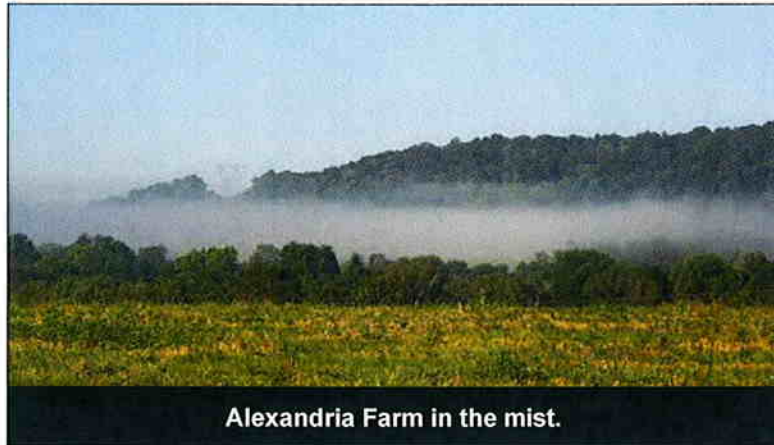


## 7: BIOLOGICAL RESOURCES

### A. Dominant Vegetation (Land Cover)

The New Jersey Comparative Risk Project (March 2003) listed habitat fragmentation and habitat loss as the highest ranking stressors of Statewide ecological quality. Certain species that require large expanses of intact habitat are becoming less common. Other factors which impact ecological health include exotic species (e.g. the hemlock wooly adelgid, an insect which causes the decline and death of hemlock trees) and exotic diseases, overpopulations of deer and geese, and pollution.



**Alexandria Farm in the mist.**

The 1995/1997 Land Use/Land Cover data layer increased the level of detail in the land use data set from 2.5 acre minimum mapping unit (for the 1986 Land Use/Land Cover layer) to 1.0 acre. The classification system used was a modified Anderson et al., level III/IV classification that provided the parameters for proper and consistent coding of the LU/LC feature classes and subclasses. The land cover classifications are shown in **Figure 7a** (for clarity of displaying different land cover types, wetlands types are shown separately in **Figure 7b**). The land cover types (which use the Anderson Classification System, and are based on the 2002 aerial photos of the state) are listed in **Table 7.1**.

The largest portion of land in Holland Township is deciduous forest greater than 50% crown closure, followed by agricultural cropland and pastureland, and then rural residential.

**Table 7.1: 2002 Land Use (Anderson Classification) in Holland Township**

Land Use Type	Land Use Code and Description	Percent of Holland
AGRI-CULTURE 27.7 %	2100: CROPLAND AND PASTURELAND	25.6 %
	2200: ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	0.8 %
	2400: OTHER AGRICULTURE	1.3 %
BARREN LAND 0.5 %	7500: TRANSITIONAL AREAS	0.5 %
FOREST 42.7 %	1140: RESIDENTIAL, RURAL, SINGLE UNIT	0.0 %
	4110: DECIDUOUS FOREST (10-50% CROWN CLOSURE)	5.3 %
	4120: DECIDUOUS FOREST (>50% CROWN CLOSURE)	28.5 %
	4210: CONIFEROUS FOREST (10-50% CROWN CLOSURE)	0.1 %
	4220: CONIFEROUS FOREST (>50% CROWN CLOSURE)	0.6 %
	4230: PLANTATION	0.0 %
	4311: MIXED FOREST (>50% CONIFEROUS WITH 10-50% CROWN CLOSURE)	0.1 %

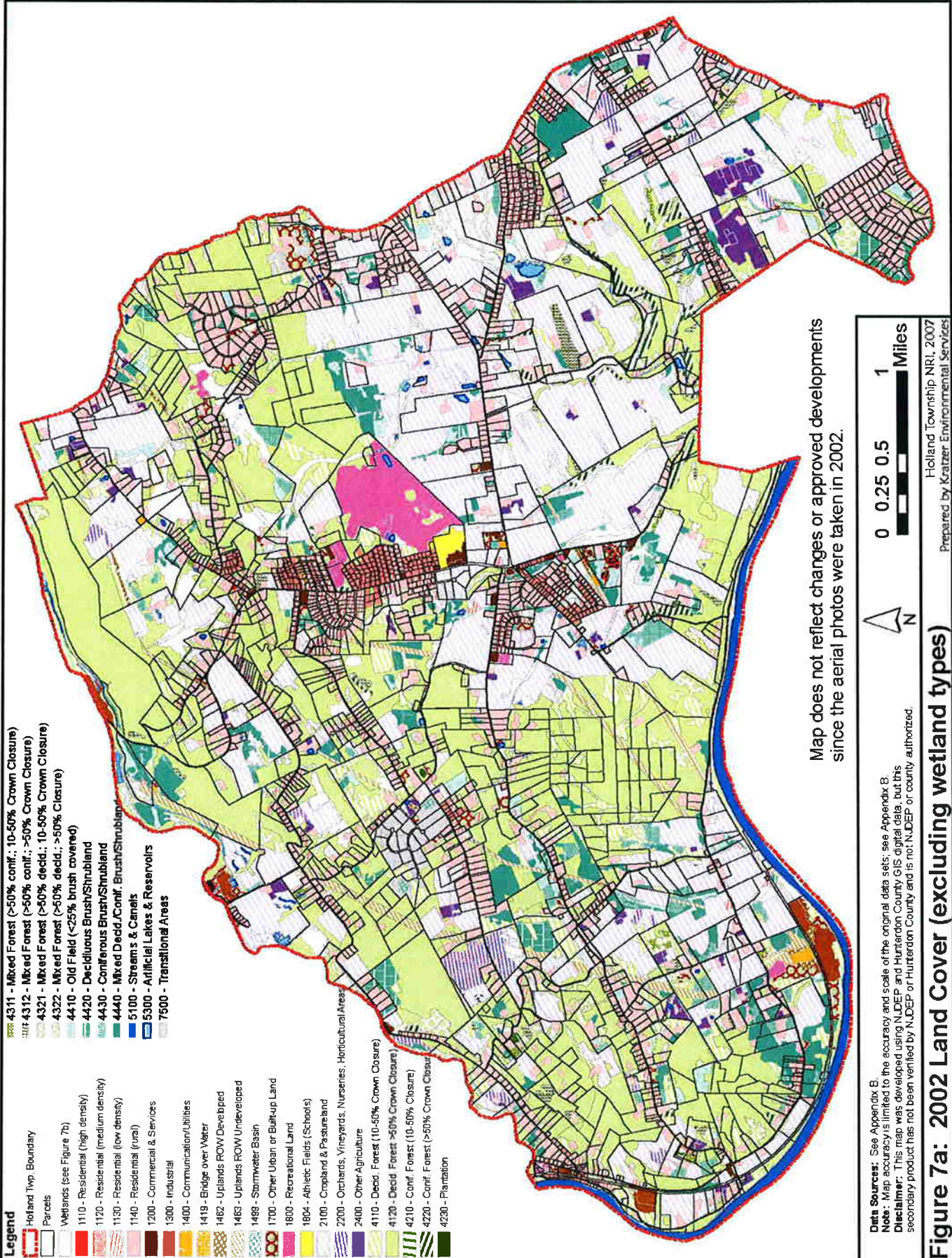
**Table 7.1: 2002 Land Use (Anderson Classification) in Holland Township**

