Eastern Westchester Biotic Corridor: Bedford Addendum

Metropolitan Conservation Alliance

a program of the

WILDLIFE CONSERVATION SOCIETY

MCA Technical Paper Series: No. 4-A

Eastern Westchester Biotic Corridor: Bedford Addendum

by

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Front cover image:
Stone Hill River, Bedford, New York ©WCS/K.Ryan

Suggested citation:
LaBruna, D. T., and M. W. Klemens. 2007. Eastern Westchester Biotic Corridor: Bedford Addendum. MCA Technical Paper No. 4-A, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

Additional copies of this document can be obtained from:
www.wcs.org/mca

ISBN 978-0-9792418-1-9
ISSN 1542-8133

Acknowledgements

This project would not have been possible without the collaboration and support of our key partners: the Westchester Community Foundation, the New York State Department of Environmental Conservation's Hudson River Estuary Program, the Town of Bedford, particularly Supervisor Lee Roberts, Director of Planning Jeff Osterman, Marcy Marchiano and Kim Kowalski, as well as the many Bedford landowners who made this project possible.

We would like to thank WCS/MCA field biologists Kevin Ryan and James Vellozzi for their hard work and persistence in gathering the field data for this project. We also thank David Kizirian, Curatorial Associate of the Herpetology Department at the American Museum of Natural History, for sharing pertinent herpetological records with us.

Spatial datasets were made available by Cornell University's Geospatial Information Repository, the New York State GIS Clearinghouse, the U.S. Fish & Wildlife Service's National Wetlands Inventory, and Westchester County GIS. We thank them for their contributions.

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Introduction

Fieldwork conducted in 1999 and 2000 by the Wildlife Conservation Society's Metropolitan Conservation Alliance (WCS/MCA) identified a corridor of important habitat for wildlife, or "biotic corridor," in the three contiguous towns of Lewisboro, North Salem, and Pound Ridge in eastern Westchester. The map of the corridor and planning recommendations to maintain its integrity for the benefit of both biodiversity and human populations were published as the "Eastern Westchester Biotic Corridor" (EWBC) report in 2002.

Since that time, the towns have made progress toward implementing some of the planning recommendations in the report. They (1) have joined into an intermunicipal agreement to facilitate implementation of the EWBC, (2) are currently working to draw up an intermunicipal conservation overlay district, and (3) have secured a Greenway grant to hire planning consultants to assist with this effort.

Due in part to the extensive media coverage the EWBC project has received, other communities in Westchester have begun to acknowledge the value of protecting wildlife habitat to maintain the level of biodiversity that our region now enjoys. Word is spreading that biodiversity affords us many benefits, including: cleaner water, cleaner air, pollination services of bees, reduction of certain diseases[1], outdoor recreation opportunities (fishing, bird watching, and hunting), the economic benefits such recreation activities bring to local businesses, and the "sense of place" unique to our particular part of the northeastern United States. The primary threat to biodiversity in our region is habitat fragmentation caused by sprawl. WCS/MCA helps communities protect their biodiversity by finding creative ways to curb sprawl and promote land uses and development that are more compatible with biodiversity.

The Town of Bedford is one of those communities that has come to understand the value of planning to protect biodiversity proactively. In early 2006, Bedford and WCS/MCA formed a partnership to explore the potential of adding Bedford to the EWBC partnership by conducting field surveys to evaluate the town's biodiversity. This addendum report to the EWBC serves to deliver the analysis of the data collected in those surveys, and to provide the rationale for adding Bedford as the fourth town in the Eastern Westchester Biotic Corridor. Please see the original report, "Eastern Westchester Biotic Corridor. MCA Technical Paper No. 4," (Miller & Klemens 2002) and subsequent MCA reports for land use planning recommendations that will help to maintain Bedford's biodiversity.

Methods

Site selection

In January 2006, WCS/MCA met with Bedford officials to formulate a strategy for evaluating biodiversity levels. The partnership narrowed the focus for the project to that portion of town that was relatively unfragmented and contiguous with the existing

[1] For example, Lyme disease is less prevalent in areas with high mammal biodiversity. *See* Allan et al. (2003).

EWBC. Due to the fact that Interstate 684 runs north-south through the town, essentially cutting the town roughly in half, and because a major highway such as this is an insurmountable obstacle for most wildlife, it was decided that the portion of town east of I-684 would be considered for inclusion into the EWBC. The study area was further narrowed to the portion of town east of Route 22 (see Appendix A for map of study area). WCS/MCA biologists extended their biological surveys to parcels outside of the designated study area in certain circumstances when a parcel straddled the study area boundary or as the opportunity arose.

