

**PRESENTATION OUTLINE
& SUMMARY OF OUTSTANDING ISSUES**

for

*The Preserve:
Old Saybrook, Westbrook, Essex, Connecticut*

- In a landscape setting undergoing steady suburbanization, and **fragmentation**, with preservation of only moderate-sized woodlots and open space tracts, very large forested tracts are regionally of high importance from a conservation standpoint, **for all species**, not just rare or uncommon ones. The proposed development design fails to set aside at least one substantial large tract.
- Very large tracts are reservoirs of **genetic diversity**, for regional metapopulations of fauna and flora. A widely known principle of population genetics is the tendency for small, isolated populations to become increasingly homogeneous, genetically, losing alleles by **random drift**.
- Small populations often suffer genetic problems due to **inbreeding**. This is a particular problem for the larger mammals such as mustelids (weasels), which already occur at low densities.
- Small populations are **less able to adapt to environmental changes**. An example would be adaptation to global warming. Genes to prevent flowering in a winter warm spells, might currently be present in a large population of a plant species at a low level, but would increase in frequency in response to climate change. This gene would likely be absent from a small plant population, which would, therefore, go extinct in the face of climate change. If there is a large population in the region, it can be a **source of genetic variability**, for the multitude of smaller habitat blocks.
- Large tracts are especially important for preserving genetic diversity of species that naturally occur at low densities such as the wood warbler (worm-eating and hooded warblers) or orchids, documented at the site.

- A very large undeveloped tract is a **source for repopulation in the larger landscape**. Small populations are more likely to go extinct or reach dangerously low levels in the face of environmental perturbations (e.g. a series of dry summers with salamander reproductive failure). If there is emigration from a nearby source population loss of biodiversity can be prevented.
- With avians the presence of **source populations** is especially critical, because suburban woodlots are **sinks** for a large proportion of our songbirds. Many migratory songbird species, ranging from the common red-eyed vireo to the rare hooded warbler, experience elevated rates of predation and nest parasitism near forest edges in small to moderate-sized woodlots. Estimates of the distance that increased rates of nest failure extend from the forest edge range from 190 feet (Paton 1994) to 600 feet (Temple 1988). A forest such as that at the Preserve **replenishes** the depleted populations in smaller tracts in the region.
- Some bird species such as hooded warbler have **behavioral avoidance of even moderate sized tracts** <400 acres, based on extensive bird survey experience of REMA staff, including compilation and analysis of data volunteer surveys by experienced birders (Gadwa 2003) (attached). These species will disappear from the local landscape unless a very large tract is preserved. The population levels of the wood warbler species, or of other forest migrants at this site, are also entirely consistent with REMA experience, *not* unusually or “surprisingly” low as suggested by EPS.
- The applicant’s consultant provided only a table of the latitude and longitude coordinates of the bird survey points and **did not do any analysis of the distribution** of the avian populations. No breakdown of raw survey data by point was provided by EPS, but REMA has done so (see Tables 1 and 2; attached).
- Note that Route 3, with the largest numbers of area-sensitive forest songbirds including hooded warbler, worm-eating warbler, and American redstart, is located on the ridge bordering Pequot Swamp Pond, which

would become a narrow forested strip sandwiched between the pond and the proposed housing cluster, under the proposed plan. The footprint of the northernmost building is in close proximity to Plots 3-5 and 3-6 with the hooded warbler.

- Based on the applicant's own avian consultant more than one third of the site was not covered during the breeding bird survey (see Figure 2, attached). More importantly a large forested block within eastern section of the site, roughly 300 acres, was not surveyed for breeding birds. Also, there is general **under-representation of breeding bird data points at or near the edges of forested wetlands**, where typically, based on REMA staff experience, both diversity and abundance of avian species (and other wildlife) is much higher.
- Interestingly, the aforementioned +/- 300-acre forested block, with significant wetland resources (e.g., headwater seeps, vernal pools, etc.), was also under-represented for mammalian species, including bats (see "Mammal Species" table in EPS Biological Survey report). Unfortunately, **a large proportion of the proposed development** (i.e. housing and golf course) is proposed within this habitat block.
- Regarding the herpetological studies conducted by Dr. Michael Klemens and his team, we note the following:
 - It is unclear if the herpetological data collected by Evans Environmental Consultants in 1999, by Robert Russo in 1999 and 2000, and by Edward Pawlak in 2002, were used in analyzing distribution and abundance of vernal pool fauna. It is highly beneficial to use data from several years to arrive at conclusions for vernal pool conservation. We recommend that all the data be included into the record, particularly Mr. Pawlak's raw data.
 - There is **lack of specific information on each of the 31 vernal pools**. Apart from egg mass counts and species presence, we know little or nothing on the hydrology, substrate, vegetation structure and diversity, water quality and invertebrate base.