	4312: MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	0.5 %
	4321: MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	0.1 %
	4322: MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	0.6 %
	4410: OLD FIELD (< 25% BRUSH COVERED)	1.2 %
	4420: DECIDUOUS BRUSH/SHRUBLAND	1.1 %
	4430: CONIFEROUS BRUSH/SHRUBLAND	1.2 %
	4440: MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	3.5 %
URBAN 20.3%	1110: RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	0.1 %
	1120: RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	1.0 %
	1130: RESIDENTIAL, SINGLE UNIT, LOW DENSITY	3.5 %
	1140: RESIDENTIAL, RURAL, SINGLE UNIT	10.5 %
	1200: COMMERCIAL/SERVICES	0.3 %
	1300: INDUSTRIAL	0.4 %
	1400: TRANSPORTATION/COMMUNICATION/UTILITIES	0.1 %
	1462: UPLAND RIGHTS-OF-WAY DEVELOPED	0.2 %
	1463: UPLAND RIGHTS-OF-WAY UNDEVELOPED	1.4 %
	1499: STORMWATER BASIN	0.1 %
	1700: OTHER URBAN OR BUILT-UP LAND	1.1 %
	1710: CEMETERY	0.0 %
	1800: RECREATIONAL LAND	1.3 %
	1804: ATHLETIC FIELDS (SCHOOLS)	0.1 %
7500: TRANSITIONAL AREAS	0.3 %	
WATER 1.9 %	5100: STREAMS AND CANALS	1.7 %
	5300: ARTIFICIAL LAKES	0.2 %
WETLANDS 6.9 %	1461: WETLAND RIGHTS-OF-WAY	0.1 %
	1750: MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	0.1 %
	1850: MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	0.0 %
	2140: AGRICULTURAL WETLANDS (MODIFIED)	0.7 %
	2150: FORMER AG. WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	0.1 %
	6210: DECIDUOUS WOODED WETLANDS	4.4 %
	6220: CONIFEROUS WOODED WETLANDS	0.0 %
	6231: DECIDUOUS SCRUB/SHRUB WETLANDS	0.2 %
	6232: CONIFEROUS SCRUB/SHRUB WETLANDS	0.0 %
	6233: MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	0.3 %
	6234: MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	0.2 %
	6240: HERBACEOUS WETLANDS	0.8 %
	6251: MIXED WOODED WETLANDS (DECIDUOUS DOM.)	0.1 %
6252: MIXED WOODED WETLANDS (CONIFEROUS DOM.)	0.0 %	
	7430: DISTURBED WETLANDS (MODIFIED)	0.0 %
<b>Source:</b> GIS data 2002 Land use/Land Cover		

## B. Wildlife

New Jersey hosts 325 bird species, 90 mammal species, 79 reptile and amphibian species and over 400 species of fish. Per square mile, New Jersey has the greatest wildlife diversity of any state in the nation, according to the NJ Division of Fish and Wildlife. New Jersey's geographic position where northern ecosystems reach their southern limit and where southern ecosystems reach their northern limit provides a wide variety of habitats including mountains, valleys, rolling hills, wetlands, pinelands, beaches, estuaries and rivers (NJDEP, 2005).

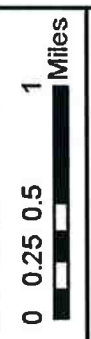




**Legend**

- 4311 - Mixed Forest (<50% conif.; 10-50% Crown Closure)
  - 4312 - Mixed Forest (>50% conif.; >50% Crown Closure)
  - 4321 - Mixed Forest (<50% decid.; 10-50% Crown Closure)
  - 4322 - Mixed Forest (>50% decid.; >50% Crown Closure)
  - 4410 - Old Field (<25% brush covered)
  - 4420 - Deciduous Brush/Shrubland
  - 4430 - Coniferous Brush/Shrubland
  - 4440 - Mixed Decid./Conif. Brush/Shrubland
  - 5100 - Streams & Canals
  - 5300 - Artificial Lakes & Reservoirs
  - 7500 - Transitional Areas
- 1110 - Residential (high density)
  - 1120 - Residential (medium density)
  - 1130 - Residential (low density)
  - 1140 - Residential (rural)
  - 1200 - Commercial & Services
  - 1300 - Industrial
  - 1400 - Communication/Utilities
  - 1419 - Bridge over Water
  - 1462 - Uplands ROW Developed
  - 1463 - Uplands ROW Undeveloped
  - 1489 - Stormwater Basin
  - 1700 - Other Urban or Built-up Land
  - 1800 - Recreational Land
  - 1804 - Athletic Fields (Schools)
  - 2100 - Cropland & Pastureland
  - 2200 - Orchards, Vineyards, Nurseries, Horticultural Areas
  - 2400 - Other Agriculture
  - 4110 - Decid. Forest (10-50% Crown Closure)
  - 4120 - Decid. Forest (>50% Crown Closure)
  - 4210 - Conif. Forest (10-50% Closure)
  - 4220 - Conif. Forest (>50% Crown Closure)
  - 4230 - Plantation

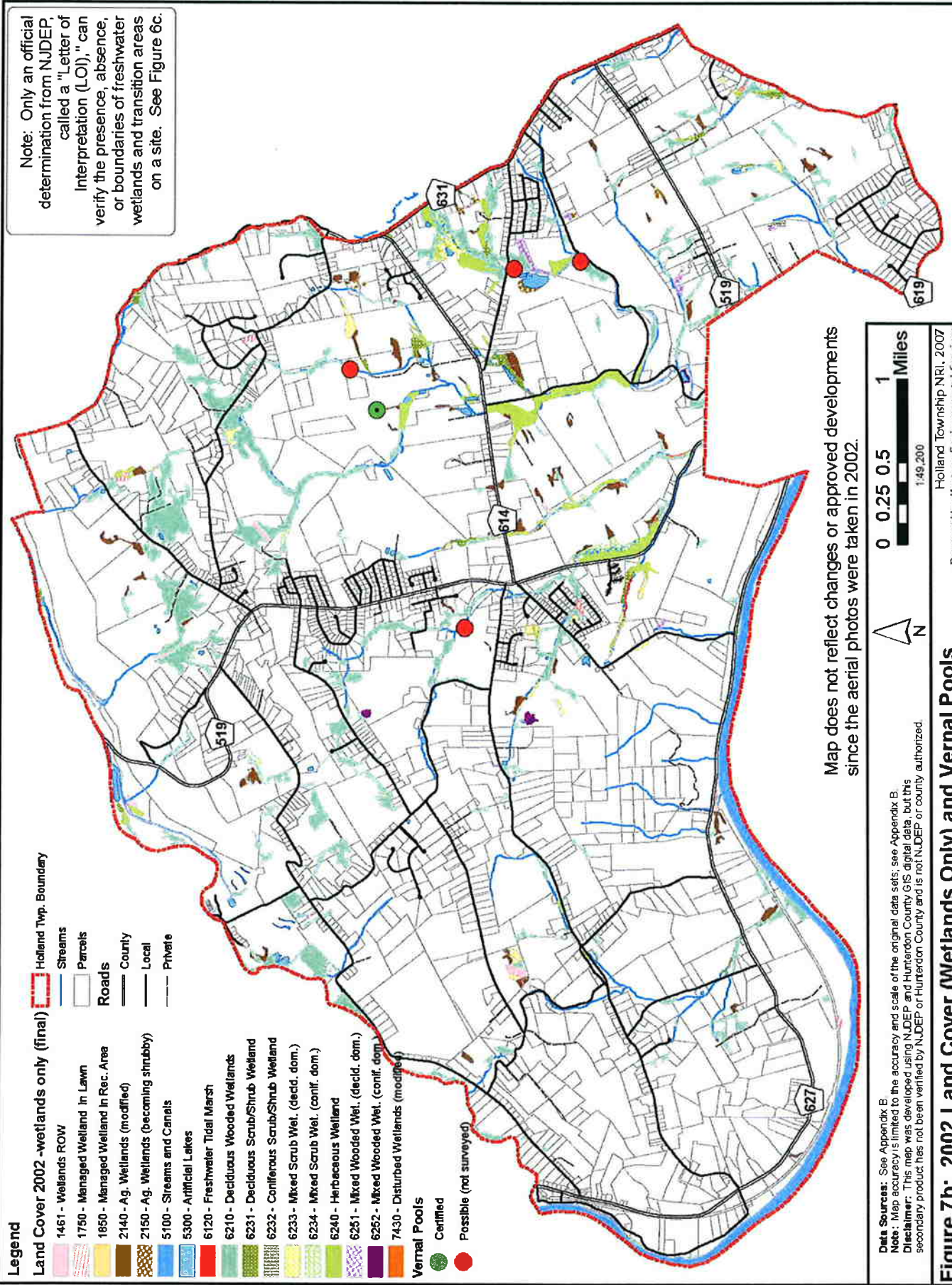
Map does not reflect changes or approved developments since the aerial photos were taken in 2002.