Site access

Because WCS/MCA focuses not just on land protection in parks and preserves, but also careful development of land, access to privately owned parcels is an important aspect of our biodiversity surveys. The Town of Bedford led the effort to gain landowner permission to access field sites, coordinating with WCS/MCA. The Town mailed letters requesting site access to the approximately 675 landowners who own the approximately 775 parcels in the study area. Of the landowners sent letters, 160 landowners responded, 152 of them permitting WCS/MCA field biologists to access their property (a 22.5% positive response rate).

Field data collection

The WCS/MCA field herpetologist conducted amphibian and reptile surveys between April and June 2006. Survey techniques consisted primarily of visual searches and the turning over of cover objects (logs, rocks, and other debris). Dip-netting was employed to detect larval amphibians and, in some cases, adult amphibians and reptiles. Our trained herpetologist's knowledge of a given species' activity patterns and preferred habitats maximized the number of species detected in the study area.

The WCS/MCA field ornithologist conducted breeding bird surveys at peak song period, starting approximately thirty minutes before sunrise when weather conditions were calm (winds less than 10 mph, no rain), until approximately 12:00 noon, assuming weather conditions remained favorable. Species detection rates are maximized at these times and under these conditions. To determine presence of birds that sing in evening hours, such as thrushes, some surveys were conducted in the late afternoon or evening. The territory covered in a survey was based on habitat quality, the likelihood of encountering uncommon breeding birds, and accessibility. Most data was collected through auditory cues (i.e., listening to bird songs and calls). Playbacks (recordings of bird songs and calls) were used to help confirm or document uncommon birds, or common birds that had not yet been detected in an area. Less often, birds were visually observed by the field ornithologist. Surveys were conducted during bird breeding season, from mid-May to late June.

In addition to the 2006 field surveys, some herpetofauna data collected between 1988 and 2004 (collected by Dr. Michael Klemens and deposited at the American Museum of Natural History) were incorporated into our analyses.

The Focal Species Approach

WCS/MCA concentrates survey efforts on wildlife species which respond specifically to development impacts including habitat loss and habitat fragmentation. Such species are termed "focal species," and can be further divided into two broad categories. Many focal species experience population declines as a result of land development and suburbanization. These species, referred to as "development-sensitive" focal species, are usually habitat specialists, with relatively narrow ecological requirements and/or complex life-history requirements that involve use of multiple, interconnected habitat types. These specialized habitats and interconnections are often compromised by development. Examples include Neotropical migrant bird species, vernal pool-breeding amphibians, and long-lived species such as box turtles. Such species tend to disappear from the landscape as their habitats are altered or fragmented. Populations of other focal species increase in response to suburbanization. These species, referred to as "development-associated" focal species, are usually habitat generalists, with much less-specific habitat requirements. Human alterations to landscapes favor, or "subsidize" (*see* Mitchell and Klemens 2000), these generalists which tend to be found in areas that have already been degraded or along edges, such as highway right-of-ways. Examples of such species include Corvids (crows and jays), Canada geese, bullfrogs, snapping turtles, raccoons and white-tailed deer. As urbanization proceeds, development-sensitive species are out-competed by development-associated species. In this manner, development-associated species tend to increase and, over time, replace development-sensitive species, resulting in an overall reduction of biodiversity.

WCS/MCA refers to the process of evaluating focal species, and its implications for ecosystem health and land use, as the "Focal Species Approach," or simply "FoSA." The results of FoSA analysis can enhance planning efforts by assessing the importance of individual sites for conservation. For example, development should be discouraged within areas that support healthy populations of development-sensitive focal species, and redirected toward sites that are already degraded (i.e., those that are dominated by development-associated species).

FoSA represents an innovative departure from traditional conservation efforts. By expanding the scope of investigation beyond federal or state listed threatened and endangered species, we are able to more proactively conserve natural resources. There are many species, currently unlisted and unprotected, whose populations are declining in response to sprawl. Rather than waiting until they are on the brink of extinction (when recovery efforts are not only dangerously uncertain, but also very expensive), it is wiser to attempt to address their habitat requirements and to stabilize their populations now. In addition, ecosystems contain complex interactions among many species. FoSA evaluates systems more reliably by considering a much broader suite of species and their relative abundances, as opposed to basing land use recommendations on a single threatened or endangered species. FoSA methods are not intended to replace the existing and necessary efforts to conserve threatened and endangered species; instead, they complement ongoing conservation and land use planning efforts.

WCS/MCA focuses, in particular, on birds and herpetofauna (amphibians and reptiles). Besides being particularly "reactive" to development pressures (and therefore good indicators of ecosystem condition), the presence and status of these species can be rapidly assessed in a relatively cost-efficient manner using established field techniques. These two groups (birds and herpetofauna) also show differing responses to fragmentation. Because of poor dispersal abilities, herpetofauna are initially more affected by fragmentation than avifauna (*see* LaBruna, et al. 2006). When used in tandem, these two groups provide a robust evaluation of ecosystem integrity.

