COMMUNITY BASED BACKYARD CONSERVATION FOR WILDLIFE IN LOUDOUN COUNTY VIRGINIA'S EVERGREEN RURAL VILLAGE, A PLANNED RESIDENTIAL DEVELOPMENT

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A major paper submitted to the faculty of Virginia Polytechnic Institute and State University in fulfillment of the requirements for the Degree of Master of Natural Resources

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ABSTRACT

Centex Homes initiated the development of a wildlife management plan for Evergreen Rural Village, a planned residential development in Loudoun County, Virginia. The county's landscape has changed from rural to suburban in the past decade, prompting the need to integrate natural resource management into land planning processes. Centex Homes partnered with Virginia Tech to develop a long term management plan for wildlife living in and around the property that incorporates community outreach and resident education. Specific recommendations in this plan incorporate habitat enhancement projects designed for a 148-acre lot donated to Loudoun County Parks and Recreation Department and community outreach activities. The plan also specifies recommendations for managing buffer areas that exist within the perimeters of large 'conservancy lots' of Evergreen, which measure approximately 20 acres to 108 acres, and consist of limited agricultural use. Lastly, the management plan includes recommendations for the design of small scale habitat enhancement projects for central village lots and low impact development sites. The management plan relies on the participation of community members to become environmental stewards of their own backyards and natural space. Recommendations from this management plan are designed for a wildlife management based covenant for the Home Owners Association.

ACKNOWLEDGMENTS

In preparing this document, multiple meetings and interviews were conducted with Bob Davis and Steve Fritz of Centex Homes, Wetland Studies and Solutions, and Bowman Consulting, and David C. Culbert P.L.C., Attorney-At-Law, who is the primary attorney working with Centex Homes to produce the covenant for the forming Home Owners Association. All proffers, plats, and landscape drawings were provided by Centex Homes. Wetland Studies and Solutions provided both natural coverage imagery and infrared imagery maps of Evergreen Village, as well as a list of species that are included in their wetland enhancement plan for the farm ponds on the property. It should be noted that a small portion of time developing this document was supported by the U.S. Department of Agriculture's Natural Resource Conservation Service through its Backyard Conservation cooperative agreement with the Wildlife Habitat Council. As an employee of the Wildlife Habitat Council, I was able to tie this document into the objectives of this cooperative agreement, which aims to incorporate the Backyard Conservation program into nonagricultural, corporately owned land. Under this agreement, the Wildlife Habitat Council works to create an outreach program for residential developers to employ habitat enhancements and native landscaping concepts in new communities.

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PART I. INTRODUCTION

Executive Summary

In 2003, Centex Homes expressed interest in creating a wildlife management plan for Evergreen Rural Village, a planned residential development in Loudoun County, Virginia- one of the fastest growing counties in the United States. The county's landscape has changed from rural to suburban in the past decade, prompting the need to integrate natural resource management into land planning processes.

The Evergreen Rural Village planned property lies in the Piedmont Plateau physiographic region of Virginia. The vegetation of this physiographic region has been severely altered by a long history of clearing, agriculture, logging, and other human disturbances. Many forested areas in this region, such as Evergreen, have gone through succession on former agricultural lands, or have a history of repeated timber cutting. The northern Piedmont, where the Evergreen property lies, exhibits early successional tree species such as Virginia pine (*Pinus virginiana*) and tulip-poplar (*Liriodendron tulipifera*). Having less topographic variation than the Appalachian region that is just to the southwest, this region reveals lower diversity of vegetation and fewer rare habitats (Virginia Department of Conservation and Recreation, 2005). The primary objective in implementing the recommendations outlined in this paper is to maximize the quality of habitats available at Evergreen Rural Village for a diversity of endemic species of the Piedmont Province of Virginia.

Centex Homes partnered with Virginia Tech to develop a long term management plan for backyard wildlife living in and around the property that incorporates community outreach and resident environmental stewardship. Specific aspects of the recommendations incorporated into this document pertain to wildlife habitat enhancement projects designed for backyard conservation and management for a 148-acre lot slated to be donated to Loudoun County Parks and Recreation Department and community outreach activities, which will eventually offer access to the public and Evergreen residents. Recommendations outlined in this document also pertain to the management of buffer areas that exist within easement areas located in the perimeters of large 'conservancy

lots' of Evergreen, which measure approximately 20 acres to 108 acres, and consist of limited agricultural use. Lastly, the management plan includes the design of small scale habitat enhancement projects for central village lots and low impact development sites. Implementation of these recommendations largely relies on the participation of community members to become stewards of their own backyards and natural space by monitoring proposed projects, with general maintenance performed by the Home Owner's Association at Evergreen Rural Village. Recommendations from this management plan are designed for a wildlife management based covenant for the Home Owners Association.

Owner Information

Centex Homes is a subsidiary of Dallas-based Centex Corporation (NYSE: CTX), and one of the largest builders of single-family housing in the United States (Centex Corporation, 2004). The environmental objectives of this developer consist of eliminating lauan, a type of plywood used as flooring underlayment in new houses, and purchasing wood products from companies committed to certification of responsible forest operations though the Forest Stewardship Council (FSC) certification program, the American Forest and Paper Association Sustainable Forestry Initiative (SFI) or the Canadian Standards Association (CSA) Sustainable Forest Management System Standards. Centex also provides a $35 one-year membership to The Nature Conservancy (TNC) to each new home owner in a residential development. Centex has contributed more than $3 million to TNC, with an additional $1.5 million committed through March 2005 for designated preservation projects. A few TNC projects receiving this support include: The Centex Homes Dolan Falls Preserve in Texas, The Nassawango Creek Preserve in Maryland, and the Disney Wilderness Preserve and Apalachicola Bluffs and Ravines Preserve in Florida (Centex Corporation, 2004).

Centex Homes also strives to implement smart growth strategies in planning new residential developments where applicable. Smart growth strategies include the reduction of development potential to a level that is appropriate and sustainable for a region and that affords communities a quality of life and open spaces. Evergreen Rural Village is an

example of this effort, with its inclusion of open space preservation, wetland habitat enhancement, and the incorporation of this management plan for backyard wildlife conservation and community outreach.

Property Description and Applicable Proffers for Evergreen Village

The property that comprises Evergreen Rural Village is situated in the southern portion of Loudoun County, Virginia, between Routes 15, 50 (Lee Jackson Memorial Highway), and 267 (Dulles Greenway) in the Evergreen Mills area. It lies adjacent to Beaverdam Reservoir and is accessible from Evergreen Mills Road and Reservoir Road. This property is considered rural, and was used for agricultural purposes historically. Decaying cobs of corn could still be seen on parts of the property grounds during the spring of 2004. Up until the time Centex Homes purchased this land, hunting was permitted on the property.

The planned development consists of a Village Center subdistrict and a Village Conservancy subdistrict. The Village Center is planned for 292 residential lots consisting of up to 268 single family detached dwelling units and up to 24 single family attached dwelling units. This subdistrict will also include up to a maximum of 15,000 square feet of permitted Commercial and Workplace Area uses and between a 4,000 square foot community center with a pool and bathhouse facility. A maximum of 13 lots is permitted in the Village Conservancy subdistrict.

The proffers of Evergreen Rural Village indicate the establishment of a Goose Creek Scenic Easement and Open Space Easement required for the Village Conservancy subdistrict, as well as the establishment of buffers along Beaverdam Reservoir, a Forest Management Plan for the property, and a Riparian Planting Plan. The Goose Creek Easement area includes a 300- foot buffer along Goose Creek that will remain undisturbed. It specifically calls for the re-establishment of any areas within the buffer that show erosion impacts and degradation with the use of only native plant materials (if all native materials are not available, no less than 50% of native species are to be used).

In regards to the Beaverdam Reservoir Buffers, this easement calls for a 300-foot buffer area to be left undisturbed. It also calls for a 1000- ft buffer outside the 300-foot buffer, which only allows for the infrastructure for the operation of the communal water system and wastewater treatment and pumping system. In this case, any eroded or degraded areas

within these buffers are to be restored with native riparian species. A riparian planting plan calls for the use of native species, and is also required for three drainage swales that drain directly into the Beaverdam reservoir. The proffers also call for a Forest Management Plan to be submitted to the County Arborist, which addresses supplementary forestation using native species and protection measures during construction and long-term management practices.

Evergreen Village proffers stipulate the use of Best Management Practices for the constructed wetland areas and bioretention in the Village Center parking lot. Centex will be using the 'Occoquan Method' for Best Management Practices, which is published in the Northern Virginia BMP Handbook (November 6, 1992) prepared by the Northern Virginia Planning District Commission (NVPDC) and the Engineers and Surveyors Institute (ESI). The Occoquan Method in this handbook refers to the removal of phosphorous in a watershed system. Best Management Practices are also applied to the inspection and maintenance of storm drainage systems, and storm water management ponds.

Lastly, Centex Homes aims to incorporate Low Impact Design within the parking lot located in the Village Center Commercial and Workplace area. Low Impact Design or LID, is a comprehensive land planning and engineering design approach for development with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. It incorporates strategic planning with management techniques that aim to achieve superior environmental protection, while allowing for development or infrastructure rehabilitation to occur (Low Impact Development Center, 2004). Centex also plans to provide all prospective home owners with information regarding property management practices that will protect water quality. This will include information pertaining to the proper disposal of petroleum products, organic fertilizers, pesticides, and insecticides in maintaining private landscaping.

Methodology

In preparing this document, several methods of obtaining pertinent information were used. A literature review of habitat management techniques was conducted, primarily through the Virginia Cooperative Extension, Virginia Departments of Game and Inland Fisheries (VDGIF) and Forestry VDOF), and additional urban planning literature. Multiple meetings and interviews were conducted with representatives from Centex Homes, Wetland Studies and Solutions, Bowman Consulting, and David Culbert, who is the primary attorney working with Centex Homes to produce the covenant for the forming Home Owners Association. Meetings and calls were conducted with all of these parties to develop the focus and primary use of this document.

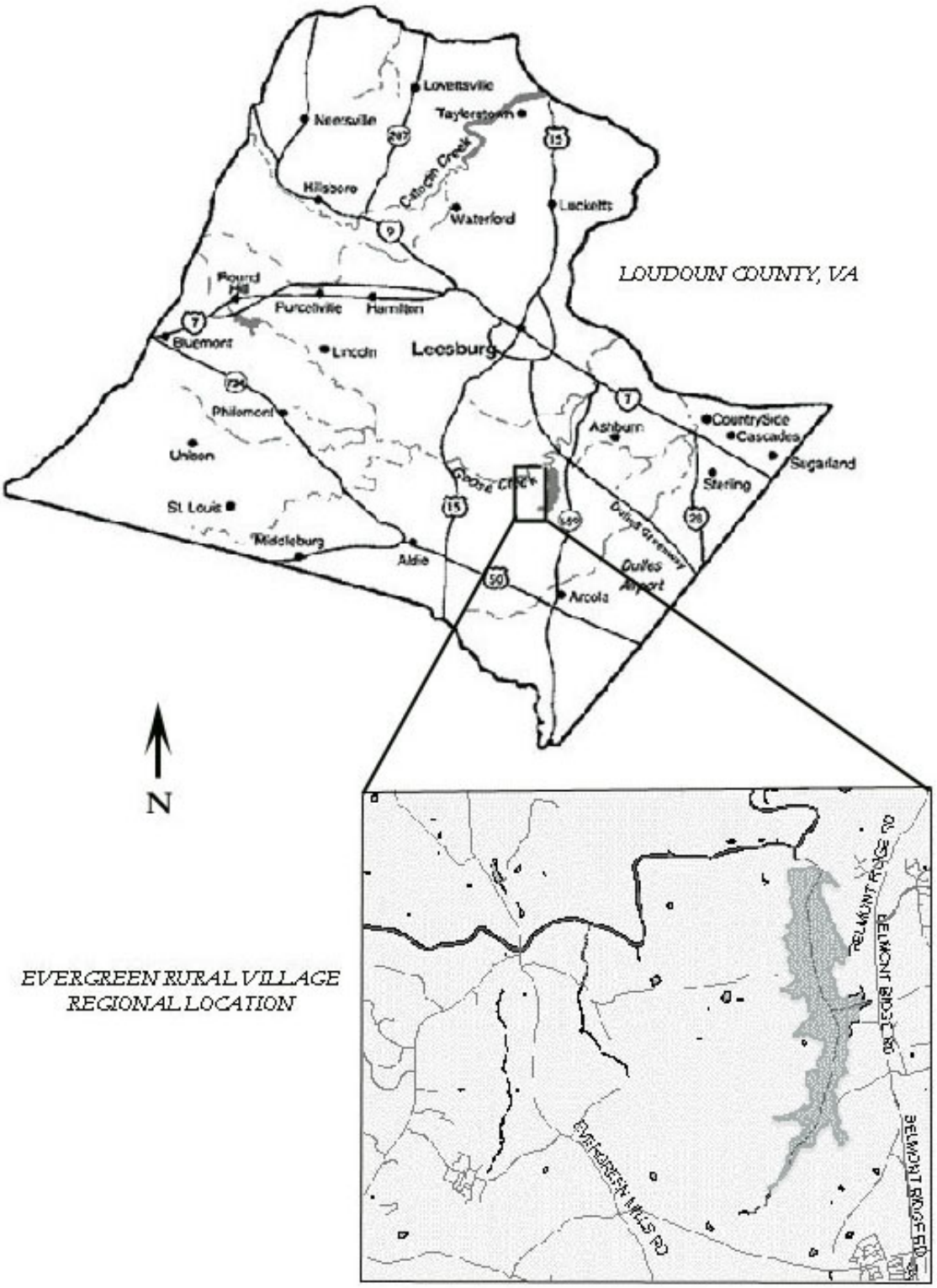
In addition, multiple site visits were conducted at Evergreen Village during the spring, summer, and fall of 2004 in order to visually understand the layout of the property and to identify key habitats and species that were to be the focus of the habitat management plan and subsequent covenant for the incoming Home Owners Association. Images from these site visits are provided in Part VIII of this document.

Target Habitats

Pre-development land within the planned Evergreen Village property can be described as a mixture of old field habitat and intermittent mixed stands of pine and hardwood. Several areas on the property consist of old abandoned farm house lots; one of which includes two farm ponds surrounded by open field. Northern conservancy lots are buffered by a riparian zone along Goose Creek. Targeted habitats that are referred to in this document have been designated as key habitats within the Commonwealth of Virginia's Department of Game and Inland Fisheries, and include Open Field/ Fallow Field (which include old farm house sites), Farm Pond habitat, Riparian zones, and mixed woodlot stands.

