

Appendix A



Kelly Boland/USFWS

Fall winterberry in a wetland in Wellfleet on Cape Cod

Conceptual Management Plan

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Introduction

Numerous conservation tools are currently being applied within the Northeastern United States by state, Federal and non-governmental partners, in a six-state effort to protect and restore shrublands for wildlife species that rely on this specific habitat type. This effort includes restoration on existing state and Federal lands, including national wildlife refuges, and assistance by numerous agencies and organizations to restore shrublands on private lands. As part of that effort, we prepared a draft and final Land Protection Plan and Environmental Assessment (draft EA/LPP) intended to establish Great Thicket National Wildlife Refuge (NWR, refuge). This proposed refuge would allow an expanded contribution by the National Wildlife Refuge System (Refuge System) to help secure additional lands in key locations to be managed in a mosaic of successional conditions targeted to shrubland and young forest. In this Appendix A - Conceptual Management Plan, we discuss in general terms how lands would be managed for shrubland dependent wildlife once the lands become part of the Refuge System.

Early successional habitat is one of the rarest habitats in this region, yet it remains a crucially important resource for numerous wildlife species. Although we are working with several public and private stakeholders to manage this habitat stage, conservation by these partners alone will not be sufficient. Although some tracts of land on existing national wildlife refuges in the Northeast are already being managed for early successional habitat, additional refuge expansion is intended to help ensure future connectivity, provide management capability and provide rotational management activities to maintain this habitat type on the landscape. One of the important benefits of refuge acquisition is greater long-term certainty of habitat maintenance that comes with permanent easements and fee acquisition, as compared to shorter-term private land enrollments.

Criteria and Target Acreages

We have delineated Refuge Acquisition Focus Areas (RAFAs) in key locations within a larger partnership project area across the six states. Within each RAFA we identify a floating “target acreage” for Service acquisition based on New England Cottontail (NEC) Conservation Strategy estimates of the need for additional management beyond current capacity on existing agency-secured lands. Opportunities for refuge fee and easement acquisition would be evaluated and guided over time through the use of a pre-determined set of the following refuge acquisition criteria:

- *Strategic Growth Priorities*—The Service’s Strategic Growth Policy lists three priorities for conservation: threatened and endangered species, migratory birds in decline, and waterfowl. We would acquire lands that contain or are in close proximity to the greatest intersection of these three priorities.
- *New England Cottontail*—The NEC has been designated as a surrogate species because it is the most dispersal-limited of the variety of associated, high priority shrubland-dependent species. We would prioritize tracts that contain or are in close proximity to known populations of NEC.
- *Landscape Connectivity*—We would give priority to parcels that can potentially provide critical connectivity between two extensive patches of habitat containing target wildlife species or shrubland-related habitat types.
- *Site Suitability*—Prioritizing tracts that naturally lend themselves to shrubland habitat would allow us to use our resources more wisely and efficiently.
- *Site Feasibility* – We would avoid acquisition of commercially zoned properties and approved residential subdivisions due to the higher cost per acre of those properties, and because of the challenges we might face in managing habitats over the long-term that might potentially be surrounded by, or adjacent to, development.

- *Proximity to Partners*—Acquiring tracts in close proximity to our partners, where protection would be complimentary to their efforts, would allow the Service and its partners to pool management resources and provide greater certainty that shrublands will continue to be managed over the long-term.

Additional factors to be considered in determining the suitability of land for easement acquisition include:

- Landowner desire to retain fee title to the property
- Landowner willingness to permit habitat management on the property
- Long-term vision for the property to continue to be managed and maintained as shrubland habitat

Land acquisition by the Refuge System is but one tool proposed to be used in combination with other partner and landowner efforts. This tool would be used where it can assist the states, National Resources Conservation Service, the Service’s Private Lands Program, and other partner efforts with securement of key parcels to improve connectivity, share management capability, and help create substantial cores. This final LPP/EA identifies a combined target acreage of 15,000 acres, to be distributed across ten RAFAs that encompass a 257,639-acre project area. Target acreages have been distributed across the RAFAs based on habitat and population goals identified by the range wide conservation partnership for the most dispersal-limited surrogate species, the NEC. While habitat must be located in the vicinity of remaining core cottontail populations for it to be useful, surrogate bird species are adapted to locating and utilizing this habitat where it is created. The estimated target acreage distribution is shown in Table A.1 below.

