ENVIRONMENTAL PLANNING SERVICES

BIOLOGICAL SURVEY

THE PRESERVE
OLD SAYBROOK, WESTBROOK AND ESSEX, CT

PREPARED FOR:

RIVER SOUND DEVELOPMENT, LLC

October 27, 2004

89 BELKNAP ROAD, WEST HARTFORD, CONNECTICUT 06117
PHONE 860-236-1578 FAX

EXECUTIVE SUMMARY

Environmental Planning Services (EPS) was retained to conduct various wetland and biological surveys at the 1000± acre tract of land known as The Preserve in Old Saybrook, Westbrook and Essex, CT. EPS staff completed an inventory of the flora and the mammalian fauna at the site, as well as wetland delineation and functional assessment of an additional 27± acre parcel (aka Pianta parcel) added to the site adjacent to Bokum Road in Old Saybrook. The wetland delineation and functional assessment of the balance of the parcel, as well as an avian survey were completed by others in conjunction with a prior application at the site. EPS reviewed this work, based on our knowledge of the site, and experience with other land use applications in Connecticut. Our conclusion was that this work was appropriate for use without supplementation, with the exception of additional wetland delineation and functional assessment work which was completed for the Pianta parcel. EPS staff also assisted in data collection for Dr. Michael Klemens' herpetological survey of the site.

A total of twenty one (21) mammal species were observed on the site by EPS staff. An additional 9 species are considered probable site users, and 2 species are considered possible site users. A total of 57 avian species were detected during the survey protocol and during incidental observations at the site. None of the wildlife species are listed as Threatened or Endangered under federal or state law. The site offers relatively intact forested wetland and non-wetland habitat and the species found at the site are considered typical of such habitat.

Six plant communities were identified at the site: old field, mixed hardwood forest, wooded swamp, Atlantic White Cedar Swamp, shrub/scrub swamp, and wet meadow/emergent marsh. Mixed hardwood forest is the dominant community, with wooded swamps and narrow, linear old fields in a utility right-of-way also common. Two specific areas of note floristically, are the small Atlantic White Cedar Swamp in the southeastern corner of the site, and the floating shrub mat wetland known as Pequot Swamp Pond in the center of the site.

No US or CT-listed Endangered or Threatened or plant species were identified at the site. Three (3) plant Species of Special Concern (Connecticut listing) were identified at the site, Prickly Pear *(Opuntia humifusa)*, occurs on bedrock knolls in partial sun. False Hop Sedge, (*Carex lupuliformis)* is present in Wetland 16, a wet meadow in the utility right-of- way and in Wetland 38 (a vernal pool with open canopy due to recently logging). A smaller, less robust population of *C. lupuliformis* was identified in Wetland 36, which is more shaded It appears that long term vegetation management is necessary to sustain this species at the site. *Polygala cruciata* was identified at two (2) locations in the southeast portion of the site in 2003. It was not present in 2004.

We were unable to identify any individuals of the other state-listed plants reported from the site vicinity by the CT DEP to the Environmental Review Team; Yellow-fringed Orchid (*Platanthera ciliaris*), Coast Sedge(*Carex exilis*), Lily-leaved Twayblade (*Liparis*

lilifolia), or Reticulated Nutrush *(Scleria reticularis)*, despite timing our surveys to overlap periods when these plants would be most conspicuous.

The wetlands at the site can generally be characterized as red maple swamps that provide a point of shallow groundwater interchange, provide good quality habitat for wetland-associated wildlife, export biomass, store and detain floodwaters, and have a large upland buffer. They receive few if any pollutants, have limited habitat diversity, lack permanent open water, and do not support a diverse array of wetland-dependent birds or mammals. Such wetlands are typical of this ecological setting. However, the overall size of the site and the contiguous wetland units within it sets these Red Maple swamps apart from others in the region. These large, intact wetland units are not common in coastal Connecticut.

No wetlands will be filled, dredged, drained or directly altered for the project, with the exception of canopy removal in golf play-over areas and for golf cart bridges. The road network will require two bridge crossings of wetlands, which have been located at narrow points. No watercourses will be impounded or diverted. Therefore, it is our judgment that the hydrologic functions (i.e., flood flow alteration, groundwater recharge/discharge, and water quality renovation) of the wetlands will not be significantly altered. The wetlands ability to collect and convey stormwater will remain unimpaired. They will continue to function as groundwater discharge zones and to a limited seasonal extent as recharge areas. Their water quality renovation function will not be substantially altered. A stormwater report has been prepared by the project engineers, which details the engineering analysis that supports this conclusion.

Indirect impacts have been avoided and/or minimized. There will be some alteration of habitat as clearing for sightlines and carry areas over the wetlands and watercourses occurs. This will have the net result of altering the distribution and abundance of wildlife at the site. Disturbance and area-sensitive woodland species may be adversely affected, while disturbance tolerant, shrub land, and grassland species may be positively affected, as a result of decreased competition and increased habitat. In our judgment, this wildlife support function is the only function of the wetlands to be altered in any significant way by the proposal. The clearing has been reduced to the minimum necessary for safe play. Herbaceous and shrub vegetation in the wetlands will be preserved.

This impact has been minimized by the exclusive use of cluster and conservation subdivision regulations, large open space set-asides (64% of the site) and careful planning to maintain ecological connectivity between open space areas throughout the site. Furthermore, the golf course Integrated Turf and Pest Management Plan has been designed to prevent adverse impacts to wetland wildlife. Additional protection of native habitat will be provided by an express exclusion of non-native, invasive plants from any site landscaping plans.

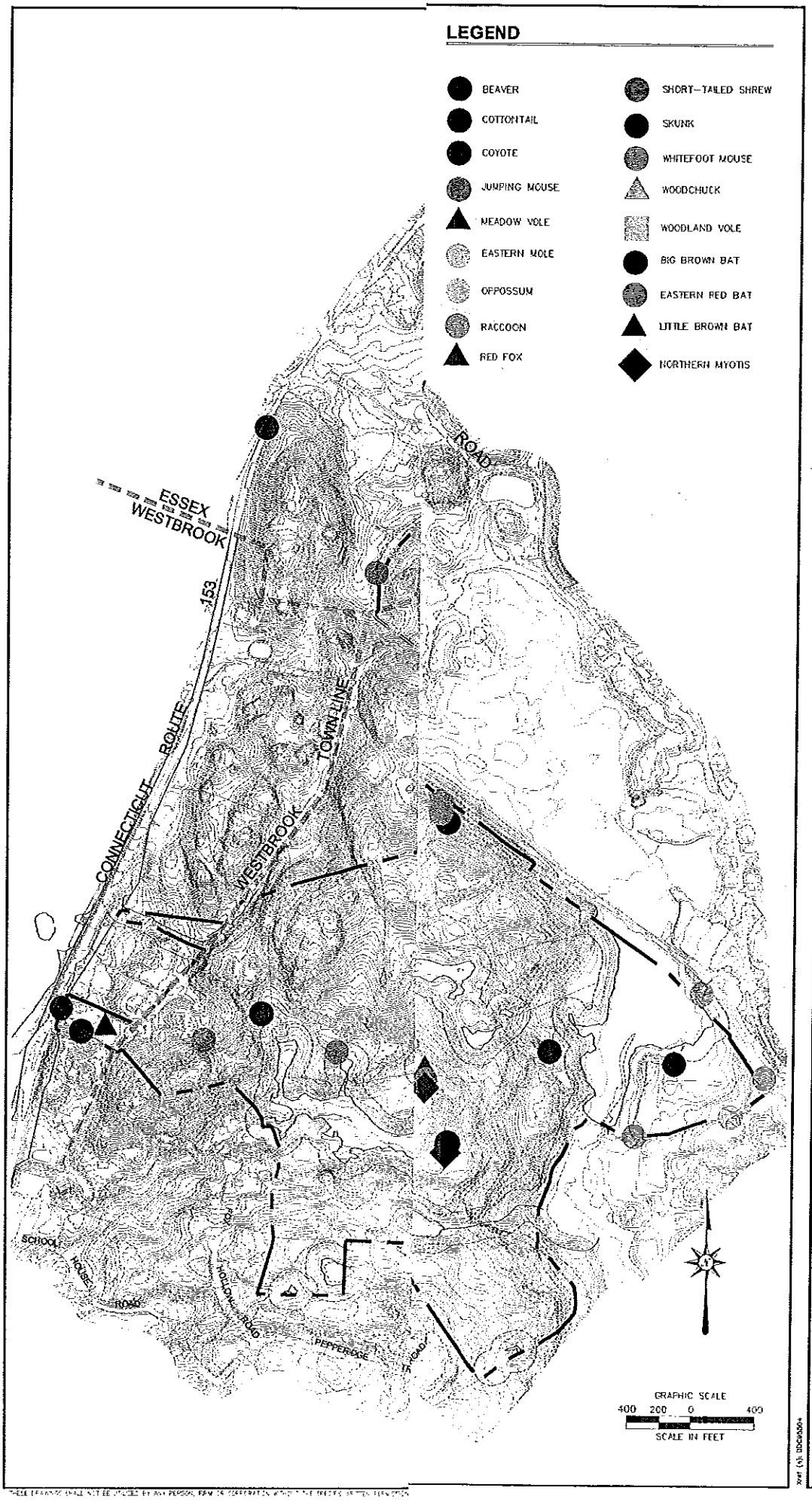
A detailed mitigation plan has been prepared to provide for enhancement and maintenance of biotic productivity at the site after construction is complete. This plan includes a variety of habitat elements:

1. Use of native grasses, forbs, shrubs, and trees to restore regulated areas adjacent to wetlands.
2. Installation of wildlife structures, including brush piles and nesting boxes.
3. Regular consultation with a botanist and a wetland scientist during construction.
4. Long term monitoring of restoration/mitigation success by a botanist and wetland scientist.

Stormwater runoff from the completed golf course and residential development will be managed to minimize the potential for adverse impacts during course operation. A detailed plan for detention and stormwater quality treatment has been prepared, which includes grit and oil separators, water quality basins and swales, and biofiltration. The detailed seeding, fertilization, and integrated pest management recommendations submitted will minimize contaminants in the runoff. The grading has been designed to treat runoff quality by directing discharges to water quality basins or extensive natural buffers throughout the site. There will be no direct discharges to watercourses. Final polishing will be in the wetlands via natural processes prior to eventual discharge to watercourses.

Table 1: Mammal species list for The Preserve in Old Saybrook, Essex and Westbrook.

Common Name	Scientific Name
Observed Species	
Opossum	*Didelphis virginiana*
Short-tailed Shrew	*Blarina brevicauda*
Eastern Mole	*Scalopus aquaticus*
Eastern Chipmunk	*Tamias striatus*
Woodchuck	*Marmota monax*
Gray Squirrel	*Sciurus carolinensis*
Beaver	*Castor canadensis*
White-footed Mouse	*Peromyscus leucopus*
Meadow Vole	*Microtus pennsylvanicus*
Woodland Vole	*Microtus pinetorum*
Meadow Jumping Mouse	*Zapus hudsonius*
Coyote	*Canis latrans*
Red Fox	*Vulpes vulpes*
Raccoon	*Procyon lotor*
Striped Skunk	*Mephitus mephitus*
White-tailed Deer	*Odocoileus virginiana*
Cottontail	*Sylvilagus sp.*
Little Brown Bat	*Myotis lucifugus*
Big Brown Bat	*Eptisicus fuscus*
Eastern Red Bat	*Lusiurus borealis*
Northern Myotis	*Myotis septentrionalis*
Probable Species	
Masked Shrew	*Sorex cinereus*
Water Shrew	*Sorex palustris*
Smoky Shrew	*Sorex fumeus*
Star-nosed Mole	*Condylura cristata*
Southern Flying Squirrel	*Glaucomys volans*
Gray Fox	*Urocyon cinereoargenteus*
Short-tailed Weasel	*Mustela erminea*
Long-tailed Weasel	*Mustela frenata*
Bobcat	*Lynx rufus*
Possible Species	
Southern Red-backed Vole	*Clethrionomys gapperi*
Southern Bog Lemming*	*Synaptomys cooperi*
**Species of special concern*	



BL Companies

ARCHITECTURE
ENGINEERING
PLANNING
LANDSCAPE ARCHITECTURE
LAND SURVEYING
ENVIRONMENTAL SCIENCES

355 Research Parkway
Meriden, CT 06450
(203) 630-1406
(203) 630-2616 Fax

Data Collected and Mapped By
Michael Klein

ENVIRONMENTAL PLANNING SERVICE
89 Belknap Rd.
West Hartford, CT 06117
Tel. (860) 236-1578

THE PRESERVE
OLD SAYBROOK, WESTBROOK, ESSEX
MIDDLESEX COUNTY, CONNECTICUT

REVISIONS
No. Date Desc.

Designed	–
Drawn	K.T.
Checked	
Approved	
Scale	1"=400'
Project No	01C955-F
Date	xx/xx/xx
CAD File	AMC95508

Title

MAMMAL SPECIES

Sheet No.

CADD FILE: PRESENTATION11-03-01/AMC95508

Opossum ***(Didelphis virginiana)***
Opossums occur throughout Connecticut, in wooded situations typically around wet lowlands and often near human habitation. Opossums are considered highly adaptable to a variety of habitats and are often common in urban and suburban areas (Whitaker and Hamilton 1998). They are nocturnal, omnivorous and non-territorial. Over the past century, the opossum's range has been slowly expanding. Opossums did not occur in New England before 1900 (Degraaf and Yamasaki 2000). Opossum activity was noted by tracks in upland forest on the western side of the property, near the Westbrook town line and a dead specimen on Ingham Hill Road in Old Saybrook. It is expected that opossums occur throughout the site.

Short-tailed Shrew ***(Blarina brevicauda)***
The Short-tailed Shrew occurs throughout Connecticut. Short-tailed Shrew activity was noted in the northeastern portion of the site on the unimproved section of Ingham Hill Road in Essex. Short-tailed Shrews occur in a variety of habitats, from forested to fairly open (Degraaf and Yamasaki 2000). Getz (1961) wrote that *Blarina* is not limited in its local distribution by any particular type of vegetation. It is found in all types ranging from entirely herbaceous to entirely woody. Getz concluded that moisture was the limiting factor for this species. He found that it avoided areas of low soil moisture as well as areas of standing water. It is expected that this species is found throughout the site, mainly in low areas as well as in the wetlands themselves, provided they are not inundated with water. The more pronounced, open canopy upland knolls are likely avoided assuming that drier conditions exist in these areas.

Eastern Mole ***(Scalopus aquaticus)***
The Eastern Mole is common statewide. *S. aquaticus* occurs in pastures, lawns, meadows (less often open woodlands) in moist loamy or sandy soils (Degraaf and Yamasaki 2000). This species is fossorial and is rarely observed above ground. Mole hills left by *S. aquaticus* were found throughout the site in upland forest as well as the utility right-of-way. It is expected that this species occurs throughout the site, but may be less abundant or absent from deep woods and absent from wetland habitats.

Eastern Chipmunk ***(Tamias striatus)***
The Eastern Chipmunk is abundant statewide. *T. striatus* are found primarily in deciduous woods, but also coniferous forest, brushy areas (Degraaf and Yamasaki 2000), farms, and suburban habitats where sufficient cover such as stumps, logs or stone walls are found (Whitaker and Hamilton 1998). *T. striatus* was found in abundance throughout the site. The observational locations for *T. striatus* were not included on the attached map because their abundance and site-wide distribution made mapping impractical and unnecessary.

Woodchuck ***(Marmota monax)***
The Woodchuck is abundant statewide. Woodchucks inhabit open woodlands, rolling farmland, pastures, meadows, open brushy hillsides, grassy highway right-of-ways and utility corridors. This species is well adapted to human-dominated landscapes (Degraaf

and Yamasaki 2000). The woodchuck was considered scarce when the country was first settled, but increased its numbers with the cutting of forests and development of farmland. A woodchuck den and individual was observed in the eastern utility right of way on a slope in dense herbaceous cover. It is likely that they are distributed throughout the utility right-of-way as well as brushy forest edges.

Gray Squirrel *(Sciurus carolinensis)*
The Gray Squirrel is abundant statewide. Gray Squirrels inhabit mature deciduous and mixed forests with mast-producing tree species, especially *Quercus* sp., *Carya* sp., and *Juglans* sp. They are also found in forested bottomlands, towns, suburban woodlots, and city parks (Degraaf and Yamasaki 2000). Gray squirrels were found in abundance in the wooded portions of the site. The observational locations for *S. carolinensis* were not included on the attached map because their abundance and site-wide distribution made mapping impractical and unnecessary.

Beaver *(Castor canadensis)*
Beavers occur throughout Connecticut (Wilson 2001). Beaver inhabit small to large slowly flowing brooks, streams, rivers, or lakes that are usually, but not necessarily, bordered by woodland. Seasonally fluctuating or fast moving waters tend to be avoided (Degraaf and Yamasaki 2000). Evidence of Beaver feeding was found on the perimeter of Wetland 16. It appears, however that no recent feeding has occurred but is evidence that beaver are active in this watershed. More recent beaver activity was noted in the northern wetland on the Bokum Road parcel. Beavers often inhabit an area for a period of time and then move on when food sources are exhausted. They may return to a wetland area when food sources regenerate. Other suitable wetland areas for beaver habitation are Wetland 35 and Pequot Swamp Pond. Many of the central wetland areas are likely unsuitable for beaver due to seasonal water level fluctuations and intermittent surface flows.

White-footed Mouse *(Peromyscus leucopus)*
P. leucopus occurs in abundance throughout Connecticut. It inhabits a wide variety of forested and open habitats. When compared to *P. maniculatus,* Populations of *P. leucopus* are distributed in more arid habitats dominated primarily by white pine, hemlock and oak (Choate 1973). White-footed Mice were found throughout the southern and western portions of the site in upland forest, palustrine emergent wetlands and wetland edges. It is expected that they are found throughout the site, except in areas of standing water.

Meadow Vole *(Microtus pennsylvanicus)*
The meadow vole is one of the most abundant mammals in New England (Degraaf and Yamasaki 2000). This species occurs in a variety of grass-dominated habitats. Getz (1961) found that *M. pennsylvanicus* occurred only in grass-like vegetation and that no particular species of grass or sedge was favored. *M. pennsylvanicus* was observed around the old abandoned house on the western side of the property as well as the adjacent grassy field on Route 153. It is expected that they occur in the grassy areas of the utility right-of-way, but none were observed.

Woodland Vole *(Microtus pinetorum)*
The Woodland Vole occurs throughout Connecticut. This species inhabits a variety of habitats including deciduous forests, grasslands, meadows, and orchards. *M. pinetorum* favors well drained uplands, but sometimes occurs in marshes and swamps (Degraaf and Yamasaki 2000). Miller and Getz (1969) studied *M. pinetorum* in central Connecticut and found that of 228 individuals captured only 8 occurred in swampy situations; and the majority occurred in upland oak forest. They appear to be most abundant on sloping portions of the upland (Miller and Getz 1969). One individual was found along the northern boundary of the site, at the edge of oak dominated forest adjacent to Ingham Hill Road. Suitable habitat exists throughout the site in upland forested areas as well as the utility right-of-way.

Meadow Jumping Mouse *(Zapus hudsonius)*
The Meadow Jumping Mouse occurs throughout Connecticut. Meadow Jumping Mice favor areas of thick, herbaceous groundcover (Whitaker 1973) and can be found in moist grassy fields, marshes, meadows, willow-alder thickets along water courses, swamps and transition areas between wetlands and uplands and mixed occasionally dry meadows (Degraaf and Yamasaki 2000). One individual was observed in dense herbaceous vegetation in the northern utility right-of-way. Suitable habitat exists throughout this utility right-of-way.

Coyote *(Canis latrans)*
The coyote is common throughout Connecticut. Coyotes occupy a great range of habitats, ranging from open lands to forest, but they do not do well in dense forest (Whitaker and Hamilton 1998). Coyotes do well in areas with a mosaic of habitats. Coyote tracks were found throughout the site, concentrated on dirt roads and trails where tracks are more readily observed. It is likely that coyote activities are concentrated in open areas of the site such as the utility-right-of-way, where prey such as rabbit, woodchuck and small mammals are more abundant.

Red Fox *(Vulpes vulpes)*
The Red Fox is found throughout Connecticut. Red Fox can be found in a variety of habitats, but prefer a mosaic of forest, cropland and pasturage. Unbroken fields and dense forest are less used; and edges are heavily used (Degraaf and Yamasaki 2000). A Red Fox was observed in the rugged wooded uplands west of Pequot Swamp Pond and tracks were observed in the eastern utility right-of-way. It is expected that this species occurs throughout the site.

Raccoon *(Procyon lotor)*
The Raccoon is common throughout Connecticut. The Raccoon is found wherever a suitable combination of woods and wetlands provide acceptable food and den sites, from swamps and marshes to mesic woods, cultivated areas, and urban situations (Whitaker and Hamilton 1998). Raccoon tracks were noted throughout the site along the edge of wetlands, in the utility right-of-way, on the railroad tracks, and in the dirt roads. Two dead individuals were found in the southeast corner of the site near the railroad tracks. It is expected that Raccoon occur throughout the site.

Striped Skunk ***(Mephitus mephitus)***
The Striped Skunk occurs throughout Connecticut. They inhabit semi-open country, woods and meadows, agricultural lands, suburban areas and trash dumps (Degraaf and Yamasaki 2000). Three dead specimens were found; two on Route 153 and one in the grassy field adjacent to the abandoned house in Westbrook. Skunk home ranges can range in size from 900-1200 acres and therefore the individuals found offsite on Route 153 likely used the site. Suitable habitat for *M. mephitus* occurs throughout the site (see photo 2).

White-tailed Deer ***(Odocoileus virginiana)***
The White-tailed Deer is common and widespread throughout Connecticut. White-tails occur in a variety of habitats, but thrive in early mixed successional stages (Whitaker and Hamilton 1998). White-tails were found throughout the site. The observational locations for *O. virginiana* were not included on the attached map because their abundance and site-wide distribution made mapping impractical and unnecessary (see photo 3).

Cottontail ***(Sylvilagus sp.)***
Two species of cottontails occur in Connecticut, the Eastern Cottontail (*S. floridanus*) and the New England Cottontail (*S. transitionalis*). The Eastern Cottontail is an introduced species which is common statewide and is expanding its range (Goodie *2002*). *S. floridanus* occupies diverse habitats, from swampy woods and coastal dunes to upland thickets and farmland, and is often found in residential areas of sizable cities. This species seldom occurs in any numbers in heavy forest (Whitaker and Hamilton 1998).

The New England Cottontail is the only native rabbit species in Connecticut and historically was found statewide (Kilpatrick 2002). Goodwin (1932) stated "the New England cottontail is the common rabbit of Connecticut". Information on the abundance and distribution of New England cottontails is limited, but the little amount of information available suggests that populations are declining in Connecticut and throughout New England (*Connecticut Wildlife* 2002). Litvaitis (2001) stated that "currently, populations of (New England) cottontails are small, disjunct, and span approximately 20% of the area this species occupied historically". This decline is generally attributed to habitat alteration as well as competition from *S. floridanus* (Whitaker and Hamilton 1998). *S. transitionalis* inhabits wetlands, idle agricultural lands, power line corridors, and patches of regenerating forest. In these habitats, secondary succession has progressed approximately 10-25 years and understory vegetation provides food and cover (Litvaitis 2001).

One cottontail was observed near the southern property boundary west of Ingham Hill Road. Because of the difficulty in distinguishing these two species in the field, it is unknown whether this individual was *floridanus* or *transitionalis*. This sighting was not made by me but by another individual from our staff. Suitable habitat for cottontails exists mainly in the utility right-of-way as well as forest edges and large logging openings with dense sapling regeneration. Many hours were spent in the utility right-of-way and no rabbits were observed. Because of the time spent and the intensive search

Goodwin found *S. cooperi* feeding on large tussocks of grass. Getz (1961) studied *S. cooperi* in southern Michigan and found it in moist or wet grassy areas, where it fed on grassy vegetation. Degraaf and Yamasaki (2000) describe the habitat of *S. cooperi* as:

"a variety of open and forested habitats where shrublands and forests have an herbaceous ground cover; in both moist lowlands and well drained and dry uplands".

S. cooperi is not known to occur in the vicinity of the project towns. This species is known to occur mainly in the northeastern and northwestern hills of CT (Dickson, CT D.E.P., pers. comm.). The following specimens of *S. cooperi* cataloged at Yale University and the University of Connecticut, Storrs support this information:

The Southern Bog Lemming requires habitats that support green succulent monocots, primarily sedges and grasses (Whitaker and Hamilton 1998). This species will inhabit bog habitats if they support this type of vegetation. Pequot Swamp Pond does represent a bog environment; however these plants are not in abundance here. The sphagnum mat is dominated mainly by dense woody vegetation. The utility right-of-way is also possible habitat for this species, although most areas are devoid of dense grasses and sedges. Several of the forested wetlands are possible habitat, although again sedges and grasses are sparse and do not constitute the dominant ground cover type. Due to the lack of *S. cooperi* records in vicinity of the project and the presence of mostly suboptimal habitat on the site, it is our judgment that it is unlikely that *S. cooperi* is found on the site.

"Species of Special Concern" means any native plant species or any native nonharvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that its unregulated taking would be detrimental to the conservation of its population or has been extirpated from the state (CT Endangered Species Act).

Bats

Thirty-two individuals were captured representing 4 species. The most common species observed was the Little Brown Bat (*Myotis lucifugus*), followed by the Big Brown Bat (*Eptesicus fuscus*), Eastern Red Bat (*Lasiurus borealis*), and the Northern Myotis (*Myotis septentrionalis*). Each species was captured in approximately equal numbers. Echolocation sequences recorded within sample areas did not reveal the presence of additional species in the subject area.

Myotis lucifugus, the Little Brown Bat, was the most frequently encountered species at the subject area (n = 10). It is probably the most common species in Connecticut and is believed to have stable (and possibly increasing) populations. The success of this species is due primarily to their recent behavioral adaptation of roosting in man-made structures following European settlement (Sparks and Choate, 2001). Each of the 10 individuals captured during the survey were pregnant females, indicating that a maternity roost or roosts are located near the subject area. Although it is possible that some individuals are roosting in trees (their ancestral habitat; Whitaker and Hamilton, 1998) within the subject area, it is more likely that the maternity colonies are located in barns, house attics, and other man-made structures located along the border of the subject property. Little brown bats likely forage over the swamps and marshes located on the subject property, as

The survey did not reveal the presence of four species that occur in Connecticut. Three of the four species, the Indiana Myotis (*Myotis sodalis*; federally endangered), Silver-haired Hat (*Lasionycteris noctivagans*; state special concern), and Hoary Bat (*Lasiurus cinereus*; state special concern) are uncommon in Connecticut. No individuals of these species were observed during a 2002 mist net survey of Connecticut (Veilleux, unpublished data), and it is therefore reasonable that no individuals were observed at the subject area (although individuals could be present). The fourth species, the Eastern Pipistrelle (*Pipistrellus subflavus*), was not commonly encountered during a 2002 mist net survey of Connecticut, but populations are considered stable. Eastern Pipistrelles form small maternity colonies in foliage and prefer oak and maple trees as roosts (Veilleux et al., in press). The subject area contains suitable habitat for this species and it was surprising that pipistrelles were not encountered during the survey.

Avians

A total of fifty-seven (57) avian (bird) species were detected either during the survey protocol or otherwise (excluding so-called incidental observations as noted above). The property consists primarily of deciduous forest interior habitat with limited areas of semi-open or open wetlands as well as limited edge habitat. There is an electric power transmission line right-of-way that runs through or along much of the site creating the limited edge habitat (transition of one habitat type to a distinctly different habitat type). A fairly extensive unpaved trail system crosses much of the property. The species mix detected on the property represents a typical mix for forest interior habitat in southern Connecticut with some edge associated species found along the power line cut.

No avian species identified by the CT DEP as Endangered, Threatened, or Species of Special Concern were identified as breeding or otherwise using the site. One species that was observed flying overhead, Red-shouldered Hawk, was listed as Special Concern at the time of the 2002 survey. No nesting activity was detected at the site, but it cannot be ruled out, based on the available habitat. However, it is no longer state-listed, due to recent data that indicates that this bird is secure in CT.

Northern Goshawk (*Accipiter gentilis*)

Little long-term research on raptors has been accomplished in Connecticut. This has resulted in an incomplete understanding of the status of Northern Goshawk in the state. It is considered an uncommon to rare nester in large, mature forest tracts and is more common in the northwest portion of Connecticut. A single bird, carrying prey, was seen over-flying the site during the survey point protocol. It is a possible nester on the subject property but no confirmation was achieved. It is a very aggressive nest defender and is likely to attack any humans who stumble upon it nest by accident. As more of our state has returned to mature forests the population of Northern Goshawks may be increasing, but more research and field work is needed to be sure.

Owls and Nightjars

A nocturnal survey was performed to identify these birds. Three to four Barred Owls (*Strix varia*) were identified at the site. Eastern Screech Owl (*Otus asio*) was not found,

but is considered likely to be present at the site or nearby, based on habitat type and the distribution of the species in Connecticut. Great Horned Owl (*Bubo virginianus*) was not found on the site. A search for nightjars did not identify any Whippoorwills (*Caprimulgus vociferous*) was unsuccessful. These birds are colonial and very vocal. It is unlikely that any of these birds are present (but undetected) at the site."*

Great Crested Flycatcher (*Myiarchus crinitus*)
This species is one of the more common breeders on the site. This species is much more often heard than seen as it prefers to inhabit the forest canopy.