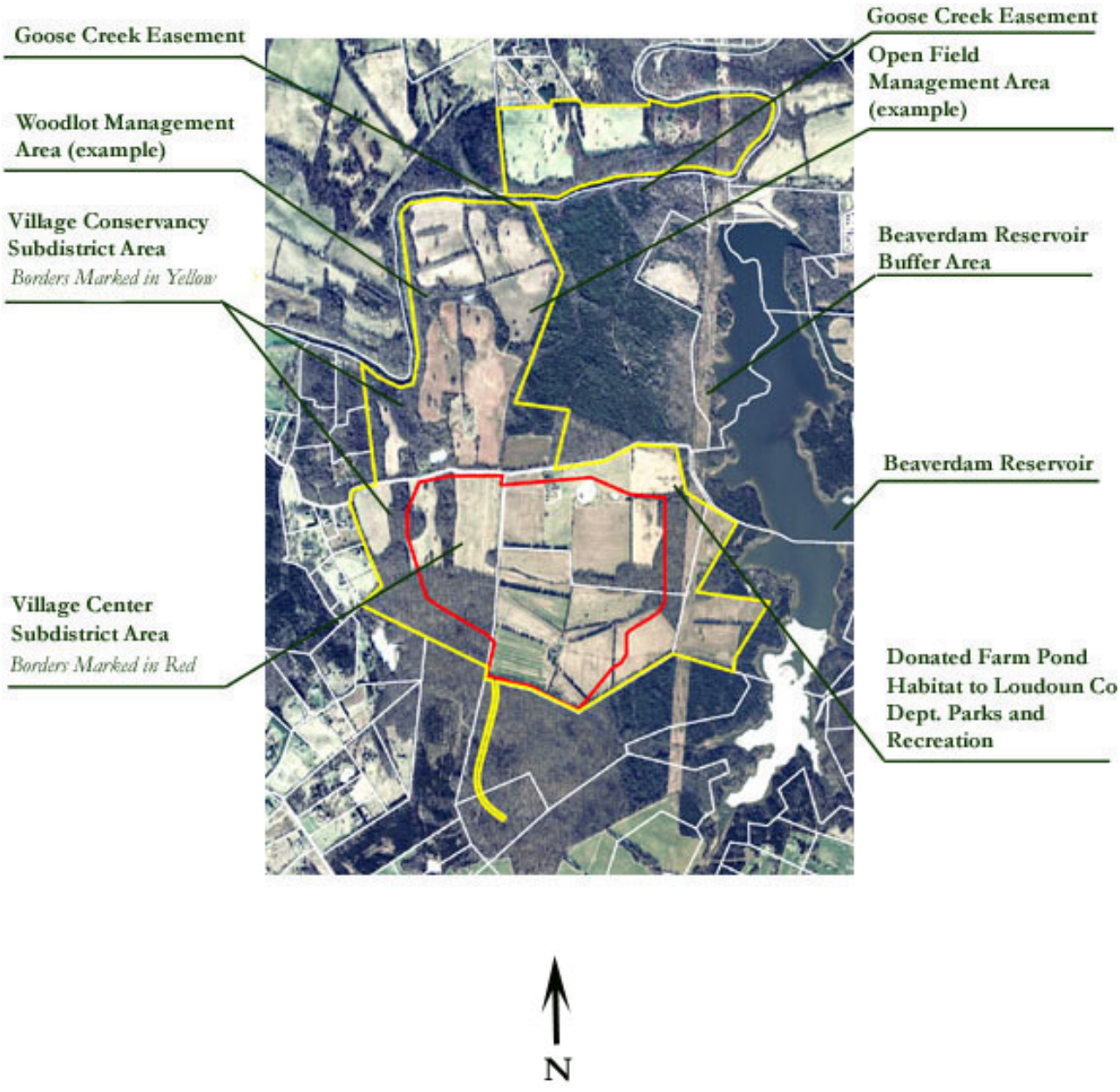
MAP INSERT I

LOUDOUN COUNTY, VA & EVERGREEN RURAL VILLAGE REGION



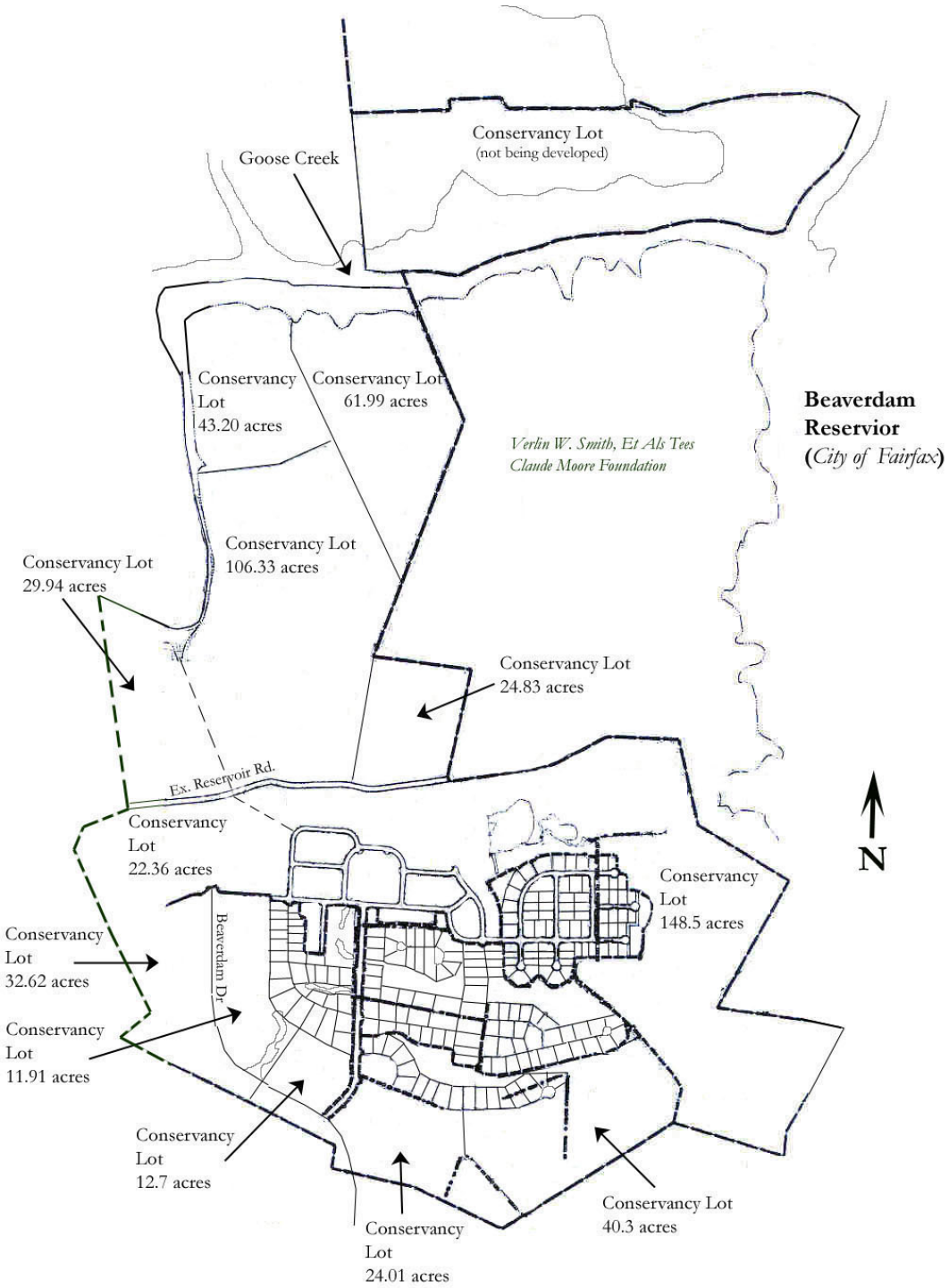
MAP INSERT II

EVERGREEN RURAL VILLAGE PLANNED DEVELOPMENT
SITE- NATURAL COLOR IMAGRY PROVIDED BY WETLAND
STUDIES AND SOLUTIONS (2002)



MAP INSERT III

Evergreen Rural Village- Overall Site Plan & Schematic



Goals and Objectives for Implementing Backyard Conservation at Evergreen Village

1. Minimize impact of development within central village/ higher density lots within Evergreen through design modifications of common areas, creation of a new habitat, and resident backyard wildlife conservation;
2. Preserve targeted habitats within the Village Conservancy subdistrict easement areas, including the Goose Creek Easement buffer, surrounding woodlots, and the Beaverdam Reservoir Buffers;
3. Manage for wildlife habitat within area designated for Loudoun County Parks and Recreation;
4. Provide for public awareness and outreach to Evergreen residents about common backyard wildlife and the management strategies used for conflict and resolution of 'nuisance' species, and to encourage residents to take up stewardship of backyard habitats and conservation areas at Evergreen;
5. Ensure sustainability and integrity of wildlife habitat management within the Evergreen property through the creation of habitat management components for the HOA covenant.

Concepts Emphasized to Achieve Desired Goals:

- Prior to development, make an effort to protect the most valuable wildlife habitat through enhancement measures, preservation of existing habitats, and creating a sustainable management plan.
- Use native plants that have value for wildlife as well as aesthetic appeal.
- Provide modes of community involvement, implementation of habitat projects, and long term stewardship through resident education and cooperation with the HOA, local schools, local conservation organizations, Loudoun County Parks and Recreation, Virginia Tech Department of Natural Resources, and other interested parties.
- Design modes of public awareness for Evergreen residents to prevent conflict with various species of suburban wildlife that are considered 'nuisance' species.

PART II. WILDLIFE HABITAT MANAGEMENT ANALYSIS AND RECOMMENDATIONS

The following sections outlines recommendations for habitat management at Evergreen Rural Village, and are organized by the goals stated in Part I of this document. Each Goal is presented with specific prescriptions for habitat enhancement projects that will help to achieve the desired goal, habitat components, proposed target areas, an explanation of the potential response from residents, and recommendations to implement the prescribed projects. The habitat components outline the ecological background and purpose of the proposed prescription, while the proposed target areas provide geographic information for where the prescription can be implemented on the property. The resulting habitats from these prescriptions that are created on the property may affect Evergreen residents in either a positive or a negative manner. The section outlining the potential response from residents explains how Evergreen community members may react to various habitat management activities and the wildlife that may ultimately use this property. The recommendations outline specific details on how to implement the overall prescription stated in each section.

Goal 1- Minimize impact of development within central village/ higher density lots within Evergreen through design modifications of common areas, creation of a new habitat, and resident backyard wildlife conservation.

Prescription- Create a warm season grass and wildflower habitat to support multiple species of pollinators and songbirds in combination with various tree and shrub plantings in common areas.

Habitat Components

Native warm season grasses have been shown to provide ideal nesting and escape cover for small mammals and songbirds, and when combined with native wildflowers can provide optimal habitat for pollinator species such as butterflies (VDGIF, 2004). These species of grasses form clumps that provide cover and openings for ground nesting birds and small mammals to move freely. Many warm season grass species also tend to be

drought resistant and often require less maintenance after initial establishment (VDGIF, 2004).

Proposed Target Areas

Please refer to the map insert for an identification of the Village Center subdistrict.

Potential Response from Evergreen Residents

Home owners that dwell within the Village Center subdistrict will be able to take advantage of this habitat management technique, as it will provide scenic viewing of many species of butterflies and songbirds that are often popular for nature lovers. It should be noted, however, that some residents may oppose the 'look' of this habitat, as it will consist of longer grass instead of a manicured lawn. Therein lies the importance of effective marketing strategies to potential home owners that aim to live in areas where natural habitats for backyard wildlife exist.

Recommendations

Using Native Warm Season Grasses and Wildflowers

When planting native warm season grasses, the VDGIF recommends that they be established in blocks and not linear strips. Openings in strips create predator traps for ground nesting birds and facilitate a search by predators (VDGIF, 2004). It is recommended that the warm season grasses be planted near escape cover such as brush or woodlots, which will also be established according to the landscape plans for these common areas.

VDGIF also recommends that native warm season grasses be planted with a cyclone spreader, conventional drill, or warm season grass drill, depending on the desired grass species, and can assist in providing this service to Centex if needed. These grass species should be planted between April 1 to June 30 and tend to take two growing seasons or longer to become fully established (VDGIF, 2004). This is largely dependent on weed control and monitoring, which is extremely important when establishing warm season grasses. In establishing these areas, it may be necessary to use herbicides before planting

to limit the amount of weedy species. In addition, repeated mowing of the area can help to control weeds during establishment. It is recommended by the VDGIF that mowing should occur in May, June, and July in order to maintain weedy species at the same level as the planting so that desired grasses are not shaded out. Mixed stands of switchgrass, indiangrass, big and little bluestem, eastern gamagrass, and sideoats gama are recommended to be planted in the common areas (VDGIF, 2004).

Once warm season grasses have established themselves, maintenance in these smaller lots should consist of a simple rotational mowing scheme. This is important in order to prevent the grasses from becoming too long and matted, which will not allow free movement of wildlife in these areas.

TABLE 1. RECOMMENDED NATIVE SPECIES OF WILDFLOWERS AND THEIR CHARACTERISTICS (PRINCE WILLIAM WILDFLOWER SOCIETY)

Common Name	Scientific Name
Black-eyed Susan	*Rudbeckia fulgida*
Blazing Star	*Liatris spicata*
Butterflyweed	*Asclepias tuberosa*
Cardinal Flower	*Lobelia cardinalis*
Coreopsis	*Coreopsis lanceolata*
Goldenrod	*Solidago spp.*
Ironweed	*Vernonia noveboracensis*
Joe-Pye Weed	*Eupatorium maculatum*
New England Aster	*Aster novae-angliae*
Phlox	*Phlox spp.*
Purple Coneflower	*Echinacea purpurea*
Smooth Aster	*Aster laevis*
Stokes, Aster	*Sokesia laevis*
Sunflower, Narrow Leaved	*Helianthus angustifolius*
Swamp Milkweed	*Asclepias incarnata*
Wild Bergamot	*Monarda fistulosa*

Use of Fertilizers and Pesticides

Although Centex Homes aims to provide incoming home owners with useful information on the proper use of fertilizers, it is recommended that the HOA also abide by these standards in maintaining and managing the common areas located in the Village Center subdistrict. This is important for management purposes, as chemical pesticides and fertilizers can contaminate surface and groundwater when used on lawns, affecting

aquatic habitats and local wildlife. Species such as the American Robin, Canada Goose, American Widgeon, raccoon and eastern gray squirrel can be highly susceptible to lawn chemicals, as they utilize lawn areas for feeding. Pesticides and fertilizers can also inhibit the activity of beneficial organisms, such as earthworms, that help to enrich soils with nutrients. In addition, fertilizers that lack organic matter may create a chemical-dependent landscape, as pest species become resistant, requiring more frequent applications over time (Organic Landscape Alliance, 2005). This can result in unnecessary expenditures for a home owners association. It is recommended that maintenance operators implement the use of organic fertilizers to reduce long term maintenance costs and to allow for less phosphorous runoff into ground water systems.