- The vernal pools were not visited in the summer to document productivity of obligates, particularly spotted salamanders.
- Many of the “non-conserved” vernal pools, such as #5, #9, #19, #23, #3, and #22 are clearly Tier 1 pools, which according to the Calhoun and Klemens (2002) methodology are worthy of conservation. This brings into question the future of the methodology in Connecticut.
- Several “non-conserved” pools, such as #3, #4, #21, #24, and #26, have comparatively moderate numbers of spotted salamander and wood frog egg masses, but also contain marbled salamanders. Due to the lack specific information it is **impossible** to ascertain if any of these pools are **important marbled salamander** pools. Very often productive marbled salamander breeding pools have lower numbers of the other obligates, since the former predate on the latter.
- The Klemens report claims that Stuart Z. Cohen, PhD, was specifically retained to address specific issues of amphibian conservation as it relates to golf course design, turf management, and IPM issues. If this is an **integral part of the best management and conservation program** proposed, why have not Mr. Cohen’s reports and recommendations been submitted into the public hearing record?
- There is **no discussion about the expected population size and structure, and distribution of the Eastern Box Turtle** on the site, although several turtles were observed and marked. As Dr. Klemens points out this species is in decline due to habitat fragmentation and loss of long-lived adults to mortality and collection. Any Open Space subdivision should account for such a fragmentation sensitive species, one which is “listed” as a Species of Special Concern.”
- It is our opinion, that none of the productive Tier 1 vernal pools should be sacrificed to development, without further analysis and substantiation. Based on the data and analysis provided thus far, the

golf course layout is inappropriate as an Open Space at this large site, which, by the applicant's own admission is a "relatively intact forest habitat."


- The floristic inventory provided for the site is fairly comprehensive. However, there are **insufficient distributional data**, particularly regarding rare and uncommon flora, such as the various orchids and mikworts observed. Moreover, there is little or no description on the potentially botanically more diverse areas with uncommon and rare species, such as hilltops with bedrock outcrops, and headwater wetland seeps. Without this kind of information it is not possible to ascertain if such areas will be protected.
- There are **no entomological surveys** of the property. With a forested parcel this size it is highly likely that "listed" insects and arthropods could exist on the property, which should be afforded conservation.



Date: 12/8/04

The Preserve: *Old Saybrook, Westbrook, Essex, Connecticut*
As seen on a November 1, 2000 Aerial Photograph (www.globexplorer.com)

Figure 1

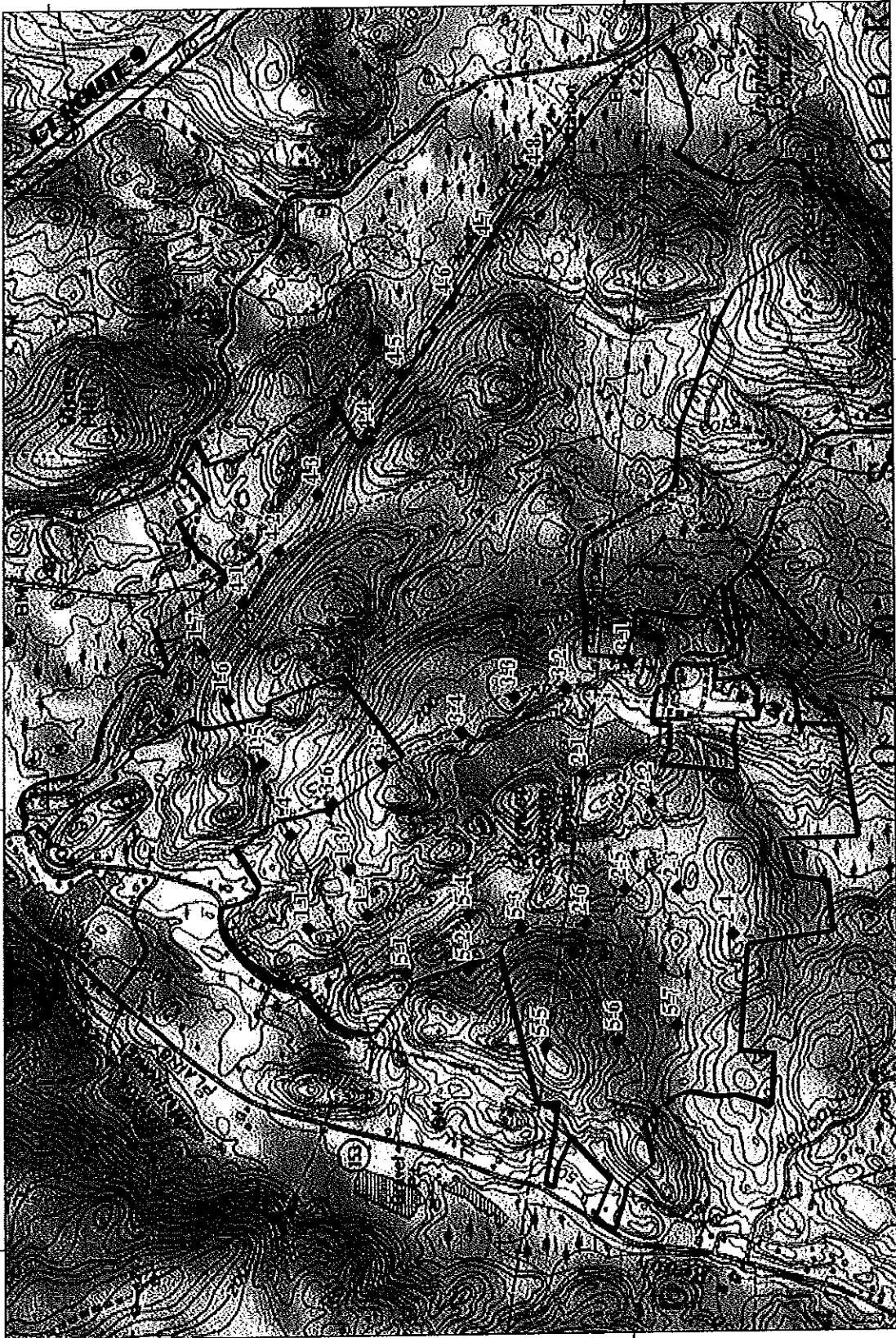

REMA
Rema Ecological Services, LLC
164 East Center Street, Suite 2
Manchester, CT 06040