Wood Thrush (*Hylocichla mustelina*) This species is in an overall decline, probably not attributable to any one factor. The prime cause is loss of habitat on its wintering grounds outside of the United States. On the subject property Wood Thrushes were detected throughout in rather low densities. It is an uncommon to common nester in our woodlands, though at now reduced densities.

Veery (*Catharus fuscescens*)
Only one signing bird was detected on the site. This species nests on or very near the ground and requires more intact, forest floor vegetation than the Wood Thrush, which nests higher up. The relative openness of the forest habitat on the site probably is the prime reason for the very low number of this uncommon to common breeder in Connecticut woodlands. This species is also declining overall.

Cedar Waxwing (*Bombycilla cedrorum*)
This species was the most abundant species detected during the survey. A common Permanent resident of Connecticut, its behavior is somewhat erratic and unpredictable. It was most often seen flying about in small to large flocks.

Wood Warblers
This group of small, long distant migrants (aka neo-tropical migrants) makes up nearly 10% of the avian bio-diversity in Connecticut. Most birds in this group are also in statewide decline. Few Wood Warblers were detected at the site, with the exception of Ovenbird (*Seiurus aurocapillus*). Ovenbirds are common forest floor nesters in Connecticut woodlands and they were detected in average or slightly below average densities on the subject property. The only other Wood Warbler found in any number was Worm-eating Warbler (*Helmitheros vermivorus*). Worm-eating Warbler has been increasing in Connecticut woodlands and a handful were detected on the subject property.

Several species of Wood Warbler were found in surprisingly low numbers, including Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), and Hooded Warbler (*Wilsonia citrina*). The reason for the low numbers of Wood Warblers detected on the site is unknown.

Scarlet Tanager (*Piranga olivacea*) was found in average densities on the site. Its easily detected song was heard on the majority of survey points.

Rose-breasted Grosbeak (*Pheucticus ludovicianus*) is a denizen of the forest canopy for the most part and it was detected in rather low densities on the subject property.

Indigo Buntings (Passerina cyanea) are typically found in edge habitat or in reverting fields where significant brush has developed. It is declining in Connecticut due to loss of habitat to clearing or forest maturation. The power line cut through the northern part of the site has created some edge habitat and all the Indigo Buntings found during the survey were found along this cut.

VEGETATION INVENTORY

Six plant communities were identified at the site: old field, mixed hardwood forest, wooded swamp, Atlantic White Cedar Swamp, shrub/scrub swamp, and wet meadow/emergent marsh. These communities are described below, their extent is shown on the attached Vegetation Map, and a comprehensive floral species list is attached as an appendix. With the exception of the Atlantic White Cedar Swamp, these are all common plant communities in southern New England.

UPLAND

Old Field

Most of the old field vegetation occurs is narrow linear areas in power line right of ways and woods roads. The right of ways exhibit diverse vegetation due to variable topography from wet meadow to dry rocky knolls. The existing home sites on CT Route 153 (Essex Road) and Bokum Road also have open areas that range from old field to mowed turf.

The vegetation in this plant community consists predominantly of an extensive herb layer composed of various grasses *(Poaceae spp.)*, Little Bluestem *(Schizachyrium scoparium)*, Deertongue *(Panicum clandestinum)*, Queen Anne's Lace *(Daucus carota)*, Yarrow *(Achillea millefolium)*, Black-eyed Susan *(Rudbeckia hirta)*, Dwarf Cinquefoil *(Potentilla canadensis)*, Hay-scented Fern*(Deenstaedtia punctiloba)*, Bracken Fern *(Pteridium aquilinum)*, Haircap Moss *(Polytrichum commune)*, *Eupatorium spp.*, and goldenrods *(Solidago spp.)*.

The common woody colonizers of old field are present and include Red Cedar *(Juniperus virginiana)* with Gray Birch *(Betula populifolia)*, Black Birch *(Betula lenta)*, and Black Cherry *(Prunus serotina)*. The shrub layer consists mostly of sumac *(Rhus spp.)*, Gray Dogwood *(Cornus racemosa)*, and brambles *(Rubus spp.)*. In recent years, several invasive non-native species have come to be dominant colonizers of open land: Multiflora Rose* *(Rosa multiflora)*, Autumn Olive* *(Elaeagnus umbellata)*, and Asiatic Bittersweet* *(Celastrus orbiculatus)*. These three species are all common in the old field areas on the site and form locally dense thickets.

In the northeast right of way there are small patches of Tree-of-heaven* *(Ailanthus altissima)* and Common Reed*

Companies

ARCHITECTURE
ENGINEERING
PLANNING
LANDSCAPE ARCHITECTURE
LAND SURVEYING
ENVIRONMENTAL SCIENCES

355 Research Parkway
Meriden, CT 06450
(203) 630-1406
(203) 630-2615 Fax

Data Collected and Mapped By
Michael Klein

ENVIRONMENTAL PLANNING SERVICE
89 Belknap Rd.
West Hartford, CT 06117
Tel. (860) 236-1578

THE PRESERVE
OLD SAYBROOK, WESTBROOK, ESSEX
MIDDLESEX COUNTY, CONNECTICUT

REVISIONS

No.	Date	Desc.

Designed	K.K.K.
Drawn	K.T.
Checked	
Approved	
Scale	1"=400'
Project No.	016955-F
Date	xx/xx/xx
CAD File	AM095510

Title

VEGETATION

Sheet No.

Nov 01, 2004 2:09pm KTangeri P:\2002\016955-F\Veg Habitat\AM095510.dwg
Layout: AM0 11x17

Xref (s): 80095504

Mixed Hardwood Forest
This is the most abundant habitat on the site and is also the most plentiful and characteristic type of vegetation in Connecticut. Our forests are included in the Central Hardwoods-Hemlock zone in a classification of New England forests. Since most of Connecticut has been cleared in the past, forests are called second growth and usually consist of relatively young trees with a diameter at breast height (dbh) of less than one foot. Some of the forest at the site has recently been logged such that the tree canopy is quite open. Other areas indicate a practice of periodic logging. Species composition in both tree and shrub layer is diverse, reflecting the range of topography from crest, to mid-slope, to low-slope communities. Tree species consist predominantly of oaks *(Quercus spp.)*, Red Cedar *(Juniperus virginiana)*, Black Cherry *(Prunus serotina)*, Shagbark Hickory *(Carya ovata)*, White Ash *(Fraxinus americana)*, American Beech *(Fagus granifolia)*, Sugar Maple *(Acer saccharum)*, and Black Birch *(Betula lenta)*. The shrub layer is mostly Sweet Pepperbush *(Clethra alnifolia)*, Maple-leaved Viburnum, *(Viburnum acerifolium)*, Witch Hazel *(Hamamelis virginiana)*, Early Lowbush Blueberry *(Vaccinium pallidum)*, Black Huckleberry *(Gaylussacia baccata)*, Multiflora Rose* *(Rosa multiflora)*, brambles *(Rubus spp.)*, Spicebush *(Lindera benzoin)*, Mountain Laurel *(Kalmia latifolia)*, Pinxter-flower Azalea *(Rhododendron periclymenoides)*, and Japanese Barberry* *(Berberis thunbergii)*. The sporadic vine layer consists largely of Fox Grape *(Vitis labrusca)*, Common Greenbriar *(Smilax rotundifolia)*, Poison Ivy *(Toxicodendron radicans)*, Virginia Creeper *(Parthenocissus quinquefolia)*. The herb layer includes Hay-scented Fern *(Dennstaedtia punctiloba)*, Christmas Fern *(Polystichum acrostichoides)*, sedges , Canada Mayflower *(Maianthemum canadense)*, Poison Ivy, Virginia Creeper, White Wood Aster *(Aster divaricatus)*, grasses, sedges *(Carex spp.)*, and goldenrods *(Solidago spp.)*.

Bedrock knolls are scattered over the site and constitute a variant of the Mixed Hardwood Forest Community. These areas are vegetated with plants tolerant of shallow, droughty soils. The vegetation is characterized by oaks, Black Huckleberry, Lowbush Blueberry *(Vaccinium angustifolium)*, Pennsylvania Sedge *(Carex pensylvanica)*, Haircap Moss, and Mountain Laurel

WETLAND

Classes of Wetland Vegetation
Based on EPS' observations, we have identified three general classes of wetland vegetation present at the site:

- **Wet Meadow/Emergent Marsh**
  Wet meadows and emergent marshes are dominated by persistent and non-persistent grasses, sedges, rushes, and other herbaceous grass-like plants.

- **Shrub-Scrub Swamp**
  Shrub-scrub swamps are dominated by woody vegetation, shrubs with some scattered stunted trees, less than 20 feet (6 m) in height.

- **Wooded Swamp**
  Wooded swamps are the most abundant wetland type in Connecticut and have a vegetational community that is characterized by a forest canopy at least 20 feet (6 m) tall.

Wetland vegetation descriptions are intended to represent a composite characterization of each wetland type as a whole. There is some variation between wetland units that can all be characterized as one wetland class. For descriptions of each individual wetland please see the Wetland Functional Assessment, October 2002, prepared by Bob Russon of Environmental Planning and Soil Science, which is attached as an Appendix.

Wooded Swamps
Wooded swamp is the most extensive wetland class on the site and includes two large systems. One is associated with a westerly-flowing watercourse (Wetland 19) which originates in Pequot Woods Swamp, and drains to the west. The other is associated with a southerly flowing stream (Wetland 18) on the eastern portion of the site. There are also numerous isolated wet depressions and smaller wetlands at the site. Most of these are also wooded swamps.

The tree layer consists predominantly of Red Maple *(Acer rubrum)* with Black Gum *(Nyssa sylvatica)*, Green Ash *(Fraxinus pensylvanica)*, Yellow Birch *(Betula allegheniensis)*, Ironwood *(Carpinus caroliniana)*, Swamp White Oak *(Quercus bicolor)*, and Pin Oak *(Quercus palustris)* also present. The shrub layer is mainly Sweet Pepperbush *(Clethra alnifolia)*, Spicebush *(Lindera benzoin)*, Highbush Blueberry *(Vaccinium corymbosum)*, Winterberry *(Ilex verticillata)*, Arrow-wood *(Viburnum recognitum)*, and Multiflora Rose*. The moderately extensive vine layer is mostly locally dense Common Greenbriar, Fox Grape, Virginia Creeper *(Parthenocissus quinquefolia)*, and Poison Ivy. The herb layer is composed of Jewelweed *(Impatiens capensis)*, sedges *(Carex spp.)*, violets *(Viola spp.)*, various grasses *(Poaceae spp.)*, Cinnamon Fern *(Osmunda cinnamomea)*, Royal Fern *(Osmunda regalis)*, Swamp Dewberry *(Rubus hispidus)*, Sensitive Fern *(Onoclea sensibilis)*, New York Fern *(Thelypteris noveboracensis)*, Poison Ivy, False Hellebore *(Veratrum viride)*, and Skunk Cabbage *(Symplocarpus foetidus)*.

Atlantic White Cedar Swamp
Though relatively small, the Atlantic White Cedar *(Chamaecyparis thyoides)* stand in the southeast corner of the site is reproducing. It has been reduced in size by tree removal in the utility right-of-way. It is located within Wetland 35 mostly northwest of the utility right-of-way. The stand is relatively dense with some Red Maple and Black Gum also present. The understory is mostly dense Sweet Pepperbush with Swamp Azalea, and Highbush Blueberry. The herb layer includes Skunk Cabbage, Cinnamon Fern, Royal Fern, and peat moss.

Shrub-Scrub Swamp
Shrub/scrub vegetation occurs in several locations on the site such as portions of Wetland 35 and two beaver impoundments (the outlet of Wetland 16 and Wetland 43) which also have open water. The species composition is similar to the wooded swamps on the site, though somewhat less diverse. The tree/scrub layer includes Red Maple and Black Gum. The shrub layer is largely Highbush Blueberry, Sweet Pepperbush, Speckled Alder *(Alnus incana)*, Swamp Rose *(Rosa palustris)*, Swamp Azalea *(Rhododendron viscosum)*. The vine layer along the periphery is mostly Common Greenbriar. The herb layer consists mostly of Cinnamon Fern, Skunk Cabbage, and Tussock Sedge *(Carex stricta)*.

Pequot Swamp Pond (Wetland 19)
Pequot Swamp Pond is a large ponded wetland which consists predominantly of an extensive floating shrub swamp mat with a wooded fringe, some open water, and emergent marsh vegetation. The shrub mat is composed primarily of Sweet Pepperbush, Water Willow *(Decodon verticillatus)*, Buttonbush *(Cephalanthus occidentalis)*, Highbush Blueberry, Red Maple, Steeplebush *(Spiraea tomentosa)*, and Swamp Azalea. The herb layer is mostly peat moss *(Sphagnum spp.)*, *Carex canescens*, Royal Fern, Cinnamon Fern, Marsh Fern, Large Cranberry, *(Vaccinium macrocarpon)*, Round-leaf Sundew *(Drosera rotundifolia)*, Marsh St. John's Wort *(Triadanum virginicum)*, and Ovate Spikerush *(Eleacharis ovata)* with shallow open water areas supporting aquatics like White Water Lily

At the southern end is an emergent area of Common Cat-tail and in the southeast is locally dense stand of Common Reed* *(Phragmites australis)*. Although Common Reed has long been considered invasive, there is more recent recognition that the problem with Phragmites monocultures is the result an introduced invasive genotype. "Native" Phragmites is not invasive. We confirmed that the stand of Common Reed in Pequot Woods Swamp was an introduced invasive genotype using the observed "morphological differences between native and introduced genotypes" as described at the Cornell University website (http://www.invasiveplants.net/phragmites/morphology.asp) and in the Appendix.

Wet Meadow/Emergent
This plant community occurs in the utility right of way, in Wetland 1, 11, 13, 16, 17, and 35 (right-of-way portion only). The wet meadow/emergent areas consists predominantly of Reed Canarygrass* *(Phalaris arundinacea)*, various sedges including Fox Sedge *(Carex vulpinoidea)*, Shallow Sedge *(Carex lurida)*, Sawbeak Sedge *(Carex stipata)*, Skunk Cabbage, goldenrods, Arrow-leaved Tearthumb *(Polygonum sagittatum)*, Soft Rush *(Juncus effuses)*, Rice Cutgrass *(Leersia oryzoides)*, Common Cat-tail *(Typha latifolia)*, Purple-leaved Willowherb *(Epilobium coloratum)*, Marsh Fern *(Thelypteris thelypteroides)*, Cinnamon Fern, Sensitive Fern *(Onoclea sensibilis)*, peat moss *(Sphagnum spp.)*, and various grasses. The shrub layer consists mostly of sporadic thickets of Sweet Pepperbush, Speckled Alder *(Alnus incana)*, Steeplebush *(Spiraea tomentosa)*, and Multiflora Rose*. There are scattered Common Reeds* in the Wetland 35 right-of-way and a patch in the Wetland 1 right-of-way.

DISCUSSION

Mammals

The species listed in this report as "probable" should not be considered less likely to be present on the site as the species observed. Many of the species on the probable list are reclusive species for which little life history and/or distribution data exists. Mammals in general are a difficult group of species to study as many are nocturnal, highly mobile and cautious. To confirm the presence of many of these species and to determine specific habitat use and abundance on the site would require several years of data collection using techniques such as radio tracking and mark-recapture. The 2 species listed as "possible" are species for which marginal habitat exists on the site or are not known to occur in this area of Connecticut.

Table 3 describes the habitat use that can be expected for the various mammal species. Many mammal species are considered habitat "generalists" and will use a wide variety of wetland and upland habitats. Therefore the habitat categories of wetlands, upland forest, and early-successional are broad and would be considered by other disciplines to encompass a variety of distinct habitats. A total of thirteen (13) species are capable of utilizing all 3 categories and are best described as generalist species. A total of twenty-one (21) species utilize upland forest habitats and twenty (20) species utilize early-successional habitats. A total of seventeen (17) species will utilize wetland habitats during at least a portion of their life history.

Table 3: Habitat use of wetlands, forest and early successional habitats.

Species	Habitat Type		
	1	2	3
Opossum	■	■	■
Short-tailed Shrew	■	■	■
Eastern Mole		■	■
Eastern Chipmunk		■	■
Woodchuck			■
Gray Squirrel		■	
Beaver	■		
White-footed Mouse	■	■	■
Meadow Vole			■
Woodland Vole		■	
Meadow Jumping Mouse			■
Coyote	■	■	■
Red Fox	■	■	■
Raccoon	■	■	■
Striped Skunk	■	■	■
White-tailed Deer	■	■	■
Cottontail		■	■
Masked Shrew	■	■	■
Water Shrew	■		
Smoky Shrew		■	
Star-nosed Mole	■		
Southern Flying Squirrel		■	
Gray Fox	■	■	■
Short-tailed Weasel	■	■	■
Long-tailed Weasel	■	■	■
Bobcat	■	■	■
Southern Red-backed Vole		■	
Southern Bog Lemming	■		■
Habitat Key			
1 – Wetlands			
2 – Upland forest			
3 – Early successional habitats (utility ROW, large logging clearings, Westbrook field)			

Table 4 describes wetland habitat use by the 3 wetland-dependant and 3 wetland-associated species. Wetland-dependant and wetland-associated species are defined as:

- **Wetland Dependant Species** – A species that may use non-wetland habitats, but occur in wetlands a preponderance of the year, or have critical life requirements met by wetlands that are not provided by non-wetlands.

- **Wetland Associated Species** – A species which is typically found in wetlands but when not available will utilize non-wetland habitats, and does not require wetlands for any critical life requirement.

Table 4: Wetland habitat use and wetland dependence.

Species	Wetland Use			
	1	2	3	WA/WD
Opossum	■	■		WA
Short-tailed Shrew	■	■		WA
Beaver	■	■	■	WD
White-footed Mouse	■	■		WA
Coyote	■	■		WA
Red Fox	■	■		WA
Raccoon	■	■		WD
Striped Skunk	■	■		WA
White-tailed Deer	■	■		WA
Masked Shrew	■	■		WA
Water Shrew	■	■	■	WD
Star-nosed Mole	■	■		WD
Gray Fox	■	■		WA
Short-tailed Weasel	■	■		WA
Long-tailed Weasel	■	■		WA
Bobcat	■	■		WA
Southern Bog Lemming	■	■		WA
Wetland Habitat Key				
1 – Palustrine emergent, Palustrine Scrub-Shrub				
2 – Palustrine forested				
3 – requires permanently inundated wetlands				
WA – Wetland associated; **WD** – Wetland dependant				

Wetlands in Table 4 are divided into the major classes present on the site. The majority of the wetlands on the site are best classified as palustrine forested wetlands. Other wetland areas, such as the utility ROW wetlands are best classified as palustrine emergent wetlands. Pequot Swamp Pond is best described as a palustrine scrub-shrub wetland. The category permanently inundated wetlands includes Pequot Swamp Pond, Wetland 35, Wetland 16 and the beaver pond on the Bokum Road parcel.

A total of 3 of the 6 wetland mammals are considered wetland dependant. Two of these mammals are restricted to permanently inundated wetlands. As noted above, many species of mammals are considered habitat generalists, and will use a variety of habitats,

including wetlands (see Table 3). Table 4 is meant to differentiate between casual wetland use and a species preference for wetlands.

Birds

No species was detected in greater than expected densities with the exception of Yellow-billed Cuckoo *(Coccyzus americanus).* However this species is being found in unusually high numbers throughout our area this year. This year's increase in Yellow-billed Cuckoos in southern Connecticut is most likely a result of a local abundance of prey items. Cyclical annual population changes are a common and unpredictable phenomena with this species. A number of species were present in lower than expected densities, such as the Wood Warblers, and some were notably low in numbers, such as Veery *(Catharus fuscescens).* This species was limited to one signing individual detected outside the survey point protocol. Generally speaking the long distance migrant species, which are of concern to the global ornithological community, were found as breeders in average to low or very low densities. Additionally, the overall species mix and the density was somewhat lower than might be expected for such promising habitat lying in relatively close proximity to the Connecticut River. Despite the promise of avian riches that such a large intact site as this may hold at first glance, no regionally important populations of any bird species was found utilizing the site. Based upon the current habitat it is also quite unlikely that this site is of notable importance to any migrant or wintering avian species.

With the exception of Pequot Swamp Pond, the wetlands at the site do not lend themselves to development of an extensive wetland-dependent[1] avifauna. Only two species associated exclusively with wetland habitat were detected on the site. Wood Duck and Mallard are the only true wetland-dependent birds breeding on the site. Red-winged Blackbird, an abundant nester in wetlands in CT, was detected on the site, but this species would be more properly considered wetland-associated.

Most species of concern to the ornithological community in the northeast United States are associated with open wetlands, grasslands, coastal beaches, or salt marshes. This site lacks these habitats, with the exception of Pequot Swamp Pond. However this pond lacks much of the characteristics that would make it attractive to wetland associated bird species that are listed as endangered, threatened, or of special concern by CT DEP, or are recognized by the ornithological community to be notable in our region.

Long distance (neo-tropical) migrants include warblers, thrushes, flycatchers, etc. Despite the large area of un-fragmented forest habitat, surprisingly few were found as breeders on the site. The lower Connecticut River Valley currently includes large areas

---

[1] **Wetland Dependant Species** – A species that may use non-wetland habitats, but occur in wetlands a preponderance of the year, or have critical life requirements met by wetlands that are not provided by non-wetlands.

Wetland Associated Species – A species which is typically found in wetlands but when not available will utilize non-wetland habitats, and does not require wetlands for any critical life requirement.

of migratory habitat, and the site is not critical stopover habitat. The Preserve will have little to no impact on foraging migrants.

Red-shouldered Hawks have been observed nesting in proximity to human habitation. Nationwide, the population is decline but it is increasing in some areas. The population of Red-shouldered Hawks within Connecticut was considered stable at the time of the last breeding bird atlas work during the 1980s, and its recent de-listing would substantiate that conclusion. The nesting success appears to be negatively affected by human activity and forest fragmentation but the species can be tolerant of human presence.

A maximum of 2 pairs of Red-Shouldered Hawks could nest on the site, but is likely one pair at most, due to the widespread logging, and its intolerance of competition from other nesting pairs. The most likely nesting areas within the subject property are the environs around the Pequot Swamp Pond and also the southeastern portion of the site opposite the power substation, where the hawk was observed in flight. Maintaining Red-shouldered Hawk nesting and foraging on this site will be enhanced by the site plan, which maximizes the area of large, undisturbed stands of mature deciduous trees near wetlands, particularly the wetlands in the southeast comer of the site. The latter area is the prime area for nesting and especially foraging at the site.

If no nesting occurs on the site the proposed project will have limited affect on continued use of this site by this species. Most available nesting sites along the lower Connecticut River Valley are public lands such as State Forests. These larger forest tracts are much more important to the future of this species here in Connecticut and beyond than small (or large) tracts that are subject to greater disturbance, by both human and natural competitors. In sum, we do not believe that the proposed development of The Preserve will have a significant impact on the conservation status of this bird.

Long distance migrant species such as the Wood Warblers, Thrushes, Flycatchers, etc, undoubtedly use this site during Spring and Fall migrations. Surprisingly few were found as breeders on the site however. Due to the loss of, or massive change to, wintering habitat in Middle America, South America, and the Caribbean, many of these species have experienced significant population declines during this century. Some of these population declines have been very severe and are indeed quite alarming. Consequently many fewer individuals now pass through Connecticut during migration than was historically the case.

Some migrant species might not use the developed site for foraging. Species that require large undisturbed tracts of forest interior such as Great Crested Flycatcher (*Myiarchus crinitus*) or Swainson's Thrush (*Catharus ustulatus*) would be much less likely to be found on the altered site during migration. However, we do not believe that these migrant species will be affected in any detectable or meaningful way by this project. The subject property lies in a portion of the Connecticut River Valley that retains a good deal of foraging habitat for these migrating species. Consequently, this site does not represent isolated, critical stopover habitat. Based upon the reduced populations of these migrants,

and the extent of their migration through Connecticut, The Preserve will quite likely have little to no impact on most of foraging migrant species that pass through this region.

The proposed site development plan will result in some reduction in Barred Owls on the site, associated with the loss of forested wetland cover. Eastern Screech Owl and Great Horned Owls will likely increase and occupy the site, respectively.

If a band of trees is left along most of the power line cut it is likely a good deal of Indigo Buntings (*Passerina cyanea*) will continue to nest here. If the right of way is cleared or "cleaned up", then it is likely this bird will no longer be found here. Several associated "brushland" species are in decline within Connecticut and leaving areas of trees and brush along, and under the existing power line could actually help these species.

Vegetation

Most of the Preserve site is Mixed Hardwood Forest on hilly terrain with bedrock knolls and outcrops. Most of the wetlands are Wooded (Red Maple) Swamps; including two large wetland systems associated with stream valleys. There are also small, isolated wooded wetlands scattered throughout the site. Beaver activity has expanded open water areas, creating shrub/scrub swamps. Vegetation management in the power-line right-of-ways which traverse the site has created linear old field habitat exhibiting surprising plant diversity over the hilly and rocky terrain. Low-lying areas of the right-of-way are managed as wet meadow/emergent marsh habitat.

Two sensitive habitats were identified. A small Atlantic White Cedar swamp occurs in the southeast portion of the site. There are few of these coastal habitats remaining in Connecticut. The second sensitive habitat is the large Pequot Swamp Pond, which lies in the center of the property. The shallow, flooded wetland has an extensive floating shrub swamp mat with a wooded fringe, some open water, and emergent marsh vegetation.

Three Connecticut-listed plant Species of Special Concern were located on The Preserve site. These locations have been documented and reported to CT DEP, as required. The Atlantic White Cedar Swamp, Pequot Swamp Pond and all populations of CT state-listed plant species will all be protected in the proposed design.

CT DEP NATURAL DIVERSITY DATA BASE

The CT DEP maintains a list of Endangered, Threatened and Special Concern plant and wildlife species[2]. This list is amended from time to time and this report references the

---

2

Endangered Species means any native species documented by biological research and inventory to be in danger of extirpation throughout all or a significant portion of its range within the state and to have no more than five occurrences in the state, and any species determined to be an "endangered species" pursuant to the federal Endangered Species Act.

most current list, which was published on the CT DEP Web Site (see Appendix) in the summer of 2004. The CT DEP's Natural Diversity Data Base (NDDB) documents and maps known occurrences of listed species and publishes maps which show a 2000' circle within which a record is randomly located (in order to protect them from collecting and other damage). The NDDB shows that records for several state-listed species occur within 2000' of the site, as seen on the attached map. The 1999 Environmental Review Team (ERT) report for the site identified them as four (4) plants; Yellow-fringed Orchid (*Platanthera ciliaris*), Marsh Milkwort (*Polygala cruciata*), Coast Sedge (*Carex exilis*), and Lily-leaved Twayblade (*Liparis lilifolia*).

We also conducted a consultation with Mr. Kenneth Metzler of the CT DEP, to identify other uncommon or listed plants or wildlife potentially present in the area. He identified the following plant species[3] to survey for based on three criteria:

1. Historic and recent records on the site:
   - Yellow-fringed Orchid (*Platanthera ciliaris*)
   - Marsh Milkwort (*Polygala cruciata*)
   - False Hop Sedge (*Carex lupuliformis*)
2. Records in the vicinity:
   - Coast Sedge (*Carex exilis*)
   - Lily-leaved Twayblade (*Liparis lilifolia*).
3. Habitat potential:
   - Reticulated Nutrush (*Scleria reticularis*)

Using this information, our floral and faunal surveys were timed to maximize the probability of locating listed species potentially present at the site.

STATE-LISTED SPECIES

During our survey work during 2003 and 2004, we did not identify any US or CT-listed Endangered or Threatened Species at the site. We did not identify any mammals that are listed as Species of Special Concern. The avian surveys also did not detect any

---

Threatened Species means any native species documented by biological research and inventory to be likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range within the sate and to have no more than nine occurrences in the state, and any species determined to be a "threatened species" pursuant to the federal Endangered Species Act, except for such species determined to be endangered by the Commissioner in accordance with section 4 of this act.

Species of Special Concern means any native plant species or any native nonharvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that its unregulated taking would be detrimental to the conservation of its population or has been extirpated from the state.

[3] One state-listed wildlife species, Eastern Box Turtle (*Terrapena carolina carolina)* was identified at the site previously; a single specimen having been located near the western site limit in Westbrook, during the surveys that accompanied the earlier application.