Lists of development-sensitive focal species vary from region to region because species ranges, habitat requirements, and responses to development also vary. The creation of the Bedford focal species list (see Appendix B) was based on the list used for the original EWBC report, which, in turn, was based on a review of literature that addressed development-sensitivity within the New York/New England region (e.g., Andrle and Carroll 1988, Klemens 1990, Klemens 1993, Bull 1998, Klemens 2000) and on observations of species distribution trends in the field. We tailored the development-sensitive species list to Bedford by including a few additional species (thirteen bird and three amphibian species). Doing so helped us to detect the most important habitat for biodiversity in Bedford. In order to determine the relative quality of an area's habitat within a region, we evaluate the number of development-sensitive (DS) species in an area as well spatial clustering and abundance of observations.

Note that species observed by WCS/MCA biologists that are not particularly reactive to development are considered "development-neutral" species; they are listed in Appendix C.

Data Management
Field survey data were stored in a Microsoft Access relational database, while spatial data, both development-sensitive species location and survey site location, were stored in shapefiles created with ESRI ArcMap 9.0.

Data Analysis
ESRI ArcMap 9.0 mapping software was used to analyze data and create the Bedford Biotic Corridor Extension map.

Step 1 – FoSA Designation
Each observation of a development-sensitive species was assigned a point in the GIS shapefile.

Step 2 – Habitat Area Mapping
Using digitally enhanced orthoimagery as a base layer, for every DS species observation, we delineated a polygon to encompass the habitat types (for example, vernal pool and forest) and habitat area that the individual is likely utilizing to meet all of its life requirements (i.e., foraging, nesting, mating, and hibernation). We excluded from polygons those areas that were already heavily fragmented (i.e., subdivisions). First, amphibian and reptile habitat polygons were delineated, then bird habitat polygons were

added. All habitat polygons were then merged (using the "union" function in ArcMap), forming one layer of several larger polygons, comprising the draft Bedford Biotic Corridor Extension map.

Step 3 – Editing & Extrapolation
To refine the draft Bedford Biotic Corridor Extension map, we edited the map informed by additional GIS layers such as wetlands, road networks, tax parcels, and topography. Polygons less than 50 acres were deleted, due to the limited ecological value of small "islands" of habitat. Areas that either connected existing polygons or were both adjacent to existing polygons and of high habitat quality (i.e., not fragmented by subdivisions) were added to the draft map.

Step 4 – Stream Corridors
In recognition of the important role streams and their riparian corridors play as habitat and dispersal routes for wildlife, in a second layer, we mapped a 1000-foot-wide corridor (500 feet from each side) along each major stream (Stone Hill River and Pitch Swamp Creek) within the study area.

Step 5 – Synthesis
Lastly, we merged both mapped layers to form the final map of the Bedford Biotic Corridor Extension (see map, Appendix D).

Results & Discussion

Our biological surveys indicate that there are two main sections of the study area that retain a significant amount of biodiversity. The first, Extension A, extends the Eastern Westchester Biotic Corridor into the northeastern part of Bedford, while the second, Extension B, extends the biotic corridor into the central-eastern portions of Bedford, south of Cross River Reservoir.

Extension A is composed of three adjacent subsections: (1) The Nature Conservancy's Mount Holly Sanctuary and vicinity, (2) Bedford Audubon Society's Hunt-Parker Sanctuary and vicinity, and (3) the area surrounding Cross River and the northwestern banks of the Cross River Reservoir. Within these three subsections, MCA biologists observed the two box turtles (one juvenile in 2004, the other in 2006)[2] found in the northern half of the survey area, and made multiple observations of four DS amphibian species (four-toed salamander, spotted salamander, red-spotted newt, and wood frog). Biologists also observed twenty-two species of DS birds, including multiple observations of: American redstart, Baltimore oriole, eastern bluebird, eastern towhee, eastern wood-pewee, hooded warbler, indigo bunting, ovenbird, rose-breasted grosbeak, scarlet tanager, veery, barn swallow, great-crested flycatcher, and hairy woodpecker; and the only observations of barred owl, black-throated green warbler, blue-gray gnatcatcher, brown

[2] The box turtle found in 2004 was dead-on-road, the result of being run over by an automobile. Roads present a dangerous obstacle for turtles and other herpetofauna as they move from one habitat fragment to another.

thrasher, field sparrow, warbling vireo, worm-eating warbler, and blue-winged warbler in the northern half of the study area.

The Hunt-Parker Sanctuary likely serves as important habitat for the DS species that our field biologists observed there. It is likely that these DS species disperse from the protection of the sanctuary into the surrounding, unprotected properties; i.e., the sanctuary likely serves an important role as core habitat for several DS species. The location of the sanctuary in proximity to Ward Pound Ridge Reservation in neighboring Pound Ridge is also likely beneficial, in particular for birds, which are able to move from habitat patch to habitat patch more readily than herpetofauna which are less able to overcome the habitat fragmentation between preserves. While Mount Holly Sanctuary is also within Extension A as multiple DS species were found there, its habitat value is somewhat depressed. See the "Recommendations" section for further discussion.