— **Approximate Property Boundary** (+/- 967 acres)
Note: Entire color plate covers approximately 7.1 square miles

1" = +/- 1,700'

72°26.000' W 72°25.000' W 72°24.000' W

41°20.000' N 41°19.000' N



72°26.000' W 72°25.000' W 72°24.000' W
 41°20.000' N 41°19.000' N
 MN 1 1/4" IN
 14 1/2°
 0 1000 FEET 0 500 1000 METERS
 0 1 MILE
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Date: 12/8/04

The Preserve: **Old Saybrook, Westbrock, Essex, Connecticut**
As seen on USGS Topographic Map (Essex Quadrangle, 1977)

Figure 2

Table 1: Breeding bird data, by point, for area-sensitive forest species, and/or uncommon or declining species from "The Preserve" in Old Saybrook, Westbrook, and Essex, CT. From the 10-27-04 Biological Survey report by EPS. Data collected by David Provencher, June 2002.

Species	Code	ROUTE 1, N edge of site, along town line						
		1-1	1-2	1-3	1-4	1-5	1-6	1-7
Black-billed Cuckoo	1 BB					1		
Yellow-billed cuckoo	9 YC		1					
Hairy Woodpecker	2 HR					1		
Northern Flicker	2 NF							
Eastern Wood Peewee	20 WP		1			1		1
Eastern Kingbird	2 EK							
Yellow-throated Vireo	5 YT							1
Red-eyed Vireo	31 RV	1	1	2	1			1
Blue gray Gnatcatcher	2 BG						1	
Woodthrush	27 WT	2		3	2	1		
Blue-winged warbler	3 BW						1	
Prairie Warbler	1 PW							
Black & White Warbler	1 WW							1
American Redstart	2 AR							
Worm-eating Warbler	11 WE				1			
Ovenbird	39 OB	3	1	2				1
Hooded Warbler	2 HO							
Scarlet Tanager	21 SC		1	2	1		1	1
Eastern Towhee	11 RS			1			2	1
Rose-breasted Grosbeak	9 GB					1		
Indigo Bunting	10 IB						2	
Total area-sensitive, forest species		3	3	4	4	4	2	5
Total area-sensitive, forest individuals		6	3	9	6	4	2	6

Notes: 1 Shading denotes an area-sensitive, forest species, impacted by fragmentation, observed on route.
 2. Tallies were prepared from raw data sheets following p. 16 of the Breeding Bird Survey Report.
 Several problems were encountered, e.g. use of the same code GC (from table on p. 16) was used for gray catbird and great crested flycatcher. Therefore the latter was not included on the list of area-sensitive forest songbirds. CB, not on list, appears to have been used for some catbird observations.

Table 1, cont.: June 2002 breeding bird data, by point, for selected species at The Preserve.

		ROUTE 2, SW of Pequot Swamp Pond					
Species	Code	2-1	2-2	2-3	2-4	2-5	2-6
Black-billed Cuckoo	BB						
Yellow-billed cuckoo	YC	1	1	1		1	
Hairy Woodpecker	HR						
Northern Flicker	NF						
Eastern Wood Peewee	WP	1	1				1
Eastern Kingbird	EK						
Yellow-throated Vireo	YT						1
Red-eyed Vireo	RV	1		1	1		
Blue gray Gnatcatcher	BG						
Woodthrush	WT		2	1		1	1
Blue-winged warbler	BW						
Prairie Warbler	PW						
Black & White Warbler	WW						
American Redstart	AR						
Worm-eating Warbler	WE		1				2
Ovenbird	OB		1	2	3	2	
Hooded Warbler	HO						
Scarlet Tanager	SC		1			1	1
Eastern Towhee	RS						
Rose-breasted Grosbeak	GB		1	1		2	
Indigo Bunting	IB						
Total area-sensitive, forest species		2	6	4	2	4	5
Total area-sensitive, forest individuals		2	6	5	4	6	6

Table 1, cont.: June 2002 breeding bird data, by point, for selected species at The Preserve.

		ROUTE 3, Site Center, E & N of Pequot Swamp Pond					
Species	Code	3-1	3-2	3-3	3-4	3-5	3-6
Black-billed Cuckoo	BB						
Yellow-billed cuckoo	YC						
Hairy Woodpecker	HR						
Northern Flicker	NF						
Eastern WoodPeewee	WP	2	1	1		1	1
Eastern Kingbird	EK		1				
Yellow-throated Vireo	YT	1					
Red-eyed Vireo	RV	1	1	1	1	1	1
Blue gray Gnatcatcher	BG						
Woodthrush	WT				2	1	
Blue-winged warbler	BW						
Prairie Warbler	PW						
Black & White Warbler	WW						
American Redstart	AR	1					1
Worm-eating Warbler	WE		1	1	1		
Ovenbird	OB	1	1	2	1	3	1
Hooded Warbler	HO					1	1
Scarlet Tanager	SC					1	1
Eastern Towhee	RS						
Rose-breasted Grosbeak	GB				1		
Indigo Bunting	IB						
Total Area-sensitive, forest species		5	4	4	5	6	6
Total Area-sensitive, forest individuals		6	4	5	6	8	6

Table 1, cont.: June 2002 breeding bird data, by point, for selected species at The Preserve.