Endangered or Threatened Species. We did identify three (3) plant Species of Special Concern at the site, and their locations are shown on the Vegetation Map:

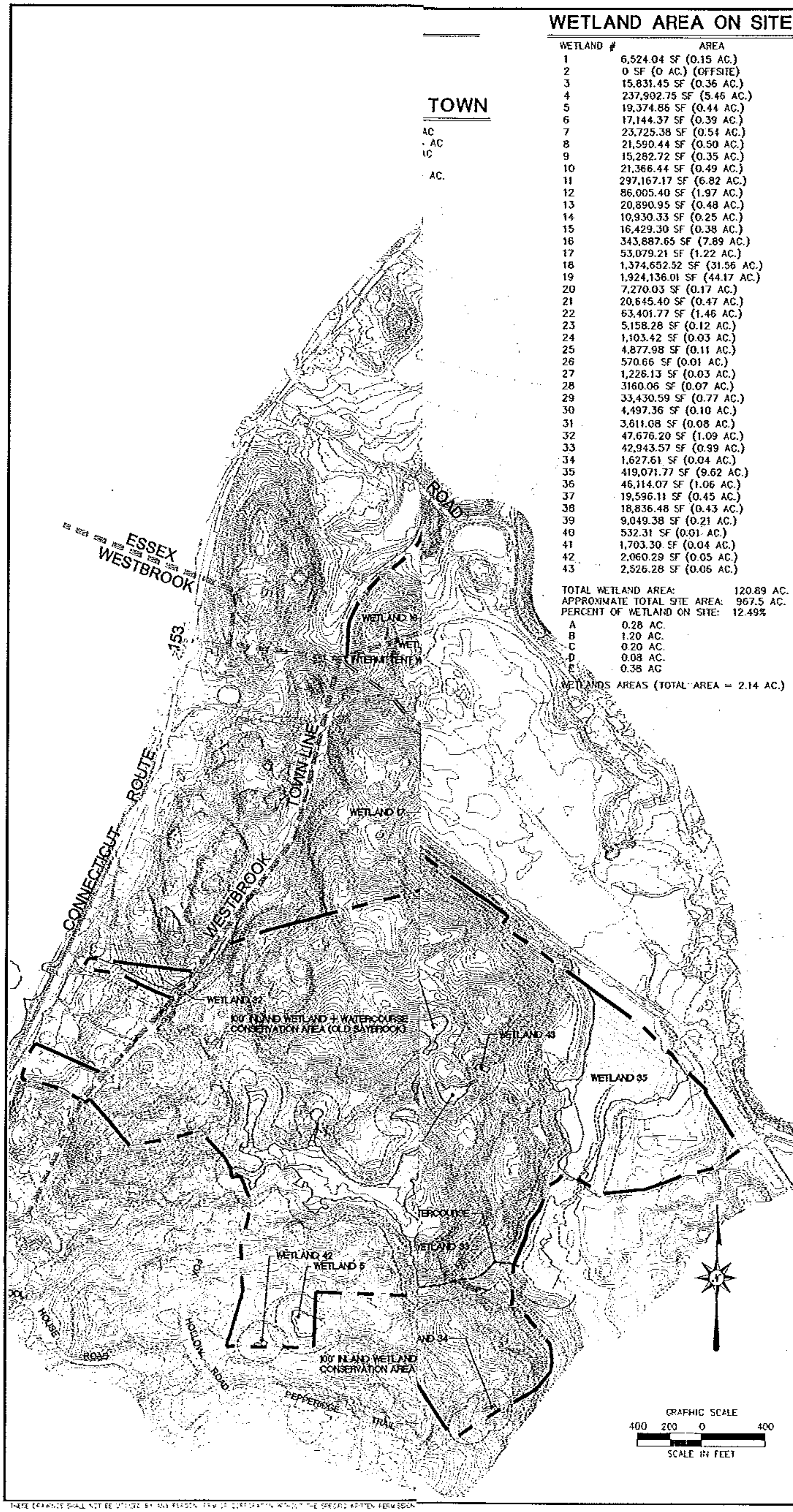
- 2 patches of Prickly Pear *(Opuntia humifusa)*, Species of Special Concern, occur on bedrock knolls in partial sun
- 2 vigorous populations of False Hop Sedge, *Carex lupuliformis* (Special Concern) occur in Wetland 16, a wet meadow in the utility right-of- way) and in Wetland 38 (a vernal pool with open canopy due to recently logging). A smaller, less robust population was identified in Wetland 36, which is more shaded Other previously reported locations could not be re-confirmed. It is possible that these local populations may have declined due to shading as the tree canopy has re-grown. This would indicate that long term vegetation management is necessary to sustain this species at the site.
- A population of *Polygala cruciata* (Species of Special Concern) is located in the utility right-of-way (wet meadow portion) of Wetland 35 during 2003. There are also a few plants at the edge of a nearby woods road. This species was not present during 2004.

We were unable to identify any individuals of Yellow-fringed Orchid, Coast Sedge, or Lily-leaved Twayblade, or Reticulated Nutrush *(Scleria reticularis)* at the site. These species were cited by the CT DEP in the Environmental Review Team report as present at (Yellow-fringed Orchid) or near the site. This is not unusual; the CT DEP records include historic sightings as well as current ones, and there is no evidence that Lily-leaved Twayblade, Coast Sedge, or Reticulated Nut-rush were ever present on the site.

We did not identify any state-listed Endangered or Threatened wildlife at the site. We identified several individuals of the Red Bat, a Species of Special Concern. Please note that although EPS staff assisted in the collection and documentation of reptiles and amphibians, the herpetofauna (listed or otherwise) are documented in Dr. Klemens' report.

WETLAND FUNCTIONAL ASSESSMENT

Russo prepared a table summarizing the principal functions of each of the 42 distinct wetland units he identified at the site. His entire report is attached as an appendix. We have expanded that summary table to include the additional wetlands delineated at the Bokum Road parcel and it is attached as Table 5. We agree with his comment that the wetlands at the site can generally be characterized as "...red maple dominated, wooded swamp that provides a point of shallow groundwater interface, has good wildlife habitat, exports biomass, and has a large upland buffer. It receives few if any pollutants, has limited habitat diversity and lacks permanent open water." Such wetlands are typical of this ecological setting. However, the overall size of the site and the contiguous wetland units within it is what sets these Red Maple swamps apart from others in the region. These large, intact wetland units (with a high concentration of imbedded or "cryptic" vernal pools) are not common in coastal Connecticut. Accordingly, conservation of the



WETLAND AREA ON SITE

WETLAND #	AREA
1	6,524.04 SF (0.15 AC.)
2	0 SF (0 AC.) (OFFSITE)
3	15,831.45 SF (0.36 AC.)
4	237,902.75 SF (5.46 AC.)
5	19,374.86 SF (0.44 AC.)
6	17,144.37 SF (0.39 AC.)
7	23,725.38 SF (0.54 AC.)
8	21,590.44 SF (0.50 AC.)
9	15,282.72 SF (0.35 AC.)
10	21,366.44 SF (0.49 AC.)
11	297,167.17 SF (6.82 AC.)
12	86,005.40 SF (1.97 AC.)
13	20,890.95 SF (0.48 AC.)
14	10,930.33 SF (0.25 AC.)
15	16,429.30 SF (0.38 AC.)
16	343,887.65 SF (7.89 AC.)
17	53,079.21 SF (1.22 AC.)
18	1,374,652.52 SF (31.56 AC.)
19	1,924,136.01 SF (44.17 AC.)
20	7,270.03 SF (0.17 AC.)
21	20,645.40 SF (0.47 AC.)
22	63,401.77 SF (1.46 AC.)
23	5,158.28 SF (0.12 AC.)
24	1,103.42 SF (0.03 AC.)
25	4,877.98 SF (0.11 AC.)
26	570.66 SF (0.01 AC.)
27	1,226.13 SF (0.03 AC.)
28	3160.06 SF (0.07 AC.)
29	33,430.59 SF (0.77 AC.)
30	4,497.36 SF (0.10 AC.)
31	3,611.08 SF (0.08 AC.)
32	47,676.20 SF (1.09 AC.)
33	42,943.57 SF (0.99 AC.)
34	1,627.61 SF (0.04 AC.)
35	419,071.77 SF (9.62 AC.)
36	46,114.07 SF (1.06 AC.)
37	19,596.11 SF (0.45 AC.)
38	18,836.48 SF (0.43 AC.)
39	9,049.38 SF (0.21 AC.)
40	532.31 SF (0.01 AC.)
41	1,703.30 SF (0.04 AC.)
42	2,060.29 SF (0.05 AC.)
43	2,526.28 SF (0.06 AC.)

TOTAL WETLAND AREA: 120.89 AC.
APPROXIMATE TOTAL SITE AREA: 967.5 AC.
PERCENT OF WETLAND ON SITE: 12.49%

A	0.28 AC.
B	1.20 AC.
C	0.20 AC.
D	0.08 AC.
E	0.38 AC

WETLANDS AREAS (TOTAL AREA = 2.14 AC.)

BL Companies
ARCHITECTURE
ENGINEERING
PLANNING
LANDSCAPE ARCHITECTURE
LAND SURVEYING
ENVIRONMENTAL SCIENCES

355 Research Parkway
Meriden, CT 06450
(203) 630-1406
(203) 630-2615 Fax

Data Collected and Mapped By Michael Klein

ENVIRONMENTAL PLANNING SERVICE
89 Belknap Rd.
West Hartford, CT 06117
Tel. (860) 236-1578

THE PRESERVE
OLD SAYBROOK, WESTBROOK, ESSEX
MIDDLESEX COUNTY, CONNECTICUT

REVISIONS
No. Date Desc.

Designed	X.X.X.
Drawn	K.T.
Checked	
Approved	
Scale	1"=400'
Project No.	01C955-F
Date	XX/XX/XX
CAD File	ANC95511

Title
WETLAND AND WATERCOURSES

Sheet No.

Nov 01, 2004 8:50am K:\Tangari F:\J0350\01c955-F\dwg\Habitat\ANC95511.dwg
Layout: SA-3A 11X17

Xref (s): 0BC95504

ecology of these wetlands and vernal pools was a primary criterion for the revised site plan, as described in detail in Dr. Klemens' report.

The Atlantic White Cedar Swamp (Wetland 35) and Pequot Swamp Pond (Wetland 19), on the other hand, represent less common wetland types. They support a different flora and provide a somewhat different set of functions. Wetland 35 is located in stratified drift and therefore has the potential to recharge groundwater. It supports an uncommon plant community (Atlantic White Cedar) and due to adjacent roads and developed areas, is providing water quality renovation and flood flow alteration functions. Its educational potential is also valuable, due to the relative rarity of this wetland type. Pequot Swamp Pond, although altered by damming (perhaps because of the damming and subsequent breach), supports a floating shrub mat and several species typical of a nutrient-poor environment. It is not a bog, but has bog-like characteristics in some regards. It has the potential to store significant volumes of floodwaters, has high aesthetic appeal, and very good passive recreation potential.

There are also several isolated wetland units at the site. These include two seasonally flooded wet depressions that are "classic" vernal pools (Wetlands 33 and 37; documented in detail in Dr. Klemens' report). On the other hand, some of these do not possess the biological and/or hydrological attributes of vernal pools and are merely isolated pockets of poorly drained soils (Wetlands 2, 23, and 43, for example). These wetlands are only seasonally saturated, and do not provide any significant wetland functions, due to their small size, isolation, and lack of a significant hydroperiod.

IMPACT ASSESSMENT

Direct Impacts

The site plan has been carefully designed to avoid impacts on wetlands and watercourses, and to minimize those that are unavoidable. The approval and use of the cluster and conservation subdivision regulations provided the flexibility necessary to site roads and design the housing mix and the home sites to minimize wetland encroachment and maintain ecological connectivity between wetlands throughout the site. No filling of wetlands, or culverting or channelization of watercourses will be required for the roads, home sites, or stormwater management areas. The road network requires three crossings of wetlands or watercourses. These crossings will be accomplished on clear-span bridges. No temporary or permanent construction in the wetlands will be required, since the bridges are located at very narrow areas that can be spanned with a structure that will not require abutments or piers in the wetlands.

Indirect Impacts

The golf course layout does not require any grading in the wetland. The cart paths will be carried over the wetlands on pile-supported structures, where necessary. Short crossings will be constructed with piers placed outside of the wetlands, and the wetland or watercourse will be spanned. Longer crossings will be constructed by driving small piles or helical screws into the wetland. The structure will be constructed using small

machinery that can operate from the bridge deck, reaching out and installing the piles ahead of the advancing deck. This has the added advantage of flexibility in the path of the bridge, which can be routed around significant trees. The deck will be designed to allow light to penetrate under the bridge.

As noted, the golf course and housing have been laid out to avoid any direct impacts on wetlands, to the maximum extent practical. No homes, fairways, tees or greens are located in the wetlands. However, several of the holes play across wetlands. In some cases, tree canopy removal will be required to allow play over wetlands. For those holes that play over wooded wetlands an adequate line of sight from play area to landing area requires removal of woody vegetation taller than about 3' in height. The shrub and herb layers will be maintained in these areas. It has been our experience that the added sunlight available typically results in higher productivity in the shrub and herb strata, which will enhance food and cover for small mammals and shrub land birds. There will be no filling or other alteration of the herbaceous layer, or wetland hydrology, required for the carry areas. To the maximum extent possible, cart path bridges will be located in these canopy removal areas to minimize required tree removal.

The site plan utilizes a variety of Best Management Practices to treat stormwater. The goal of the stormwater treatment design is to control both the quantity and the quality of the runoff in a manner which will minimize impacts to wetland ecology and hydrology and downstream water quality to the maximum extent practicable. Accordingly, treatment areas were located is manner that disperses the discharges and preserves the existing natural drainage patterns. The BMPs are described in detail in the engineering report prepared by BL Companies. EPS has worked with the engineers to design the measures to mitigate wetland impacts from construction, as well. The BMP areas will be re-vegetated with native, wildlife-attractive trees, shrubs, grasses and forbs to minimize impacts on wildlife habitat. These water quality treatment areas will be also utilized as temporary sediment basins, where appropriate, thereby minimizing temporary indirect impacts

AVOIDANCE, MINIMIZATION AND MITIGATION

The project design process followed the required sequencing of avoidance of impacts, minimization and mitigation. All practicable steps were taken to avoid direct impacts. In some cases, minor areas of impact were required to access interior portions of the site and to provide connectivity for the recreational areas. Those impacts were then minimized to the maximum practicable extent. Only then were mitigation measures applied to offset the small loss in wetland area and ecological value.

The road network has been designed to only require three (3) wetland or watercourse crossings. Several cart path crossings are required to access the golf course. As noted above, all of the road and cart paths crossings of the wetlands will be accomplished on bridges or pile-supported "boardwalks", which will span the wetlands. No placement of earthen fill will be required. The second mitigation measure is impact minimization. Golf play across wetlands will be accomplished through canopy removal to provide

"carrys" or "play-over" areas. No fairways, tees, or greens will be constructed in the wetlands. The wetland shrub and herb layer will remain. On several holes, the carrys are located in the vicinity of intermittent watercourses where there is no significant existing wetland vegetation. Supplemental plantings along the wetlands or watercourses at the "carrys" will be provided (see attached Planting Analysis). Occasional mowing and/or pruning of shrubs and stump-sprout saplings will be required to maintain the necessary site lines.

Each proposed "carry area" has been evaluated in the field by a botanist to determine appropriate plant species and locations to mitigate impacts in the upland review area and maintain adequate buffers. The primary purpose of the mitigation plantings will be to provide wildlife habitat. They were also sited in accordance with water quality treatment measures and the requirements of golf play. Typical native trees, shrubs, herbs, and seed mixes are shown on the attached planting list. In some cases, water quality basins will be planted to native vegetation, as well. The landscaping plan specifies that no invasive species shall be planted on the site, as determined by the CT Invasive Plant List (produced by the Connecticut Invasive Plants Council) Connecticut Public Act No. 03-136.

Although these measures will mitigate impacts on wildlife to the maximum extent practicable, the distribution and abundance of wildlife at the site will be altered as a result of the project. This is an unavoidable consequence of the change in land use at the site. However, the biological inventory was used in the design process to develop a site plan that maximizes preservation of bio-diversity at the site, through long-term preservation of ecologically significant open space. Conservation restrictions have been placed on nearly two-thirds (64%) of the site. The 36% of site slated for development has been located so that vital habitat areas and ecological connections have been preserved. This would not be possible without use of the Conservation Subdivision regulations.

Impact minimization will also be accomplished via establishing and using Best Management Practices for management of stormwater throughout the site. Stormwater will be treated for quality and quantity prior to discharge to the wetlands. Existing drainage patterns will be preserved. Water quality treatment areas are provided for all sheet drainage from the golf course into the wetlands. These treatment measures include small bio-retention basins and leaky stone dikes. The basins will treat run-off from the golf course in the turf and promote infiltration to provide additional treatment in the soil. These water quality mitigation areas will be re-vegetated with plant materials that are native and indigenous to the region. Depending on the as-built hydrology, these plantings will provide additional wetland and non-wetland wildlife habitat. This will enhance the functions of the upland review areas that are by grading during construction.

An Integrated Turf and Pest Management Plan has been prepared that minimizes the use of fertilizers and pesticides, and avoids the use of products with a significant risk of human, aquatic, or amphibian toxicity (Cohen, 2004). A detailed ecological risk assessment has been prepared which uses protection of amphibian biodiversity as the end-point. Due to the sensitivity of amphibians to water quality changes as a result of

their semi-permeable skin, this will provide a substantial level of environmental protection. The performance of the Integrated Turf and Pest Management Plan (ITMP) will be assured by implementation of a detailed Environmental Monitoring Program, including surface and groundwater monitoring at several locations. These measures will apply to the golf course, all common areas, and to any professional lawn care companies that service private homes at the site. An educational program will encourage their use on the small area of lawns that are privately maintained. The ITMP, coupled with the monitoring program, will serve to prevent any adverse impact to wetlands, watercourses or groundwater from the proposed golf course and residential development after construction. Impacts during construction will be mitigated by implementation of a detailed Erosion and Sediment Control Plan as shown on the plans, as well as a Stormwater Pollution Prevention Plan submitted to the CT DEP.

Respectfully submitted,

Michael S. Klein, Principal
Registered Soil Scientist
Certified Professional Wetland Scientist

REFERENCES

Whitaker, J. O. and Hamilton, W.J. 1998. Mammals of the Eastern United States. Cornell University Press, Ithaca, London

Degraaf, R. M. and Yamasaki, M. 2001. New England Wildlife, Habitat, Natural History and Distribution. University Press of New England.

Conaway, C.H. 1952. Life History of the Water Shrew. The American Midland Naturalist. 4(1): 219-224.

Goodwin, G.G. 1932. New Records and Some Observations on Connecticut Mammals. Journal of Mammalogy. Pg 36-40.

Litvaitis, J.A., Sherburne, J.A., Bissonette, J.A. 1986. Bobcat Habitat Use and Home Range Size in Relation to Prey Density. Journal of Wildlife Management 50(1): 110-117.

Observation on New England Bobcats. 1951. Journal of Mammalogy. 33(3): 356-358.

Getz, L.L. 1961. Factors Influencing the Local Distribution of *Microtus* and *Synaptomys* in Southern Michigan. Ecology. 42(1): 110-118.

Sollberger, D.E. 1940. Notes on the Life History of the Small Eastern Flying Squirrel. Journal of Mammalogy. 21: 282-293.

Getz, L.L., Miller, D.H. Life History Notes on *Microtus pinetorum* in Central Connecticut. Journal of Mammalogy. 50(4): 777-783.

Hamilton, W.J., Jr. 1931b. Habits of the Star-nosed Mole (*Condylura cristata*). J. of Mammalogy. 12:345-355.

Goodie, T., Kilpatrick, H. Cottontail Collection Effort Providing Clues. Connecticut Wildlife. CT Department of Environmental Protection, Wildlife Division. Sept-Oct 2003. pg 8.

Kilpatrick, H. New England Cottontail Study Hops Along. Connecticut Wildlife. CT Department of Environmental Protection, Wildlife Division. Nov-Dec 2002. pg 8.

Getz, L.L. 1961. Factors Influencing the Local Distribution of Shrews. The American Midland Naturalist. 65(1):67-87.

Whitaker, J.O. Jr. 1963. A Study of the Meadow Jumping Mouse, *Zapus Hudsonius* in Central New York. Ecological Monographs. 33(3):215-251.

Harvey, M.J. 1976. Home Range, Movements, and Diel Activity of the Eastern Mole, Scalopus aquaticus. The American Midland Naturalist. 95(2): 436-444.

Choate, J.R. 1973. Identification and Recent Distribution of White-Footed Mice (*Peromyscus*) in New England. J. of Mammalogy. 54(1): 41-47.

Dickson, J. Personnel Communication. CT Department of Environmental Protection, Wildlife Division. Sessions Woods, Burlington, CT.

Wilson, J.M. 2001. Beavers in Connecticut: Their natural history and management. Connecticut Department of Environmental Protection, Wildlife Division. Hartford, CT. 18 pp.

Russo, R. 2002. Functional Wetland Evaluation for the Preserve.

BL Companies, 2004. Drainage Design Report for The Preserve.

Eastern Connecticut Resource Conservation and Development Area Inc., Eastern Connecticut Environmental Review Team Report, THE PRESERVE, Essex, Old Saybrook and Westbrook CT. No date. 106 pp plus un-numbered appendices.

Evans Associates Environmental Consulting, Inc. 1999. Herpetological Survey Report for the Preserve Site. Towns of Old Saybrook and Essex, Middlesex County, CT. 10 pp plus 2 pp appendix.

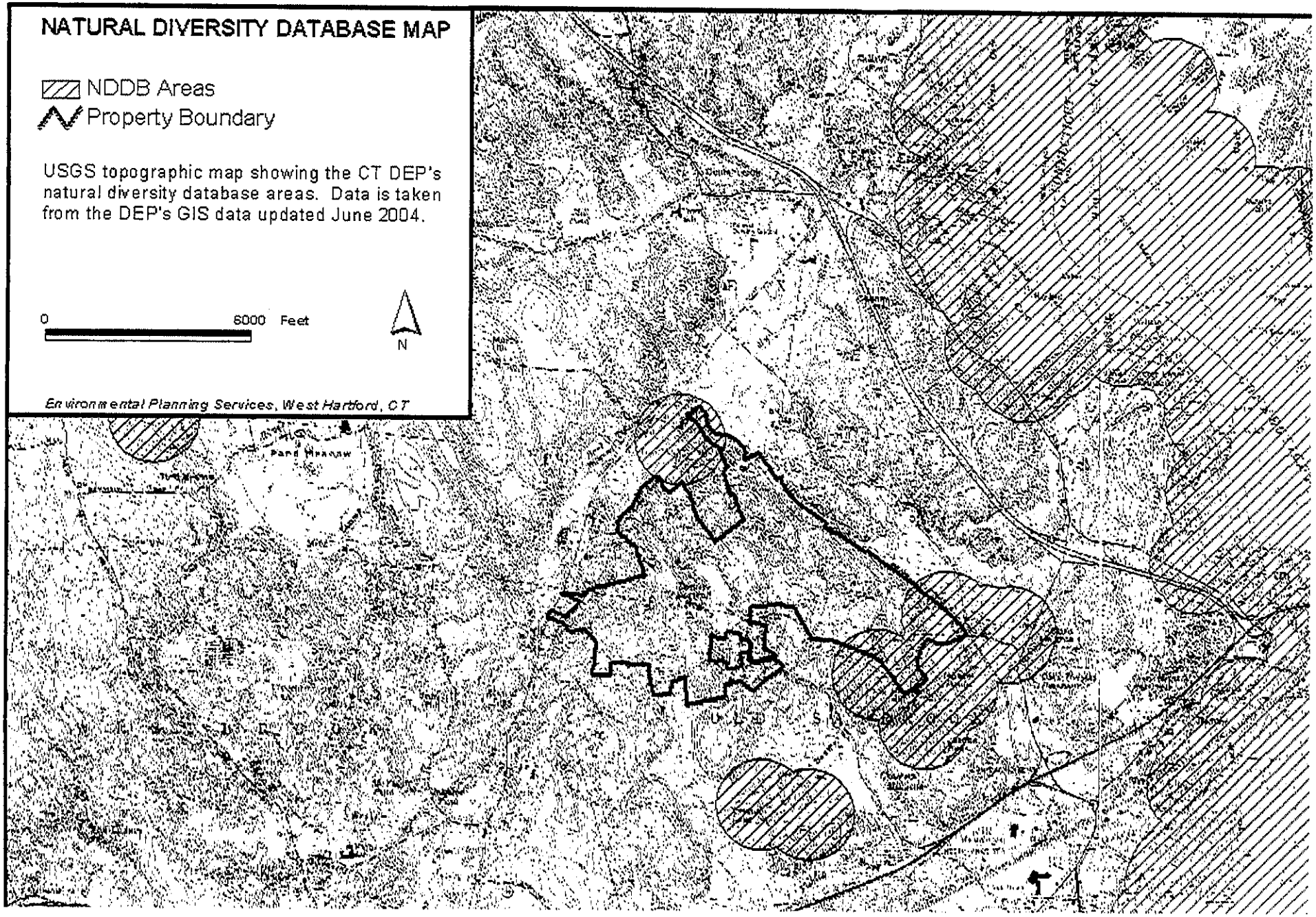
Provencher, David F. 2002. Breeding Bird Survey Report. The Preserve, Old Saybrook, CT. 16 pp plus unnumbered appendices.

Valley Environmental Services, undated. Ecological Assessment for The Preserve. 17 pp.

Valley Environmental Services, 2002. Rare and Endangered Plant Species Survey, The Preserve, Old Saybrook CT. 10 pp.

Cohen, S. Ecological Risk Assessment for the Preserve. Environmental Turf Services, 2004.

Cohen, S. Integrated Pest Management Plan for the Preserve. Environmental Turf Services, 2004.


NATURAL DIVERSITY DATABASE MAP
NDDB Areas
Property Boundary
USGS topographic map showing the CT DEP's natural diversity database areas. Data is taken from the DEP's GIS data updated June 2004.
0
6000 Feet
N
Environmental Planning Services, West Hartford, CT
Pond Meadow

SELECT PHOTOS

Photo 1: Remote camera

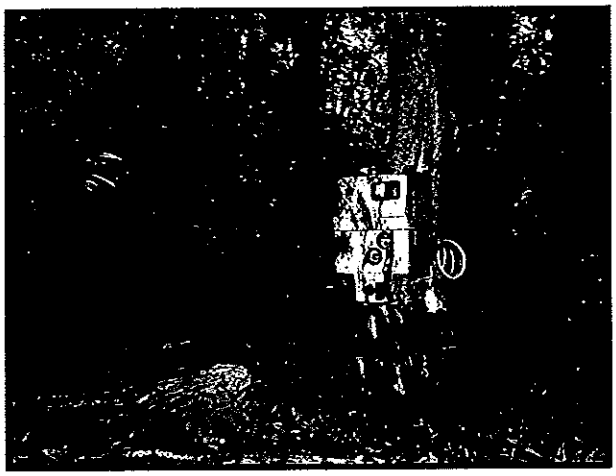


Photo 2: Dead Striped Skunk, Westbrook side of property

Photo 3: White-tailed Deer using remote camera

Mitigation Plant List
The Preserve
Old Saybrook, Connecticut

WETLAND PLANT LIST

			Root	Size
Trees				
Ar	Acer rubrum	Red Maple	Cont	4-6'
Ns	Nyssa sylvatica	Black Gum	Cont	4-6'
QB	Quercus bicolor	Swamp White Oak	Cont	4-6'
SN	Salix nigra	Black Willow	Cont	4-6'
Shrubs				
Ac	Amelanchier canadensis	Shadblow	Cont	18"-36"
AA	Aronia arbutifolia	Red Chokeberry	Cont	18"-36"
CO	Cephalanthus occidentalis	Buttonbush	Cont	18"-36"
CA	Cornus amomum	Silky Dogwood	Cont	18"-36"
CL	Clethra alnifolia	Sweet Pepperbush	Cont	18"-36"
Ca	Cornus amomum	Silky Dogwood	Cont	18"-36"
Gb	Galyussica baccata	Huckleberry	Cont	2-3'
Iv	Ilex verticillata*	Winterberry*	Cont	18"-36"
KA	Kalmia angustifolia	Sheep Laurel	Cont	18"-36"
KI	Kalmia latifolia	Mountain Laurel	Cont	2-3'
LB	Lindera benzoin	Spicebush	Cont	18"-36"
RV	Rhododendron viscosum	Swamp Azalea	Cont	18"-36"
RP	Rosa palustris	Swamp Rose	Cont	18"-36"
Sd	Salix discolor	Pussy Willow	Cont	18"-36"
Sc	Sambucus canadensis	Common Elderberry	Cont	18"-36"
SL	Spiraea latifolia	Meadowsweet	Cont	18"-36"
ST	Spiraea tomentosa	Steeplebush	Cont	18"-36"
Va	Vaccinium augustifolium	Lowbush Blueberry	Cont	1 qt
VC	Vaccinium corymbosum	Highbush Blueberry	Cont	18"-36"
Va	Viburnum acerifolium	Maple-leafed Viburnum	Cont	2-3'
VL	Viburnum lentago	Nannyberry	Cont	18"-36"
Vr	Viburnum recognitum	Arrow-wood	Cont	18"-36"

***= 1 male per 5 female**

Herbs

Aca	Acorus calamus	Sweetflag	plug	2"
Ai	Asclepias incarnata	Swamp Milkweed	plug	2"
CP	Caltha palustris	Marsh Marigold	plug	2"
CC	Carex crinita	Fringed Sedge	plug	2"
CI	Carex lurida	Lurid Sedge	plug	2"
CV	Carex vulpinoidea	Fox Sedge	plug	2"
CG	Chelone glabra	Turtlehead	plug	2"
Da	Dulichium arundinaceum	Three-way Sedge	plug	2"
Em	Eupatoriadelphus maculatus	Joe-pye Weed	plug	2"
Gc	Glyceria canadensis	Fowl Manna Grass	plug	2"
Irv	Iris versicolor	Blue Flag	plug	2"
Jc	Juncus canadensis	Canada Rush	plug	2"
Je	Juncus effusus	Soft Rush	plug	2"
LC	Lobelia cardinalis	Cardinal Flower	plug	2"
Pv	Peltandra virginica	Arrow Arum	plug	2"
Pc	Pontederia cordata	Pickerelweed	plug	2"
SI	Sagittaria latifolia	Northern Arrowhead	plug	2"
Sa	Scirpus atrovirens	Green Bulrush	plug	2"
Scc	Scirpus cyperinus	Wool Sedge	plug	2"
Sv	Scirpus validus	Soft-stem Bulrush	plug	2"
Spa	Sparganium americanum	Burreed	plug	2"
Vh	Verbena hastata	Blue Vervain	plug	2"

Ferns

AD	Adiantum pedatum	Maidenhair Fern	Cont	1 gal.
OS	Onoclea sensibilis	Sensitive Fern	Cont	1 gal.
OC	Osmunda cinnamomea	Cinnamon Fern	Cont	1 gal.
OR	Osmunda regalis	Royal Fern	Cont	1 gal.

