

## SUCCESSIONAL HABITATS



WADE FARM, BLOCK 53

**F**IELDS IN READINGTON TOWNSHIP, once dedicated to agriculture, then left fallow and allowed to grow naturally, create a very beautiful and interesting habitat, that produces an ever changing variety of plants and subsequently animals as the years pass. Simply allowing some of Readington's preserved open space to revert to successional woods over time is actually a positive way of increasing the biodiversity in Readington Township.



Block 66

## **Successional fields and woodlands**

### **A. Definition/structure**

- In Readington, these areas are largely composed of abandoned farmland undergoing vegetational succession.
- Local successional vegetation stages usually proceed from (1) early-successional mixed-species herbaceous cover of grasses, forbs, and brambles, (2) mid-successional combination of herbaceous cover, scattered shrubs, and small trees (both early- and late-successional species), and (3) a later-successional type consisting of young early-successional trees forming an almost closed canopy, interspersed with declining herbaceous plants, woody shrubs, and young later-successional trees.
- In most areas in Readington (excluding very wet wetlands), vegetational succession will proceed towards a “dynamic climax” stage of closed-canopy deciduous hardwood forest consisting of mostly later-successional tree species.
- Vegetational stage can be somewhat age-independent due to the presence of several possible succession-inhibiting factors (e.g., overabundance of herbivores, infrequent mowing or other human-related disturbance, several years of exceptional drought).

### **B. Extent and location**

- See Figure 5.

### **C. Characteristic flora and fauna of successional habitats**

- The following lists include species associated with successional vegetation in Readington, which depend mostly, entirely, or for a significant portion of their lives on the habitat.
- **Trees:** eastern redcedar, black cherry, red maple, flowering dogwood, American elm, aspen (quaking, big-toothed), gray birch, ash, pin oak
- **Shrubs and brambles:** bayberry, dewberry, allegheny blackberry, black raspberry, gray dogwood, sumac (staghorn, smooth, winged), multiflora rose (non-native)
- **Herbs:** little bluestem, common milkweed, goldenrod spp., orchard grass, foxglove beardtongue, foxtail, queen-Anne’s-lace common mullein, hawkweed, common cinquefoil, butter-and-eggs, ox-eye daisy
- **Mammals:** meadow vole, cottontail rabbit, whit-tailed deer, striped skunk

- **Birds:** red-tailed hawk, cooper's hawk, field sparrow, chipping sparrow, song sparrow, yellow warbler, prairie warbler, northern cardinal, American robin, mourning dove, mockingbird, brown thrasher, white-eyed vireo
- **Herpetiles:** box turtle, garter snake, red-backed salamander
- **Mosses and lichens:** brittish soldier lichen, haircap moss, sphagnum moss
- **Invertebrates:** bumblebee, honey bee, hummingbird moth, ant spp., spider spp.

#### **D. Key requirements for healthy flora and fauna populations**

- **Large size of contiguous agricultural landscape/grassland**  
Larger sized areas offer a larger number of soil and climatic microsites (e.g., moisture and nutrient content of soil, aspect of slope, combinations of adjacent habitat types), a larger pool of resources, and more protection from disturbances/predation. This, in turn, allows such larger areas to support both a higher diversity, and larger, more stable populations of characteristic species.
- **Suitability of neighboring/associated habitats**  
Many organisms associated with successional habitats depend on other habits for critical resources during some or all of the year. These include wetlands, streams, rivers, and ponds, as well as mature-forest edges. In addition, plant propagules arriving from healthy adjacent habitats promotes greater diversity in developing successional communities.  
Thus, loss or degradation of those neighboring or associated habitats can have severe negative impacts on populations of organisms in otherwise healthy-appearing, but isolated/fragmented successional habitats.

#### **E. Important ecosystem functions of successional habitat**

- **Soil-building**  
Vegetational succession is usually accompanied by an improvement in soil structure and fertility. Annual cycles of growth and return of organic material to the soil surface, as well as root growth and the activity of soil fauna, result in a slow but steady increase in soil nutrients and organic matter content. Soil eroded, or otherwise depleted of nutrients by environmentally-unfriendly agricultural practices can thus begin regeneration over a period of many decades by allowing land to undergo this successional process.
- **Hydrologic buffering**  
Over time, successional habitats typically show an increasing ability to buffer extremes in precipitation. As a more organic-material-rich soil develops in these habitats, the ability of the soil to absorb precipitation increases. The result is increased flood control due to decreased surface runoff, as well as increased groundwater and stream levels during droughts.

- **Reforestation**

Successional habitats in Readington will usually proceed towards a mature deciduous forest cover. This gradual reforestation results ultimately in the return of diverse mature-forest habitat, home to a large number of native species (including many threatened and endangered species).

## **F. Major threats to habitat and proposed solutions**

- **Fragmentation by suburban development**

Successional habitat fragmented by suburban development results in lower-quality habitat than relatively larger, contiguous habitat, both during succession and in the eventual mature-forest cover. Fragmentation results in larger areas of existing habitat being exposed to edge-related disturbances, provides a smaller resource base for wildlife, and hinders exchange of individuals and genetic material between habitats.

*Possible solutions:* Continue and accelerate Township efforts to preserve open space—particularly larger areas contiguous to existing open-space.

- **Overpopulation of white-tailed deer**

Over-abundance of white-tailed deer has several significant effects on successional communities. Overgrazing inhibits growth of most native woody shrubs and trees, resulting in a delayed vegetational succession at the herbaceous/bramble stage. Oftentimes, only relatively unpalatable non-native species are able to persist in such overgrazed successional fields. A typical result is the formation of a dense tangle of multiflora rose and Japanese honeysuckle after 15-20 years, rather than a young forest consisting of native trees and shrubs.