Extension B winds west from the southeastern banks of Cross River Reservoir to the Ketcham Preserve vicinity and south to Pitch Swamp. Within it, MCA biologists observed multiple DS reptile species, including: eastern box turtle and black rat snake, as well as the only worm snake, wood turtle, and northern black racer observations in the entire study area. Several species of DS amphibians were also observed, including multiple observations of: spotted salamander, red-spotted newt, and wood frog, and the only observation of four-toed salamander in the southern half of the study area.

Pitch Swamp constitutes a vital portion of Extension B and is worthy of particular conservation attention. This wetland is home to one of two wood turtles and seven of the nine box turtles observed in the entire study area. However, mere presence of box turtles is not proof of a healthy, reproducing population. Sometimes a population consists of only older individuals because the mortality rate for hatchlings and juveniles is high (this may be due to a variety of factors, one of which may be predations by the development-associated raccoon). This lack of recruitment of younger animals into the population, or "recruitment crisis," places the population in danger of dying out (Klemens 1989). However, at Pitch Swamp this is not the case; the box turtles we detected ranged in age from juveniles to adults and represented both sexes[3]. This suggests an actively breeding population of box turtles. The observation of a wood turtle is particularly notable as individuals of this species require a large area (~1 mile radius) of intact, unfragmented habitat to survive. Its presence suggests a large expanse of high quality (i.e., intact, unfragmented) habitat. However, this is somewhat tempered by the fact that we observed only a *single* wood turtle in Pitch Swamp, and that this adult, male individual was of indeterminate age. Therefore, we do not know if the wood turtle population is reproducing. An adult, female wood turtle was collected dead-on-road (about 635 meters from aforementioned wood turtle) adjacent to Pitch Swamp in 1988. Unfortunately, this historical record does not elucidate the present reproductive status of the wood turtle population in the Pitch Swamp ecosystem. These turtles may be an extension of the wood turtle population that occurs in Stone Hill River at Ward Pound Ridge Reservation. This

[3] The seven box turtles observed at Pitch Swamp included: adult female of 14 years, juvenile female of 10 years, juvenile female of 11 years, adult female of indeterminate age, adult male of 14 years, adult male of indeterminate age, and juvenile female of 7 years.

underscores the intermunicipal conservation opportunity provided by incorporating this section of Bedford into the existing Eastern Westchester Biotic Corridor. Overall, the persistence of these two highly development-sensitive reptile species indicates a large, high quality, intact wetland ecosystem. Pileated woodpecker, an area-sensitive bird species, was observed at Pitch Swamp, providing further evidence of Pitch Swamp's importance as a large, intact section of habitat that is of high conservation concern.

Thirty-one species of DS birds were detected in Extension B. They include multiple observations of: American redstart, Baltimore oriole, barred owl, chimney swift, eastern bluebird, eastern kingbird, eastern towhee, eastern wood-pewee, indigo bunting, ovenbird, pileated woodpecker, rose-breasted grosbeak, scarlet tanager, veery, warbling vireo, wood thrush, worm-eating warbler, yellow-throated vireo, blue-winged warbler, Louisiana waterthrush, barn swallow, black-billed cuckoo, cedar waxwing, great blue heron, great-crested flycatcher, and hairy woodpecker. Other birds species detected include the only observations of black-throated green warbler and field sparrow in the southern half of the study area, and the only observations of Canada warbler, Cooper's hawk, and green heron in the entire study area.

Recommendations

Because Bedford's suburban neighborhoods, large estates, farms and remnant woodlots appear green to the eye, one might assume that the town retains most of the wildlife that it has held historically. However, we found this is not entirely the case. Much of the Bedford's forest habitat is degraded due to 1) a poor-quality forest understory (shrubs and herbs that grow on the forest floor) due to deer overbrowsing, 2) the manicured condition of estate grounds (lawns and the chemicals used to maintain them, as well as "neatening" of vegetation, are inhospitable to most wildlife), and 3) habitat fragmentation (mainly due to subdivisions and roads). As a result, our biodiversity surveys turned up fewer DS species observations than we expected.

While there are still important pockets of biodiversity worth conserving in Bedford, much of the Bedford Biotic Corridor Extension would benefit from habitat restoration in the form of deer control and "naturalizing" of heavily manicured lawns and gardens. The MCA ornithologist observed fewer shrub-nesting birds, such as the veery, than expected. This is likely due to the state of the forest understory which is of low quality in that it is both sparse and dominated by the invasive Japanese barberry. This, in turn, is due to overbrowsing by the high concentration of deer in the region. Similarly, in Mount Holly Sanctuary, protection from development is not sufficient to guarantee the quality of its habitat; Mount Holly Sanctuary suffers from degraded habitat that lessens its importance to wildlife. Its red maple swamp is quality herpetofauna habitat, but the overbrowsing by deer in the forest has led to a degraded understory overrun with invasive Japanese barberry.