NON-WETLAND PLANT LIST

Trees

Ar	Acer rubrum	Red Maple	Cont	4-6'
AAR	Amelanchier arborea	Downy Shadbush	Cont	4-6'
AL	Amelanchier laevis	Smoothe Shadbush	Cont	4-6'
CF	Cornus florida	Flowering Dogwood	Cont	4-6'
Jv	Juniperus virginica	Red Cedar	Cont	4-6'
Ps	Pinus strobus	White Pine	Cont	4-6'
Qr	Quercus rubrum	Red Oak	Cont	4-6'

Shrubs

Ac	Amelanchier canadensis	Shadblow	Cont	2-3'
Am	Aronia melanocarpa	Black Chokeberry	Cont	2-3'
Au	Arctostaphylos uva-ursi	Bearberry	Cont	1 qt
Co	Celtis occidentalis	Common Hackberry	Cont	2-3'
Cp	Comptonia peregrina	Sweetfern	Cont	12-18"
Cr	Cornus racemosa	Gray Dogwood	Cont	2-3'
Ca	Corylus americana	American Hazelnut	Cont	2-3'
Gb	Galyussica baccata	Huckleberry	Cont	2-3'
Kl	Kalmia latifolia	Mountain Laurel	Cont	2-3'
Mp	Myrica pensylvanica	Northern Bayberry	Cont	2-3'
Pv	Prunus virginiana	Chokecherry	Cont	2-3'
Rf	Rhodedendron nudiflorum	Pinxterflower azalea	Cont	2-3'
Va	Vaccinium augustifolium	Lowbush Blueberry	Cont	1 qt
Vc	Vaccinium corymbosum	Highbush Blueberry	Cont	2-3'
Va	Viburnum acerifolium	Maple-leafed Viburnum	Cont	2-3'
Vl	Viburnum lentago	Nannyberry	Cont	2-3'
Vr	Viburnum recognitum	Arrow-wood	Cont	2-3'

Standard Seed Mixes

New England Wetmix
New England Conservation/Wildlife Mix
New England Erosion Control/Restoration Mix
Southern Tier Forested Wetland Mix
Southern Tier Forested Drawdown Mix

Custom Seed mixes

Scientific Name	Common Name	Percent (by number of seeds)
Warm Season Grass/Wildflower Mix* (Application Rate: 20 pounds per acre) For edges and road verges that do not permit heights over 30"		
Andropogon virginicus	Broomsedge	30
Asclepias syriaca	Common Milkweed	2
Asclepias tuberosa	Butterfly Weed	2
Aster linarifolius	Stiff Aster	2
Aster novae angliae	New England Aster	2
Aster novi belgii	New York Aster	2
Lupinus perennis	Lupine	2
Monarda fistulosa	Wild Bergamot	2
Panicum clandestinum	Deertongue	10
Panicum virgatum	Switchgrass	10
Rudbeckia hirta	Black-eyed Susan	5
Schizachrium scoparium	Little Bluestem	25
Solidago odora	Sweet Goldenrod	2
Solidago speciosa	Showy Goldenrod	2
Tridens flavus	Tall Purpletop	2
Meadow & Wildflower Mix* (Application Rate: 20 pounds per acre) where height is not a concern		
Andropogon gerardii	Big Bluestem	10
Andropogon virginicus	Broomsedge	20
Asclepias syriaca	Common Milkweed	1
Asclepias tuberosa	Butterfly Weed	2
Aster linarifolius	Stiff Aster	2
Aster novae angliae	New England Aster	2
Aster novi belgii	New York Aster	1
Eragrostis spectabilis	Purple Love Grass	3
Lespedeza capitata	Roundheaded Bushclover	1
Lupinus perennis	Lupine	2
Monarda fistulosa	Wild Bergamot	2
Panicum clandestinum	Deertongue	5
Panicum virgatum	Switchgrass	5
Rudbeckia hirta	Black-eyed Susan	3
Schizachrium scoparium	Little Bluestem	25
Solidago odora	Sweet Goldenrod	2
Solidago speciosa	Showy Goldenrod	4
Sorgastrum nutans	Indian Grass	5
Tridens flavus	Tall Purpletop	5

Biofilter Seed Mix* (Application Rate: 25 pounds per acre)
For dry basins

Andropogon virginicus	Broomsedge	25
Agrostis stolonifera	Creeping Bentgrass	10
Aster novae angliae	New England Aster	5
Bidens frondosa	Beggar-ticks	1
Carex tribuloides	Blunt Broom Sedge	5
Carex vulpinoidea	Fox Sedge	5
Eupartorium maculatum	Joe-Pye Weed	2
Euthamia graminifolia	Grass-leaved Goldenrod	1
Monarda fistulosa	Wild Bergamot	2
Panicum clandestinum	Deertongue	15
Panicum virgatum	Switchgrass	25
Polygonum pennsylvanicum	Pennsylvania Smartweed	1
Solidago canadensis	Canada Goldenrod	2
Verbena hastata	BlueVervain	2

Biofilter slopes shall be overseeded with winter rye (application rate: 50 pounds per acre).

*** Custom seed mixes available from Southern Tier Consulting, Inc.**
Final seeding rates to be determined by supplier.

Morphological differences between native and introduced genotypes of Common Reed

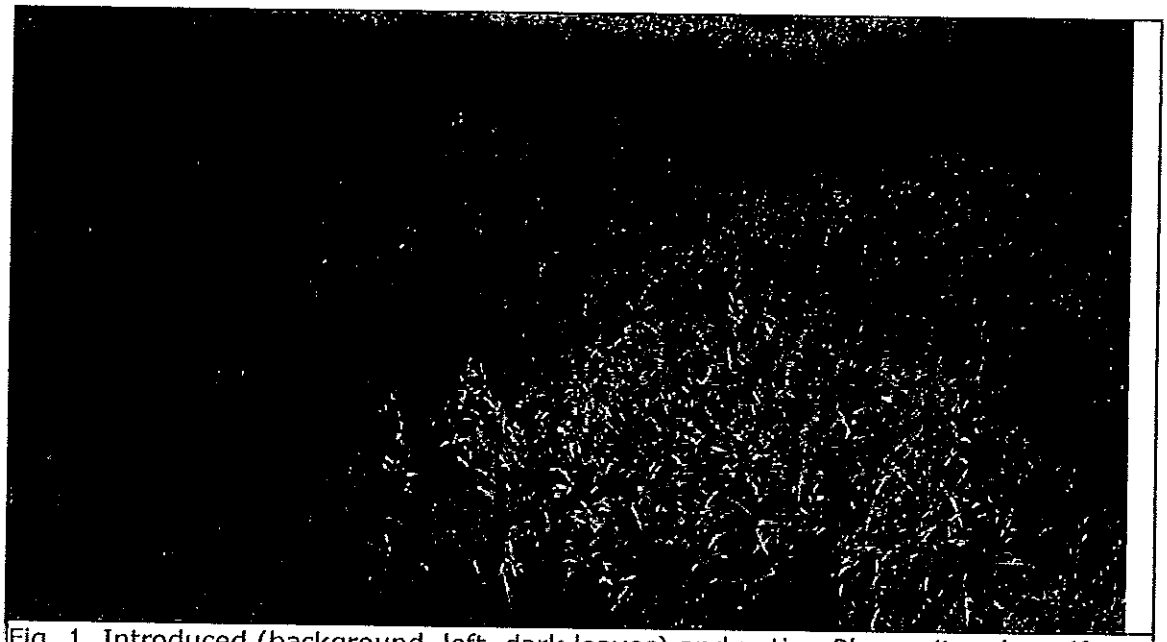


Fig. 1. Introduced (background, left, dark leaves) and native *Phragmites* clone (front, right, light green leaves) at Montezuma NWR

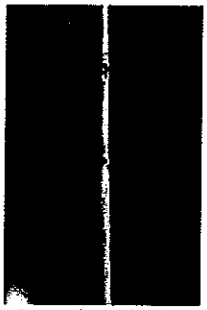
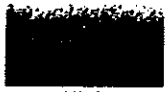
The recent development of molecular markers identifying native and non-native populations of *Phragmites* in North America now makes it possible to look for morphological characters potentially distinguishing these lineages. Preliminary observations of populations in New York (Fig. 1), Maryland, Maine, Indiana, Wisconsin, Minnesota, Virginia, Arizona, Washington, and Louisiana as well as examination of numerous herbarium specimens indicate that such morphological differences may exist (Table 1). [**Please note**: We are updating Table 1 as new evidence emerges. Please check frequently or sign up for our email list so you are automatically informed if updates are provided. In the most recent update, various traits were deleted (node coloration, ligule color, stem straightness) because they did not provide consistent separation of native and introduced haplotypes. Others were added (rhizome diameter and color, leaf sheath characters, habitat requirements)].

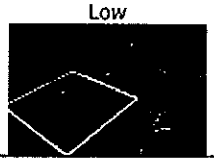
Please note that these traits are based on examination of now a considerable number of native and introduced clones but need further confirmation. What has become particularly clear over the past few months is that the various North American haplotypes differ in their morphological characters. And that these characters change over the course of the season and through the winter. Please also remember that the specimens you see in the field are the result of the genotype and its interactions with the biotic and abiotic environment. The same genotype grown in the moister Northeast will look quite different in the arid West. We are further examining these differences through field visits and by creating an experimental garden in Ithaca where different haplotypes are grown under standardized conditions. We need your help to identify and map other growing locations of native genotypes.

We also need to increase the sample size to assess whether the preliminary evidence for morphological differences between native and introduced genotypes is consistent across populations and lineages. By the end of May we will offer a diagnostic service using the identified morphological characters for those that need or want to know whether their local *Phragmites* patch is native or introduced.

Table 1. Observed differences between native and introduced *Phragmites* clone

Trait	**Native Haplotypes**	**Introduced Haplotypes (Haplotype M)**	**Gulf Coast (Haplotype I)**
Leaf sheaths	Fall off in the fall or are very easy removed if they stay on the stem.	Leaf sheaths stay on the plant, occasionally basal ones fall off the stem. Leaf sheaths are difficult to remove (use a twisting motion)	Not known
Stem color at base (spring/summer) Note: Leaf sheath needs to be removed	 Red to Chestnut	Tan Very occasionally do lower internodes show a brownish coloration in the winter.	Not known
Stem color at base (winter) Note: Leaf sheath needs to be removed on introduced haplotype	 Light chestnut to light brown/gray	Tan 	Not known

Stem texture Note: Run your finger across and up and down the stem after removing the leaf sheath	 Smooth and shiny (Looks polished. Often with dark spots [fungal attack] clustered at nodes in winter). Stem fungus absent in currently known Western and southwestern populations)	Rough and dull (Stems are ribbed. Ridges visible with naked eye. Very Occasionally do basal internodes appear smooth).	Not known
Stem flexibility	High	Rigid	Not known
Stem toughness	Low	High	Not known
Stem density	 Low	 High	High
Time of Flowering	Early (July-August)	Intermediate (August September)	Late (October-November)
Inflorescence	 Sparse Please note that sparse inflorescenses not automatically indicate native status!	 Dense	Not known
Senescence	Early **Please note that native southwestern genotypes (3 examined in AZ) appear to be evergreen without senescing. Instead, stems branch at the top,and lower leaves fall off.**	Late	Not known

Leaf color	Yellow-green	Inland pops: Dark green/gray Coastal pops: yellow-green to dark green/gray	Yellow-green
Rhizome density	Low 	High	Not known
Rhizome color	Yellowish	White to light yellow. Rhizomes will darken after excavation.	Not known
Rhizome diameter	Usually under 15mm Almost perfectly round. Occasionally slightly comnpressed.	few nodes under 15mm, most >15mm Mostly compressed (oval)	unknown unknown
Clonal expansion rate	Slow	Rapid	Rapid
Habitat requirements	Potentially restricted? All examined native populations grow on moist soils. Sites can be under tidal influence but are never continuously inundated.	Wide range of conditions Introduced genotypes can grow on fairly dry sites and on sites where rhizomes are continuously inundated.	Unknown

In general, native populations appear to have a lower stem density, and produce a reddish-purple color on their stems and ligules in spring and summer that is not present in non-native populations. When checking for these differences note that the side of the stems exposed to the sun will show the brightest coloration. The reddish color fades somewhat into a chestnut brown in the fall but was still very obvious in October in Virginia; in the winter the red stems turn light to chestnut brown and somewhat gray. Stems of native genotypes are smooth and shiny as if polished, particularly in the winter, while stems of introduced genotypes are dull, rough and ribbed (ridges visible with the naked eye once leaf sheath has been removed). These differences are easy to recognize by running your fingers up and down them stems.

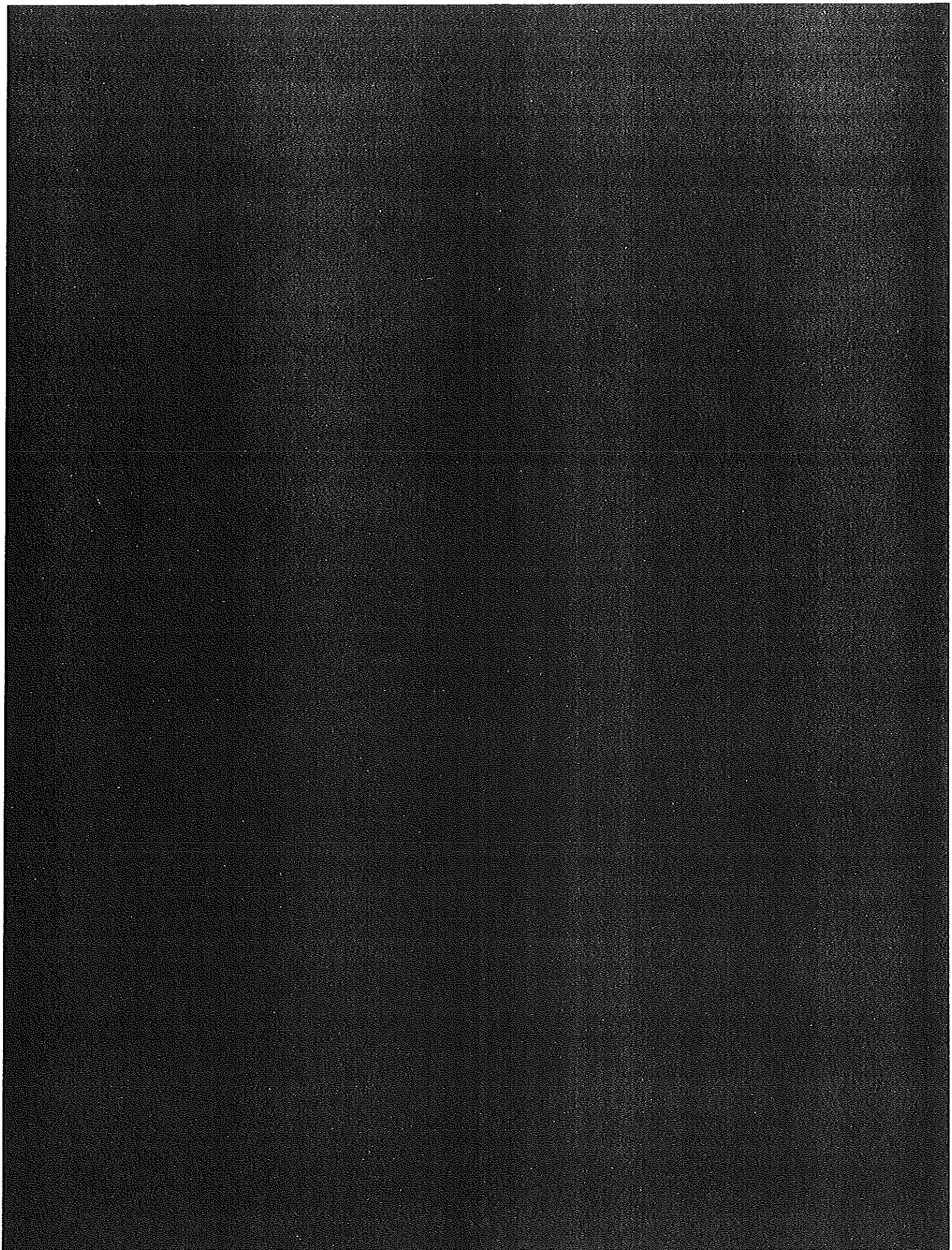
Please note that a leaf sheath wraps around the stem almost entirely. It is important to remove the leaf sheath when checking for stem morphology or texture.

For all native genotypes leaf sheaths either fall off by themselves or are very easily removed when handling *Phragmites*. In the introduced genotypes, leaf sheaths may fall off at the base of the stem (which is also occasionally reddish or brownish) but on upper nodes are very difficult to remove (hold a stem close to an internode and use a twisting motion to check). In instances where native and introduced clones grow in close vicinity of each other, differences in stem density and stem toughness become obvious on windy days. Introduced genotypes remain sturdy and erect and move little while native genotypes easily bend and swing in the wind. Stems of introduced genotypes are often almost perfectly straight while stems of native

genotypes often grow crooked (Haplotype E, known from the Northeast and Midwest does conform to this pattern but not all other populations).

In the fall and winter, differences in the density of inflorescences are also obvious; introduced genotypes appear to have much denser and larger inflorescences. Observations in New York and Virginia also suggest that native genotypes senesce earlier than introduced genotypes (this is a common phenomenon in introduced species which often show extended growing periods). In addition, an unidentified stem fungus attacks native genotypes with dark spots often clustered around internodes while introduced genotypes remain fungus free (there appears to be a reduction over the winter in the abundance of this stem spot fungus and not all western populations appear to be attacked).

Excavations of rhizomes at several sites have also produced consistent differences between native an dintroduced haplotypes. Native haplotypes have round rhizomes that are yellow and rhizome diameters of less than 15mm. Rhizomes of introduced haplotypes, particularly when freshly excavated and rinsed are white (they darken over time) and compressed (flattened). Although there are some rhizomes with diameters <15mm, most rhizome diameters in introduced genotypes are larger than 15mm (measure in the center of an internode and use largest diameter).



SURVEY REPORT OF THE BAT COMMUNITY PRESENT AT A HABITAT AREA IN ESSEX, MIDDLESEX COUNTY, CONNECTICUT

JACQUES P. VEILLEUX, Ph.D.

DEPARTMENT OF BIOLOGY
SACRED HEART UNIVERSITY
FAIRFIELD, CT 06825

(203) – 365 – 4772
veillleuxj@sacredheart.edu

REPORT SUBMITTED TO:

ENVIRONMENTAL PLANNING SERVICES

CONTACT:

ERIC DAVISON

_____

Jacques P. Veilleux

_____

Date

TABLE OF CONTENTS

ABSTRACT 3

INTRODUCTION 4

MATERIALS and METHODS 6

RESULTS 10

DISCUSSION. 24

RECOMMENDATIONS 26

LITERATURE CITED 27

APPENDIX 1 28

ABSTRACT

A survey of the bat community present at a habitat area located in Essex, Middlesex County, Connecticut, was conducted during 14 – 28 June 2003. A total of 16 net nights was conducted at 8 mist net areas. Thirty-two individuals were captured representing 4 species. The most common species observed was the little brown bat (*Myotis lucifugus*), followed by the big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and the northern myotis (*Myotis septentrionalis*). As compared with previous data, the eastern red bat was captured more often than expected at the site. Eastern red bats are listed as state special concern in Connecticut and it is recommended that additional data be collected to determine the degree to which this species uses the site, in terms of roosting and foraging, and how the population may be affected by habitat modification.

INTRODUCTION

A survey of the bat community present at a 1000 acre habitat area (hereafter termed 'subject area'), located in Essex, Old Saybrook, and Westbrook, Middlesex County, Connecticut (N 41°19.213; W 072°24.797) was conducted from 14 through 28 June 2003. Development of the subject area into a golf course and residential housing is currently planned. This survey was carried out in cooperation with Environmental Planning Services, in support of applications to the local land use boards.

Eight species of bats occur in Connecticut during summer months (Goodwin, 1935; Whitaker and Hamilton, 1998). Of these species, one is listed as federally endangered (Indiana Myotis, *Myotis sodalis*), and 3 are listed as state special concern within Connecticut (Eastern Red Bat, *Lasiurus borealis*; Hoary Bat, *L. cinereus*; and Silver-haired Bat, *Lasionycteris noctivagans*). The remaining four species are considered to have secure populations within Connecticut (Little Brown Bat, *Myotis lucifugus*; Northern Myotis, *M. septentrionalis*; Big Brown Bat, *Eptesicus fuscus*; and Eastern Pipistrelle, *Pipistrellus subflavus*).

Species of particular concern

Myotis sodalis, Indiana myotis

STATUS: FEDERALLY ENDANGERED

The Indiana bat spends the winter in large hibernating groups in relatively few caves mainly located throughout the southeastern United States (Whitaker and Hamilton, 1998). Individuals emerge from hibernation in late April through early May and migrate to their summer ranges. During summer, maternity colonies (aggregations of female bats with young) are found under loose bark of trees, and often, but not always, in riparian habitats. Females give birth to a single young. Colonies are difficult to locate because they are in wooded or semi-wooded areas and there are relatively few bats in the colony, usually less than 100. Captures of pregnant/lactating females or juvenile Indiana bats in nets does indicate the presence of a nearby maternity colony, presumably with larger numbers of bats indicating that the colony is quite close. No Indiana bats were captured in Connecticut during a mist net survey (25 net nights; study is ongoing) conducted during summer of 2002 (Veilleux, unpublished data).

Lasiurus borealis, Eastern red bat.

STATUS – STATE SPECIAL CONCERN

The red bat spends its winter months in southern states (remaining active) and migrates to its summer range in northern states. During summer months red bats roost singly (except for family units of a female and her young), hanging among tree foliage (Whitaker and Hamilton, 1998). Females give birth to three to four young. Populations of this species are considered to be declining in Connecticut, although it appears that much suitable habitat is available throughout the state. Only two individuals were captured in Connecticut during summer 2002; one in New Haven County (Cheshire) and one in Tolland County (Tolland; Veilleux, unpublished data).

Lasiurus cinereus, Hoary bat.

STATUS – STATE SPECIAL CONCERN

The hoary bat is the largest species in Connecticut. Like the red bat, hoary bats migrate south for the winter: to southern California, Central America and a few to coastal south Carolina (Cryan, 2003). Individuals roost singly (except for family groups of female and young) and hangs in foliage or on tree bark (typically on coniferous trees such as Douglas fir) during the daytime. Females give birth to two young. No hoary bats were captured in Connecticut during summer of 2002 (Veilleux, unpublished data).

Lasionycteris noctivagans, silver-haired bat.

STATUS – STATE SPECIAL CONCERN

The silver-haired bat is a distinctively colored migratory species. In the east it migrates from mid-southern states to its summer range in Michigan, New England, and Southeastern Canada (Whitaker and Hamilton, 1998). Maternity colonies are relatively small, averaging approximately 20 individuals, and are mainly located in tree cavities. No silver-haired bats were captured in Connecticut during summer of 2002 (Veilleux, unpublished data), and few have been captured in recent years (Jenny Dickson, CTDEP, personal communication).

Additional species

Four additional species are likely present at the subject area during summer months. The little brown bat is probably the most common species in Connecticut. Of 133 individuals captured during summer 2002, 86 were little brown bats. Little brown bats typically form maternity colonies in man-made structures (e.g. barns, attics) and colonies often reach several thousand individuals. The big brown bat is probably the second most common species in Connecticut. Thirty-six of 133 individuals captured during 2002 were big brown bats. Like the little brown bat, big brown bats form maternity colonies in man-made structures (in the eastern United States), although colony size is smaller, reaching several hundred individuals. The eastern pipistrelle appears to be relatively uncommon in Connecticut (6 individuals captured during 2002), although populations are considered stable. Pipistrelles are the smallest species in Connecticut. Pipistrelles form small maternity colonies of three or four individuals within clusters of dead leaves, usually of oak and maple trees (Veilleux et al., in press). The northern myotis also appears to be relatively uncommon in Connecticut (3 individuals captured during 2002). Northern myotis form maternity colonies under exfoliating bark or in tree hollows (Foster and Kurta, 1999). Colony size is relatively small, reaching approximately 30 individuals.

The purpose of this survey was to document the diversity of the bat community present at the subject area, assess the potential impact of development activity on the community, and to provide recommendations for ameliorating negative impacts on the bat community due to habitat alteration.

MATERIALS and METHODS

Selection of sampling localities

Reconnaissance to locate suitable sampling localities occurred for a total of 24 hours during 8, 10, and 11 June 2003. Suitable sampling sites, in order of decreasing suitability, were defined as follows: 1) waterways, such a creek or small river, approximately 10 m in width, 2) woodland trails approximately 10 m in width, and 3) woodland ponds. Waterways are preferred sites for capturing bats because individuals use such areas to drink, forage, and travel to additional foraging areas from their day roosts. Woodland trails are also suitable sampling areas because bats both forage and travel along these routes. Woodland ponds offer suitable foraging and drinking habitat, but placement of mist nets in areas likely to capture bats is often difficult. Non-suitable sampling sites include dense wooded sites, relatively narrow trails cluttered with vegetation, and open woodland sites with a tall overstory canopy.

No suitable waterways were available in the subject area, but an extensive network of logging roads and similar unimproved roads/trails was located. Most sampling occurred along such trails (for examples of mist net sites see Fig 1a - 1d). Specific sites were chosen where a canopy was formed above the trail by overhanging branches from trees. When the canopy is of a suitable height (approximately 8 m), such sites create a 'funnel', effectively concentrating flying bats toward the net. On several occasions, sampling occurred at less suitable sites due to the presence of a potential roost structure typically used by Indiana myotis or northern myotis (Fig 2a – 2b). When mist netting occurred at sites near potential roost structures, the structure was observed from dusk until dark to determine if bats were present.

Mist netting methods and protocol

Bats were captured by mist netting. Each mist net setup consisted of two mist nets, one above the other, for a total surface area of $45m^2$ (9 m horizontal, 5 m vertical). Mist nets were placed across woodlands trails at 8 primary sites, with two mist net setups at each primary site (mist net setups were located at least 100 m from one another at a primary site; Figure 3). Therefore, total sampling effort consisted of 16 net nights (1 mist net setup = 1 net night) following protocol suggested by the United States Fish and Wildlife Service).

Mist nets were attended by observers from dusk until midnight. Mist nets were checked with a flashlight once per 5 min, or after receiving an echolocation sequence on bat detectors. Sampling occurred on nights with little or no rainfall. In addition to mist netting, echolocation calls emitted by bats were recorded at one mist net site per night, using an AnabatII bat detector and storage CF ZCAIM (Titley Electronics, Australia). Echolocation sequences were downloaded to a computer and analyzed using Analook software. Sequences were identified as belonging to individual species or species groups. Therefore, although a species may not have been captured in a mist net, if present its occurrence would have been documented by its echolocation sequence.

Following capture, sex, age, body mass, and reproductive status were recorded for each bat. Age class (adult or juvenile) was determined by degree of ossification of the

epiphyseal plates in the finger bones (Anthony 1988). Adult females were classed as pregnant by degree of distention of the abdomen and lactation was determined by whether milk could be expressed after gentle pressure was applied to the nipple (Racey 1988). Bats were considered to be non-breeding if the abdomen was not distended (as is typical of bats early in the year, i.e. late April to early May) or if no milk could be expressed from nipples that obviously had been suckled (i.e. in the case of post-lactating females). Males were considered reproductive if the testes were descended into the scrotum and non-reproductive if the testes remained in the abdominal cavity. A numbered aluminum wing band (provided by the Connecticut Department of Environmental Protection) was fitted to each captured bat (left wing of females, right wing of males; Barclay and Bell, 1988).

Vegetation Analyses

Dominant woody vegetation within the subject area was characterized. Overstory trees and understory trees and shrubs were identified within a 0.1 ha plot located at each net site (16 plots total). Knowledge of the tree species composition of the subject area is necessary to infer potential use of the area by tree roosting bat species.

Figure 1a – 1d. Examples of mist net locations sampled during the current survey of bat diversity at the Essex, Connecticut subject area (for locations of sites on the subject area see Fig. 3)

Figure 1a. Mist net site A11

Figure 1b. Mist net site B11

Figure 1c. Mist net site B21

Figure 1d. Mist net site B22

Figure 2a – 2b. Examples of two potential roost structures typically used by Indiana myotis and northern myotis. Each structure was observed from dusk until dark to determine if bats were present. No bats were observed exiting from either structure.

Figure 2a. Red oak (*Quercus rubra*) snag located near mist net site B22.