**Data Sources:** See Appendix B  
**Note:** Map accuracy is limited to the accuracy and scale of the original data sets; see Appendix B  
**Disclaimer:** This map was developed using NDEP and Hudson County GIS digital data, but this secondary product has not been verified by NDEP or Hudson County and is not NDEP or county authorized.

**Figure 7a: 2002 Land Cover (excluding wetland types)**

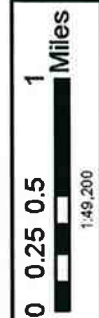




Note: Only an official determination from NJDEP, called a "Letter of Interpretation (LOI)," can verify the presence, absence, or boundaries of freshwater wetlands and transition areas on a site. See Figure 6c.

- Legend**
- Land Cover 2002 -wetlands only (final)**
- 1461 - Wetlands ROW
  - 1750 - Managed Wetland In Lawn
  - 1850 - Managed Wetland In Rec. Area
  - 2140 - Ag. Wetlands (modified)
  - 2150 - Ag. Wetlands (becoming shrubby)
  - 5100 - Streams and Canals
  - 5300 - Artificial Lakes
  - 6120 - Freshwater Tidal Marsh
  - 6210 - Deciduous Wooded Wetlands
  - 6231 - Deciduous Scrub/Shrub Wetland
  - 6232 - Coniferous Scrub/Shrub Wetland
  - 6233 - Mixed Scrub Wet. (decid. dom.)
  - 6234 - Mixed Scrub Wet. (conif. dom.)
  - 6240 - Herbaceous Wetland
  - 6251 - Mixed Wooded Wet. (decid. dom.)
  - 6252 - Mixed Wooded Wet. (conif. dom.)
  - 7430 - Disturbed Wetlands (modified)
- Vernal Pools**
- Green circle: Certified
  - Red circle: Possible (not surveyed)
- Other Features:**
- Red dashed line: Holland Twp. Boundary
  - Blue line: Streams
  - Black outline: Parcels
  - Black line: Roads
  - Thick black line: County
  - Thin black line: Local
  - Thin grey line: Private

Map does not reflect changes or approved developments since the aerial photos were taken in 2002.



**Data Sources:** See Appendix B  
**Note:** Map accuracy is limited to the accuracy and scale of the original data sets; see Appendix B  
**Disclaimer:** This map was developed using NJDEP and Hurlerston County GIS digital data, but this secondary product has not been verified by NJDEP or Hurlerston County and is not NJDEP or county authorized.

**Figure 7b: 2002 Land Cover (Wetlands Only) and Vernal Pools**

The NJDEP website offers checklists for the birds, mammals, reptiles and amphibians of New Jersey, noting the status of each (e.g. common or rare) (see **Internet Resources**). A variety of plant and animal species enjoy Holland Township's diversity of habitat types, although a catalogue of those specifically found within the boundaries of Holland has never been done.

A few species of interest are discussed below.

### White-tailed Deer

The largest herbivore living wild in New Jersey is the white-tailed deer (*Odocoileus virginianus*). Although the deer is a large animal, individuals tend to stay in a one square mile or less home range, one of the smallest ranges among wild ruminants. Fawns weigh approximately 7½ pounds at birth (which usually occurs between May and the first two weeks of June) while adult females average 100 pounds and adult males average 150 pounds (Burnett, No Date).

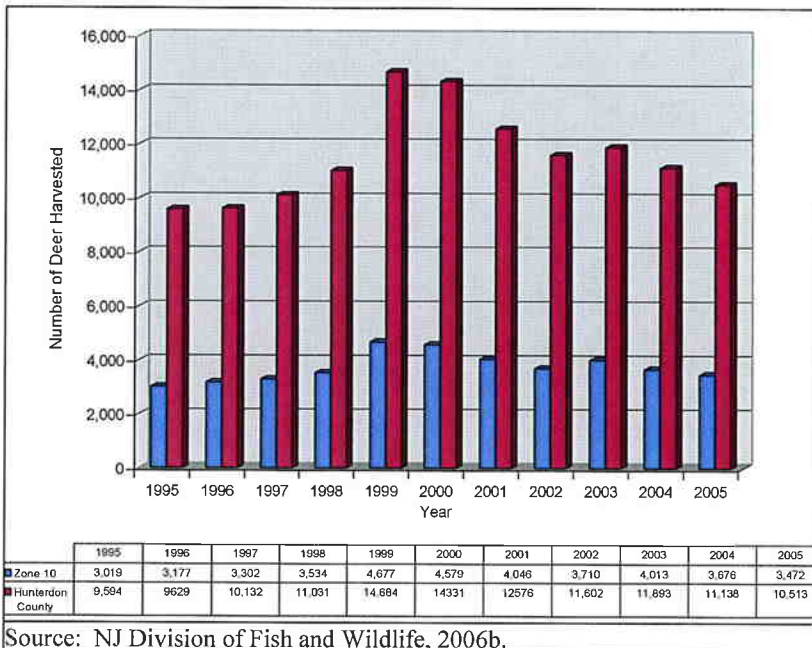
Biologists have estimated that before the arrival of European settlers, there were about 8-11 white-tailed deer per square mile. By the early 1900's, New Jersey's deer herd was reduced to a handful by unregulated hunting. However, efforts to protect the deer herd were so successful that deer were considered over-populous by the 1920's (Latham et al, 2005). In addition, deer have been able to adapt to human-altered habitats. Studies have shown that deer densities of over 10-15 per square mile have negative impacts on the diversity of understory vegetation and on the native songbird and wildflower populations which depend on a diverse understory, while deer populations in excess of 20 per square mile prevent tree regeneration (Latham et al, 2005; Pennsylvania Audubon, no date).

For comparison, NJDEP's hunting figures<sup>1</sup> for Hunterdon County show that an average for the period 1995-2003 of 27 deer per square mile are *taken* by hunters each year (see **Table 7.2**), therefore populations are well over the ecological carrying capacity. For the past ten years, Hunterdon County has experienced the highest deer harvest in the state (nearly double the harvest of the next highest, Sussex County). Deer Management Zone 10, which encompasses

Holland Township, has one of the highest harvest rates in the county (NJ Division of Fish and Wildlife, 2006b).