*Possible solutions:* Control populations of white-tailed deer through the establishment of more liberal hunting seasons, the encouragement of farm-owners to apply for degradation permits, and the hiring of professional sharpshooters to control populations in developed areas.

- **Human disturbance**

Much successional habitat in Readington lies fairly close to recently-built suburban development—much of it representing Township-owned open-space associated with the . As a result, degradation of the habitat through human-related disturbances can be a significant problem. Soil erosion and compaction from off-road vehicles, littering, and overabundance of human-subsidized predators such as house-cats and raccoons can result in severely depressed habitat quality.

*Possible solutions:* Initiate educational programs for Township residents concerning location and access points of open space parcels in their area, as well as organize volunteer-led nature walks in these areas for both children and adults. Involvement of local residents in their local open-space resources will likely promote a vastly increased appreciation of these areas, and the resulting local

stewardship will likely be both cheaper and more effective than any possible Township regulations and enforcement.



**LAND USE & LAND COVER LOCATION LEGEND**

- AGRICULTURAL WETLANDS (MODIFIED)
- ALTERED LANDS
- ARTIFICIAL LAKES
- ATHLETIC FIELDS (SCHOOLS)
- COMMERCIAL SERVICES
- CONIFERUS BRUSH/SHRUBLAND
- CONIFERUS FOREST (10-49% CROWN CLOSURE)
- CONIFERUS FOREST (50-99% CROWN CLOSURE)
- CROPLAND AND PASTURELAND
- DECIDUOUS BRUSH/SHRUBLAND
- DECIDUOUS FOREST (10-49% CROWN CLOSURE)
- DECIDUOUS FOREST (50-99% CROWN CLOSURE)
- DECIDUOUS SCRUB/SHRUB WETLANDS
- DECIDUOUS WETLANDS
- DEVELOPED WETLANDS (MODIFIED)
- EXTRACTIVE MINING
- FORMER AGRICULTURAL WETLAND (RECOVERING SHRUBBY, NOT BUILT-UP)
- HERBACEOUS WETLANDS
- INDUSTRIAL
- INDUSTRIAL/COMMERCIAL COMPLEXES
- MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA
- MANAGED WETLAND IN BUILT-UP MAINTAINED GREENSPACE
- MIXED DECIDUOUS/CONIFERUS BRUSH/SHRUBLAND
- MIXED FOREST (50% CONIFERUS WITH 50% CROWN CLOSURE)
- MIXED FOREST (50% CONIFERUS WITH 10-49% CROWN CLOSURE)
- MIXED FOREST (50% CONIFERUS WITH 10-49% CROWN CLOSURE)
- MIXED FOREST (50% CONIFERUS WITH 50% CROWN CLOSURE)
- MIXED FORESTED WETLANDS (DECIDUOUS DOM)
- MIXED SCRUB/SHRUB WETLANDS (CONIFERUS DOM)
- MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM)
- MIXED URBAN OR BUILT-UP LAND
- OLD FIELD (1-25% BRUSH COVERED)
- ORCHARDS/VEGETABLES/FRUIT/VEGETABLES/AGRICULTURAL AREAS
- OTHER AGRICULTURE
- OTHER URBAN OR BUILT-UP LAND
- PARKS/RECREATION
- RECREATIONAL LAND
- RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING
- RESIDENTIAL, MEDIUM DENSITY, SINGLE UNIT
- RESIDENTIAL, SINGLE UNIT, LOW DENSITY
- RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
- STREAMS AND CANALS
- TRANSITIONAL AREAS
- TRANSPORTATION/COMMUNICATIONS/UTILITIES
- WETLAND RIGHTS-OF-WAY (MODIFIED)