Species	Code	ROUTE 4, NE & E side, just east of RR ROW							
		4-1	4-2	4-3	4-4	4-5	4-6	4-7	4-8
Black-billed Cuckoo	BB								
Yellow-billed cuckoo	YC							1	
Hairy Woodpecker	HR			1					
Northern Flicker	NF							1	
Eastern WoodPeewee	WP		1				1		1
Eastern Kingbird	EK						1		
Yellow-throated Vireo	YT	1				1			
Red-eyed Vireo	RV	3	3	1	2	1	1	1	2
Blue gray Gnatcatcher	BG				1				
Woodthrush	WT		1	1					
Blue-winged warbler	BW				1				1
Prairie Warbler	PW								
Black & White Warbler	WW								
American Redstart	AR								
Worm-eating Warbler	WE						1		
Ovenbird	OB	2	1		2			1	
Hooded Warbler	HO								
Scarlet Tanager	SC	1	1	1	1	1			
Eastern Towhee	RS				1	1	2		
Rose-breasted Grosbeak	GB					2			1
Indigo Bunting	IB	2	1	2		1	1	1	
Total Area-sensitive, forest species		4	5	4	4	4	2	2	3
Total Area-sensitive, forest individuals		7	7	4	6	5	2	1	4

Also Northern Goshawk (Point 4-4)

Table 1, cont.: June 2002 breeding bird data, by point, for selected species at The Preserve.

Species	Code	ROUTE 5, SW Corner of Site						
		5-1	5-2	5-3	5-4	5-5	5-6	5-7
Black-billed Cuckoo	BB							
Yellow-billed cuckoo	YC	1	1					1
Hairy Woodpecker	HR							
Northern Flicker	NF							1
Eastern WoodPeewee	WP		1	1	1	1		1
Eastern Kingbird	EK							
Yellow-throated Vireo	YT							
Red-eyed Vireo	RV	1				1	1	
Blue gray Gnatcatcher	BG							
Woodthrush	WT	1	4	1	2		1	
Blue-winged warbler	BW							
Prairie Warbler	PW		1					
Black & White Warbler	WW							
American Redstart	AR							
Worm-eating Warbler	WE		1		1	1		
Ovenbird	OB	1	2	2	1		2	1
Hooded Warbler	HO							
Scarlet Tanager	SC	1		1		1	1	1
Eastern Towhee	RS		3					
Rose-breasted Grosbeak	GB							
Indigo Bunting	IB							
Total Area-sensitive, forest species		4	4	4	4	4	3	2
Total Area-sensitive, forest individuals		4	7	5	5	4	4	2

Data tabulation by point by S. Gadwa , Rema Ecological Services, LLC
12/8/2004

<i>Table 2: Trends</i>		<i>Breeding Bird Atlas: No. Blocks where Confirmed (out of a total of 596 blocks, each 10 sq. miles in area (Bevier 1994)</i>	<i>2003 Summer Breeding Bird Count, CT, Total Count</i>	<i>Rate of Decline or increase, Breeding Bird Survey Data, CT 1966-2002</i>
Black-billed Cuckoo		31	26	-9.20%
Yellow-billed cuckoo		20	50	-13.9%
Hairy Woodpecker	A	171	202	-3.70%
Northern Flicker	A	329	512	-3.30%
Eastern Wood Peewee	A	132	510	-0.60%
Eastern Kingbird		468	526	-2.50%
Yellow-throated Vireo	A	83	176	-2.50%
Red-eyed Vireo	A	264	2255	2.30%
Blue gray Gnatcatcher	A	97	217	7.10%
Woodthrush	A	245	1065	-1.20%
Blue-winged warbler		353	271	-3.20%
Prairie Warbler		93	101	-6.30%
Black & White Warbler	A	222	453	-0.80%
American Redstart	A	192	896	2.30%
Worm-eating Warbler	A	68	91	7.10%
Ovenbird	A	244	1249	0.10%
Hooded Warbler	A	18	11	63% (N=6)
Scarlet Tanager	A	187	569	-1%
Eastern Towhee		256	557	-5.80%
Rose-breasted Grosbeak	A	254	351	-2.60%
Indigo Bunting		115	346	-4.80%
<i>American Robin (for comparison)</i>		592	4750	0.60%

This table accompanies Table 1, showing data by point for selected species in the data set collected at the Preserve in June 2002 by David Provencher. Species annotated with "A" are forest species sensitive to habitat fragmentation (area-sensitive). Bold indicates species with lowest populations, state-wide.

Table 3: Avian species that are known from the Site or its vicinity or are expected at the Site based on regional abundance and available habitat, and which do not appear on the submitted avian lists.

