PLANT SPECIES LIST*

Scientific Name	**Common Name**
Acer negundo	Boxelder
* *Acer pennsylvanica*	Striped maple
Acer platanoides	Norway maple
* *Acer rubrum*	Red maple
Acer saccarinum	Silver maple
* *Acer saccharum*	Sugar maple
Achillea millefolium	Yarrow
Acorus calamus	Sweetflag
Actaea alba	Doll's eyes
Adiantum pedatum	Maidenhair fern
Agropyron repens	Quackgrass
Agrostis alba	Redtop
Alisma plantago-aquatica	Water-plantain
Alliaria petiolata	Garlic mustard
Allium canadense	Wild garlic
* *Alnus rugosa*	Speckled alder
Amaranthus retroflexus	Pigweed
* *Ambrosia artemisiifolia*	Ragweed
Amelanchier canadensis	Shadbush
Apocynum cannabinum	Indian hemp
Aralia nudicaulis	Wild sarsaparilla
* *Arctium minus*	Common burdock
Arisaema triphyllum	Jack-in-the-pulpit
Asarum canadense	Wild ginger
Asclepias incarnata	Swamp milkweed
* *Asclepias syriaca*	Common milkweed
Aster divaricatus	White wood aster
Aster dumosus	Bushy aster
Aster ericoides	Heath aster
* *Aster novae-angliae*	New England aster
Aster novae-belgii	New York aster
Aster umbellatus	Flat-top white aster
Aster vimineus	Small white aster
Avena sativa	Oat
* *Betula alleghaniensis*	Yellow birch
* *Betula papyrifera*	Paper birch
Betula populifolia	Gray birch
Bidens spp.	Beggar's-tick

PLANT SPECIES LIST*

Scientific Name	**Common Name**
Boehmeria cylindrica	False nettle
Brassica rapa	Field mustard
Bromus inermis	Smooth brome
Caltha palustris	Marsh marigold
Calystegia sepium	Hedge-bindweed
Cardamine concatenata	Cut-leaf toothwort
Carex crinita	Sedge
Carex lacustris	Lake sedge
Carex lurida	Sedge
* *Carex pennsylvanica*	Pennsylvania sedge
Carex scopiaria	Sedge
* *Carex spp.*	Sedge
Carex stricta	Sedge
Carex vulpinoidea	Sedge
* *Carpinus caroliniana*	Ironwood
Carya cordiformis	Bitternut hickory
Carya glabira	Pignut
* *Carya ovata*	Shagbark hickory
Caulophyllum thalictroides	Blue cohosh
Centaurea maculosa	Spotted knapweed
Chelidonium majus	Celandine
Chelone glabra	White turtlehead
Chenopodium album	Lamb’s quarters
Chichorium intybus	Chickory
Chrysanthemum leucanthemum	Oxeye daisy
Circium arvense	Canada thistle
* *Cirsium discolor*	Field thistle
Cirsium vulgare	Bull-thistle
Clematis virginiana	Virgin’s-bower
Comptonia peregrina	Sweet fern
* *Cornus amomum*	Silky dogwood
* *Cornus foemina*	Gray dogwood
Cornus stolonifera	Redosier dogwood
Coronilla varia	Crown vetch
* *Corylus americana*	Hazelnut
* *Crataegus spp.*	Hawthorn
Cynanchum nigrum	Black swallow wort
Cypripedium acaule	Pink lady's slipper
* *Dactylis glomerata*	Orchard grass

PLANT SPECIES LIST*

Scientific Name	**Common Name**
* *Daucus carota*	Queen Anne's lace
Dianthus armeria	Deptford pink
Dipsacus sylvestris	Teasel
Dryopteris spp.	Wood fern
Echinocystis lobata	Wild cucumber
Epifagus virginiana	Beech-drops
Epilobium spp.	Willow-herb
* *Equisetum arvense*	Field horsetail
Erigeron philadelphicus	Daisy fleabane
Erythronium americanum	Yellow troutlily
Eupatorium maculatum	Joe pye-weed
Eupatorium perfoliatum	Boneset
Eupatorium rugosum	White snakeroot
Euthamia graminifolia	Flat-top goldenrod
* *Fagus grandifolia*	American beech
* *Fragaria virginiana*	Wild strawberry
Fraxinus americana	White ash
* *Fraxinus pennsylvanica*	Green ash
Galium spp.	Bedstraw
Geranium robertianum	Herb robert
Geum canadense	Avens
Glechoma hederacea	Ground ivy
Glyceria melicaria	Slender mannagrass
Hamamelis virginiana	Witch-hazel
Helianthus tuberosus	Jerusalem artichoke
Hepatica nobilis	Hepatica
Heracleum lahatum	Cow parsnip
Hesperis matronalis	Dame's rocket
Hypericum perforatum	St. John’s-wort
Impatiens capensis	Spotted jewelweed
Iris versicolor	Blue-flag iris
Juglans nigra	Black walnut
Juglans cinera	Butternut
* *Juncus effusus*	Soft rush
Juncus tenuis	Slender rush
* *Larix laricina*	Eastern larch
Leersia oryzoides	Rice cutgrass
Lemnaceae	duckweed
Linaria vulgaris	Butter-and-eggs

PLANT SPECIES LIST*

Scientific Name	**Common Name**
Liriodendron tulipifera	Tuliptree
Lobelia inflata	Indian-tobacco
* *Lonicera tatarica*	Tartarian honeysuckle
Lotus corniculata	Bird's-foot trefoil
* *Lycopodium spp.*	Clubmoss/groundpine
Lysimachia nummularia	Moneywort
Lythrum salicaria	Purple loosestrife
Maianthemum canadensis	Wild lily-of-the-valley
* *Malus spp.*	Apple
Matteuccia struthiopteris	Ostrich fern
Medicago sativa	Alfalfa
Melilotus alba	White sweet clover
Melilotus offinalis	Yellow sweet clover
Mentha spicata	Spearmint
Monotropa uniflora	Indian pipe
Myosotis laxa	Forget-me-nots
Nasturtium officinale	Watercress
Nuphar luteum	Pond lily
Nymphaea odorata	Water lily
Oenothera biennis	Common evening primrose
* *Onoclea sensibilis*	Sensitive fern
Osmunda cinnamomea	Cinnamon fern
Osmunda regalis	Royal fern
Ostrya virginiana	Hop hornbeam
Oxalis spp.	Yellow sorrel
Parthenocisus quinquefolia	Virginiana creeper
* *Phalaris arundinacea*	Reed canary grass
* *Phleum pratense*	Timothy
* *Phragmites australis*	Common reed
Phytolacca americana	Pokeweed
* *Picea abies*	Norway spruce
* *Picea pungens*	Colorado blue spruce
Pilea pumila	Clear weed
* *Pinus resinosa*	Red pine
* *Pinus strobus*	White pine
Pinus sylvestris	Scotch pine
Plantago lanceolata	English plantain
Plantago major	Common plantain
Platanus occidentalis	Sycamore

PLANT SPECIES LIST*

Scientific Name	**Common Name**
Poa palustris	Fowl bluegrass
Poa pratensis	Kentucky bluegrass
Podophyllum peltatum	Mayapple
Polygonum cuspidatum	Japanese knotweed
Polygonum pennsylvanicum	Pennsylvania smartweed, Pinkweed
Polygonum sagittatum	Tearthumb
Polygonum virginianum	Jumpseed
Polystichum acrostichoides	Christmas fern
* *Populus deltoides*	Eastern cottonwood
Populus tremuloides	Trembling aspen
* *Potentilla simplex*	Old-field cinquefoil
Prunella vulgaris	Heal-all
Prunus pensylvanica	Pin cherry
* *Prunus serotina*	Black cherry
* *Pteridium aquilinum*	Bracken fern
* *Quercus alba*	White oak
Quercus bicolor	Swamp white oak
Quercus palustris	Pin oak
* *Quercus rubra*	Northern red oak
Quercus velutina	Black oak
Ranunculus acris	Tall buttercup
Ranunculus hispidus	Swamp buttercup
* *Rhamnus cathartica*	Common buckthorn
* *Rhus typhina*	Staghorn sumac
Ribes spp.	Gooseberry
Robinia pseudo-acacia	Black locust
* *Rosa multiflora*	Multiflora rose
Rubus allegheniensis	Allegheny blackberry
Rubus alumnus	Blackberry
Rubus flagellarus	Dewberry
Rubus idaeus	Red raspberry
* *Rubus occidentalis*	Black raspberry
Rudbeckia hirta	Black-eyed susan
Rumex crispus	Curly dock
Sagittaria latifolia	Common arrowhead
Salix babylonica	Weeping willow
* *Salix discolor*	Pussy willow
* *Salix nigra*	Black willow
Sambucus canadensis	Common elder

PLANT SPECIES LIST*

Scientific Name	**Common Name**
Sanguinaria canadensis	Bloodroot
Scirpus atrovirens	Green bulrush
Scirpus cyperinus	Wool grass
Scirpus validus	Soft-stemmed bulrush
Secale spp.	Perennial rye
Senecio aureus	Golden ragwort
Setaria spp.	Foxtail
Solidago canadensis	Canada goldenrod
* *Solidago gigantea*	Late goldenrod
Solidago rugosa	Wrinkled (rough-stemmed) goldenrod
Sparganium americanum	Bur-reed
* *Sphagnum fallax*	Sphaguum moss
Spiraea alba	Meadowsweet
Spiraea latifolia	Meadowsweet
Symplocarpus foetidus	Skunk cabbage
* *Taraxacum officinale*	Dandelion
Tiarella cordifolia	Foamflower
Tilia americana	Basswood
Toxicodendron radicans	Poison ivy
Trientalis borealis	Star flower
* *Trifolium pratense*	Red clover
* *Trifolium repens*	White clover
Trillium erectum	Red trillium
Trillium grandiflorum	White trillium
Triticum spp.	Wheat
* *Tsuga canadensis*	Hemlock
Tussilago farfara	Coltsfoot
* *Typha angustifolia*	Narrow-leaf cattail
Typha latifolia	Broad-leaf cattail
* *Ulmus americana*	American elm
Urtica doica	Stinging nettle
Vaccinium angustifolium	Lowbush blueberry
Vaccinium corymbosum	Highbush blueberry
* *Vaccinium pallidum*	Blueberry
Verbascum thapsus	Mullein
* *Verbena hastata*	Blue vervain
Viburnum acerifolium	Mapleleaf viburnum
Viburnum cassanoides	Wild raisin
Viburnum lentago	Nannyberry

PLANT SPECIES LIST*

Scientific Name	**Common Name**
Viburnum recognitum	Arrowwood
Vicia cracca	Cow vetch
Viola sororia	Marsh blue violet
* *Vitis aestivalis*	Wild grape
Zanthoxylem americanum	Prickly ash
Zea mays	Corn
Zizania aquatica	Wild rice

Notes:
*Observed on site (EDR Field Notes, 2005, EDR Field Notes, 2005 & EDR Wetland Deliniation Report, 2005)

WILDLIFE SPECIES LIST*

Common Name	Scientific Name
<u>Bird Species</u>	
<u>Herons, Bitterns</u>	<u>*Ardeidae*</u>
* great blue heron	*Ardea herodias*
* green heron (green-backed)	*Butorides striatus*
* American bittern	*Botaurus lentiginosus*
<u>Waterfowl</u>	<u>*Anatidae*</u>
* Canada goose	*Branta canadensis*
* mallard	*Anas platyrhynchos*
* American black duck	*Anas rubripes*
* blue-winged teal	*Anas discors*
* wood duck	*Aix sponsa*
green winged teal	*Anas crecca*
<u>American Vultures</u>	<u>*Cathartidae*</u>
* turkey vulture	*Cathartes aura*
black vulture	*Coragyps atratus*
<u>Hawks</u>	<u>*Accipitridae*</u>
Bald eagle	*Haliaeetus leucocephalus*
osprey	*Pandion haliaetus*
* sharp-shinned hawk	*Accipiter striatus*
* Cooper's hawk	*Accipiter cooperii*
* red-tailed hawk	*Buteo jamaicensis*
* American kestrel	*Falco sparverius*
* northern harrier	*Circus cyaneus*
* red-shouldered hawk	*Buteo lineatus*
* broad-winged hawk	*Buteo platypterus*
* peregrine falcon	*Falco peregrinus*
<u>Grouse</u>	<u>*Tetraonidae*</u>
* ruffed grouse	*Bonasa umbellus*
<u>Quail</u>	<u>*Phasianidae*</u>
* ring-necked pheasant	*Phasianus colchicus*
* northern bobwhite	*Colinus virginianus*
<u>Turkeys</u>	<u>*Meleagrididae*</u>
* wild turkey	*Meleagris gallopavo*
<u>Rails</u>	<u>*Rallidae*</u>

WILDLIFE SPECIES LIST*

	Common Name	**Scientific Name**
*	Virginia rail	*Rallus limicola*
	sora rail	*Porzana carolina*
*	common moorhen	*Gallinula chloropus*
	<u>Plovers</u>	<u>*Charadriidae*</u>
*	killdeer	*Charadrius vociferus*
	<u>Sandpipers</u>	<u>*Scolopacidae*</u>
*	spotted sandpiper	*Actitus macularia*
*	American woodcock	*Philohela minor*
*	common snipe	*Gallinago gallinago*
*	upland sandpiper	*Bartramia longicauda*
	<u>Gulls, Terns</u>	<u>*Laridae*</u>
*	ring-billed gull	*Larus delawarensis*
	<u>Pigeons, Doves</u>	<u>*Columbidae*</u>
*	rock dove	*Columba livia*
*	mourning dove	*Zenaida macroura*
	<u>Cuckoos</u>	<u>*Cuculidae*</u>
*	yellow-billed cuckoo	*Coccyzus americanus*
*	black-billed cuckoo	*Coccyzus erythropthalmus*
	<u>Typical Owls</u>	<u>*Strigidae*</u>
*	eastern screech owl	*Otus asio*
*	great horned owl	*Bubo virginianus*
	barred owl	*Strix varia*
	<u>Goat Suckers</u>	<u>*Caprimulgidae*</u>
*	common nighthawk	*Chordeiles minor*
	<u>Swifts</u>	<u>*Apodidae*</u>
*	chimney swift	*Chaetura pelagica*
	<u>Hummingbirds</u>	<u>*Trochilidae*</u>
*	ruby-throated hummingbird	*Archilochus colubris*
	<u>Kingfishers</u>	<u>*Alcedinidae*</u>
*	belted kingfisher	*Ceryle alcyon*
	<u>Woodpeckers</u>	<u>*Picidae*</u>

WILDLIFE SPECIES LIST*

Common Name	Scientific Name
* northern flicker	*Colaptes auratus*
* pileated woodpecker	*Dryocopus pileatus*
* red-bellied woodpecker	*Melanerpes carolinus*
* red-headed woodpecker	*Melanerpes erythrocephalus*
* hairy woodpecker	*Picoides villosus*
* downy woodpecker	*Picoides pubescens*
* yellow-bellied sapsucker	*Sphyrapicus varius*
Flycatchers	*Tyrannidae*
* eastern kingbird	*Tyrannus tyrannus*
* great crested flycatcher	*Myiarchus crinitus*
* eastern phoebe	*Sayornis phoebe*
* willow flycatcher	*Epidonax traillii*
* least flycatcher	*Epidonax minimus*
* Acadian flycatcher	*Epidonax viresceus*
* alder flycatcher	*Epidonax alnorum*
* eastern wood-pewee	*Contopus virens*
Larks	*Alaudidae*
* horned lark	*Eremophila alpestris*
Swallows	*Hirundinidae*
* purple martin	*Progue subis*
* bank swallow	*Riparia riparia*
* tree swallow	*Tachycineta bicolor*
* barn swallow	*Hirundo rustica*
* northern rough-winged swallow	*Stelgidopteryx serripennis*
* cliff swallow	*Hirundo pyrrhonotta*
Jays, Crows	*Corvidae*
* blue jay	*Cyanocitta cristata*
* American crow	*Corvus brachyrhynchos*
* common raven	*Corvus corax*
Titmice	*Paridae*
* black-capped chickadee	*Parus atricapillus*
* tufted titmouse	*Parus bicolor*
Nuthatches	*Sittidae*
* white-breasted nuthatch	*Sitta carolinensis*
* red-breasted nuthatch	*Sitta canadensis*

WILDLIFE SPECIES LIST*

Common Name	**Scientific Name**
Creepers	*Certhiidae*
* brown creeper	*Certhia americana*
Wrens	*Troglodytidae*
* Carolina wren	*Thryothorus ludovicianus*
* marsh wren	*Cistothorus palustris*
* house wren	*Troglodytes aedon*
winter wren	*Troglodytes troglodytes*
Mimic Thrushes	*Mimidae*
* northern mockingbird	*Mimus polyglottos*
* gray catbird	*Dumetella carolinensis*
* brown thrasher	*Toxostoma rufum*
Thrushes	*Turdidae*
* American robin	*Turdus migratorius*
* wood thrush	*Hylocichla mustelina*
* veery	*Catharus fuscescens*
* hermit thrush	*Catharus guttatus*
* eastern bluebird	*Sialia sialis*
Kinglets	*Sylviidae*
* blue-gray gnatcatcher	*Polioptila caerulea*
* golden-crowned kinglet	*Regulus satrapa*
ruby-crowned kinglet	*Regulus calendula*
Waxwings	*Bombycillidae*
* cedar waxwing	*Bombycilla cedrorum*
Starlings	*Sturnidae*
* European starling	*Sturnus vulgaris*
Vireos	*Vireonidae*
* solitary vireo	*Vireo solitarius*
* red-eyed vireo	*Vireo olivaceus*
* yellow-throated vireo	*Vireo flavifrons*
* warbling vireo	*Vireo gilvus*
Wood Warblers	*Parulidae*
* black and white warbler	*Mniotilta varia*
* blue-winged warbler	*Vermivora pinus*
* golden-winged warbler	*Vermivora chrysoptera*

WILDLIFE SPECIES LIST*

Common Name	Scientific Name
* Nashville warbler	*Vermivora ruficapilla*
* yellow warbler	*Dendroica petechia*
* magnolia warbler	*Dendroica magnolia*
* black-throated blue warbler	*Dendroica caerulescens*
* chestnut-sided warbler	*Dendroica pensylvanica*
* yellow-rumped warbler	*Dendroica coronata*
* black-throated green warbler	*Dendroica virens*
* blackburnian warbler	*Dendroica fusca*
* pine warbler	*Dendroica pinus*
* ovenbird	*Seiurus aurocapillus*
* northern waterthrush	*Seiurus noveboracensis*
* Louisiana waterthrush	*Seiurus motacilla*
* common yellowthroat	*Geothlypis trichas*
* Canada warbler	*Wilsonia canadensis*
* American redstart	*Setophaga ruticila*
* prairie warbler	*Dendroica discolor*
* hooded warbler	*Wilsona citrina*
* cerulean warbler	*Dendroica cerulea*
Weaver Finches	*Ploceidae*
* house sparrow	*Passer domesticus*
Blackbirds	*Icteridae*
* bobolink	*Dolichonyx oryzivorus*
* eastern meadowlark	*Sturnella magna*
* red-winged blackbird	*Agelaius phoeniceus*
* Baltimore oriole	*Icterus galbula*
* common grackle	*Quiscalus quiscula*
* brown-headed cowbird	*Molothrus ater*
Tanagers	*Thraupidae*
* scarlet tanager	*Piranga olivacea*
Finches	*Fringillidae*
* northern cardinal	*Cardinalis cardinalis*
* rose-breasted grosbeak	*Pheucticus ludovicianus*
* indigo bunting	*Passerina cyanea*
* house finch	*Carpodacus mexicanus*
* purple finch	*Carpodacus purpureus*
* American goldfinch	*Carduelis tristis*
* rufous-sided towhee	*Pipilo erythrophthalmus*
* savannah sparrow	*Passerculus sandwichensis*

