



Managing Stopover Habitat for Migratory Landbirds

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PREFACE

THIS MANUAL WAS PREPARED by the NJ Division of Fish, Game, and Wildlife's Endangered and Nongame Species Program to identify land management practices favorable to the preservation and improvement of critical migrant landbird stopover habitat in Cape May County, New Jersey. It has been adopted from a similar, albeit broader, document written by the Management Committee of the Maryland Partners in Flight. The main purpose of the manual is to provide the land manager with a single, succinct, and useful digest of the most important practices to follow (or avoid) in fostering a bird-friendly habitat. We do not presume that this manual is definitive, yet at the same time we have sought to be authoritative. All of the guidelines contained within are supported by research in the open literature.

The birds that this manual is designed to conserve are migrant landbirds that use the Cape May peninsula as a fall stopover site. Other families of birds, such as waterfowl and shorebirds, are beyond the purview of this document, as are non-migrant resident birds. However, the practices recommended here will benefit most bird species (migrants and non-migrants) as well as a wide variety of non-avian wildlife.

ACKNOWLEDGMENTS

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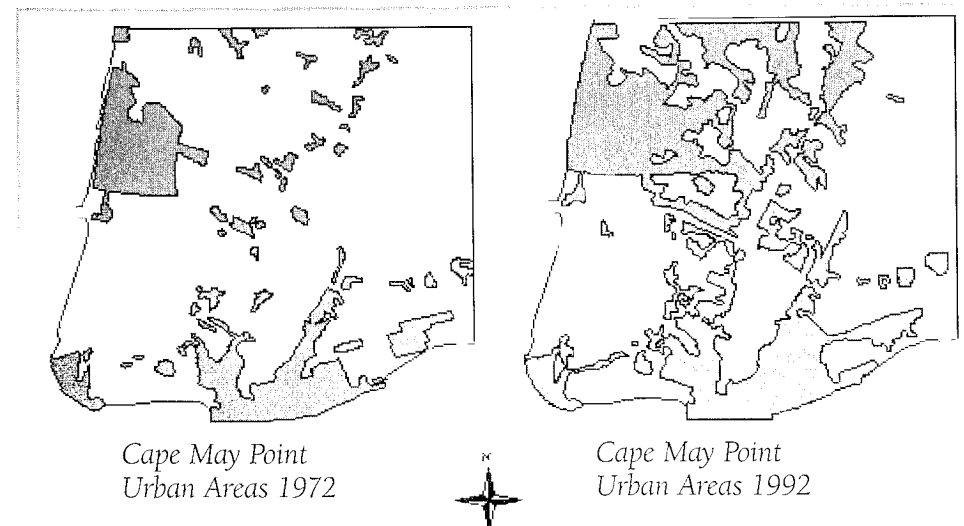
INTRODUCTION

Cape May Stopover Protection Project

THE CAPE MAY PENINSULA is one of the most significant migratory bird concentration areas in the world. It is an important fall stopover for woodcock, over 130 neotropical passerines, 15 species of raptors, and many species of short-distance avian and insect migrants. This diversity of species is attracted to the peninsula's ideal habitat, including one of the largest contiguous forests on the middle Atlantic coast, and the tidal marshes of both the Delaware Bay and Atlantic coast. Recent studies have found a significant link between the quality of this habitat and survival during migration—the better the habitat, the longer the stay, the healthier the birds.

Unfortunately, habitat on the Cape May peninsula is steadily declining, with nearly 40% having been lost since 1972 (Figure 1). Based on current land development pressures, losses will continue and most likely have a long-term, negative, and irreversible impact on the quality of the peninsula as a migratory stopover. To make matters worse, the most severe development pressure on non-conserved land is now occurring in areas containing critical habitat.

Figure 1: Developed Areas of Cape May Peninsula, 1972-1992





Seeking to reverse the trend of high quality habitat loss on the Cape May peninsula, the Endangered and Nongame Species Program (ENSP) launched the Cape May Stopover Protection Project in 1997. This two year project offers a unique approach to land conservation whereby partners, including ENSP, the Nature Conservancy (TNC), New Jersey Audubon Society (NJAS), the Association of New Jersey Environmental Commissions (ANJEC), the Conserve Wildlife Foundation, and the US Fish and Wildlife Service (USFWS), are engaging private land owners, municipal and county planning boards, and local land managers in volunteer partnerships to restore and conserve critical high quality habitat.

The Cape May Stopover Protection Project is centered around the Conserved Land Center strategy. Conserved Land Centers (CLCs)—lands already conserved through existing open space ownership (Figure 2) and freshwater wetlands regulations—were identified as hubs around which migratory bird habitat will be expanded. In all, ENSP staff members identified and mapped more than 66,000 acres of this high quality habitat on the Cape May peninsula. Accordingly, land managers of these areas have a

unique opportunity to vastly enhance and improve migrant habitat on the Cape. By following the management recommendations outlined in this guide, land managers of key CLCs can have a major impact on the future of Cape May as a fall stopover for migrating birds.