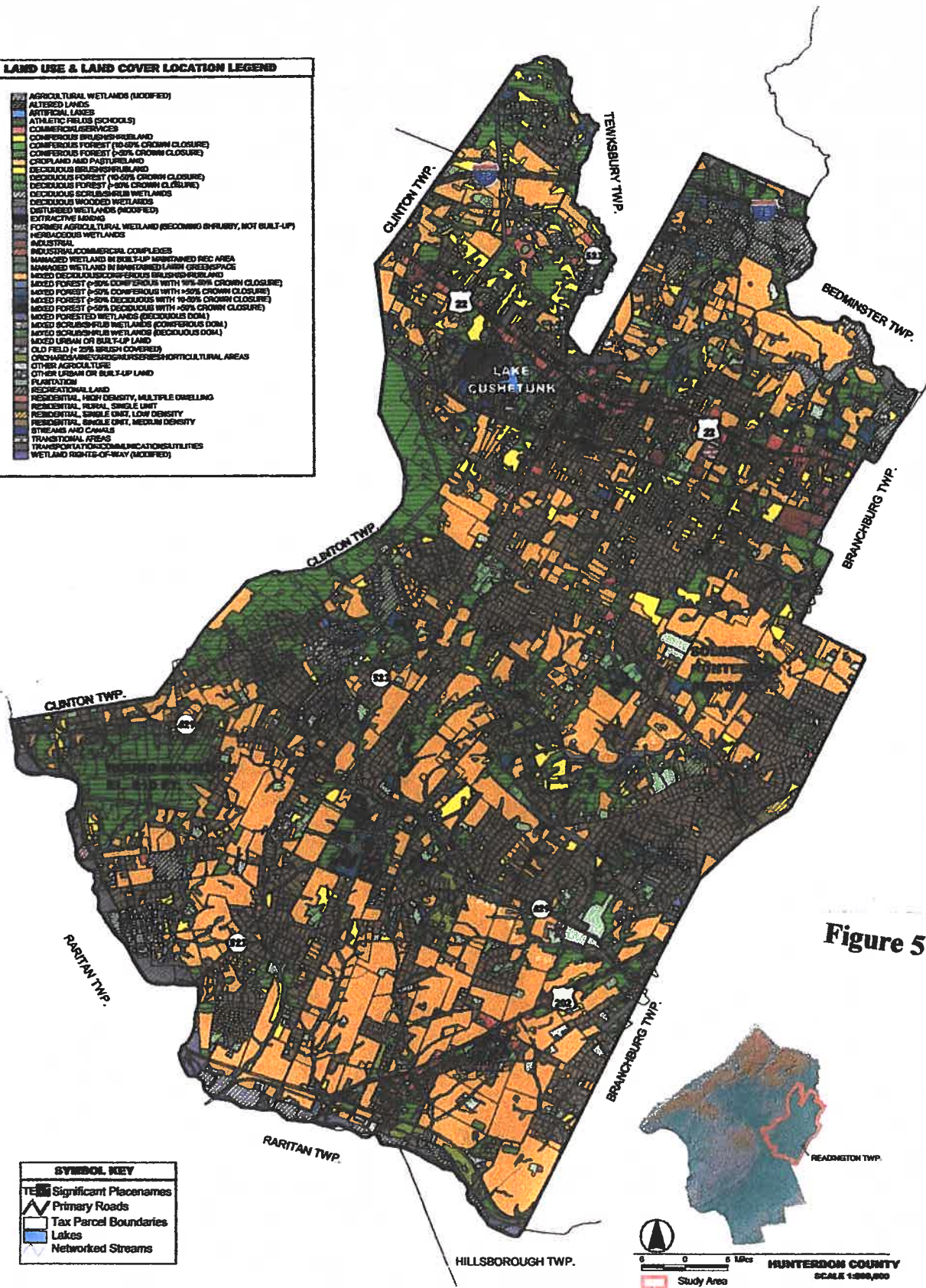


Figure 5

**SYMBOL KEY**

- TE Significant Placenames
- Primary Roads
- Tax Parcel Boundaries
- Lakes
- Networked Streams

READINGTON TOWNSHIP, NRI, 2000

Land use & Land Cover Information Collected from New Jersey Department of Environmental Protection, WebGIS; GIS Data Downloads, WMA 8, 1995-97 LULC from Aerial Photography Scale: 1 meter resolution

NOTES  
1. DATA ACCURACY IS LIMITED TO THE ACCURACY AND SCALE OF THE ORIGINAL DATA SOURCES.

Figure 16: Readington Township Land Use & Land Cover Map

DRAWN BY:	KJM
CHECKED BY:	GMS, SF
Project No.:	160.02



# Successional fields and woodlands

Extent and location in Readington



# Suburban

---



## **Suburban developments**

### **A. Definition/structure**

- In Readington, this habitat typically includes a mosaic of recently-built (ca. within the past twenty years) two-story residential houses, often-sprawling lawns dotted with landscaped trees, gardens, some remnant and newly-planted tree-lines, and small woodlands.

### **B. Extent and location in Readington**

- See Figure 6.

### **C. Characteristic flora and fauna of suburban habitats**

- The following lists include suburban development-associated species found in Readington which can be commonly found in the habitat.
- **Trees:** assorted landscaped deciduous and coniferous trees, including maple (red, silver, Norway), oak (pin, red), flowering dogwood, various fruit trees, white pine, Norway spruce
- **Shrubs:** assorted landscape varieties including viburnum spp., rhododendron spp.,
- **Mammals:** cottontail rabbit, gray squirrel, white-tailed deer, raccoon, Virginia opossum, woodchuck
- **Birds:** American robin, northern cardinal, blue jay, American crow, European starling, house sparrow, house finch, goldfinch, chipping sparrow, white-throated sparrow, downy woodpecker
- **Invertebrates:** butterfly spp., bumblebee, honey bee

### **D. Key requirements for healthy flora and fauna populations**

- **Wildlife-friendly landscape plantings**  
Some species plants provide more numerous and higher-quality resources to wildlife than other plants. Native trees and shrubs typically provide superior food resources, while coniferous trees offer shelter from climatic extremes and predators. In addition, some species of flowering landscape shrubs offer food for butterflies, hummingbirds, and other insects. In addition, almost any tree or shrub will provide superior habitat than an unbroken lawn.
- **Non-toxic lawn-care**



Applications of excessive amounts of herbicide, pesticide, and soluble fertilizer to lawns can be toxic to a wide range of wildlife, including beneficial soil organisms, insects, birds, and mammals (as well as humans). The replacement of such practices with environmentally-friendly lawn-care practices (e.g., application of compost instead of soluble fertilizer, toleration of plant diversity within a lawn) can benefit both local organisms and those affected by the runoff of chemical lawn-care substances.

- **Bird boxes and feeders**

Construction (or purchase) of bird boxes is both relatively simple and educational (for children and adults). Such boxes can provide housing for a number of cavity-nesting bird species which might otherwise be absent from a suburban landscape (e.g., bluebirds, house wrens, black-capped chickadees, titmice, screech owls, woodpeckers).

Bird feeders can also attract a number of species which would otherwise avoid suburban landscapes. Feeding in the winter can attract several species of sparrow, woodpeckers, and finches, among others.