Common Name	Scientific Name	Notes
American Black Duck	<i>Anas rubripes</i>	Shrub swamps, emergent wetlands
Broad-winged hawk	<i>Buteo platypterus</i>	<u>Observed</u> on the Essex portion of the Site in Summer of 2000
Ruffed grouse	<i>Bonasa umbellus</i>	Upland woods near wetlands, power line ROW
Great horned owl	<i>Bubo virginianus</i>	<u>Observed</u> on the Essex portion of the Site in Summer of 2000
Whip-poor-will	<i>Caprimulgus vociferous</i>	Known from the Essex portion of the Site (ca. 2000)
Pileated woodpecker	<i>Dryocopus pileatus</i>	Breeds in the vicinity of Site based on CT BBS*
Acadian flycatcher	<i>Empidonax virescens</i>	Woodlands; known from vicinity of Site
Eastern phoebe	<i>Sayornis phoebe</i>	<u>Observed</u> on the Essex portion of the Site in Summer of 2000
Brown creeper	<i>Certhia americana</i>	Expected based on habitat; known from the region
Carolina wren	<i>Thryothorus ludovicianus</i>	<u>Observed</u> on the Essex portion of the Site in Summer of 2000
Northern mockingbird	<i>Mimus polyglottos</i>	Power line ROW; known from vicinity of Site
Brown thrasher	<i>Toxostoma rufum</i>	ROW; woodland edges; CT Species of Special Concern
White-eyed vireo	<i>Vireo griseus</i>	Scrub shrub and emergent wetlands near woodland edges
Chestnut-sided vireo	<i>Dendroica pennsylvanica</i>	ROW; woodland edges; known from the vicinity of Site
Louisiana waterthrush	<i>Seiurus motacilla</i>	Flowing perennial stream in wooded swamps
Canada warbler	<i>Wilsonia canadensis</i>	Near stream within wooded wetlands
Swamp sparrow	<i>Melospiza georgiana</i>	Marshes, swamps, bogs, known from vicinity

* Connecticut Breeding Bird Survey (Summer 2003) (CT Ornithological Society)

SELECTED AVIAN REFERENCES:

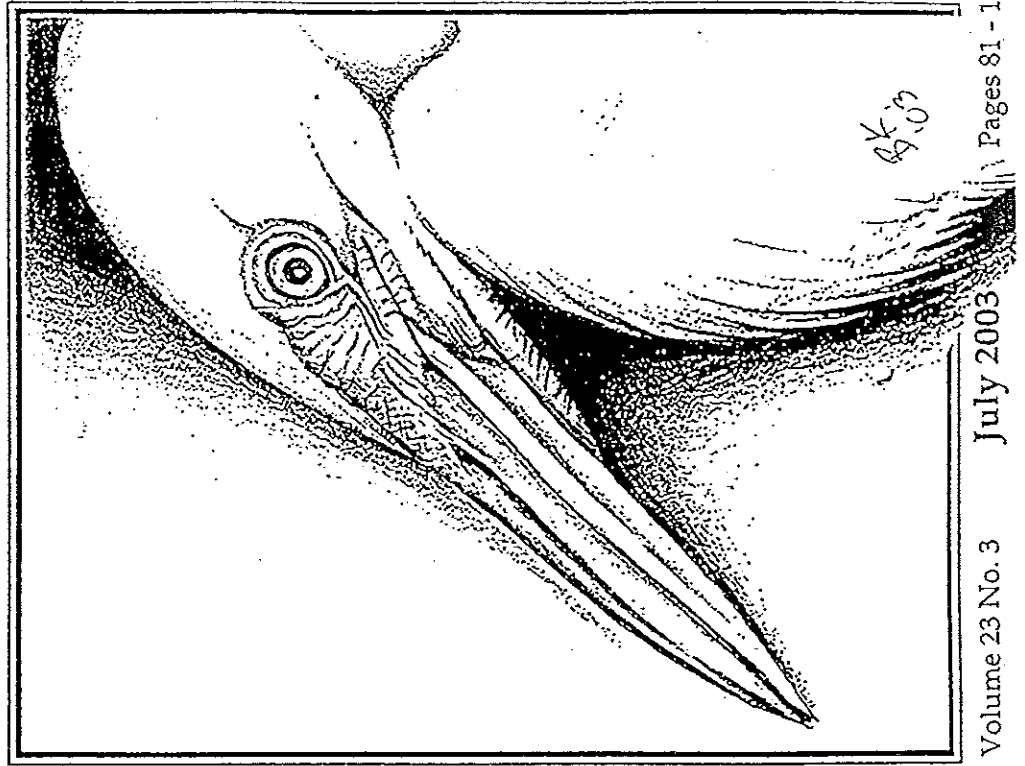
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placed so as to maximize distances from forest edges, and at least 200 meters apart. Data was recorded spatially on a specially designed form, divided into four quadrants, allowing accurate counts of individuals. Size of habitat block and type (s) of habitat were noted. The Ontario data recording system was also used for plots in non-forested habitat. Annotations indicating breeding activity (e.g., singing) were recorded.

Results

Tables 2 and 3 show numbers of species, numbers of individuals, and numbers of area-sensitive forest species, including both totals and average densities per plot for nine sites. Table 3 also indicates the number of disturbance-sensitive species of shrubland habitats. These tables show the maximum number of individuals observed (on either of the two surveys), and values are averaged for sites with multiple plots. Statistical analysis was constrained by differences in the number of points per site. However, patterns are very clear, even without statistical support, and are consistent with the existing scientific literature on area-sensitivity and the importance of landscape ecological integrity and wetland habitat for songbird communities. For the four sites not formally analyzed, the avian community composition, as shown in Table 4, appears to follow similar patterns.

Highest densities (over 20 individuals/plot) and high overall diversity occurred in tracts with significant forested wetlands: bottomland hardwood forest at Moss Farms in Cheshire along the Ten Mile River, along the Eight Mile River at Churchill Road in Southington, and at Tyler Mill by the Muddy River in Wallingford; and also Deadwood Swamp in Plainville and Farmington. In 1998 these forests had good ecological integrity; they were either large (over 250 acres) or set in a predominantly rural landscape. Densities in the Moss Farms bottomland forest (an average of 26 individuals/plot in 1998) were significantly higher than in upland forest on Cathole Mountain (10.8 individuals/plot). The Moss Farms Tract has a higher proportion of wetlands and a thicker understory, which supports higher insect densities. By contrast, at Community Lake wooded wetlands were dewatered when the lake drained after a dam breach in 1983, and now support low bird densities (averaging 12 per plot).