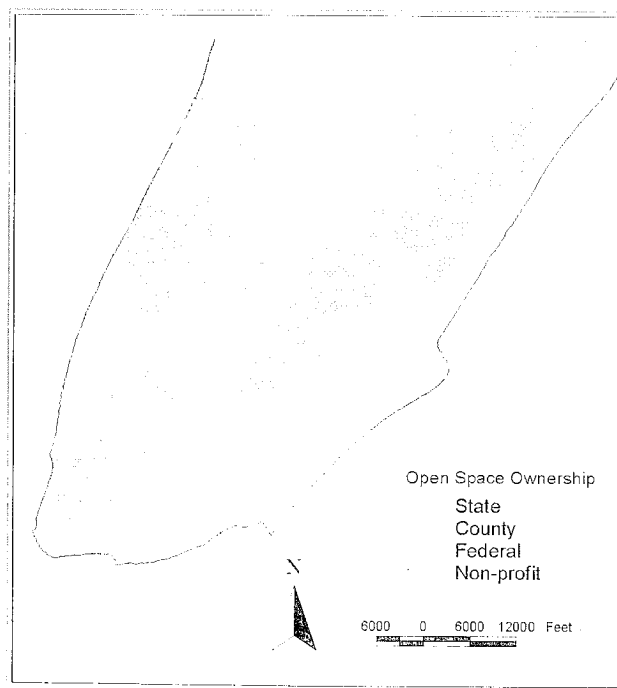


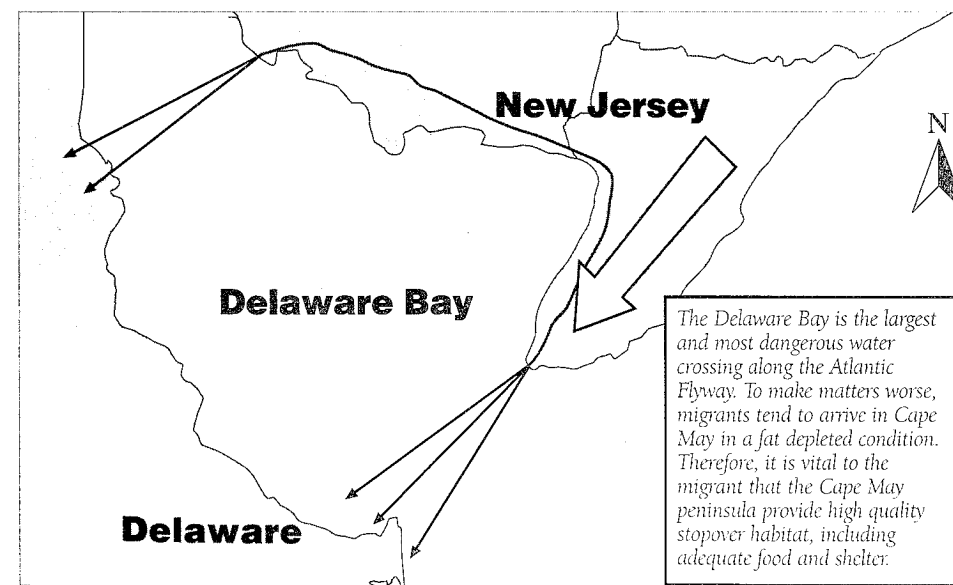
Figure 2: Lower Cape May County Open Space



Stopover Ecology

MIGRATION IS A COMPLEX PROCESS. The geographic distribution of birds during migration is primarily influenced by prevailing weather patterns, major landforms, and the bird's individual orientation mechanisms. When bad weather or large bodies of water are encountered (i.e. Delaware Bay), migrating birds tend to stop and delay their journey (Figure 3). In fact, most migrant landbirds make a series of short night flights, stopping during the day to rest and refuel. Because of the high energy demands of migration, most birds arrive in stopover habitat in a fat-depleted condition. By periodically stopping to rest and eat, migrating birds are able to obtain sufficient fat stores necessary to continue migration. However, stopping also increases the risk of predation. It becomes necessary, therefore, for the migrant to resolve the conflicting demands between predator avoidance and food acquisition when choosing a suitable stopover habitat. Other factors that influence habitat suitability during migration include competition, water availability, vegetative structure, and patch size.

Figure 3: Delaware Bay Crossing



Locating appropriate habitat is also critical to the migrating bird. Most migrant landbirds fly at night, commencing shortly after sunset and usually ending by midnight or shortly thereafter. Stopover habitat selection occurs in the early morning shortly before dawn. This phenomenon, known as morning flight, allows the migrating birds to redistribute themselves according to their individual assessment of habitat suitability. These birds are constantly making decisions to stay in a patch of habitat or to move on in hopes of finding something better. Lean birds are more likely than fatter birds to stay in sub-optimal habitat. These fat-depleted birds will broaden their use of microhabitat and increase their repertoire of foraging maneuvers in an attempt to replenish fat stores. Not all species, however, exhibit this plasticity in foraging behavior. Many are strongly associated with specific habitats during fall migration. Therefore, it is critical to the success of migration that a wide variety of habitat types be available to the migrant.

The number of factors influencing migration and stopover ecology illustrate the intricacies of this phenomenon on both the population and individual level. Each of these factors increases the vulnerability of landbirds during the migration process. In addition, migrants are faced with a constantly changing landscape due to increased development along the migration route. Although many migratory bird populations display the ability to change behavior with changing environmental conditions, this behavioral flexibility may not be sufficient to accommodate large scale, rapid shifts in habitat structure. Therefore, protection of high quality stopover habitat is critical to the health of migratory bird populations.

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Forest Habitat

A LARGE BODY OF RESEARCH indicates that the decline in North American migratory forest-interior breeding birds is due largely to loss and degradation of forest habitat. This loss occurs both as a direct loss of acreage to development and habitat fragmentation. Small forest patches do not support as many bird species, or as high a density, as do large patches. This is not to say, however, that smaller forest tracts are not also important. They can serve as migratory stopover sites for many forest-interior birds and for a variety of other birds. Small tracts are especially important along coastlines, on peninsula tips, and in landscapes where other forests are scarce. In addition, patches that are close to, or connected to, other patches provide higher quality habitat than more isolated forests.