- **Designated “natural” areas**

Designation of certain areas within an open or wooded lawn as a “natural” area, to be mown only once a year (in the fall) or not at all, can provide immediate and future habitat to a wide range of species which would otherwise avoid suburban areas. Such “natural areas,” with their diversity of ground-cover, decomposing grass or wood, and flowering plants provide a good-deal more resources (food and shelter) to wildlife than a heavily manicured landscape. Such areas need-not be left entirely to natural succession, however, some basic ecological processes such as decomposition of plant material and maintenance of plant diversity should be encouraged.

## **E. Potential ecosystem functions of existing suburban habitat**

- **Migration corridors for wildlife**

Planting of wildlife-friendly suburban landscaping, and the scattering of “natural” areas within the suburban landscape can allow existing suburban landscapes to serve as migration corridors for wildlife traveling between more suitable habitats. The connecting of smaller pieces of suitable habitat in this manner increases the overall quality of all habitats in an area.

In addition, wildlife-friendly suburban habitats can aid migratory birds during their long journeys in the Spring and Fall, when they crucially depend on the availability of suitable areas for rest and food along their route.

- **Hydrological buffering**

Although suburban landscapes typically allow far less infiltration of precipitation than forested or successional habitats, certain landscaping practices can greatly increase the value of existing suburban habitats in this regard. Designation of “natural” areas in place of lawn results in a significant increase in

infiltration, as does the inclusion of trees and shrubs into an otherwise extended lawn. Minimization of impervious parking areas and groundcover can also increase infiltration.

- **Reducing human-caused environmental degradation elsewhere**

Any steps towards self-sufficiency with regard to food, fiber, or firewood production in the suburban landscape can decrease suburbia's dependence on environmentally-destructive large-scale agricultural practices in both the United States and other countries. Such practices also decrease our reliance on energy-consumptive long-distance transportation costs for such products.

Vegetable gardens, backyard fruit trees and bushes, small-scale egg and livestock production, and tree plantings in suburban landscapes all contribute towards a more environmentally-friendly, sustainable society.

## **F. Major threats to habitat and proposed solutions**

- **Excessive use of herbicides, pesticides and soluble fertilizer**

Excessive use of herbicides, pesticides, and soluble fertilizer on lawns and gardens is toxic to many species of wildlife.

*Possible solutions:* For both the health of the environment and their own health, encourage residents to seek out the many other readily available, and easily performed methods of environmentally-friendly lawn and garden care.

- **Sprawling, manicured lawns**

Large, regularly-mowed lawns allow very little infiltration of stormwater. As a result, increased surface runoff from such areas can contribute significantly to downstream flooding and the corresponding ecological and property damage.

In addition, such extensive lawns provide minimal food or shelter value to wildlife. Almost any plantings (excluding plantings of invasive exotic species) or alternate management of such lawns represents an improvement to wildlife habitat quality.

*Possible solutions:* Promote backyard habitat improvement through (1) planting of shade and fruit trees, shrubs, and gardens, (2) the setting-aside of "natural" areas, (3) use of birdhouses and feeders, (4) construction of ponds.

- **"Build-out" under current zoning**

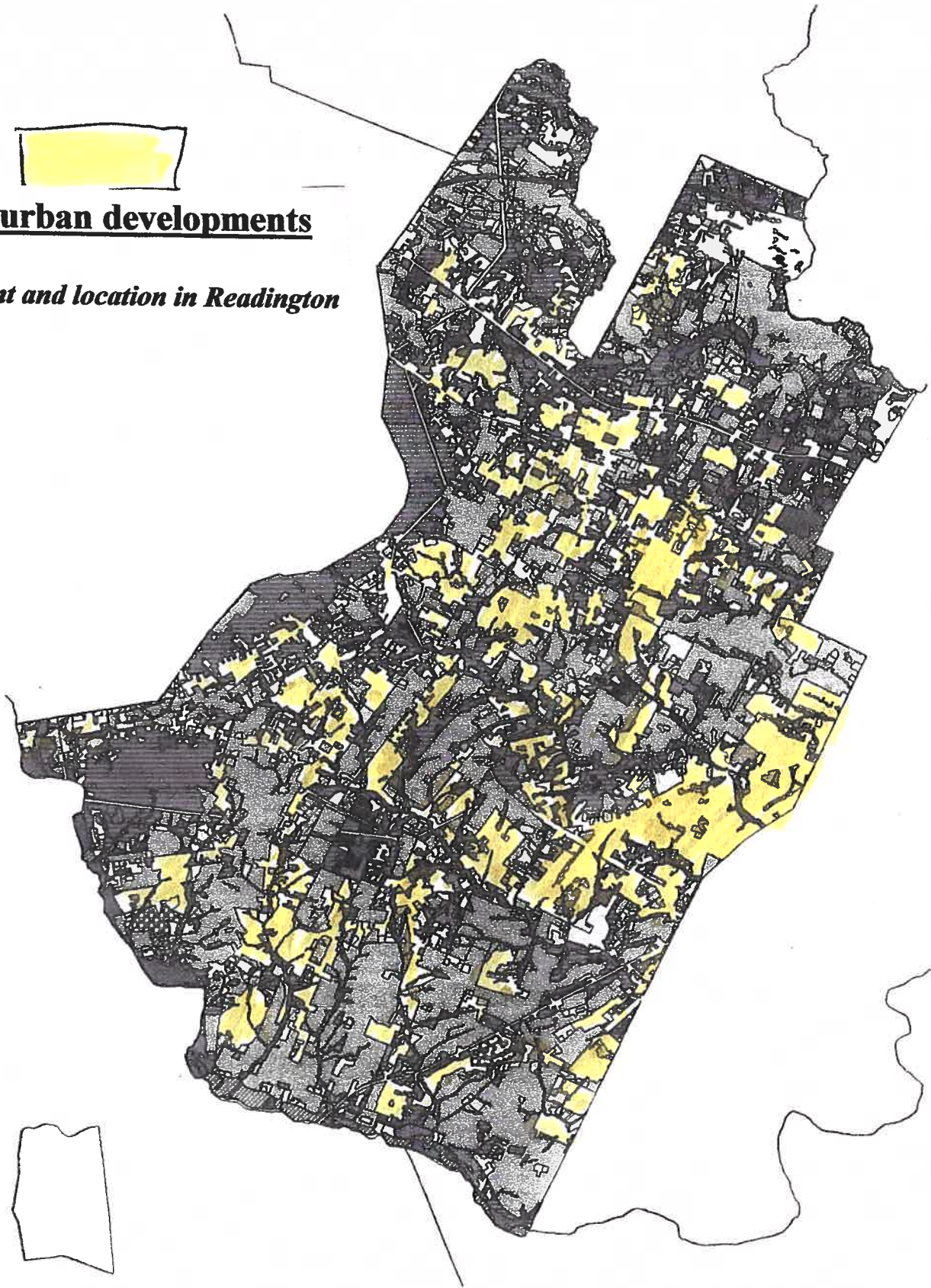
Many of the wildlife species found in suburban settings depend crucially on higher-quality neighboring habitats of woodland, successional fields, and agricultural landscapes. The loss of such habitats via complete "build-out" of Readington under current zoning regulations would drastically decrease the diversity and abundance of wildlife formerly found in those habitats, but would reduce suburban wildlife to a small fraction of what now utilizes such landscapes.