Table 2. Summary of Survey Data from Forested Tracts in the Quinnipiac Watershed.

	Tyler Mill Plots 2-4 1998	Cathole Mtn. Plots B1-4 1998	Moss Farms Lowlands Plots 1-3 1998	Churchill Rd ¹ Plot 1 1998	Community Lake 1997 ²
SIZE OF HABITAT BLOCK	1200+ acres	800+ acres	~250	~75 acres	~10 acres
AVERAGE NO. SPECIES	15	13.3	15.5	20	15.5
TOTAL NO. SPECIES	28.0	22	22	20	15
AVG. MAX. NO. INDIVIDUALS/ POINT	21.3	10.8	26	21	12
TOT. NO. AREA-SENSITIVE SPECIES	11.0	10	11	4	3
AVG. MAX NO. AREA-SENSITIVE INDIVIDUALS ³ /PLOT	8.7	10.5	15.5	7	1.5

¹ Churchill Road habitat includes a shrub component, along river and forest edges

² For this site, 1997 data was used rather than 1998 data, because only one survey was conducted in 1998, not the two required by protocol.

³ Area-sensitive, which includes 1) forest interior species, 2) forest interior/edge species with better reproductive success in forest interiors, and 3) species needing large forested territories

INTERPRETING QUINNIPIAC SONGBIRD SURVEYS:

Effects of Landscape Setting on Avian
Community Composition

Sigrun N. Gadwa

Introduction

Bird Surveys were conducted in the Quinnipiac River Watershed from 1997 to 1999 as part of the QRW Association's volunteer monitoring program, using the modified Ontario protocol for forest breeding bird surveys. The study goal was to gather baseline information on bird communities in undeveloped habitat areas in the Quinnipiac watershed, and to look for patterns relating community composition and abundance to landscape setting and wetland status. Funding for program coordination came from the Connecticut Department of Environmental Protection (hereafter CTDEP) under the Clean Water Act, and from the Community Foundation for Greater New Haven.

Results for nine sites, the 1998 surveys and several key sites surveyed only in 1997 are summarized in Tables 2 and 3. Sites varied greatly in the sizes and shapes of the undeveloped habitat blocks, proximity of busy roads, and interspersed with non-forested habitat, as summarized in Table 1. Five sites included a substantial percentage of bottomland or wetland habitat along rivers in the Quinnipiac watershed. Table 4 tabulates species occurrences for all thirteen sites and for each of the 58 bird species recorded at survey points.

Methods

Surveys took place in early summer during the breeding season, but possible non-breeders were also recorded. Highly experienced volunteer birders used the modified Ontario protocol for Forest Breeding Bird Surveys recommended by the CTDEP Wildlife Division. Ten-minute point counts were divided into two five-minute segments. Two surveys were done in early summer, prior to July 5th, during early morning (before 9 AM). Points were

Table 1. Locations of 1997-1999 Quinnipiac Watershed Inland Bird Surveys

Site Code	Town	No. Plots & Year	Location
BA	Southington	1 - 97	Bowling Alley Site, N. of Quinnipiac River, W. of Route 10; 2.5 acre woodlot
BB	Cheshire	1 - 99	Broad Brook Reservoir, 1000+ acres of forest & rural mosaic on perimeter of reservoir
CH	Wallingford Southington	1 - 97, 98	Churchill Rd, by Eight Mile River, ~75 acres, forest with thicket within a 150+acre rural area
CA	Meriden	5 - 98	Cathole Mountain, N. of Sams Road, draining to Sodom Brook, 750+ acres, upland forest
CL	Wallingford	1 - 97, 98	Community Lake, ~ 10 acre wooded strip E. of Route 15 & W. of 30-40 acres of sparse flats and shrubland along Q. River
DW	Farmington, Plainville	5 - 97 ¹	Deadwood Swamp, headwaters of Quinnipiac River, 350 acres
JU	Southington	1 - 97, 98	Jude Lane, along sewer line W. of Eight Mile River, ~60 acres
MF	Cheshire	3 - 97, 98	Moss Farms Lowlands, E. of Ten Mile River, S. of Jarvis St.
PR	North Haven	2 - 99	Peter's Rock, traprock ridge, >150 acres, mostly forested
QR	North Haven	5 - 97 ¹	Quinnipiac River State Park, between Q. River & Rt. 15 ~400 acres of forest, clearings, narrow rectangle (<2000' wide)
SM	Southington	2 - 97	Southington Mountain, Plots between reservoirs # 2 & # 3, >1200 acre tract, forested with some burned second growth
TM	Wallingford	3 - 98, 99	Tyler Mill (Traprock Mtn) along Muddy River, >1200acres
WH	Wallingford	1 - 98	Windswept Hill, Tyler Mill Route, N. of McKenzie Res., ~150acres

Note: Boldface type indicates that data is summarized in Tables 2 and 3.

¹ Surveys at these two sites were part of a research project conducted through the Yale School of Forestry and Environmental Sciences and coordinated by Celia Lewis, but the same survey protocol was used and data was shared with QRWA.