SPECIFIC MANAGEMENT RECOMMENDATIONS

1. Landscape and regional considerations:
 - a. At the regional level, conservation efforts aimed at benefiting forest interior birds should target:
 - large contiguous tracts of older forest;
 - other high quality habitat such as riparian and floodplain areas;
 - forested wetlands;
 - existing or potential habitat for regionally rare birds;
 - forests that also provide habitat for other animal and plant species that are endangered, threatened, or rare.
 - b. Isolated woodlots smaller than 25 acres should not normally receive high priority for regional protection. At the local level, however, avoid the loss of even small forest patches (<25 acres), particularly along coastlines, streams and riverside corridors, peninsula tips, and where forests are scarce. These forests provide important migratory stopover sites for a variety of birds.
 - c. Apart from these special situations, managers should consider clearing small wooded areas that intrude into larger fields if doing so would improve the quality of potentially valuable grassland

2. Size and fragmentation considerations:
 - a. Maximize the amount of contiguous forest "interior" (forest area more than 100m from the forest edge) within each forest tract.
 - Promote reforestation of gaps between disconnected forest tracts.
 - Promote reforestation of forest openings, narrow finger-like clearings projecting into the forest, and riparian corridors.
 - Reforestation can be achieved through natural succession or hastened by plantings of locally native tree species. Avoid planting tree monocultures and, invasive, non-native plant species.
 - Before reforesting fields larger than 100 acres, determine whether they are already functioning as high-quality habitat for grassland bird species. Careful consideration should be made as to which habitat type—field or forest would be more valuable.
 - b. In planning new construction, minimize loss and fragmentation of existing contiguous forests larger than 50 acres.
 - Concentrate construction of any kind on non-forested tracts.
 - If forest loss can not be avoided, concentrate building in small forest patches (<50 acres) or along the periphery (<100m inside edge) of non-riparian forests.
3. In areas where management for forest game birds is an objective, these recommendations are consistent with that objective and at the same time will promote habitat for migratory birds.
 - a. Focus operations near existing forest edges.
 - b. Avoid making openings in the forest interior.
 - c. In lieu of making new openings as brood habitat for wild turkey and ruffed grouse, manage existing transmission line corridors and permanent access roads for this purpose.
 - d. Use restraint when establishing "green tree reservoirs" (small wooded areas that are periodically flooded and drained to provide waterfowl habitat in the winter) in riparian or bottomland forests so as not to reduce the amount of already scarce, high quality breeding habitat. Leave these reservoirs unflooded during some seasons to allow the vegetation to recover.

4. General Practices

- a. Retain at least some snags on each acre. Snags provide important foraging and roosting sites for many stopover migrants. Snags of at least 8 inches in diameter are best for providing nest cavities and should be clustered in groups of three or four rather than spaced uniformly.
- b. Retain dead and downed woody plant debris (logs, leaf litter, etc.) on the forest floor. This material returns nutrients to the soil and provides a micro-habitat for a diverse invertebrate community. These invertebrates provide a valuable food source for migrating birds.
- c. In areas where fires would not endanger dwellings, nor would be prohibited by law, carry out controlled burns in order to promote the regeneration of fire or gap dependent native vegetation (NJ Forest Fire Service # (609) 726-9010).
- d. Establish a 30' wide scrub-shrub transition zone between forested and grassland habitats.

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Grassland Habitats

GRASSLAND DWELLING BIRDS ARE suffering the most precipitous population decline of any habitat-specific group. Some of the natural processes that once maintained this type of habitat no longer occur. Modern agricultural practices are increasingly incompatible for providing habitat for grassland birds. Most old fields are allowed to succeed to forest or get preferentially sold for development. It may be on large tracts of land set aside for other purposes (military bases, airports, and landfills), but still compatible for grassland birds, that these highly vulnerable species will find their last refuge.

SPECIFIC MANAGEMENT RECOMMENDATIONS

1. Fragmentation and size considerations:

- a. Conservation efforts aimed at benefiting grassland birds should target the largest tracts available. Large tracts will accommodate area sensitive species as well as less area sensitive species.
- b. Small tracts are also extremely important for stopover migrants. Avoid the loss of even very small tracts of grassland habitat.
- c. Ideally, grasslands should be adjacent or close to each other, particularly if the areas are relatively small. Consider planting or maintaining corridors between adjacent patches.
- d. Avoid fragmenting grasslands. Sources of fragmentation includes roads, buildings, groves of trees, and hedgerows.

2. Mowing Guidelines: Annual mowing is often necessary for maintaining grasslands and preventing succession to forest.

- a. Do not mow during the fall migration season (July-September).
- b. The best time to mow is early spring (March-April). This allows time for regrowth and seed production in time for fall migrations.
- c. Mow on a rotational basis, allowing some large blocks or wide strips to remain unmown for at least a six week period. Stagger the location of mown sections so that the amount of contiguous unmown area is maximized.
- d. Use a cutting height of at least 10 inches.

3. Establishment of grassland habitats:

- a. Wherever possible, establish native warm season grasses as the dominant cover type. Avoid planting or maintaining cold season grasses.
- b. Monotypic stands do not provide adequate habitat for birds, especially in the form of vegetative structure. It is most beneficial to plant a mixture of tall and short grasses, which results in a mosaic of vegetative heights.

4. Maintenance of grassland habitats:

- a. See mowing guidelines above.
- b. Prescribed burns can be used to maintain and are often beneficial to grassland communities. Conduct burns in early spring (March-Early April). In grasslands larger than 100 acres, prescribe burns on an annual rotation in which 20-30 percent of the total grassland area is burned each year. On smaller areas, annual burn areas should be larger, but not exceeding 50-60 percent (NJ Forest Fire Service # (609) 726-9010).
- c. Light grazing (leaving more than 40 percent of the vegetation over 10 inches tall) or moderate grazing (20-40 percent over 10 inches) can benefit grassland habitats and help to maintain native warm season grasses. The best method is to use a rotational system in which some sections are lightly grazed while other sections are left idle.

5. General Practices:

- a. Minimize human disturbance to grassland habitats, especially during fall migration. If trails and roads are planned through a grassland area, locate them close to the edge.
- b. Control invasive, non-native plant species wherever possible. Native species should be favored in any restoration efforts.

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Scrub-Shrub Habitat

LIKE GRASSLAND, SCRUB-SHRUB habitat is becoming less common. Regionally, most habitat types (not including urban and suburban) are either agrarian or forested, with little in between. In many places open meadows directly abut forests with no shrub transition zone, creating miles of "hard edge." These commonly occurring areas may accommodate forest and grassland species of landbirds, but the scrub—dependent species are left without adequate habitat. Not surprisingly, many of these birds are suffering. To help meet the needs of these birds, it is desirable to maintain some areas in essentially an arrested stage of early succession. The principles and practices presented here were written with utility corridors and rights-of-way in mind, but can be applied to other open areas, including airports, landfills, open space areas, and transportation corridors. In addition, the following practices can be applied along the edges between fields and forests to create a "soft" or "feathered" edge.