*Possible solutions:* Continue efforts to preserve open-space, while tightening zoning restrictions on remaining Township land containing important wildlife habitat.



**Suburban developments**

*Extent and location in Readington*



**Figure 6**









ABOVE:  
DOBOZYNSKI FARM PARK  
BLOCK 63

RIGHT:  
LANE/ZWEERINK FARM  
BLOCK 75



### Appendix

- **Fact sheet, Raritan Basin Management Project**
- **Report: Wander Ecological, Ecological rationale for Open Space Preservation in Readington Township.**
- **Discussion of the Landscape Project**
- **Resources and references**



# Raritan Basin Watershed Management Project

## Fact Sheet # 4

### THE PROTECTION OF CRITICAL HABITATS

#### What Are Critical Habitats?

"Critical habitat" is a term that is generally associated with the Federal Endangered Species Act. The term refers to natural areas that support threatened and endangered plant and animal species. Critical habitats provide food, water and shelter necessary for the survival of these sensitive species.

#### Why Are Critical Habitats Important?

As the population of New Jersey continues to grow, more and more natural areas are being developed. This has resulted in habitat losses for many species. Currently there are 61 species of wildlife and over 300 species of plants listed on New Jersey's threatened and endangered species list. Many species spend their entire lifecycle within this region, while others depend on the region's resources for just one aspect of their lifecycle, such as breeding, or stopping to feed during migration.

The preservation of diverse numbers of plants and animals is important for maintaining a healthy ecosystem, and may also be important to human health. Throughout history, medical technology has been looking to plants and animals in search of developing new medicines. In recent times, some people previously thought that Horseshoe Crabs were valuable only as fishing bait. Now scientists have found that the blood of Horseshoe Crabs may help find a cure for some types of cancer.

One of the most important things that can be done to protect plants and wildlife is to preserve their habitat. If the habitat they use is not protected and continues to be developed, their numbers will continue to decline. Areas that are considered to be critical habitats are not only important to plants and wildlife. Blocks of uninterrupted, preserved land are also important to humans. Ground water recharge, open space, clean water and clean air all depend on keeping land preserved in its natural state.



*Development in our region continues to threaten habitat necessary for the survival of plants and wildlife. Reptiles and amphibians are both extremely sensitive to environmental pollutants and declining water quality.*

## **Working to Protect Critical Habitats...**

The NJDEP Division of Fish and Wildlife's Endangered and Nongame Species Program has formed an approach to help in the preservation of critical habitats. This project is called the Landscape Project. Using Geographic Information Systems (GIS) mapping, the project is identifying critical habitats based on existing land use/land cover data, and the known locations of endangered and threatened species and declining species of forest interior dwelling songbirds. The Raritan Basin Project is using the information provided by the Landscape Project to determine the location of critical habitat areas in the Raritan Basin. After these strategies to help communities protect these important areas.

## **What Can You Do To Help?**

- Find out what species of threatened or endangered plants and wildlife live in your region and work with municipal officials to develop ordinances to protect them.
- Plant native species instead of grass in your yard to attract and support wildlife.
- Support tax check-offs that benefit wildlife.
- Support the acquisition of open space in your community.

### **For More Information.....**

If you would like to learn more about endangered and threatened species in New Jersey, contact the NJDEP Division of Fish and Wildlife's Endangered and Nongame Species Program at (609) 292-9400. If you would like more information on how to become involved in the Raritan Basin Project, contact the NJ Water Supply Authority, Watershed Protection Programs Unit, at (732) 356-9344, or visit our website at [www.raritanbasin.org](http://www.raritanbasin.org). The Raritan Basin Watershed Management Project is a partnership of government, non-profit and private organizations working together to improve the water resources of the Raritan River. You may also contact the New Jersey Department of Environmental Protection's Raritan Region staff at (609) 633-7020 or visit the NJDEP Division of Watershed Management website at [www.state.nj.us/dep/watershedmgt/](http://www.state.nj.us/dep/watershedmgt/).