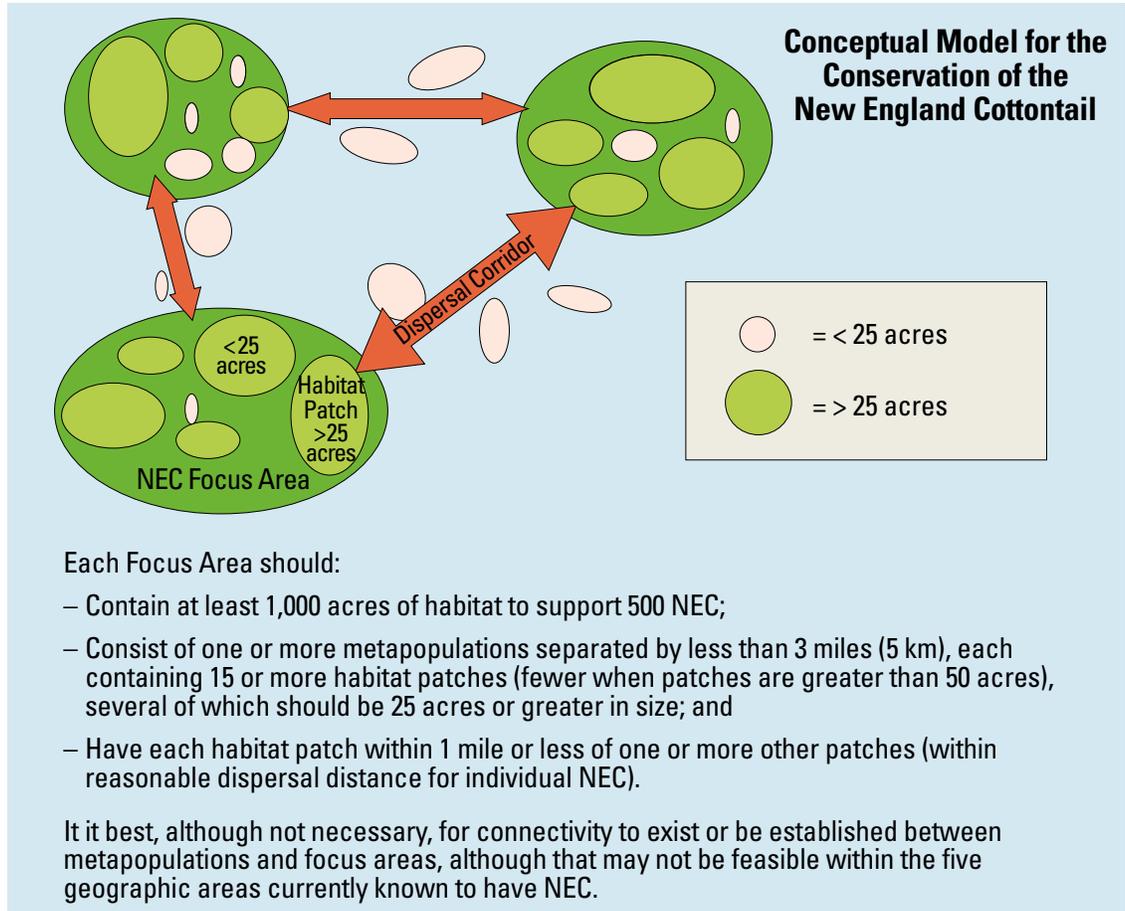
Table A1: Refuge Acquisition Focus Area Target Acres