WILDLIFE SPECIES LIST*

Common Name	Scientific Name
* grasshopper sparrow	*Ammodramus honslowii*
* Henslow's sparrow	*Ammodramus savannarum*
* vesper sparrow	*Pooecetes gramineus*
* dark-eyed junco	*Junco hyemalis*
snow bunting	*Plectrophenax nivalis*
* clay-colored sparrow	*Spizella pallida*
* chipping sparrow	*Spizella passerina*
* field sparrow	*Spizella pusilla*
* swamp sparrow	*Melospiza georgiana*
* song sparrow	*Melospiza melodia*
white-throated sparrow	*Zonotrichia albicollis*
Mammal Species	
Opossums	*Didelphiidae*
* opossum	*Didelphis virginiana*
Shrews	*Soricidae*
smoky shrew	*Sorex fumeus*
masked shrew	*Sorex cinereus*
shorttail shrew	*Blarina brevicauda*
least shrew	*Cryptotis parva*
Moles	*Talpidae*
eastern mole	*Scalopus aquaticus*
starnose mole	*Condylura cristata*
Plainnose Bats	*Vespertilionidae*
eastern pipistrel	*Pipistrellus subflavus*
* big brown bat	*Eptesicus fuscus*
* hoary bat	*Lasiurus cinereus*
* red bat	*Lasiurus borealis*
* little brown myotis	*Myotis lucifugus*
* silver-haired bat	*Lasionycteris noctivagans*
* Indiana myotis	*Myotis sodalis*
Racoons	*Procyonidae*
* raccoon	*Procyon lotor*
Weasels	*Mustelidae*
shorttail weasel	*Mustela erminea*
longtail weasel	*Mustela frenata*

WILDLIFE SPECIES LIST*

Common Name	**Scientific Name**
mink	*Mustela vison*
striped skunk	*Mephitis mephitis*
Dogs, Wolves, Foxes	*Canidae*
coyote	*Canis latrans*
* red fox	*Vulpes vulpes*
gray fox	*Urocyon cinereoargenteus*
Squirrels	*Sciuridae*
* woodchuck	*Marmota monax*
* eastern chipmunk	*Tamias striatus*
* eastern gray squirrel	*Sciurus carolinensis*
red squirrel	*Tamiasciurus hudsonicus*
southern flying squirrel	*Glaucomys volans*
Beaver	*Castoridae*
beaver	*Castor canadensis*
Mice, Rats, Lemmings, Volves	*Cricetidae*
deer mouse	*Peromyscus maniculatus*
white-footed mouse	*Peromyscus leucopus*
meadow vole	*Microtus pennsylvanicus*
muskrat	*Ondatra zibethicus*
Old World Rats & Mice	*Muridae*
Norway rat	*Rattus norvegicus*
house mouse	*Mus musculus*
Jumping Mice	*Zapeoidae*
meadow jumping mouse	*Zapus hudsonicus*
woodland jumping mouse	*Napaeozapus insignis*
Hares, Rabbits	*Leporidae*
* eastern cottontail	*Sylvilagus floridanus*
Deer	*Cervidae*
* whitetail deer	*Odocoileus virginianus*
Bears	*Ursidae*
black bear	*Ursus americanus*

WILDLIFE SPECIES LIST*

	Common Name	Scientific Name
	Reptile and Amphibian Species	
	Box and Water Turtles	*Emydidae*
*	painted turtle	*Chrysemys picta*
*	wood turtle	*Clemmys insculpta*
*	Eastern spiny softshell	*Apalone s. spinifera*
	Snapping Turtles	*Chelydridae*
*	common snapping turtle	*Chelydra serpentina*
	Musk and Mud Turtles	*Kinosternidae*
	stinkpot	*Sternotherus odoratus*
	Colubrids	*Colubridae*
	northern water snake	*Natrix sipedon sipedon*
*	northern brown snake	*Storeria dekayi dekayi*
*	eastern garter snake	*Thamnophis sirtalis sirtalis*
*	northern red-bellied snake	*Storeria o. occipitomaculata*
*	eastern milk snake	*Lampropeltis triangulum triangulum*
*	smooth green snake	*Liochlorophis vernalis*
*	northern ringneck snake	*Diadophis punctatus edwardsi*
	northern black racer	*Coluber constrictor constrictor*
	Mole Salamanders	*Ambystomatidae*
	blue-spotted salamander	*Ambystoma laterale*
*	Jefferson's salamander	*Ambystoma jeffersonianum*
*	spotted salamander	*Ambystoma maculatum*
	Newts	*Salamandridae*
*	red-spotted newt	*Notophthalmus viridescens*
	Lungless Salamanders	*Plethodontidae*
*	red-backed salamander	*Plethodon cinereus cinereus*
*	northern two-lined salamander	*Eurycea bislineata bislineata*
*	slimy salamander	*Plethodon glutinosus*
*	northern dusky salamander	*Desmognathus fuscus*
*	Allegheny dusky salamander	*Desmognathus ochrophaeus*
*	northern spring salamander	*Gyrinophilus p. porphyriticus*
*	Wehrle's salamander	*Plethodon wehrlei*
	Toads	*Bufonidae*

WILDLIFE SPECIES LIST*

Common Name	**Scientific Name**
* American toad	*Bufo americanus*
Tree Frogs	*Hylidae*
spring peeper	*Pseudacris c. crucifer*
gray treefrog	*Hyla versicolor*
True Frogs	*Ranidae*
* wood frog	*Rana sylvatica*
* pickeral frog	*Rana palustris*
northern leopard frog	*Rana pipiens*
* green frog	*Rana clamitans melanota*
* bull frog	*Rana catesbeiana*
northern cricket frog	*Acris c. crepitans*

FISH SPECIES LIST[2]

Sunfishes	*Centrarchidae*
smallmouth bass	*Micropterus dolomieui*
largemouth bass	*Micropterus salmoides*
pumpkinseed	*Lepomis gibbosus*
rock bass	*Ambloplites rupestris*
bluegill	*Lepomis macrochirus*
Bullhead/Catfishes	*Ictaluridae*
brown bullhead	*Ameiurus nebulosus*
Suckers	*Catostomidae*
white sucker	*Catostomus commersoni*
Sculpins	*Cothidae*
slimy sculpin	*Cottus cognatus*
Perches	*Percidae*
Johnnie darter	*Etheostoma nigrum*
yellow perch	*Perca flavescens*
Carps and Minnows	*Cyprinidae*
carp	*Cyprinus carpio*
creek chub	*Semotilus atromaculatus*
blacknose dace	*Rhinicthys atratulus*
common shiner	*Luxilus cornutus*
golden shiner	*Notemigonus crysoleucas*

WILDLIFE SPECIES LIST*

Common Name	**Scientific Name**
Trout	*Salmonidae*
brown trout	*Salmo trutta*
brook trout	*Salvelinus fontinalis*

Notes:
*Observed on site
(NYS Reptile and Amphibian Survey, 2005,
EDR Field Notes, 2005, Breeding Bird Survey, 1989-1998,
Breeding Bird Atlas, 2000-2005, EDR field notes, 2005,
& EDR Wetland Deliniation Report, 2005)

Avian and Bat Information Summary and Risk Assessment for the Proposed Cohocton Wind Power Project in Cohocton, New York

FINAL REPORT

Prepared For:

UPC Wind Management, LLC

Prepared By:

Woodlot Alternatives, Inc.
30 Park Drive
Topsham, ME 04086

February 2006

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1.0 Introduction

As the demand for clean energy increases, wind energy generating stations are being proposed or constructed across the United States. Wind has been used successfully across the globe to generate electricity and is generally considered to be an environmentally healthy and viable means of meeting part of our energy demands. Ever since the implementation of wind turbine technology into the energy production industry there have been concerns that wind farms can negatively impact birds and bats.

Collision with turbines appears to be the most widespread potential direct threat to birds and bats from any wind farm. Evidence from emerging work at onshore sites has demonstrated that collisions do occur at existing facilities. The degree to which birds and bats are impacted is dependent upon a number of factors, including the wind farm site, habitat use, and species presence. Collision mortality is not the only impact to birds and bats from wind energy facilities. Other forms of impact, such as habitat loss and disturbance, can also negatively affect birds and bats on either a short-term or long-term basis.

This report has been prepared to summarize existing information on birds and bats in the vicinity of the proposed Cohocton Wind Power Project in west-central New York and provide an assessment of risk to birds and bats from construction of the project. The assessment uses information collected on-site as well as studies conducted for two proposed projects in the adjacent town of Prattsburgh, New York. These projects are located in close proximity to Cohocton and data collected for those projects have been used, to the extent practicable, to increase the information base for the Cohocton Wind Power Project.

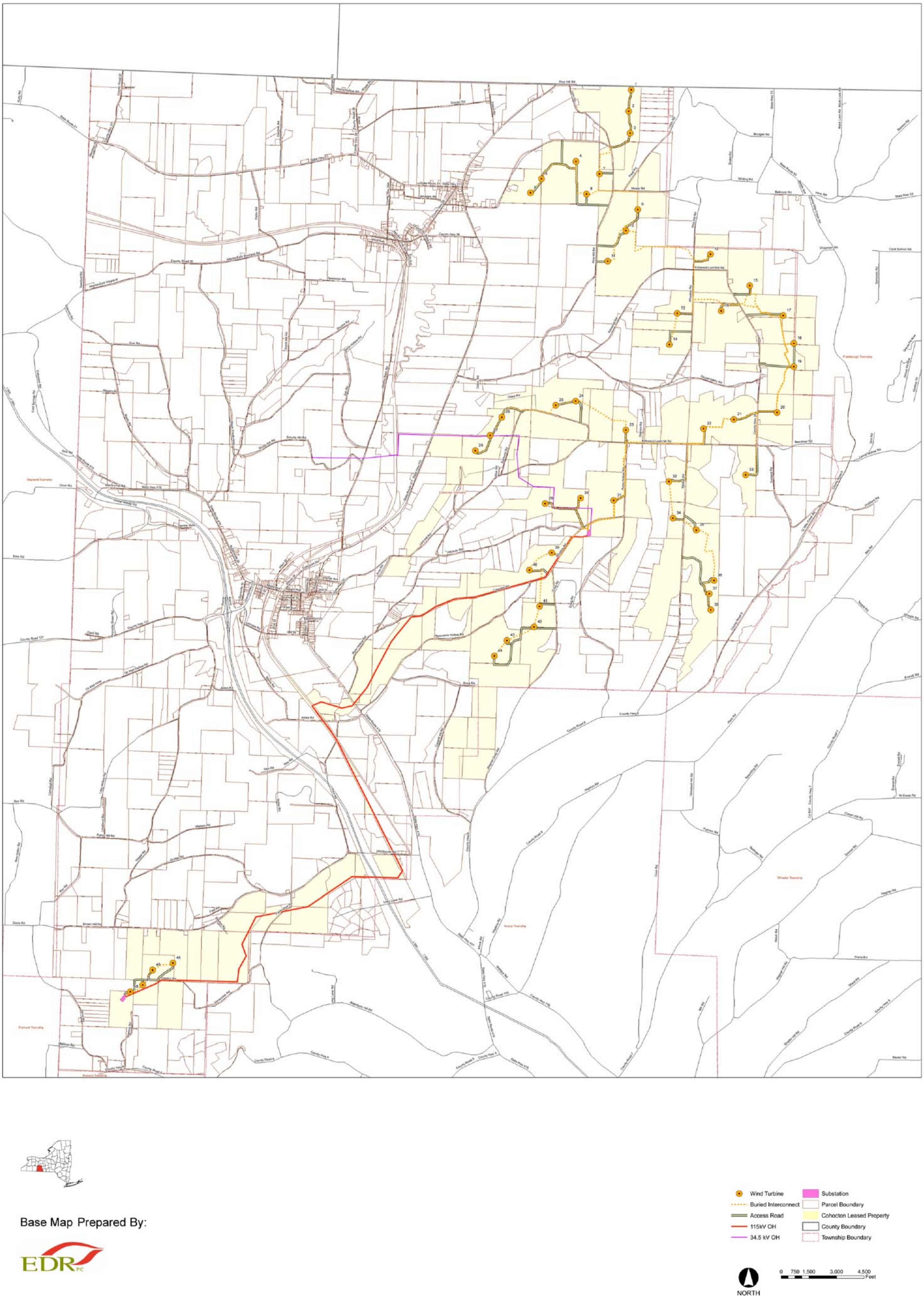
Following is a description of the project, a review of surveys conducted on-site and at the neighboring proposed projects, a review of known sources of mortality of birds and bats (which includes wind farms and other sources), and an assessment of potential risk to birds and bats from the project. Because no definitive method of predicting the actual risk of a given project exists, this assessment will be qualitative in nature but will draw from quantitative studies, to the extent practicable.

2.0 Background Information

2.1 PROJECT AND PROJECT AREA DESCRIPTION

UPC Wind Management, LLC (UPC Wind) is proposing to develop an 82 megawatt (MW) wind-powered generating facility on approximately 5,755 acres of leased land in the Town of Cohocton, Steuben County, New York. The project is anticipated to include 41 wind turbines, each with a generating capacity of 2.0 MW. For planning purposes UPC Wind has evaluated a total of 48 potential wind turbine sites at which to place the proposed 41 turbines (Figure 1-1). Forty-four of the 48 potential turbine sites are located on Pine Hill and Lent Hill. An additional four potential turbine sites are located on Brown Hill near the proposed point of interconnection with an existing New York State Electric and Gas (NYSEG) 230 kilovolt (kV) transmission line.

Each wind turbine will include an 87 meter (m) (285’) diameter, 3-bladed rotor mounted on a 78 m (256’) tall steel tubular tower. Three meteorological towers (met towers) will also be installed, along with an operations and maintenance building, approximately 13 miles of gravel access road, 27 miles of buried gathering lines (electrical interconnect), and a 9.2 mile long overhead



DATE: February 2006
SCALE: As Noted
PROJ. NO. 105048
FIGURE: 1-1

PREPARED BY:
WOODLOT ALTERNATIVES, INC.
ENVIRONMENTAL CONSULTANTS
105048-00-Location.dwg

PROJECT:
Cohocton Wind Power Project
Cohocton, New York

SHEET TITLE:
Figure 1-1
Study Area Location Map

115 kV transmission line that will connect a central collection station on Lent Hill to a new substation adjacent to the existing NYSEG transmission line on Brown Hill. The 115 kV transmission line will be carried on treated wood poles and will cross the Cohocton River Valley and Interstate Route 390. The river and highway crossings are both currently anticipated to be above-ground crossings.

The project area is located within both the Central Appalachians and Finger Lakes Highlands subzones of the Appalachian Plateau Ecozone of New York (Dickinson 1983 and Will *et al*. 1982 as cited in Andrle and Caroll 1988). This region of southwestern New York consists of long valleys and rolling ridges, roughly orientated in a north to south direction. The Appalachian Plateau consists of highlands that are rather flat-topped with deeply dissected valleys. Most of the plateau has cold, snowy winters and cool, wet summers. Northern hardwoods are the predominant forest canopy species, although south-facing slopes are often dominated by oaks and other hardwood species typically found in central Appalachia. Pine and hemlock are also common species. Agricultural land uses are a dominant characteristic of the landscape, and approximately one-third of the ecozone is forested. In general, forested habitats are found on steep sideslopes of highland plateau areas and within narrow stream valleys. Open, agricultural habitats are most common in wide river valley bottoms and on the tops of plateau areas.

The Finger Lakes Highlands and Central Appalachians subzones share similar characteristics with the Appalachian Plateau ecozone. Elevations are generally higher in the Central Appalachians (average elevation of 457 m to 700 m; 1,500' to 2,300') than in the Finger Lakes Highlands (average elevation of 305 to 518 m; 1,000' to 1,700').

The project area sits atop a plateau that runs northeast to southwest through Cohocton Township. The general elevation in the project area ranges from 600 m to 655 m (1,968' to 2,150'). Narrow, steep-sided stream valleys dissect the plateau from all directions and are heavily forested with hemlock and a mixture of hardwoods. The Cohocton River valley lies to the west and south of most of the proposed turbine locations and the Twelvemile Stream valley lies to the east. The Naples Creek valley lies to the north and drains into the nearby Canandaigua Lake. Included in this latter area is the 6,100-acre High Tor Wildlife Management Area, which includes a diversity of upland and wetland habitats at the southern end of Canandaigua Lake.

Land use in the project area is agricultural, with open fields comprising more than two-thirds of the project area. Forested habitats include oaks, northern hardwoods, pine, and hemlock. Mature forest stands are common, as are areas of young, secondary growth, including hedgerows, wood borders, and old fields. As mentioned above, the proposed turbines will be located primarily in active agricultural fields. Specific uses of each field vary from year to year but primarily include hay, alfalfa, and row crop (primarily corn) production. A few turbines, however, may be located adjacent to or within primarily second growth forest stands.

2.2 AVAILABLE SURVEY DATA

Avian and bat field surveys for the Cohocton Wind Power Project were initiated in 2004. On-site field investigations included:

- raptor migration surveys conducted during two fall migration periods (2004 and 2005) and one spring migration period (2005);
- a brief radar survey conducted during spring 2005 migration period; and
- bat detector surveys conducted in the late fall of 2004, spring of 2005, and late-summer and fall of 2005.

Additional avian and bat community information was then sought from other off-site investigations taking place locally and regionally. Two wind power projects are currently being proposed in the adjacent town of Prattsburgh. The three project areas are very similar in many respects. Since they are so near to each other, they are subject to similar climates and have very similar natural communities. Similarly, current and historical land uses at the sites are similar and are dominated by agricultural landscapes, although the Cohocton study area has a slightly greater proportion of open agricultural fields (particularly tilled cropland). Consequently, avian and bat communities are likely to be very similar between the three sites. The portions of those studies that are relevant to the avian and bat communities in the Cohocton project area have been summarized in this report.