The overabundance of deer results in excessive damage to agricultural crops, gardens and residential landscaping; an increased incidence of deer/vehicle collisions; prevention of forest regeneration (which impacts plants and animals dependent on the forest); and the potential for reduced deer health due to inadequate

**Table 7.2: Deer Hunting Harvest 1995 - 2005**



<sup>1</sup> Deer harvest figures reflect numbers of hunters, availability of land on which to hunt, changes in hunting regulations, as well as other factors, so are not a direct measure of deer population.



nutrition and the spread of disease (Bowman's Hill, 2004; Honachevsky, 2000; Native Plant Society, 2004; Pennsylvania Audubon, 2004; Sauer, 1998). Despite all this, deer remain a natural part of the ecosystem, and are not solely responsible for diversity loss and habitat degradation. Many people still enjoy seeing deer, and many also gain satisfaction from hunting deer. Deer hunting contributes to the economy, as well, as deer hunters in New Jersey spend more than 100 million dollars each year as they enjoy in excess of 1.6 million recreation-days hunting deer (NJ Division of Fish and Wildlife, 2006b).

### Black Bears

Black bears, the largest land mammals in the state, are occasionally seen in Holland Township. Evidence of black bears has been recorded in the Musconetcong Gorge section of the Musconetcong River Reservation. They are most frequently seen during the breeding season of June and July, when the males travel extensively in search of females. Black bears are omnivorous in food preferences, consuming a range of foods from skunk cabbage, berries, nuts, insects, small mammals, road-kill and human garbage. They are sometimes responsible for damage to bird feeders, beehives, sweet corn, livestock, garbage, etc. Black bears that are fed, unintentionally or intentionally, can become dangerous and may have to be destroyed (NJ Division of Fish and Wildlife, 2006a).

The Division of Fish and Wildlife offers information and techniques for damage and nuisance prevention (see **Internet Resources**).

### Coyotes

The population of eastern coyotes was reduced to 100 in the state in 1975, but has rebounded to the current population of 3,000. The coyote is the largest canine found in NJ, primarily nocturnal, but sometimes seen during the day, and extremely wary of humans. They are not pack animals, although the young may remain with the parents for 1 ½ years. Coyotes are opportunistic predators, feeding on small animals, carrion, insects, fruit and other vegetable matter. They occasionally kill and eat small livestock (e.g. chickens, goats) and pets, and raid garbage (Burnett, 2002).

### Wildlife of Vernal Pools

*Vernal pools* are defined as confined depressions, either natural or man-made, that maintain ponded water for part of the year, have no permanent outflow, and are devoid of breeding fish populations. These temporary wetlands provide habitat to many species of amphibians, several of which breed exclusively in vernal pools, as well as a multitude of insects, reptiles, plants, and other wildlife (see **Table 7.3**).

The NJ Freshwater Wetlands Protection Act (adopted in 1989) did little to protect vernal pools because wetlands less than one acre in size were exempt from regulatory protection. Most vernal pools in NJ are less than 1/4 acre; therefore vernal pools could be filled, drained, or modified with a general permit. The loss of this critical habitat put the



Left: A newly emergent gray treefrog (*Hyla versicolor*).  
Right: Spotted salamander (*Ambystoma maculatum*) larvae almost ready to emerge from their eggs.

species that depend on vernal pools at risk. The NJDEP approved new regulations in September 2001, providing protection for vernal pools.

NJDEP Division of Fish and Wildlife, Nongame Species Program directs the Vernal Pool Project, which is an effort to map and survey the vernal pools throughout the state. Because of the ephemeral nature and small size of vernal pools, the program recruits volunteers to visit possible vernal pools and confirm, or “certify,” whether the sites fulfill the regulatory definition. The state has identified five potential vernal pools within Holland, one of which has been “certified” (see **Figure 7b**).

**Table 7.3: Vernal Pool Amphibians and Reptiles**

Obligate Vernal Pool Breeding Amphibians	Facultative Vernal Pool Breeding Amphibians	Reptiles that Inhabit Vernal Pools on a Seasonal Basis
Eastern tiger salamander <i>ENDANGERED</i>	Green frog	Wood turtle <i>THREATENED</i>
Marbled salamander <i>Special Concern</i>	Bullfrog	Spotted turtle <i>Special Concern</i>
Spotted salamander	Pickerel frog	Mud turtle
Jefferson salamander <i>Special Concern</i>	Southern leopard frog	Eastern painted turtle
Blue-spotted salamander <i>ENDANGERED</i>	Carpenter frog <i>Special Concern</i>	Common snapping turtle
Wood frog	Northern spring peeper	
Eastern spadefoot toad	Northern cricket frog	
	New Jersey chorus frog	
	Upland chorus frog	
	Northern gray treefrog	
	Southern gray treefrog <i>ENDANGERED</i>	
	Pine barrens treefrog <i>ENDANGERED</i>	(These reptiles visit vernal pools primarily to eat the eggs and larvae of amphibians.)
	Four-toed salamander	
	Long-tailed salamander <i>THREATENED</i>	
Note: Species in black are either known to occur in Holland Township or their ranges include Holland; species in grey have ranges which do not include Holland.		
Sources: Tesauro, no date; Kenney et al, no date; Schwartz and Golden, 2002; N.J.A.C 7:7A, Appendix 1.		

### Fish & Wildlife of Aquatic Habitats

A NJDEP program called *Integrated Biological Aquatics Assessment* combines various studies in an evaluation of the ecological health of aquatic habitats. Beginning in 2000, the Endangered and Nongame Species Program conducted surveys for freshwater mussels, dragonflies and damselflies (*Odonata*) and stream-associated reptiles and amphibians (often grouped under the term “herptiles”) at selected Ambient Biomonitoring Network (AMNET; see Section 6H) sites, in addition to stream habitat assessments. Assessments of fish assemblages are a useful environmental indicator to adequately evaluate biological integrity and protect surface water quality. The USEPA’s Rapid Bioassessment Protocol V method is used for these assessments, with some modifications for regional conditions (NJ Department of Fish and Wildlife, 2000).

These efforts have identified 12 native freshwater mussel species, 9 of which are listed as endangered, threatened or special concern; 172 *Odonata* species, of which 43 are considered rare; and 72 herptile species, 17 of which are listed as endangered or threatened. The macroinvertebrate population at one site in Holland was studied and the results discussed in **Section 6i** (Surface Water Quality).

The Bureau of Freshwater Fisheries evaluates fish populations with its Fish Index of Biotic Integrity (IBI), which uses fish populations as an indicator of stream water quality. Although no IBI sampling sites are located within Holland Township, two sites are located on streams which are partially within Holland: Harihokake Creek near the mouth of the stream in Alexandria Township (site FIBI034), and Musconetcong River at Route 632/Asbury-

Bloomsbury Road in Franklin Township (Warren County)<sup>2</sup>, which is about 4 miles upstream of where the Musconetcong reaches Holland (FIBI061). “Good” IBI ratings were determined for Harihokake Creek site FIBI034 and “poor” for the Musconetcong River site FIBI061. A list of fish species found at these sites during the most recent sampling dates may be found in Table 7.4.