By contrast, organic fertilizers such as those produced from organic matter tend to offer a slow release of nitrogen, phosphorous and potassium, thereby enhancing soil quality and limiting runoff as well as the number of applications needed (VDGIF, 2004). In addition, organic herbicides may reduce harmful affects on plants and animals. For these reasons, it is strongly recommended that the herbicides be chosen appropriately in establishing warm season grasses.

Prescription- Plant native trees and shrubs in common areas and residential lots as part of the planned landscaping in the Village Center subdistrict.

Habitat Components

As native warm season grasses are recommended to be planted within the common area lots within the Village Center subdistrict, it is recommended that native tree and shrub species also be planted within these areas to provide food and cover for a variety of species. As noted previously, planted brush and shrub species provide additional cover for ground nesting birds, songbirds, and small mammals when adjacent to warm season grasses and wildflowers. Native shrubs and trees planted within the residential lots where landscaping prior to the home owner moving in will also provide food sources and cover for backyard wildlife that many residents will be able to enjoy seeing.

Proposed Target Areas

Proposed target areas include those that have been identified in the landscaping plans for common areas within the Village Center subdistrict as well as residential lots where landscaping can be implemented prior to a home becoming occupied by a resident.

Potential Response from Evergreen Residents

Many of the wildlife species attracted to these recommended plantings will consist of songbirds, ground nesting birds, and small mammals. However, those species that utilize these habitats can often attract predators, such as fox, raccoon, various species of hawks, and even coyotes. Interaction with these species often requires a plan of resolution if conflict occurs. It is recommended that home owners abide by HOA guidelines in dealing with these potential conflicts, and that Centex and the HOA provide for continual urban wildlife education and awareness to prevent misunderstandings and encouragement for cooperation with the HOA. These recommendations for the HOA are provided in Part V. of this document.

Recommendations

Planting native shrubs and trees will provide both food sources and cover habitat for a variety of wildlife that occupy suburban areas. It is recommended that the HOA utilize this list as well in providing residents with appropriate species for individual property landscaping as well.

TABLE 2. NATIVE SHRUBS AND TREES IN THE COMMONWEALTH OF VIRGINIA RECOMMENDED FOR USE IN RESIDENT GARDENS AND COMMON AREAS (VDGIF, 2004)

Common Name	***Scientific Name or Genus***	**Type**
Arrrowood, Blackhaw, & Cranberry Bush	*Viburnums*	Shrub
Bayberry and Wax Myrtle	*Myrica*	Shrub
Blackberry	*Rubus*	Shrub
Chokeberry	*Aronia*	Shrub
Chokecherry	*Prunus*	Shrub
Winterberry and Inkberry	*Ilex*	Shrub
Black Cherry	*Prunus serotina*	Tree
Blackgum	*Nyssa*	Tree

Table 2. Continued

Dogwoods	*Cornus*	Tree
Eastern Red Cedar	*Juniperus virginiana*	Tree
Eastern White Pine	*Pinus strobus*	Tree
Hollies	*Ilex*	Tree
Oaks	*Quercus*	Tree

TABLE 3. NATIVE PLANTS THAT SERVE AS NECTAR SOURCES FOR LOCAL POLLINATOR SPECIES IN THE COMMONWEALTH OF VIRGINIA (VDGIF, 2004)

COMMON NAME	*GENUS*	TYPE
Azalea	*Rhododendron*	Shrub
Buttonbush	*Cephalanthus*	Shrub
Pepperbush	*Clethra*	Shrub
Sweetspire	*Itea*	Shrub
Asters & Milkweeds	*Asclepias*	Perennial
Bergamot & Bee Balm	*Monarda*	Perennial
Black-eyed Susan	*Rudbeckia*	Perennial
Cardinal Flower	*Lobelia*	Perennial
Coneflower	*Echinacea*	Perennial
Goldenrod	*Solidago*	Perennial

Goal 2- Preserve targeted habitats within the Village Conservancy subdistrict easement areas, including the Goose Creek Easement buffer, surrounding woodlots, and the Beaverdam Reservoir Buffers.

Prescription- Maintain existing woodlot buffers within the Village Conservancy subdistrict prior to housing development and incorporate snag management for cavity nesting species into this regime.

Habitat Components

The primary focus of managing these areas will consist of preserving the existing woodlot habitat under conservation easement guidelines and through snag management for cavity nesting species. Woodlots, depending on the size of the fragment, can provide habitat for several avian species, including owls, woodpeckers, and songbirds; many of these species largely rely on cavities within snags, or dead or dying trees, for nesting habitat. Certain mammal species will also utilize cavities, such as raccoons and squirrels.

Cavity nesting birds common to the northern Virginia area include woodpeckers, Chickadees, Titmice, Great-Crested Flycatchers, Bluebirds, and Tree Swallows (VDGIF, 2004). These species will either nest in tree cavities that they excavate themselves or will inhabit older cavities that have been excavated by another species. Within the woodlots, downed trees and woody debris also serve as habitat for many cavity users, as well as cover for species such as Wild Turkey and the cottontail (VDOF, 2005). This woodlot is also prime habitat for many species, as it lies adjacent to old field habitat and includes the riparian habitat along Goose Creek. This diversity in habitat provides for necessary seasonal use by many species, such as Wild Turkey and cottontail. Wild Turkey utilize hardwood habitats in the fall and winter for food and roosting sites, while cottontails use forest openings and downed debris for shelter in the winter months (VDOF, 2005). Both of these species, as well as several Bluebirds, Chickadees, Tree Swallows, and woodpeckers, were all sighted at Evergreen Village on multiple occasions during the spring and summer of 2004.

Birds of Prey

Owls, such as the Great Horned Owl, the Barred Owl, and the Eastern Screech Owl, can also be present in smaller sized woodlots such as the ones that exist within the buffers of the Village Conservancy subdistrict. These owl species are present within their territories year round, and have adapted well to human presence and suburban infrastructure (VDOF, 2005). The Great Horned Owl resides primarily in upland areas with a mixture of forests, fields, and brushy habitats (VDOF, 2005). Barred Owls are likely to be found in floodplain forest areas, and tend to prefer mature hardwood forests with plenty of tree cavities for potential nest sites (VDOF, 2005). Eastern Screech Owls, which are the smallest owl species in the area, reside in a diverse array of habitat types, including mixed forests, woodlots, swamps, and suburban parks, and for this reason are the most likely species of owl that might be seen at Evergreen. This species will prefer habitats that consist primarily of hardwood most of the time, however, but utilize edge habitats, wet woods, and abandoned fields such as those found at Evergreen for hunting purposes. Though Eastern Screech Owls can reside in several habitats, this species is presently declining in Virginia due to their tendency to hunt along road sides, resulting in fatalities

from vehicle collisions (VDOF, 2005). Screech owls are also considered cavity nesters, they will readily respond to snag management and artificial nesting sites. Northern Saw-whet Owls inhabit woodlands throughout the continental United States, and are common in deciduous and mixed conifer- deciduous forested areas. They may be found in rural or suburban environments during migration and winter (Yan, 2001).

Red-shouldered Hawks, a day time predator, will favor floodplain forests, swamps, and low-lying areas for hunting and for nesting and has become tolerant of human activity in close proximity. This species can also benefit from woodlot conservation at Evergreen. Cooper's Hawk, though declining in Virginia, may be able to benefit from woodlot conservation as well, as these hawks tend to inhabit deciduous and mixed forests, woodlots, and forest patches associated with field openings, and prefer to be near edges or openings (VDOF, 2005).

Proposed Target Areas

Please refer to the map insert for targeted woodlot habitats located within the Conservancy Village subdistrict easement areas.

Potential Response from Evergreen Residents

As many of these habitats located within the Conservancy Village subdistrict allow limited use by Evergreen residents, there will be little interaction with people other than those using the planned trail along the Goose Creek easement area. Because of this projected limited interaction, it is assumed that residents will likely respond positively to wildlife sightings and encounters, with the exception of a coyote. This document will further explore resolution of conflicting interaction with other species that are likely to inhabit these areas in the section outlining Goal 4.

Recommendations

As Centex Homes develops the Village Conservancy subdistrict areas, it is recommended that any non-hazardous snags be left in place. These standing trees will not impede any forestation efforts, either, and will only aid in providing habitat for many cavity nesters. VDOF recommends giving preference to any live trees with existing cavities when

performing snag removal, as they will survive and stand longer than existing dead ones. VDOF also recommends a density of 10-20 small (12 inches or less in diameter) and 2-5 large (12 inches or more in diameter) snags or trees with existing cavities per acre (VDOF, 2005).

Snag Creation

Centex can also create snags where the minimum number is not met through the use of girdling, or using an herbicide on a tree. If snags are lacking at the area, they can be created through a process called "girdling". Girdling is the process of removing a band of bark from around the entire circumference of a live tree. The cut should be deep enough that the inner layer of wood, the cambium, is exposed. This will result in the tree's death and the creation of a snag for wildlife. This should not be done on any older or historical trees for preservation purposes or any mast producing trees such as oaks or hickories, as they produce nuts that are eaten by wildlife (VDOF, 2005). In creating a snag, it is recommended that it be at least 6 feet tall if it is to be useful for wildlife as nesting or denning sites. In addition, snags should not be created within a close proximity to roads, driveways, homes, parking lots, or trails (unless all hazardous limbs are removed). However, this can be done on any existing invasive exotic species such as Tree of Heaven (*Ailanthus altissima*). Other species such as red maple, sweetgum or poorly formed trees, can be used in creating snags (VDOF, 2005).

Downed Woody Debris

In addition, course or downed woody debris from fallen limbs, trees, or brush provides excellent habitat for a diversity of species, particularly insects and amphibians and cavity nesting birds and mammals. Many species of wildlife will use downed woody debris as shelter or a source of food. These fallen limbs and trees also provide support for various plant species. Different stages of decaying wood support mosses, fungi, and seedling growth that all thrive on the organic matter.

Benefits of leaving course or downed woody debris in terrestrial and aquatic systems, can include the following (Stevens, 1997):

- Sites for nests, dens and burrows;
- Habitat for microbial decomposers (e.g., bacteria, fungi and actinomycetes);
- A primary energy source for a complex food web;
- Hiding cover for predators and protective cover for their prey;
- Moist microsites (e.g., for amphibians, insects, worms, plants, ectomycorrhizal fungi and tree roots);
- Travel-ways across streams, across the forest floor, beneath and through the snow; and
- Refuge during disturbance and environmental stress (e.g., low moisture and temperature extremes).
- Structure to slow stream flow and create pools;
- Places for food to accumulate; and
- Cover from temperature extremes and predators.

Stevens (1997) notes that size is an important consideration when leaving woody debris, as large pieces will persist in an ecosystem much longer than small pieces. Any downed woody debris, such as hollow logs, tree tops, brush piles, and limbs should remain in any easement areas.

Prescription- Maintain open field/ fallow field habitats within Village Conservancy subdistrict easement areas.

Habitat Components

Open fields or fallow fields are areas that had been used at one point for agricultural purposes, and exist in the early stages of succession. These areas typically consist of a variety of warm and cool season grasses, small shrubs, and sometimes small trees. When adjacent to woodlots, as they are at Evergreen, these areas provide quality wildlife habitat for a variety of species, as several species frequently make use of open fields during different seasons. Wild Turkey require openings in the forest or agricultural areas where insects are abundant, and will consume mast, fruits, seeds, greens and agricultural crops as their main diet, but grasses and seeds are the primary food source in winter and spring

foods (VDGIF, 2004). Young Turkey poults will primarily feed on insects in the summer, and therefore largely rely on open fields for this purpose (VDGIF, 2004).

Several raptor species will also utilize open fields for hunting, including the Barn Owl (though rarely seen in Loudoun), the Red-tailed Hawk, Sharp-shinned Hawk, and the American Kestrel. Barn Owls are unique, and will inhabit man-made structures that are typically found on farms, such as barns and silos, so this species may not be seen often at Evergreen. Though, the habitat they typically use for hunting does include abandoned fields and pastures. Residents moving into the large conservancy lots may be able to provide artificial habitat via the construction and installation of nest boxes, which Barn Owls will use (VDOF, 2005). Kestrels will use nest boxes as well, as they are considered cavity nesters. Kestrels can often be seen on manmade perches such as power lines or poles, where they search for prey. Their hunting habitat primarily consists of open field and pasture land (VDOF, 2005).

The Red-tailed Hawk is commonly seen along roadsides, and has adapted well to residential sites. This species will also utilize open fields for hunting, but will probably be seen throughout Evergreen as it perches on several man-made structures near roadsides to hunt. As with many other species, it will nest in hardwood or pine trees typically found in woodlots, and uses open areas for hunting (VDOF, 2005). The Sharp-shinned Hawk also favors open areas, hedgerows, and wooded strips for hunting, and nests in coniferous forests near water in the upper piedmont region (VDOF, 2005). For this reason, Sharp-shinned Hawks may have readily taken to nesting along the Goose Creek Easement area.

Proposed Target Areas

Please refer to the map insert for targeted open field/ fallow field habitats located within the Conservancy Village subdistrict easement areas and Village Conservancy resident lots.

Potential Response from Evergreen Residents

Those residents that move into the Village Conservancy lots will be impacted the most by these habitat management recommendations. They will be the residents that will be

responsible for maintaining many of the open field habitats that do not fall into the easement areas. These residents will likely encounter many of the raptor species listed in this section, which will not likely cause a disturbance among these home owners. Potential negative impacts may be those associated with encounters of small mammals, such as mice, voles, or other potential prey items that raptors will hunt. They may also encounter various snake and reptile species, which can cause conflict or anxiety with residents. And, as some of these people will be residing close to the Goose Creek Easement area, they may also encounter predators such as coyotes. Addressing conflicts and resolution of encounters with these species is best accomplished with continued outreach and education, which is further explained in this document in the section that outlines Goal 4.