Refuge Acquisition Focus Area	Refuge Acquisition Focus Area Size	Target Acres
Cape Elizabeth-Scarborough (ME)	3,254	~800
Berwick-York (ME)	26,410	~2,000
Rollinsford (NH)	4,705	~500
Oyster-Dover-Bellamy (NH)	10,913	~500
Merrimack Valley North (NH)	36,495	~500
Pachaug-Ledyard (CT)	38,208	~3,500
Plymouth (MA)	3,698	~500
Mashpee (MA)	28,633	~1,500
RI East -West (RI)	71,440	~3,200
Northern Housatonic (NY-CT)	33,883	~2,000
Totals	257,639	15,000

Habitat recommendations for the NEC were developed by the range wide collaborative partnership and presented in the Conservation Strategy for that species. The general conceptual configuration and intent is presented below (Figure A.1). Shrubland migratory bird species and other Species of Greatest Conservation Need (SGCN) are intended to benefit in direct relationship to amounts of shrubland restored, with exact location being less critical. The habitat

protected through this proposal aligns with recovery plan goals for Service priorities, including the bog turtle, northern red-bellied cooter, and karner blue butterfly in specific focus areas.

Figure A1: Conceptual Model for the Conservation of the New England Cottontail: An example configuration of habitat networks or metapopulations.



Managing Habitat for Priority Shrubland Species

In addition to a partial focus on protection and maintenance of more persistent/stable types of shrubland where possible, our land acquisition proposal would also require active restoration and maintenance of shrubland and young forest habitat types. We can no longer depend on natural disturbances to create enough early successional habitat to reverse the trend of species loss. Habitat must be actively and continuously maintained and regenerated through human intervention if current population levels of declining species are to be sustained or improved. Habitat management techniques described below (excerpted from Arbuthnot, M. 2008, *A Landowners Guide to New England Cottontail Management*) would be used to improve conditions for shrubland birds, NECs, bog turtles, and other declining species.

Overview of Early Successional Habitat Management

In areas with more persistent and stable types of shrublands we encourage passive management techniques and allow for natural vegetative growth. In other areas, we would engage in active restoration and maintenance of shrublands and

young forest habitat types, where appropriate. Managing habitat for shrubland species can take many forms, depending on the acreage and current condition of the tract of land and how much effort we are able to commit to management. Depending on soils, hydrologic regimes, and vegetation, we may consider mechanical cutting, prescribed burning, herbicides, riparian area restoration, or planting habitat areas to create and maintain optimal conditions.

Special Considerations

Some management actions (e.g., brush-hogging a field, clearcutting a forest, or burning a pitch-pine scrub oak barren) may temporarily eliminate the existing shrub structure, making it necessary to ensure that year-round residents, like the NEC, will always have a sufficient amount of suitable habitat available in the area. A rotational management scheme that distributes restorative treatments over time and space can be used to maintain a shifting mosaic of early successional habitat that is likely to meet multiple species long-term needs. If possible, for NEC purposes, treatment units should be at least 25 acres in size. New habitats should be made available and suitable for use by cottontails before re-starting succession on old habitats. Management of smaller parcels will require coordination with neighbors who are also managing habitat, to ensure that patches are located close enough together for cottontail dispersal, and that restoration work is spread out over time.

The ecology of different habitat and forest types differs. Guidelines for promoting early successional habitat in various types of vegetative cover—from fields to shrubs to forests—are found in the following sections.

Managing and Maintaining Existing Early Successional Habitat

Typical shrublands in the Northeast need regular management in order to prevent their succession to forest. Some shrubland habitats are relatively short-lived and will mature into forest after 20 to 25 years of inactivity, for example, an aspen-birch stand. Periodic monitoring of stem density and plant diversity, coupled with maintenance management every 5 to 15 years (depending on method, soil, and vegetation type) should be sufficient to maintain appropriate habitat for the suite of shrubland-dependent species. As described below, wetlands and coastal shrublands may require less frequent management.