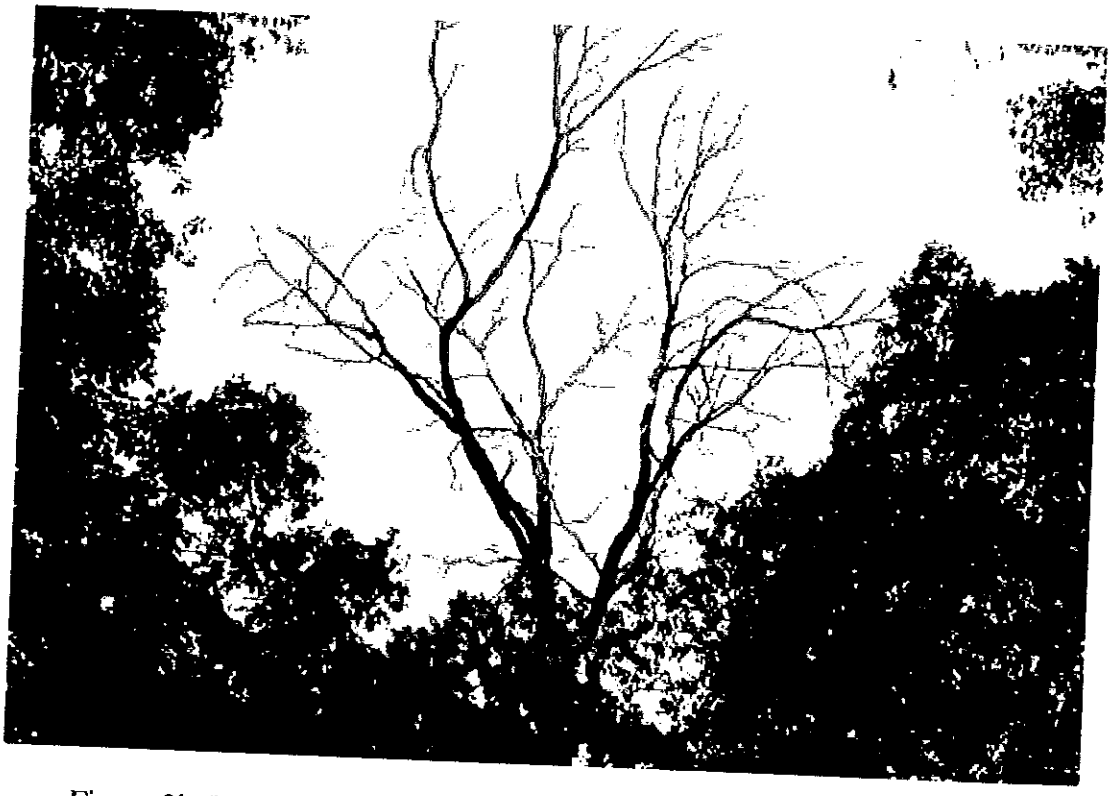
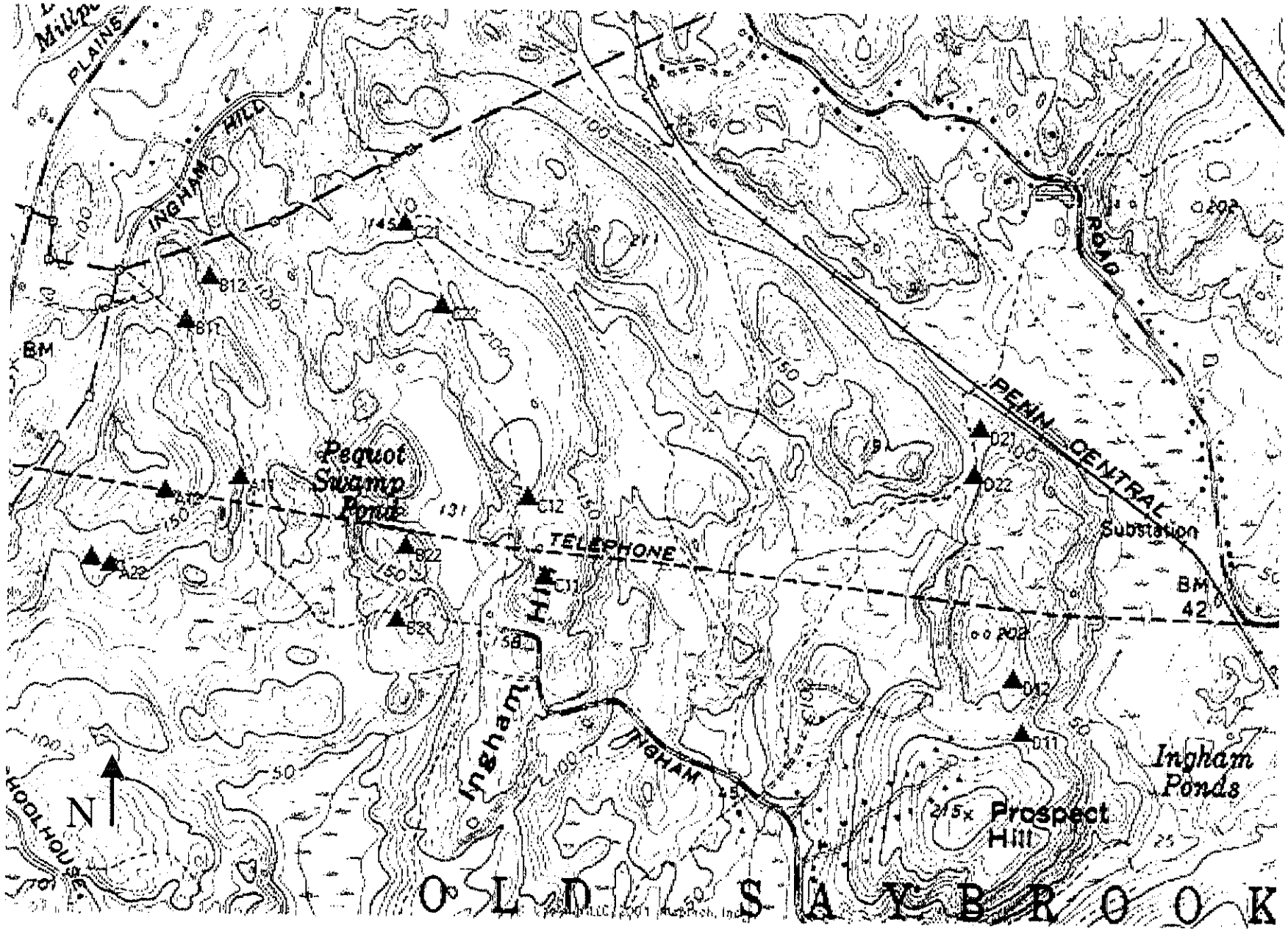


Figure 2b. White pine (*Pinus strobus*) snag located near mist net site B12.

Figure 3 Mist net sites sampled on the subject property located in Essex, Middlesex County, Connecticut.



RESULTS

Capture data

Mist netting for bats occurred on 8 nights, with 2 mist net setups per night, for a total of 16 net nights. Netting occurred during the period of 14 June through 28 June 2003. A total of 32 individuals, representing 4 species, was captured during the current survey. In order of decreasing abundance the species were: *Myotis lucifugus* (little brown bat; n = 10), *Eptesicus fuscus* (big brown bat; n = 8), *Lasiurus borealis* (eastern red bat; n = 7), and *Myotis septentrionalis* (northern myotis; n = 7). Each species was observed at an approximately equal rate (captures per net night; Fig. 4). Results of captures per mist net site are presented in tables below. Capture locations for each species are provided in Figures 5a – 5d. Photographic documentation of each species is provided in Appendix 1 (Fig 8a-8d).

Figure 4. Capture rate per net night for each species observed during the current survey.

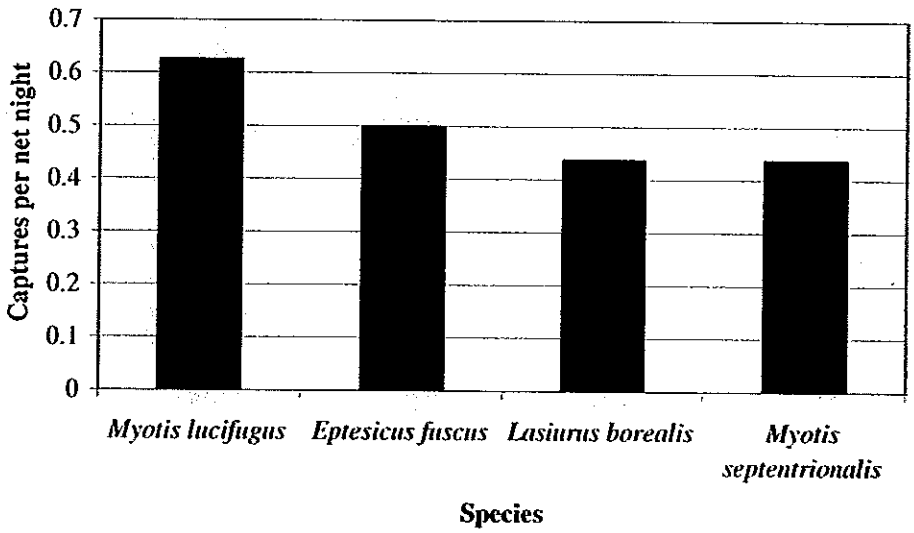


Table 1a – 1b. Capture results for mist net sites A11 and A12 sampled on 17 June 2002. Minimum, mean, and maximum temperatures during the sample were 11.7°, 13.2°, and 17.1° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 77.3%, 92.4%, and 97.6%, respectively. Conditions were clear, no rainfall, light wind, and no visible moon during the sample.

Table 1a. Capture data for mist net site A11.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2045	*Lasiurus borealis*	F	Adult	Pregnant	17	CTDEP - 21220
2125	*Lasiurus borealis*	M	Adult	Testis Scrotal	12.5	CTDEP - 21222
2125	*Eptesicus fuscus*	M	Adult	Testis Scrotal	16	CTDEP - 21223
2138	*Myotis septentrionalis*	M	Adult	Testis Abdominal	6.5	CTDEP - 21226

Table 1b. Capture data for mist net site A12.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2110	*Eptesicus fuscus*	M	Adult	Testes Scrotal	14.5	CTDEP - 21221
2132	*Myotis lucifugus*	F	Adult	Pregnant	10	CTDEP - 21224
2150	*Eptesicus fuscus*	F	Adult	Pregnant	18	CTDEP - 21225
2205	*Myotis lucifugus*	F	Adult	Pregnant	10.5	CTDEP - 21227
2350	*Myotis lucifugus*	F	Adult	Pregnant	10	CTDEP - 21230
2350	*Myotis septentrionalis*	F	Adult	Pregnant	9	CTDEP - 21229

Table 2a – 2b. Capture results for mist net sites A21 and A22 sampled on 24 June 2002. Minimum, mean, and maximum temperatures during the sample were 18.0°, 19.9°, and 22.6° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 82.3%, 97.1%, and 100%, respectively. Conditions were clear, no rainfall, light wind, and no visible moon during the sample.

Table 2a. Capture data for mist net site A21.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
	No Bats Captured					

Table 2b. Capture data for mist net site A22.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
	No Bats Captured					

Table 3a – 3b. Capture results for mist net sites B11 and B12 sampled on 14 June 2002. Minimum, mean, and maximum temperatures during the sample were 18.1°, 18.8°, and 19.9° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 96.5%, 99.5%, and 100%, respectively. Conditions were overcast, light rainfall, light wind, and no visible moon during the sample.

Table 3a. Capture data for mist net site B11.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2322	*Myotis septentrionalis*	M	Adult	Testes Abdominal	7.0	CTDEP - 21248

Table 3b. Capture data for mist net site B12.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
	No Bats Captured					

Table 4a – 4b. Capture results for mist net sites B21 and B22 sampled on 15 June 2002. Minimum, mean, and maximum temperatures during the sample were 16.6°, 18.3°, and 20.3° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 71.7%, 82.4%, and 89.7%, respectively. Conditions were overcast, no rainfall, light wind, and no visible moon during the sample.

Table 4a. Capture data for mist net site B21.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2125	*Lasiurus borealis*	F	Adult	Pregnant	17	CTDEP - 21215
2125	*Lasiurus borealis*	F	Adult	Pregnant	N/A	N/A
2315	*Eptesicus fuscus*	F	Adult	Pregnant	25.5	CTDEP - 21212
2315	*Myotis lucifugus*	F	Adult	Pregnant	9	CTDEP - 21211
2355	*Eptesicus fuscus*	M	Adult	Testes Scrotal	17	CTDEP - 21210

Table 4b. Capture data for mist net site B22.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2158	*Lasiurus borealis*	M	Adult	Testes Abdominal	11	CTDEP - 21217
2254	*Myotis lucifugus*	F	Adult	Pregnant	10	CTDEP - 21219
2254	*Myotis lucifugus*	F	Adult	Pregnant	8	CTDEP - 21218

Table 5a – 5b. Capture results for mist net sites C11 and C12 sampled on 19 June 2002. Minimum, mean, and maximum temperatures during the sample were 17.2°, 18.0°, and 20.4° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 87.8%, 98.5%, and 100%, respectively. Conditions were overcast, no rainfall, light wind, and no visible moon during the sample.

Table 5a. Capture data for mist net site C11.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2200	*Myotis lucifugus*	F	Adult	Pregnant	9.5	CTDEP - 21232
2320	Escape (unidentified)					

Table 5b. Capture data for mist net site C12.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2150	*Myotis lucifugus*	F	Adult	Pregnant	10.0	CTDEP - 21231
2240	*Myotis septentrionalis*	F	Adult	Pregnant	8.5	CTDEP - 21246
2305	*Myotis lucifugus*	F	Adult	Pregnant	12.0	CTDEP - 21233
2254	*Lasiurus borealis*	M	Adult	Testes Abdominal	12.0	CTDEP - 21245

Table 6a – 6b. Capture results for mist net sites C21 and C22 sampled on 28 June 2002. Minimum, mean, and maximum temperatures during the sample were 17.1°, 18.4°, and 21.4° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 73.1%, 87.9%, and 95.1%, respectively. Conditions were clear, no rainfall, light wind, and no visible moon during the sample.

Table 6a. Capture data for mist net site C21.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2309	*Eptesicus fuscus*	M	Adult	Testes Scrotal	18.0	CTDEP - 21234

Table 6b. Capture data for mist net site C22.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
	No Bats Captured					

Table 7a – 7b. Capture results for mist net sites D11 and D12 sampled on 26 June 2002. Minimum, mean, and maximum temperatures during the sample were 22.8°, 24.3°, and 26.4° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 79.8%, 83.9%, and 90.0%, respectively. Conditions were clear, no rainfall, light wind, and no visible moon during the sample.

Table 7a. Capture data for mist net site D11.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2140	*Eptesicus fuscus*	M	Adult	Testes Scrotal	18.5	CTDEP - 21242
2230	*Myotis septentrionalis*	F	Adult	Pregnant	9.5	CTDEP - 21243

Table 7b. Capture data for mist net site D12.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2158	*Lasiurus borealis*	F	Adult	Lactating	13.5	CTDEP - 21244
2254	*Myotis septentrionalis*	M	Adult	Testes Abdominal	6.5	CTDEP - 21238
2254	*Myotis lucifugus*	F	Adult	Pregnant	11.5	CTDEP - 21236

Table 8a – 8b. Capture results for mist net sites D21 and D22 sampled on 27 June 2002. Minimum, mean, and maximum temperatures during the sample were 22.4°, 24.4°, and 26.7° C, respectively. Minimum, mean, and maximum relative humidity during the sample were 52.3%, 75.9%, and 90.5%, respectively. Conditions were clear, no rainfall, high wind, and no visible moon during the sample.

Table 8a. Capture data for mist net site D21.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2135	*Myotis septentrionalis*	M	Adult	Testes Abdominal	7.0	CTDEP - 21235

Table 8b. Capture data for mist net site D22.

Time	Species	Sex	Age	Reproductive Condition	Mass (g)	Band Number
2325	*Eptesicus fuscus*	M	Adult	Testes Scrotal	15.5	CTDEP - 21237

Analysis of echolocation sequences

Echolocation sequences produced by bats were recorded during six samples (sites A11, A21, B22, C12, C21, and D12) using an AnabatII bat detector and storage CF ZCAIM. Echolocation sequences were not recorded during two samples due to light rain on one occasion and hardware malfunction on another occasion.

A total of 291 echolocation sequences was recorded representing 4 species (Fig. 6a – 6d). One hundred and fifty-eight sequences were identifiable (54%) to species, while the remainder of the sequences were fragmentary and not identifiable. Each sequence belonged to one of the 4 species captured during the survey. In order of decreasing occurrence, the recorded sequences were: *Myotis septentrionalis* (n = 102), *Lasiurus borealis* (n = 38), *Myotis lucifugus* (n = 15), and *Eptesicus fuscus* (n = 3).

During one of the six samples, echolocation sequences were recorded for species not captured at the sample locality (area A21 / A22). No bats were captured at either site during this sample, but each of the four species were present as indicated by echolocation sequences. For each of the

additional samples, echolocation sequences did not reveal additional species present in the area that were not captured in mist nets.

Figure 5a. Capture locations for *Myotis lucifugus* (little brown bat).

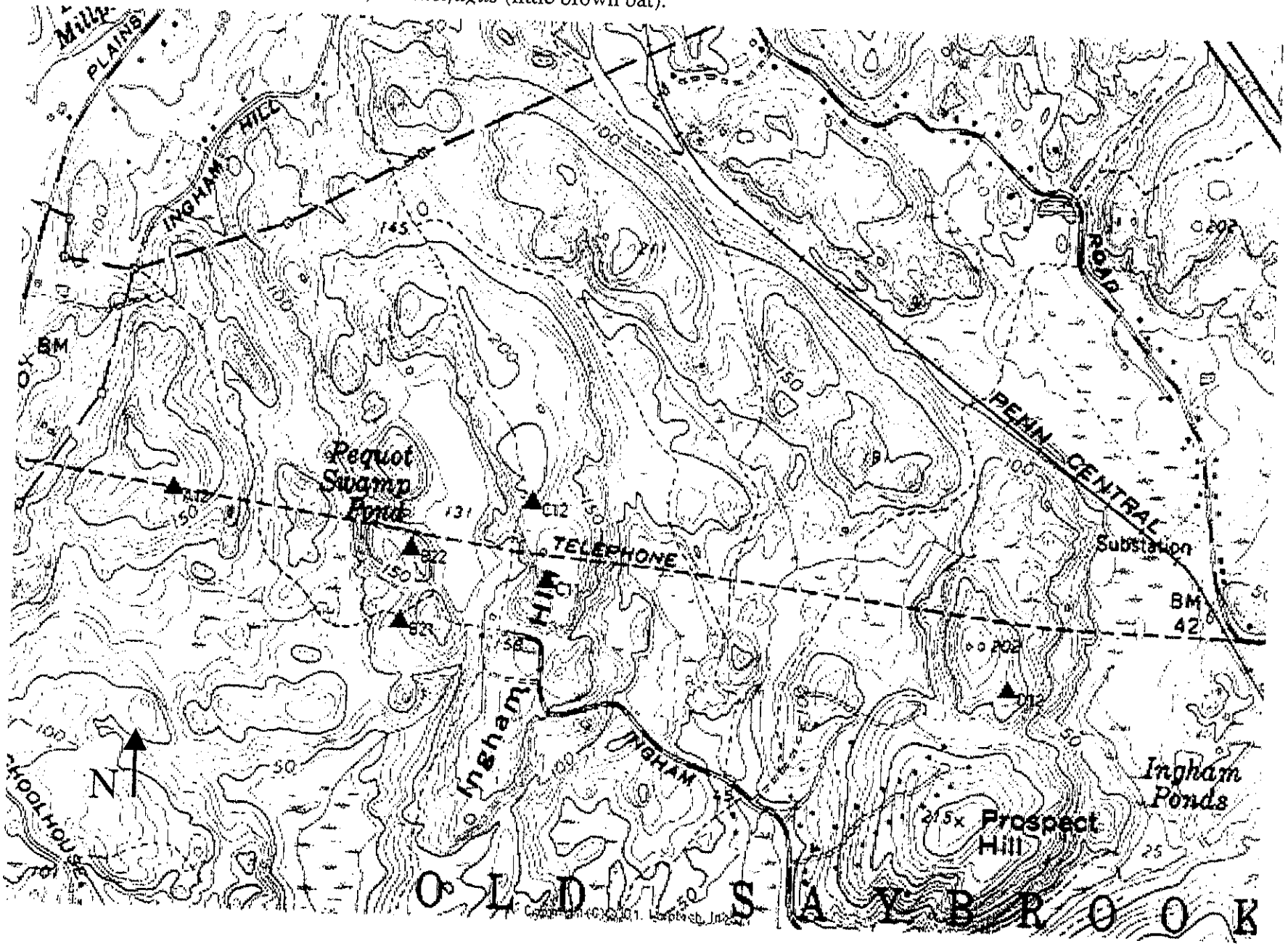


Figure 5b. Capture locations for *Eptesicus fuscus* (big brown bat).

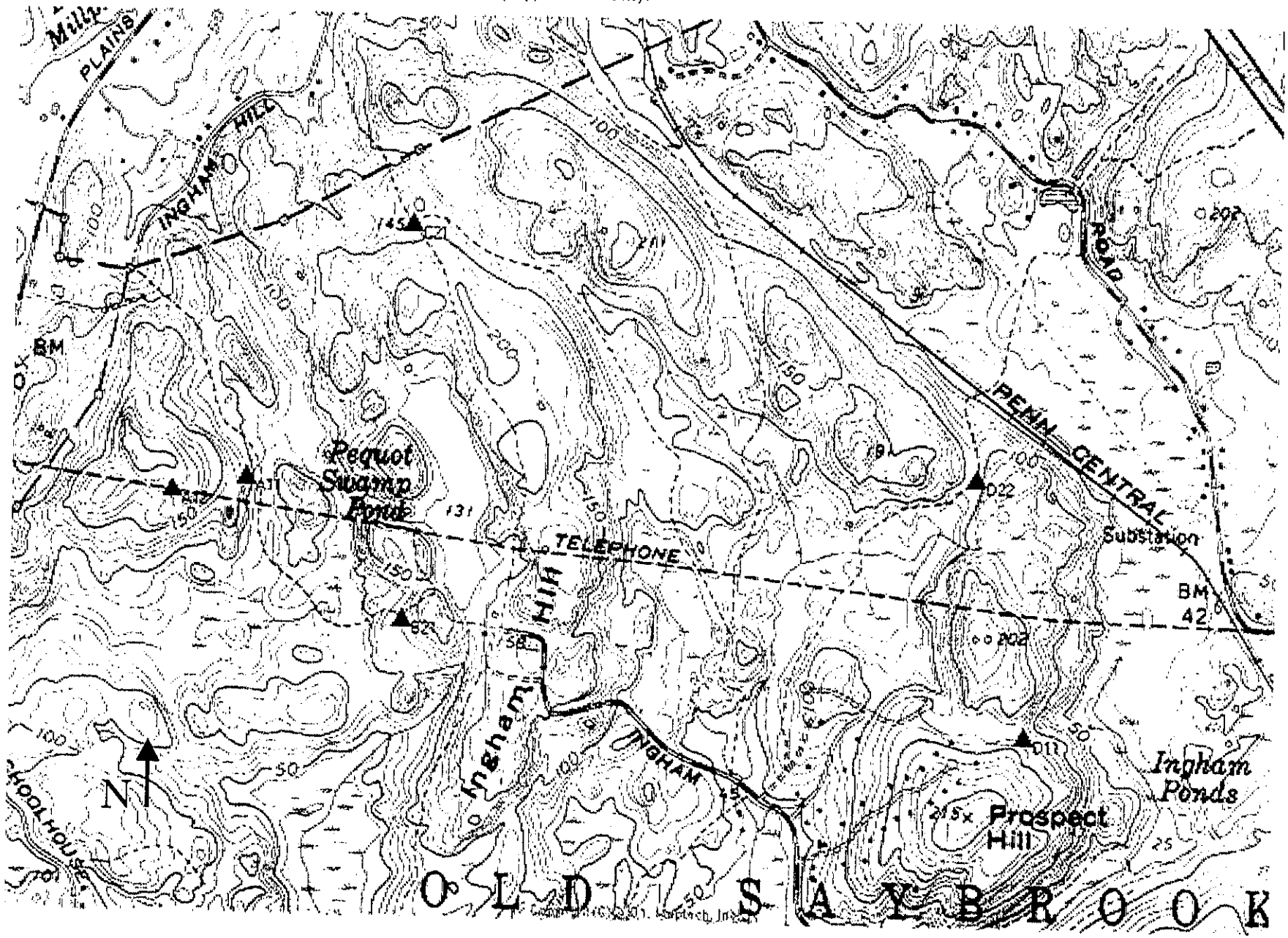


Figure 5c. Capture locations for *Lasiurus borealis* (eastern red bat).

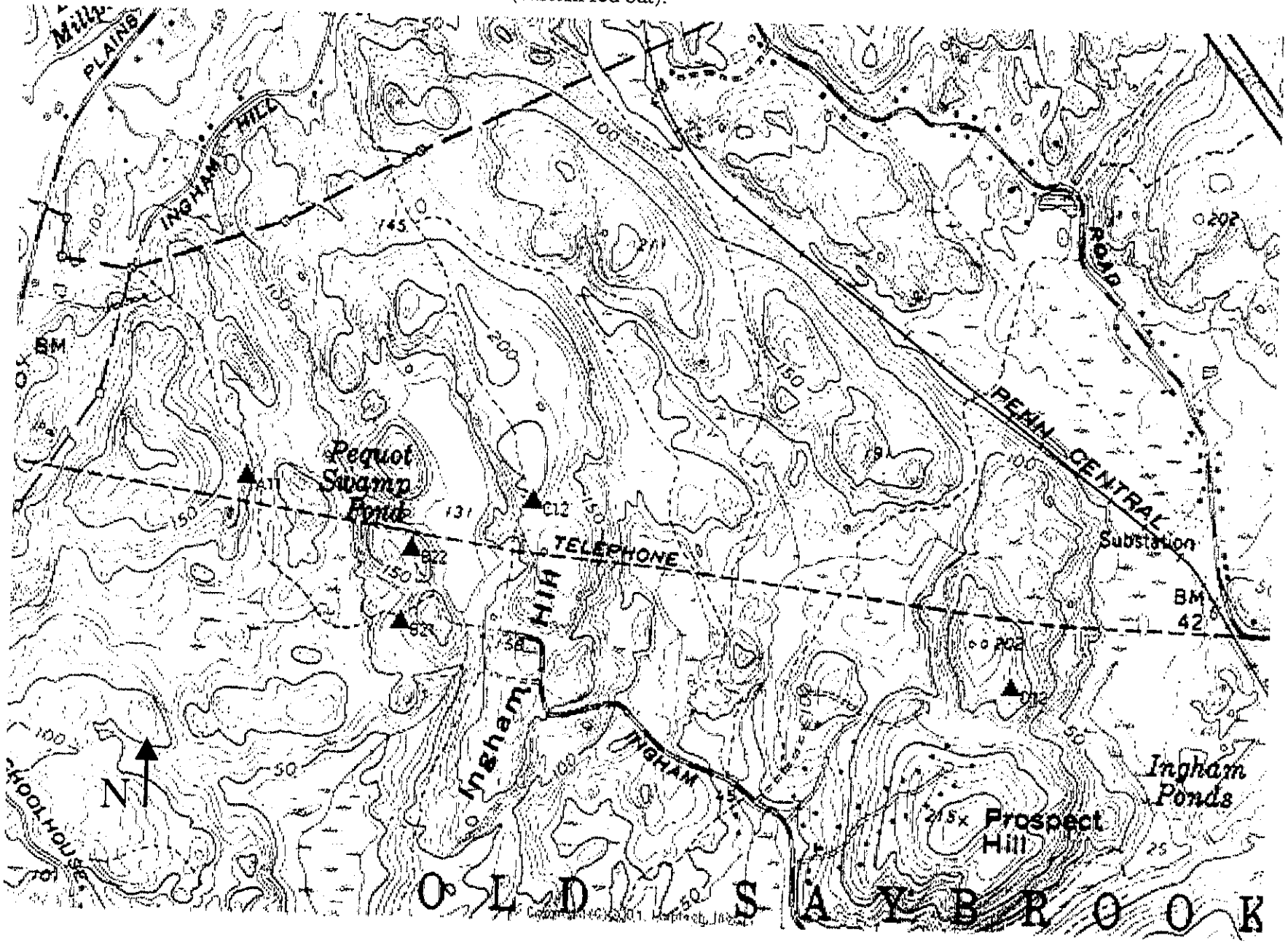


Figure 5d. Capture locations for *Myotis septentrionalis* (northern myotis).