Recommendations

It is recommended that all existing open field areas that fall within the buffer areas of the Village Conservancy subdistrict with grasses, forbs, and legumes be maintained for wildlife habitat. To prevent further succession to a woodlot, mowing or disking can be conducted by residents occupying this area as management techniques to ensure that grasses and moderate herbaceous growth are maintained. Mowing and disking should not be conducted during the months of May to July in order to prevent the destruction of several ground nesting birds such as Wild Turkey and their habitat (VDOF, 2005). Rabbits often use these habitats as well, and it is not recommended to mow or use a bush hog until August. At that time, the bush hog should be set to its highest level so as to prevent the destruction of nests and maintain a level of cover for wildlife. It is also recommended that mowing or bush hogging be done in strips of 30-40 feet, and performed every 3-4 years (VDOF, 2005). Vehicle access should be prohibited or limited during these times as well. Residents who own dogs should be encouraged to use leashes while walking, and to keep them indoors or within fenced areas during these months, as they can exhibit predatory behavior towards several ground nesting birds, such as Wild Turkeys (VDOF, 2005).

Field Border Enhancement

Field borders can also be established along the woodlot edges in conservation lots by residents, or by Centex contractors within the easement areas. Field borders provide loafing or nesting habitat, as well as areas where wildlife can escape from enemies or obtain shelter from weather. Species planted in these areas often provide food sources such as berries and vines for wildlife as well (VDGIF, 2004). Species planted in borders should primarily consist of woody plants of low to medium level in height. If possible, they should be planted at a width of 30 feet to allow for an ample buffer between the woodlot edge and the field habitat (VDGIF, 2004). It is recommended that borders should be maintained by periodically removing undesirable, invading trees as they begin to take over or shade out low-growing plants as the field border becomes well established (VDGIF, 2004).

VDOF (2004) recommends the following three methods in planting field borders:

- In edges adjacent to the woodlot, some trees along the field edge can be cut (this can be done in creating snags) to allow sunlight to penetrate and the remaining vegetation to grow into a shrubby stage. These borders are advantageous in that they do not tend to reduce the amount of open field habitat. Limbs or small trees that are cut can be used as downed woody debris or brush piles around the field borders. It is recommended that large trees that are chosen to be cut be left as snags according the height recommended above. VDOF recommends that any persimmon, black gum, sassafras, American dogwood and other obvious fruit producers be left standing. This process will create optimal field borders in approximately two years (VDOF, 2005).
- Allow natural vegetation to encroach into the field and grow undisturbed until reaching the desirable stage; or
- Plant nursery grown shrubs (many are available from VDOF or other native nurseries). Shrubs should be selected based upon their ability to produce fruit, berries, or other potential food items for wildlife. VDOF recommends native shrub honeysuckles, rem red and tartarian, shrub dogwoods, silky, red osier, American dogwood and shrub lespedeza (VA-70) (VDOF, 2005).

Evergreen Rural Village as a Potential Release Site for Rehabilitated Wildlife

The proposed Evergreen Advisory Board for Backyard Wildlife (see description of this committee in the section outlining Goal 4) may also wish to permit the release of injured or orphaned birds of prey into the open field and field border habitat. Many wildlife rehabilitators often seek out prime release sites for injured or orphaned wildlife, and the habitat at Evergreen may be optimal for this purpose. The wildlife rehabilitator will require a visit to the site to better assess the potential release location, and to determine if there are existing species there that could out-compete or threaten the survival of the released animal. Recommended local organizations that the Board could partner with in this effort are the Raptor Conservancy of Virginia (http://www.raptorsva.org/), which is located in Fairfax and aims to further the rehabilitation and release to the wild of injured, ill or orphaned native Virginia birds of prey, the education of the public about raptors and preservation of their habitat, and the increase the wild population of endangered and threatened raptors. Contact information for this organization is provided in Appendix XI. In addition, the Board may also choose to enlist collaboration with the Wildlife Rescue League (http://www.wildliferescueleague.org/), which is a non-profit organization that provides care for sick, injured and orphaned wildlife in order to return them to the wild. They consist of licensed rehabilitators that are located throughout Virginia and suburban Maryland, and work with animal shelters, humane societies, wildlife groups, nature centers and veterinary hospitals to provide care many species of wildlife found in the Evergreen region.

Artificial Nesting Structures

The residents that move into the large Conservancy lots may also wish to provide artificial nesting habitat for several of the species mentioned in this section and the previous (in regards to snag management and cavity nesting species). For next box construction and installation procedures, it is highly recommended that residents use those provided by the Cornell Lab of Ornithology, which can be downloaded via **http://www.birds.cornell.edu/programs/AllAboutBirds/AttractingBirds/Nestboxes**

Prescription- Maintain Goose Creek Easement riparian habitat.

Habitat Components

Riparian buffer zones are those that lie adjacent to streams, rivers, lakes, and wetlands. These lands offer tremendous value to local ecosystems as they catch many nutrients that filter down from upland areas. Because of this characteristic and the vegetative cover they tend to provide, they also serve as corridors for many species of wildlife. Canopy cover over the water surface from riparian vegetation is vital for several species of fish as well as aquatic birds. This cover provides the necessary shade that maintains cooler temperatures for fish, as well as nesting areas for the Wood Duck. Plants that exist within riparian buffers also provide food sources via leaf material or when insect species fall into the water surface (Klapproth and Johnson, 2000). Riparian areas with unique characteristics, such as older growth, wetlands, or endangered species offer key habitats that must be preserved. Within the Goose Creek easement area, there are not only older trees, but also archeological values. An old stone wall stretches along the banks of this area, and it is highly recommended that this area be studied and kept under strict preservation.

Riparian buffers also tend to support higher densities and diversities of migratory birds, and can provide key habitat in areas where this is less interior forest, such as in agricultural areas or old fields such as those that exist at Evergreen (VDOF, 2005). Mammals will also use the vegetation in riparian areas for food and cover, and reptiles are common to these areas as they support higher levels of humidity and moisture (VDOF, 2005). Snags tend to be prevalent in these areas, which will aid in supporting cavity nesting species. It is important to note that the root systems of riparian vegetation will help stabilize the banks of the Goose Creek easement area, and it will be important to maintain these areas to prevent erosion. These plants will also help to improve the water quality of Goose Creek itself, as they help to remove excess nitrogen and phosphorous that often exists in rain water runoff from suburban and agricultural areas.

Proposed Target Areas

Please refer to the map insert for targeted riparian buffer habitats located within the Goose Creek Easement and Beaverdam Reservoir Buffer areas.

Potential Response from Evergreen Residents

Those residents that move into the Village Conservancy lots will be affected most by these habitat management recommendations, as they will live in closest proximity to these riparian buffers. Potential benefits to residents will be the likely encounter with many migratory and songbirds that utilize these habitats. Potential negative impacts may be those associated with encounters of small mammals, various reptile species, deer, raccoon, fox, and coyote. Some of these species can cause conflict or general unsettlement anxiety with residents, as some are considered rabies vectors or nuisance species. Addressing conflict and resolution of encounters with these species is best accomplished with continued outreach and education, which is further explained in this document in the section outlining Goal 4 of this document.

Recommendations

If, under the guidelines of the proffers for Evergreen, riparian species must be planted in both the Goose Creek Easement and Beaverdam Reservoir Buffer areas, the Virginia Department of Forestry (2005) highly recommends several species of trees, shrubs, grasses, vines and other plants that have developed root systems or a tolerance for damp to very wet soil that is often found in riparian buffer zones. Below is a list of these recommended species:

TABLE 4. NATIVE RIPARIAN BUFFER ZONE SPECIES

Common Name	***Scientific Name***
Black Gum	*Nyssa biflora*
Buttonbush	*Cephalanthus occidentalis*
Green Ash	*Fraxinus pennsylvanica*
Grey stem Dogwood	*Cornus racemosa*
Pin Oak	*Quercus palustris*
Red Maple	*Acer rubrum*
Redosien Dogwood	*Cornus sericea*
River Birch	*Betula nigra*

Table 4. Continued

Smooth Alder	Alnus serrulata
Spice Bush	*Lindera benzoin*
Sweet Gum	*Liquidambar styraciflua*
Sycamore	*Platanus occidentalis*
Water Oak	*Quercus nigra*
Willow Species	*Salix sp.*

Wildlife Damage Prevention

It should be noted that tree damage from beaver may be a potential conflict in the riparian buffer zones the Goose Creek Scenic Easement and Beaverdam Reservoir Buffer areas. Any plantings done to re-establish areas within the buffers that show erosion impacts and degradation may be affected by beaver. Beaver will fell trees that are between two and six inches in diameter that lie within 100 feet of a body of water (HSUS, 2005). They will often also remove bark from a tree and leave a tree standing. For this reason, a tree protection plan should be in place for all trees planted within these buffers.

Allowing beaver to inhabit the streams in this region should be encouraged, as their presence often has a positive effect in wetland creation dam creation, which can provide key habitats for a diversity of other species. Beaver presence is usually not a problem until damage from beaver on expensive plantings is noticed. Recommended tree guards for smaller trees consist of a cylinder made of galvanized, welded wire wrapped around a tree 6-12 inches out from the trunk and three feet from the ground. Larger trees may require that the cylinder be staked. Corrugated plastic drainpipes can be used for seedlings. Pipes should be slit to allow room for the tree to grow (HSUS, 2005).

Fencing can also help to prevent beavers from damaging trees that are grouped together. A three to four foot fence can be placed off the water side, but extended if beavers begin to learn how to get around it (HSUS, 2005)

Goal 3- Manage for wildlife habitat within area designated for Loudoun County Parks and Recreation

Prescription- Provide measures to maintain shoreline vegetation recommended by Wetland Studies and Solutions, including the management and monitoring of Canada geese.

Habitat Components

Within the area Centex is presently donating to Loudoun County Department of Recreation, there exists two farm ponds on an old farm site. It is recommended that this area be managed as natural space and wildlife habitat and not developed for recreational use with the exception of nature trails and wildlife viewing areas for the public. Wetland Studies and Solutions has prepared a separate landscaping plan for this area, and the list of species they intend to use along the shorelines of these farm ponds is outlined below.

TABLE 5. PROPOSED LIST OF PLANTS TO BE INCORPORATED INTO FARM POND LANDSCAPING PLAN AND PRIMARY WILDLIFE ATTRACTED (PROVIDED BY WETLAND STUDIES AND SOLUTIONS, 2004)

PROPOSED SPECIES TO BE PLANTED	PRIMARY WILDLIFE ATTRACTED
American Hornbeam & Ironwood	**Ruffed grouse, bobwhite, pheasant, wild turkey, squirrel, rabbit, deer**
American Sycamore	**Raccoons, opossum, wood duck Pileated and other woodpeckers**
Annual Ryegrass	**Sparrows, finches, small mammals**
Awnless Beggar Ticks	**Wood duck, sparrows, finches, quail Rabbit**
Blue Bervain	**Butterflies**
Blueflag	**Hummingbirds, butterflies**
Boneset	**Butterflies**
Brookside Alder	**Finches, sparrows, doves Yellow warbler, song sparrow and other small songbirds**

Bulrush	**Waterfowl, Songbirds, small mammals**
Buttonbush	**Beaver, Deer**
Deertounge	**Butterflies, Hummingbirds** **Sparrows, blackbirds, cowbirds**
Fowl-Manna-Grass	**Sparrows, small mammals**
Fox Sedge	**Songbirds, esp. sparrows, small mammals**
Gama Grass	**Deer, Songbirds, small mammals**
German/Foxtail Millet	**Erosion and Sediment Control**
Grassleaf Goldenrod	**Butterflies**
Green Ash	**Cardinal, wood duck, squirrels**
Halberd-Leaved Tearthumb	**Blackbirds, finches, sparrows, songbirds, small mammals**
Joe Pye Weed	**Butterflies, esp. swallowtails**
New England Aster	**Butterflies**
Nodding Beggar Ticks	**Butterfiles**
	Sparrows, finches, small mammals
NY Ironweed	**Butterflies**
PA Smartweed	**Sparrows, finches, blackbirds, quail, small mammals**
Pin Oak, Willow Oak, Swamp White Oak, & Swamp Chestnut Oak	**Blue jays, woodpeckers, deer, fox, raccoons, squirrels, other rodents**
Red Maple	**Finches, chickadees, squirrels** **Robins, goldfinches, other birds**
Box Elder	**Finches, chickadees, squirrels** **Robins, goldfinches, other birds**
Rice Cut Grass	**Swamp sparrows, waterfowl**
Sedge	**Songbirds, esp. sparrows, small mammals**
Silky Dogwood	**Catbird, thrasher, thrushes, woodpeckers**

Soft Rush	**Songbirds, small mammals**
Southern Arrowwood	**Robins, bluebirds, other thrushes thrashers, catbirds and vireos**
Spicebush	**Thrushes vireos, catbird, bluebird Butterfly caterpillars**
Swamp Milkweed	**Butterflies Monarch butterfly caterpillars**
Sweet Gum & River Birch	**Finches, cardinals, chickadees, sparrows, squirrels**
Switchgrass	**Sparrows, blackbirds, cowbirds**
Virginia Wild-Rye	**Sparrows, small mammals Deer, small mammals**
Wrinkled Goldenrod	**Butterflies**

Monitoring for Invasive Vegetation

To ensure the long term success of this planned habitat, it is recommended that the area be consistently monitored for invasive vegetation, such as phragmites and cattails, which can undermine the hard efforts and costs of implementing the landscaping plan. Phragmites is an exotic invasive reed that is now found in every U.S. State, and is particularly prolific in the mid-Atlantic region (Ecology and Management of Invasive Plants Program, 2004). Cattails, though native to the mid-Atlantic, can also become prolific and can become an indicator of disturbance in a wetland. The spread of narrow-leaved cattail may be partly due to increased eutrophication, or nutrient enrichment, of wetlands and increased use of road salt. Narrow-leaved cattail can be especially abundant in more saline habitats such as near tidewater along the Atlantic Coast, and in eutrophic that can be present on agricultural lands. Where it becomes established it can form dense stands that can exclude most native species (Thompson and Luthin, 2004).

Managing Canada geese

In addition, it is also recommended that the area be monitored for the Canada geese, which can, at times, be destructive to open water areas with shoreline vegetation. For this

reason, it will be important for the proposed Evergreen Advisory Board for Backyard Conservation to implement both a monitoring plan and coordinate with state biologists in managing Canada geese if the local population begins to reach high numbers.

There are two known behavioral patterns of Canada geese in North America; those that migrate and those that are considered resident geese that remain in one area throughout the year. It is the second type that is most likely to cause conflict with residents or destruction to the landscaped area around the farm ponds. All Canada geese are considered to be grazers, foraging on tender grasses and submergent and aquatic vegetation, though also feeding at younger stages of life on insects, crustaceans, and mollusks that are associated with aquatic plants (French et al., 2001). Commonly seen around storm water management ponds and other suburban settings, these geese often take food offered by people, which is not regarded as healthy for any aquatic bird. Preferred feeding grounds are those near water and in open areas, such as fields or pastures, which tend to lack obstructions used by potential predators (French et al., 2001).