Naturalizing the heavily manicured lawns and gardens by reducing lawn area, decreasing use of biocides (pesticides, insecticides, and herbicides, particularly near waterways), allowing a "buffer" zone of shrubs to grow where there is currently an abrupt transition

between lawn and forest (to benefit bird species like brown thrasher, chestnut-sided warbler, and blue-winged warbler), mowing fields every three-to-five years instead of annually to create "old field" habitat (to benefit bird species such as pheasant, yellow warbler, blue-winged warbler, and ruffed grouse), and allowing a complex, multi-layered vegetation structure to grow instead of pruning and simplifying it, are all actions that citizens can take to improve the value of their property to wildlife. Habitat fragmentation due to the hard infrastructure of roads and subdivisions is more difficult to mitigate; instead, efforts should focus on preventing further habitat fragmentation.

In order for the Town of Bedford to protect the biodiversity identified in Bedford Biotic Corridor Extensions A and B from further habitat fragmentation, we recommend that Bedford join the EWBC intermunicipal agreement between the towns of Lewisboro, North Salem, and Pound Ridge, and that they participate in drafting the language of the Eastern Westchester Biotic Corridor Overlay District ordinance, which is ongoing.

For further recommendations on both land preservation and land use planning, please refer to the original EWBC report, as well as subsequent WCS/MCA reports (which focus on other towns in New York State but recommendations are nonetheless applicable to Bedford; free, downloadable publications are indicated below, other publications are available for purchase – go to www.wcs.org/mca to download publications and order form):

- *Pocantico Hills Biodiversity Plan, Rockefeller State Park Preserve and Associated Private Lands: A Public-Private Land Stewardship Initiative, WCS/MCA Technical Paper No. 12* The Pocantico Hills Biodiversity Plan is the result of a public-private partnership between WCS/MCA, the New York State Office of Parks, Recreation and Historic Preservation, Rockefeller family members, Friends of the Rockefeller State Park Preserve, and the Rockefeller Brothers Fund. This report provides conservation, management, restoration, and public education recommendations to maintain and increase the wildlife biodiversity on Rockefeller State Park Preserve and surrounding Rockefeller family lands. Includes map highlighting areas of significant biodiversity. Ideas presented apply to any North American suburban park containing temperate ecosystems. MCA, 2006. *Available for purchase.*

- *From Planning to Action: Biodiversity Conservation in Connecticut Towns, WCS/MCA Technical Paper No. 10* To counteract sprawl development and protect biodiversity, local land use decision-makers need three items: the scientific information to identify problems, the technical solutions to those problems, and the legal authority to implement those solutions. This resource provides guidance on all three. The twelve primary challenges facing land use decision-makers identified in this publication arose out of the authors' collective experience working with municipal officials, and is a practical guide to making ecologically- and legally-informed development decisions. Although this report focuses on towns in Connecticut, the guidance here applies to other "home-rule" states such as New York. MCA, 2006. *Available for purchase.*

- *Croton-to-Highlands Biodiversity Plan: Balancing Development and the Environment in the Hudson River Estuary Catchment, WCS/MCA Technical Paper No. 7* The Croton-to-Highlands Biodiversity Plan was developed out of a partnership between WCS/MCA and the four contiguous New York towns of Cortlandt, New Castle, Putnam Valley, and Yorktown. The report provides policy and planning recommendations to support a multi-town approach to conserve wildlife and habitats and includes a map highlighting priority areas for conservation. MCA, 2004. *PDF available at www.wcs.org/mca.*

- *Best Development Practices: Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States, WCS/MCA Technical Paper No. 5* This paper contains techniques to guide local and state land use decision-makers as they attempt to conserve vernal pool habitats and wildlife. It provides a pragmatic approach to conservation that encourages communities to attain a more complete understanding of their vernal pool resources, gather information that enables them to designate exemplary pools worthy of protection efforts, and develop strategies to protect them. MCA, 2002. *Available for purchase.*

- *Eastern Westchester Biotic Corridor, WCS/MCA Technical Paper No. 4* The Eastern Westchester Biotic Corridor (EWBC) is a partnership between MCA and the three contiguous New York towns of North Salem, Lewisboro, and Pound Ridge. This report provides science-based information and tools to support a regional, multi-town approach to conserve wildlife and habitats. MCA, 2002. *PDF available at www.wcs.org/mca.*

We should note that the Bedford Biotic Corridor Extension includes some of the lands surrounding Cross River Reservoir which are owned by New York City. Any restoration, management, or other implementation of WCS/MCA recommendations should be conducted in cooperation with the city's Department of Environmental Protection.