Restorative management is generally only necessary when invasive plants are problematic, when stem density falls below 30 stems per 10-by-10 foot block (if the target is NEC), or when habitat is determined to be past suitability for target species by technical experts. In these cases, the shrubland would need to be cut or burned and allowed to re-grow to achieve an appropriate density. A combination of techniques is often used to hinder growth of invasive and other undesirable plants in restored shrubland. It is easier to monitor for and to control invasive plants before they become well-established, than it is afterward. Also, by selectively removing young trees as they emerge above the shrub canopy, it is possible to delay the need to mow the whole patch by many decades. This is a good approach with limited land, as it can help avoid the need to have multiple areas that would be clearcut on a rotating basis. In addition to upland shrub thickets, appropriate early successional habitat can take many forms, including the vegetation types listed below.

Coastal Shrublands

Between the high salt marsh of New England coasts and the adjacent upland vegetation, or on the backside of dune and cobble beaches, coastal shrublands are often present. These shrubby areas occur above the average high tide line but can be flooded by storm tides. Wind, flooding, and heavy salt spray keep the seaward vegetation, in a shrubby state by suppressing succession. Vegetation exposed to these conditions may remain in a shrub state indefinitely, and would just need to be monitored periodically to prevent invasion by exotic species. In less exposed areas, coastal shrublands will grow more densely and will need management

similar to that of other upland areas. Coastal shrublands are rare habitat types, which provide high quality foods for many types of wildlife and include fruit and seed producing shrubs targeted by migrating birds (e.g., northern bayberry).

Shrub Swamps

Wetlands dominated by dense woody vegetation less than 20 feet tall are known as shrub swamps. Common scrub-shrub species in these habitats include speckled alder, buttonbush, red osier dogwood, and willows. Soils are seasonally or permanently flooded with up to one foot of water. These shrub habitats are less prone to succession than some upland shrub areas because they are often too wet for trees to grow at their normal rate of maturation. These are essential habitats for feeding and brooding American woodcock, especially those on fertile soil, and also heavily utilized by spotted and blanding's turtles, and year round habitat for NECs. To retain the shrub-like structure of these habitats, trees that may form a large canopy periodically should be cut to allow sunlight to penetrate to the shade-intolerant shrub species. They do not need to be extracted from the swamp, however, because the fallen trunk adds diversity to the understory and becomes habitat for many species.

Alder thickets provide particularly good foraging and brood rearing habitat for the American woodcock and are also utilized by NEC and other shrubland birds. This hardy shrub species grows rapidly, at a high density, and in a variety of soil types. Since alders suffer from shading, removing the overtopping trees in a wetland forest or strip/brush cutting in shrub swamps will often result in rapid alder sprout growth, particularly in winter and spring. Dormant season cutting of alders is also a beneficial management tool since alders are capable of vigorous growth from stump sprouts. In the early spring, prescribed fires that kill only the aerial stems are also recommended for regeneration of speckled alder. Prescribed fire intervals of about nine years are adequate to keep alder stands in the desired condition. Alternatively, under the right conditions, alder can be propagated by planting seeds or planting seedlings.

Pitch Pine – Scrub Oak Barrens

Pine barrens are shrubby habitats characterized by pitch pine, scrub oak, and low-growing woody shrub and heath species such as blueberry, wintergreen, and black huckleberry. They typically occur on dry coastal sand plains or on former New England coastal pastures with nutrient-poor soils. When exposed to occasional wildfire or prescribed fire, pitch pine and scrub oak communities have the ability to suppress forest regeneration and tree development, resulting in habitat that can benefit NECs and other shrub obligate species for centuries. Some old pine barrens that have experienced an absence of fire for 50 to 100 years are undergoing forest succession, with the arrival of white pine and hardwoods such as red maple, red oak, and beech. However, in pine barrens where fires occur at least every 40 years, fire-adapted species such as pitch pine and scrub oak remain dominant. Fire clears away the leaf litter on the forest floor and eliminates fire-intolerant species that have invaded the community. After fire suppression is implemented, shrubs and groundcover re-grow quickly, while pitch pine and scrub oak re-sprout at higher densities than before.