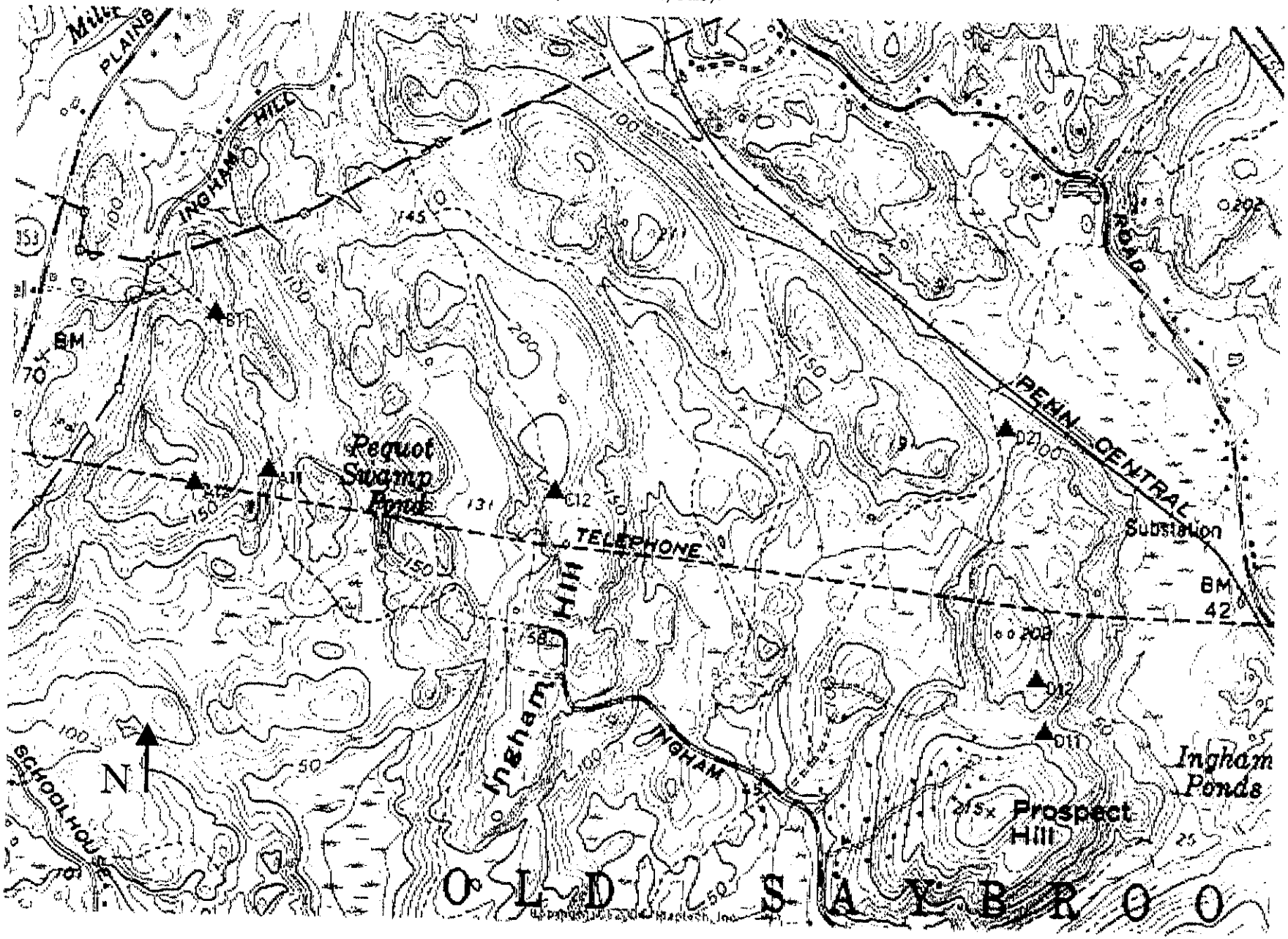


Figure 6b. Echolocation sequence produced by *Eptesicus fuscus* (big brown bat).

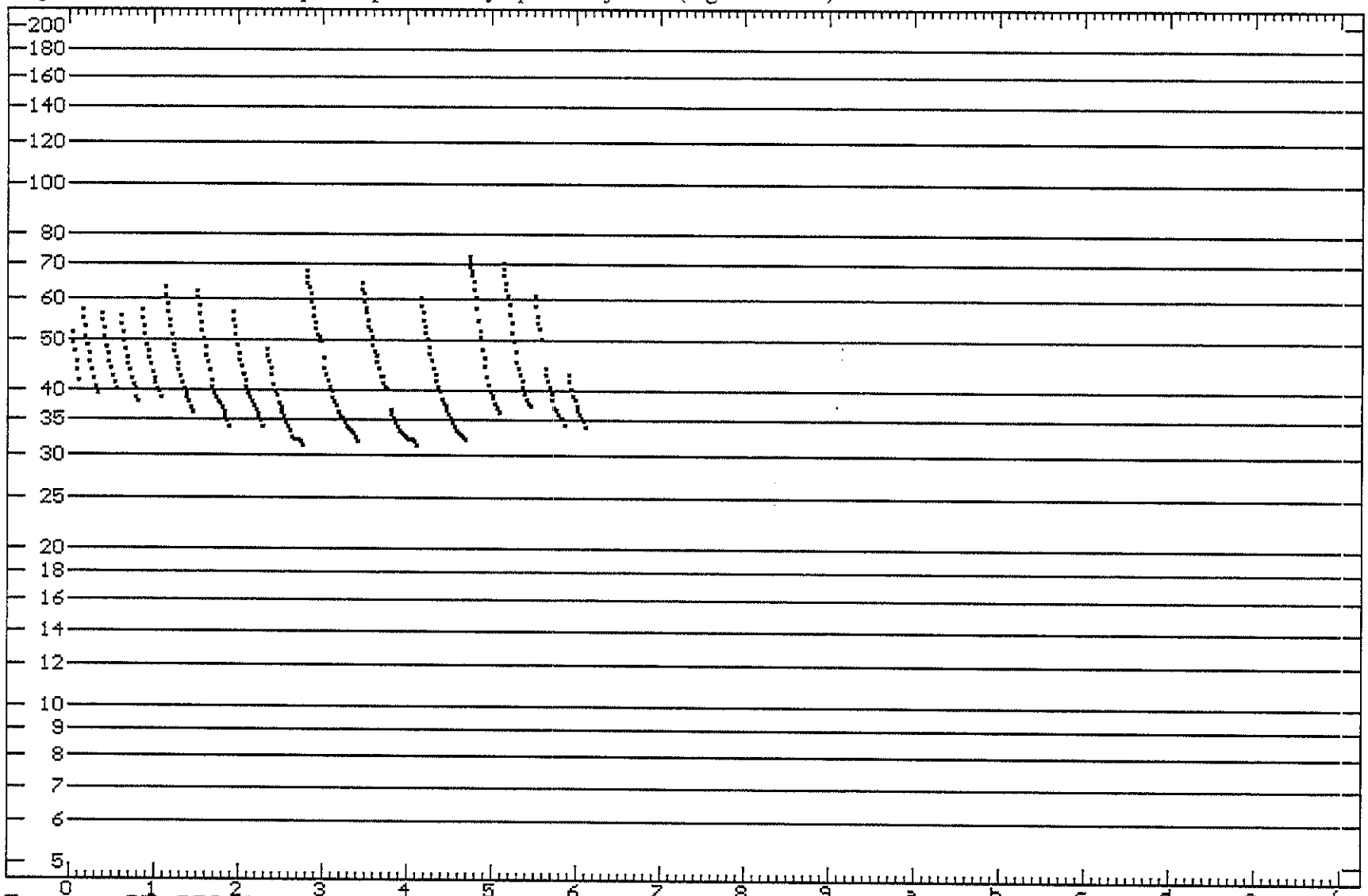


Figure 6c. Echolocation sequence produced by *Lasiurus borealis* (eastern red bat).

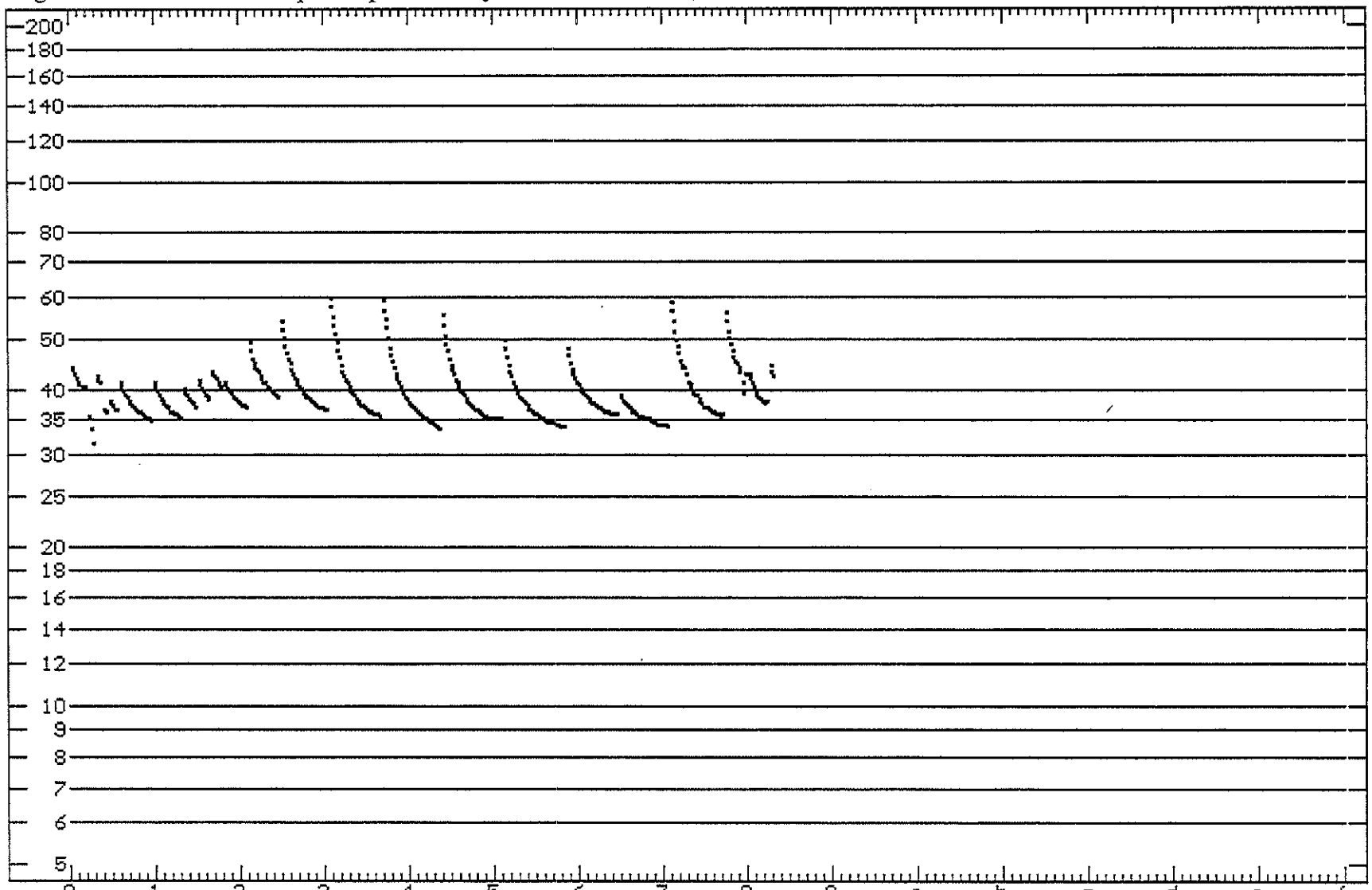
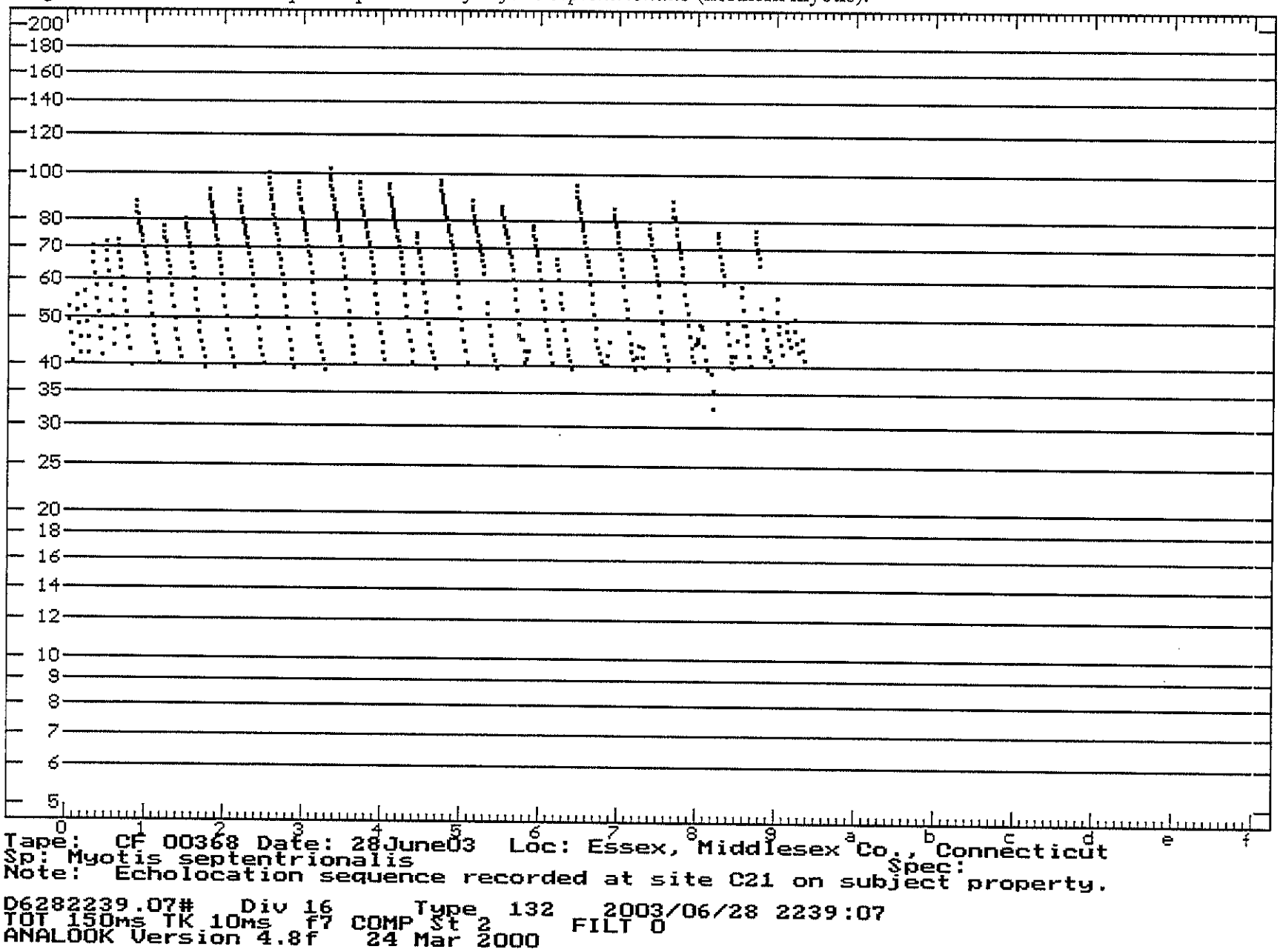


Figure 6d. Echolocation sequence produced by *Myotis septentrionalis* (northern myotis).



Tree species abundance

Totals of 262 overstory trees and 215 understory trees were identified from 16, 0.1 ha circular plots (1 plot per net site; Table 9). Thirteen over story tree species and 20 under story tree species were observed. The most commonly observed overstory trees were: *Quercus rubra* (red oak, 31.8%), *Quercus alba* (white oak; 20.5%), *Betula nigra* (black birch; 14.8%), and *Carya cordiformis* (bitternut hickory; 12.5%). The most commonly observed under story trees were: *Fagus grandifolia* (American beech; 14.9%), *B. nigra* (14.0%), *C. cordiformis* (12.1%), *Betula alleghaniensis* (yellow birch; 11.6%), and *Prunus serotina* (black cherry; 10.7%).

Table 9. Occurrence of over story and under story trees observed during 16 samples (one sample per mist net site)

Species	Overstory		Understory	
	Number	% Occurrence	Number	% Occurrence
Quercus rubra (red oak)	84	31.8	14	6.5
Quercus alba (white oak)	54	20.5	4	1.9
Betula nigra (black birch)	39	14.8	30	14.0
Carya cordiformis (bitternut hickory)	33	12.5	26	12.1
Fagus grandifolia (American beech)	19	7.2	32	14.9
Quercus palustris (pin oak)	13	4.9	0	0.0
Acer saccharum (sugar maple)	9	3.4	11	5.1
Fraxinus americana (white ash)	4	1.5	1	0.5
Betula alleghaniensis (yellow birch)	2	0.8	25	11.6
Acer rubrum (red maple)	2	0.8	2	0.9
Quercus prinus (chestnut oak)	1	0.4	0	0.0
Prunus serotina (black cherry)	1	0.4	23	10.7
Sassafras albidum (sassafras)	1	0.4	10	4.7
Juniperus virginiana (eastern red cedar)	0	0.0	18	8.4
Kalmia latifolia (mountain laurel)	0	0.0	8	3.7
Cornus florida (flowering dogwood)	0	0.0	5	2.3
Carpinus caroliniana (ironwood)	0	0.0	2	0.9
Quercus velutina (black oak)	0	0.0	2	0.9
Tsuga canadensis (eastern hemlock)	0	0.0	1	0.5
Carya ovata (shagbark hickory)	0	0.0	1	0.5
Totals	262	100%	215	100%

DISCUSSION

The purpose of the current survey was to document the diversity of the bat community present at the subject area located in Essex, Old Saybrook, and Westbrook, Middlesex County, Connecticut. The subject property is relatively large (4 km^2) and contains several habitat types. Both un-thinned and thinned upland sites, containing large numbers of secondary growth red oak, white oak, black birch and bitternut hickory are present. Lowland swamps and marshes (e.g. Pequot Swamp Pond) and ephemeral (vernal) water bodies are located throughout the subject property. These habitat types provide suitable roosting and foraging habitat for bats, respectively.

Four of the eight species of bats known to occur in Connecticut were captured at the subject area during the current survey (*Myotis lucifugus*, *Eptesicus fuscus*, *Lasiurus borealis*, and *M. septentrionalis*). Each species was captured in approximately equal numbers. Echolocation sequences recorded within sample areas did not reveal the presence of additional species in the subject area.

Myotis lucifugus, the little brown bat, was the most frequently encountered species at the subject area (n = 10). The little brown bat is probably the most common species in Connecticut and is believed to have stable (and possibly increasing) populations. The success of this species is due primarily to their recent behavioral adaptation of roosting in man-made structures following European settlement (Sparks and Choate, 2001). Each of the 10 individuals captured during the survey were pregnant females, indicating that a maternity roost or roosts are located near the subject area. Although it is possible that some individuals are roosting in trees (their ancestral habitat; Whitaker and Hamilton, 1998) within the subject area, it is more likely that the maternity colonies are located in barns, house attics, and other man-made structures located along the border of the subject property. Little brown bats likely forage over the swamps and marshes located on the subject property, as individuals often feed where dense swarms of insects (particularly midges (Diptera: Chironomidae) are available (Whitaker and Hamilton, 1998).

Eptesicus fuscus, the big brown bat, was the second most frequently encountered species at the subject area (n = 8). As is the case in *M. lucifugus*, big brown bats are common in Connecticut and populations are stable or increasing. In addition, the success of big brown bats is also due to their habit of roosting in man-made structures (although they may rarely use tree hollows as well). Two of the eight individuals captured during the survey were pregnant females, with the remainder comprised of adult males. The presence of the two pregnant females indicates that a maternity roost or roosts are located near the subject property. Big brown bats feed primarily on beetles (Coleoptera), including large numbers of scarabid beetles, but feed on ants (Hymenoptera) and flies (Diptera) as well (Whitaker and Hamilton, 1998).

Lasiurus borealis, the eastern red bat, was observed in higher proportions than might have been predicted from previous data. Eastern red bats are not common in Connecticut, and populations are considered to be declining. This decline has led to the placement of the eastern red bat on the Connecticut Department of Environment Protection's list of endangered, threatened, and special concern species (Public Act 89-224). Eastern red bats are currently listed as state special concern. During a mist net survey of Connecticut initiated in 2002, only 2 individuals were

captured during 25 mist net samples (Veilleux, unpublished data). During the current survey, seven eastern red bats were captured at five mist net sites, including three pregnant females, one lactating female, and three adult males.

The presence of pregnant and lactating females indicates that the subject property may be used as a site for roosting and likely for foraging. Female eastern red bats do not form maternity colonies, but roost singly. Mager and Nelson (2001) found eastern red bats to prefer oaks (*Quercus* spp.), sweetgum (*Liquidambar styraciflua*), maples (*Acer* spp.), and hickories (*Carya* spp.) as roost trees, and Hutchinson and Lacki (2000) found individuals to prefer hickories, sweetgum, white oak, and American beech as roosts. Eastern red bats have been found to prefer roosting habitat containing relatively large tracts of secondary growth oak/hickory forest (Hutchinson and Lacki, 2000). The subject property contains relatively large tracts of such suitable roosting habitat (oaks and hickories comprised approximately 60% of over story trees), and therefore may provide day roosts for a relatively large number of reproductive female eastern red bats. Red bats feed primarily on moths (Lepidoptera) and beetles (Whitaker and Hamilton, 1998), and likely forage over the swamp/marsh habitat, as well as along the trails that cross the subject property.

Myotis septentrionalis, the northern myotis, was captured on seven occasions at the subject area. Northern myotis are not common in Connecticut, but populations are widespread in the state and are considered stable. Three of the seven individuals captured during the survey were pregnant females, with adult males comprising the remaining 4 individuals. The presence of the three pregnant females indicates that a maternity roost or roosts are located near or on the subject property. Northern myotis roost in trees, either in hollows or under exfoliating bark (Foster and Kurta, 1999). Sasse and Pekins (1996) reported that northern myotis preferred American beech, sugar maple, yellow birch, and red maple as roosts; roost trees were often snags (dead or dying trees). Foster and Kurta (1999) found northern myotis to prefer silver maples (*Acer saccharinum*) and green ash (*Fraxinus pennsylvanica*) as roost trees. Northern myotis feed primarily on moths, but beetles, flies, caddisflies and spiders are also important food items (Whitaker and Hamilton, 1998).

The survey did not reveal the presence of four species that occur in Connecticut. Three of the four species, the Indiana myotis (*Myotis sodalis*; federally endangered), silver-haired bat (*Lasionycteris noctivagans*; state special concern), and hoary bat (*Lasiurus cinereus*; state special concern) are uncommon in Connecticut. No individuals of these species were observed during a 2002 mist net survey of Connecticut (Veilleux, unpublished data), and it is therefore reasonable that no individuals were observed at the subject area (although individuals could be present). The fourth species, the eastern pipistrelle (*Pipistrellus subflavus*), was not commonly encountered during a 2002 mist net survey of Connecticut, but populations are considered stable. Eastern pipistrelles form small maternity colonies in foliage and prefer oak and maple trees as roosts (Veilleux et al., in press). The subject area contains suitable habitat for this species and it was surprising that pipistrelles were not encountered during the survey.

RECOMMENDATIONS

The subject area supports a fairly diverse community of bats and is likely used as foraging and/or roosting habitat by each species captured during the current survey. Data gathered by mist net surveys are able to document the presence of bat species, but unfortunately cannot (typically) provide evidence that individuals roost or forage within a specific habitat area.

Although the little brown bat, big brown bat, and northern myotis occur on site, the main concern raised by this survey is whether eastern red bats roost and forage within the subject area. Due to the eastern red bat's status as state special concern, specific recommendations are to determine: 1) whether eastern red bats roost and/or forage within the subject property, and 2) whether eastern red bats utilize specific localized areas of the subject property as roosting and/or foraging habitat.

The best method for determining specific habitat use by eastern red bats is radio telemetry. A small radio transmitter is attached to reproductive females. During daytime hours, tagged individuals are tracked to their day roosts (i.e. roost trees) using a radio receiver, and during nighttime hours, foraging locations are documented by triangulation techniques (also with radio receivers). These data would document specific patterns of habitat use by eastern red bats at the subject area and therefore would allow managers to best determine how to reduce potentially negative impacts on the eastern red bat population at the subject area.

LITERATURE CITED

Anthony, E.L.P. 1988. Age determination in bats. Pp. 47-57 *in* Ecological and behavioral methods for the study of bats. (T. H. Kunz. ed.). Smithsonian Institution Press. Washington, D.C. London. 533pp.

Barbour, T. W., and W. H. Davis. 1969. Bats of America. University Press of Kentucky, Lexington, 286 pp.

Barclay, R.M.R. and G.P. Bell. 1988. Marking and observational techniques *in* Ecological and Behavioral Methods for the Study of Bats. (T. H. Kunz. ed.). Smithsonian Institution Press. Washington, D.C. London. 533pp.

Cryan, P. M. 2003. Seasonal distribution of migratory tree bats (*Lasiurus* and *Lasionycteris*) in North America. Journal of Mammalogy. 84:579-593.

Foster, R.W. and A. Kurta. 1999. Roosting ecology of the northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). Journal of Mammalogy. 80:659-672.

Goodwin, G. G. 1935. The Mammals of Connecticut. State Geological and Natural History Survey. Bulletin No. 53. 221pp.

Hutchinson, J. and M.J. Lacki. 2000. Selection of day roosts by red bats in mixed mesophytic forests. Journal of Wildlife Management. 64: 87-94.

Mager, K.J. and T.A. Nelson. 2001. Roost-site selection by eastern red bats (*Lasiurus borealis*). American Midland Naturalist. 145:120-126.

Racey, P.A. 1988. Reproductive assessment in bats. Pp. 31-43 *in* Ecological and behavioral methods for the study of bats. (T. H. Kunz. ed.). Smithsonian Institution Press. Washington, D.C. London. 533pp.

Sasse, D.B. and Pekins, P.J. 1996. Summer roosting ecology of northern long-eared bats (*Myotis septentrionalis*) in the White Mountain National Forest. Pp. 91-101 *in* Bats and Forests Symposium, October 19-21, 1995, Victoria, British Columbia, Canada (R.M.R. Barclay and R.M. Brigham, ed.). Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 23/1996.

Sparks, D.W. and J.R. Choate. 2000. Distribution, natural history, conservation, and biogeography of bats in Kansas. Pp. 173-228 in: Reflections of a naturalist: papers honoring Professor Eugene D. Fleharty. Fort Hayes Studies. Special Issue 1. 241pp.

Veilleux, J.P., J.O. Whitaker, Jr. and S.L. Veilleux. *In press*. Tree-roosting ecology of reproductive female eastern pipistrelles, *Pipistrellus subflavus*, in Indiana. Journal of Mammalogy. (August 2003).

Whitaker, J. O. Jr. and W. H. Hamilton. 1998. Mammals of the Eastern United States. Cornell University Press. 583pp.

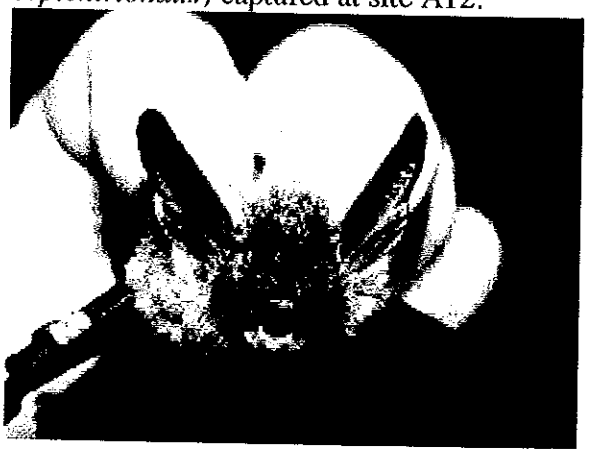
APPENDIX 1

Figure 8a. Little brown bat (*Myotis lucifugus*) captured at site A12.

Figure 8b. Big brown bat (*Eptesicus fuscus*) captured at site C21.

Figure 8c. Eastern red bat (*Lasiurus borealis*) captured at site A12.

Figure 8d. Northern myotis (*Myotis septentrionalis*) captured at site A12.