In the three tracts over 250 acres surveyed by volunteers for QROWA in 1998, the species recorded always included a core group of area-sensitive species: Eastern Wood-Pewee, Scarlet Tanager, Rose-breasted Grosbeak, Ovenbird, Red-eyed Vireo, and Wood Thrush. The Moss Farms bottomland corridor is 5000 feet broad at its widest and approximately 250 acres. 1998 surveys documented 11 area-sensitive species, including two wetland-associated neotropical migrants (abundant Veery and one pair of Louisiana Waterthrush) and several year-round residents (e.g., Hairy Woodpecker). The Cathole Mountain and Tyler Mill tracts are much larger (750+ and 1200+ acres each). These tracts had 10 and 11 area-sensitive species respectively, including Worm-eating Warbler and Black-and-white Warbler. Peters Rock and Southington Mountain (large upland tracts with only two survey points) appear to have similar avian communities (See Table 4). Average species richness per plot was notably lower than total species richness in each of the large tracts. Note that 1997 data for the Moss Farms site included single observations of several area-sensitive warblers, such as Black-throated Blue Warbler, not observed in 1998, but more common prior to the development of seventy acres of uplands at this site in the early 1990's.

Table 4 shows many forest songbird species and many suburban and edge species in two large forested wetland sites, with multiple clearings and gaps, surveyed by Yale researchers Celia Lewis and Jay West in 1997. These sites had the highest species richness in the Quinnipiac study. A total of 32 species were recorded in the compact 350-acre Deadwood Swamp (DS). Fourteen area-sensitive species occurred at high densities (an average of 10.6 individuals per plot) despite multiple small forest gaps and a utility corridor. By contrast, the approximately 400-acre Quinnipiac River State Park site has an elongated shape and is next to a major highway (Route 15) with somewhat larger inclusions of non-forested habitat. At this site the number of area-sensitive species was only six, with an average per plot density of 4.6, and the species total was 27. The very smallest site, the 2.5-acre Bowling Alley woodlot had a total of only eight species with no area-sensitive species. Three to four area-sensitive forest songbirds, usually including Red-eyed Vireo, Great Crested Flycatcher, and Wood Thrush, were recorded in the moderate-sized forested tracts.

Data for sites with a significant component of non-forested habitat is summarized in Table 3 and species composition is shown in Table 4. Certain shrubland species such as Blue-winged Warbler, Prairie Warbler, Brown Thrasher, and/or Field Sparrow tend

Table 3. Summary of Selected Bird Survey Data from Sites with Habitat Mosaics of Forest, Meadow, and Shrubland

Plots, Year	Habitat Type	Size of Habitat Block	TOTAL NO. SPECIES	AVG. TOTAL NO. INDIVIDUALS	NO. DISTURBANCE-SENSITIVE SHRUBLAND SPECIES	NO. AREA-SENSITIVE FOREST SPECIES	AVG. MAX NO. AREA-SENSITIVE INDIVIDUALS ?/PLOT
Windswept Hill	Shrub - field woods mosaic	>150 acres	17	29	2	1	1
Jude Lane	Wooded strip, by Eight Mile Rte, Plot 2, 1998	~ 60 acres & sewer line	14	21	2	4	3
Churchill Rd 1	Forest & thickets Eight Mile Rte, Plot 1, 1998	75 acres woods, >150 acres rural	20	21	3	4	7
Deadwood Swamp	Wooded swamp with clearings field utility corridor, ~350 acres	~350 acres	32	24.2	1	14	10.6
Quinnipiac River State Park	Floodplain forest, old clearings field clearings ~400 acres by hwy, rectangle		27	23.4	0	8	4.6

? Area-sensitive, which includes 1) forest interior species, 2) forest interior/edge species with better reproductive success in forest interiors and 3) resident species needing large forested territories.

Table 4: All species recorded in Ontario survey plots at all survey sites, from 1997 to 1999

Species	Land- scape Sensitive	BA	BB	CH	CA	CL	DW	JU	MF	PR	QR	SM	TM	WH
Broad-winged Hawk	a							X	X					
Mourning Dove				X	X								X	X
Black-billed Cuckoo	d			X							X			
Red-bellied Woodpecker			X			X	X				X			
Downy Woodpecker				X	X	X	X	X	X	X	X	X	X	
Hairy Woodpecker	a								X				X	
Northern Flicker			X	X					X					
Pileated Woodpecker	a						X							
Eastern Wood-Pewee	a		X		X		X		X			X	X	
Eastern Phoebe				X			X	X			X	X	X	
Great Crested Flycatcher	a			X		X	X	X	X	X	X		X	
Blue Jay		X	X		X	X	X	X	X	X	X		X	X
American Crow		X	X	X		X	X	X	X	X	X		X	X
Black-capped Chickadee				X	X	X	X		X	X	X		X	X
Tufted Titmouse		X	X	X	X	X	X	X	X		X		X	
White-breasted Nuthatch	a				X		X		X	X			X	
Brown Creeper	a						X			X				
House Wren													X	X
Blue-gray Gnatcatcher	a									X				
Veery	a		X	X			X		X	X	X		X	
Hermit Thrush				X										
Wood Thrush	a		X	X	X		X	X	X	X	X	X	X	X
American Robin			X	X	X	X	X	X	X	X	X		X	X
Gray Catbird		X		X	X	X	X	X	X	X	X		X	
Northern Mockingbird				X										
Brown Thrasher	d			X										
Cedar Waxwing							X				X		X	X
Red-eyed Vireo	a		X	X	X	X	X	X	X	X	X	X	X	X
Blue-winged Warbler	d						X	X						
Yellow Warbler				X		X	X		X			X		
Prairie Warbler	d			X										
Black-and-White Warbler					X		X		X				X	
Black-throated Blue Warbler	a								X					
American Redstart	a				X		X		X		X		X	
Worm-eating Warbler	a				X		X		X			X	X	
Ovenbird	a		X	X	X		X	X	X		X		X	
Northern Waterthrush	a						X							
Louisiana Waterthrush	a						X		X					
Common Yellowthroat				X		X	X	X	X		X	X	X	
Hooded Warbler	a											X		
Scarlet Tanager	a		X		X		X		X	X	X	X	X	X
Northern Cardinal			X	X	X	X	X	X	X	X	X	X	X	X