To maintain pine barrens for our target species, like eastern towhees and brown thrashers, the recommended management includes the careful use of prescribed fire once every 10 to 40 years. In communities that have become overgrown with hardwoods, 3 to 5 annual burns would initially be necessary to exclude the unwanted species, followed by a regular 10 to 40 year burn cycle. In suburban areas or lands adjacent to residential development, prescribed burning can be challenging. In these areas, cutting or brush hogging scrub oak and pitch pine would maintain dense cover, since both species re-sprout vigorously from cut stems.

Old Fields

Throughout the project area, many sites occupied by NECs and shrubland birds are old fields such as idle agricultural lands, in many cases approximately 10 to 25 years after farming or tree-cutting activities are stopped. Old fields will naturally persist as good habitat for 20 to 25 years. We recommend periodic monitoring for invasion of exotic plants, but otherwise, occasional management actions such as selective cutting, mowing, or selective removal of undesirable trees should be all that is required to maintain the field in an appropriate environment. If these activities are performed about once every 5 to 15 years, they should prevent trees from becoming too large while still providing forage and cover plants, thus ensuring decades of early successional habitat.

Reclaiming old fields that have thinned out or are more than 20 to 25 years post-disturbance requires more aggressive initial management. Grown trees (including all saplings over 3 inches in diameter) can be removed using a tree shear, hydro-ax, Brontosaurus, or other heavy-duty land clearing equipment. Afterwards, the area can be maintained by removing saplings and performing the treatments mentioned above every 5 to 15 years. More productive areas would require more frequent attention, with maintenance activities taking place every 1 to 3 years. In some cases, such as a large amount of aspen or birch, the site may need to be sectioned into large blocks or strips and entered on a rotating 5 to 15 year schedule, depending on the target wildlife and surrounding habitat matrix. A more exact management schedule would be determined based on the properties of each individual site.

In some instances, it is undesirable to wait for an old field habitat to succeed into a shrub dominated habitat. This is particularly true in croplands and grasslands that were intensively grazed or in previously developed areas, where shrublands will develop very slowly without some intervention. If travel corridors need to be established quickly, or a particular vegetative species composition is desired, planting can help jump-start the areas into suitable habitat. In areas where invasive, non-native species are dominant, planting shrublands may help prevent the establishment of a non-native monoculture.

Black racer



Vicki DeLoach Flickr.com

Old Orchards

Abandoned orchards provide great food, cover, and nesting opportunities for a multitude of species. Interspersed with the apple trees are clumps of shrubs and seedling or sapling trees as well as a thick blanket of herbaceous ground cover. Bats, snakes, and many small mammals make their homes in this habitat. Once the area becomes dominated by overtopping hardwoods, however, there is a decline in early successional wildlife species and apple trees die. Orchards can be returned to an early successional state by removing overtopping trees and any trees larger than 3 inches in diameter, while leaving all apple trees. Invasive exotic plants can be treated with herbicide to control their growth and inhibit them from taking over the orchard. To maintain a mosaic of natural shrubs and trees, the orchard should be mowed or brush-hogged every 5 to 7 years.

Young Aspen Stands

Aspen saplings are known habitats for numerous shrubland species. During the herb/shrub stage of an aspen stand, which typically lasts only a year or two, aspens grow at high densities of 4,000 to 6,000 stems per acre. The aspen's underground system of root suckers sends up new sprouts on a regular basis, resulting in large colonies of trees that all originated from a single seedling. In order to maintain biodiversity and keep habitat in an early successional stage, intensive initial management and frequent upkeep of aspen-dominated lands would be required.