SPECIFIC MANAGEMENT RECOMMENDATIONS

1. Establishment and maintenance of scrub-shrub habitat:
 - a. When establishing a scrub-shrub habitat area, clear vegetation selectively with a chainsaw, cutting tree species that are tall growing and leaving behind all shrubs and low growing trees. Species left behind will serve as seed sources for the lower growing plant community desired.
 - b. After initial clearing, the area can be left alone for several years. This interval will allow desirable shrubs and low growing trees to become established. Some undesirable trees will begin to encroach, but they should not need selective control for at least 3-4 years.
 - c. At 3-4 years after clearing, begin selective vegetation management using one of or a combination of the following techniques:
 - Apply small amounts of herbicide to the root collar (up to a height of about 18 inches) of all tall growing tree species. This essentially girdles and kills the tree. On average, approximately 5 gallons per acre is needed and applications can be done during the growing or dormant seasons.

Applications should only be performed by certified pesticide applicators and should follow all permit guidelines.

- An alternative to herbicides is the physical girdling target trees. This can be accomplished by cutting a ring around the base of the tree, essentially cutting off the flow of energy to the roots.
 - Equipment intensive alternatives include bull-dozing and the drumming and chopping of target trees.
- d. After initial herbicide applications, some selective pruning must be done. Some desirable species might need to be topped if they grow more than 10-12 feet. If more than a third of the canopy needs removal then the whole plant should be cut down. Topping more than a third of the canopy limits value for food and cover.

2. Special techniques are needed for wet scrub/shrub habitats:

- a. Always use a herbicide approved for wetlands.
- b. The technique is to wet down most of the leaves of the tree using a light mist. Concentrate application on terminal ends and spray drift must be carefully controlled.
- c. Only use this technique for saplings under 6-8 feet tall so that spray wands can reach the leaves.
- d. In wetlands where larger trees must be controlled, selective cutting should be used. Stump sprouts can be controlled later using the above technique.

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Wetland Habitats

AMONG THE MOST PRODUCTIVE and diverse of avian habitats, wetlands are used by nearly a third of North America's bird species. However, wetlands are among the most threatened of habitat types due to demands for land use modifications. Coastal wetlands are especially threatened; development and recreational activities of a human population compete with wildlife for space within this natural environment.

SPECIFIC MANAGEMENT RECOMMENDATIONS

1. Size and Structure considerations:
 - a. A diverse vegetative cover, including emergents of various heights, floating aquatics, and areas of open water, is most conducive to a diverse bird community.
 - b. Wetlands with an intermediate amount (33-66%) of cover relative to open water support more bird species than do closed cover (more than 66%) or open water (less than 33%).
 - c. A wetlands complex consisting of many marshes varying in size and stage of vegetative succession is important to migratory birds.
 - d. Management activities that promote growth of both emergent and submerged aquatic vegetation will benefit a greater variety of bird species.
2. Management of Impoundments:
 - a. Artificial draw-downs of water level in impoundments is an extremely useful management tool to increase bird use. Draw-downs allow the germination and growth of plants in the shallow waters and exposed pool margins. This, in turn, favors invertebrate species that are a good food source for migrating birds.
 - b. Draw-downs should be undertaken on a staggered basis throughout the season.
 - c. Avoid reflooding draw-down areas during the period of plant growth, to prevent the clouding of water with silt, which reduces the light needed to sustain plant growth. Reflooding should proceed gradually in the late summer and early fall.

d. Annual draw-downs resulting in the near absence of fish can have the incidental consequence of making impoundments especially good habitat for amphibians.

2. General Considerations:

- a. Avoid clearing, mowing, or paving areas adjacent to wetlands. A buffer of at least 100 feet is recommended. This will help to stem the flow of sediment and pollutants into the wetlands.
- b. Active beaver sites provide excellent habitat for migrating birds. Avoid management practices that control beaver if this practice does not conflict with other management objectives.

Recommendations for Control of Phragmites

COMMON REED, *PHRAGMITES AUSTRALIS*, is a 8' to 15' tall invasive plant commonly found on the marsh's upland edge. When given the opportunity, by alteration of the wetland hydrology, removal of existing vegetation, or through changes in the local ecosystem, this plant will spread over much of the marsh surface. Phragmites spreads primarily by way of rhizomes attached to the main plant or broken off by muskrat activity or storms. The broken rhizomes are carried by the tides and currents, eventually finding suitable areas for colonization. The mature plant produces thousands of seeds each year, but these will not sprout unless they fall upon dry substrate. Thus, on an average wetland, the spread of this plant is primarily due to rhizomes.

Small patches (less than an acre in size) of phragmites can provide cover and nesting habitat for birds and mammals. However, as the size of the patch increases, only the outside edge of the phragmites is utilized by wildlife. In a tidal marsh, phragmites growth limits fish access to the marsh's surface. Nutrients become tied up in the persistent stalks of the plant thereby reducing the amount of detrital matter that is available to other plants and animals. Over time this plant will dry out marshes and can raise the elevation of the marsh through the accumulation of old stalks. Studies have shown that the small clumps of common reed will eventually overlap to form extensive and dense stands to the exclusion of all other

plants and most forms of animal life. Because of the aggressive nature of this plant, it is at times desirable to control its spread. This is most easily accomplished while the plant is still present in small clumps.

Once it has been decided that phragmites should be controlled or eliminated, the manager should spend time determining how the plant got established and what allowed it to spread. Conditions favorable to spread include diking or drainage of wetlands, disturbance of previously existing plant life, dredge spoil, farming practices, storm events, road construction, deposition of tidally borne rhizomes, sprouting of seeds on dry areas and other events. This information may be determined from old aerial photos and by talking with locals who have a knowledge of the environmental changes. With this knowledge in hand, it will be easier to alter the conditions that originally encouraged the dominance of common reed and thus reduce the chances of phragmites dominance in the future.