Breeding Bird Survey (BBS) data were also accessed from the United States Geological Survey (USGS) database as were data from New York State's Breeding Bird Atlas (BBA) database. In all, survey data from off-site sources included:

- raptor migration surveys, radar surveys, and bat detector surveys conducted at one of the proposed wind developments in Prattsburgh in the fall of 2004 and spring of 2005 (Woodlot 2005a,b);
- radar surveys in the fall of 2004 (Mabee *et al*. 2005) and summer 2004 bat mist-netting and detector surveys (BCM 2004) conducted for the other project in Prattsburgh;
- USGS BBS data from four routes located north and east of the Cohocton Wind Power Project (Sauer *et al.* 2005);
- NYS BBA data from the survey block that includes the Cohocton Wind Power project study area, and
- consultation with the New York Department of Environmental Conservation Natural Heritage Program regarding rare species and ecological communities in the vicinity of the project area.

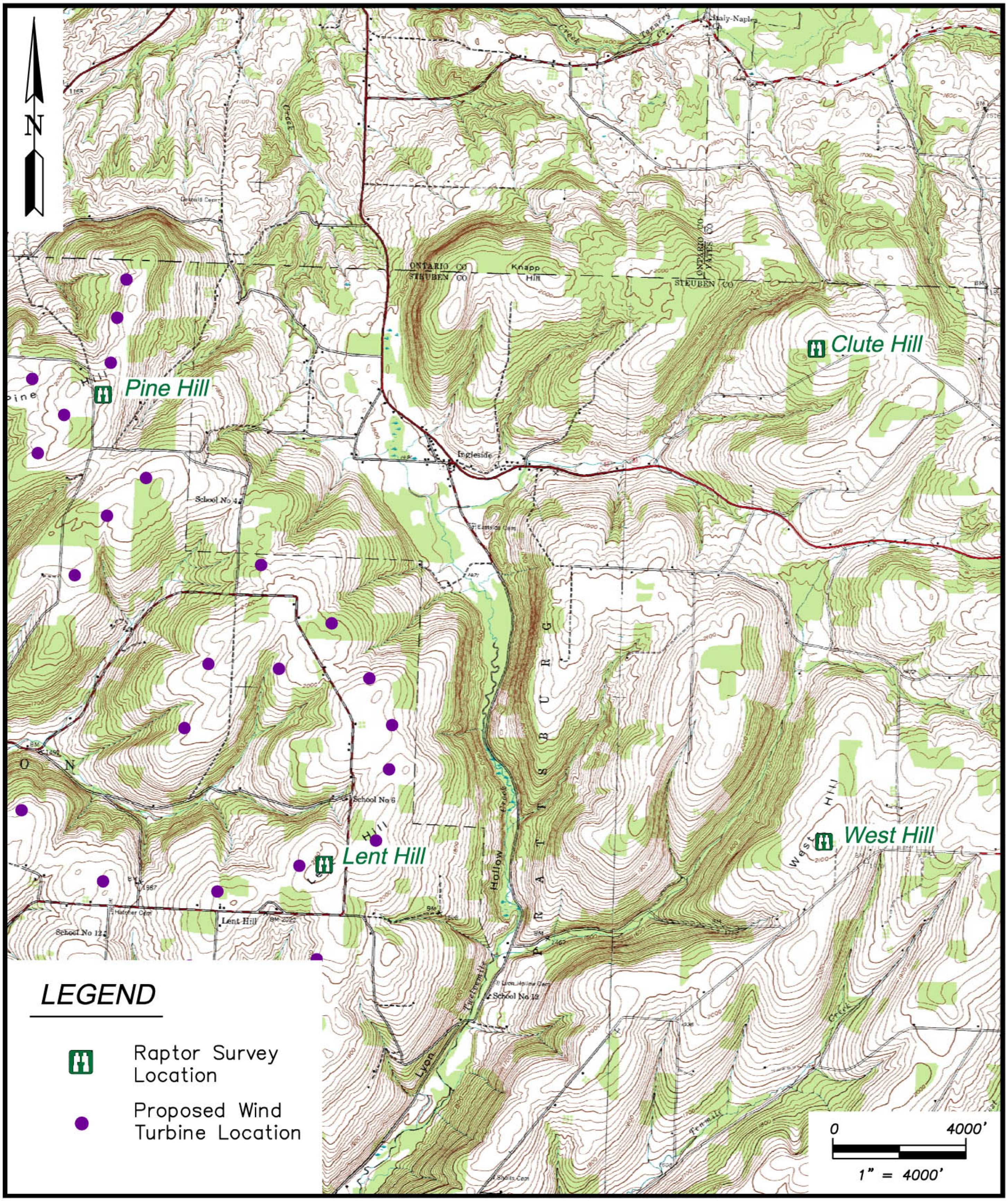
Following is a summary of the on-site and off-site surveys identified above. This information has been briefly summarized to provide an overview of the avian and bat resources in the vicinity of the Cohocton Wind Power Project.

3.0 Summary of Avian and Bat Surveys

3.1 RAPTOR MIGRATION SURVEYS

Daytime raptor surveys were conducted in the Cohocton project area during the fall of 2004 and continued during the spring and fall of 2005. Surveys in the fall of 2004 and spring of 2005 were conducted from Lent Hill, while those in the fall of 2005 were conducted either at Lent Hill or at Pine Hill (Figure 3-1). Eight days of surveys were conducted during fall 2004 and 10 days during spring 2005 from the met tower at Lent Hill. Fall 2005 surveys were conducted four times from Lent Hill and three times from Pine Hill. In addition, concurrent raptor surveys were being conducted from nearby observation points in Prattsburgh. This latter data were collected from Clute Field on 13 days in fall 2004 and from West Hill on 10 days in Spring 2005 (Figure 3-1).

Surveys were typically conducted from approximately 9:00 am to 3:00 pm each day and all raptors observed were recorded. Attempts were made to distinguish between migrating raptors and resident raptors, the latter of which were typically observed making short distance flights to field edges and nearby forest blocks and actively hunting for food. The height of flight of raptors was also estimated.



PREPARED BY:

WOODLOT ALTERNATIVES, INC.
ENVIRONMENTAL CONSULTANTS

DATE: November 2005

SCALE: 1" = 4000'

JOB NO. 105048

FILE: 105048-80-Raptor.dwg

Figure 3-1
Raptor Survey Location Map
Cohocton Wind Power Project
Cohocton, New York

REV.

The results of the hawk watch surveys are summarized below and in Tables 3-1 and Appendix A Tables 1, 2, and 3. A total of 128 raptors representing 8 species were observed during the fall 2004 surveys, yielding an overall observation rate of 3.1 birds/hour. In the spring 2005, 164 raptors representing 11 species were observed, yielding an observation rate of 2.73 birds/hour. Turkey vultures (*Cathartes aura*) (37%) and red-tailed hawks (*Buteo jamaicensis*) (24%) comprised most of the observations. During the fall 2005, 131 raptors representing 10 species were observed, yielding an overall observation rate of 3.27 birds/hour. Daily passage rates ranged from 0.83 to 5.25 raptors/hour during fall 2005. Similar to spring 2005, turkey vultures (43%) and red-tailed hawks (20%) were the most common species observed.

Table 3-1. Summary of raptor migration survey data in the vicinity of the Cohocton Wind Power Project

Summary Information	Site and Season				
	Cohocton			Prattsburgh	
	Fall 2004	*Spring 2005*	*Fall 2005*	*Fall 2004*	*Spring 2005*
Number of Survey Days	8	10	7	13	10
Number of Species Observed	8	11	10	10	15
Number of Individuals	128	164	131	220	314
Number Birds/Hour	3.1	2.73	3.27	3.01	5.23
% flying < 125 m above ground	80%	77%	63%	62%	83%

Raptor results from the Prattsburgh surveys (fall 2004 and spring 2005) were similar to or slightly higher than at Cohocton (Woodlot 2005a,b). Fall 2004 surveys from Clute Field resulted in 220 birds observed, from 10 species, yielding an observation rate of 3.01 birds/hour. During spring 2005, a total of 314 raptors were observed from 15 species, with an observation rate of 5.23 birds/hour. No raptor survey was conducted in Prattsburgh during fall 2005.

The total number of raptors observed and the observation rates are very low compared to data from other sites in the region (Appendix A Tables 1, 2, and 3), which include observation rates 3 to 15 times greater then at the Cohocton Wind Power Project. The low numbers and observation rate is not unexpected, as conversations with regional experts indicated that the central New York area is not well known for dense concentrations of migrating hawks, particularly in the fall (Albano 2003).

The flight habits of raptors in the project area were variable, though the locations of those observations often occurred in similar locations. Geographical location can affect the magnitude of raptor migration at a particular site. Most migrants passing through the project area were flying on a south to north orientation during the spring and a north to south orientation during the fall. The steep hillsides of Lyon Hollow Valley and other surrounding valleys appeared to produce good thermal conditions for migrating raptors.

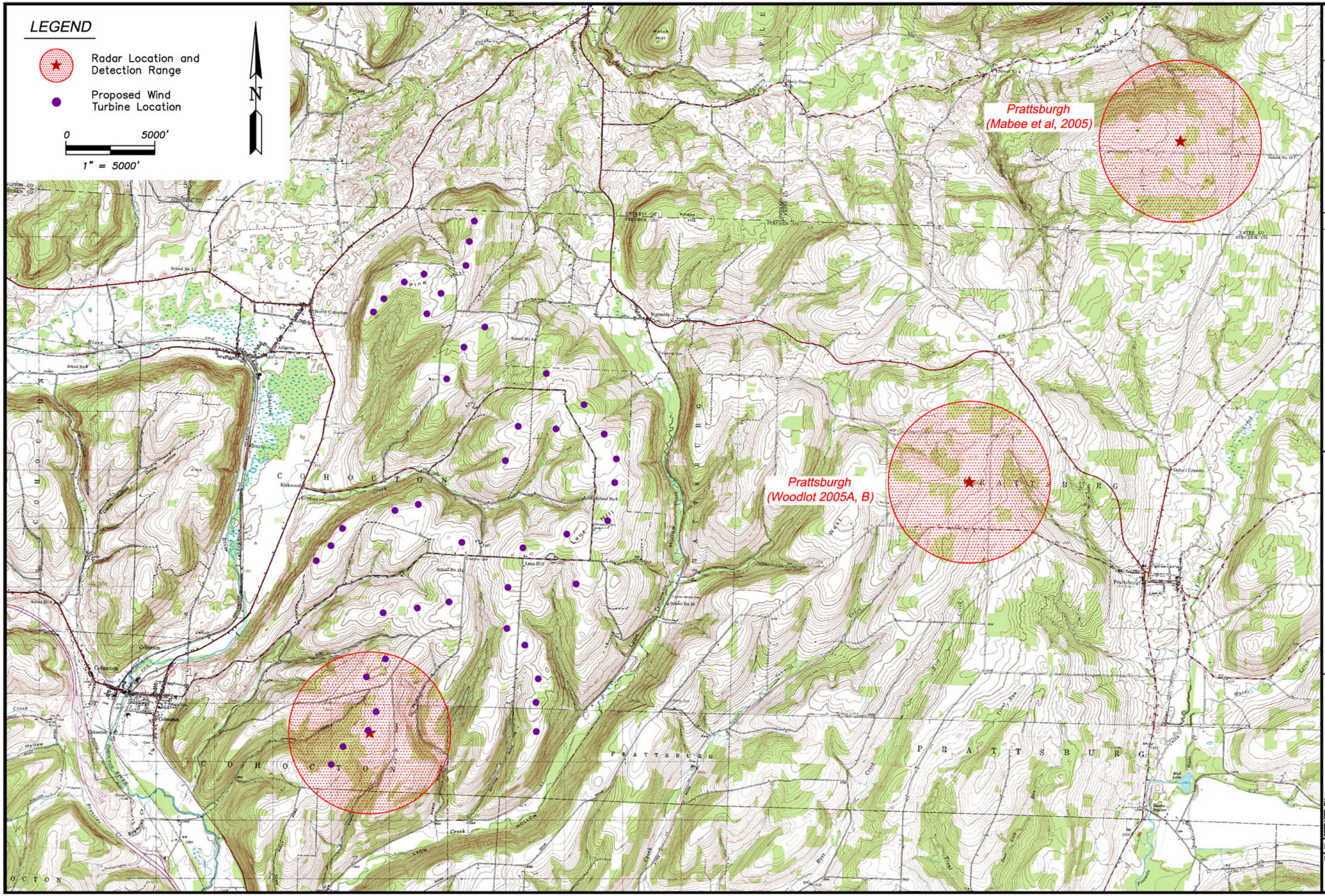
Flight heights were estimated for all raptors observed during the migration surveys. At both sites, the majority of raptors observed were flying below the blade-swept area of the proposed turbines (< 125 m, 410'). Field surveys documented that approximately 80 percent of the 128 raptors observed during the fall 2004 survey at Lent Hill were flying less than 125 m above the ground, which is the approximate maximum height of the proposed wind turbines. The spring 2005 surveys documented approximately 77 percent of the 164 raptors observed flying below this height. Fall 2005, found 63 percent of the 131 raptors flying within the blade-swept area. Raptor flight heights were also documented during the surveys in Prattsburgh. Raptors flew below 125 m about 62 percent of the time in fall 2004 and 83 percent of the time in the spring 2005.

Five species of conservation concern were observed during the three raptor surveys at Cohocton. These included peregrine falcon (*Falco peregrinus*) (State-listed Endangered), northern harrier (*Circus cyaneus*) (State-listed Threatened), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), and red-shouldered hawk (*Buteo lineatus*) (State-listed Special Concern). While these species are of conservation concern, most of the individuals observed were migrants and unlikely to be residents of the project area.

Most raptors flying though the project were observed within the blade sweep area. Most long-distance migrants observed passing near or through the project area flew higher than resident birds. These birds were taking advantage of thermals and crosswinds flowing up hillsides. Consequently, they were consistently observed gaining altitude in these areas before following straight flight paths north or south. Based on the flight paths of migrants observed, it is likely that the central parts of the plateaus, where most wind turbines are being proposed, receive moderate to low use by migrating raptors. The majority of birds follow valleys, ridgelines, and side slopes (all of which are along the periphery of the proposed development area) that develop stronger thermals and crosswinds for migration. Raptors observed during the study were seen flying low when crossing ridge tops from one valley to another. This behavior may be a potential concern for the project site due to the non-continuous ridges of the central-New York landscape and the behavior of migrating raptors. However, it should be noted that passage rates in the vicinity of the project area were relatively low for the region. Observation rates of raptors during the surveys in Cohocton and Prattsburgh ranged from 2.7 to 5.2 birds/hour while rates at other sites generally ranged from 10 to 60 birds/hour during the same migration seasons. Section 4.2.1, below, provides an additional assessment of the raptor migration survey results with respect to the anticipated risk to raptors of colliding with the proposed turbines.

3.2 NOCTURNAL RADAR SURVEYS

Three nights of on-site radar surveys were conducted. While this is a very limited data set, those three nights were chosen to correspond with radar data collected at a Prattsburgh site. The two radar surveys were located approximately 9.7 kilometers (km) (6 miles) apart (Figure 3-2) and occurred May 10 – 12, 2005. Identical radar systems were used at both sites, as were identical sampling methods (horizontal and vertical radar antenna orientation).



PROJECT:	Cohocton Wind Power Project
ADDRESS:	Cohocton, New York
SHEET TITLE:	Radar Survey Location Map
SCALE:	1" = 5000'
DATE:	November 2005
PREPARED BY:	WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS
PROJ. NO.	105048
FIGURE NO.	3-2

105048-80-Location.dwg

NO.	REVISIONS	DATE

Table 3-2 presents the results of the three nights of sampling at the Cohocton Wind Power Project and the Prattsburgh study that was conducted at the same time. In general, variation in the results was observed, though trends in the results were quite similar. Passage rate was the most similar migration metric observed between the two sites, with the passage rate for Cohocton documented at 371 targets/km/hour (t/km/hr) and for Prattsburgh at 292 t/m/hr (Woodlot 2005a).

Table 3-2. Comparison of results from radar surveys conducted in Cohocton and Prattsburgh spring 2005

Night of	**Passage Rate (t/km/hr)**		**Flight Height (m)**		**Flight Direction**	
	Prattsburgh	Cohocton	Prattsburgh	Cohocton	Prattsburgh	Cohocton
May 10	621	773	461	745	19	31
May 11	184	206	225	518	112	200
May 12	70	133	278	563	296	334
Mean	292	371	321	609	18	28

Nightly mean passage rates at Cohocton varied from 133 ± 20 to 773 ± 121 t/km/hr, with an overall mean of 371 ± 58 t/km/hr, while passage rates at Prattsburgh were slightly lower, varying from 70 ± 15 to 621 ± 94 with an overall nightly mean of 292 ± 46 t/km/hr (Woodlot 2005a).

Mean flight height of targets at Prattsburgh was lower than at Cohocton (Woodlot 2005a). Mean nightly flight height at Prattsburgh varied from 225 m to 461m (738' to 1,512') with an overall mean of 321 ± 34 m (1,053' ± 112'). Differences between the nightly and overall flight heights were very consistent, approximately 290 m (951'), though the sites only vary by 30 m (164').

The percent of targets flying below 125 m (410') varied from 4 to 31 percent with a mean for the three nights of 22 percent. Flight heights were lowest the first hour after sunset (215 m, 705') and the first hour before sunrise (282 m, 925') and highest 2 to 4 hours after sunset (458 to 398 m, 1,503 to 1,306'). Mean flight height of targets at Cohocton was higher, ranging from 518 ± 67 m to 745 ± 58 m (1,699 ± 220 to 2,444 ± 190') with an overall mean of 609 m ± 65 m (1,998 ± 213'). The percent of targets flying below 125 m varied from 4 to 20 percent with a three-night mean of 12 percent. Flight heights at Cohocton were also lowest the first hour after sunset (481 m, 1,578') and the first hour before sunrise (458 m, 1,503') and peaked 6 to 8 hours after sunset (700 to 732 m, 2,297 to 2,402').

Flight direction was comparable at Prattsburgh and Cohocton. At Prattsburgh the flight direction varied from 19º to 296º with a mean flight direction of 18º ± 53º. At Cohocton, flight direction ranged from 20º to 33º with a mean flight direction of 28° ± 74°.

The brief comparison study between the Cohocton and Prattsburgh sites indicate that nighttime migration over the two sites is likely to be very similar. Data from both sites show high flight heights relative to the proposed turbines and natural landscape features as well as uniform movement across the radar display at each site. This indicates that movement over the project areas is likely to occur as a broad front movement and that landscape features are not causing night-migrating birds to concentrate at any specific locations in the project areas.

Radar surveys conducted in the fall of 2004 by Alaska Biological Research, Inc. (ABR) at one of the proposed developments in Prattsburgh (Mabee *et al.* 2005) are similar to those conducted by Woodlot during the same time period at the other Prattsburgh project (Woodlot 2005b). The ABR study was conducted for 45 nights while the Woodlot study was conducted for 30 nights and both studies used similar radar systems.