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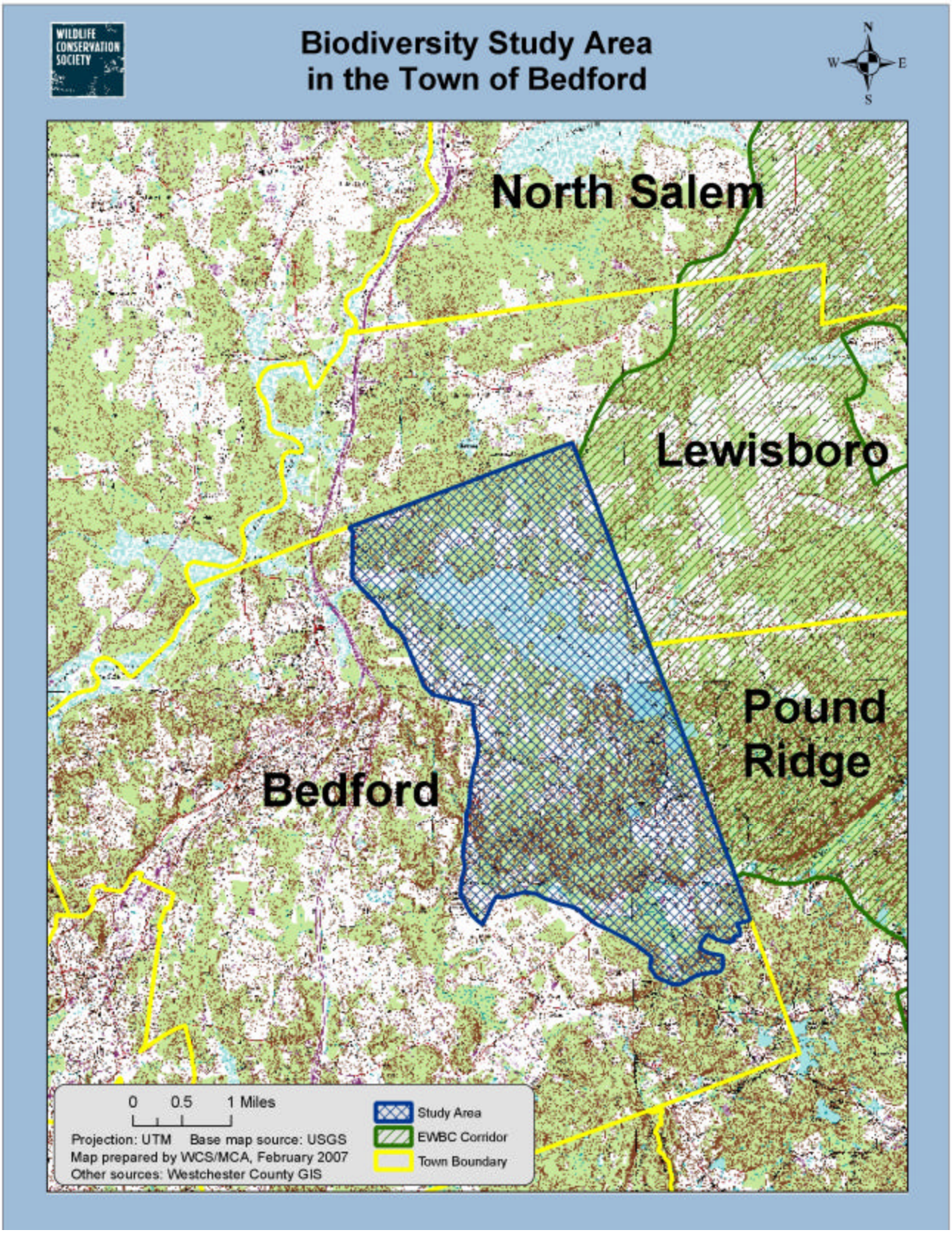
Appendix A


WILDLIFE CONSERVATION SOCIETY
Biodiversity Study Area in the Town of Bedford
N
W
E
S
North Salem
Lewisboro
Pound Ridge
Bedford
0 0.5 1 Miles
Projection: UTM Base map source: USGS
Map prepared by WCS/MCA, February 2007
Other sources: Westchester County GIS
Study Area
EWBC Corridor
Town Boundary