Presently, the most effective method of controlling phragmites on an open marsh is through the use of glyphosate herbicide, applied at a rate of 4 pints per acre. The compound should be applied to the plant as it nears the end of the growing season but before a killing frost sets in (from 15 August through 15 October in New Jersey). Care must be taken to prevent physical damage to the plant before, during, and for 6 weeks after application because any damage will result in poor transference of the systemic herbicide from the leaf surface to the roots. Once winter has set in and all growing has been completed, the old stems can be removed by burning or cutting. Removing the dead stalks allows sun light to reach the surface and encourages other plants to grow and compete with the phragmites. Following the next growing season, any phragmites that are still growing should be re-sprayed.

If phragmites is within an impoundment, it is recommended that an attempt be made to control the plant by mowing or cutting the plant then raising the water level 18"-36" above the base of the plant and maintaining that level for the entire growing season. Maintain that water level the following year if new growth should appear. Once controlled, water-lowering can be utilized as desired. In some situations, it may be possible to introduce salt water into the impoundments. If the salinity is greater than 12 parts per thousand, this water will stunt and kill common reed. However, dilution of

the salt water from rain fall or upland drainage may reduce the effectiveness of salt water control. Therefore, monitoring is necessary to insure salt levels remain high.

In upland areas, the use of a rotary mower or plowing can control the spread of common reed or eliminate it entirely. Mowing should be done a minimum of two times a year: once in mid-summer (end of July) and again in late fall before the killing frost. This will not quickly eliminate common reed, but it will delay or stop its spread by reducing the nutrients stored in the extensive rhizome system. It will be necessary to continue this mowing for three or four years before the reed is dead.

Plowing will eliminate the plant entirely after one or two seasons. Allowing an area to go fallow with a source of reed adjacent will often result in dominance by phragmites. Plowing followed by plantings will damage the phragmites and provide competitors for the reed. In some upland areas, control has been accomplished by mowing and then covering the phragmites patch with black plastic for 2 years. This will kill the plant if the plastic is properly secured to the ground, insuring that rhizomes are not able to reach the sunlight.

In some cases, it may be necessary to employ two or more techniques to achieve complete control of this aggressive plant. The key to success is persistence and awareness of what events encourage this plant establish itself in an area.

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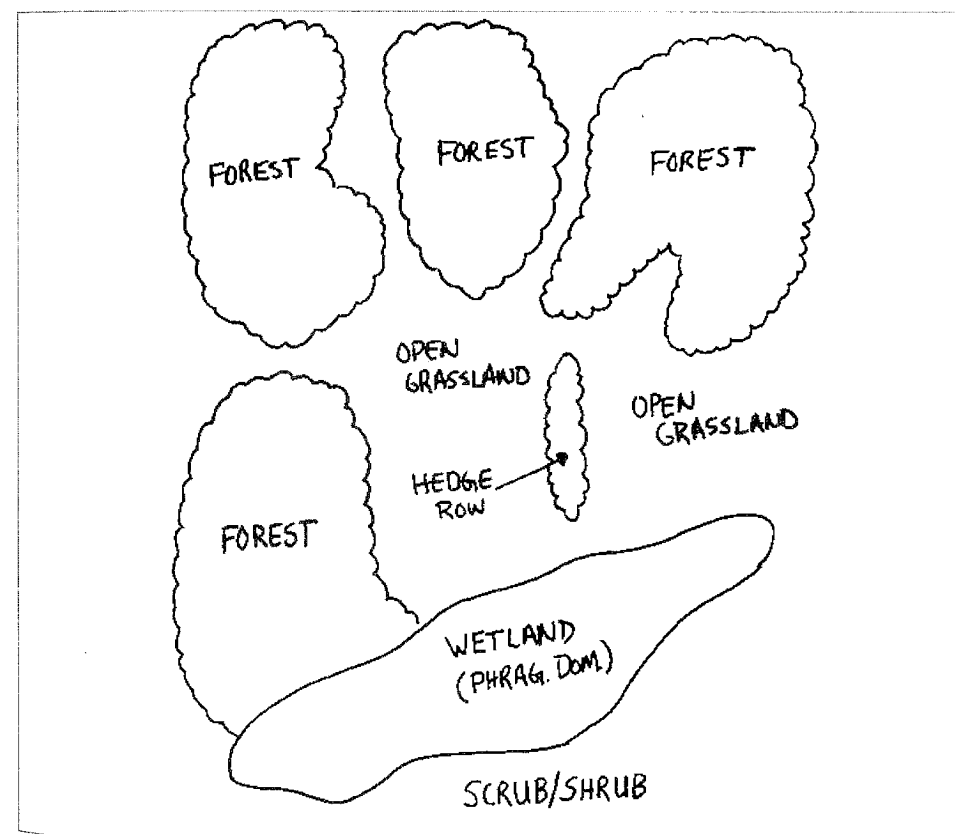
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Hypothetical Land Management Plan

WHEN MANAGING OPEN SPACE areas for the benefit of migratory landbirds, the land manager must first evaluate the abundance and distribution of the different habitat types contained on that particular tract of land. Based on this evaluation and the guidelines contained in this manual, managers can formulate management goals that will not only benefit migratory birds, but other forms of wildlife as well. By integrating some of these goals into existing management plans, the open space land manager can improve the quality of the Cape May peninsula as a fall stopover site. The following is an example of a land management plan for a hypothetical open space area.

Figure 4: Open space area before land management practices are applied.