Though incoming residents of Evergreen will often enjoy viewing these charismatic birds, resident Canada geese have been known to inflict damage to personal property. Often foraging in large congregations, resident geese have the potential to cause damage to residential lawns and gardens at Evergreen, particularly the planned landscaped area around the farm ponds. The physical result of this is often trampled vegetation and compacted soil, which can create poor conditions for plant growth. This can therefore increase erosion, resulting in an area that supports little biodiversity. In addition, large groups of resident geese tend to leave behind large amounts of fecal matter, which can potentially cause concern for public health. French et al. (2001) reports that a well-fed, healthy adult Canada Goose can produce up to 1.5 pounds of fecal matter per day, and that where resident geese populations consist of over 100 individuals, the continuous influx of nutrients contained in this fecal matter can contribute to the eutrophication of small water bodies, especially those that have restricted circulation and flow-through such as the farm ponds at Evergreen (French et al., 2001). A common concern of the public is the potential contamination of water with *E. coli* from dense populations of Canada geese in urban and suburban areas. Though, the presence of *E. coli* and other

pathogens in goose feces does not necessarily mean that these pathogens will be passed on to humans, either by direct contact or through the food chain. While an overwhelming amount of goose feces is aesthetically unappealing to home owners, there is little likelihood that zoonotic pathogens will be passed along to humans (Ball, 2004).

These conflicts with Canada geese also present a potentially significant problem at airports, which is important for residents to recognize as Evergreen sits within close proximity (less than 5 miles) of Dulles International Airport. Airplanes driven by jet engines are often vulnerable to mechanical failure when a bird or foreign object flies into the engine, putting not only the plane a risk but the passengers inside. French et al. (2001) reports that the Federal Aviation Administration (FAA) has estimated that 35% of all reported bird-aircraft strikes involve Canada geese (about 240 goose-aircraft collisions occur each year). For these reasons and those outlined above, it is recommended that the HOA and proposed Evergreen Advisory Board implement a management plan for resident Canada geese.

Proposed Target Areas

Please refer to the map insert for targeted habitats located within the area being donated to Loudoun County Department of Parks and Recreation.

Potential Response from Evergreen Residents

Resident Canada geese have the potential to present several types of conflicts to the landscaping efforts as well as Evergreen residents. Please refer to the *Habitat Components* section for this detailed explanation.

Recommendations

French et al. (2001) devises three categories of integrated pest management (IPM) techniques used to manage Canada geese, including husbandry methods, non-lethal methods, and lethal methods. IPM protocol begins with identifying the conflict and evaluating its significance, followed by review of the available techniques to reach resolution and the implementation of a management strategy that is most appropriate. The strategy only begins with the most simple and least expensive until this method is either

exhausted or ineffective. From there, the management strategy moves up this scale to more aggressive techniques (French et al., 2001). For the purposes of this document, these three categories will be summarized, and the reader is recommended to pursue further detail in the original paper published by French et al., 2001.

Husbandry Techniques-

As Canada geese tend to congregate near water where food sources are generally available, it can be useful to simply reduce the amount of forage that exists near the pond. In addition, reducing the amount of fertilizer applied to areas surrounding a pond may decrease the nutrients found in the food sources of geese, thereby making the food sources less attractive. Additionally, it has also been reducing or eliminating all mowing of vegetation within 50-75 feet of a pond's edge, or reducing the total amount of lawn area, and planting the area between the water's edge with plants that are less palatable to geese, and refraining from watering of lawns (which reduces productivity) can help to prevent large congregations of Canada geese from taking up permanent residence. Also, eliminating all supplemental feeding of geese from Evergreen resident and visitors will help to minimize potential conflicts.

Centex may wish to consider where the Village center recreational facilities will be developed, as these areas tend to attract geese. Placing natural obstructions (e.g., trees, shrubs, rocks) may be viewed by geese as potential hiding spots for predators, and geese may therefore avoid these areas.

Non-Lethal Methods

French et al. (2001) separates non-lethal methods into two main categories: scare devices or strategies and physical deterrents. Scare devices are intended to frighten or chase birds away from an area and physical barriers are intended to prevent birds from gaining access to an area.

In discouraging geese from congregating in an area, it is recommended that scare devices should be in place prior to the onset of damage. These techniques often consist of auditory, visual, and physical methods. Auditory scare devices make loud or

objectionable noises that frighten geese. These can consist of a propane cannon, pyrotechnics, and recorded distress calls of Canada geese. Visual frightening devices are effective when a goose is able to recognize or interpret an image or object that represents a potential threat. This might consist of a strobe light, mylar reflective tape strung between posts to form a fence or attached to a pole as streamers, scarecrows, owl effigies, rubber snakes, and "eyespot" balloons. Geese can quickly become habituated to ignore these devises, therefore multiple methods are recommended.

Harassment of geese often provides longer lasting results and includes such devises as radio-controlled toys, dogs, and water sprays. Goose dogs, specifically border collies, can be trained to chase and harass geese until the birds move elsewhere. This technique, however, must be repeated to remain effective, as geese often continuously search for optimal sites and will return if they perceive the threat is gone. It should be noted that it is illegal to allow any dog to catch or harm a goose, however, and it is recommended that dogs be leashed or prevented from chasing geese during the early summer molt when these birds are flightless.

Physical deterrents will impede movement of geese from their resting and feeding areas. These barriers can be created using vegetation, fencing, or rocks, and placed along the shoreline of the ponds to block the pathways the geese will use to exit the water. They will also help to prevent them from seeing potential predators. Fencing, installed just shoreward of the waterline, can be constructed from mylar tape, metal mesh, plastic or synthetic mesh, wood, or strand, so long as it falls within the parameters of the HOA. In addition, a wire grid constructed above the surface of the water has been effective in preventing geese from landing on small water bodies. Chemical repellents are reported to generally have broad public acceptance as they do not harm geese and can easily be applied directly to a problem site. A specific chemical, methyl anthranilate has been approved for use as a goose repellent by the U.S. Environmental Protection Agency and is available under the name ReJeX-iT®, and is formulated for application in on open water bodies and on turf grasses.

Lethal Methods

These methods should be viewed as only a last resort when previous methods have proven to be ineffective and the density of geese is overwhelmingly large. Translocation may not be entirely feasible, as there may be concerns for disease concerns. Therefore, it is strongly recommended that the community work cooperatively with the HOA and the proposed Evergreen Advisory Board for Backyard Conservation (see Goal 4) toward an approved service plan that coordinates "nuisance" control activities in a way that minimizes the need for direct action and/or lethal control. Also, as these are lethal methods, it should be noted that no resident should implement any form of reproductive or population control techniques without prior approval and necessary permits from the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries.

Hunting, though used as a cost-efficient method to control goose populations, is not recommended at this site, as hunting is now illegal on the property and the setting for the area is considered suburban. Safety of Evergreen residents, visitors, and neighbors should be the number one priority.

As a means to deter geese from nesting where it could potentially become a nuisance, it is permitted by the appropriate authorities mentioned above to remove nesting materials on a daily basis before a nest is completed and becomes occupied. This may encourage geese to choose to nest in an alternative location. Oiling and shaking eggs found in a nest are examples of methods used to prevent eggs from hatching, and require the appropriate permits. These techniques will work best when applied as soon as possible after the last egg is laid and before the embryo becomes more fully developed. It is recommended that unless dummy eggs are used to replace those that are destroyed, that eggs not be removed from a nest as a loss of an entire clutch will usually trigger the female's instinctive behavior to build another nest and produce another clutch.

Other lethal methods include capture techniques that are coordinated through and authorized by the Virginia Department of Game and Inland Fisheries. These included herding methods and the use of immobilizing chemical through baits. Live-captured

geese are usually sent to USDA-inspected processing plants for preparation and donation to local food banks for the needy. In Virginia, the U.S. Department of Agriculture's Wildlife Services agency provides on-site technical assistance to municipalities and residential communities confronted with resident Canada Goose problems. It should be noted, however, that there is no systematic process in place to test geese that are killed for consumption via a food bank. As Canada geese congregate and consume lush vegetation that is enriched with fertilizers and potential pesticides, certain chemicals known to be harmful to humans may be present in individual birds and subsequentially passed to humans. Those individuals who utilize food banks may therefore not be aware of potential risks associated with consuming goose meet from a captured population, and usually are not in a position to question whether or not the meat has been tested (Ball, 2004). Due to the uncertainty surrounding potential risk of transmitting harmful chemicals to humans, and the lack of a systematic method for testing goose meat, this method is not advised. This concern further emphasizes the need to shift to the use of slow release organic fertilizers to prevent this potential problem.

In summary, the following general guidelines outlined by Doncaster and Keller (2005) will help to prevent the negative impacts from dense populations of Canada geese:

- Vegetate the shoreline to make the site less attractive to geese
- Allow green grass grow in and around farm pond areas
- Don't allow access to geese through breaks in barrier plantings
- Restrict a goose's access to the shore from the water
- Don't use rocks or boulders < 2 feet in diameter
- Try to establish a barrier that is > 12 inches in height
- Make sure barrier fencing is safe to wildlife, that it is well maintained, that it is made from a durable material, and that it is at least 30 inches in height
- Maintain or establish tall vegetation, particularly trees
- Reduce proximity of ball fields to open water
- Maintain or build a path for recreational use along the shoreline
- Install signage that prohibit feeding geese

For these reasons, it is recommended that the conservancy lot slated to be donated to Loudoun County Department of Parks and Recreation be maintained as habitat, as these prevention measures are not conducive to other more recreational uses of this parcel and will help to prevent potentially dense populations of Canada geese.

Prescription- Provide measures to provide additional habitat components for bats.

Habitat Components

Attracting bats to the farm pond area can be considered effective insect control, which is often useful in areas of standing water or water with restricted circulation and flow. Interestingly, bats are the only major predators of night-flying insects (VDOF, 2005). Certain bat species have been documented to eat 3000-7000 insects each night and can be viewed as an alternative to chemicals for insect control. In addition, there are 15 species of bats known in Virginia and many use bat houses (VDOF, 2005). Below is a table of common bats found in Virginia.

TABLE 6. BATS FOUND IN THE COMMONWEALTH OF VIRGINIA (VDGIF, 2004)

COMMON NAME	SCIENTIFIC NAME
Big Brown Bat	*Eptesicus fuscus fuscus*
Brazilian Free-tailed Bat	*Tadarida brasiliensis cynocephala*
Eastern Pipistrelle	*Pipistrellus subflavus subflavus*
Eastern Big-eared Bat	*Plecotus rafinesquii macrotis*
Eastern Red Bat	*Lasiurus borealis borealis*
Eastern Small-footed Myotis	*Myotis leibii*
Evening Bat	*Nycticeius humeralis humeralis*
Gray Bat	*Myotis grisescens*
Hoary Bat	*Lasiurus cinereus cinereus*
Indiana Bat	*Myotis sodalis*
Little Brown Bat	*Myotis lucifugus lucifugus*
Northern Myotis	*Myotis septentrionalis septentrionalis*
Northern Yellow Bat	*Lasiurus intermedius floridanus*
Rafinesque's Big-eared Bat	*Plecotus rafinesquii rafinesquii*
Seminole Bat	*Lasiurus seminolus*
Silver Haired Bat	*Lasionycteris noctivagans*
Southeastern Myotis	*Myotis austroriparius*
Virginia Big-eared Bat	*Corynorhinus (= Plecotus) townsendii virginianus*

Proposed Target Areas

Please refer to the map insert for targeted habitats located within the area being donated to Loudoun County Department of Parks and Recreation.

Potential Response from Evergreen Residents

There are many common fears associated with bats that Evergreen residents may express if Centex chooses to install bat houses. These species can cause conflict or general unsettlement with residents, as some are considered rabies vectors or nuisance species. Addressing conflict and resolution of encounters with these species is best accomplished with continued outreach and education, which is further explained in this document in the section outlining Goal 4 in this document.

Recommendations

To best attract bats to the farm pond area, it is recommended that bat houses be constructed and installed. This can be accomplished by a Centex contractor or biologist, or through the residents themselves when they begin to move in to their homes. Bat houses are recommended to be installed within close proximity to the farm ponds (within a half-mile) at a height of 10-15 feet, facing southeast or east, and sheltered as much as possible from the wind (VDOF, 2005).

Internal temperatures have a direct affect on usage of a house by a bat. Houses meant for use by nursery colonies should be oriented to receive direct sunlight for warmer temperatures, especially in the morning. Another method for warming a bat house it to paint it a dark color. Females tend to prefer consistent temperatures of 80-90 degrees F, although some species can tolerate temperatures up to 120 degrees F. Bats will usually produce only one pup annually but can congregate in large colonies. Bat houses that do not follow these guidelines will most likely attract bachelor bats, which do not live with females while young are being reared (VDOF, 2005).

It is important to note that bat houses may not be used at first, but if a house is not occupied by the second year, it should be moved to a warmer or cooler location. Evergreen can probably expect bats to occupy houses in early Spring if they are installed

by April (VDOF, 2005). Pesticides can deter bats from inhabiting areas, which is another reason why the HOA covenant for wildlife should discourage this use unless absolutely necessary.

Bat houses are most effective when made of high quality, untreated, rough-cut wood. Entrances to the houses should be rough as well and covered with plastic mesh and not metal, which can injure a bat (VDOF, 2005). The rough surfaces will allow bats to attach themselves to the surface. The houses should be monitored regularly for general maintenance, but only during the month of November through February when bats will not be present (VDOF, 2005). For box designs, it is recommended that the appropriate party constructing these houses use those that are certified by Bat Conservation International (**http://www.batcon.org/)**, which specifically lists the Standard Bat Box (7 chambers), Nine-Chamber Bat House, and the Five-Chamber Nursery House offered by Bat Conservation and Management (**www.batmanagement.com**) which the Virginia Department of Game & Inland Fisheries and the Virginia Department of Forestry recommends.

Goal 4- Provide for public awareness and outreach to Evergreen residents about common backyard wildlife and the management strategies used for conflict and resolution of 'nuisance' species, and to encourage residents to take up stewardship of backyard habitats and conservation areas at Evergreen.

Prescription- Provide awareness to Evergreen residents regarding wildlife species present and likely to be encountered or seen by residents to prevent conflict and misguided perceptions about wildlife and management techniques employed at Evergreen Rural Village**.**

Habitat Components

Other than Canada geese, there are other species that could potentially cause conflict with Evergreen residents, and could potentially impede habitat enhancement measures. Some of these species include fox (red or gray), raccoon, skunk, coyote, and white-tailed deer.