**Table 7.4 List of Fishes Collected During Index of Biotic Integrity Sampling of Harihokake Creek and Musconetcong River (listed in order of abundance)**

COMMON NAME	SCIENTIFIC NAME	# FOUND	SIZE RANGE (INCHES)
<b>FIBI034: Harihokake Creek at River Road in Alexandria Township – 2001 (most recent sampling date)</b>			
White Sucker*	<i>Catostomus commersoni</i>	105	
Tesselated Darter	<i>Etheostoma olmstedii</i>	47	
Blacknose Dace	<i>Rhinichthys atratulus</i>	45	
American Eel*	<i>Anguilla rostrata</i>	43	
Creek Chub	<i>Semotilus atromaculatus</i>	17	
Longnose Dace	<i>Rhinichthys cataractae</i>	17	
Redbreast Sunfish*	<i>Lepomis auritus</i>	12	3.7 – 5.5
Common Shiner	<i>Luxilus cornutus</i>	8	
Smallmouth Bass*	<i>Micropterus dolomieu</i>	5	2.8 - 11.0
Margined Madtom	<i>Noturus insignis</i>	4	
Green Sunfish*	<i>Lepomis cyanellus</i>	3	1.2
Rock Bass*	<i>Ambloplites rupestris</i>	3	3.1 - 6.3
Pumpkinseed*	<i>Lepomis gibbosus</i>	1	4.3
<b>Number of Fish Species:13</b>	<b>Number of Fish: 310</b>	<b>Nearby AMNET Water Quality Rating:</b> 1992 – moderately impaired 1997 – non-impaired	
<b>FIBI Score: 40</b>	<b>FIBI Rating: Good</b>	<b>Habitat Score: 163</b>	<b>Habitat Rating: Optimal</b>
<b>FIBI061: Musconetcong River at Route 632/Asbury-Bloomsbury Road – 2003 (most recent sampling date)</b>			
American Eel*	<i>Anguilla rostrata</i>	48	
Blacknose Dace	<i>Rhinichthys atratulus</i>	11	
Tesselated Darter	<i>Etheostoma olmstedii</i>	4	
Brown Trout*	<i>Salmo trutta</i>	2	7.3-10.4
Satinfish Shiner	<i>Cyprinella analostana</i>	2	
Rock Bass*	<i>Ambloplites rupestris</i>	2	6.7
Longnose Dace	<i>Rhinichthys cataractae</i>	1	
<b>Number of Fish Species: 7</b>	<b>Number of Fish: 70</b>	<b>Nearby AMNET Water Quality Rating: N/A</b>	
<b>FIBI Score: 28</b>	<b>FIBI Rating: Poor</b>	<b>Habitat Score: 140</b>	<b>Habitat Rating: Suboptimal</b>
* Regulated as a fishable species under current New Jersey Fish and Wildlife codes			
Sources: NJ Division of Fish and Wildlife, 2002; NJ Division of Fish and Wildlife, 2004; NJ Division of Fish and Wildlife, 2006d (fish photos are available at this website)			

Recreational fishing often focuses on trout or American shad. Trout are stocked in the Harihokake Creek and Musconetcong River. The Musconetcong River at Musconetcong Gorge (county owned property) is also considered a good and fair fishing resource for smallmouth bass and largemouth bass, respectively. The Musconetcong River access site owned by the state provides fair fishing opportunity for pickerel, catfish and eels. American Shad is an anadromous fish species which returns from the ocean to spawn in the Delaware River in early spring. The shad migration is monitored by the NJ Fish and Wildlife service with hydroacoustic equipment that is mounted on the piers of the Route 202 Bridge at Lambertville, NJ (NJ Fish and Wildlife,

<sup>2</sup> An additional FIBI site is located on the Musconetcong in its upper reaches, but is not included here because it is less relevant to Holland Township.



2006c). The study estimated that 160,500 shad passed Lambertville in 2005 (NJ Fish and Wildlife, 2006e). See **Section 6J** for Fish Consumption Advisories.

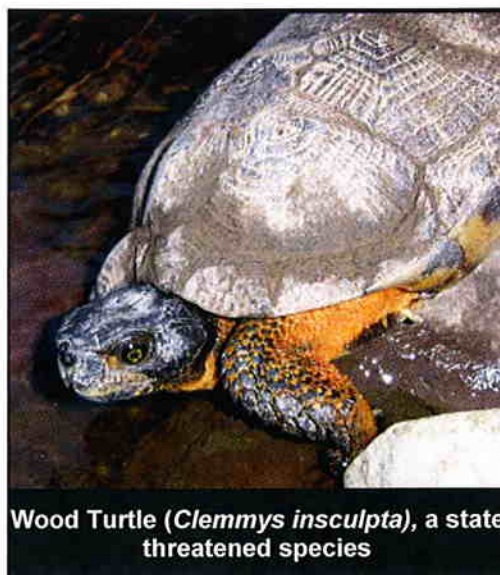
### C. Endangered, Threatened and Special Concern Species

The health of an area's animal and plant populations can be an indicator of the health and sustainability of the environment for people. The decline or disappearance of one (or more) species may signal the deterioration of the habitat. Other species, and human health and welfare, may soon follow. Preserving the future of endangered and threatened species helps preserve our own species, benefiting human health and quality of life by protecting watersheds, preserving land in its natural state, and restoring wildlife habitat. Many people also place an intrinsic value on all species.

The NJDEP Division of Fish and Wildlife, Endangered and Nongame Species Program's (ENSP) mission is: "To actively conserve New Jersey's biological diversity by maintaining and enhancing endangered and nongame wildlife populations within healthy functioning ecosystems." The program is responsible for the protection and management of New Jersey's wildlife, including 73 species currently listed as endangered or threatened, plus another 57 species of special concern. **Table 7.5** presents the definitions used by NJDEP in describing the status of species. In order to better document the status or change in status of species, NJDEP solicits information from the general public concerning sightings of endangered, threatened and special concern species. A reporting form is available on the Internet, and is included in **Appendix C**.

Many species are naturally rare in parts of their range, especially at the periphery. New Jersey often lies at the southern periphery of the range for many "northern" species and at the northern edge of the range of many "southern" species. Therefore, a species considered rare or imperiled within the state of New Jersey is not necessarily in danger of extinction worldwide. For state-wide species lists, see **Internet Resources**.

A search of NJDEP Division of Parks and Forestry *Natural Heritage Database* in October 2005 revealed the documented presence of 15 endangered, threatened and special concern animals and 11 plants in Holland Township (see **Tables 7.5** for code definitions and **Table 7.6** for list). These include three endangered species (bald eagle, vesper sparrow and bog turtle), meaning that they likely need management action to avoid extinction within NJ. There are three threatened species, which are vulnerable and could become endangered, including two birds (bobolink and Cooper's hawk) and one reptile (wood turtle). Special concern species, which warrant concern due to evidence of decline or vulnerability, include four birds (eastern meadowlark, northern parula warbler, sharp-shinned hawk and veery), one reptile (box turtle) and three amphibians (carpenter frog, Fowler's toad, and northern spring salamander). In addition, there is one threatened invertebrate found within the township (the yellow lampmussel), as well as five endangered vascular plants and six imperiled vascular plants. No lists are available for non-vascular plants.



The bald eagle and the bog turtle are also listed as threatened on the Federal endangered species list. Federal cost-sharing programs, which provide funding for habitat management and improvement, may be available for private landowners having bog turtles on their land (NJDEP, bog turtle fact sheet, no date).

Fact sheets, including photos, for many of the rare animals listed below are presented in **Appendix C**. **Appendix C** also includes a list of Hunterdon County rare species and natural communities. The species found in other locations within the county also have potential to be present in Holland if suitable habitat is present within the township.