Appendix B
Bedford Focal Species

Development-Sensitive Species

		Federal Status	*New York State Status*	*Westchester County Status*	*Audubon Watchlist*
Amphibians					
Spotted salamander	*Ambystoma maculatum**				
Four-toed salamander	*Hemidactylium scutatum*				
Red-spotted newt	*Notophthalmus viridescens**				
Wood frog	*Rana sylvatica**				
Reptiles					
Wood turtle	*Clemmys insculpta*		SC	E	
Eastern box turtle	*Terrapene c. carolina*		SC	T	
Eastern worm snake	*Carphophis a. amoenus*		SC	SC	
Northern black racer	*Coluber c. constrictor*				
Black rat snake	*Elaphe obsoleta*				
Birds					
Great blue heron	*Ardea herodias**				
Green heron	*Butorides virescens**				
Cooper's hawk	*Accipiter cooperii**		SC	E	
Broad-winged hawk	*Buteo platypterus**				
Black-billed cuckoo	*Coccyzus erythropthalmus**				
Barred owl	*Strix varia*				
Chimney swift	*Chaetura pelagica*				
Hairy woodpecker	*Picoides villosus**				
Pileated woodpecker	*Dryocopus pileatus*				
Eastern wood-pewee	*Contopus virens*				
Great crested flycatcher	*Myiarchus crinitus**				
Eastern kingbird	*Tyrannus tyrannus*				

		Federal Status	*New York State Status*	*Westchester County Status*	*Audubon Watchlist*
Yellow-throated vireo	*Vireo flavifrons*				
Warbling vireo	*Vireo gilvus*				
Cliff swallow	*Petrochelidon pyrrhonota**				
Barn swallow	*Hirundo rustica**				
Blue-gray gnatcatcher	*Polioptila caerulea*				
Eastern bluebird	*Sialia sialis*				
Veery	*Catharus fuscescens*				
Wood thrush	*Hylocichla mustelina*			SC	Declining
Brown thrasher	*Toxostoma rufum*				
Cedar waxwing	*Bombycilla cedrorum**				
Blue-winged warbler	*Vermivora pinus**				Declining
Chestnut-sided warbler	*Dendroica pensylvanica**				
Black-throated green warbler	*Dendroica virens*				
American redstart	*Setophaga ruticilla*				
Worm-eating warbler	*Helmitheros vermivorum*			SC	Declining
Ovenbird	*Seiurus aurocapilla*				
Louisiana waterthrush	*Seiurus motacilla**				
Hooded warbler	*Wilsonia citrine*				
Canada warbler	*Wilsonia canadensis*			SC	Declining
Scarlet tanager	*Piranga olivacea*				
Eastern towhee	*Pipilo erythrophthalmus*				
Field sparrow	*Spizella pusilla*				
Rose-breasted grosbeak	*Pheucticus ludovicianus*				
Indigo bunting	*Passerina cyanea*				
Baltimore oriole	*Icterus galbula*				

Federal, State, and County Status: E=Endangered, T=Threatened, SC=Special Concern; Audubon Watchlist: applies only to birds
*Additional development-sensitive species since original EWBC report