With the exception of white-tailed deer, these other species often trigger concern of the public because they are known rabies vectors.

White-tailed Deer

In many areas of Virginia, the white-tailed deer has become so abundant in suburban and urban areas that the public often voices concern about damage to gardens as well as deer-vehicle collisions. It has been documented that an adult deer eats about as much vegetation as a person "could cram into a basketball" in one day (Bromley et al., 1997). White-tailed deer often use open habitats at night, and take cover in brushier places during the day. However, as stated above, deer readily use resident backyards, adjacent open fields, and other suburban settings, and have been sighted on every visit to Evergreen. Management of deer on the property will largely consist of public awareness, prevention of damage to planted trees with tubex coverings, and possibly the installation of obstructions or even fences to prevent access by deer in some key areas.

Skunks and Raccoons

In regards to skunks, the public does not often think warmly of this species. Parkhurst (1996) outlines recommendations for skunk management that are applicable for this document, which are summarized in the 'recommendations' portion of this section. Skunks are often viewed as pests, as they are perceived to invade gardens and dig up areas when they are seeking food sources, such as insects, earthworms, and grubs. Other major problems associated skunks, as well as opossums and raccoons, are their ability to break into garbage cans and even houses. These species have become highly adaptable to urban areas, and are nocturnal. VDGIF recommends prevention by removing the attractant to these animals.

Canids

Coyotes, fox (red and gray), and wild dogs have expanded their historical range and have adapted to suburban and urban areas, often triggering conflicts with humans and domesticated pets (Pederson, 2004). Evergreen residents will need to be prepared for coyote encounters, behaviors, and potential conflicts such as attacks on their pets. Tracks

likely belonging to a coyote were sighted along the banks of the Goose Creek easement area. Due to the coyote's confirmed presence in the greater Washington DC area, it will be important for the HOA covenant to include outreach and education to Evergreen residents regularly.

Proposed Target Areas

Species mentioned in the section are highly adaptable to suburban settings, and are likely to be seen throughout Evergreen Rural Village. Therein lies the importance of outreach to all residents, as these species have been known to trigger conflict with the public.

Potential Response from Evergreen Residents

This section is dedicated to conflict resolution of most species that are considered 'nuisance' by the VDGIF, and therefore all recommendations for these species, including outreach to Evergreen resident, is outlined in detail below.

Recommendations

It is recommended that Centex form a wildlife committee, or an *Evergreen Advisory Board for Backyard Conservation,* before residents move in to ensure the long term management and sustainability of natural resources and wildlife at Evergreen. Members on this committee should consist of Evergreen residents, the HOA for the property, local conservation organizations, and Virginia Tech instructors and students who may potentially become involved with future projects at Evergreen. Part VI of this document lists local technical assistance sources and contacts to help form this proposed committee. This group can be responsible for creating outreach activities with local conservation organizations, VDGIF, WHC, and others, as well as the coordination with residents in monitoring wildlife and wildlife usage of habitats and artificial nesting structures. This group can also work collaboratively to determine the most effective means for managing 'nuisance' wildlife according to the recommendations outlined in this document. It is also recommended that the proposed Evergreen Advisory Board address the need to disseminate information about wildlife management plans to neighboring housing

developments so that these residents are aware of potential wildlife encounters and conflicts.

White-tailed Deer Considerations

Regarding deer and the recommendations for managing them at Evergreen and the potential conflict they pose to residents, non-lethal methods are the only ones recommended and also permitted within the suburban context of the Evergreen area. As they pose threats to home gardens and landscaped grounds, various types of deterrents and harassment techniques have been documented. Often included in recommendations are various types of fencing. Fencing as high as eight feet has proven to be effective, but does not often fall within the guidelines of an HOA, nor is it generally appealing to home owners. It may therefore be feasible for homeowners to install a low cost fence that was developed by a strawberry grower in Cumberland County and is documented by O'Dell (1997). This fence was constructed with a 7-strand five foot height high-tensile electrically-charged slant, and had the ability to exclude 100% of deer. It was noted that this 3-dimensional effect of a slanting tier of wires can confuse the depth of field vision by deer so they will not jump by night or by day over this shorter five foot fence height. Normally this height would not impede deer from jumping over. It should be noted that this fence is electrical, and should therefore be advertised as such to prevent people and their pets from being injured. It has also been found to exclude smaller mammals such as groundhogs, through an adaptation of placing this electrified wire closer to the ground level. For figures and picture of this fence, visit:
http://www.ext.vt.edu/news/periodicals/commhort/1997-10/1997-10-02.html

As reported by O'Dell (1997), the fence costs under a dollar per running foot of fenced land perimeter for, and is presently the “most economical, long-term solution to our horticultural deer damage control problem in Virginia.” The article did not specifically mention whether or not the slanted fence was able to exclude skunks, but it may also be useful in this effort. Skunks will dig under fences quickly, and might be excluded more efficiently with the use of a buried fence that is also electrified (though only to shock an animal and not to harm it) (Parkhurst, 1996). The Humane Society of the United States (HSUS, 2004) recommends that the buried wire be bent at a 45° angle, and then run at

least 12 inches of wire out away from the building in a reverse "L" shape, thereby creating a false bottom, which will block any skunk that attempts to dig back. With this method, however, it is strongly advised that a home owner check that all animals are out from under a structure before sealing it off. If not, the remaining animals may starve as they would be trapped. These methods have also shown to be effective with opossums as well. The HSUS Urban Wildlife Sanctuary Program further outlines these methods and others in excluding skunks from a home owner's property.

Given the importance of deer management at Evergreen Rural Village, it will be important to monitor their impact on vegetation planted throughout the property. This presents an opportunity for a detailed project by another graduate student with Virginia Tech's College of Natural Resources. An eventual project might entail a study on the relationship between lot size, vegetative cover, plant diversity and deer presence or impact.

Skunk Management Considerations

There are repellents on the market that can deter skunks, but it is recommended to prevent skunk problems by eliminating attractive denning sites and food sources. Denning sites, for example, could consist of brush or rock piles, elevated sheds, and openings under porches or house foundations (HSUS, 2004). It is not advisable, therefore, for resident to leave out accessible pet food dishes, uncovered garbage cans, unprotected compost piles. If a situation becomes a problem for a resident, they may wish to contact the Virginia Department of Game and Inland Fisheries to find out more about relocation of nuisance animals. Removal requires a permit, and therefore homeowners must not transport any wild animal from their property (Parkhurst, 1996). Trapping, however, does not solve a problem for an extended period of time, as another skunk or opossum will often take the place of the removed one during the next denning season in the spring months (HSUS, 2004).

Raccoon Management Considerations

The raccoon is also an extremely adaptive species, and has learned to thrive in suburban settings. In addition to its ability to break into and use gardens, garbage cans, bird

feeders, fish ponds, and kitchen pantries, they also readily use chimneys, attics, and porches as denning sites (HSUS, 2004). After first confirming that a raccoon is the actual cause of a conflict, the HSUS (2004) recommends a similar plan of action of that described for Canada geese- IPM. Passive reaction, or simply waiting for a raccoon to leave, may be helpful, followed up with prevention measures for the next denning season. This tends to be most significant when a mother with young is present, as cubs cannot care for themselves long after birth. Trapping and moving the family is not recommended as it usually leads to the mother being separated from her young, which raises the vulnerability of the cubs (HSUS, 2004).

If a raccoon(s) finds its way in uncapped chimneys or attics, other passive techniques are recommended by the HSUS, such as leaving the attic lights on, and/or placing a battery-operated radio in the denning area. It is not recommended to use smoke or fire to drive raccoons or any wildlife species out of chimneys as this will most likely result in the death of the younger individuals (HSUS, 2004). In regards to their ability to break into trash cans, it is recommended that residents place garbage outside the night before pick up to discourage raccoons from invading the trash areas. Lids should be secured with bungee cords, ropes, or weights (HSUS, 2004).

Canid Management Considerations

Foxes have also been known to cause concern with the public when seen in backyards. Red and Gray foxes should not be considered dangerous to residents, except when rabid, and HSUS reports that fox rabies are rare in most places (HSUS, 2004). If Evergreen residents choose to provide outdoor cages for rabbits, these cages should be well secured with an 8-inch, L-shaped footer at least a foot deep along the outer perimeter. As with skunks, foxes also dig under fences (HSUS, 2004).

Understanding certain aspects of coyote behavior is important in making management decisions. For example, when coyotes become sexually mature, the male and the female form a monogamous pair and stay together to hunt, sleep, and search for denning sites (Parker, 1995). Therefore, if one coyote is sighted by a resident, there is likely another

one within close proximity. Denning sites include brush covered slopes, embankments that may be surrounded by downed woody debris, ledges, abandoned dens from other animals, areas below outbuildings, culverts, and drainage pipes (Parker, 1995).

Domesticated Pets and their Relationship to Wildlife

To protect domestic pets that reside at Evergreen, Pederson (2004) suggests that all pets and companion animals that go outdoors to be current on all vaccinations against transmissible diseases/viruses for which reliable vaccines exist, and that cats be kept indoors as they are often preyed upon by coyotes. In addition, she recommends that female dogs that have not been spayed be kept indoors, as they can attract coyotes capable of breeding. As with recommendations for raccoons, feeding stations for pets should also be kept indoors, so as to not attract coyotes. In addition, coyotes can also be attracted to trash and garbage that is left out, so abiding by recommendations for raccoons will also help to prevent similar conflict with coyotes. Educating residents through outreach materials, events, and through partnerships with local conservation organizations and departments will best prevent potential conflicts with coyote and other types of urban wildlife.

It is recommended that Evergreen residents keep household cats indoors to prevent them from preying on various species of wildlife. Domestic or free-roaming cats can exhibit predatory behavior to small mammals and birds. As several habitat recommendations in this document pertain to backyard bird species, the presence of domestic cats may prevent birds from utilizing enhanced habitats. Domestic cats will not always kill their prey, as some animals will escape. Many of these, however, often die from stress or wounds and subsequent infections from a bite or scratch. Birds can particularly become stressed from a near capture experience (HSUS, 2005).

Residents may wish to place bells on their cat’s collars, but a cat can soon learn to hunt without being heard. Cat species are excellent hunters, and instinctively learn to stalk their pretty quietly. It should also be noted that cats can be preyed upon themselves from local wildlife such as foxes and coyotes, which have been documented in the Evergreen

and Washington DC metropolitan area. If residents wish to allow their cats to go outside, it is recommended that a person accompany the cat and supervise their time outside and in their own backyard.

Environmental Education and Awareness for Evergreen Residents

To best educate Evergreen residents about not only backyard wildlife and the benefits they can bring in viewing and monitoring, it is equally important to provide regular outreach to incoming residents of this planned development. This can easily be coordinated with a local biologist through a non-profit or through VDGIF. Outreach activities can be accomplished within the Village Center via monthly workshops and annual events for Earth Day and Arbor Day. In addition, it is feasible that the proposed Evergreen Advisory Board for Backyard Conservation also collaborate with local scout clubs, who are often looking for projects such as bird box construction, as well as the local Evergreen school. Biology and ecology students may be able to use some of the proposed trails at Evergreen for field trips and other forms of outdoor education. Public awareness should not limited to Evergreen residents only, as partnerships with outside groups often leads to a more successful and sustainable wildlife habitat management plan.

It is therefore recommended that the HOA provide resident and community awareness by taking the following actions:

Host a yearly Earth Day event or Arbor Day event to promote the guidelines of a wildlife management covenant, and relay pertinent information to Evergreen residents on the following topics (as recommended by the Humane Society of the United States (2001) regarding their *Model Guidelines for Nuisance Wildlife Control*):

- Wildlife diseases;
- Wildlife damage identification and site evaluation;
- Integrated wildlife damage management;
- Methods of approved lethal and nonlethal resolution of common

- Wildlife problems, including frightening devices, repellents, one-way door exclusion and other exclusion methods, habitat modification and live-trap and release;
- Handling of infant and immature wildlife and techniques to limit the possibility of orphaning;
- Humane capture, handling and transport of wildlife;
- Techniques to prevent reoccurrence of problems;
- Disposition of sick or injured wildlife;
- Euthanasia and disposal of carcasses; and
- Applicable wildlife laws, rules and policies.

Additional information promoted at these events can relay pertinent information to Evergreen residents on these following topics:

- Common backyard wildlife seen in Loudoun County
- Resident wildlife biology, life cycles, and habits
- Native plantings appropriate for their yards and properties
- Invasive species identification and management
- Support for residents to become involved in habitat management, such as:

    - Creation of nature clubs, such as an invasive species watchdog club, bird watching club, bird box maintenance club, trail maintenance club, wildlife sighting/ inventory club, and others based upon interest of residents
    - Creation of a group of residents that communicates regularly with the HOA on various measures of the covenants for Evergreen, including that of habitat management.
    - Participation in VDGIF's Wildlife Mapping System.

- Coordination with local conservation groups to assist in aspects of habitat management, resource support for resident clubs, and collaboration in holding Earth Day and Arbor Day events. These groups could include, but are not limited to, the following local organizations:

- Virginia Polytechnic Institute and State University- Natural Resources Dept.
- Wildlife Habitat Council (certification, backyard program, Wildlife at Work)
- Loudoun Wildlife Conservancy
- Loudoun County parks and planning
- Virginia Department of Game and Inland Fisheries
- Piedmont Environmental Council
- Virginia Tech graduate students
- Sustainable Loudoun Network
- Land Trust of Virginia
- Wildlife Rescue League
- Virginia Coalition for Teaming with Wildlife
- Audubon Naturalist Society
- Virginia Native Plant Society
- Bat Conservation International
- International Dark Sky Association and its Virginia chapter
- Blue Ridge Center for Environmental Stewardship

PART III. IMPORTANCE OF APPROPRIATE MARKETING TO POTENTIAL EVERGREEN RESIDENTS

Centex Homes intends to implement recommendations outlined in this document throughout Evergreen Rural Village. Evergreen will serve as a new model for backyard conservation in suburbia and will rise above the existing strategies in planning residential developments with open space preservation for other residential developers. Equally important is the motivation and response from Evergreen residents to take responsibility of monitoring wildlife and implementing the recommendations outlined in the proposed wildlife covenant for the HOA.

