastern Phoebe
 ___ Great Crested Flycatcher
- PARROTS**
 ___ Tropical Kingbird
 ___ Western Kingbird
 ___ Eastern Kingbird
- SHRIKES**
 ___ Northern Shrike
 ___ Loggerheaded Shrike
- VIREOS**
 ___ White-eyed Vireo
 ___ Blue-headed Vireo
 ___ Warbling Vireo
 ___ Red-eyed Vireo
- JAYS & CROWS**
 ___ Blue Jay
 ___ American Crow
 ___ Fish Crow
 ___ Common Raven
- LARKS**
 ___ Horned Lark
- SWALLOWS**
 ___ Purple Martin
 ___ Tree Swallow
 ___ Northern Rough-winged Swallow
 ___ Bank Swallow
 ___ Cliff Swallow
 ___ Cave Swallow
 ___ Barn Swallow
- CHICKADEES & TITMICE**
 ___ Black-capped Chickadee
 ___ Boreal Chickadee
 ___ Tufted Titmouse
- NUTHATCHES**
 ___ Red-breasted Nuthatch
 ___ White-breasted Nuthatch
- CREEPERS**
 ___ Brown Creeper
- WRENS**
 ___ Carolina Wren
 ___ House Wren
 ___ Winter Wren
- KINGLETS & THRUSHES**
 ___ Golden-crowned Kinglet
 ___ Ruby-crowned Kinglet
 ___ Blue-gray Gnatcatcher
 ___ Eastern Bluebird
 ___ Veery
 ___ Gray-cheeked Thrush
 ___ Swainson's Thrush
 ___ Hermit Thrush
 ___ Wood Thrush
 ___ American Robin
- THRASHERS**
 ___ Gray Catbird
 ___ Northern Mockingbird
 ___ Brown Thrasher
- STARLINGS**
 ___ European Starling
- PIPITS**
 ___ American Pipit
- WAXWINGS**
 ___ Cedar Waxwing

Appendix VI. Summary of key issues and recommendations.

<u>Issue (in order of occurrence)</u>	<u>Recommended Solution</u>	<u>Suggested Methods</u>	<u>Who</u>	<u>Priority</u>
The potential to meet at least three other Connecticut IBA criteria.	Collect the necessary data to definitively determine which Connecticut criteria are satisfied.	Use data from the monitoring scheme recommended in this plan to determine if the designation of Connecticut criteria 1 and/or 4a is warranted. Connecticut criterion 5 is presently satisfied and should be recognized as such.		
The accumulation of trash and the backflow of contaminants in Morris Creek and its associated marshes.	Volunteer cleanup? Is it accessible, is it safe?			
Limited information regarding the water composition of Morris Creek coupled with the presence of numerous sources of pollution and runoff in the immediate area.	Research into the exact water composition of Morris Creek.	Analysis of the effects of leaching on water composition.		
Heavy use (for recreational, commercial, industrial, and waste disposal purposes) of New Haven Harbor.	Research concerning the effects of current uses, non-point sources of pollution, and sewer overflows on the biological productivity and health of the harbor.	Continued assessments of water quality. Continued research aimed towards eliminating wet weather overflows.		
Minor	Identification of			

accumulation of petroleum components in the soils of the dredging spoils field.	pollutant sources. Determination of leaching potential.			
Inadequate estimates of land cover within the park boundary.	Detailed analysis of the park's current land cover.	The utilization of satellite imagery, rather than Landsat data, as is most appropriate for site-level analysis of this type.		
The desired extension of the bird-related tourism season at the park.	Provide wildlife observation opportunities immediately before and after the park's traditional birding season, the fall migration.	Construction and maintenance of Purple Martin houses. The addition of feed plots designed to attract wintering sparrows. The potential restoration of the dredging spoils field to reintroduce open water and mudflats.		
Incomplete knowledge of the mammal composition of the park.	Surveys to determine the use of certain areas of the park by mammals.	Small mammal trapping in the dredging spoils field.		
The threat of development in surrounding areas, and the potential that this development could disrupt existing corridors of open space.	Identification of the most likely locations for future development, and the potential effects this development could have on the park's importance to migrants.	Use the attached stakeholder list and map to identify high priority areas for acquisition, focusing on the Morris Creek area.		
The potential threat that feral cats pose to migrant songbirds.	Monitor the situation and use the referenced informational materials if it is decided that feral cats are a serious threat.			
The potential for overuse or	Advocate the protection of	<ul style="list-style-type: none"> Simplify woodland trail 		

development of natural areas of the park.	natural areas to prevent overuse and development from becoming issues in the future.	<ul style="list-style-type: none"> system • Monitor visitation • Continue and expand monitoring activities 		
Succession and the potential for obstructed views of the horizon.	If succession is deemed a serious issue, vegetation inventories of the northeastern section are warranted to assess the current and future potential to block views for hawkwatchers.	<ul style="list-style-type: none"> • Limit the addition of new trees to species that have a maximum height within acceptable height limits 		
The need for a high level of stakeholder support at the park to support current and future conservation activities.	The formation of an IBA Site Support Group.	The organization of current disparate stakeholders and recruitment of new individuals for a unified Site Support Group.		
Species that start migration early in the season such as Osprey, Bobolink, and Purple Martin.	Begin monitoring efforts as early in August as is realistically possible.			
The current unpredictable and unreliable availability of monitoring data.	The centralization of data into a database that can be updated and viewed by the public.	Examples include www.ebird.org and www.avianknowledge.net .		
Difficulties in monitoring passerines, especially nocturnal migrants.	Extend current and introduce new monitoring efforts.	Begin monitoring of non-raptor landbirds in the early morning hours. Implement acoustic detection monitoring methods, and a passerine banding station.		
Limited information on the source, age, sex,	Resume operation of the raptor banding station.			

and final destination of migrating raptors.				
The potential for monitoring efforts encompassing a wide variety of taxa, requiring a wide variety of methods.	The organization of a unified monitoring scheme.	Involve individuals that possess the depth of interest and knowledge required to effectively organize the different aspects of the monitoring scheme.		
The need for adequate funding to support current and future conservation and research activities.	Use information and links provided in this plan to seek appropriate funding opportunities.			
The need to advertise special events, such as the Annual Migration Festival,	Promote the park through appropriate outlets, such as local establishments and chambers of commerce.			
The use of synthetic pesticides and fertilizers.	The use of synthetic lawn care chemicals should be discouraged in favor of organic alternatives that are healthy for both humans and the environment.			
Opportunities for habitat enhancement and restoration.	Enhancements and restorations on a project-by-project basis to optimize potential for migrant use of the park.	Projects include: <ul style="list-style-type: none"> • butterfly gardens • feed plots • the adoption of “green” management practices • re-establishment of the Dike Trail • restoration of the dredging spoils field • nest-box programs 		
Subsidence of the	???	???		

marsh peat in the five acres of dredging spoils.				
Several proposed tourism trails that plan to include the park as a destination.	Support the establishment of the trails, taking into consideration possible adverse effects of increased tourism.	???		
Discontinuity of protected natural areas in surrounding areas, and the potential importance of land corridors to migrants.	Identify and act upon land acquisition opportunities in the adjacent and surrounding areas.	Work with the New Haven Land Trust, City of New Haven, and other interested partners to prioritize acquisition opportunities, using materials provided in this plan.		
Unequaled potential for educational and outreach activities.	Facilitate the development of conservation education and outreach activities.	Encourage connectivity to surrounding areas through greenways, increase signage, and promote educational programming (BioBlitz, monarch tagging, the Annual Migration Festival, bird and butterfly walks).		