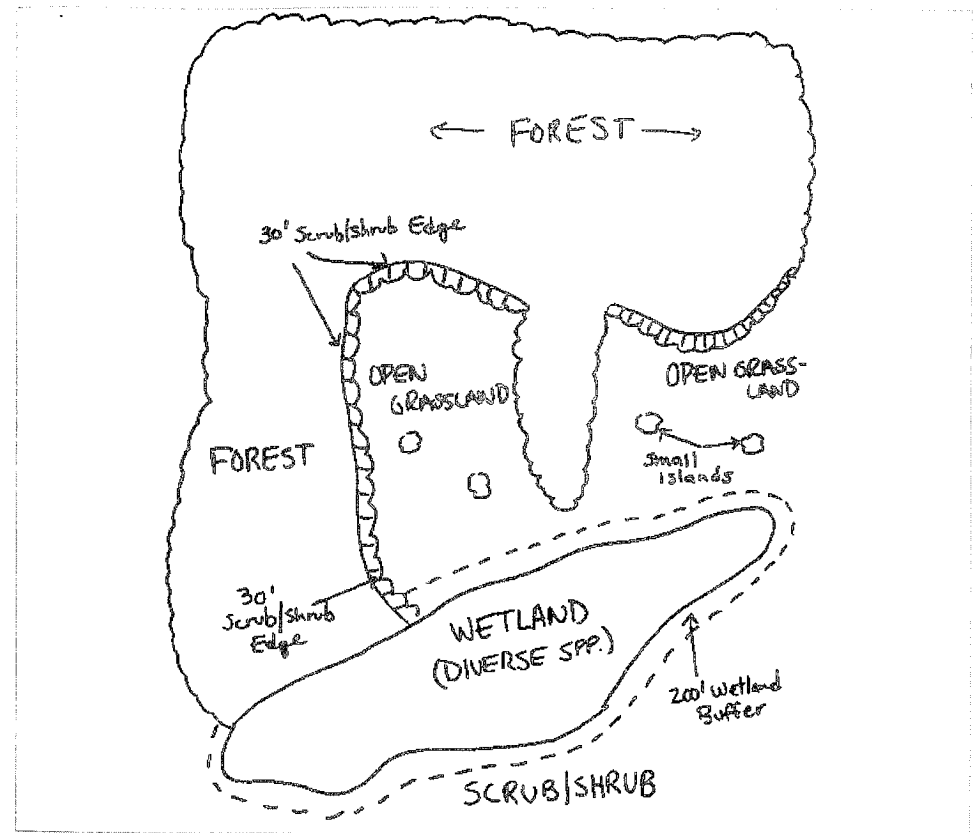


The forest area in this example is quite fragmented (Figure 4). The areas in between patches offer little to no benefit to migrating birds. Therefore, the patches should be allowed to grow together, forming one large, contiguous forest tract. This can be accomplished through natural succession or hastened by the planting of native trees. While in early successional stages, these areas will provide high quality scrub/shrub habitat. After the forest gaps are closed, a 30' scrub/shrub transition zone between forest and grassland should be established (see Scrub/Shrub section for details), creating a soft or feathered edge. This will provide additional areas where migrating birds can feed.

The small hedge row in the center of Figure 4 should be allowed to connect to the forest, creating a corridor for wildlife. This area will allow migrating birds to forage into the grassland and return to the safety of the trees. Serving the same purpose, small clumps of trees should be allowed to grow on the grassland. These areas will provide perches from which migrating raptors can search for prey.

The wetland area (Figure 4) is dominated by phragmites. Therefore, an intensive phragmites control program should be established (see wetland section). This will allow native plant species to establish, thus, creating a more diverse marsh. In addition, a 200' "no cut" buffer should be established around the wetland area. This will allow native plants to grow and protect the wetland from pollution.

Figure 5: Open Space area after land management practices are applied.





Summary

Accounts of migratory landbird population declines have been well documented in recent years, causing scientists throughout the world to launch national and international conservation initiatives. The majority of these initiatives have focused on loss and fragmentation of breeding and wintering habitat. Migratory stopover habitats, however, have received comparably less attention. By initiating the Cape May Stopover Protection Project, the Division of Fish, Game & Wildlife's Endangered and Nongame Species Program has sought to reverse this trend by focusing on protection and improvement of critical stopover habitats on the Cape May peninsula. Because of the vast amounts of land on the Cape already under public domain through open space ownership and wetlands regulations, there exists a unique opportunity to achieve this goal. By enhancing stopover habitat in existing open space areas, land managers can have a huge impact on the future of Cape May as a stopover for migratory birds.



Appendix A: Landbird Habitat Associations

Bird	Forest	Grassland	Scrub/Shrub	Wetland
Black Vulture	+	+	+	+
Turkey Vulture	+	+	+	+
Sharp-shinned Hawk	+			
Cooper's Hawk	+			
Northern Goshawk	+			
Red-tailed Hawk	+	+		
Red-shouldered Hawk	+			
Broad-winged Hawk	+			
Bald Eagle	+			+
Northern Harrier		+		+
Osprey				+
Peregrine Falcon				
Merlin	+			
American Kestrel		+		
Common Barn Owl		+		
Eastern Screech Owl	+			
Great Horned Owl	+			
Long-eared Owl	+	+		
Short-eared Owl		+		+
Northern Saw-whet Owl	+			
Common Nighthawk	+			
Chuck-wills-widow	+			
Whip-poor-will	+			
Chimney Swift				
Ruby-throated Hummingbird		+		+
Belted Kingfisher				+
Red-headed Woodpecker	+			
Red-bellied Woodpecker	+			
Yellow-bellied Sapsucker	+			
Downy Woodpecker	+			
Hairy Woodpecker	+			

Bird	Forest	Grassland	Scrub/Shrub	Wetland
Northern Flicker	+			
Eastern Wood-Pewee	+			
Olive-sided Flycatcher	+			
Yellow-bellied Flycatcher	+			
Acadian Flycatcher	+			
Alder Flycatcher	+			
Willow Flycatcher	+			
Least Flycatcher	+			
Eastern Phoebe	+		+	
Great-crested Flycatcher	+			
Eastern Kingbird		+		
Western Kingbird		+		
Horned Lark		+		
Purple Martin		+		+
Tree Swallow		+		+
N. Rough-winged Swallow		+		+
Bank Swallow		+		+
Cliff Swallow		+		+
Barn Swallow		+		+
Blue Jay		+	+	+
American Crow	+	+		+
Fish Crow				
Carolina Chickadee	+			
Tufted Titmouse	+			
Red-breasted Nuthatch	+			
White-breasted Nuthatch	+			
Brown Creeper	+			
Carolina Wren	+		+	
House Wren			+	
Marsh Wren				+
Golden-crowned Kinglet	+		+	
Ruby-crowned Kinglet	+		+	