Appendix B (continued)
Bedford Focal Species

Development Associated Species

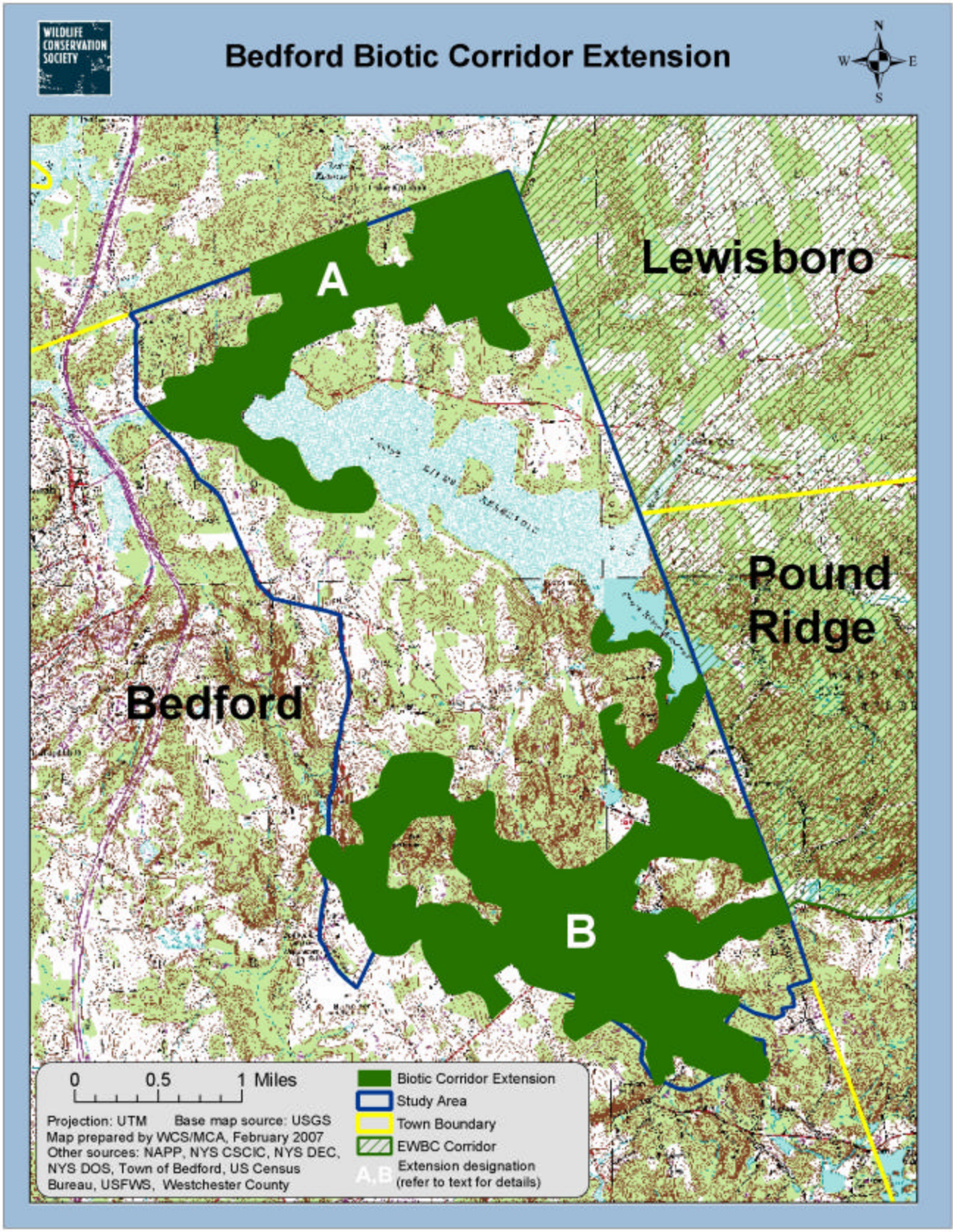
Amphibians	
Northern two-lined salamander	*Eurycea bislineata*
Redback salamander	*Plethodon cinereus*
American toad	*Bufo americanus*
Northern spring peeper	*Pseudacris crucifer*
Bullfrog	*Rana catesbeiana*
Green frog	*Rana clamitans*
Reptiles	
Common snapping turtle	*Chelydra serpentina*
Painted turtle	*Chrysemys picta*
Northern water snake	*Nerodia sipedon*
Eastern garter snake	*Thamnophis s. sirtalis*
Birds	
Canada goose	*Branta canadensis*
Blue jay	*Cyanocitta cristata*
American crow	*Corvus brachyrhynchos*
House wren	*Troglodytes aedon*
Northern mockingbird	*Mimus polyglottos*
European starling	*Sturnus vulgaris*
Brown-headed cowbird	*Molothrus ater*
House finch	*Carpodacus mexicanus*
House sparrow	*Passer domesticus*

Appendix C

Development Neutral Species

Amphibians	
Gray treefrog	*Hyla versicolor*
Pickerel frog	*Rana palustris*
Reptiles	
Northern ringneck snake	*Diadophis punctatus edwardsii*
Birds	
Double-crested cormorant	*Phalacrocorax auritus*
Mallard	*Anas platyrhynchos*
Spotted sandpiper	*Actitis macularia*
Killdeer	*Charadrius vociferus*
Wild turkey	*Meleagris gallopavo*
Mourning dove	*Zenaida macroura*
Turkey vulture	*Cathartes aura*
Red-tailed hawk	*Buteo jamaicensis*
Great horned owl	*Bubo virginianus*
Belted kingfisher	*Ceryle alcyon*
Downy woodpecker	*Picoides pubescens*
Red-bellied woodpecker	*Melanerpes carolinus*
Northern flicker	*Colaptes auratus*
Eastern phoebe	*Sayornis phoebe*
Red-winged blackbird	*Agelaius phoeniceus*
Common grackle	*Quiscalus quiscula*
American goldfinch	*Carduelis tristis*
Chipping sparrow	*Spizella passerina*
Song sparrow	*Melospiza melodia*
Northern cardinal	*Cardinalis cardinalis*
Tree swallow	*Tachycineta bicolor*
Red-eyed vireo	*Vireo olivaceus*
Yellow warbler	*Dendroica petechia*
Pine warbler	*Dendroica pinus*
Common yellowthroat	*Geothlypis trichas*
Gray catbird	*Dumetella carolinensis*
Carolina wren	*Thryothorus ludovicianus*
White-breasted nuthatch	*Sitta carolinensis*
Tufted titmouse	*Baeolophus bicolor*
Black-capped chickadee	*Poecile atricapillus*
American robin	*Turdus migratorius*

Appendix D


WILDLIFE CONSERVATION SOCIETY
Bedford Biotic Corridor Extension
N
W
E
S
A
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Lewisboro
Pound Ridge
Bedford
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0.5
1 Miles
Projection: UTM
Base map source: USGS
Map prepared by WCS/MCA, February 2007
Other sources: NAPP, NYS CSCIC, NYS DEC, NYS DOS, Town of Bedford, US Census Bureau, USFWS, Westchester County
Biotic Corridor Extension
Study Area
Town Boundary
EWBC Corridor
A,B
Extension designation (refer to text for details)