Floral Species List: The Preserve

Old Saybrook, Essex, and Westbrook, Connecticut

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
STRATUM Trees				
Acer rubrum	Red Maple	FAC	1-7	
Acer saccharum	Sugar Maple		2	
Ailanthus altissima	Tree-of-Heaven	NI	1,2	invasive
Amelanchier arborea	Downy Serviceberry	FAC-	2	
Betula alleghaniensis	Yellow Birch	FAC	2,3,5	
Betula lenta	Black Birch	FACU	1,2	
Betula populifolia	Gray Birch	FAC	1,3,5	
Carpinus caroliniana	Ironwood	FAC	2,3,5	
Carya ovata	Shagbark Hickory	FACU-	2,3	
Carya sp.	hickory		1,2	
Carya tomentosa	Mockernut Hickory		2	
Chamaecyparis thyoides	Atlantic White Cedar	OBL	1,4,7	
Cornus alternifolia	Alternate-lvd Dogwood		2	
Cornus florida	Flowering Dogwood	FACU-	1,2	
Crataegus sp.	hawthorn		2	
Fagus grandifolia	American Beech	FACU	2,3	
Fraxinus pensylvanica	Green Ash	FACW	3	
Juniperus virginiana	Eastern Red Cedar	FACU	1,2	
Liriodendron tulipifera	Tulip-tree	FACU	2,3	
Nyssa sylvatica	Black Tupelo	FAC	1,3,4,5	
Ostrya virginiana	Hop-hornbeam	FACU-	2,3	
Pinus strobus	Eastern White Pine	FACU	1,2	
Prunus serotina	Black Cherry	FACU	2	
Prunus sp.	cherry cultivar		1	
Prunus virginiana	Choke Cherry	FACU	4	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Quercus alba	White Oak	FACU-	2	
Quercus bicolor	Swamp White Oak	FACW+	2,3	
Quercus coccinea	Scarlet Oak		2	
Quercus palustris	Pin Oak	FACW	3	
Quercus rubra	Red Oak	FACU-	2,3	
Quercus sp.	oak		1	
Quercus velutina	Black Oak		2	
Robinia pseudo-acacia	Black Locust	FACU-	2	invasive
Sassafras albidum	Sassafras	FACU-	1,2,3	
Tsuga canadensis	Eastern Hemlock	FACU	2,3,5	
Ulmus americana	American Elm	FACW-	3	
STRATUM Shrubs				
Alnus incana	Speckled Alder	FACW+	3,5,7	
Amelanchier canadensis	Oblong-leaf Serviceberry	FAC	2	
Aronia arbutifolia	Red Chokeberry	FACW	3,6,7	
Berberis thunbergii	Japanese Barberry	FACU	2,3	invasive
Cephalanthus occidentalis	Buttonbush	OBL	3,6	
Clethra alnifolia	Sweet Pepperbush	FAC+	1-7	
Comptonia peregrina	Sweet Fern		1,2	
Cornus racemosa	Gray Dogwood	FAC	1	
Corylus americana	American Hazelnut	FACU-	1,2	
Decodon verticillatus	Hairy Swamp Loosestrife	OBL	3,5,6,7	
Elaeagnus angustifolia	Russian Olive	FACU	1	invasive
Euonymus alatus	Winged Spindle-tree		1,2,3	invasive
Genista tinctoria	Dyers' Greenwood		1	
Hamamelis virginiana	Witch Hazel	FAC-	2,3	
Ilex verticillata	Winterberry Holly	FACW+	1,3,4,5,7	
Juniperus communis	Common Juniper		1	
Kalmia angustifolia	Sheep Laurel	FAC	1,7	
Kalmia latifolia	Mountain Laurel	FACU	1,2,3,5	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Ligustrum sp.	privet		2,6	invasive
Lindera benzoin	Spicebush	FACW-	2,3.5	
Lonicera morrowii	Morrow's Honeysuckle	NI	2	invasive
Lyonia ligustrina	Maleberry	FACW	5,7	
Myrica pensylvanica	Northern Bayberry	FAC	7	
Rhododendron periclymenoides	Pinxter Flower		2,3,5	
Rhododendron viscosum	Swamp Azalea	OBL	3,4,5,6	
Rhus copallina	Winged Sumac	NI	1	
Rosa multiflora	Multiflora Rose	FACU	1,2,3,4,7	invasive
Rosa palustris	Swamp Rose	OBL	5,6,7	
Rubus allegheniensis	Allegheny Blackberry		1	
Rubus flagellaris	Northern Dewberry		1	
Rubus hispidus	Bristly Dewberry	FACW	1,2,3,5,7	
Rubus occidentalis	Black Raspberry		2	
Rubus sp.	brambles		1,2,3,7	
Sambucus canadensis	Common Elderberry	FACW-	3,7	
Smilax glauca	Cat Greenbrier	FACU	2	
Smilax herbacea	Carrion-flower	FAC	2	
Spiraea latifolia	Broad-leaf Meadowsweet	FAC+	1,5,7	
Spiraea tomentosa	Steeplebush	FACW	5,6,7	
Toxicodendron vernix	Poison Sumac	OBL	5	
Vaccinium angustifolium	Lowbush Blueberry	FACU-	1,2	
Vaccinium corymbosum	Highbush Blueberry	FACW-	1-7	
Vaccinium macrocarpon	Large Cranberry	OBL	6	
Vaccinium pallidum	Early Lowbush Blueberry		2	
Viburnum acerifolium	Maple-leaved Viburnum		1,2,3	
Viburnum dentatum var. lucidum	Southern Arrowwood	FACW-	2,3,5,7	syn. Viburnum recognitum
Viburnum lentago	Nannyberry	FAC	3	
STRATUM Vines				
Celastrus orbiculatus	Asiatic Bittersweet		2,3	invasive

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Lonicera japonica	Japanese Honeysuckle	FAC-	2,3	invasive
Parthenocissus quinquefolia	Virginia Creeper	FACU	1-5,7	
Smilax rotundifolia	Common Greenbrier	FAC	1-5, 7	
Toxicodendron radicans	Poison Ivy	FAC	1,2,3,7	
Vitis aestivalis	Summer Grape	FACU	7	
Vitis labrusca	Fox Grape	FACU	1,2,4,7	
STRATUM Herbs				
Acalypha rhomboidea	Commom Copper-Leaf	FACU-	2	
Achillea millefolium	Yarrow	FACU	1,2	
Actaea sp.	baneberry		2	
Adiantum pedatum	Maidenhair Fern	FAC-	2,3	
Agalinis tenuifolia	Slender False-Foxglove	FAC	1,7	
Agrimonia gryposepala	Tall Hairy Groovebur	FAC	2	
Agrostis perennans	Upland Bentgrass	FACU	2	
Agrostis stolonifera	Spreading Bentgrass	FACW	1	
Alisma subcordatum	Small Water-Plantain	OBL	7	
Ambrosia artemisiifolia	Annual Ragweed	FACU	1,2,7	
Amphicarpa bracteata	Hog Peanut	FAC	2	
Andropogon gerardii	Big Bluestem	FAC	1	
Anemone quinquefolia	Wood Anemone	FACU	2,3	
Antennaria neglecta	Pussytoes		2	
Anthoxanthum odoratum	Sweet Vernal Grass	FACU	1	
Apocynum cannabinum	Indian Hemp	FACU	1	
Aquilegia canadensis	Columbine		1,2	
Arabis glabra	Tower Mustard		1	
Aralia nudicaulis	Wild Sasparilla	FACU	1,2	
Arisaema triphyllum	Swp Jack-in-the-Pulpit	FACW-	2,3,7	
Artemisia vulgaris	Common Mugwort		1	
Asclepias incarnata	Swamp Milkweed	OBL	7	
Asclepias syriaca	Common Milkweed		1	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Asplenium platyneuron	Ebony Spleenwort	FACU	2	
Astilbe sp.	Astilbe		1	non-native
Athyrium filix-femina	Subarctic Lady-fern	FAC	2,3	
Bartonia virginica	Yellow Screwstem	FACU	1,7	
Berberis vulgaris	European Barberry	FACU	2	
Bidens frondosa	Devil's Beggar-ticks	FACW	3,6,7	
Boehmeria cylindrica	False Nettle	FACW+	3,5,7	
Botrychium virginianum	Rattlesnake Fern	FACU	2	
Brachyelytrum erectum	Short Husk Grass		2,7	
Calamagrostis canadensis	Bluejoint Reedgrass	FACW+	7	
Caltha palustris	Marsh Marigold	OBL	3	
Cardamine parviflora	Small-Flower Bitter-cress	FACU	2	
Cardamine pensylvanica	Pennsylvania Bitter-cress	OBL	3	
Carex (Ovales Group)	sedge spp.		1,7	
Carex albicans var. emmonsii	Emmon's Sedge		2	
Carex canescens	Hoary Sedge	OBL	6	
Carex comosa	Bearded Sedge	OBL	6	
Carex crinita	Fringed Sedge	OBL	3,7	
Carex debilis var. debilis	White-edge Sedge	FAC	7	
Carex folliculata	Northern Long Sedge		3,5,7	
Carex gracillima	Graceful Sedge	FACU+	2,7	
Carex interior	Inland Sedge	OBL	3	
Carex intumescens	Bladder Sedge	FACW+	3,7	
Carex laxiflora	Loose-flowered Sedge	FACU+	2,7	
Carex lupuliformis	False Hop Sedge	FACW+	3,7	Special Concern Species
Carex lurida	Shallow Sedge	OBL	3,4,6,7	
Carex pensylvanica	Pennsylvania Sedge		1,2	
Carex scoparia	Pointed Broom Sedge	FACW	1,7	
Carex spicata	Prickly Sedge		1,2	introduced
Carex spp.	sedges		1-7	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Carex stipata	Sawbeak Sedge	OBL	7	
Carex stricta	Tussock Sedge	OBL	3,5	
Carex swanii	Swan's Sedge	FACU	2,7	
Carex virescens	Ribbed Sedge		2	
Carex vulpinoidea	Fox Sedge	OBL	1,2,7	
Cassia nictitans	Wild Sensitive Plant		1	
Cerastium vulgatum	Mouse-ear Chickweed	FACU	1	
Chelidonium majus	Celandine		2	
Chelone glabra	White Turtlehead	OBL	3	
Chimaphila maculata	Striped Wintergreen		2	
Chimaphila umbellata	Pipsissewa		2	
Chrysanthemum leucanthemum	Ox-eye Daisy		1,2	
Chrysosplenium americanum	Golden Saxifrage	OBL	3	
Cinna arundinacea	Stout Wood-Reedgrass	FACW+	2,3	
Cinna latifolia	Slender Wood-Reedgrass	FACW	3	
Circaea quadrisulcata	Enchanter's Nightshade		2	
Cirsium vulgare	Bull Thistle	FACU-	1	
Cladonia rangiferina	Reindeer Moss		1	lichen
Clinopodium vulgare	Wild Basil		1	
Comandra umbellata	Bastard Toadflax	FACU-	1	
Commelina communis	Asiatic Dayflower	FAC-	2	
Conyza canadensis	Horseweed		1	
Coronilla varia	Crownvetch		1	
Cuscuta sp.	dodder		4,6,7	
Cyperus strigosus	Straw-colored Umb.-sedge	FACW	7	
Cypripedium acaule	Pink Lady's-slipper	FACU	2	
Cystopteris fragilis	Brittle Bladderfern	FACU	2	
Dactylis glomerata	Orchard Grass	FACU	1	
Danthonia spicata	Poverty-grass	FACU	1,2	
Daucus carota	Queen Annes's Lace		1	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Dennstaedtia punctilobula	Hay-scented Fern		1,2,3	
Deparia acrostichoides	Silvery Glade Fern	FAC	2,3,7	
Desmodium nudiflorum	Naked-flwrd Tick-trefoil		2	
Desmodium paniculatum	Panicled Tick-trefoil		1	
Desmodium rotundifolium	Prostrate Tick-trefoil		1,2	
Dianthus armeria	Deptford Pink		1	
Dianthus barbatus	Sweet William		2	introduced
Dicanthelium latifolium	Broadleaf Rosette Grass		2	syn. Panicum latifolium
Dichanthelium clandestinum	Deer-tongue Grass		1,2,7	syn. Panicum clandestinum
Dichanthelium sp.	panic grass		1,2	syn. Panicum sp.
Digitaria sanguinalis	Hairy Crabgrass	FACU	1	
Dioscorea villosa	Wild Yam	FAC+	3	
Drosera intermedia	Spoonleaf Sundew	OBL	6,7	
Drosera rotundifolia	Roundleaf Sundew	OBL	6	
Dryopteris carthusiana	Spinulose Wood Fern	FAC+	3	
Dryopteris cristata	Crested Shield-fern	FACW+	3,7	
Dryopteris intermedia	Evergreen Wood-fern	FACU	2,3,5	
Dryopteris marginalis	Marginal Wood-fern	FACU-	2	
Dulichium arundinaceum	Three-way Sedge	OBL	3	
Echinochloa muricata	Rough Barnyard Grass	FACW+	1,7	
Eleocharis ovata	Ovate Spikerush	OBL	6,7	
Epilobium coloratum	Purple-leaved Willowherb	OBL	2	
Equisetum arvense	Field Horsetail	FAC	3,7	
Erechtites hieracifolia	Fireweed or Pilewort	FACU	1,2,7	
Erigeron annuus	White-top Fleabane	FACU	1	
Erythronium americanum	Dog-tooth Violet		2,3	
Eupatorium dubium	Joe-Pye Weed	FACW	1,5,7	
Eupatorium hyssopifolium	Hyssopleaf Thoroughwort		1	
Eupatorium maculatum	Spotted Joe-Pye Weed	FACW	1,2	
Eupatorium perfoliatum	Boneset	FACW+	1,7	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Eupatorium pilosum	Hairy Thoroughwort	FACW	7	
Eupatorium rotundifolium	Round-leaf Thorough-wort	FAC-	7	
Eupatorium rugosum	White Snakeroot		1,7	
Eupatorium sessilifolium	Upland Boneset		1	
Euphorbia cyparissias	Cypress Spurge		1	invasive
Eurybia divaricata	White Wood Aster		1,2,3	syn. Aster divaricatus
Euthamia graminifolia	Grass-leaved Goldenrod	FAC	1,7	
Euthamia tenuifolia	Slender-leaved Goldenrod		1,7	
Fallopia japonica	Japanese Knotweed		1,2	invasive
Festuca rubra	Red Fescue	FACU	1	
Festuca sp.	fescue		1	
Galium aparine	Catchweed Bedstraw	FACU	1	
Galium circaezans	Wild Licorice		2	
Galium palustre	Marsh Bedstraw	OBL	6,7	
Galium pilosum	Hairy Bedstraw		2	
Galium trifidum	Small Bedstraw	FACW+	6,	
Gaylusaccia baccata	Black Huckleberry	FACU	1,2	
Geranium maculatum	Spotted Cranesbill	FACU	2,3	
Geum laciniatum	Rough Avens	FAC+	3	
Glechoma hederacea	Gill-over-the-Ground	FACU	2	
Glyceria canadensis	Rattlesnake Grass	OBL	6	
Glyceria striata	Fowl Manna Grass	OBL	5,6,7	
Gnaphalium obtusifolium	Sweet Everlasting		1	
Goodyera pubescens	Rattlesnake Plantain	FACU-	2	
Hedeoma pulegioides	American Pennyroyal		2	
Helianthemum canadense	Frostweed		1	
Helianthus decapetalus	Thin-leaf Sunflower	FACU	1	
Helianthus divaricatus	Woodland Sunflower		1	
Hieracium gronovii	Hairy Hawkweed		1	
Hieracium pratense	King Devil		1	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Hieracium scabrum	Rough Hawkweed		1	
Hieracium venosum	Rattlesnakeweed		2	
Houstonia caerulea	Bluets	FACU	1,2,7	
Huperzia lucidula	Shining Clubmoss	FACW-	3,7	syn Lycopodium lucidulum
Hydrocotyle americana	Water Pennywort	OBL	3,7	
Hypericum canadense	Canadian St. John's Wort	FACW	1,3,7	
Hypericum gentianoides	Pineweed		1	
Hypericum mutilum	Slender St. John's-wort	FACW	7	
Hypoxis hirsuta	Yellow Star-grass	FAC	1,2	
Impatiens capensis	Jewelweed	FACW	2,3	
Ionactis linariifolius	Flaxleaf Whitetop Aster		2	syn. Aster linariifolius
Iris versicolor	Blue Flag	OBL	5	
Juncus brevicaudatus	Narrow-panicled Rush	OBL	1,7	
Juncus canadensis	Marsh Rush	OBL	3,6	
Juncus effusus	Soft Rush	FACW+	1,3,6,7	
Juncus tenuis	Path Rush	FAC-	1,2	
Krigia virginica	Dwarf Dandelion		1,2	
Lactuca canadensis	Wild Lettuce	FACU-	1	
Lapsana communis	Nipplewort		2	
Lechea intermedia	Largepod Pinweed		1,2	
Leersia oryzoides	Rice Cutgrass	OBL	3,5,6,7	
Lemna minor	Lesser Duckweed	OBL	5	
Lespedeza capitata	Round-headed Bush-clover	FACU-	1	
Lespedeza hirta	Hairy Bushclover		1	
Lespedeza procumbens	Trailing Bushclover		1	
Lespedeza virginica	Slender Bushclover		1	
Linaria canadensis	Blue Toadflax		1	
Linum virginianum	Virginia Yellow Flax		1	
Lobelia cardinalis	Cardinal Flower	FACW+	3,5,7	
Lobelia inflata	Indian Tobacco	FACU	1,2	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Ludwigia alternifolia	Seedbox	FACW+	7	
Ludwigia palustris	Water Purslane	OBL	3,5,7	
Luzula multiflora	Common Woodrush	FACU	2,3	
Lycopodiella appressa	Northern Bog Clubmoss	OBL	6	syn. Lycopodium inundatum
Lycopodium clavatum	Running Pine	FAC	3	
Lycopodium digitatum	Running Clubmoss	FACU-	2	syn.Lycopodium complanatum
Lycopodium obscurum	Tree Clubmoss	FACU	2,3,5	
Lycopus sp.	bugleweed		3	
Lycopus uniflorus	Northern Bugleweed	OBL	3,5,6,7	
Lycopus virginicus	Virginia Bugleweed	OBL	3,7	
Lysimachia ciliata	Fringed Loosestrife	FACW	7	
Lysimachia quadrifolia	Whorled Loosestrife	FACW+	1,2	
Lysimachia terrestris	Swamp Candles	OBL	6	
Maianthemum canadense	Canada Mayflower	FAC-	2,3	
Medeola virginiana	Indian Cucumber-root		2,3	
Melampyrum lineare	Cow-wheat	FACU	1,2	
Menispermum canadense	Canada Moonseed	NI	7	
Microstegium vimineum	Japanese Stiltgrass		2	invasive
Mikania scandens	Climbing Hempweed	FACW	5,7	
Mimulus ringens	Allegheny Monkey-flower	OBL	3,7	
Mitchella repens	Partridgeberry	FACU	2,3	
Monotropa uniflora	Indian Pipes	FACU-	2	
Muhlenbergia schreberi	Nimble-will	FAC	1,2	
Nuphar luteum	Yellow Cow-lily	OBL	5	
Nymphaea odorata	White Water-lily	OBL	5,6	
Onoclea sensibilis	Sensitive Fern	FACW	2,3,5,7	
Opuntia humifusa	Eastern Prickly Pear		1,2	Special Concern Species
Osmunda cinnamomea	Cinnamon Fern	FACW	2-7	
Osmunda claytoniana	Interrupted Fern	FAC	2,3	
Osmunda regalis	Royal Fern	OBL	3,4,5,6,7	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Oxalis europaea	Common Wood-sorrel		1,2,3	
Pachysandra terminalis	Japanese Spurge		2	
Panax trifolius	Dwarf Ginseng		2,3	
Panicum rigidulum	Red-top Panic Grass	FACW+	7	
Panicum sp.	panic-grass		1,2,3,6,7	
Pedicularis canadensis	Wood Betony	FACU	2	
Penstemon digitalis	Foxglove Beardtongue	FAC	1	
Phalaris arundinacea	Reed Canary Grass	FACW+	7	invasive
Phegopteris hexagonoptera	Broad Beech Fern	FAC	2,3	
Phleum pratense	Timothy	FACU	2	
Phragmites australis	Common Reed	FACW	1,3,4,6,7	invasive
Phytolacca americana	Pokeweed	FACU+	1,7	
Pilea pumila	Clearweed	FACW	3,5,7	
Plantago major	Common Plantain	FACU	1,2	
Platanthera lacera	Green-Fringe Orchid	FACW	6	
Platanthera x clavellata	Green Wood Orchid	FACW+	4	
Platanus occidentalis	American Sycamore	FACW-	2	
Poa compressa	Canada Bluegrass	FACU	1,2	
Poaceae spp.	misc. grasses		1,2,3,7	
Podophyllum peltatum	May Apple	FACU	2,3	
Polygala cruciata	Field Milkwort	FACW+	1,7	Special Concern Species
Polygala sanguinea	Purple Milkwort	FACU	1	
Polygala verticillata	Whorled Milkkwort		1	
Polygonatum commutatum	Giant Solomon's Seal	FACU	2	
Polygonatum pubescens	Hairy Solomon's Seal		2	
Polygonum arifolium	Halberd-leaved Tearthumb	OBL	3,7	
Polygonum aviculare	Creeping Knotweed		1	cosmopolitan weed
Polygonum cespitosum	Cespitose Knotweed	FACU-	2	invasive
Polygonum hydropiper	Water Pepper	OBL	3	
Polygonum hydropiperoides	Mild Water Pepper	OBL	3,7	

SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Polygonum pensylvanicum	Pennsylvania Smartweed	FACW	2	
Polygonum sagittatum	Arrow-leaved Tearthumb	OBL	1,3,7	
Polygonum scandens	Hedge Cornbind	FAC	1,2	
Polygonum spp.	smartweed		1,2,7	
Polygonum virgnianum	Virginia Knotweed	FAC	2	
Polypodium virginianum	Common Polypody		1,2	
Polystichum acrostichoides	Christmas Fern	FACU-	1,2,3	
Polytrichum commune	Haircap Moss		1,2,3	
Potentilla canadensis	Dwarf Cinquefoil		1,2,3	
Potentilla norvegica	Rough Cinquefoil	FACU	1	
Potentilla simplex	Old Field Cinquefoil	FACU-	1	
Prenanthes trifoliata	Tall Rattllesnake Root		2	
Proserpinaca palustris	Marsh Mermaid-weed	OBL	3,6	
Prunella vulgaris	Self-heal	FACU+	1,2	
Pteridium aquilinum	Bracken Fern	FACU	1,2	
Pycnanthemum muticum	Blunt Mountain-mint	FACW	1,3,7	
Pycnanthemum tenuifolium	Narrow-lvd Mtn-mint	FACW	1	
Ranunculus abortivus	Small-flowered Crowfoot	FACW-	2	
Ranunculus bulbosus	Bulbous Buttercup		1	introduced
Rhexia virginica	Virginia Meadow Beauty	OBL	3,7	
Rhynchospora alba	White Beaksedge	OBL	6,7	
Rhynchospora capitellata	Brownish Beakrush	OBL	6,7	
Rudbeckia hirta	Black-eyed Susan	FACU-	1	
Rumex acetosella	Field Sorrel		1,2	
Rumex obtusifolius	Bitter Dock	FACU-	1	
Sagittaria latifolia	Common Arrowhead	OBL	3	
Saxifraga virginiensis	Virginia Saxifrage	FAC-	2	
Schizachyrium scoparium	Little Bluestem		1	
Schoenoplectus smithii	Blunt-scaled Bulrush	OBL	7	
Scirpus atrovirens	Green Bulrush	OBL	1,7	

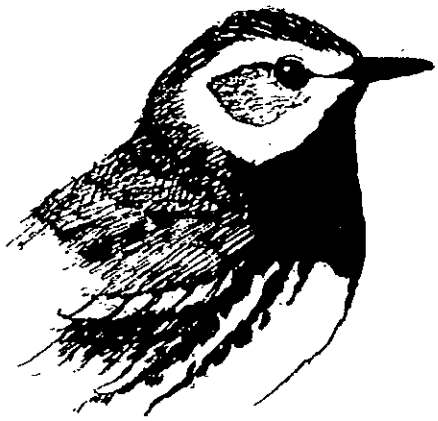
SCIENTIFIC NAME	COMMON NAME	IND	HABITAT	
Viola sagittata	Arrow-leaf Violet	FACW	2	
Viola septentrionalis	Northern Blue Violet	FACU	2	
Viola spp.	violets		4,7	
Woodwardia areolata	Netted Chain Fern	OBL	3	
Xyris difformis	Bog Yellow-eyed Grass	OBL	6	

File copy: Rec'd 7/18/02
DGG

Breeding Bird Survey Report

"The Preserve" Old Saybrook, Connecticut

The Description, Data, and Analysis of a Breeding Bird Survey Conducted During June, 2002 on the Old Saybrook, Connecticut Property Known as "The Preserve".



Produced for BL Companies.
July 14, 2002
David F. Provencher
43 Branch Hill Rd
Preston, CT. 06365

Table of Contents

Survey Summary Page 3
Survey Routes and Points
Results

Assessment of Survey Results including CTDEP Listed Species Page 4
Discussion
Red-shouldered Hawk (*Buteo lineatus*)
Long-distance (Neotropic) Migrants

Avian species detected on "The Preserve" Page 8

Selected Species Discussion Page 8
Wetland Dependent Species
Northern Goshawk (*Accipiter gentilis*)
Owls and Nightjars
Great Crested Flycatcher (*Myiarchus crinitus*)
Wood Thrush (*Hylocichla mustelina*)
Veery (*Catharus fuscescens*)
Cedar Waxwing *(Bombycilla cedrorum)*
The Wood Warblers
Scarlet Tanager (*Piranga olivacea*)
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)
Indigo Bunting (*Passerina cyanea*)

Table 1. Breeding Bird Survey Point Results Page 12

Survey Protocol Page 13

References Page 14

GPS Data for Breeding Bird Survey Points Page 15

Survey Data Sheet Key Page 16

Survey Data Sheets Page 17

Survey Summary

Survey Routes and Points

Five survey routes were run between June 1, 2002 and June 9, 2002. Each route consisted of 6 to 8 individual survey points located approximately 500 feet to 700 feet apart where data was collected for 10 minutes per point. A total of 34 survey points were used. 2 survey points actually fall outside the subject property but where deemed important and relevant due to their location. Including observations taken outside the survey route protocol nearly 30 miles were walked on the property. All species detected on the property are considered in this report whether detected within or without the survey route protocol.

Results

A total of 49 avian species were detected during survey data collection and an additional 8 species were noted on the property outside of the survey protocol. Several species were detected crossing the property "airspace" but were not recorded because their occurrence was incidental with no specific use or need of the property's environs. An example of such incidental species would be Herring Gull (*Larus argentatus*). Species suspected of likely being present but were undetected during time spent on the property are discussed within the body of this report.

No avian species currently listed by The Connecticut Department of Environmental Protection (CTDEP) as endangered, threatened, or special concern was detected on the property during survey point data collection. One such listed species, Red-shouldered Hawk (*Buteo lineatus*), was observed flying over the property and this species can be assumed to be nesting on or near the property. The observation of Red-shouldered Hawk and its relevance as a listed species is addressed within the Assessment section of this report. Non-listed species found on the site are included within Table 1 or the Selected Species Discussion section of this report.

The site offers relatively intact forest interior habitat and the species found utilizing the property are typical of such habitat in southern New England. No notable or critical population of any migratory or non-migratory species considered to be of concern to the greater ornithological community was found on the site. No species population notable within Connecticut or southern New England was found on the site. No species population notable for the lower Connecticut River Valley or its immediate environs was found on the site. The proposed project will likely have very little impact on the avian populations and diversity of south-central Connecticut. Additional discussion on avian populations observed on the site can be found under the Selected Species Discussion section of this report.

What affect the proposed project will have on any nesting Red-shouldered Hawks is difficult to say. On face value it can be expected that the site will be abandoned for future nesting after this project is completed. If nesting should continue to occur on the subject property, assuming that it is occurring now, fragmenting of the forest habitat throughout the site may lower the nesting success. This is likely due to the introduction of greater human disturbance, greater vegetative growth reducing the open canopy areas, and greater competition from other raptors such as Red-tailed Hawk (*Buteo jamaicensis*).

The possibility of maintaining Red-shouldered Hawk nesting and foraging on this site could be enhanced by leaving the largest possible undisturbed stands of mature deciduous trees near the wetlands, particularly the Pequot Swamp Pond and the area of wetlands around the southeast corner of the subject property. I suspect the latter area to be the prime area for nesting and especially foraging with some foraging occurring at scattered areas of wetlands on and off the subject property. If nesting is not occurring on the site but instead the area is being utilized for foraging only then the proposed project will have limited affect on continued use of this site by this species. Regrettably there has been little long-term raptor research within Connecticut and much is unknown about this species' status, requirements, and particularly population within our state. This lack of knowledge makes assessing the relative importance of a particular nesting site for this species very problematical. Especially a site that is most likely supporting only a single pair. The habitat requirements of this species means that most available nesting sites along the lower Connecticut River Valley are public lands such as State Forests. These larger forest tracts are much more important to the future of this species here in Connecticut and beyond than small tracts that are subject to greater disturbance, by both human and natural competitors.

Long-distance (Neotropic) Migrants

Long distance migrant species such as the Wood Warblers, Thrushes, Flycatchers, etc., undoubtedly use the habitat of this site during Spring and Fall migrations. Surprisingly few were found as breeders on the site however. Due to the loss of, or massive change to, wintering habitat in Middle America, South America, and the Caribbean, many of these species have experienced significant population declines during this century. Some of these population declines have been very severe and are indeed quite alarming. Consequently many fewer individuals now pass through Connecticut during migration than was historically the case. The subject property exists in a region of the Connecticut River Valley and its environs that currently offers a good deal of foraging habitat for these migrating species. Consequently this site does not represent an isolated critical stopover habitat. Based upon the sadly reduced populations of these long and middle distance migrants, and the densities which they are now encountered during migration through Connecticut, the proposed project for this site will quite likely have little to no impact on most of foraging migrant species that pass through this region. Some migrant species may indeed not use the altered site for foraging. Species that require large undisturbed tracts of forest interior such as Great Crested Flycatcher (*Myiarchus crinitus*) or Swainson's Thrush (*Catharus ustulatus*) would be much less likely to be found on the

altered site during migration. Ultimately it is most unlikely that these migrant species will be impacted in any detectable or meaningful way by such a project on this site.

Avian species detected on "The Preserve"

49 avian species were detected using The Preserve in Old Saybrook for breeding during the survey point protocol. An additional 8 species that were likely using the site for breeding or foraging were observed outside the survey point protocol. The species detected within the protocol are listed in Table 1 along with the number of survey points each species was detected on as well as the total number of individuals of each species detected. The additional 8 species observed outside of the formal survey point data collection are as follows:

Turkey Vulture (*Cathartes aura*) several, **Red-shouldered Hawk** (*Buteo lineatus*) one, **Red-tailed Hawk** (*Buteo jamaicensis*) two, **Rock Dove** (*Columba livia*) several, **Barred Owl** (*Strix varia*) three, **Belted Kingfisher** (*Ceryle alcyon*) one, **Tree Swallow** (*Tachycineta bicolor*) several, and **Veery** (*Catharus fuscescens*) one.

Discussion of the one CTDEP listed species detected on "The Preserve" can be found earlier within this section. Other selected avian species detected during the survey are briefly discussed in the Selected Species Discussion section.