The HOA will only be partly responsible for protecting and maintaining open space and monitoring wildlife. This is why it will be beneficial for Evergreen residents and members of the HOA to cooperatively form an Evergreen Advisory Board for Backyard Conservation, so that if open space is being neglected or improperly managed, or wildlife species are not being managed according to the recommendations in this document, the community will be able to take consistent control of a situation. For residents to take notice about issues facing their community as it relates to suburban wildlife, it will be important for Centex to properly market this planned development so as to attract these 'types' of people to live there. Although Centex has internal facts about the benefits of creating livable communities that balance the needs of residents and natural resources, below is a summary of research shown to support this type of a balanced community, which Centex may choose to use in designing marketing strategies for Evergreen Rural Village.

Consumers today are seeking livable communities and developments that incorporate some type of natural space design and outdoor trails or recreation. In regards to the economic benefits, there are reduced infrastructure costs, added property values, decreased community service costs, and better overall public health. Natural space design and low impact developments have been shown to reduce infrastructure construction costs by 10 to 33% as the need to build and maintain conventional stormwater structures are reduced. These designs can also reduce the need to clear and grade by 35 to 60%. As

a result, erosion control expenditures, which can cost up to $5,000 per acre, can be significantly reduced (Schueler, 1995)

Commonly known is research pointing to increased property values that lie close to natural areas. A study in Amherst, Massachusetts showed that clustered housing with open space appreciated at a higher annual rate (22%) than conventionally designed subdivisions (19.5%) (Lacy, 1990).

Open space and trails in natural space and cluster developments provide outdoor recreational opportunities for residents, which creates health benefits for local residents as they have access to outdoor hiking, jogging, and walking. Natural space designs can also benefit rural areas, such as western Loudoun (which is close to Evergreen) areas by maintaining a local rural character.

PART IV. CRITICAL ANALYSIS AND DISCUSSION

Centex Homes should be commended for their environmental objectives in eliminating lauan as flooring underlayment in new houses, purchasing wood products from companies committed to certification of responsible forest operations, and providing a $35 one-year membership to TNC to each new home buyer. Centex Homes will be implementing these practices at Evergreen. Evergreen represents a model for Centex, in its inclusion of open space preservation, wetland habitat enhancement, and the incorporation of this management plan for backyard wildlife conservation and community outreach. This section offers a brief critique of its current strategies for sustainable conservation of Evergreen's natural space and wildlife.

Planning developments for various types of habitats to ensure biodiversity is challenging to incorporate into land-use planning objectives. The concept implies the need for designating relationships between wildlife species and their associated habitats. Providing certain general guidelines for land-use planners can help steer planning initiatives. Pressey and Cowling (2001) outline a list of conservation planning stages from a landscape perspective, which will be used to critique broad natural resource planning objectives for Evergreen:

1. Identify conservation goals for the planning region. This goal is necessarily subjective, but sets the broad landscape contest for specific restoration and other management activities. Targets are set for minimum area size, distances between restored sites, location and type of corridors, and so forth;

   Centex Homes may not have adequately researched specific conservation goals in the context of the northern Piedmont region and how they align with the land planning objectives for Evergreen, but adequately identified key habitats for easement and natural space purposes. It should be noted that regional planning is critical at the landscape perspective; monitoring and evaluating inside and outside property lines is crucial in conserving healthy wildlife populations and contiguous habitat. While the

regional landscape changes, through fragmentation or changes in land-use practices, the dynamics between habitat patches will also be changed (Morrison, 2002). Some habitat patches become highly productive, deemed source habitats, which produce a surplus of individuals that may eventually colonize other habitat patches that are not as optimal (sink habitats). Within the land-use planning process, determining the dynamics of a population on a landscape level helps to reveal priority habitats for ecological use, such as restoring sink habitats to sources, or even developing source habitats instead of sinks.

Eco-regional planning is also significant in conserving wildlife in the aggregate. As development proceeds and subdivisions form large clumps over time, immigration from adjacent habitats will diminish, and barriers that result can block wildlife corridors. While clustered subdivisions reduce total disturbance zone area (Theobald et al., 1997), the positioning of adjacent clustered subdivisions in nearby counties should be considered to limit fragmentation. From a biological perspective, land-use planning must be approached with ecosystem management in mind, incorporating needs for wildlife in the aggregate and those of residing humans. This approach will not only incorporate a landscape perspective, but takes into account the social, political, and biological components of management that are necessary to preserve integrity of human life and wildlife.

2. Review the present conservation areas;

Centex Homes adequately reviewed important habitats and conservation areas designated for easement purposes at Evergreen. Centex has established a Goose Creek Scenic Easement and Open Space Easement required for the Village Conservancy subdistrict, as well as the establishment of buffers along Beaverdam Reservoir, a Forest Management Plan for the property, and a Riparian Planting Plan. Planting plans call for the use of native species, and Evergreen Village proffers call for the use of Best Management Practices in reference to the constructed wetland

areas and bioretention in the Village Center parking lot. It is not known yet as to whether or not these bioretention ponds will be put into place, however.

3. Select additional conservation areas. List additional areas that are necessary to meet conservation goals, including those locations in need of restoration;

   Specific aspects of this plan incorporate habitat enhancement projects designed for a 148-acre lot donated to Loudoun County Parks and Recreation Department and community outreach objectives. Within this area exists two farm ponds on an old farm site that are being enhanced with native species through the contractor Wetland Studies and Solutions. At the time this document was written, no sustainable plan for managing this area was in place, which is why recommendations in this document pertain to monitoring for invasive vegetation and nuisance species such as resident Canada geese. While many of the proffers mandate the use of native plant materials, no plan is in existence for sustainable management of any easement areas that could be compared to the recommendations outlined here. It should be emphasized that invasive vegetation is often prevalent in disturbed areas, and disturbance to the land often occurs during the development process. A monitoring plan that stresses the use of IPM is therefore necessary to ensure that habitat created is managed and that costs incurred in creating the habitat do not go to waste.

4. Implement conservation actions. Apply the steps needed to meet the conservation goals;

   A common way to incorporate conservation design into a community is through cluster development. The main objective of cluster development is to allow residential development while still protecting an area's natural features, allowing for more open space, and protecting the character of rural communities. Cluster developments usually site homes on smaller lots with less emphasis on minimum lot size without increasing the total number of homes, or density. Remaining land, which would have been allocated to individual home sites, is then converted into protected

open space and shared by the residents of the subdivision and possibly the entire community. This is the case with the Village Center subdistrict and the land adjacent that is being donated to Loudoun County Department of Parks and Recreation. It is not known, however what the final footprint locations of the houses in the Village Conservancy subdistrict will be, and therefore no conclusions as to the nature of open space they provide within the larger lots can be made at this time.

5. Maintain required values of conservation areas. This step involves the maintenance and monitoring of the conservation areas to ensure that goals are met.

Centex responded positively to the preliminary recommendation to form specific guidelines for backyard wildlife conservation in a covenant that will be incorporated into overall HOA guidelines and rules for Evergreen Rural Village. This will aid in providing an element of sustainability in the implementation of conservation practices, and these efforts should be recognized. Building partnerships with outside conservation organizations and individuals will also aid in sustainable management of natural areas and wildlife at Evergreen, as these resources will bring in continued expertise and assistance in community outreach. Community outreach will be important in gaining support and enthusiasm from Evergreen residents to support these wildlife management practices. Centex, however, has not yet developed effective marketing strategies to attract residents that both enjoy being around wildlife (and do not necessarily embody a ‘not in my backyard’ syndrome) and will be enthusiastic in supporting wildfire management efforts. This document recommended that Centex form a wildlife committee, or an *Evergreen Advisory Board for Backyard Conservation*, before residents move in to ensure the long term management and sustainability of natural resources and wildlife at Evergreen. This group can be responsible for creating outreach activities with local conservation organizations, VDGIF, Virginia Tech, the Wildlife Habitat Council, and others, as well as the coordination with residents in monitoring wildlife and wildlife usage of habitats and artificial nesting structures. This group can also help to determine the

most effective means for managing so called nuisance wildlife according to the recommendations outlined in this document.

In addition, it is helpful to explore the efforts made by that of another community that has endeavored to implement wildlife management as part of its master plan. Just such example is Harmony, a residential community located in Osceola County, FL that presently restricts community development to pastures in the area so that native plant and animal communities in natural surrounding spaces can be preserved. Harmony's land plan has been formulated by a committee of environmental professionals and administered by a full-time Harmony conservation manager. Their habitat management plan calls for the following selected conservation and environmental education strategies (Harmony Fl, 2002). Centex Homes may want to consider some of these elements or concepts for Evergreen Rural Village and future residential developments:

- Removal of invasive plants, and replacement by native flora.
- 3,000 3"-caliper or larger trees planted throughout community.
- To be compatible with adjacent rural conditions, housing will be restricted to 1 unit per 10 acres in the easternmost 4,000 acres.
- Protection and restoration of on-site wetlands to help maintain the major wetland system which extends well beyond the community.
- Dark-Sky compliance, which provides starry night skies by using public lighting which produce no upward light pollution.
- A new, 31-acre, gopher tortoise habitat.
- A new, 2-acre, endangered orchid preserve.
- Field trips, outdoor laboratories and habitat studies for students.
- Classes and resident participation in wildlife restoration, invasive plant removal, water-quality monitoring and more.
- 70% of land to remain open space.
- No homes, lots or private land fronting the lakes.

The master plan also includes parks designed for community members, who can take advantage of trails and scenic views, as well as pet parks that include enclosed areas where dogs can run off leash.

PART V. LIST OF RECOMMENDATIONS FOR HOA COVENANT

A homeowners' association or HOA will be responsible for protecting and maintaining open and natural space. Evergreen residents may also have the authority to enforce the open-space provisions approved by Centex. The following outlines recommendations for the HOA covenant for backyard wildlife at Evergreen, and relates each recommendation to a specific habitat management goal outlined in this document. It is within this section that this document addresses Goal 5, which is to ensure sustainability and integrity of wildlife habitat management within the Evergreen property through the creation of habitat management components for the HOA covenant

TABLE 7. RECOMMENDATIONS FOR AN HOA COVENANT FOR BACKYARD WILDLIFE CONSERVATION AT EVERGREEN RURAL VILLAGE RELATING TO EACH HABITAT MANAGEMENT GOAL

HABITAT MANAGEMENT GOAL	RECOMMENDATION FOR HOA COVENANT
GOAL 1, 3	Use the least toxic and least persistent herbicide, pesticide or fungicide; assume that the product is as toxic or more toxic to birds and other wildlife. (VDGIF, 2004)
GOAL 1, 3	Always heed any special warnings of herbicides, pesticides, and fungicides on the label regarding wildlife. (VDGIF, 2004)
GOAL 1, 3	Do not spray during the breeding season for wildlife, and never spray near nests, dens or burrows. (VDGIF, 2004)
GOAL 1, 3	Protect valuable wildlife area such as field edges, woodlots, ditches, hedges, rockpiles, fencelines (though not those within resident lots), and wetlands/ ponds by preventing pesticide sprays from entering these habitats. (VDGIF, 2004)
GOAL 1, 3	Do not create puddle sprays during application or when cleaning equipment, as birds and other wildlife may be attracted to water to bathe or drink. (VDGIF, 2004)
GOAL 1, 3	Avoid using the granular formulations of extremely toxic insecticides. Soil incorporation of these products is rarely

	adequate and birds can eat the granules by mistaking them for food or grit. (VDGIF, 2004)
GOAL 1, 3	Inspect fields carefully, and avoid the repeat use of any product that causes wildlife deaths. (VDGIF, 2004)
GOAL 1, 3	Use the lowest application rate recommended for a pesticide, herbicide, or fungicide. (VDGIF, 2004)
GOAL 1, 3	Do not wash pesticide application equipment in any body of water. (VDGIF, 2004)
GOAL 1, 3	Avoid overlapping pesticide, herbicide, or fungicide spray swaths and when possible, "spot spray" only those areas that need treatment. (VDGIF, 2004)
GOAL 1, 3	Avoid pesticide drift by not spraying on windy days, or when there is potential for heavy rainfall soon after application. (VDGIF, 2004)
GOAL 1, 3	Store, treat and dispose of pesticide containers properly. (VDGIF, 2004)
GOAL 1, 3	Maintenance operators should implement the use of organic fertilizers to reduce long term maintenance costs and to allow for less phosphorous runoff into ground water systems.
GOAL 1, 2, 3, 4	Report incidents of wildlife mortality to the VA Department of Game and Inland Fisheries. (VDGIF, 2004)
GOAL 1	Plant native warm season grasses in blocks and not linear strips between April 1 to June 30 (VDGIF, 2004).
GOAL 1	Always try to use native trees, shrubs, and perennials in common areas and residential lots (VDGIF, 2004).
GOAL 2	Leave non-hazardous snags in place, and give preference to any live trees with existing cavities when performing any snag removal (VDGIF, 2004).
GOAL 2	Do not create snags within a close proximity to roads, driveways, homes, parking lots, or trails (personal experience).
GOAL 2	Leave downed woody debris, such as hollow logs, tree tops, and limbs in any

	easement areas (VDOF, 2005).
GOAL 2	Mowing and disking of open fields should not be conducted during the months of May to July in order to prevent the destruction of several ground nesting birds (VDGIF, 2004).
GOAL 2	Set bush hogs to its highest level for use in open fields so as to prevent the destruction of nests and maintain a level of cover for wildlife (VDGIF, 2004).
GOAL 2	Institute a tree protection program for all native riparian species planted in the Goose Creek and Beaverdam Reservoir Easement areas.
GOAL 2, 3	Vehicle access should be prohibited or limited in open fields during the month of May through July (VDGIF, 2004).
GOAL 2, 4	Residents who own dogs should be encouraged to keep them indoors or within fenced areas (or leashed) during May through July, as they can exhibit predatory behavior towards several ground nesting birds (VDGIF, 2004).
GOAL 1, 2, 3, 4	Monitor for invasive vegetation, such as phragmites & Canada geese around landscaped area of farm ponds.
GOAL 3, 4	Do not permit public or Evergreen residents to feed waterfowl or any other wildlife (French et al, 2001).
GOAL 4	Form a wildlife committee, or an *Evergreen Advisory Board for Backyard Conservation*, before residents move in to ensure the long term management and sustainability of natural resources and wildlife at Evergreen.
GOAL 3, 4	Employ integrated pest management (IPM) techniques for all species of 'nuisance' wildlife in managing conflict with Evergreen residents.
GOAL 4	Avoid feeding pets outside, and take the bowls in at night to prevent wildlife from breaking into yards in search of this food source. (HSUS, 2004)
GOAL 4	Provide a recycling program that incorporates the following concepts

	(HSUS, 2004): 1. Rinse all plastics and glass before placing them in containers outside for pickup; 2. Trash bins should have proper closures on them to help prevent wildlife from opening them; 3. Trash and recyclables should be placed outside only the night before pickup.
GOAL 4	Keep cats indoors
GOAL 4	If dead birds or obviously sick birds are noticed near bird feeders, stop feeding immediately and discard all seed; clean and disinfect all feeders and the ground below them. Wait a week before resuming feeding. (HSUS, 2004)
GOAL 4	Windows on houses and buildings should be altered in appearance if window bird feeders are used to help reduce window collisions of birds (HSUS, 2004).
GOAL 4	Bird feeders should be cleaned often with a 5–10% solution of chlorine bleach and warm water for two or three minutes. All spilled seeds, hulls, and feces should be cleaned at least once a week to prevent health problems with visiting birds, and to remove ground food sources available for 'nuisance' wildlife. (HSUS, 2004)
GOAL 4	The HOA shall provide resident and community awareness regularly by hosting a yearly Earth Day event or Arbor Day event to promote the guidelines of its wildlife management covenant, and relay pertinent information to Evergreen residents on proper monitoring and management of backyard wildlife at Evergreen.