In general, these fall 2004 surveys yielded very similar results. Mean nightly passage rates documented during the Woodlot study varied from 12 to 474 t/km/hr with a seasonal mean passage rate of 193 t/km/hr. Mean nightly passage rates documented during the ABR study varied from 18 to 863 t/km/hr with a seasonal mean passage rate of 200 t/km/hr. Flight direction was also similar between the studies, with a mean seasonal flight direction of 188º from the Woodlot study and 177º from the ABR study. The largest difference between the two studies was in the flight altitude of targets. The Woodlot study documented a range in nightly mean flight altitude from 190 m to 727 m (623’ to 2,385’) above the radar and a seasonal mean of 516 m (1,692’). The ABR study documented a range in nightly mean flight altitude from 202 m to 584 m (663’ to 1,916’) above the radar and a seasonal mean of 365 m (1,198’). The percentage of targets flying below 125 m (410’) was also calculated, with Woodlot documenting 2.6 percent of targets below this height and ABR documenting 9 percent of targets below this height. The similarity in results again indicates that nighttime bird migration over the project area is likely to be broad front, with similar patterns in movement observed over the broad geographic scale of west-central New York. More importantly, this similarity indicates that the data collected for these very nearby projects are probably very representative of migration over the Cohocton study area.

The results presented above are of sites in proximity to each other and indicate that nighttime bird migration over the two locations is likely to be very similar. When compared to other studies using similar methods, these results fall within the range of those other studies (Table 3-3). The information presented in Table 3-3 only includes the passage rates across all sites as this is the only metric that has been consistently calculated between them. Flight direction was not included because the studies cover such a large geographic area and occurred over a span of more than 10 years.

Table 3-3. Summary of passage rates from other radar studies

Year	Location	Passage Rate (t/km/hr)	Reference
Fall			
1993	Louisiana*	7,500-37,500	Gauthreaux and Belser 1998
1994	Western Maine	551	ND&T 1995a
1994	Copenhagen, NY	341	Cooper *et al*. 1995
1994	Martinsburg, NY	661	Cooper *et al*. 1995
1998	Harrisburg, NY	336	Cooper and Mabee 1999
1998	Wethersfield, NY	466	Cooper and Mabee 1999
2003	Chautauqua, NY	235	Cooper *et al*. 2004a
2003	Mt. Storm, WV	241	Cooper *et al*. 2004b
2004	Prattsburgh, NY	200	Mabee *et al*. 2005
2004	Prattsburgh, NY	193	Woodlot 2005b
Spring			
1994	Western Maine	99	ND&T 1995b
1994	Carthage, NY	159	Cooper *et al.* 2004c
1999	Weathersfield, NY	41	Cooper *et al.* 2004c
2003	Chautauqua, NY	395	Cooper *et al.* 2004c
2005	Cohocton, NY**	371	This report
2005	Prattsburgh, NY	277	Woodlot 2005a

* This study used weather radar, rather than small marine radars to quantify migration.
** This study was calculated with only three nights of radar sampling.

3.3 BREEDING BIRD SURVEYS

The USGS BBS database was accessed to identify the breeding bird community documented in the area during these long-term survey efforts (Sauer *et al*. 2005). Data collected included the mean number of individuals of each species observed during surveys conducted from 1966 to 2004. Data from four routes located within approximate 20 miles of the Cohocton Wind Power Project area were used.

BBS survey data documented between 99 and 118 species of birds likely breeding in the vicinity of the project area (Appendix B Table 1). The most commonly observed species (i.e., the most number of individuals per year of survey) include European starling (*Sturnus vulgaris*), red-winged blackbird (*Agelaius phoeniceus*), American robin (*Turdus migratorius*), common grackle (*Quiscalus quiscala*), American crow (*Corvus brachyrhynchos*), song sparrow (*Melospiza melodia*), house sparrow (*Passer domesticus*), barn swallow (*Hirundo rustica*), American goldfinch (*Carduelis tristis*), and yellow warbler (*Dendroica petechia*). Species of conservation concern observed during these surveys (which include nearly 40 years of annual surveys) include northern harrier (Threatened), Cooper's hawk (Special Concern), sharp-shinned hawk (Special Concern), horned lark (*Eremophila alpestris*) (Special Concern), Henslow's sparrow (*Ammodramus henslowii*) (Threatened), grasshopper sparrow (*Ammodramus savannarum*) (Special Concern), and vesper sparrow (*Pooecetes gramineus*) (Special Concern). The species data reflects the landscape conditions surrounding the Cohocton study area. The area is dominated largely by open habitats such as agricultural croplands, hayfields, pastures, early successional shrublands, and young forests.

New York State BBA data was obtained for survey block 2971D, which includes much of the Cohocton study area. That data identified 92 species that are possibly breeding (40 species), probably breeding (5 species), and confirmed to be breeding (47 species) in the vicinity of the project area (Appendix B Table 2). Included in those data are two species of conservation concern in New York State: Cooper's hawk and horned lark. Both species are listed as Species of Special Concern. The species composition of the BBA data is generally quite similar to the BBS data, with the majority of species documented common in the open and mixed agricultural/ forested habitats that dominate the landscape around the project area.

Because breeding bird surveys were not conducted at the Cohocton Wind Power Project study area, it is not possible to describe the full composition of the bird assemblage there during the nesting season. However, incidental observations made during the course of other field investigations (such are raptor migration surveys timed late in the spring and early in the fall) indicate that the common species of the project area are similar to the common species documented during BBS and BBA surveys. Additionally, two species of conservation concern—northern harrier and horned lark—were observed and believed to be resident to the project area during the nesting season.

3.4 NEW YORK NATURAL HERITAGE PROGRAM CONSULTATION

The New York Department of Environmental Conservation (NYDEC) provided a Natural Heritage Program Report on rare species and ecological communities in the vicinity of the project (Appendix C). The report identified rare or state-listed animals, plants, significant natural communities, and other significant habitats known or suspected to occur at or in the immediate vicinity of the project site.

Three bird species of conservation concern were identified as occurring within 16 km (10 miles) of the project area. These include the great blue heron (*Ardea herodias*), bald eagle (*Haliaeetus leucocephalus*), and clay-colored sparrow (*Spizella pallida*). Additionally, three Waterfowl Winter Concentration Areas were identified.

The great blue heron record was actually a nesting colony (often referred to as a rookery) located south of the project area. The heron itself is a protected, non-game species within the state but is not listed as endangered, threatened, or special concern within the state. Similarly, the clay-colored sparrow, which is not a listed species, is considered to be a notable species as it was formerly a rarity to the state but has been on the increase since the 1970s. The record for this species occurred at a Christmas tree farm southeast of the project area. The bald eagle records were associated with Canandaigua and Hemlock Lakes. These include nest locations that are located 11 to 19 km (7 to 12 miles) north and northwest of the project area. Finally, the waterfowl winter concentration areas were associated with the two largest lakes near the project area, Canandaigua and Keuka Lakes, lying to the east and north of the project area, as well as a large wetland system located well northwest of the project.

The Natural Heritage reports also identify if any Indiana bat (*Myotis sodalis*) hibernacula are known within 64 km (40 miles) of a project area. The Natural Heritage report indicated that there were no records of known hibernacula for this species in the area.

3.5 BAT SURVEYS

Three sources of information on bat resources in the vicinity of the project area are available. These include detector surveys of bat migration conducted at the Cohocton Wind Power Project (fall of 2004, spring of 2005, and fall of 2005), detector surveys of bat migration conducted at one of the proposed projects in Prattsburgh (fall of 2004 and spring of 2005), and summertime mist netting and detector surveys conducted at the other Prattsburgh study area. A brief description of each of these surveys follows.

3.5.1 Migration Surveys

Surveys Conducted at the Cohocton Wind Power Project

Acoustic bat surveys were conducted at the Cohocton site during fall 2004, spring 2005, and fall 2005. These surveys used Anabat II detectors, which were either deployed at various heights in an on-site met tower (on Lent Hill) to operate passively or hand-carried to actively survey various habitats in the study area. The active surveys were conducted for one night during the fall of 2004, while a total of 105 nights were passively surveyed. During the fall 2005 survey, two detectors were often deployed simultaneously at different heights during the passive surveys, resulting in an increased number of detector nights.

The results of the bat detector surveys in Cohocton are provided in Table 3-4. A total of 484 bat passes were recorded during the three seasons of surveys. More than half (268 passes, or 55%) of these were recorded on the very first night of sampling, when the detector was hand-held and used to sample characteristically active habitats for bats. The areas surveyed included field edges, wooded roadways, stream corridors, and wetland edges. Once the detectors were deployed in the met tower, for a total of 153 detector nights, only 216 passes were recorded. The met tower was located at the crest of a hill in the middle of a field. This habitat is not as actively used by bats as forest, field, and wetland edges are, hence the lower passage rate recorded. Placement of the detectors in the met tower, however, was chosen because of the ability to raise the detectors to greater heights and because the proposed turbines would be placed largely within open fields and not at habitat edges or within forested areas.

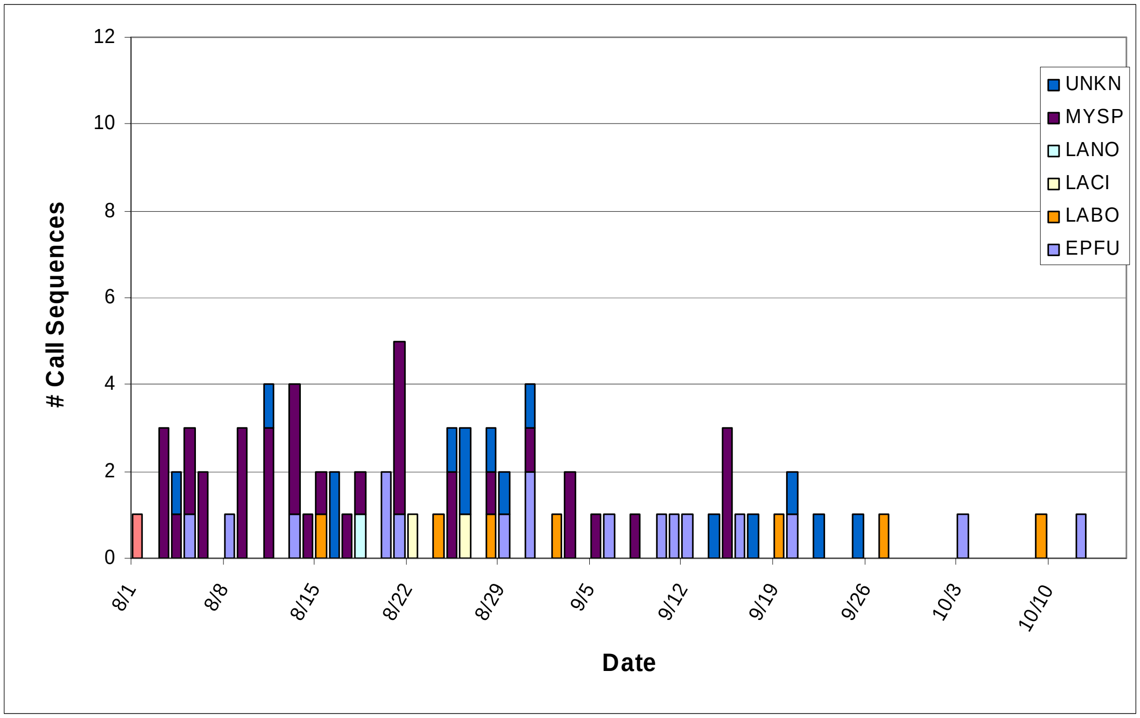
Table 3-4. Summary of bat detector surveys conducted in Cohocton and Prattsburgh

Project	Season	Survey Type	Dates	# Nights	# Detector nights	# Recorded bat passes	Mean passage rate*	Maximum passage rate recorded**
Cohocton	Fall 2004	Active	Aug 18	1	1	268	n/a	n/a
	Fall 2004	Passive	Oct 9-10	2	2	4	2.00	4
	Spring 2005	Passive	May 2-30	29	29	21	0.72	4
	Fall 2005	Passive	Aug 3-Oct 15	74	122	191	1.57	10
Prattsburgh	Fall 2004	Active	Aug 16-19, Oct 25-27	6	9	218	n/a	n/a
	Fall 2004	Passive	Aug 31-Nov 3	23	23	51	2.2	9
	Spring 2005	Passive	Apr 24-May 30	45	57	16	0.28	2

* Number of bat passes recorded per detector-night

** The maximum number of bat passes recorded from any single detector for a 12-hour sampling period

The fall 2005 surveys took place on 75 nights between August 3 and October 15, 2005, and included two detectors operated at heights of approximately 15 m (50’) and 23 m (75’) within the guy wire array of the Lent Hill met tower. One detector malfunctioned after September 19, resulting in a total of 121 detector nights. During these surveys, a total of 191 bat passes were detected (Table 3-4). Nightly passage rates varied between 0 and 10 passes per night, with the maximum of 10 occurring at the low detector on September 16, 2005 (Figure 3-3).



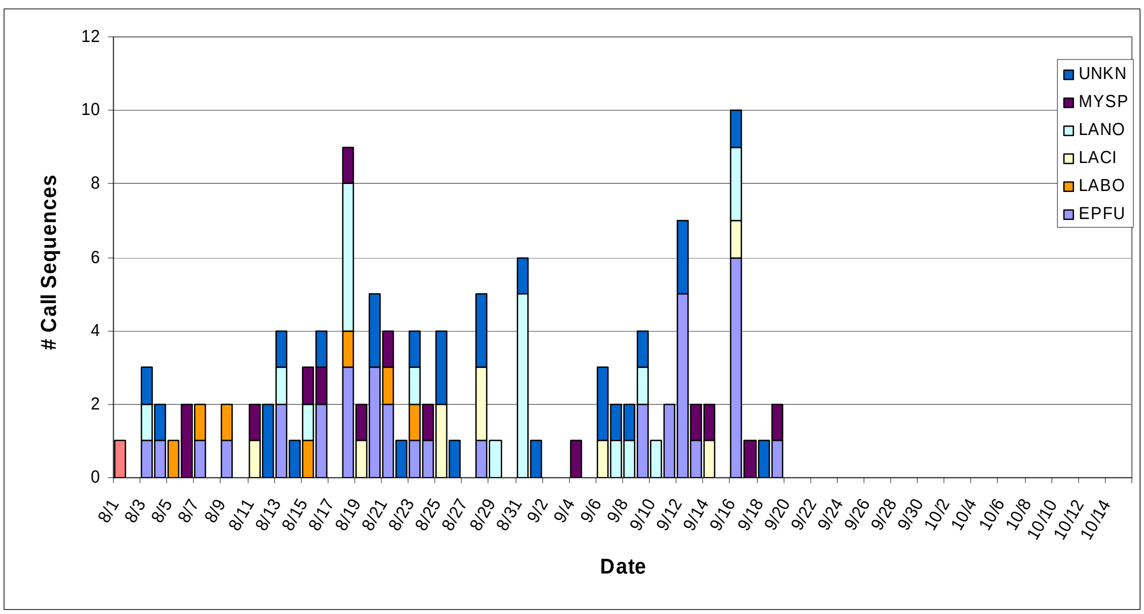


Figure 3-3. Nightly passage rates measured during fall 2005 surveys by the high detector (top chart) and low detector (bottom chart). EPFU = big brown bat, LABO = eastern red bat, LACI = hoary bat, LANO = silver-haired bat, MYSP = *Myotis* spp., UNKN = unknown

Passage rates were generally greater at the low detector than at the high detector during fall 2005 surveys. However, passage rates at the high and low detectors were not correlated, suggesting that most bats were detected by only one of the detectors. Although the detectors were within approximately 7.5 m (25') of one another, they were oriented horizontally, and would have detected a bat simultaneously only if the bat had been flying roughly between the detectors. Out of the 191 recorded bat passes, only 4 pairs of recorded calls were recorded by both detectors within 10 seconds of one another.

Of the 191 bat call sequences recorded during the fall 2005 survey, 149 (78%) were identified to species, or to genus *Myotis*, based on visual comparison to libraries of reference calls created using the Anabat system and compiled by Chris Corben and Lynn Robbins. Calls within *Myotis* were not identified to species, due to similarity of calls between species and the lack of a robust site-specific reference library of calls upon which to base comparison (Robbins and Britzke 1999). However, all of the *Myotis* call sequences recorded at the Cohocton site most closely resembled those of the little brown myotis (*Myotis lucifugus*), whose calls tend to be more steeply sloped and lower in frequency than those of other myotids, including the endangered Indiana bat. In addition to myotids, four species—big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*L. cinereus*), and silver-haired bat (*Lasionycteris noctivagans*)—were detected at Cohocton. Big brown bats and myotids were the most common bats detected, followed by silver-haired, eastern red, and hoary bats, all of which made up similar portions of the detected calls (Figure 3-4).

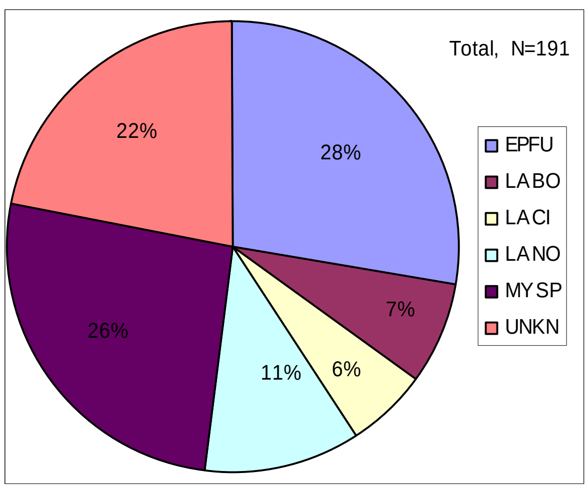


Figure 3-4. Species composition of recorded bat passages at Cohocton during fall 2005 surveys. EPFU = big brown bat, LABO = eastern red bat, LACI = hoary bat, LANO = silver-haired bat, MYSP = *Myotis* spp., UNKN = unknown.

Species composition of bats detected at Cohocton was similar between spring 2005 and fall 2005 surveys, although eastern red bats were not detected during the spring. Passage rates were much lower during spring sampling than in the fall (Figure 3-5). This is likely due to a combination of cold, harsh weather during spring 2005, and seasonal differences in bat activity levels. Passive acoustic monitoring was conducted during fall 2004 on only two nights, during the second week of October, when bat activity levels were very low. Only 4 bat passes were detected during these surveys. Very low passage rates were also detected during October 2005 (Figure 3-3). Active surveys conducted in mid-August 2004 indicated the presence of the same species documented during 2005 surveys, as well as the eastern pipistrelle, although this species was detected in a valley adjacent to the study area, and not along the hilltops in the study area. Overall, the highest bat passage rates in the study area were measured along edges of forest fragments and on wooded roads.