## **Ecological Rationale for Open Space Preservation in Readington Township**

Readington Township's remaining open space is under continuing pressure for development for residential, commercial, and industrial uses. The adverse ecological impacts of the loss of open space (or, conversely, the beneficial impacts of its preservation) should be carefully considered in land-use planning decisions.

Preservation of open space is essential for the maintenance of ecological communities that are at least partially representative of the natural world that is being destroyed by development. Hundreds of species of plants, and of vertebrate and invertebrate animal species, depend for their survival on the maintenance of relatively undisturbed open space. The extensive impervious surfaces that are the hallmark of developed land are essentially incompatible with any visible life, but even less-altered landscapes such as suburban yards can support only a catastrophically diminished suite of species compared to natural habitats. Even here, native organisms are often deliberately targeted for eradication.

Where a forest stood with 25 native species of trees, cleared land may be replanted with two or three—cultivated varieties or even nonnative species. Dozens of forest herbaceous plants are replaced by a monoculture of turfgrass. Where the forest supported 30 species of breeding birds, a new subdivision may support 5 or 6. The few insect species that remain of the hundreds that lived in the forest become objects of fear, loathing, and pesticide application. Thus, biodiversity—the number of different life forms, at all levels of organization from the molecular to the landscape level, that an area can support—is the first casualty of land development.

As a result of drastic changes to the natural landscape, the "ecosystem services" that it formerly provided are seriously degraded, if not completely lost. Ecosystem services are essential life-support functions for the biosphere—and thus human civilization—that often go unnoticed until seriously disrupted, and that are generally difficult to evaluate in monetary terms compared to the dollar value of land subjected to development or extractive use.

Many of the human activities that modify or destroy natural ecosystems may cause deterioration of ecological services whose value, in the long term, dwarfs the short-term



economic benefits that society gains from those activities. Thus preservation of open space provides, at least at the local level, the opportunity to maintain ecosystem services such as:

- **Climate buffering:** Natural ecosystems may play a large-scale role in stabilizing global climate oscillations, and, on a local scale, transpiration by plants (by inducing local rainfall) limits regional moisture loss and moderates surface temperature rises. Forests likewise moderate temperatures by providing shade and surface cooling, and blocking winds.
- **Air purification:** Plants in natural ecosystems utilize atmospheric carbon dioxide, producing oxygen as a byproduct. This process not only produced an atmosphere on Earth conducive to life as we know it, but continues to ameliorate the excess carbon dioxide produced by human civilization.
- **Mitigation of droughts and floods:** Natural vegetation and plant litter shield soil from the destructive impacts of raindrops, preventing rapid runoff that leads to floods and erosion of soil (and its subsequent harmful deposition into aquatic systems). This protection allows the soil to soak up the water, then release it slowly to plant roots, groundwater aquifers, and surface streams. Living vegetation, through transpiration, also returns water from the ground into the atmosphere, a vital link in the water cycle. Wetland systems function to absorb and slow the velocity of floodwaters, and to trap sediments.
- **Soils services:** In addition to functioning in the water cycle, as described above, soils in natural ecosystems (1) shelter seeds and provide physical support to growing plants; (2) retain and deliver nutrients to plants; (3) provide the matrix for decomposition of organic matter and wastes by microbes and other soil organisms, and for detoxification of many human-produced pollutants (thus protecting water supplies); (4) recycle nutrients to plants; and (5) play an important role in regulating the global carbon, nitrogen and sulfur cycles.
- **Pollination:** More than 90% of the plants for which the mode of pollination is known (and about 70% of agricultural crop species) require pollination by animals. More than 100,000 wild animal species—including birds, bats, bees, butterflies, beetles, and flies—are known to provide free pollination services for crop and garden plants as well as

meadows, rangelands, and forests. These animals require the continued existence of a wide variety of natural habitats for feeding, breeding, and other aspects of their life cycles.

- **Pest control:** An estimated 99% of potential crop pests are controlled by natural predators, including birds, spiders, parasitic wasps and flies, ladybugs, fungi, viral diseases, and numerous other types of organisms. Providing natural habitat to maintain populations of these organisms reduces our dependence on pesticides, which are expensive, often seriously toxic to nontarget organisms and humans, and promote resistance in target pests.
- **Seed dispersal:** Natural ecosystems support the thousands of animal species that disperse seeds and thereby ensure successful reproduction and range expansion of many species of plants.
- **Providing aesthetic beauty and intellectual/spiritual stimulation:** Open space and natural ecosystems are a continuing source of artistic inspiration, spiritual peace and rejuvenation, and intellectual stimulation for many people of many cultures.
- **Ecosystem goods:** The ecosystem service of providing marketable goods from natural areas (for example, fish, animals and animal products, timber, fuelwoods, foods, fibers, pharmaceuticals, spices, gums and resins, essential oils and flavorings, dyes and tannins, fats and waxes, insecticides), while very important in some areas of the world, is probably not a major function of ecosystems in Readington Township

For ecosystems to provide such locally and globally important services requires very large numbers of species and populations (i.e., high biodiversity), and ecosystems operate on such a large scale and in such complex and little-understood ways, that very few of their services could be replaced by technological "fixes." The only rational way to maintain this life-support system, of whose parts and workings we as yet have only the dimmest understanding, is to maintain extensive areas of open space within which human influences are kept to a minimum.