Bird	Forest	Grassland	Scrub/Shrub	Wetland
Blue-gray Gnatcatcher	+			
Eastern Bluebird		+		
Veery	+			
Gray-cheeked Thrush	+			
Swainson's Thrush	+			
Hermit Thrush	+			
Wood Thrush	+			
American Robin	+	+		+
Gray Catbird				+
Northern Mockingbird		+		
Brown Thrasher				+
American Pipit		+		
Cedar Waxwing	+	+		
White-eyed Vireo				+
Red-eyed Vireo	+			
Solitary Vireo	+			
Yellow-throated Vireo				+
Warbling Vireo	+			
Philadelphia Vireo	+			
Blue-winged Warbler				+
Golden-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		+		

Bird	Forest	Grassland	Scrub/Shrub	Wetland
Blackburnian Warbler	+			
Yellow-throated Warbler	+			
Pine Warbler	+			
Prairie Warbler			+	
Palm Warbler		+	+	
Bay breasted Warbler	+			
Blackpoll Warbler	+			
Cerulean Warbler	+			
Black and White Warbler	+			
American Redstart	+			
Prothonotary Warbler	+			
Worm-eating Warbler	+			
Ovenbird	+			
Northern Waterthrush	+			+
Louisiana Waterthrush	+			+
Kentucky Warbler	+			
Mourning Warbler			+	
Common Yellow- throat			+	+
Hooded Warbler	+			+
Wilson's Warbler	+			
Canada Warbler	+			
Yellow-breasted Chat			+	
Summer Tanager	+			
Scarlet Tanager	+			
Northern Cardinal	+	+	+	
Blue Grosbeak		+		
Rose-breasted Grosbeak	+			
Indigo Bunting		+		
Dickcissel		+		
Rufous-sided Towhee	+		+	
American tree Sparrow		+		
Chipping Sparrow		+		

Bird	Forest	Grassland	Scrub/Shrub	Wetland
Clay-colored Sparrow		+		
Field Sparrow		+		
Vesper Sparrow		+		
Lark Sparrow		+		
Savannah Sparrow		+		
Grasshopper Sparrow		+		
Henslow's Sparrow		+		
Fox Sparrow	+		+	
Song Sparrow		+	+	
Lincoln's Sparrow		+		
Swamp Sparrow				+
White-throated Sparrow	+	+	+	
White-crowned Sparrow		+		
Dark-eyed Junco	+	+	+	
Bobolink		+		
Red-winged Blackbird				+
Eastern Meadowlark		+		+
Rusty Blackbird	+	+		
Common Grackle	+	+		
Brown-headed Cowbird	+	+		
Orchard Oriole	+			
Northern Oriole	+			
Purple Finch	+		+	
Red Crossbill	+			
Common Redpoll		+		
Pine Siskin		+		
American Goldfinch		+		
Evening Grosbeak	+			

Appendix B

7



Cape May Bird Observatory

NEW JERSEY'S NATIVE TREES, SHRUBS & VINES THAT ARE BENEFICIAL TO BIRDS

by Patricia Sutton

Native trees, shrubs, and vines are the key to successful backyard habitats, offering critical food and cover to our wildlife. Native vegetation will thrive with the least amount of care. Non-native ornamentals require a great deal of care (watering, chemicals for insect pests, fertilizing) and tend not to thrive as readily as native vegetation. Many non-native ornamentals have no food value to our wildlife. This should be a prime consideration with successive drought years and water shortage problems. Be sure to include native evergreens, key in providing cover year-round (safe refuge from predators and bad weather, safe nesting sites, and a safe place to roost through the night).

If an area is left along (not mowed, left brushy), native trees, shrubs and vines will flourish on their own. Many of these plants are spread by the birds as they pass the seeds through their system.

Key

- ** highly important secondary food source (insects : warblers)
- + indicates additional species known to feed on family of plant
- (w) wetland species -- will do best in wet situations
- (s) southern species -- not reliably hardy in North Jersey
- (n) northern species -- may not thrive where summers are hot
- no notation hardy statewide
- (c) statewide (unless otherwise noted) & adaptable to coastal areas
- # number of NJ bird species that feed on (nuts, berries, buds, fruits, seeds, nectar, catkins)

Trees

Red Cedar, <i>Juniperus virginiana</i> (c)	32	Yellow Birch, <i>B. lutea</i> (n)	13+
PINES, <i>Pinus</i> spp.	27	Gray Birch, <i>B. populifolia</i> (c)	14+
Pitch Pine, <i>Pinus rigida</i> (c)	28	American Hornbeam or Ironwood, <i>Carpinus caroliniana</i> ..	10
White Pine, <i>P. strobus</i>	35	American Beech, <i>Fagus grandifolia</i>	25
Scrub Pine, <i>P. virginiana</i> (c)	35	OAKS, <i>Quercus</i> spp.	29
Shortleaf Pine, <i>P. echinata</i>	35	White Oak, <i>Quercus alba</i> (c)	29
HICKORIES, <i>Carya</i> spp.	19	Post Oak, <i>Q. stellata</i> (c)	29
Pignut Hickory, <i>Carya glabra</i>	19	Black Oak, <i>Q. velutina</i> (c)	29
Shagbark Hickory, <i>C. ovata</i>	19	Spanish Oak, <i>Q. falcata</i> (c)	29
Mockernut Hickory, <i>C. tomentosa</i> (c)	19	Scrub Oak, <i>Q. ilicifolia</i> (c)	29
Butternut, <i>Juglans cinerea</i>	11	Willow Oak, <i>Q. phellos</i> (c)	29
Black Walnut, <i>J. nigra</i>	18	Pin Oak, <i>Q. palustris</i>	29
BIRCHES, <i>Betula</i> spp.	24	Red Oak, <i>Q. rubra</i>	29
Black or Sweet Birch, <i>Betula lenta</i>	13+	American Hackberry, <i>Celtis occidentalis</i> (c)	25