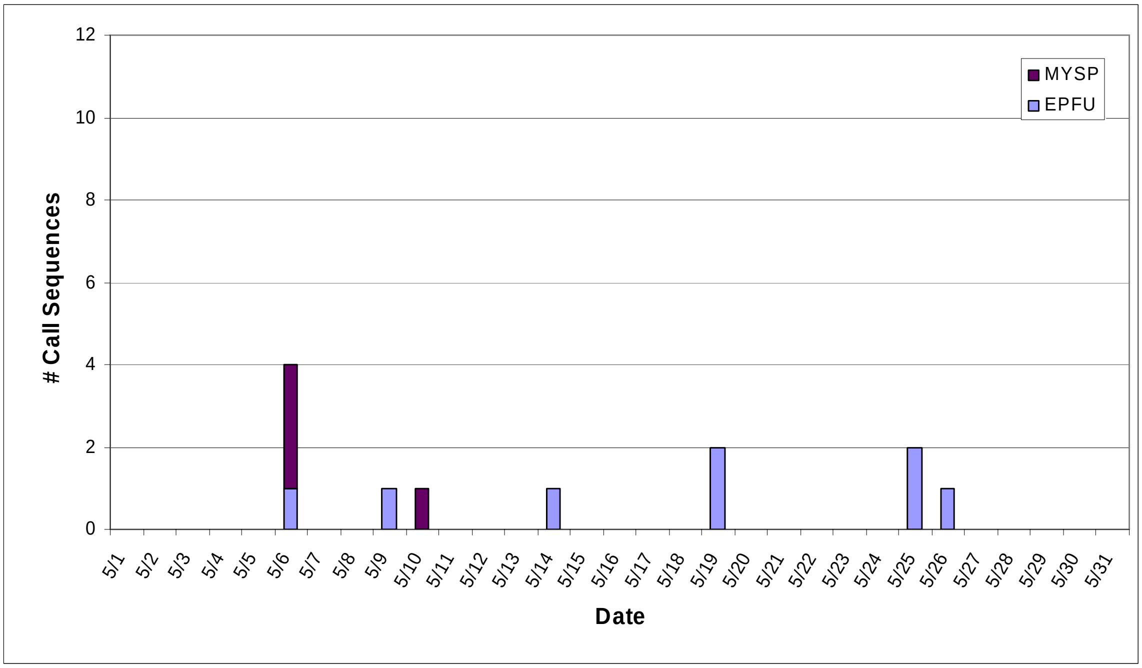
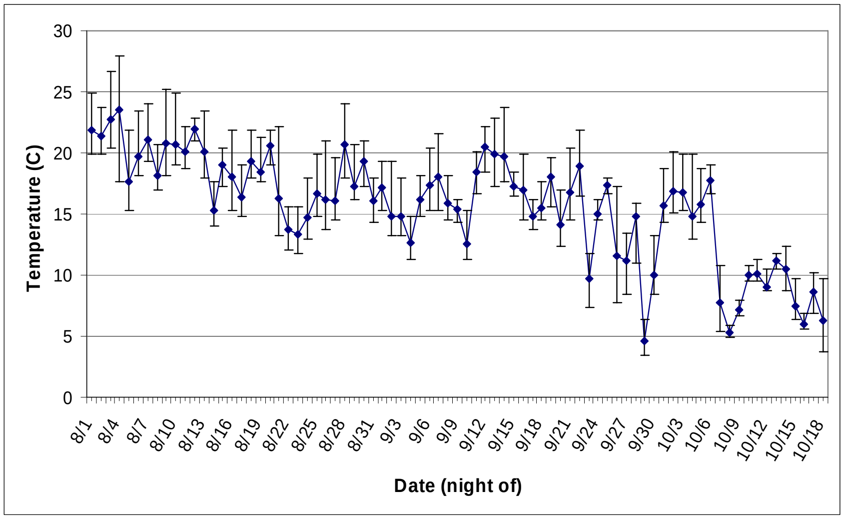


Figure 3-5. Nightly passage rates measured at Cohocton during spring 2005 surveys (high detector). EPFU = big brown bat, MYSP = *Myotis* spp.

Temperature and wind speed data were recorded at 10-minute intervals at a height of 50 m (164’) by the Lent Hill met tower. Mean nightly temperatures declined steadily from August 1 to October 19, with the maximum temperature of 27.9ºC (82.2ºF) occurring on the night of August 4, and the minimum of 3.4ºC (38.1ºF) occurring on September 29 (Figure 3-6). Wind speed varied considerably during the survey period, but maximum wind speeds did increase during this time period, with wind speeds exceeding 40 mph on five nights between September 20 and October 15 (Figure 3-6). Bat passage rates at both the high and low detectors showed a weak positive correlation with nightly mean temperature (Figure 3-7). Wind speed showed a weak negative correlation with passage rates at the high detector, and almost no relationship with passage rates at the low detector (Figure 3-8). The affect of temperature on bat activity levels is expected to be equal between the two detectors, whereas wind speed may limit bat activity to a greater extent at higher elevations. However, we did not collect appropriate data to verify this possibility.



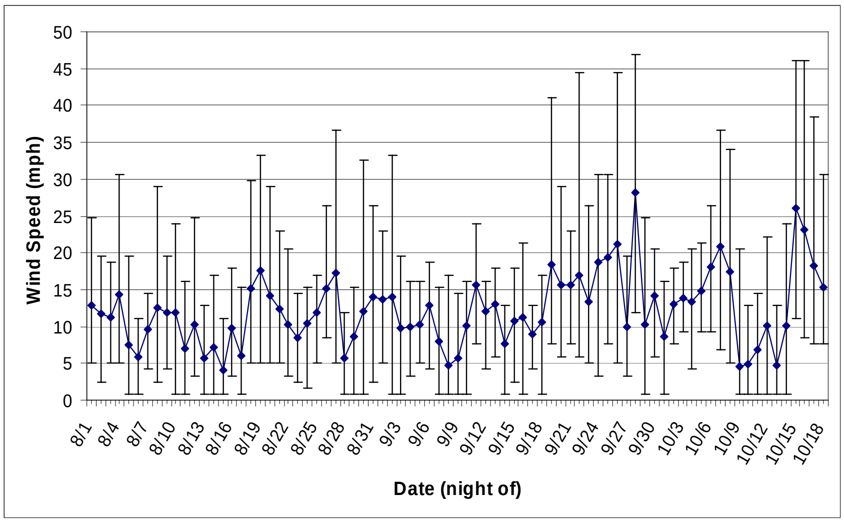


Figure 3-6. Mean nightly temperature (top) and wind speed (bottom) as recorded at a height of 50 m by the Cohocton met tower. Error bars represent maximum and minimum temperature and wind speed.

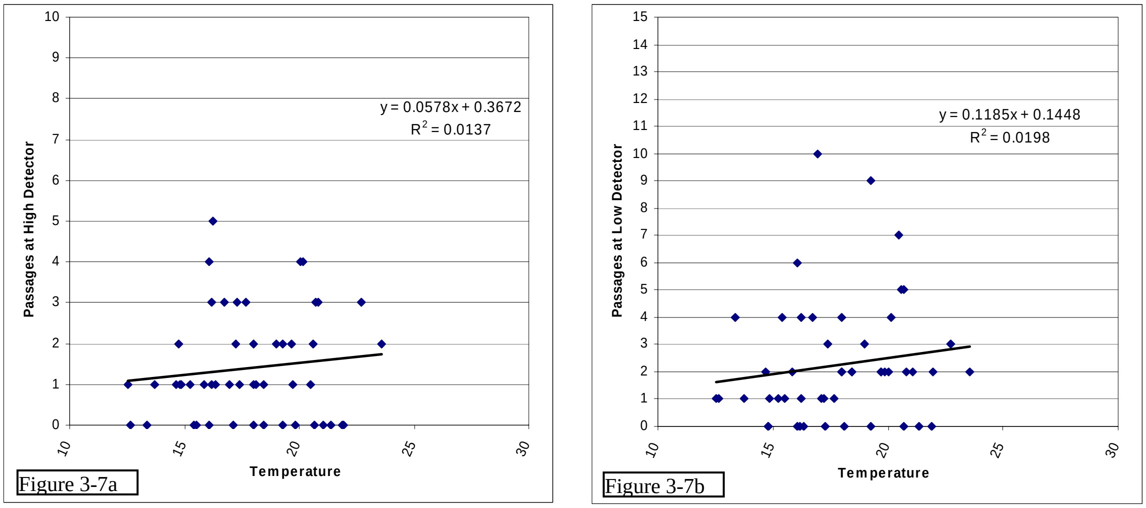


Figure 3-7. Mean nightly temperature and bat passage rates at the high (Figure 3-7a) and low (Figure 3-7b) bat detectors. Figure 3-7a includes data from August 1 to October 15, and Figure 3-7b includes data from August 1 to September 19.

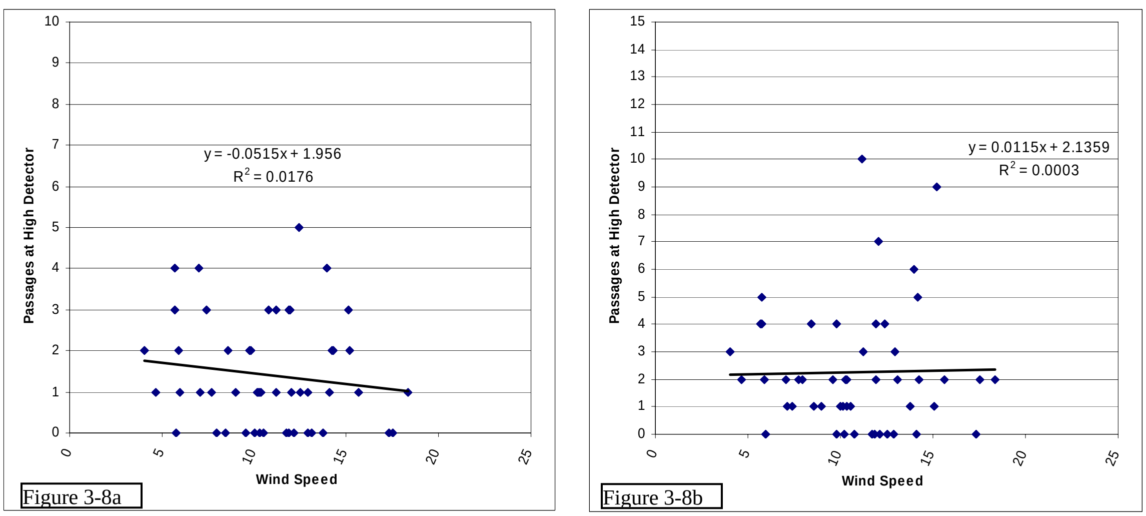


Figure 3-8. Mean nightly wind speed and bat passage rates at the high (Figure 3-8a) and low (Figure 3-8b) bat detectors. Figure 3-8a includes data from August 1 to October 15, and Figure 3-8b includes data from August 1 to September 19.

Surveys Conducted at One of the Proposed Projects in Prattsburgh

Bat detector surveys were conducted at one of the proposed projects in Prattsburgh during the fall 2004 and spring 2005 migration periods (Woodlot 2005a, b). The fall 2004 detector surveys included some evenings of active sampling when the detectors were hand-held along field edges and near streams and wetlands. Detectors were also deployed at two heights above the ground in the guy wire array of one of the on-site met towers. The fall survey occurred from mid-August to the end of October. The spring 2005 surveys consisted solely of detectors placed in the met tower guy wire array and occurred from mid-April through the end of May. While the detectors were in the met tower they were generally at heights of 15 m (50’) and 30 m (100’) above the ground.

A total of 269 bat call sequences were recorded during the fall 2004 survey efforts in Prattsburgh (Table 3-4). The majority of these calls (218) were recorded during the first week of sampling when the detectors were hand-held or placed near the ground level along field edges. The overall detection rate during the fall survey was 2.2 detections/night. On nights when the two detectors were both deployed in the tower at the same time, detection rate at the higher detector was 1.6 detections/night and 17 at the lower detector. Detection rates fell steadily from the end of August through September and hardly any bats were detected in October. Of the calls recorded, 136 could be identified to Genus or species. Species detected, in decreasing order of abundance, were Myotis sp. (76), big brown bat (34), silver-haired bat (10), eastern pipestrelle (9), hoary bat (6), and eastern red bat (1).

A total of only 16 call sequences were recorded during the spring detector surveys. The overall detection rate during the spring surveys was 0.28 detections/night, which was much lower than detection rates documented during the fall surveys. Detection rates at the high detector (0.22 detections/night) were approximately half of that observed at the low detector (0.40 detections/night). The species composition of calls recorded during the spring surveys was different than the fall, with big brown bats making up the vast majority (70%) of the calls recorded and relatively few *Myotis* and hoary bat call sequences recorded.

3.5.2 Summer Surveys

Summer 2004 bat surveys were conducted by Bat Conservation and Management, Inc. (BCM) at one of the proposed projects in Prattsburgh as part of a coincident wind energy development natural resource investigation (BCM 2004). Mist netting was conducted at five sites in the project area in early July and late August of 2004. Detector surveys were also conducted at each of the five sites.

A total of 101 bats were documented during the mist-netting surveys. Little brown bats were the most abundant species netted, accounting for 75 percent of the collected animals. This was followed by the northern long-eared bat (*Myotis septentrionalis*) (15%), big brown bat (6%), eastern red bat (2%), and hoary and silver-haired bats (1% each).

The detector surveys documented 2,209 bat calls. Big brown bats accounted for the greatest percentage of calls recorded (47%), followed closely by little brown bats (42%). Other species recorded included northern long-eared bats, eastern red bats, hoary bats, silver-haired bats, and eastern pipistrelles. No rare species of bats were documented during the field surveys.

4.0 Risk Assessment

Because wind turbines are large, have moving parts, and extend above the forest canopy, the potential exists for wildlife collisions to occur. Bird collisions with tall structures, such as buildings and communications towers, have been well documented, though few empirical studies documenting the magnitude or criteria needed for collisions to occur exist. What is known is that the larger reported collision events generally occur with taller structures and during periods of inclement weather. Lighting of these structures has been identified as a significant contributing factor to collisions. Few studies have been conducted on tower or turbine lighting types that are linked to avian attraction and mortality. However, it is generally believed that red flashing lights on any type of tall tower may be more of an attractant to night-migrating birds and the use of few white strobe lights on turbines, which is an approach being adopted by the industry, would create less of an attraction to migrating birds.

Wildlife collisions with wind turbines first emerged as a concern in the western United States, when large numbers of raptor fatalities were reported at wind power facilities in California. Although most studies of the potential wildlife impacts of wind power facilities have focused on collisions of birds with turbines, bats are also vulnerable to collisions with wind turbines. In fact, the most recent evidence suggests that bat mortality at wind power developments in the east is more common than bird mortality, as studies that are presently occurring are reporting bat mortality but little to no bird mortality.

Following is an assessment of the risk of birds and bats to collide with wind turbines at the proposed Cohocton Wind Power Project. It is not necessarily an assessment of all impacts associated with the project but rather an assessment of the potential risk that the proposed turbines might pose to birds and bats and the significance of that risk. Other impacts to birds or bats from wind turbines can occur, such as habitat loss or disturbance effects of the operating wind turbines on local wildlife (Keil 2005). These impacts are generally considered less significant than potential mortality risk, as the placement of large turbines in primarily agricultural landscapes drastically reduces the amount of wildlife habitat lost due to project construction. Additionally, acclimatization of local wildlife to the presence of the turbines is expected to occur over time. Consequently, this report focuses on the risk of birds and bats to collide with the proposed turbines.

Risk assessment is largely a qualitative process based on existing information and site characteristics. Site-specific information on wildlife communities in and around the project area has been summarized above. In general, a large amount of information on avian and bat populations in the area has been collected. While this information can not specifically identify the number of potential collisions at the project it does provide a basis for biological opinions on the risk of collision-related mortality.

Additional information used in the risk assessment process includes bird and bat mortality studies at existing facilities. Mortality surveys are the only source of information on the number of fatalities at wind power facilities. These types of surveys typically report mortality as the number of fatalities per turbine per year (fatalities/turbine/year) at that particular site. Under this reporting convention, larger projects would be expected to cause more fatalities than smaller projects. However, the context of these studies and the type, number, and landscape setting of turbines within each facility studied must be considered when using fatality information from one site to predict risk at another.

Following is a review of existing information of known collision-related mortality at wind power facilities. Included are project-specific results as well as anticipated variation based on species' biology and regional and landscape context of specific projects investigated. Also included is an assessment of the overall affect of wind energy developments across the nation compared to other forms of avian mortality. An assessment of risk of birds and bats of collision with turbines in the proposed Cohocton Wind Power Project area follows that review. The assessment is divided into major taxonomic groups based on biological characteristics that might make them more or less susceptible to collision. Groups discussed include raptors, waterfowl and water birds, songbirds, and bats.

4.1 REVIEW OF KNOWN COLLISION-RELATED MORTALITY

Nearly all species of birds have been found to be at risk of colliding with wind turbines. The original concern about avian collisions at wind energy developments arose from observations of high mortality rates of hawks and eagles at the Altamont Pass and Solano County Wind Resource Areas in California; mortality rates that could pose a biologically significant impact to those populations (Orloff and Flannery 1992, Hunt 2002).

Since then, significant contributing factors to high raptor mortality at these California sites include the number, density, and physical characteristics of turbines; high raptor wintering density; and high prey densities within the wind resource areas. In general, these facilities have a large number of turbines, with over 5,000 present in Altamont pass alone. The turbines are predominantly older generation turbines that are smaller, lower to the ground, and with blades that spin faster as wind speed increases. The turbines are also spaced very close together, relative to more modern facilities with larger turbines. Finally, many turbines are placed on lattice type towers, which provide an abundance of perching locations. Estimates of raptor and other bird mortality at Altamont Pass are very variable. However, using the most recent and seemingly reliable estimates, it is likely that thousands of raptors strike turbines every year at that facility (Erickson *et al.* 2002, Sterner 2002, Smallwood and Thelander 2004, GAO 2005).

There are several lines of evidence that suggest that raptor mortality outside of California (particularly outside of Altamont Pass) would be lower than within California. These include significantly lower raptor use at most proposed wind developments sites relative to California sites, larger turbines with slower moving blades that may be more easily avoided by foraging raptors, and the now standard use of tubular towers that essentially eliminate perching sites below the spinning blades. Emerging evidence from mortality surveys at newer facilities in other parts of the United States corroborates this. Erickson *et al.* (2002) report that few raptors have been found during mortality searches at operating facilities across the United States. For example, they report that buteo mortality has been documented at only one facility (Buffalo Ridge, MN), as of early 2002, despite similar levels of buteo use as at Altamont Pass. Additional incidents of raptor mortality at newer wind energy facilities have since been documented. Erickson *et al*. (2003) report small numbers of several species, including American kestrel (*Falco sparverius*), northern harrier, and short-eared owl (*Asio flammeus*), at the Foote Creek Rim Wind Plant in Wyoming. One red-tailed hawk has been found at the Top of Iowa Wind Farm in north-central Iowa (Koford *et al*. 2005). One sharp-shinned hawk and one turkey vulture were found at the Mountaineer Wind Energy Center in West Virginia (Arnett 2005). Despite this newer information, mortality rates of raptors appears to be very low outside of California and at newer facilities with larger turbines and slower turbine blades.