**Table 7.5 Definitions of Species Status**

<b>STATE STATUS</b>	<b>STATE STATUS DEFINITIONS</b>
E	<i>Endangered</i> applies to a species whose prospects for survival within the state are in immediate danger due to one or several factors, such as loss or degradation of habitat, over-exploitation, predation, competition, disease or environmental pollution, etc. An endangered species likely requires immediate action to avoid extinction within NJ.
T	<i>Threatened</i> applies to species that may become Endangered if conditions surrounding it begin to or continue to deteriorate. Thus, a Threatened species is one that is already vulnerable as a result of, for example, small population size, restricted range, narrow habitat affinities, significant population decline, etc.
Special	<i>Special Concern</i> applies to species that warrant special attention because of some evidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming Threatened. This category would also be applied to species that meet the foregoing criteria and for which there is little understanding of their current population status in the state.
D	<i>Declining</i> species applies to a species which has exhibited a continued decline in population numbers over the years.
S	<i>Stable</i> (or increasing) applies to species that appear to be secure in NJ and not in danger of falling into any of the preceding categories in the near future.
U	<i>Undetermined</i> refers to a species about which there is not enough information available to determine the status.
<b>FEDERAL STATUS</b>	<b>FEDERAL STATUS DEFINITIONS</b>
LE	Taxa formally listed as <i>endangered</i> .
LT	Taxa formally listed as <i>threatened</i> .
<b>STATE RANK</b>	<b>STATE ELEMENT RANK DEFINITIONS</b>
S1	<i>Critically imperiled in New Jersey</i> because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Species ranked S1 are often restricted to specialized habitats and/or restricted to an extremely small (3%) geographical area of the state. Also included are species which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are species for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.
S2	<i>Imperiled in New Jersey</i> because of rarity (6 to 20 occurrences). Historically many of these species may have been more frequent, but now, largely through habitat destruction, are known from fewer extant occurrences. The S2 rank also includes species which occur in habitats restricted to 10 % of the total state area.
S3	<i>Rare in state</i> with 21 to 100 occurrences (plant species in this category have only 21 to 50 occurrences). Includes species which are widely distributed in the state but often occurring in small populations, and also in habitats which may be common or widespread. Species having a moderately restricted distribution (but greater than 10%) in New Jersey, but are locally abundant, are also included. Species ranked S3 are not yet imperiled in state but may soon be if additional populations are destroyed.



S4	Apparently secure in the state, with many occurrences.
S5	Demonstrably secure in state and essentially ineradicable under present conditions.
B	Refers to the <i>breeding</i> population of the element in the state.
N	Refers to the <i>non-breeding</i> population of the element in the state.
<b>REGIONAL STATUS</b>	<b>REGIONAL STATUS CODES FOR PLANTS AND ECOLOGICAL COMMUNITIES</b>
LP	Indicates taxa listed by the <i>Pinelands Commission</i> as endangered or threatened within their legal jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the NJ Pinelands Comprehensive Management Plan.
HL	Indicates taxa or ecological communities protected by the <i>Highlands Water Protection and Planning Act</i> within the jurisdiction of the Highlands Preservation Area.
<b>GLOBAL RANK</b>	<b>GLOBAL ELEMENT RANK DEFINITION</b>
G1	<i>Critically imperiled globally</i> because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2	<i>Imperiled globally</i> because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3	Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.
G4	Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery.
G5	Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery.
GNR	Species has not yet been ranked
Note: To express <i>uncertainty</i> , the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).	
Sources: : NJ Division of Fish and Wildlife, 2005: <a href="http://www.njfishandwildlife.com/spclspp.htm">http://www.njfishandwildlife.com/spclspp.htm</a> and <a href="http://www.nj.gov/dep/parksandforests/natural/heritage/spplant_apl.html">http://www.nj.gov/dep/parksandforests/natural/heritage/spplant_apl.html</a>	

The New Jersey Endangered Species Conservation Act was signed into law on Dec.14, 1973, preceding the federal Endangered Species Act by two weeks. According to NJ DEP Commissioner Bradley Campbell, (Bean, 2003), these regulations have done a good job of protecting listed species that occur in wetlands and in the Pinelands area, but have often failed to protect species found elsewhere. Critical habitat regulations (under development) will use the state's Landscape Project (see **Figures 7c through 7f**) to also protect upland habitats.

NJDEP provided additional protection of threatened and endangered species by designating waters that provide critical habitat for endangered species as Category One (C1) waters (see **Figure 6d**). Rare, threatened and endangered species are often very sensitive to pollution and habitat disturbances, therefore should benefit from the C1 regulations aimed to establish stream buffers and maintain water quality.

**Table 7.6: Species Presently Recorded in the Natural Heritage Database for Holland Twp**

Common Name	Scientific Name	Federal Status	State Status	Global Rank	State Rank	Habitat
Vertebrates, birds:						
Bald eagle (foraging area) *	<i>Haliaeetus leucocephalus</i>	LT	E	G4	S1B, S2N	Large perch trees near a body of water
Bobolink *	<i>Dolichonyx oryzivorus</i>		T/T	G5	S2B	Large hayfields, pastures
Cooper's hawk *	<i>Accipiter cooperii</i>		T/T	G5	S3B, S4N	Mixed riparian or wetland forests; avg. 0.2 miles from nearest house
Eastern meadowlark	<i>Sturnella magna</i>		D/S	G5	S3B, S4N	
Northern parula warbler	<i>Parula americana</i>		Special	G5	S3B	Humid woods
Sharp-shinned hawk	<i>Accipiter striatus</i>		Special	G5	S2B, S3N	Woods, thickets
Veery	<i>Catharus fuscescens</i>		Special	G5	S3B	Damp deciduous woods
Vesper sparrow *	<i>Pooecetes gramineus</i>		E	G5	S1B, S2N	Grasslands, cultivated & fallow fields
Vertebrates, reptiles:						
Bog turtle *	<i>Clemmys muhlenbergii</i>	LT	E	G3	S2	Calcareous fens, sphagnum bogs, wet meadows
Eastern box turtle	<i>Terrapene carolina</i>		Special	G5	S5B	Woods & meadows
Wood turtle *	<i>Clemmys insculpta</i>		T	G4	S3	Clean streams & undisturbed uplands
Vertebrates, amphibians:						
Carpenter frog	<i>Rana virgatipes</i>		Special	G5	S4	Sphagnum bogs; emergent wetlands
Fowler's toad	<i>Bufo woodhousii fowleri</i>		Special	G5	S4	Vernal pools, shallow edges of lakes & ponds
Northern spring salamander	<i>Gyrinophilus p. porphyriticus</i>		Special	G5T5	S3	Cool mountain streams & shaded seepages
Invertebrate:						
Yellow lampmussel *	<i>Lampsilis cariosa</i>		T	G3G4	S1	Delaware River
Natural Community:						
Shale cliff/rock outcrop community				G3		S2?
Vascular Plants:		<b>Regional Status</b>				
Yellow Giant-hyssop	<i>Agastache nepetoides</i>	HL		G5		S2
Small-fruit groovebur	<i>Agrimonia microcarpa</i>	HL		G5		S2
Bush's sedge	<i>Carex bushii</i>	LP,HL	E	G4		S1
Pale sedge	<i>Carex pallescens</i>	HL		G5		S2
Hairy lipfern	<i>Cheilanthes lanosa</i>	HL		G5		S2
Cornel-leaf aster	<i>Doellingeria infirma</i>	HL		G5		S2
Frank's love grass	<i>Eragrostis frankii</i>	HL		G5		S2
Green violet	<i>Hybanthus concolor</i>	LP,HL	E	G5		S1
False boneset *	<i>Kuhnia eupatorioides</i>	LP,HL	E	G5T5		S1
Basil mountain-mint *	<i>Pycnanthemum clinopodioides</i>	LP,HL	E	G2		S1
Canadian violet	<i>Viola canadensis</i>	LP,HL	E	G5TNR		S1
* = fact sheets for these species are included in Appendix C.						
Note: For status and rank definitions, refer to Table 7.5.						
Sources: NJDEP ONLM, October 18, 2005; NJDEP ONLM fact sheets; Schwartz, 2002; Peterson, 1980						



## D. Protecting Habitats for Endangered, Threatened & Special Concern Animals: The Landscape Project

The Landscape Project is a pro-active, ecosystem-level approach to the long-term protection of rare species and their important habitats in New Jersey. Its goal is to protect New Jersey's biological diversity by maintaining and enhancing rare wildlife populations within healthy, functioning ecosystems. It provides users with peer reviewed, scientifically sound wildlife data that is easily accessible and can be used by state, county, and local governments, as well as nongovernmental conservation organizations and private land owners for planning, open space acquisition, and land-use regulation (Niles et al, 2004). The NJDEP, Division of Fish and Wildlife, Endangered and Nongame Species Program is responsible for the Landscape Project.