First, a half-acre of land surrounding an aspen tree should be clearcut, including all other aspens in the area. The hardy root system, which can even survive intense forest fires, will produce seedlings up to a half acre from the single standing tree. Most regenerating sprouts appear within two years of disturbance, and many come from stump re-sprouting. Clearcutting and prescribed burning will promote growth of other seedling species in addition to aspen, resulting in a diverse young stand of habitat within just a few years. Management must involve frequent cutting in order to prevent the area from maturing into a closed-canopy forest.

Aspens occur naturally on a variety of dry and wet sites. Opening up an aspen stand on a sandy or gravelly dry site often results in an abundance of shrubs and herbs, including blueberry, beaked hazel, and wintergreen. Wet-site shrubs in aspen stands with fine-textured sediments and poor drainage include highbush blueberry, mountain holly, common winterberry, alders, viburnums, wood sorrel, and goldthread. This type of habitat will require frequent management including periodic selective cutting, but will ensure quick regrowth of a dense understory favorable to cottontails.

Invasive Shrub Species and Methods for Control

NECs, shrubland birds, and associated species often occupy habitat patches that contain exotic shrub species. Many of these invasive species (e.g., autumn olive, multiflora rose, Japanese barberry, buckthorn, and bush honeysuckle) contribute to the density of understory cover, but often spread at the expense of native species that may provide a better source of food. When undertaking management work, we consider it important to avoid any actions that may promote the spread of invasives, and proactive monitoring and management are recommended to prevent exotic species from dominating a particular site. However, removing all invasive plants at once may be detrimental to the cottontail and other wildlife populations. A plan for sequential removal of exotic plants over a period of years may be warranted.

Since invasive plants can come to dominate an area within just two or three years, periodic inspections would be conducted for the presence and spread of these species, which should preferably be treated or removed prior to seedset. If control of well-established invasive plants is deemed appropriate, we would follow species-specific guidelines. All other habitat management activities would also be carefully evaluated for their effect on exotic species, since activities such as cutting and burning can inadvertently lead to invasive seed dispersal or creation of habitats more favorable to invasives.

The Field-Forest Interface

Many shrubland birds and the NEC use edge habitat, such as the transition from forest to field, as long as it is in a thick and shrubby condition. Since herbaceous food comprises the majority of the rabbit's diet during the summer season, open herbaceous areas proximal to shrub habitat may be beneficial if properly managed. Often the border or edge between forest and open land is straight and abrupt and does not provide optimum habitat conditions for the NEC. In this

case, we may want to manage or plant field borders to improve availability of high quality foods. Cut-back borders or feathered edges can be used to create a softer transition between field and forest. An ideal cut-back border will exhibit a rough, irregular edge and the interior will be composed of a variety of shrubs, trees, blackberry, raspberry, vines such as greenbrier, and herbaceous plants. Desirable trees and shrubs (e.g., dogwoods, viburnums, serviceberry, etc.) should be retained. Border width may vary, but a minimum width of 50 feet is recommended and much wider borders are preferred. Once the cutback border is fully mature or the transition zone becomes abrupt, it may be necessary to re-establish the border.

Linear habitat features such as forest-field borders, hedgerows, and riparian buffers can serve as important travel corridors for NEC and help connect rabbit populations, thereby reducing fragmentation effects.

Creating Young Forest Habitat

The seedling stages of aspen, birch, northern hardwood, and red maple forests are also important to certain bird species (e.g., American woodcock) and contain some of the cottontail's preferred winter habitats. Management can be conducted on a small scale by constantly maintaining a patch of forest to keep it at an early successional stage, or it can be integrated into larger forestry operations, which incorporate rotations of patch cuts to ensure that at least one patch is always suitable. Smaller areas (5 to 10 acres) may be maintained as satellite patches as part of a larger, multi-property habitat management plan. A larger timber harvest to create early successional habitat could be pre-commercial, break-even, or commercial, depending on the quantity and quality of forest products generated. Because the harvesting of timber and the size and distribution of clearcuts is regulated by many states and towns, cutting activity would be coordinated as necessary.