Potential collision-related waterfowl and water bird mortality at wind energy developments can occur due to the flocking behavior of these species, courtship flight behavior demonstrated by some species, and activity periods that include nocturnal, diurnal, and crepuscular times. However, despite these types of activities and behaviors, waterfowl and water bird mortality at wind developments has been low, making up approximately 5 percent of reported mortality (Erickson *et al.* 2002). The Top of Iowa Wind Farm in north-central Iowa is an example of low waterfowl mortality relative to use. The facility is located in cropland between three wildlife management areas that receive approximately 2.5 million waterfowl-use days annually. Surveys of waterfowl activity in the vicinity of the project documented large numbers of ducks and geese, including 487 flocks of geese foraging in fields with wind turbines, yet no waterfowl were found during mortality surveys conducted from April to December in 2003 and 2004 (Koford *et al.* 2005).

Songbirds (e.g., warblers, vireos, thrushes, sparrow) account for up to 80 percent of known fatalities reported (Johnson *et al.* 2000, Erickson *et al.* 2002). Mortality of these species has included both daytime and nocturnal fatalities (Erickson *et al.*2001). A wide variety of species have been found during mortality surveys. There appears to be little evidence that the species composition of nighttime collision-related fatalities can be predicted either quantitatively or qualitatively. Mortality from daytime collisions may be qualitatively assessed, however, based on some available information. Reported fatalities at existing developments in agricultural landscapes indicate that one species in particular, the horned lark, may be more susceptible to collisions than other species. Horned larks have frequently been reported as the most abundant species found during mortality searches, although at many of these sites they are also one of the most abundant breeding species (Erickson *et al.*2001). Compared to nearly all other grassland nesting species male horned larks undertake very active aerial displays during the nesting season. These displays typically take them higher above the ground (up to 244m, 800') than other species with aerial displays such as bobolink (Beason and Franks 1974). Consequently, this species is likely at greater risk of colliding with wind turbines located in their breeding territories relatively to other species of open habitats.

Erickson *et al*. (2001, 2002) provided a summary of known avian collisions with wind turbines, which are often calculated as the number of fatalities/turbine/year. Fatality rates varied from 0 to 4.5 fatalities/turbine/year with most of the reported rates being less than 2 fatalities/turbine/year. Subsequent work has generally provided similar results with respect to avian fatalities at existing wind farms. They estimate an average of 2.19 bird fatalities/turbine/year in the United States, although this estimate does not reflect the variability in fatalities among wind energy facilities (i.e., some have reported dozens of fatalities while others have reported very few or none). However, they do recognize that sites in California have significantly more fatalities than elsewhere, and estimate the fatality rate to be lower outside of California, at approximately 1.83 fatalities/turbine/year (corrected for searcher efficiency and scavenging).

Based on 15,000 wind turbines in operation in the United States at that time, and a mortality of 2.19 birds per turbine per year, they suggest that 33,000 birds are killed each year by wind turbines in the U.S.A., 26,600 of which are killed in California. Although this may seem to be a large number of bird deaths, the impact is relatively small compared to the millions of birds that travel through wind farms each year and the millions of birds that die due to collision with transmission lines, vehicles, buildings and communication towers; for example, it is estimated that a total of 80 million birds are killed on American roads each year (Erickson *et al*. 2001, 2002). Table 4-1 provides a summary of some causes of bird mortality across the nation and estimates of the annual number of fatalities. As the table indicates, estimates of mortality at wind energy developments is orders of magnitude lower than estimates of mortality from other sources.

Table 4-1. Summary of nation-wide bird mortality estimates

Structure/Cause	Total Bird Fatalities	Reference
Vehicles	60 - 80 million	1
Building and Windows	98 - 980 million	2
Powerlines	10,000 - 174 million	1
Communication Towers	4 - 50 million	1
Wind Generation Facilities	10,000 - 40,000	1
Agricultural Pesticides	67 million	3
Housecats	100 million	4

1 Erickson *et al.* 2001
2 Klem 1991
3 Pimentel and Acquay 1992
4 Coleman and Temple 1993

Although most studies of the potential wildlife impacts of wind power facilities have focused on collisions of birds with turbines, bats are also vulnerable to collisions with wind turbines. In fact, wind projects have emerged as a potentially significant source of mortality for migrating bats following results of a study conducted at the Mountaineer Wind Energy Facility in Tucker County, West Virginia. That study estimated that approximately 2,000 bats collided with wind turbines between April 20 and November 9, 2003 (Johnson and Strickland 2004, Kerns and Kerlinger 2004). Subsequent fieldwork in 2004 at the Mountaineer site and nearby Meyersdale Wind Facility has revealed even higher rates of bat collision mortality with operating wind turbines (Arnett *et al.* 2005). These studies documented mortality at eastern wind power developments of nearly one bat per turbine per day during a swarming period survey (Arnett 2005) and an annual estimate at 46.2 fatalities/turbine/year, which far exceeds any reported fatality rates for avian species (Johnson and Strickland 2004).

These studies have raised numerous concerns regarding the potential for collision mortality associated with wind turbines to impact bat populations (Williams 2003). The concerns lie primarily with wind farms on forested ridgelines in the eastern United States, where documented bat fatality rates have been considerably higher (bats/turbine/year) than at western and mid-western wind farms (Johnson *et al*. 2000, Williams 2003, Arnett *et al.* 2005). Mortality at western and mid-western facilities is much lower, with documented fatality rates ranging from only 0.07 to 2.32 fatalities/turbine/year (Erickson *et al.* 2002). However, emerging evidence from one facility on the prairies of Alberta indicate that bat mortality in those open habitats can be comparable to that observed along the forested ridgelines of the central Appalachian mountains (pers. comm. unpublished data presented by Robert Barclay, University of Calgary, Alberta, at the North American Symposium on Bat Research, October 2005).

Researchers currently have limited understanding of the specific factors influencing rates of bat collision mortality, although evidence from the timing of fatalities documented at existing wind facilities and other structures suggests that migrating bats are at the highest risk, while risk during the summer feeding and pup-rearing period is low (Johnson and Strickland 2004, Johnson *et al*. 2003, Whitaker and Hamilton 1998). Additionally, only certain species of bats may be at risk. Of the 45 species of bats that occur in the United States, only 6 have been found during mortality searches (Erickson *et al.* 2002). These include hoary bat, eastern red bat, silver-haired bat, big brown bat, little brown bat, and eastern pipistrelle.

The combined literature on wind turbine related mortality is slowly providing a clearer picture of the potential local, regional, and national impact of these facilities on birds and bats. While there are still many unknowns regarding the causes and total impact of collision related mortality it appears that impacts to birds may be low relative to other known causes of mortality. Mortality surveys have provided a baseline of methods and results on which to establish future investigations and base assessments of risk at proposed developments.

4.2 POTENTIAL RISK OF COLLISION RISK AT THE COHOCTON WIND POWER PROJECT

4.2.1 Raptors

The fatality of raptors at California wind farms was the catalyst for investigations of the effects of wind energy developments on birds. The high rates of mortality that have been found in California, particularly at Altamont Pass, are attributable to at least five factors. These include: high raptor density, high prey density, high turbine density, short lattice towers, and fast spinning blades that blur at high wind speeds. The combination of these factors is unique to projects within California, although not all projects within that state include all of these factors.

Newer projects that have been constructed outside of California and within the last five to ten years have significantly different characteristics than those found at Altamont Pass and other California developments with high raptor density. In general, newer sites have much lower raptor density and probably lower prey densities (Erickson *et al*. 2002). Additionally, newer developments have widely spaced turbines, tall tubular towers and blades that spin slow enough to be visible even at high wind speeds. The result from these characteristics is that fewer raptors have been documented colliding with wind turbines that at the California facilities. In fact, scarcely more than 10 raptors have been found at all projects outside of California that have been used for mortality surveys (the number of projects at which mortality surveys have been conducted is in the range of 15, with many of them investigated for more than 1 year). This compares with more than 100 raptors a year found at Altamont Pass and estimates of thousands killed annually at that facility.

The Cohocton Wind Power Project shares the characteristics of other modern wind energy developments outside of California. Raptor density has been shown to be very low, particularly during the migration period. No specific information on prey density is available but it is likely low in tilled croplands and, since raptor density is not high, it’s anticipated that prey density is not significantly high. Turbine density in the project area will be very low. Turbines will be clumped in groups of two to six, but spacing within these groups will be 457 m (1500’) or more and groups will occasionally be miles apart. Most importantly, wind turbines will consist of tall tubular towers and slow moving blades.

The anticipated mortality of raptors at the Cohocton Wind Power Project is expected to be similar to that observed at other modern facilities at which mortality surveys have occurred. Specifically, raptor fatalities are expected to be uncommon. Of the mortality surveys that have occurred over the past five years very few raptor fatalities have been reported. The belief behind this is that because of their day-time habits and the slow moving blades of modern large turbines, raptors are aware of the spinning blades and avoid them. The Cohocton Wind Power Project is no different from those other facilities and, consequently, the risk of raptors colliding with the proposed turbines is anticipated to be low. This assessment of low risk to raptors includes migrating raptors as well as raptors that are resident or nesting locally within and in the vicinity of the project area, including the bald eagles nesting at Canandaigua and Hemlock Lakes.

4.2.2 Waterfowl and Water Birds

Similar to raptors, very few waterfowl or water birds have been found during mortality surveys at existing wind energy developments, despite the characteristics of some species that might actually make them seem to be more at risk of colliding with wind turbines. The Top of Iowa project provides supporting evidence that waterfowl are at low risk of colliding with wind turbines. Despite extremely high waterfowl use of that project area and the surrounding vicinity, including direct observations of nearly 500 flocks of Canada geese feeding in fields with wind turbines, no waterfowl mortality has been observed at that project.

The Cohocton Wind Power Project does include turbines that will be located in fields that will likely be used by flocks of migrating geese. Based on the available information from other facilities, however, the risk of fatalities to waterfowl and water birds to collide with the proposed wind turbines is very low.

4.2.3 Songbirds

To date, the number of passerine fatalities observed by collisions with wind turbines in the United States and Europe has been relatively small compared to other forms of collision and non-collision related mortality. The primary reason that migrating passerines are infrequently killed appears to be that these birds migrate at altitudes above the wind sweep area of wind turbines. The lower heights and absence of guy wires on new wind turbines may account for lower mortality of passerines.

Fall 2004 and spring 2005 radar surveys documented the passage of night migrating birds through the project area and breeding bird surveys documented that community in the fields and woods of the project area. The overall level of activity documented during those surveys is within the range of other similar surveys that have been conducted over the past several years. Beyond that it is not possible to use those data to quantitatively identify the overall impact of the Cohocton Wind Power Project to songbirds because of a lack of a predictive model that links pre-construction radar data to fatality rates.

Instead, fatality rates from other projects can be used to determine a possible level of impact at the proposed project. Use of fatality rates from other wind energy developments should be used only if those projects are representative of the project being assessed (i.e., in the same region and with similar landscape characteristics) or if differences between those projects can be identified to place any results in better perspective.

Mortality from surveys at existing facilities is typically expressed as the number of fatalities/turbine/year. As such, the overall mortality expected at a given project gets larger as the size (i.e., number of turbines) of a proposed wind energy development increases. The Cohocton Wind Power project, as proposed, would include up to 41 wind turbines[1]. This is fairly representative of most projects either already operating in the eastern United States or being proposed in New York State.

Mortality rates at existing projects have ranged from 0 to 6 fatalities/turbine/year. The overall national average of mortality at existing wind facilities has been calculated at 2.19 fatalities/turbine/year (Erickson *et al*. 2002). Results from California wind resource areas are generally higher than at facilities outside of California and the mortality rate from all surveys conducted outside the state is lower, at 1.83 fatalities/turbine/year. Using these fatality rates and the proposed number of turbines at the Cohocton Wind Power Project (41) an estimate of the potential fatality rate can be calculated. Using the full range of mortality estimates anywhere from 0 to 246 birds may be expected to potentially collide with the proposed turbines annually. Using the national and outside-California averages of 2.19 and 1.83, estimates of mortality range from 90 down to 75 fatalities/turbine/year, respectively.

There is considerable uncertainty in calculating any expected mortality at a proposed wind energy development. As outlined above, pre-construction data cannot definitively predict the number of collision-related fatalities at a proposed project. Therefore mortality data from existing sites has been used to calculate some potential fatality estimates. While fatality at any site could vary based on a number of biological and physical characteristics of that site there is no indication that the Cohocton Wind Power Project would result in collision-related fatality that is significantly different (either less or greater than) that which has been found at other facilities. In this respect,

[1] Note that this assessment pertains only to the project as currently proposed and does not incorporate an expanded project that is being considered by UPC Wind Management, LLC.

the pre-construction surveys have their greatest utility. The brief radar survey indicated that night-time migration through the project is within the range of and similar to other sites. Similarly, the day-time raptor migration did not document any significant concentrations of birds in the vicinity of the project.

Consequently, until additional methods to quantitatively predict risk are developed risk assessment will remain largely qualitative. The calculated collision rates listed above are simply rough estimates using the only data available. On a purely qualitative basis, songbird mortality from the Cohocton Wind Power Project is anticipated to generally be low due to the low height of the turbines relative to the flight heights measured with the radar at this and other nearby sites and the emerging evidence that songbird and overall avian mortality at modern wind facilities is low.

4.2.4 Bats

Bat mortality at wind projects in the eastern United States has recently been identified as a potential risk to certain bat populations (Williams 2003). Wind projects have been cited as a potential threat to migrating bats for a number of years, especially since a study at the Mountaineer Wind Energy Facility in Tucker County, West Virginia, documented 475 dead bats between April 20 and November 9, 2003 (Johnson and Strickland 2004). Subsequent fieldwork in 2004 at the Mountaineer site and nearby Meyersdale Wind Facility has revealed even higher rates of bat collision mortality with operating wind turbines (Arnett *et al.* 2005). These studies have raised numerous concerns regarding the potential for collision mortality associated with wind turbines to impact bat populations (Williams 2003). The concerns lie primarily with wind farms in the eastern United States, where documented bat fatality rates have been considerably higher (bats per turbine per year) than at western wind farms (Williams 2003, Arnett *et al.* 2005).

Bat collision mortality during the breeding season is virtually non-existent, despite the fact that relatively large populations of some bat species have been documented in close proximity to some wind facilities that have been investigated. These data suggest that wind plants do not currently impact resident breeding bat populations in the United States. All available evidence indicates that most of the bat mortality at wind plants in the United States involves migrant or dispersing bats in the late summer and fall.

Researchers currently have limited understanding of the specific factors influencing rates of bat collision mortality, although evidence from the timing of fatalities documented at existing wind facilities and other structures suggests that migrating bats along some Appalachian ridgelines are at the highest risk (Johnson and Strickland 2004; Johnson *et al*. 2003; Whitaker and Hamilton 1998). A number of plausible hypotheses explaining the high rates of bat mortality have been presented by bat researchers, but none of these have been adequately tested. The most likely mechanisms explaining bat collision center on the possibility that ridges act as corridors for migrating or feeding bats, that bats are unable to detect turbines visually or by echolocation, or that bats may be attracted to wind turbines due to artificially high insect concentrations, light attraction, or acoustic attraction. Other researchers believe that during migration bats turn off their echolocation to conserve energy (Arnett *et al.* 2005).

Nine species of bats occur in New York, based upon their normal geographic range. These are the little brown myotis, northern myotis, (*Myotis septentrionalis*), Indiana bat, eastern small-footed myotis (*M. leibii*), silver-haired bat, eastern pipistrelle, big brown bat, eastern red bat, and hoary bat (Whitaker and Hamilton 1998). Of these, the Indiana bat is federally listed as Endangered, and the small-footed bat is listed as a Species of Special Concern by the state of New York. According to the New York Department of Environmental Conservation, eight

Indiana bat hibernacula are present in New York. These hibernacula, however, are located in the eastern part of the state (NYDEC website, accessed 12/30/04).

The results of the relatively few studies that have documented bat fatalities at existing wind facilities indicate that the risk of bats colliding with wind turbines can be higher than that for birds. The actual mortality rates observed range from 0.07 to 2.32 fatalities/turbine/year at facilities in open and mixed landscapes in the west and mid-west (Erickson *et al.* 2002) to 46.2 fatalities/turbine/year at facilities located on forested ridgelines in the east (Johnson and Strickland 2004). In a similar exercise as was used previously for birds, estimates of the number of bats that may collide with wind turbines at the Cohocton Wind Power Project can be derived by multiplying reported mortality rates by the number of proposed turbines. This results in estimates of 3 to 95 bat fatalities per year if fatality rates similar to western and mid-western projects are realized and 1,894 bat fatalities per year if fatality rates are similar to rates found at facilities along forested ridgelines of the central Appalachians.

The question remains, however, of how similar or different the Cohocton Wind Power Project is to those facilities that have been investigated for bat mortality. Clearly, it is not identical to either of these two categories of facilities, although it does share some characteristics of each. The project will be located in an agricultural landscape. The turbines themselves will be placed in fields on rolling hills. These characteristics are similar to those of western and mid-western facilities. The project area itself is located atop a plateau that is separated from other plateaus by steep-sided, narrow valleys. It is also located in the eastern United States where bat populations in general may be higher than western and mid-western areas due to the prevalence of forested habitat. These characteristics are similar to those of the eastern facilities have been investigated.

The result of comparisons of the Cohocton Wind Power Project with other projects that have been investigated for mortality is that the proposed project probably lies somewhere in between those other projects with respect to the risk of bat collisions with turbines. Exactly where within the range of mortality rates observed is not known. Until additional data emerge and any reliable predictive models can be developed using a single or a mix of techniques (radar, echolocation call detection, thermal imaging), risk assessments of bats will remain largely qualitative.

The use of fatality rates from other projects has been used largely to provide a reasonable range of fatalities that could occur, should fatality rates of the proposed project be similar to those other facilities that have been investigated. On a qualitative basis, bat mortality at the proposed Cohocton Wind Power Project is anticipated to generally be moderate, relative to those other facilities. Certainly, the risk of collisions for bats is expected to be higher than that for birds. Future research will lend insight and help researchers better understand the impacts of wind turbines on bat populations.

5.0 Conclusions

Wind technology is advancing quickly, and potential environmental effects seen in earlier studies may be avoided with proper siting of facilities and newer turbine and facility designs. Only recently have improved studies on the potential effects of wind energy developments on birds and bats been emerging to assist with the assessment of new proposed projects to these animals that are vulnerable to colliding with wind turbines.

Comparison of the physical setting of the proposed Cohocton project and the biological communities of the bird and bat populations in the vicinity of the project provide a reasonable expectation that potential mortality at the project could be within the range of mortality found at existing facilities. Certainly, no one characteristic of the proposed project yields any anticipation that mortality could be significantly different (either higher or lower). Consequently, it is anticipated that the overall risk of bird collisions is low, which is based on observed mortality rates at existing facilities.