NJDEP created the dataset by intersecting endangered, threatened and rare species data with the 1995 Land Use / Land Cover GIS layer, which was derived from satellite imagery. The resulting data layer identifies, delineates and ranks (based on the conservation status of species present) critical habitat statewide (see **Table 7.7** for rank definitions). Each patch is coded for the number of special concern, state threatened, state endangered and federally listed species present. **Figure 7c** shows emergent wetlands and forested wetlands habitats. **Figure 7d** displays forest and grassland habitats. **Figure 7e** shows habitats for wood turtles and foraging bald eagles. All habitats are combined in the map in **Figure 7f**.

**Table 7.7: Landscape Project Habitat Rank Definitions**

Rank	Definition
1	Suitable Habitat - designates a patch as suitable habitat, no species documented
2	Special Concern - patch where species of special concern have been documented
3	State Threatened - patch where state threatened species have been documented
4	State Endangered - patch where state endangered species have been documented
5	Federal T E - patch where federal T E species have been documented
Note: Not all categories are present for each habitat within Holland Township.	
Source: Niles et al, 2004	

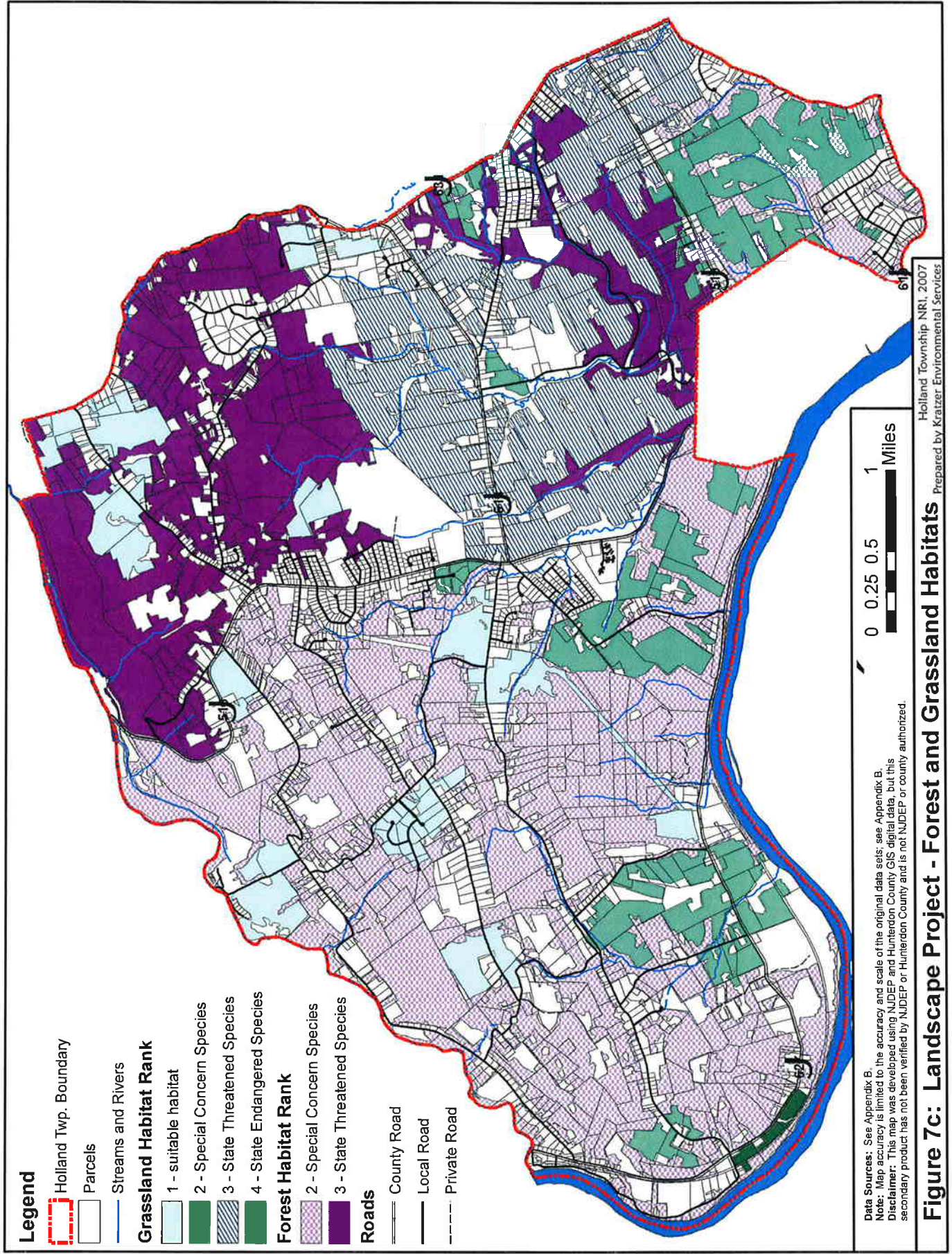
## E. Protecting Habitats for Endangered, Threatened & Special Concern Plants: Natural Heritage Priority Sites

*Natural Heritage Priority Sites* represent some of the best remaining habitat for rare species and exemplary natural communities in the state. They have been identified through the Natural Heritage Database by the NJDEP Office of Natural Lands Management (ONLM) as areas critically important for preservation of New Jersey's biological diversity. The database provides detailed, up-to-date information on rare plant species and natural communities for planners, developers, and conservation agencies for use in resource management, environmental impact assessment, and both public and private land protection efforts.