Table 4 (cont'd): All species recorded in Ontario survey plots at all survey sites, from 1997 to 1999

Species	Land- scape Sensitive ¹	BA	BB	CH	CA	CL	DW	JU	MF	PR	QR	SM	TM	WH
Rose-breasted Grosbeak	a		X		X		X		X		X		X	
Eastern Towhee	d				X	X		X	X	X			X	X
Field Sparrow	d			X										
Song Sparrow						X		X	X			X		
Common Grackle		X												
Brown-headed Cowbird				X			X					X		X
Red-winged Blackbird				X			X					X		X
European Starling									X					X
Northern Oriole		X			X				X			X		
House Finch					X									
American Goldfinch		X		X	X	X	X	X	X			X		X
Barn Swallow														X
Tree Swallow				X				X						
Belted Kingfisher													X	
Mallard														
Killdeer		X					X							

Notes: Boldface type indicates that summary data is shown in Tables 2 and/or 3.

¹ "a" = area-sensitive, which includes 1) forest interior species, 2) forest interior/edge species with better reproductive success in forest interiors, and 3) resident species needing large forested territories.

"d" = disturbance-sensitive species of non-forested habitats, based on distribution in Bevier (1994), with absence from many urbanized blocks in Connecticut.

to be absent from suburban landscapes (Bevier 1994). Several of these species (annotated with "d" in Table 4) of open habitats were noted in both moderate and large-sized sites, but not in the elongated Quinnipiac River State Park site adjacent to Route 15 or at the Community Lake site, with a 10-acre forested strip along Route 15 adjacent to 40-50 acres of non-forested habitat. A total of 17 species and 23 individuals, including Blue-winged Warbler and Eastern Towhee, were recorded at the Windswept Hill site, consisting of over 150 acres of rural habitat. Disturbance-sensitive shrubland species also occurred at the survey points at Churchill Road and Deadwood Swamp, sites with good ecological integrity.

This data set underscores the importance from the standpoint of songbird conservation of preserving the ecological integrity of the very large forested tracts in Connecticut. These include the tra-prock ridges, the eastern and western highlands, and broad river corridors that connect larger forested hillsides tract populations into

This data set underscores the importance from the standpoint of songbird conservation of preserving the ecological integrity of the very large forested tracts in Connecticut. These include the tra-prock ridges, the eastern and western highlands, and broad into metapopulations*. Higher species richness on larger tracts is consistent with the findings of various ornithological researchers including Robbins (1989) and Robert Askins at Connecticut College (1993).

Forested wetlands and moist woodlands were found to be notable not only for avian species richness, but also for their productivity. These results are consistent with a widely cited Massachusetts study that found density of foliage-gleaning birds to be positively correlated with density of small shrubs (1 to 3 meters) and surface wetness (Swift et al. 1984).

The Quinnipiac study, like others, found that Wood Thrush and Red-eyed Vireo do not appear to avoid small tracts and forest edges per se. However, the area-sensitivity of these species has been documented by studies of reproductive success (Donovan et al. 1995). For a variety of neo-tropical migrants nesting success is higher in forest interior "core habitat" than in edge habitat (Paton 1997). Small wooded tracts may become a population "sink" for area-sensitive species that attempt to nest there (Temple 1986 and Donovan et al. 1995).

* The term metapopulation refers to a group of distinct populations that are, however, interconnected by some degree of gene flow.

The Quinupiac study also shows a relationship between avian communities and ecological integrity in a non-forested setting; the absence of disturbance-sensitive shrubland species is linked to proximity of highways and suburban development. In addition to nest predation on forest edges (widely discussed in the ornithological literature), noise, light, and human activities are also factors that might eliminate certain songbird species. A study in Holland by Reijnen and Foppen (1997) showed decreased species richness and abundance closer to major roads. Residential development, with lawnmowers, leaf-blowers, etc. is another major concern for disturbance-sensitive species. Multiple *natural* clearings and a non-continuous tree canopy, however, were associated with high densities of forest-interior species and disturbance-sensitive shrubland species at the large Deadwood Swamp tract.

Minimizing impacts on large habitat blocks is an important consideration in selecting sites and designing large projects such as golf courses and large subdivisions. This data set substantiates the value of broad buffers for maintenance of wildlife habitat wetland function for birds.

Since 1998 development has significantly reduced habitat areas at the Churchill Road and Jude Lane sites in Southington, at Cathole Mountain in Meriden, and at the Windswept Hill site in Wallingford. Follow-up Ontario Surveys would be valuable in these areas in order to find to what extent reduction in the sizes of habitat blocks has reduced species richness and/or abundance.

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CORRECTION:

In Volume 23, Number 2, April 2003, Page 52,
Under Coastal Counts, Column GS:

The number of Snow Geese should be blank with a State Total of 16.

The number of Canada Geese should read "3676" with a State Total "38902."