However, bats may be more susceptible and thus the risk for these species is higher than for birds. While the project may not reflect the fairly low collision rates found at western and mid-western projects, neither is it expected that it will reflect the alarming rates found along forested ridgelines of the central Appalachians. In this respect, the risk of bat collisions with the proposed turbines is generally anticipated to be moderate.

Future investigations of fatality rates at modern facilities in a variety of landscapes remain the only way to definitively identify the impact of new projects on birds and bats. Additionally, future studies that combine mortality surveys with survey techniques that are typically used during pre-construction studies (i.e., radar, acoustic, thermal imaging, visual diurnal studies) may be the only way that predictive models of risk for new projects can be derived.

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Appendix A

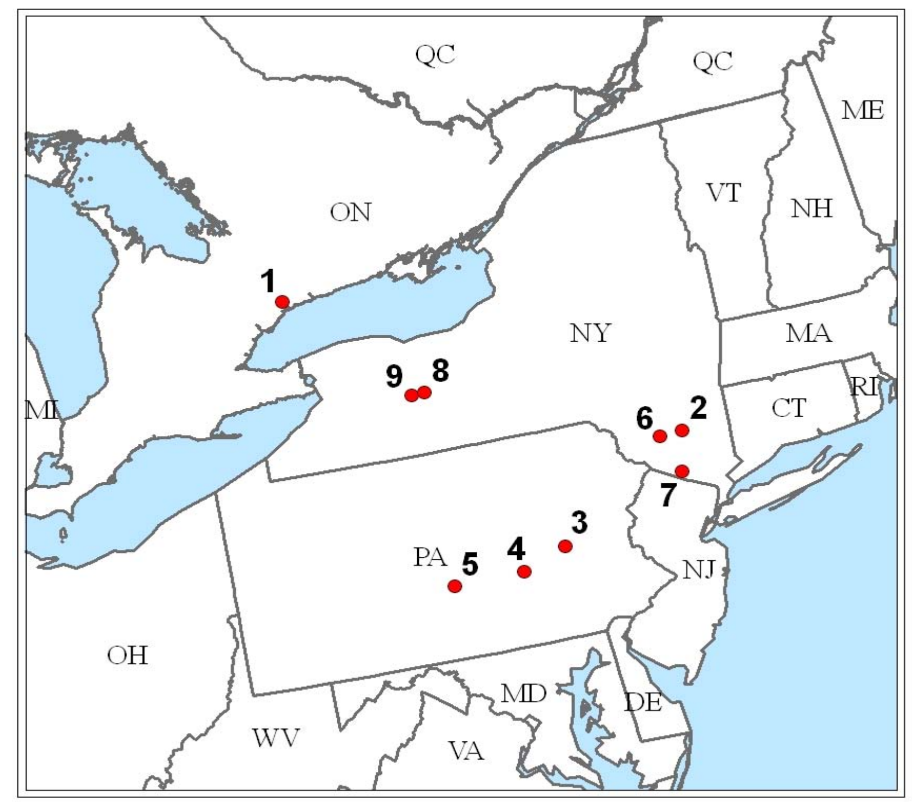
Appendix A Table 1. Summary of Fall 2004 Hawk Count Surveys at WindFarm Cohocton and Other Regional Hawk Watch Sites*

Site Number**	Location	Observation Hours	TV	OS	BE	NH	SS	CH	NG	RS	BW	RT	RL	GE	AK	ML	PG	UR	UB	UA	UF	UE	TOTAL	BIRDS/ HOUR
1	**Cranberry Marsh, Ontario**	306	1174	116	40	126	920	106	23	19	895	1003	322	10	448	44	30	131	0	0	0	0	5407	17.7
2	**Mohonk Preserve, NY**	39.5	0	32	4	7	88	7	1	2	1436	12	0	0	24	4	5	27	0	0	0	0	1649	41.7
3	**Hawk Mountain, PA**	752	177	672	215	178	2958	534	31	212	6387	2855	10	88	358	100	44	146	0	0	0	0	15031	20.0
4	**Second Mountain, PA**	719	1050	193	86	103	1508	252	48	132	1633	1322	4	54	111	32	12	65	0	0	0	0	7404	10.3
5	**Stone Mountain, PA**	252.75	0	101	37	59	584	146	15	36	1027	893	1	79	50	24	17	64	0	0	0	0	3134	12.4
6	**Summitville, NY**	82.5	112	20	9	2	131	50	4	5	788	64	0	1	12	11	2	14	0	0	0	0	1225	14.8
7	**Mount Peter, NY**	317	199	121	24	23	754	86	1	24	1913	339	1	1	78	4	8	45	0	0	0	0	3665	11.6
8	**Prattsburgh, NY**	73	81	2	0	6	10	1	0	0	23	52	0	0	3	2	0	4	30	3	2	1	220	3.0
9	**Cohocton Wind Power Project**	41.29	35	0	0	20	3	1	1	0	0	62	1	0	0	1	0	2	1	1	0	0	128	3.1

* Data obtained from HMANA website.

** See map to right for site location.

Abreviation Key:
TV - Turkey Vulture
OS - Osprey
BE - Bald Eagle
NH - Northern Harrier
SS - Sharp-shinned Hawk
CH - Cooper's Hawk
NG - Northern Goshawk
RS - Red-shouldered Hawk
BW - Broad-winged
RT - Red-tailed Hawk
RL - Rough-legged Hawk
GE - Golden Eagle
AK - American Kestrel
ML - Merlin
PG - Peregrine Falcon
UR - unidentified Raptor
UB - unidentified Buteo
UA - unidentified Accipiter
UF - unidentified Falcon
UE - unidentified Eagle



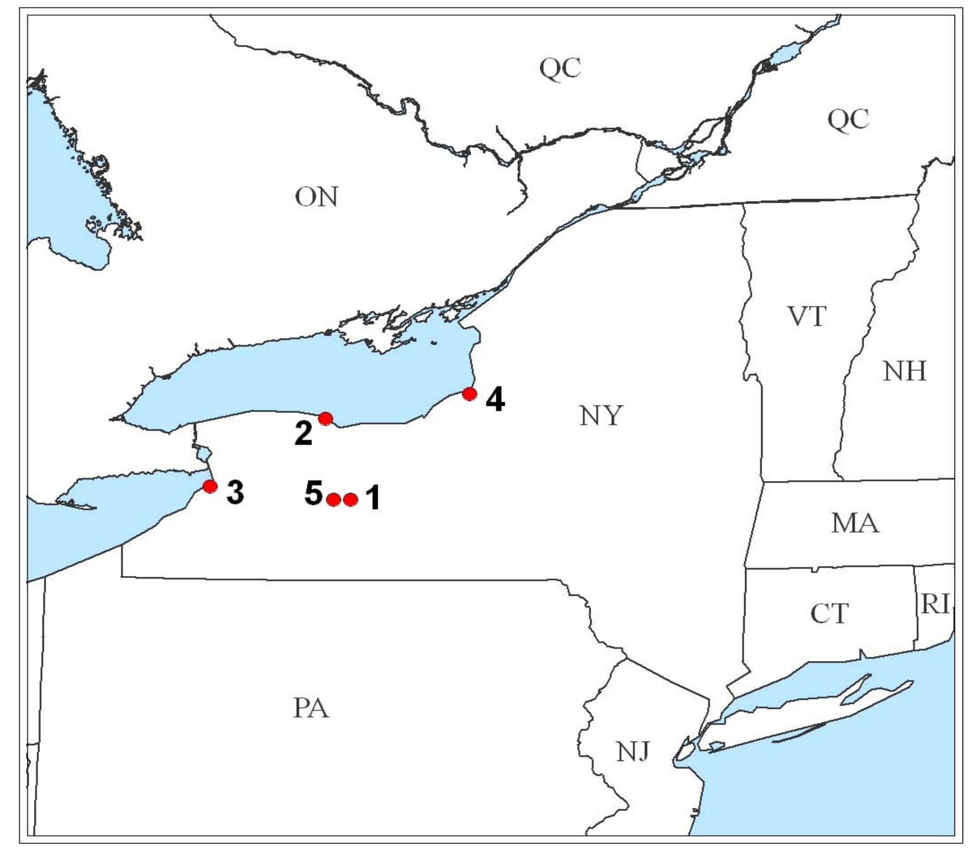
Appendix A Table 2. Summary of Spring 2005 Hawk Count Surveys at WindFarm Cohocton and Other Regional Hawk Watch Sites*

Site Number**	Location	Observation Hours	BV	TV	OS	BE	NH	SS	CH	NG	RS	BW	RT	RL	GE	AK	ML	PG	SW	UR	UB	UA	UF	UE	TOTAL	BIRDS/ HOUR
1	**Prattsburgh, NY**	60	0	111	4	4	17	23	16	2	5	11	77	11	1	11	1	1	0	0	19	0	0	0	314	5.2
2	**Braddock Bay, NY**	464.75	1	9019	102	115	701	1382	392	47	200	16294	2004	318	31	188	22	12	3	0	0	0	0	0	30,831	66.3
3	**Hamburg, NY**	396.25	0	7838	109	42	76	525	124	2	299	2503	1368	42	3	95	3	6	0	106	0	0	0	0	13,141	33.2
4	**Derby Hill, NY**	386.75	1	6834	278	137	423	1510	330	26	501	8928	4022	369	49	158	29	4	0	24	0	0	0	0	23,626	61.1
5	**Cohocton Wind Power Project**	60	0	61	0	0	10	14	2	0	3	7	40	7	0	3	2	1	0	3	9	0	2	0	164	2.7

* Data obtained from HMANA website.
** See map to right for site location.

Abreviation Key:

BV - Black Vulture
TV - Turkey Vulture
OS - Osprey
BE - Bald Eagle
NH - Northern Harrier
SS - Sharp-shinned Hawk
CH - Cooper's Hawk
NG - Northern Goshawk
RS - Red-shouldered Hawk
BW - Broad-winged
RT - Red-tailed Hawk
RL - Rough-legged Hawk
GE - Golden Eagle
AK - American Kestrel
ML - Merlin
PG - Peregrine Falcon
SW - Swainson's Hawk
UR - unidentified Raptor
UB - unidentified Buteo
UA - unidentified Accipiter
UF - unidentified Falcon
UE - unidentified Eagle



Appendix A Table 3. Summary of Fall 2005 Hawk Count Surveys at WindFarm Cohocton and Other Regional Hawk Watch Sites*

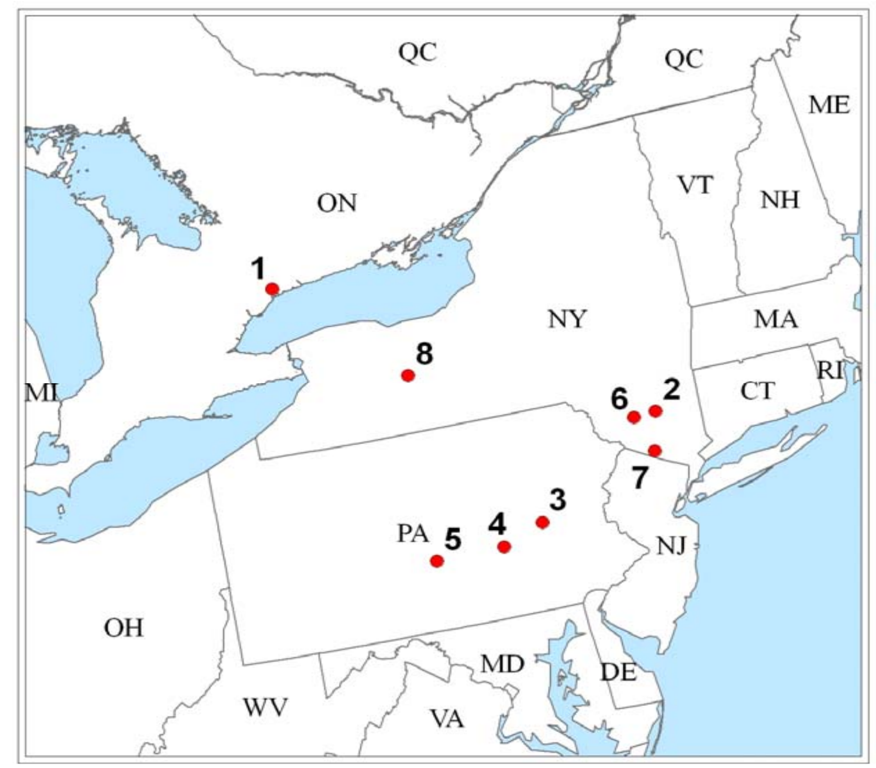
Site Number**	Location	Observation Hours	TV	OS	BE	NH	SS	CH	NG	RS	BW	RT	RL	GE	AK	ML	PG	UR	UB	UA	UF	UE	TOTAL	BIRDS/ HOUR
1	**Cranberry Marsh, Ontario**	248.5	2920	122	40	89	1216	153	10	43	220	996	19	19	482	27	15	134	0	0	0	0	6505	26.2
2	**Mohonk Preserve, NY**	19.5	0	6	1	1	28	4	0	0	15	4	0	0	7	1	4	5	0	0	0	0	76	3.9
3	**Hawk Mountain, PA**	751.9	358	480	154	118	4360	1025	12	198	5273	2647	1	51	465	189	52	131	0	0	0	0	15579	20.7
4	**Second Mountain, PA**	677.5	172	189	69	88	1843	272	46	77	3082	849	0	35	105	39	25	57	0	0	0	0	7024	10.4
5	**Stone Mountain, PA**	190	43	65	22	37	766	262	6	56	425	935	1	31	92	33	9	30	0	0	0	0	2814	14.8
6	**Summitville, NY**	77.25	120	53	16	10	205	58	8	13	660	306	1	6	24	4	8	21	0	0	0	0	1518	19.7
7	**Mount Peter, NY**	287.67	55	126	25	39	1067	130	4	11	3783	130	0	1	144	37	16	52	0	0	0	0	5669	19.7
8	**Cohocton Wind Power Project**	40.12	57	0	0	11	5	3	0	0	16	26	1	0	5	0	0	6	0	1	0	0	131	3.3

* Data obtained from HMANA website on 11-1-05.

** See map to right for site location.

Abreviation Key:

TV - Turkey Vulture
OS - Osprey
BE - Bald Eagle
NH - Northern Harrier
SS - Sharp-shinned Hawk
CH - Cooper's Hawk
NG - Northern Goshawk
RS - Red-shouldered Hawk
BW - Broad-winged
RT - Red-tailed Hawk
RL - Rough-legged Hawk
GE - Golden Eagle
AK - American Kestrel
ML - Merlin
PG - Peregrine Falcon
UR - unidentified Raptor
UB - unidentified Buteo
UA - unidentified Accipiter
UF - unidentified Falcon
UE - unidentified Eagle



Appendix B

Appendix B Table 1
Summary of Breeding Bird Survey Data

Species (in order of overall abundance)	**Mean No. of Birds per Survey for each BBS Route (1989 – 1998 data).**			
	Naples (BBS 61110)	***Candice L (BBS 61050)***	***Mendo (BBS 61051)***	***Branchport (BBS 61049)***
European Starling (*Sturnus vulgaris*)	106.67	67.64	116.29	148.17
Red-winged Blackbird (*Agelaius phoeniceus*)	98.57	64.48	100.65	119.5
American Robin (*Turdus migratorius*)	61.5	63.96	61.94	84.89
Common Grackle (*Quiscalus quiscula*)	72.37	30.64	48.65	45.44
American Crow (*Corvus brachyrhynchos*)	41.07	47.28	34.21	63.28
Song Sparrow (*Melospiza melodia*)	37.07	31.12	36.32	41.5
House Sparrow (*Passer domesticus*)	48.33	18.44	42.65	36.06
Barn Swallow (*Hirundo rustica*)	17.13	22.88	21.32	38.33
American Goldfinch (*Carduelis tristis*)	16.37	18.2	23.41	33
Yellow Warbler (*Dendroica petechia*)	14.93	14.88	16.24	26.78
Mourning Dove (*Zenaida macroura*)	18.07	11.68	21.32	19.17
Bank Swallow (*Riparia riparia*)	9.9	10.48	0.38	45.06
Common Yellowthroat (*Geothlypis trichas*)	8.42	15.52	8.06	32.33
Northern Cardinal (*Cardinalis cardinalis*)	20.17	17.08	17.06	9.83
Bobolink (*Dolichonyx oryzivorus*)	3.4	22.12	12.97	22.22
Rock Dove (*Columba livia*)	2.87	3.8	17.74	33.83
House Wren (*Troglodytes aedon*)	12.03	18.8	6	7.44
Savannah Sparrow (*Passerculus sandwichensis*)	9.1	8.92	8.79	13.83
Cedar Waxwing (*Bombycilla cedrorum*)	7.53	7.28	3.38	21.56
Brown-headed Cowbird (*Molothrus ater*)	12.43	10.24	5.85	11.17
Eastern Meadowlark (*Sturnella magna*)	4.93	8.08	8.24	16.89
Red-eyed Vireo (*Vireo olivaceus*)	9.03	10.16	3.94	14.89
Blue Jay (*Cyanocitta cristata*)	9.67	11.08	6.03	11.17
Black-capped Chickadee (*Poecile atricapillus*)	8.2	13.92	4.06	11.5
Indigo Bunting (*Passerina cyanea*)	9.43	12.36	6.65	8.33
Chipping Sparrow (*Spizella passerina*)	0	0	14.68	21.56
Field Sparrow (*Spizella pusilla*)	6.33	11.88	3.74	13.83
House Finch (*Carpodacus mexicanus*)	13	8.16	4.38	8.78
Ring-necked Pheasant (*Phasianus colchicus*)	2.83	4.64	22.68	3.67
Wood Thrush (*Hylocichla mustelina*)	5.07	10.72	4.85	12.28
Gray Catbird (*Dumetella carolinensis*)	11.57	0	6.32	14.89
Baltimore Oriole (*Icterus galbula*)	10.23	8.8	5.68	6.33
Tree Swallow (*Tachycineta bicolor*)	8.97	2.36	2.68	8.06
Killdeer (*Charadrius vociferus*)	3.6	4.76	8.5	5
Eastern Towhee (*Pipilo erythrophthalmus*)	3.03	5.44	1.41	10.44
Willow/Alder Flycatcher (*Empidonax* spp.)	0.83	3.88	3.26	10
Eastern Phoebe (*Sayornis phoebe*)	4.93	3.28	1.85	5.56
Eastern Kingbird (*Tyrannus tyrannus*)	2.43	3.28	2.71	6.28
Northern Flicker (*Colaptes* spp.)	4.63	3.52	2.32	3.94

(continued)