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Trees (continued)

American Elm, <i>Ulmus americana</i>	18
Red Mulberry, <i>Morus rubra</i> (c)	44
Tulip Tree or Yellow Poplar, <i>Liriodendron tulipifera</i>	10
Sassafras, <i>Sassafras albidum</i> (c)	23
Sweet Gum, <i>Liquidambar styraciflua</i> (c)	21
SERVICEBERRIES, <i>Amelanchier</i> spp.	38
Juneberry, Shadbush, Shadblow, or Serviceberry, <i>Amelanchier canadensis</i> (c)	26+
Downy Serviceberry, <i>A. arborea</i>	19+
Wild Black Cherry, <i>Prunus serotina</i> (c)	53
Pin or Fire Cherry, <i>P. pensylvanica</i>	42
Chokecherry, <i>P. virginiana</i>	43
Crab Apple, <i>Malus</i> spp.	26
HOLLIES, <i>Ilex</i> spp.	29
American Holly, <i>Ilex opaca</i> (c)	13+
MAPLES, <i>Acer</i> spp.	14
Box Elder, <i>Acer negundo</i> (w)	4+
Red Maple, <i>A. rubrum</i> (c)	5+
Silver Maple, <i>A. saccharinum</i> (w)	4+
Sugar Maple, <i>A. saccharum</i>	5+
Sour Gum or Black Tupelo, <i>Nyssa sylvatica</i> (c)	34
Flowering Dogwood, <i>Comus florida</i> (c)	37
Persimmon, <i>Diospyros virginiana</i> (s, c)	15

Shrubs

Common Waxmyrtle, <i>Myrica cerifera</i> (s, c)	25
Northern Bayberry, <i>M. pensylvanica</i> (c)	25
Speckled Alder, <i>Alnus rugosa</i> (w)	15
Smooth Alder, <i>A. serrulata</i> (w)	15
Common Spicebush, <i>Lindera benzoin</i>	15
Wild Black Current, <i>Ribes americanum</i> (n)	15
HAWTHORNS, <i>Crataegus</i> spp.	19
Beach Plum, <i>Prunus maritima</i> (c)	**
Red Chokeberry, <i>Aronia arbutifolia</i> (c, w)	12
Black Chokeberry, <i>A. melanocarpa</i> (c)	7
ROSES, <i>Rosa</i> spp.	25
Pasture or Carolina Rose, <i>Rosa carolina</i> (c)	25
Meadow or Smooth Rose, <i>R. blanda</i>	25
Virginia Rose, <i>R. virginiana</i>	25
Swamp Rose, <i>R. palustris</i> (c, w)	25
BRAMBLES, <i>Rubus</i> spp.	49
Purple-flowering Raspberry, <i>Rubus odoratus</i> (n)	49
Black Raspberry, <i>R. occidentalis</i>	49
Red Raspberry, <i>R. idaeus</i>	49
Alleghany Blackberry, <i>R. allegheniensis</i> (c) ..	49
Dewberry, <i>R. flagellans</i> (c)	49
SUMACS, <i>Rhus</i> spp.	33
Winged or Dwarf Sumac, <i>Rhus copallina</i> (c)	21+
Smooth Sumac, <i>R. glabra</i>	21+
Staghorn Sumac, <i>R. typhina</i>	21+

Shrubs (continued)

HOLLIES, <i>Ilex</i> spp.	29
Smooth Winterberry, <i>Ilex laevigata</i> (c, w)	7+
Inkberry, <i>I. glabra</i> (c)	9+
DOGWOODS, <i>Comus</i> spp.	34
Alternate-leaved Dogwood, <i>Comus alternifolia</i>	34
Silky Dogwood, <i>C. amomum</i> (w)	18+
Red-osier Dogwood, <i>C. stolonifera</i>	18+
HUCKLEBERRIES, <i>Gaylussacia</i> spp.	24
Black Huckleberry, <i>Gaylussacia baccata</i>	12+
Dangleberry, <i>G. frondosa</i>	13+
BLUEBERRIES, <i>Vaccinium</i> spp.	36
Highbush Blueberry, <i>Vaccinium corymbosum</i> (c)	16+
Lowbush Blueberry, <i>V. angustifolium</i>	8+
ELDERS, <i>Sambucus</i> spp.	46
Common Elder or Elderberry, <i>Sambucus canadensis</i> (c, w)	33+
Snowberry, <i>Symphoricarpos albus</i>	8
Coralberry, <i>S. orbiculatus</i>	15
VIBURNUMS, <i>Viburnum</i> spp.	23
Arrowwood, <i>Viburnum dentatum</i> (c)	12+
Mapleleaf Viburnum, <i>V. acerifolium</i>	10+
Witch-hod, <i>V. cassinoides</i> (n, w)	9+
Nannyberry, <i>V. lentago</i> (c)	11+
Cranberry Viburnum, <i>V. tinifolium</i>	6+

Vines

Common Greenbrier, <i>Smilax rotundifolia</i> (c)	20
Cat Greenbrier, <i>S. glauca</i> (c)	19
Poison Ivy, <i>Rhus radicans</i> (c)	34
American Bittersweet, <i>Celastrus scandens</i> (c)	15
Virginia Creeper, <i>Parthenocissus quinquefolia</i> (c)	37
GRAPES, <i>Vitis</i> spp.	51
Fox Grape, <i>Vitis labrusca</i> (c)	51
Summer Grape, <i>V. aestivalis</i> (c)	51
Riverbank Grape, <i>V. riparia</i>	51
Frost Grape, <i>V. vulpina</i>	51
Trumpet Creeper, <i>Campsis radicans</i> (c)	2

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