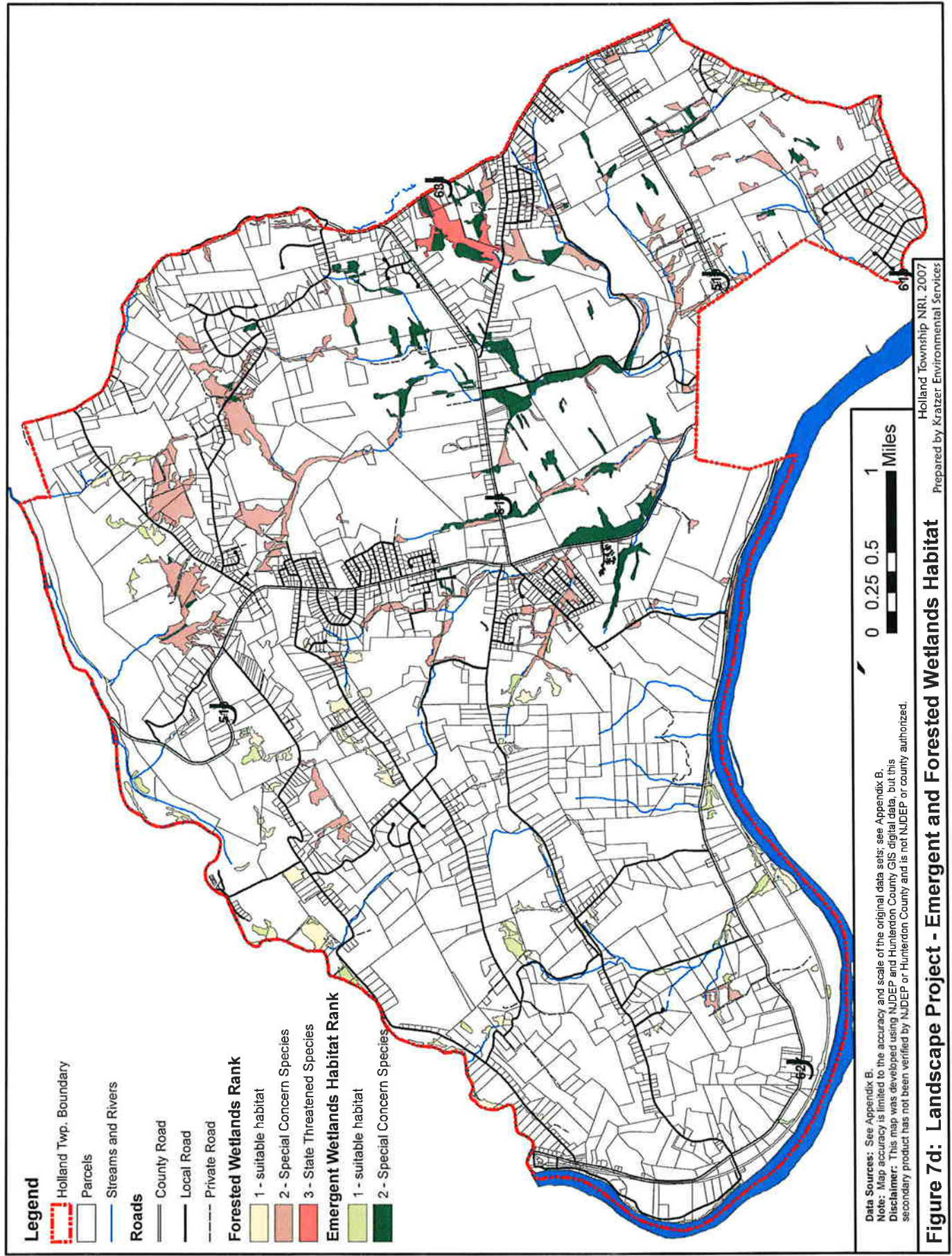
**Prickly Pear Cactus (*Opuntia humifusa*) on Milford Bluffs, a Natural Heritage Priority Site of High Significance.**





**Figure 7c: Landscape Project - Forest and Grassland Habitats**





**Legend**

Holland Twp. Boundary

Parcels

Streams and Rivers

**Roads**

County Road

Local Road

Private Road

**Forested Wetlands Rank**

1 - suitable habitat

2 - Special Concern Species

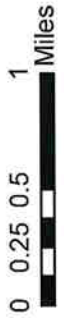
3 - State Threatened Species

**Emergent Wetlands Habitat Rank**

1 - suitable habitat

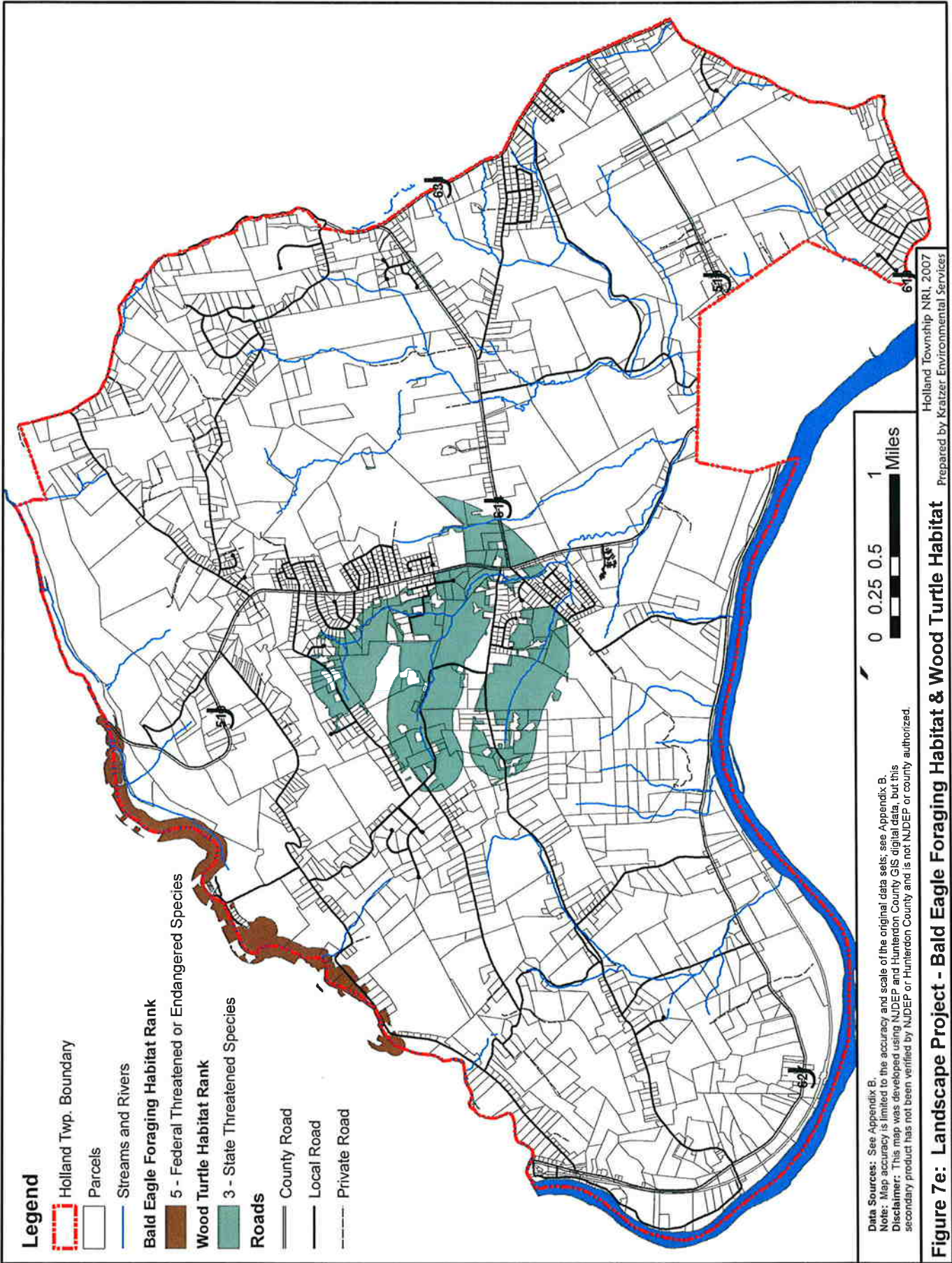
2 - Special Concern Species

Data Sources: See Appendix B.  
 Note: Map accuracy is limited to the accuracy and scale of the original data sets; see Appendix B.  
 Disclaimer: This map was developed using NJDEP and Hunterdon County GIS digital data, but this secondary product has not been verified by NJDEP or Hunterdon County and is not NJDEP or county authorized.



**Figure 7d: Landscape Project - Emergent and Forested Wetlands Habitat**





**Figure 7e: Landscape Project - Bald Eagle Foraging Habitat & Wood Turtle Habitat**  
 Holland Township NRI, 2007  
 Prepared by Kratzer Environmental Services