Appendix B Table 1 (continued)
Summary of Breeding Bird Survey Data

Species (in order of overall abundance)	**Mean No. of Birds per Survey for each BBS Route (1989 – 1998 data).**			
	Naples (BBS 61110)	***Naples (BBS 61110)***	***Naples (BBS 61110)***	***Naples (BBS 61110)***
Chimney Swift (*Chaetura pelagica*)	3.63	1.76	1.12	7.67
Purple Martin (*Progne subis*)	4.33	2.76	6.74	0
Eastern Wood-Pewee (*Contopus virens*)	3.1	6.04	1.32	2.06
Great Crested Flycatcher (*Myiarchus crinitus*)	2.9	4.8	1.32	2.5
Warbling Vireo (*Vireo gilvus*)	4.23	2.84	1.41	2.11
Chestnut-sided Warbler (*Dendroica pensylvanica*)	1	1.72	1.32	5.06
Willow Flycatcher (*Empidonax traillii*)	0.77	2.08	3.09	3.06
Scarlet Tanager (*Piranga olivacea*)	2.2	2.72	0.94	2.89
Alder Flycatcher (*Empidonax alnorum*)	0.07	1.16	0.18	6.94
Eastern Bluebird (*Sialia sialis*)	1.6	1.32	1.06	4.11
Canada Goose (*Branta canadensis*)	1.43	0.32	0.76	5.44
Brown Thrasher (*Toxostoma rufum*)	1.17	1.36	1.97	3.44
Downy Woodpecker (*Picoides pubescens*)	2.57	2.16	1.59	1.5
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)	0.87	1.32	1.85	3.33
Mallard (*Anas platyrhynchos*)	2.53	0.84	1.35	2.44
Blue-winged Warbler (*Vermivora pinus*)	0.83	1.64	0.41	3.78
Veery (*Catharus fuscescens*)	0	2.12	1.68	2.72
Vesper Sparrow (*Pooecetes gramineus*)	1.83	1.36	0.38	2.78
Ovenbird (*Seiurus aurocapillus*)	0	1.84	0.82	3.39
American Redstart (*Setophaga ruticilla*)	0.9	0.28	0.68	3.83
White-breasted Nuthatch (*Sitta carolinensis*)	2.17	1.72	0.74	0.83
Horned Lark (*Eremophila alpestris*)	1.73	0.76	1.09	1.28
Grasshopper Sparrow (*Ammodramus savannarum*)	0.3	0.88	0.68	3
American Kestrel (*Falco sparverius*)	0.33	0.56	1.26	2.39
Red-tailed Hawk (*Buteo jamaicensis*)	0.37	1.24	0.71	1.72
Tufted Titmouse (*Baeolophus bicolor*)	1.1	1	0.59	1.28
Red-bellied Woodpecker (*Melanerpes carolinus*)	0.9	1.04	0.74	1.06
Northern Mockingbird (*Mimus polyglottos*)	0.43	0.24	2.68	0.22
Dark-eyed Junco (*Junco hyemalis*)	0.77	1.6	0.06	0.94
N. Rough-winged Swallow (*Stelgidopteryx serripennis*)	0.73	0.48	0.21	1.78
Least Flycatcher (*Empidonax minimus*)	0.37	0.96	0.5	1
Purple Finch (*Carpodacus purpureus*)	0.47	0.44	0.38	1.39
Great Blue Heron (*Ardea herodias*)	0.57	0.36	0.59	1.11
Ruby-throated Hummingbird (*Archilochus colubris*)	0.3	0.36	0.32	1.28
Hooded Warbler (*Wilsonia citrina*)	0.17	0.32	0.85	0.83
Swamp Sparrow (*Melospiza georgiana*)	1.3	0.56	0.15	0.06
Ring-billed Gull (*Larus delawarensis*)	0.37	0.04	0.06	1.56
Yellow-throated Vireo (*Vireo flavifrons*)	1.43	0.2	0.12	0.22
Black-billed Cuckoo (*Coccyzus erythropthalmus*)	0.1	0.4	0.35	0.67

(continued)

Appendix B Table 1 (continued) Summary of Breeding Bird Survey Data				
Species (in order of overall abundance)	**Mean No. of Birds per Survey for each BBS Route (1989 – 1998 data).**			
	Naples (BBS 61110)	***Naples (BBS 61110)***	***Naples (BBS 61110)***	***Naples (BBS 61110)***
Pileated Woodpecker (*Dryocopus pileatus*)	0.07	0.24	0.38	0.78
Yellow-billed Cuckoo (*Coccyzus americanus*)	0.1	0.36	0.56	0.44
Hairy Woodpecker (*Picoides villosus*)	0.1	0.2	0.41	0.67
Belted Kingfisher (*Ceryle alcyon*)	0.7	0.48	0.15	0
Henslow's Sparrow (*Ammodramus henslowii*)	0	0.16	0.15	1
Green Heron (*Butorides virescens*)	0.37	0.44	0.21	0.17
Black-th. Green Warbler (*Dendroica virens*)	0.13	0.44	0.35	0.22
Sapsucker (3 species) (*Sphyrapicus* spp)	0	0.56	0	0.39
Yellow-bell. Sapsucker (*Sphyrapicus varius*)	0	0.56	0	0.39
Yellow-rumped Warbler (*Dendroica coronata*)	0	0.12	0	0.78
Turkey Vulture (*Cathartes aura*)	0.17	0.32	0.09	0.28
American Black Duck (*Anas rubripes*)	0	0	0.03	0.78
Wild Turkey (*Meleagris gallopavo*)	0	0.08	0.03	0.67
Blue-headed Vireo (*Vireo solitarius*)	0.1	0.08	0.41	0.17
Blue-gray gnatcatcher (*Polioptila caerulea*)	0.47	0.2	0	0
Yellow-breasted Chat (*Icteria virens*)	0.2	0.16	0	0.28
Upland Sandpiper (*Bartramia longicauda*)	0	0	0.53	0.06
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	0.13	0	0.44	0
Broad-winged Hawk (*Buteo platypterus*)	0	0.08	0.15	0.33
Hermit Thrush (*Catharus guttatus*)	0	0.24	0	0.28
Spotted Sandpiper (*Actitis macularia*)	0.07	0.16	0.21	0.06
American Bittern (*Botaurus lentiginosus*)	0.43	0	0.06	0
Cerulean Warbler (*Dendroica cerulea*)	0.4	0.08	0	0
Prairie Warbler (*Dendroica discolor*)	0	0	0	0.44
Ruffed Grouse (*Bonasa umbellus*)	0	0.04	0	0.39
Wood Duck (*Aix sponsa*)	0.3	0.04	0.09	0
Common Raven (*Corvus corax*)	0	0.04	0.03	0.33
Cooper's Hawk (*Accipiter cooperii*)	0.07	0.04	0.06	0.22
Magnolia Warbler (*Dendroica magnolia*)	0	0.2	0.06	0.11
Red-breasted Nuthatch (*Sitta canadensis*)	0	0.12	0.03	0.22
Carolina Wren (*Thryothorus ludovicianus*)	0.2	0.16	0	0
Louisiana Waterthrush (*Seiurus motacilla*)	0.17	0.08	0	0.11
Marsh Wren (*Cistothorus palustris*)	0.33	0	0.03	0
Sharp-shinned Hawk (*Accipiter striatus*)	0	0.04	0	0.28
Northern Harrier (*Circus cyaneus*)	0	0	0.09	0.22
Black-and-white Warbler (*Mniotilta varia*)	0.03	0	0.03	0.17
Blackburnian Warbler (*Dendroica fusca*)	0	0.04	0.06	0.11
Northern Bobwhite (*Colinus virginianus*)	0	0.04	0	0.17
Great Horned Owl (*Bubo virginianus*)	0	0	0.09	0.11
(continued)				

Appendix B Table 1 (continued) Summary of Breeding Bird Survey Data				
Species (in order of overall abundance)	**Mean No. of Birds per Survey for each BBS Route (1989 – 1998 data).**			
	Naples (BBS 61110)	***Naples (BBS 61110)***	***Naples (BBS 61110)***	***Naples (BBS 61110)***
Nashville Warbler (*Vermivora ruficapilla*)	0	0.08	0.06	0.06
Cliff Swallow (*Petrochelidon pyrrhonota*)	0	0.12	0	0.06
Golden-crowned Kinglet (*Regulus satrapa*)	0	0.16	0	0
Brown Creeper (*Certhia americana*)	0	0	0.09	0.06
Black-thr. Blue Warbler (*Dendroica caerulescens*)	0	0	0.03	0.11
Canada Warbler (*Wilsonia canadensis*)	0	0.12	0	0
Acadian Flycatcher (*Empidonax virescens*)	0	0	0	0.11
Eastern Screech-Owl (*Otus asio*)	0	0	0	0.11
Clay-colored Sparrow (*Spizella pallida*)	0	0.04	0	0.06
Virginia Rail (*Rallus limicola*)	0.1	0	0	0
Golden-winged Warbler (*Vermivora chrysoptera*)	0	0	0.03	0.06
Common Moorhen (*Gallinula chloropus*)	0.07	0	0	0
Common Snipe (*Gallinago gallinago*)	0	0.04	0.03	0
Pine Warbler (*Dendroica pinus*)	0	0.04	0.03	0
American Woodcock (*Scolopax minor*)	0	0	0.06	0
Blue-winged Teal (*Anas discors*)	0	0	0.06	0
Common Nighthawk (*Chordeiles minor*)	0	0.04	0	0
Northern Waterthrush (*Seiurus noveboracensis*)	0.03	0	0	0
Total Number of Species	***115***	***118***	***110***	***99***

Appendix B Table 2
Summary of New York State Breeding Bird Atlas information from Block 2971D during 2000-2005.

Common Name	Scientific Name	Behavior Code	Breeding Status
Acadian Flycatcher	*Empidonax virescens*	X1	Possible
Alder Flycatcher	*Empidonax alnorum*	FL	Confirmed
American Crow	*Corvus brachyrhynchos*	FL	Confirmed
American Goldfinch	*Carduelis tristis*	P2	Probable
American Kestrel	*Falco sparverius*	FL	Confirmed
American Redstart	*Setophaga ruticilla*	DD	Confirmed
American Robin	*Turdus migratorius*	FY	Confirmed
American Woodcock	*Scolopax minor*	X1	Possible
Baltimore Oriole	*Icterus galbula*	X1	Possible
Bank Swallow	*Riparia riparia*	X1	Possible
Barn Swallow	*Hirundo rustica*	ON	Confirmed
Barred Owl	*Strix varia*	X1	Possible
Belted Kingfisher	*Ceryle alcyon*	FL	Confirmed
Black-and-white Warbler	*Mniotilta varia*	X1	Possible
Black-billed Cuckoo	*Coccyzus erythropthalmus*	X1	Possible
Black-capped Chickadee	*Poecile atricapillus*	FY	Confirmed
Black-throated Green Warbler	*Dendroica virens*	FL	Confirmed
Blue Jay	*Cyanocitta cristata*	FL	Confirmed
Blue-gray Gnatcatcher	*Polioptila caerulea*	X1	Possible
Blue-headed Vireo	*Vireo solitarius*	X1	Possible
Blue-winged Warbler	*Vermivora pinus*	X1	Possible
Bobolink	*Dolichonyx oryzivorus*	FY	Confirmed
Brown Creeper	*Certhia americana*	X1	Possible
Brown-headed Cowbird	*Molothrus ater*	P2	Probable
Canada Goose	*Branta canadensis*	FL	Confirmed
Carolina Wren	*Thryothorus ludovicianus*	P2	Probable
Cedar Waxwing	*Bombycilla cedrorum*	FL	Confirmed
Chimney Swift	*Chaetura pelagica*	ON	Confirmed
Chipping Sparrow	*Spizella passerina*	FL	Confirmed
Common Grackle	*Quiscalus quiscula*	FY	Confirmed
Common Yellowthroat	*Geothlypis trichas*	FL	Confirmed
Cooper's Hawk	*Accipiter cooperii*	X1	Possible
Dark-eyed Junco	*Junco hyemalis*	FL	Confirmed
Downy Woodpecker	*Picoides pubescens*	FL	Confirmed
Eastern Bluebird	*Sialia sialis*	FY	Confirmed
Eastern Kingbird	*Tyrannus tyrannus*	FL	Confirmed
Eastern Meadowlark	*Sturnella magna*	X1	Possible
Eastern Phoebe	*Sayornis phoebe*	FL	Confirmed
Eastern Screech-Owl	*Megascops asio*	X1	Possible
Eastern Towhee	*Pipilo erythrophthalmus*	X1	Possible
Eastern Wood-Pewee	*Contopus virens*	X1	Possible
European Starling	*Sturnus vulgaris*	FL	Confirmed

(continued)

Appendix B Table 2 (continued)
Summary of New York State Breeding Bird Atlas information from Block 2971D during 2000-2005.

Common Name	Scientific Name	Behavior Code	Breeding Status
Field Sparrow	*Spizella pusilla*	X1	Possible
Gray Catbird	*Dumetella carolinensis*	ON	Confirmed
Great Blue Heron	*Ardea herodias*	X1	Possible
Great Crested Flycatcher	*Myiarchus crinitus*	FY	Confirmed
Great Horned Owl	*Bubo virginianus*	X1	Possible
Green Heron	*Butorides virescens*	X1	Possible
Hairy Woodpecker	*Picoides villosus*	X1	Possible
Hermit Thrush	*Catharus guttatus*	X1	Possible
Hooded Warbler	*Wilsonia citrina*	X1	Possible
Horned Lark	*Eremophila alpestris*	FL	Confirmed
House Finch	*Carpodacus mexicanus*	FY	Confirmed
House Sparrow	*Passer domesticus*	NY	Confirmed
House Wren	*Troglodytes aedon*	FY	Confirmed
Indigo Bunting	*Passerina cyanea*	X1	Possible
Killdeer	*Charadrius vociferus*	DD	Confirmed
Least Flycatcher	*Empidonax minimus*	X1	Possible
Magnolia Warbler	*Dendroica magnolia*	X1	Possible
Mallard	*Anas platyrhynchos*	FL	Confirmed
Mourning Dove	*Zenaida macroura*	FL	Confirmed
Northern Cardinal	*Cardinalis cardinalis*	FL	Confirmed
Northern Flicker	*Colaptes auratus*	FL	Confirmed
Ovenbird	*Seiurus aurocapillus*	DD	Confirmed
Pileated Woodpecker	*Dryocopus pileatus*	X1	Possible
Red-bellied Woodpecker	*Melanerpes carolinus*	P2	Probable
Red-eyed Vireo	*Vireo olivaceus*	FY	Confirmed
Red-tailed Hawk	*Buteo jamaicensis*	P2	Probable
Red-winged Blackbird	*Agelaius phoeniceus*	FL	Confirmed
Rock Pigeon	*Columba livia*	ON	Confirmed
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	FY	Confirmed
Ruby-throated Hummingbird	*Archilochus colubris*	X1	Possible
Scarlet Tanager	*Piranga olivacea*	X1	Possible
Song Sparrow	*Melospiza melodia*	FL	Confirmed
Spotted Sandpiper	*Actitis macularia*	FL	Confirmed
Swamp Sparrow	*Melospiza georgiana*	X1	Possible
Tree Swallow	*Tachycineta bicolor*	ON	Confirmed
Tufted Titmouse	*Baeolophus bicolor*	X1	Possible
Turkey Vulture	*Cathartes aura*	X1	Possible
Veery	*Catharus fuscescens*	X1	Possible
Virginia Rail	*Rallus limicola*	X1	Possible
Warbling Vireo	*Vireo gilvus*	FY	Confirmed
White-breasted Nuthatch	*Sitta carolinensis*	X1	Possible
Wild Turkey	*Meleagris gallopavo*	FL	Confirmed

(continued)

Appendix B Table 2 (continued)
Summary of New York State Breeding Bird Atlas information from Block 2971D during 2000-2005.

Common Name	Scientific Name	Behavior Code	Breeding Status
Willow Flycatcher	*Empidonax traillii*	X1	Possible
Winter Wren	*Troglodytes troglodytes*	X1	Possible
Wood Duck	*Aix sponsa*	FL	Confirmed
Wood Thrush	*Hylocichla mustelina*	FL	Confirmed
Yellow Warbler	*Dendroica petechia*	FL	Confirmed
Yellow-billed Cuckoo	*Coccyzus americanus*	X1	Possible
Yellow-rumped Warbler	*Dendroica coronata*	X1	Possible
Yellow-throated Vireo	*Vireo flavifrons*	X1	Possible
	Total Number of Species	***92***	

NYS Breeding Bird Atlas Behavior Code Key:

X1 - Species seen in possible nesting habitat or singing male(s) present in breeding season. Possible
S2 - Singing male present on more than one date in the same place. Probable
P2 - Pair observed in suitable habitat in breeding season. Probable
T2 - Bird (or pair) apparently holding territory. Probable
D2 - Courtship and display, agitated behavior. Includes copulation, well developed brood patch, or cloacal protuberance. Probable
N2 - Visiting probable nest site. Probable
B2 - Nest building or excavation of a nest hole. Probable
DD - Distraction display or injury-feigning. Confirmed
UN - Used nest found. Confirmed
FE - Female with egg in the oviduct. Confirmed
FL - Recently fledged young. Confirmed
ON - Adults(s) entering or leaving nest site indicating occupied nest. Confirmed
FS - Adult carrying fecal sac. Confirmed
FY - Adult(s) with food for young or feeding young. Confirmed
NE - Nest and eggs, bird on nest or egg, or eggshells beneath nest. Confirmed
NY - Nest with young. Confirmed

Appendix C

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **FAX:** (518) 402-8925
Website: www.dec.state.ny.

Erin M. Crotty
Commissioner

November 3, 2005

RECEIVED
NOV 07 2005
EDR, P.C.

Brian Schwabenbauer
Environmental Design & Research
238 West Division St
Syracuse, NY 13204

Dear Mr. Schwabenbauer:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to an Environmental Assessment for the proposed Cohocton Wind Power Project #05-005, area as indicated on the map you provided, located in the Towns of Avoca, Cohocton and Prattsburgh, Steuben County.

Enclosed is a report of rare or state-listed animals and plants, significant natural communities, and other significant habitats, which our databases indicate occur, or may occur, on your site or in the immediate vicinity of your site. The information contained in this report is considered sensitive and may not be released to the public without permission from the New York Natural Heritage Program.

PLEASE NOTE: For Windpower Projects, we report all records found within the project boundary and any avian records that may be located within a 10-mile buffer of the project boundary. We also report Indiana bat hibernaculum that may be located within a 40-mile buffer of the project boundary.

The presence of rare species may result in this project requiring additional permits, permit conditions, or review. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, at the enclosed address.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our databases. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species or significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental impact assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information

Sincerely,

Betty Ketcham

Betty A. Ketcham, Information Services
NY Natural Heritage Program

cc: Reg. 8, Wildlife Mgr.
Mark Wothal, Bureau of Habitat, 4th floor, Albany
Peter Nye, Endangered Species Unit, 5th floor, Albany
Jack Nasca, Environmental Permits, 4th floor, Albany