1. In general, a positive correlation exists between the amount of open space preserved and the number of species (i.e., the greater biodiversity) preserved. For example, preserving a larger parcel, or more parcels, makes it more likely that a specific habitat (such as limestone outcrops) or habitat feature (such as a water source) required by a certain plant or animal species will be included in the preserved area.
2. Preserving larger parcels of a single habitat type (such as forest or grassland) makes it more likely that species requiring large areas of habitat, or populations requiring large numbers of individuals to be viable, will be preserved.
3. Preservation of smaller undeveloped "corridors" that connect larger parcels is important to permit movement of organisms among the parcels. Forest-inhabiting salamanders, for example, cannot cross dry, open habitats such as suburban backyards, to move between forest parcels. Movement corridors are critically important for facilitating genetic interchange among otherwise isolated populations, providing organisms an escape route from unfavorable conditions at one location, and allowing immigrating organisms to recolonize parcels where a species may have been locally extirpated.
4. The more extensive the open space available to wildlife populations, the less likely the occurrence of undesirable human-wildlife interactions.
5. Preserving open space restricts the amount of impervious cover within watersheds, and thus reduces the many adverse impacts that inevitably result following introduction of such cover. As noted in the *ANJEC Report* of Winter 2001, as little as 10 percent impervious cover within a watershed may result in the following detectable changes in its streams:
  - increased floods
  - channel and bank erosion, resulting in widening of the stream
  - lower dry-weather flow
  - decline in woody debris (habitat/food source for many instream organisms)
  - deterioration of the stream's riffle-and-pool structure, which provides habitat for a wide array of aquatic organisms

- increased sedimentation, turbidity, velocity, and temperature, and introduction of pollutants (such as hydrocarbons and asbestos from automobiles, fertilizers and pesticides from lawn maintenance, and fecal coliform bacteria from pet wastes), all of which adversely impact instream plant and animal life

Once impervious coverage within a watershed reaches 25-30 percent, streams generally no longer support aquatic life, are unsafe for contact recreation, and have highly unstable channels.

6. Impervious cover can affect the hydrologic cycle. When soil with good vegetative cover is replaced by impervious cover, water from precipitation no longer infiltrates the soil to replenish local groundwater supplies. Precipitation is intercepted and routed rapidly away, generally across other impervious surfaces. Some is conveyed directly into streams, some into systems such as detention basins (which infiltrate only a small percentage of the total water detained), and some evaporates (a much greater percentage than would have evaporated off the original surfaces).

The decrease in groundwater recharge (often coupled with increased groundwater withdrawal from wells) may consequently impact the baseflow of streams, leading to lower low flow conditions and even to complete loss of flow under some conditions. Naturally, aquatic organisms are severely impacted in such cases.

Draft: Warden Ecological  
for: Readington Township





## The Landscape Project

---

New Jersey is the most densely populated state in the nation. One of the consequences of this distinction is the extreme pressure that is placed on our natural resources. As the population grows we continue to lose or impact the remaining natural areas of the state. As more and more habitat is lost, people are beginning to appreciate the need to maintain land in its natural state. For example, we now know that wetlands are critical for recharging aquifers, lessening the damage from flooding and naturally breaking down contaminants in the environment. Forests and grasslands protect the quality of our drinking water, help purify the air we breathe and provide important areas for outdoor recreation. Collectively these habitats are of critical importance to the diverse assemblage of wildlife found in New Jersey, including more than 60 species classified as threatened or endangered.

Suburban sprawl is rampant as people leave our cities to live in the "country." Some of the consequences of this rapid suburbanization are the loss and degradation of critically important wildlife habitats and the fragmentation and isolation of habitats that remain. Many rare species require large contiguous blocks of habitat to survive. Small patches of fields, forests and wetlands interspersed with development provide habitat for some common species but don't provide the necessary habitat for most of our rare wildlife. We need to protect large, contiguous blocks of forest, grasslands and wetlands to assure the survival of rare species over the long-term.

Despite New Jersey's protection efforts, which include strict land use regulations and an aggressive open space acquisition program ([Green Acres](#)), we continue to lose critical wildlife habitat at an alarming rate. In just the last three decades we have lost 40% of the critical migratory bird stopover habitat on Cape May peninsula and 50% of the state's bog turtle habitat. Protecting large expanses of fields, forests and wetlands helps to ensure that rare species will remain a part of New Jersey's future. In addition to providing habitat for the conservation of rare species, protecting important wildlife habitat will result in more open space for outdoor recreation. Recent surveys by the [US Fish and Wildlife Service](#) show that more than 60% of Americans participate in some form of wildlife related recreation. Open spaces provide places where people can escape the confines of urban and suburban living. Retaining habitats in their natural state provides other benefits such as reducing the threat of flooding, allowing for the biodegradation of environmental contaminants and recharging ground water reserves.

In 1994 the NJ Division of Fish, Game and Wildlife's [Endangered and Nongame Species Program](#) adopted a large scale (landscape level) approach to protect rare species and important habitats, which is entitled, the Landscape Project. The Landscape Project is a pro-active, ecosystem-level approach for the long-term protection of rare species and their habitat in New Jersey. One of the unique features of

the Landscape Project is that it focuses on the big picture and not just on individual rare species locations as they become threatened. The Landscape Project identifies critical wildlife habitats within large landscapes that must be preserved now if we want to assure the conservation of New Jersey's rare wildlife for future generations. Since many animal populations require large expanses of natural habitat for their long-term survival, the Landscape Project focuses on large areas that are ecologically similar with regard to their plant and animal communities.

Using a computer mapping program known as the [Geographic Information System](#) (GIS), the New Jersey Division of Fish, Game and Wildlife's Endangered and Nongame Species Program is developing maps that identify critical wildlife habitat based on rare species location information and land cover classifications. Areas of critical rare species habitat within each landscape region have been identified and mapped using an extensive database of rare species location information and land use classification data. Landscape Project maps, available early in the Year 2000, provide a highly accurate, reliable and scientifically sound information base for habitat protection needs within each landscape.