Maintaining Continuous Young Forest Habitat

Although most trees are late-successional species, dense, regenerating stands in the seedling/sapling stage provide good habitat for early successional obligate wildlife species. There is a 10 to 15 year window during which regenerating hardwood forests provide suitable understory habitat before the tree canopy closes. Establishing early successional forest with adequate understory density for the cottontail will, under most circumstances, require the intensive initial effort of clearcutting a tract of grown forest and allowing the trees and shrubs to re-sprout or grow from seed. Small patch cuts or small group selection cuts will not create the same habitat type, as remaining trees will expand their canopies quickly, blocking needed light from reaching the forest floor. Only larger clearcuts (five or more acres in size) will enable shade-intolerant herbaceous plants, shrubs, and vines to grow, resulting in thicker ground cover.

In a mature maple forest, for example, a dense understory can be created by clearcutting a tract of the forest and then allowing a few years of re-growth. During the initial clearcutting phase, individual trees larger than 3 inches in diameter can be cut with a chainsaw, and the remainder can be mowed with a brush hog, or a feller buncher can do both at once. After this initial treatment, the stand should be re-entered every one to three years in order to remove undesirable trees. As long as the tree canopy is kept open, appropriate habitat should be able to grow on the forest floor.

To maintain a constant supply of young forest habitat with less frequent management, forests should be managed on a rotational schedule. When one patch begins to enter the mid-successional stage, a more recently clearcut patch would be developing a dense understory of saplings ideal for NEC use. Maintaining two or three patches of 10 or more acres each on a rotating schedule of management once every five years would ensure constant habitat for New

England cottontails. Each type of forested community regenerates differently, which must be kept in mind in determining treatment.

Integrating Habitat Management into Forestry Operations

Habitat management for shrubland species is compatible with long-term or large-scale forestry operations, as long as the rotational cutting scheme ensures that a patch of suitable habitat will be available at any given time. An example of an effective plan would be a 100-year rotation of an 80 to 90 acre tract, consisting of five 10 to 15 acre even-aged forest stands centered around a 10 acre alder swamp. The goal is to eventually have adjacent forest stands differing in age by approximately 20 years, with at least 16 percent of the tract in regenerating early successional forest integrated with permanent shrub refugia.

Acquisition Decisions and Management Planning

The following guidance would be taken into consideration as opportunities arise and we make decisions regarding management possibilities for new lands and easements that may be acquired:

Manage large areas. Since NECs experience low survival in habitat patches less than 12 acres in size, the most valuable areas under management for this species will be at least this size. Blocks of 25 acres or more would be preferred, since this is the minimum amount of habitat thought to sustain cottontail populations. Shrubland birds are less area-restricted, and this same placement and maintenance of shrubland on the landscape is intended to directly support breeding and migration stopover needs for numerous species.

Maintain dispersal corridors. If we manage smaller satellite patches of habitat, corridors linking these patches to a larger core patch would be essential for the cottontails' population stability. Corridors can be narrow strips of shrubs along field edges, streams, or roads.

Create a rotational management plan. Most NECs and shrubland bird habitat needs to be periodically restored by cutting, which usually makes the habitat unsuitable for the species for several years. Alternating management activities on two or more patches would ensure that shrubland-dependent species will always have suitable habitat.

Coordinate with partners. Where possible, we would consult with neighboring partners and adjacent landowners interested in shrubland habitat restoration, for the purpose of combining and coordinating efforts to support shrubland species. We would work with neighboring landowners interested in managing for early successional habitat, especially those with significant open space or shrubland habitat, to coordinate such things as timetables for management activities, so that appropriate habitat would always be available.

Conduct periodic habitat reviews. We would monitor the presence of invasive species, which can completely dominate a habitat area within two or three years if left unchecked. To avoid setbacks and maintain native plant diversity, exotic species would be monitored on a regular basis. We would also monitor the density and height of the vegetation in habitat management areas.

Monitor NECs, shrubland birds, and other early successional wildlife. Periodic monitoring will be conducted to check for target species (e.g., bog turtle).

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