PART VI. TECHNICAL ASSISTANCE SOURCES AND CONTACTS

Virginia Polytechnic Institute and State University
Natural Resource Program
Director of Natural Resources Programs
Virginia Tech
1021 Prince Street
Alexandria, VA 22314
Tel: (703) 706-8121
FAX: (703) 518-8196
dtrauger@vt.edu

Wildlife Habitat Council
Wildlife Biologist
8737 Colesville Road Suite 800
Silver Spring, MD 20910
(301) 588-8994
lkordella@wildlifehc.org

Virginia Department of Game and Inland Fisheries
P.O. Box 11104
Richmond, VA 23230-1104
(804) 367-1000
http://www.dgif.virginia.gov/index.asp

Virginia Department of Forestry
P.O. Box 3758, University Station
Charlottesville, VA 22903
(804) 977-6555
http://www.dof.virginia.gov/

Virginia Cooperative Extension
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231-5299
http://www.ext.vt.edu/

Virginia Cooperative Extension
Loudoun Office
30 B Catoctin Circle SE
Leesburg, VA 20175
703-777-0373 - Main Office
703-771-5844 - Fax
Office Hours
8:30 am to 5:00 pm, Monday through Friday

Virginia Department of Soil and Water Conservation
203 N. Governor Street, Suite 206
Richmond, VA 23219
(804) 786-2064
http://www.dcr.state.va.us/sw/index.htm

USDA Agricultural Stabilization and Conservation Service
400 N. Eighth Street
Richmond, VA 23240
(804) 771-2591

Bat Conservation and Management
220 Old Stone House Road
Carlisle, PA 17013
(717) 241-ABAT (2228) office & fax
http://www.batmanagement.com
Contact: John Chenger

Wildlife Rescue League
P.O. Box 704
Falls Church, VA 22040
General Information:
wrl@wildliferescueleague.org
Volunteer Information:
volcoord@wildliferescueleague.org
Administrative Telephone: (703) 391-8625
WRL Wildlife Hotline: (703) 440-0800

PART VII. GLOSSARY AND ACRONYMS

Acronyms

- HOA- Home Owner's Association
- HSUS- Humane Society of the United States
- IPM- Integrated Pest Management
- VDGIF-: Virginia Department of Game and Inland Fisheries
- VDOF- Virginia Department of Forestry
- VDCR- Virginia Department of Conservation and Recreation

Terms and Definitions

- Clustered Development- directs development on only a portion of the land while conserving the remainder as open space.
- Conservation Easement- A conservation easement is a voluntary agreement that allows a landowner to limit the type or amount of development on their property while retaining private ownership of the land.
- Cool Season Grass- Plants that mainly provide a winter or early spring food source for wildlife (examples: clover, winter wheat, rye, ryegrass).
- Covenant- a written agreement or promise usually under seal between two or more parties especially for the performance of some action.
- Forb- an herb other than grass.
- Fungicide - A pesticide that kills fungi.
- Girdle- To encircle the stem of a living tree with cuts that completely sever bark and cambium and often are carried well into the outer sapwood, for the purpose of killing the tree by preventing passage of nutrients or by introducing toxic materials. Besides girdling proper, or removal of bark and cambium in a band of appreciable width girdling may take several forms, viz: 1) Hacking or frilling - A single line of overlapping downward axe cuts, leaving a frill into which toxic materials may be poured. 2) Double hacking - Girdling by means of a double frill cut around the tree and the removal of the chips between them. 3) Notching - Ringing the tree with notches cut well into the sapwood. 4) Stripping - Peeling off a band of bark completely around the tree. (Virginia Department of Forestry)
- Habitat- The local environment in which a plant or animal lives. (Virginia Department of Forestry)
- Herbicide - A pesticide that kills plants or inhibits their growth.
- Insecticide - A pesticide that kills insects.
- Invasive (pertaining to a species)- An "invasive species" is defined as a species that is : non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. (Executive Order 13112). Invasive species can be plants, animals, and other organisms (e.g., microbes). It should be noted that this document also refers to an invasive species that is native to the mid-Atlantic region.
- Legume- any of a large family (*Leguminosae* syn. *Fabaceae*) of dicotyledonous herbs, shrubs, and trees having fruits that are loments, bearing nodules on the roots

that contain nitrogen-fixing bacteria, and including important food and forage plants (as peas, beans, or clovers).

- Low Impact Design- Low Impact Design or LID, is a comprehensive land planning and engineering design approach for development with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. It incorporates strategic planning with management techniques that aim to achieve superior environmental protection, while allowing for development or infrastructure rehabilitation to occur.
- Nuisance (pertaining to a wildlife species) – Wildlife tend to be considered a nuisance when an animal damages, or is about to damage, a property.
- Pesticide - Any substance used for controlling, preventing, destroying, or repelling any pest.
- Riparian- Living environment located on the bank of a natural watercourse (as a river) or sometimes of a lake or a tidewater.
- Snag- A standing dead tree used by many species of birds and mammals for feeding and nesting.
- Suburban- the residential area on the outskirts of a city or large town.
- Warm Season Grass- Plants that mainly provide a food source for wildlife during warmer weather months.

PART VIII. IMAGES TAKEN AT EVERGREEN RURAL VILLAGE (PRIOR TO DEVELOPMENT)

VILLAGE CENTER DISTRICT- JULY 2004

VIEW OF FARM PONDS- OCTOBER 2004

VIEW OF LARGER FARM POND- JULY 2004

VIEW OF AREA AROUND FARM PONDS TO BE ENHANCED WITH NATIVE VEGETATION- JULY 2004

SECOND VIEW OF FARM POND AREA TO BE ENHANCED WITH NATIVE VEGETATION- OCTOBER 2004

TREE OF HEAVEN AT ABANDONED FARM SITE IN FARM POND AREA- OCTOBER 2004

VIEW OF EXISTING VEGETATION IN CONSERVANCY DISTRICT- OCTOBER 2004

VIEW OF A CONSERVANCY LOT- JULY 2004

VIEW OF A CONSERVANCY LOT- JULY 2004

TREE OF HEAVEN ON CONSERVANCY LOT- OCTOBER 2004

GOOSE CREEK- JULY 2004

GOOSE CREEK RIPARIAN AREA EXHIBITING REMNANTS OF OLD STONE WALL- JULY 2004

SNAG AT GOOSE CREEK- JULY 2004

PART IX. LIST OF SPECIES CITED

COMMON NAME	SCIENTIFIC NAME
Flora	
American Cranberry Bush	*Viburnum Trilobum*
American Dogwood	*Cornus florida*
American Hornbeam	*Carpinus caroliniana*
American Sycamore	*Platanus occidentalis*
Annual Ryegrass	*Lolium multiflorum*
Awnless Beggar Ticks	*Bidens polyepis*
Azalea	*Rhododendron sp.*
Bayberry	*Myrica sp.*
Bee Balm	*Monarda didyma*
Big Bluestem	*Andropogon gerardii*
Black Cherry	*Prunus serotina*
Black Gum	*Nyssa sylvatica*
Blackberry	*Rubus*
Black-eyed Susan	*Rudbeckia fulgida*
Blackhaw	*Viburnum prunifolium*
Blazing Star	*Liatris spicata*
Blue Vervain	*Verbena hastata*
Blueflag	*Iris vericolor*
Boneset	*Eupatorium perfoliatum*
Box Elder	*Acer negundo*
Brookside Alder	*Alnus serrulata*
Bulrush	*Scirpus atrovirens / S. cyperinus*
Butterflyweed	*Asclepias tuberosa*
Buttonbush	*Cephalanthus occidentalis*
Cardinal Flower	*Lobelia cardinalis*
Chokeberry	*Photinia floribunda*
Chokecherry	*Prunus virginiana*
Coneflower	*Echinacea sp.*
Coreopsis	*Coreopsis lanceolata*
Deertounge	*Dichanthelium clandestinum*
Eastern Gamagrass	*Tripsacum dactyloides*
Eastern Red Cedar	*Juniperus virginiana*
Eastern White Pine	*Pinus strobus*
Fowl-Manna-Grass	*Glyceria striata*
Fox Sedge	*Carex vulpinoidea*
Gama Grass	*Treipsacum dactyloides*
German/Foxtail Millet	*Setaria iItalica*
Goldenrod	*Solidago sp.*
Grassleaf Goldenrod	*Euthamia graminifolia*
Green Ash	*Fraxinus pennsylvanica*
Grey stem Dogwood	*Cornus racemosa*

Halberd-Leaved-Tearthumb	*Polygonum arifolium*
Hickory	*Carya spp.*
Hollies	*Ilex spp.*
Indiangrass	*Sorghastrum nutans*
Inkberry	*Ilex glabra*
Ironweed	*Vernonia noveboracensis*
Joe Pye Weed	*Eupatorium maculatum*
Lespedeza	*Lespedeza thunbergii*
Little Bluestem	*Schizachyrium scoparius*
Narrow-leaved Cattail	*Typha angustifolia*
New England Aster	*Aster novae-angliae*
Nodding Beggar Ticks	*Bidens cernua*
NY Ironweed	*Vernonia noveboracensis*
PA Smartweed	*Polygonum pennsylvanicum*
Pepperbush	*Clethra sp.*
Persimmon	*Diospyros virginiana*
Phlox	*Phlox spp.*
Phragmites	*Phragmites australis*
Pin Oak	*Quercus palustris*
Purple Coneflower	*Echinacea purpurea*
Red Maple	*Acer rubrum*
Red Osier Dogwood	*Cornus sericea*
Rice Cut Grass	*Leesia oryzoides*
River Birch	*Betula nigra*
Sassafras	*Sassafras albidum*
Sedge	*Carex lurida / Carex crinita*
Sidoats Gama	*Tripsacum dactyloides*
Silky Dogwood	*Cornus amomum*
Smooth Alder	*Alnus serrulata*
Smooth Aster	*Aster laevis*
Soft Rush	*Juncus effusus*
Southern Arrowwood	*Viburnum dentatum*
Spicebush	*Lindera benzoin*
Stokes, Aster	*Sokesia laevis*
Sunflower, Narrow Leaved	*Helianthus angustifolius*
Swamp Chestnut Oak	*Quercus michauxii*
Swamp Milkweed	*Asclepia incarnata*
Swamp White Oak	*Quercus bicolor*
Sweet Gum	*Liquidambar styracifula*
Sweetspire	*Itea spp.*
Switchgrass	*Panicum virgatum*
Tartarian	*Lonicera tatarica*
Tree of Heaven	*Ailanthus altissima*
Tulip Poplar	*Liriodendron tulipifera*
Virginia Pine	*Pinus virginiana*
Virginia Wild-Rye	*Elymus virginicus*

Water Oak	*Quercus nigra*
Wax Myrtle	*Myrica cerifera*
Wild Bergamot	*Monarda fistulosa*
Willow Oak	*Quercus phellos*
Winterberry	*Ilex verticillata*
Wrinkled Goldenron	*Solidago rugosa*
Fauna	
American Kestrel	*Falco sparverius*
Barn Owl	*Tyto alba*
Barred Owl	*Strix varia*
Big Brown Bat	*Eptesicus fuscus fuscus*
Black-capped Chickadee	*Poecile atricapillus*
Brazilian Free-tailed Bat	*Tadarida brasiliensis cynocephala*
Canada Goose	*Branta canadensis*
Cooper's Hawk	*Accipiter cooperii*
Coyote	*Canis latrans*
Eastern Big-eared Bat	*Plecotus rafinesquii macrotis*
Eastern Bluebird	*Sialia sialis*
Eastern Cottontail	*Sylvilagus floridanus*
Eastern Pipistrelle	*Pipistrellus subflavus subflavus*
Eastern Red Bat	*Lasiurus borealis borealis*
Eastern Screech Owl	*Otus asio*
Eastern Small-footed Myotis	*Myotis leibii*
Evening Bat	*Nycticeius humeralis humeralis*
Gray Bat	*Myotis grisescens*
Great Horned Owl	*Bubo virginianus*
Hoary Bat	*Lasiurus cinereus cinereus*
House Mouse	*Mus musculus*
Indiana Bat	*Myotis sodalis*
Little Brown Bat	*Myotis lucifugus lucifugus*
Meadow Vole	*Microtus pennsylvanicus*
Northern Myotis	*Myotis septentrionalis septentrionalis*
Northern Yellow Bat	*Lasiurus intermedius floridanus*
Rafinesque's Big-eared Bat	*Plecotus rafinesquii rafinesquii*
Red-tailed Hawk	*Buteo jamaicensis*
Seminole Bat	*Lasiurus seminolus*
Sharp-shinned Hawk	*Accipiter striatus*
Silver Haired Bat	*Lasionycteris noctivagans*
Southeastern Myotis	*Myotis austroriparius*
Tree Swallow	*Tachycineta bicolor*
Tufted Titmouse	*Baeolophus bicolor*
Virginia Big-eared Bat	*Corynorhinus (= Plecotus) townsendii virginianus*
White-tailed Deer	*Odocoileus virginianus*
Wild Turkey	*Meleagris gallopavo*
Woodpecker sp.	*Picoides spp., Colaptes auratus,*

	Melanerpes carolinus, Dryocopus pileatus
Great-Crested Flycatcher	*Myiarchus crinitus*
Virginia Opossum	*Didelphis virginiana*
Saw-whet Owl	*Aegolius acadicus*
Eastern Gray Squirrel	*Sciurus carolinensis*
Raccoon	*Procyon lotor*
Domestic Cat	*Felis catus*
Domestic Dog	*Canis familiaris*
Red Fox	*Vulpes vulpes*
Striped Skunk	*Mephitis mephitis*

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