The Landscape Project has been designed to provide users with scientifically sound information that is easily accessible and can be integrated with planning and protection programs at every level of government. Landscape Project maps and overlays provide a basis for proactive planning such as the development of local habitat protection ordinances, zoning to protect critical habitat, management guidelines for rare species protection on public and private lands, and land acquisition projects.

The project goal is to protect New Jersey's biological diversity by maintaining and enhancing rare wildlife populations within healthy, functioning ecosystems. The products of the Landscape Project provide the information needed to guide rare species protection efforts at the state, county and municipal levels. Landscape Project products will provide users with valuable critical habitat information that can be used for planning purposes before any actions take place. Proper planning with accurate and scientifically sound information will result in less conflict and wasted time and money attempting to resolve endangered and threatened species conflicts.

Landscape Project maps will enable state, county, municipal and private agencies to identify important habitats and protect them in a variety of ways. They provide land-use regulators and state, county and local planners with the tools they need to enhance protection through the regulatory and planning process. Landscape Project products provide tools to guide citizen actions to protect rare species habitat at the local level. Local efforts are currently underway in Chester Township in Morris County and Delaware Township in Hunterdon County.

They will also be used to prioritize land parcels for purchase through acquisition programs like [Green Acres](#), Farmland Preservation, and the [U.S. Fish and Wildlife Service's](#) refuge system. Landscape mapping will also foster better management of the

1 million acres of open space that already exist in New Jersey. These lands are managed by a variety of agencies and organizations, both public and private. Critical habitat maps identify areas on these lands that may require special management or cooperative management by different agencies responsible for lands within the same ecosystem. Under the Landscape Project, ENSP biologists will work hand in hand with public land managers and private landowners to develop best management practices for the long-term conservation of rare species and ecosystems.

Landscape Project maps will be available via the Internet in several ways. GIS coverages will be available for download early in the Year 2000 on the Division of Fish, Game and Wildlife's website. One version is available to users employing ArcView or ArcExplorer, a free GIS program available from [Environmental Systems Research Institute, Inc.](http://www.esri.com) (www.esri.com). For those who do not need to download the maps or do not want to download ArcExplorer, the maps will be viewable in the Year 2000 over the internet through the NJDEP GIS interactive internet mapping project at: [www.state.nj.us/dep/gis](http://www.state.nj.us/dep/gis).

---



## Resources

### Online:

Landscape Project - Critical Habitat Mapping: downloads will be available on Endangered and Nongame Species Program website, [www.state.nj.us/dep/fgw/ensphome.htm](http://www.state.nj.us/dep/fgw/ensphome.htm). Contact: Amanda Dey, Endangered and Nongame Species Program, Division of Fish and Wildlife, (609) 292-9451 [adey@dep.state.nj.us](mailto:adey@dep.state.nj.us)

Landscape Project Report: details the methodology used to delineate critical habitat (forest, grassland, wetland) in New Jersey. PDF file; download available at [www.state.nj.us/dep/fgw/ensphome.htm](http://www.state.nj.us/dep/fgw/ensphome.htm).

New Jersey Natural Heritage Program: [www.abi.org/nhp/us/nj/index.html](http://www.abi.org/nhp/us/nj/index.html)

Land cover change analysis, 1972, 1984, 1995: Landsat TM imagery (grids) of New Jersey classified to Level I (6 land cover classes); interactive mapping and summary tables with change in acreage by county and watershed. Rutgers University, Center for Remote Sensing and Spatial Analysis, [www.crssa.rutgers.edu/projects](http://www.crssa.rutgers.edu/projects) select "NJ Landscape Change Research".

Land cover change analysis, 1986 to 1995/97: Land use/Land cover polygon shapefiles for New Jersey's Watershed Management Areas have been created by comparing the 1986 LU/LC layers from the NJDEP GIS database to the 1995/97 color infrared digital imagery, and delineating areas of change. In addition, an impervious surface (IS) code has been assigned to each polygon. All polygons retain the original 1986 land use code, as well as being given a 1995/97 land use code so that change analysis can be done directly from these data sets. Downloads of this and many other data layers available at [www.state.nj.us/dep/gis](http://www.state.nj.us/dep/gis), NJ Department of Environmental Protection, Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA).

### Useful References:

Peterson, R. T. 1980. **A Field Guide to the Birds of Eastern and Central North America**. Fourth Edition. Houghton Mifflin Company, Boston, MA.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. **The Birder's Handbook: A field guide to the natural history of North American Birds**. Simon and Schuster Inc., New York, NY. (*An excellent reference and companion to your identification guide*).

Conant, R. 1975. **A Field Guide to the Reptiles and Amphibians of Eastern and Central North America**. Second Edition. Houghton Mifflin Company, Boston, MA.

Burt, W. H., and R. P. Grossenheider. 1976. **A Field Guide to the Mammals of North America north of Mexico**. Third Edition. Houghton Mifflin Company, Boston, MA.

**Grasslands of Northeast North America: ecology and conservation of natural and agricultural landscapes**. 1997. P. D. Vickery and P. W. Dunwiddie, Eds. Massachusetts Audubon Society, Lincoln, MA.

Collins, B. R., and K. H. Anderson. 1994. **Plant Communities of New Jersey: A study in landscape diversity**. Rutgers University Press, New Brunswick, NJ. (*A very good reference to habitats of NJ*)

Tiner, R. W. 1998. **In Search of Swampland: A wetland sourcebook and field guide**. Rutgers University Press, New Brunswick, NJ.