Selected Species Discussion

Wetland Dependent Species

The only true wetland dependent species detected on the subject property were; Wood Duck (*Aix sponsa*) an uncommon to common nester in wooded swamps, and Mallard (*Anas platyrhynchos*) an abundant introduced and invasive species in nearly all types of open wetlands. Red-winged Blackbird (*Agelaius phoeniceus*), an abundant nester in wetland habitat, was also detected but this species is only partially dependent on wetlands. The nature of most of the wetlands on the subject property do not lend themselves to extensive wetland dependent avian communities. The only wetland showing a clearly dependent community was Pequot Swamp Pond which supports species that are fairly common to abundant in Connecticut.

Northern Goshawk (*Accipiter gentilis*)

As was stated in the discussion of Red-shouldered Hawk, not enough long-term research on raptors has been accomplished in Connecticut. This has resulted in an incomplete understanding of the status of Northern Goshawk in our state. It is considered an uncommon to rare nester in large, mature forest tracts and is more common in the northwest portion of Connecticut. A single bird carrying prey was seen over-flying the site during the survey point protocol. It is a possible nester on the subject property but no confirmation of this has been achieved. It is a very aggressive nest defender and is likely to attack any humans who stumble upon it nest by accident. As more of our state has returned to mature forests the population of Northern Goshawks may be increasing, but more research and field work is needed to be sure.

Owls and Nightjars

A nocturnal survey resulted in finding three (probably four) Barred Owls (*Strix varia*). One pair was discovered at close range while another calling bird was heard in the distance. This distant bird was almost certainly one of a pair. Eastern Screech-Owl (*Otus asio*) was not found during the survey but based upon the species distribution in Connecticut and the habitat of the site, it is likely to be either present on the subject property or is breeding nearby. Great Horned Owl (*Bubo virginianus*) was not found during the survey. The proposed project is likely to reduce or eliminate Barred Owl from this site due to its habitat requirement of forested wetlands for breeding and foraging. This species is declining for this reason. Eastern Screech-Owl and Great Horned Owl will likely increase on the site as a result of the habitat alterations the project will entail. The Screech-Owl in particular will benefit from the fragmented forest. Great Horned Owl is a common species in Connecticut and Eastern Screech-Owl is common in the Connecticut River Valley westward and uncommon to very uncommon in the eastern portion of the state.

A search for nightjars, in particular Whippoorwill (*Caprimulgus vociferous*), failed to detect any. Whippoorwills are colonial nesters and, as the species scientific name suggests, quite vocal and easy to find at this time of the year. Whippoorwill numbers have declined dramatically in recent decades.

Great Crested Flycatcher (*Myiarchus crinitus*)

One of the more common breeders detected on the site. This species is much more often heard than seen as it prefers to inhabit the forest canopy. This behavior is regrettable since the bird is quite attractive when seen well. Its piercing "wheeep" call can be heard throughout the forest on the site.

Wood Thrush (*Hylocichla mustelina*)

This species overall population is in marked decline. The reason for decline is probably not attributable to just one factor but it is universally accepted that the prime cause is loss of habitat on its wintering grounds outside of the United States. The haunting song of this forest denizen is perhaps the most beautiful sound heard in our eastern forests. On the subject property Wood Thrushes were detected throughout in rather low densities. It is an uncommon to common nester in our woodlands, though at now reduced densities.

Veery (*Catharus fuscescens*)

Another woodland denizen with a haunting, ethereal song. Only one signing bird was detected on the site. This species nests on or very near the ground and requires more forest floor vegetation than the Wood Thrush, which nests higher up. The relative openness of the forest habitat on the site probably is the prime reason for the very low number of this uncommon to common breeder in Connecticut woodlands. This species is also declining overall.

Cedar Waxwing (*Bombycilla cedrorum*)

This species was the most abundant species detected during the survey. A common permanent resident of Connecticut it behavior is somewhat erratic and unpredictable. It was most often seen flying about in small to large flocks.

The Wood Warblers

This group of beautiful small long distant migrants makes up nearly 10% of the avian species officially accepted as having occurred in our state. Unfortunately most Wood Warblers are also in decline. On the subject property few were detected with the exception of Ovenbird (*Seiurus aurocapillus*). Ovenbirds are common forest floor nesters in Connecticut woodlands and they were detected in average or slightly below average densities on the subject property. The only other Wood Warbler found in any number was Worm-eating Warbler (*Helmitheros vermivorus*). Worm-eating Warbler has been increasing in Connecticut woodlands and a handful were detected on the subject property. Several species of Wood Warbler were found in surprisingly low numbers. Such species include Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), and Hooded Warbler (*Wilsonia citrina*). The reason for the low numbers of Wood Warblers detected on the site is unknown. Certainly in similar habitat in Connecticut a greater number would be expected.

Scarlet Tanager (*Piranga olivacea*)

Few ordinary people know of this beautiful scarlet and black inhabitant if the forest canopy. It was found in average densities on the site. Its easily detected burry song was heard on the majority of survey points.

Rose-breasted Grosbeak (*Pheucticus ludovicianus*)

This species is also in notable decline. Producing one of the most melodious and beautiful songs of any North American passerine, this species is also very handsomely bedecked in black, white, and rose-red. It is a denizen of the forest canopy for the most part and it was detected in rather low densities on the subject property.

Indigo Bunting (*Passerina cyanea*)

The male of this small "sparrow" is an electric blue when seen in good light. Indigo Buntings are found in edge habitat (that is to say where forest meets field) or in reverting fields where a good deal of brush has developed. It is declining in Connecticut due to many brushy areas, or "secondary growth" areas, having been cleared or having grown into forest. The powerline cut through the northern part of the site has created some edge habitat and all the Indigo Buntings found during the survey were found along this cut. If a band of trees is left along most of the powerline cut it is likely a good deal of these birds will continue to nest here. If the powerline cut is cleared or "cleaned up, then it is likely this dazzling little bird will no longer be found here. Many edge associated species

are in decline within Connecticut and leaving areas of trees and brush around, along, and under the existing powerline could actually help these species.

Table 1. Breeding Bird Survey Point Results for "The Preserve" Old Saybrook, Connecticut

Species recorded on survey points	# of survey points detected on	Total # of individuals recorded during surveys	CT State listed species
Wood Duck (*Aix sponsa*)	1	1	No
Mallard (*Anas platyrhynchos*)	1	1	No
Northern Goshawk (*Accipter gentilis*)	1	1	No
Buteo species	1	1	No
Mourning Dove (*Zenaida macroura*)	11	12	No
Black-billed Cuckoo (*Coccyzus erythropthalmus*)	1	1	No
Yellow-billed Cuckoo (*Coccyzus americanus*)	9	9	No
Red-bellied Woodpecker (*Melanerpes carolinus*)	13	14	No
Downy Woodpecker (*Picoides pubescens*)	11	11	No
Hairy Woodpecker (*Picoides villosus*)	3	4	No
Northern Flicker (*Colaptes auratus*)	3	3	No
Eastern Wood-Pewee (*Contopus virens*)	18	19	No
Great Crested Flycatcher (*Mylarchus crinitus*)	17	18	No
Eastern Kingbird (*Tyrannus tyrannus*)	2	2	No
Yellow-throated Vireo (*Vireo flavifrons*)	5	5	No
Red-eyed Vireo (*Vireo olivaceus*)	23	29	No
Blue Jay (*Cyanocitta cristata*)	27	50	No
American Crow (*Corvus brachyrhynchos*)	16	22	No
Black-capped Chickadee (*Poecile atricapillus*)	8	10	No
Tufted Titmouse (*Baeolophus bicolor*)	30	56	No
White-breasted Nuthatch (*Sitta carolinensis*)	12	12	No
Blue-gray Gnatcatcher (*Polioptila caerulea*)	2	2	No
Eastern Bluebird (*Sialia sialis*)	1	1	No
Wood Thrush (*Hylocichla mustelina*)	20	28	No
American Robin (*Turdus migratorius*)	18	23	No
Gray Catbird (*Dumetella carolinensis*)	9	12	No
Cedar Waxwing (*Bombycilla cedrorum*)	15	121	No
Blue-winged Warbler (*Vermivora pinus*)	4	4	No
Yellow Warbler (*Dendroica petechia*)	2	4	No
Prairie Warbler (*Dendroica discolor*)	1	1	No
Black-and-white Warbler (*Mniotilta varia*)	1	1	No
American Redstart (*Setophaga ruticilla*)	2	2	No
Worm-eating Warbler (*Helmitheros vermivorus*)	10	11	No
Ovenbird (*Seiurus aurocapillus*)	25	42	No
Common Yellowthroat (*Geothlypis trichas*)	6	7	No
Hooded Warbler (*Wilsonia citrina*)	2	2	No
Scarlet Tanager (*Piranga olivacea*)	20	20	No
Eastern Towhee (*Pipilo erythrophthalmus*)	7	9	No
Chipping Sparrow (*Spizella passerina*)	1	1	No
Song Sparrow (*Melospiza melodia*)	1	1	No
Northern Cardinal (*Cardinalis cardinalis*)	16	18	No
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)	7	8	No
Indigo Bunting (*Passerina cyanea*)	8	12	No
Red-winged Blackbird (*Agelaius phoeniceus*)	12	20	No
Common Grackle (*Quiscalus quiscula*)	7	15	No
Brown-headed Cowbird (*Molothrus ater*)	16	22	No
Baltimore Oriole (*Icterus galbula*)	4	4	No
House Finch (*Carpodacus mexicanus*)	1	1	No
American Goldfinch (*Carduelis tristis*)	15	20	No

Survey Protocol

* Modified?

The breeding bird survey protocol used for the property known as The Preserve in Old Saybrook Connecticut was a slightly modified version of a protocol used for a number of ongoing breeding bird surveys in Connecticut. Initially the property was studied from topographical maps and site plans. Next the property was visited and walked extensively to determine the most productive survey routes to employ.

The survey routes chosen would consist of between 5 and 8 survey points each. These survey points would be from 500 feet to 700 feet apart as determined by GPS data however the routes would be somewhat dynamic in that each successive survey point would be chosen by actual bird activity or most promising habitat. That is to say when moving from one point to the next the observer would choose the next point based upon the maximum bird activity of the promise of activity, which could be deduced by habitat. An attempt was made as well to keep each successive point between the Previously stated distances apart. In this way the protocol was designed to maximize species and individuals detected. This is appropriate for determining avian diversity and density on a site but is not the best protocol for long-term population studies. Long-term studies must set survey points that do not change from year to year and are not based upon bird activity but rather on a set location. This study was designed for a short-term appraisal of avian species on the subject property. The early June time frame chosen for this survey protocol ensures that virtual all breeding birds migrating through Connecticut have passed by and the locally breeding birds are producing maximum levels of song and territorial defense. It is generally assumed that any singing male detected represents the occurrence of a breeding pair of that avian species.

For diurnal species activity is greatest during the period of dawn till approximately 9:30AM. This is particularly true for avian vocalizations, which constitutes the great majority of collectable data. So each route was covered as early in the day as possible and all routes except one were completed prior to 9:30AM. Each survey point entailed remaining at the point and recording all bird activity detected over a 10 minute span. No prompting was used to elicit responses. All recorded data was visually observed activity or vocalizations. For nocturnal species the site was walked between 3:00AM and dawn and owl and nightjar imitations and recordings were used to elicit responses.

The data from each survey point was plotted on a separate data sheet. These data sheets are simply two-dimensional representations of the area surrounding the observer. Two lines are drawn perpendicular to one another on the sheet and their intersection represents where the observer is standing. North is indicated at the head of the sheet and bird activity is plotted on the sheet relative to the observer's position and to North. The distance from the observer to the edge of the sheet simply represents the maximum distance that the observer can hear or see. This distance is of course relevant to the observer's ability, the terrain, and the nature and behavior of the avian species in question.

References

The Atlas of Breeding Birds of Connecticut. 1994. Louis R. Bevier editor. State Geological and Natural History Survey of Connecticut. Department of Environmental Protection. Bulletin 113.

Checklist of North American Birds. 1998. Seventh Edition. American Ornithologists' Union. Allen Press, Inc. Lawrence,Kansas.

Connecticut Birds.1990. Joseph D. Zeranski and Thomas R. Baptist. University Press of New England.

Birds of New York State. 1974. *Reissued 1985 with supplements and corrections.* John Bull. Cornell University Press. Ithaca, New York.

Field Checklist of Connecticut Birds. 2002. David F. Provencher editor. Connecticut Orithological Association. Fairfield, Connecticut.

Internet Resources

Red-shouldered Hawk (Buteo lineatus). Birds in Forested Landscapes. Cornell Lab of Ornithology. http://birds.cornell.edu/bfl/speciesaccts/reshaw.html

Red-shouldered Hawk Habitat Model. USFWS Gulf of Maine Watershed Habitat Analysis http://r5gomp.fws.gov/gom/habitutstudy/metadata/red-shouldered_hawk_model.htm

Status of the Red-shouldered Hawk Within the Upper Mississippi River Valley and Management Guidelines for Nesting Habitat. October 1994. Jon W. Stravers, and Kelly J. McKay. Midwest Raptor Research Fund. http://www.mvr.usace.army.mil/forestry/Publications/RSH%20management%20guidelines%20for%20nesting%20habitat.doc

GPS Data for Breeding Bird Survey on "The Preserve" Old Saybrook Connecticut

Point	Latitude	Longitude	Accuracy
	Route 1		
1	41°19.559′ N	72°25.283′ W	17′
2	41°19.457′ N	72°25.255′ W	24′
3	41°19.487′ N	72°25.151′ W	28′
4	41°19.586′ N	72°25.069′ W	25′
5	41°19.633′ N	72°24.906′ W	21′
6	41°19.694′ N	72°24.760′ W	20′
7	41°19.736′ N	72°24.644′ W	22′
	Route 2		
1	41°19.077′ N	72°24.938′ W	44′
2	41°18.965′ N	72°25.000′ W	25′
3	41°18.919′ N	72°25.200′ W	26′
4	41°18.826′ N	72°25.307′ W	25′
5	41°19.010′ N	72°25.199′ W	34′
6	41°19.079′ N	72°25.278′ W	31′
	Route 3		
1	41°18.998′ N	72°24.682′ W	21′
2	41°19.110′ N	72°24.743′ W	26′
3	41°19.198′ N	72°24.761′ W	25′
4	41°19.290′ N	72°24.841′ W	36′
5	41°19.426′ N	72°24.910′ W	31′
6	41°19.514′ N	72°24.977′ W	27′
	Route 4		
1	41°19.666′ N	72°24.541′ W	37′
2	41°19.606′ N	72°24.421′ W	19′
3	41°19.539′ N	72°24.296′ W	29′
4	41°19.445′ N	72°24.176′ W	36′
5	41°19.390′ N	72°24.022′ W	27′
6	41°19.305′ N	72°23.869′ W	26′
7	41°19.236′ N	72°23.734′ W	28′
8	41°19.149′ N	72°23.574′ W	29′
	Route 5		
1	41°19.388′ N	72°25.388′ W	27′
2	41°19.280′ N	72°25.378′ W	25′
3	41°19.188′ N	72°25.285′ W	23′
4	41°19.279′ N	72°25.256′ W	40′
5	41°19.148′ N	72°25.552′ W	22′
6	41°19.021′ N	72°25.542′ W	28′
7	41°18.924′ N	72°25.510′ W	31′

Survey Data Sheet Key

Species	Survey code	Species	Survey code
Wood Duck	N/A	Cedar Waxwing	**WX**
Mallard	N/A	Blue-winged Warbler	**BW**
Northern Goshawk	N/A	Yellow Warbler	**YW**
Mourning Dove	**MD**	Prairie Warbler	**PW**
Black-billed Cuckoo	**BB**	Black-and-white Warbler	**WW**
Yellow-billed Cuckoo	**YC**	American Redstart	**AR**
Red-bellied Woodpecker	**RD**	Worm-eating Warbler	**WE**
Downy Woodpecker	**DN**	Ovenbird	**OB**
Hairy Woodpecker	**HR**	Common Yellowthroat	**CY**
Northern Flicker	**NF**	Hooded Warbler	**HO**
Eastern Wood-Pewee	**WP**	Scarlet Tanager	**SC**
Great Crested Flycatcher	**GC**	Eastern Towhee	**RS**
Eastern Kingbird	**EK**	Chipping Sparrow	N/A
Yellow-throated Vireo	**YT**	Song Sparrow	**SoSp**
Red-eyed Vireo	**RV**	Northern Cardinal	**CD**
Blue Jay	**BJ**	Rose-breasted Grosbeak	**GB**
American Crow	**AC**	Indigo Bunting	**IB**
Black-capped Chickadee	**BC**	Red-winged Blackbird	**RwBl**
Tufted Titmouse	**TT**	Common Grackle	**CG**
White-breasted Nuthatch	**WN**	Brown-headed Cowbird	**BH**
Blue-gray Gnatcatcher	**BG**	Baltimore Oriole	**BaOr**
Eastern Bluebird	**EB**	House Finch	**HF**
Wood Thrush	**WT**	American Goldfinch	**AG**
American Robin	**RB**		
Gray Catbird	**GC**		

Species Plotting Key

Singing bird is **circled**: (RV)

Calling bird is **not circled**: CD

Triangle indicates interaction with another individual of same species: $\overset{\Delta}{WT}$

Superscript next to bird indicates species detected during first 5 minute segment of data collection: OB^{1}
During the second 5 minute segment: OB^{2}
During both segments: OB^{12}

Line with arrow indicates travel of moving bird: YC ——————▶YC

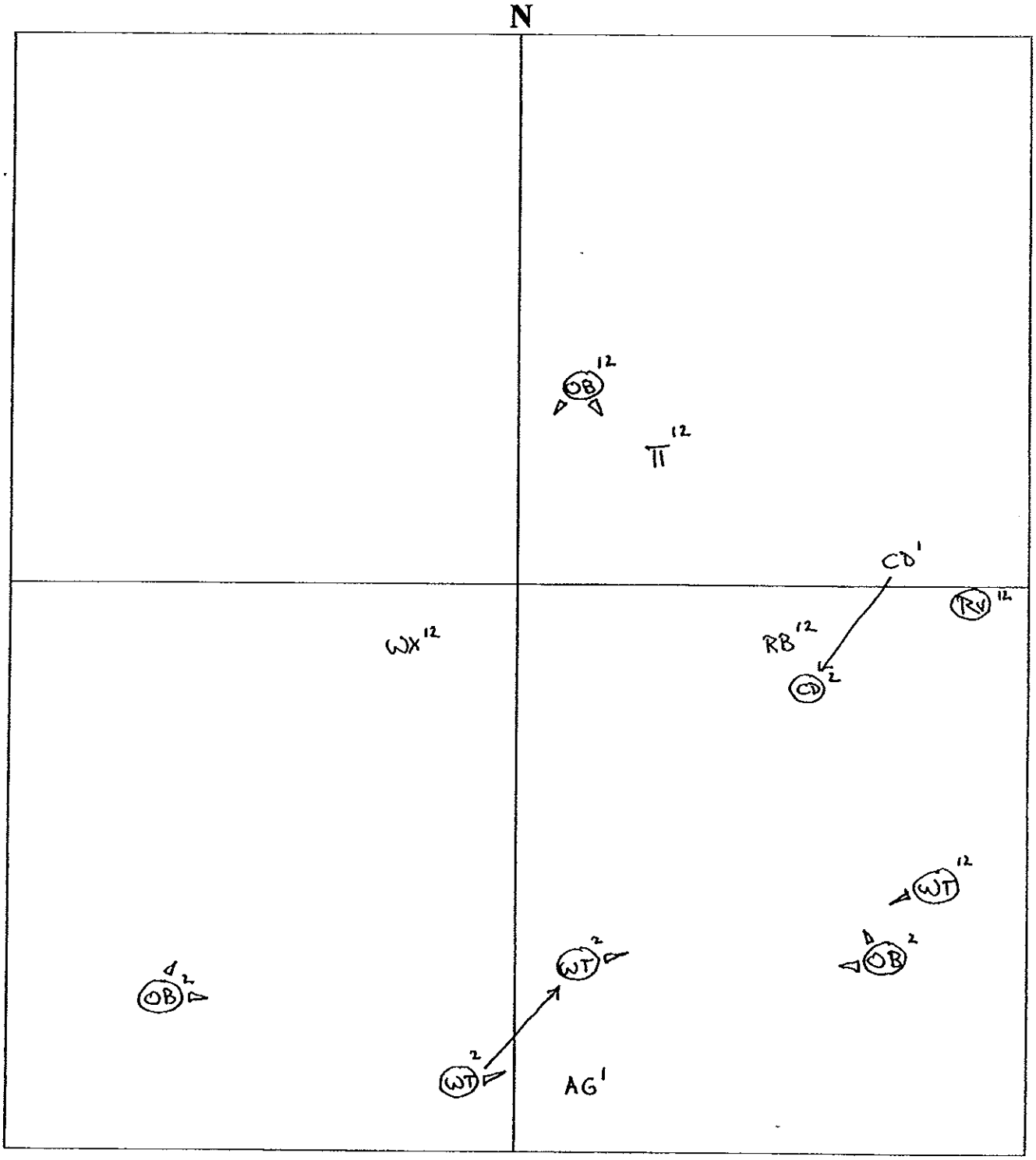
Line with species included indicate flyby or flyover bird: ——— WX ———▶

Subscript preceded by x indicates number of individuals observed together: WX_{x8}

Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

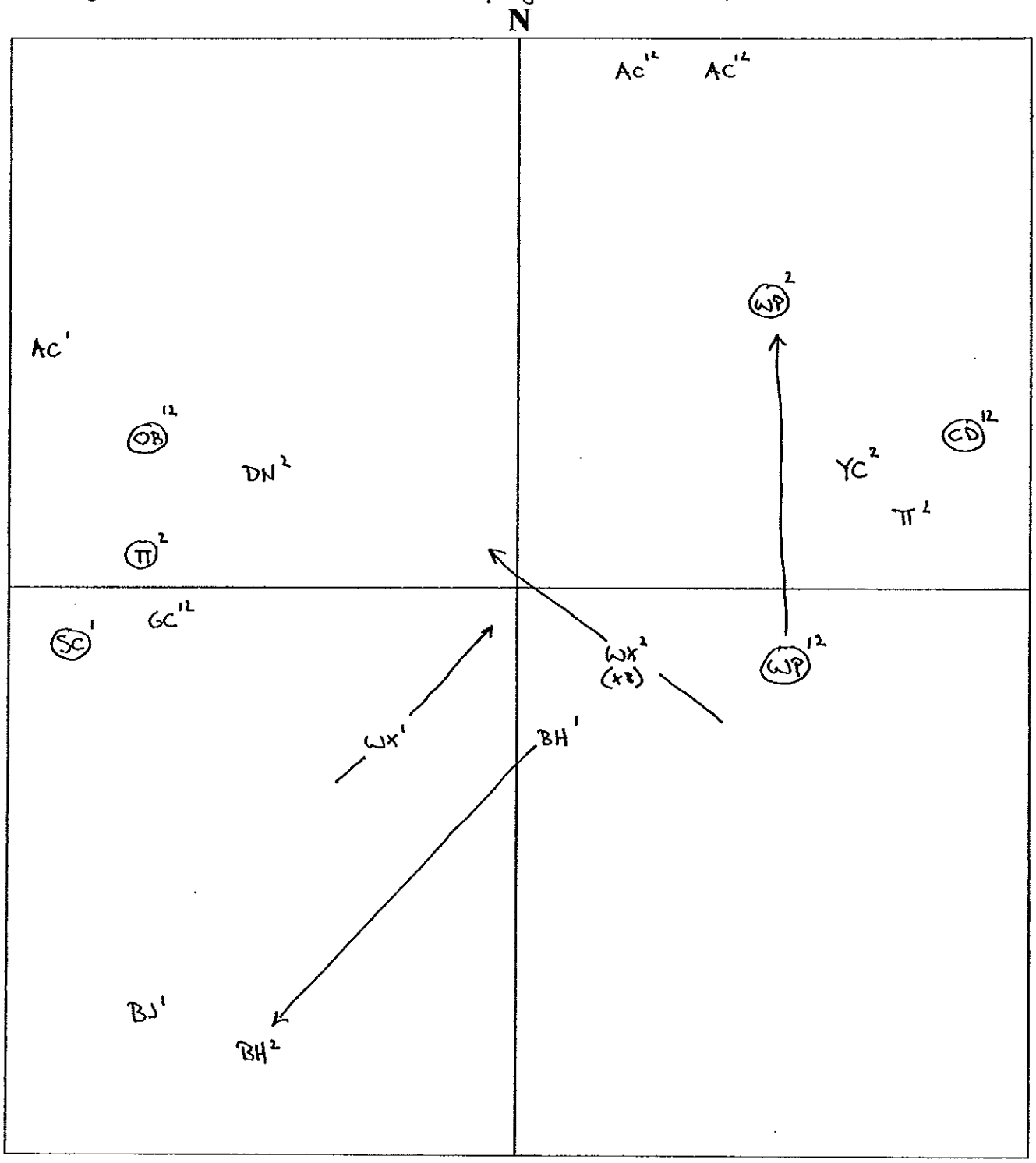
Route: One (1) **Point:** (1) **GPS Location:** 41° 19.559'N 72° 25.283'W Accuracy 17'
Date: 6-1-02 **Time:** 0558 **Weather:** Clear, calm ~65°F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: One (1) **Point:** (2) **GPS Location:** 41°19.457'N 72°25.255'W Accuracy 24'
Date: 6-1-02 **Time:** 0618 **Weather:** Calm/Light breeze, Clear, ~65° F

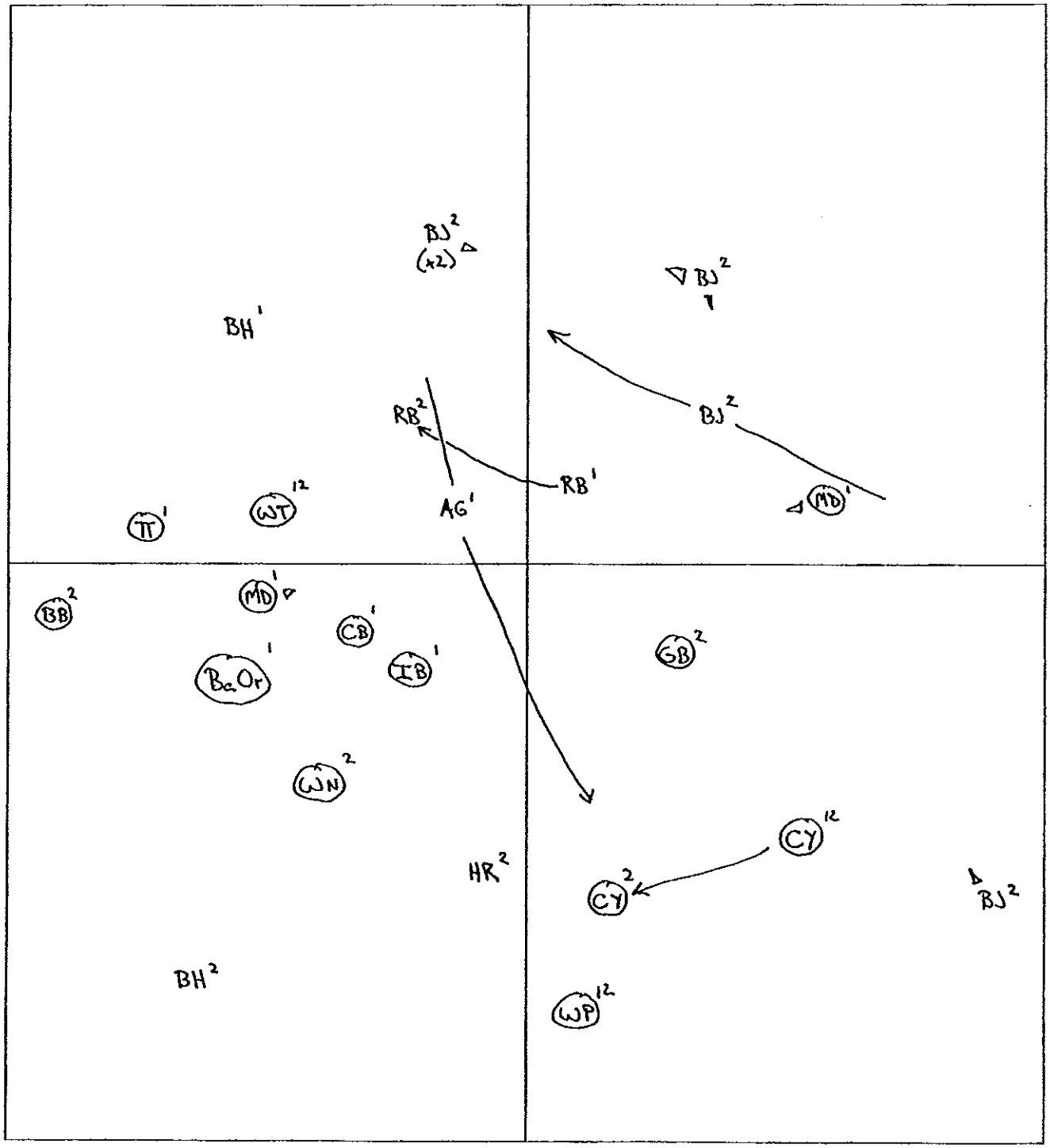


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: One (1) **Point:** (5) **GPS Location:** 41°19'.633'N 72°24.906'W Accuracy 21'
Date: 6-1-02 **Time:** 0714 **Weather:** Clear, Light breeze, ~70°F

N

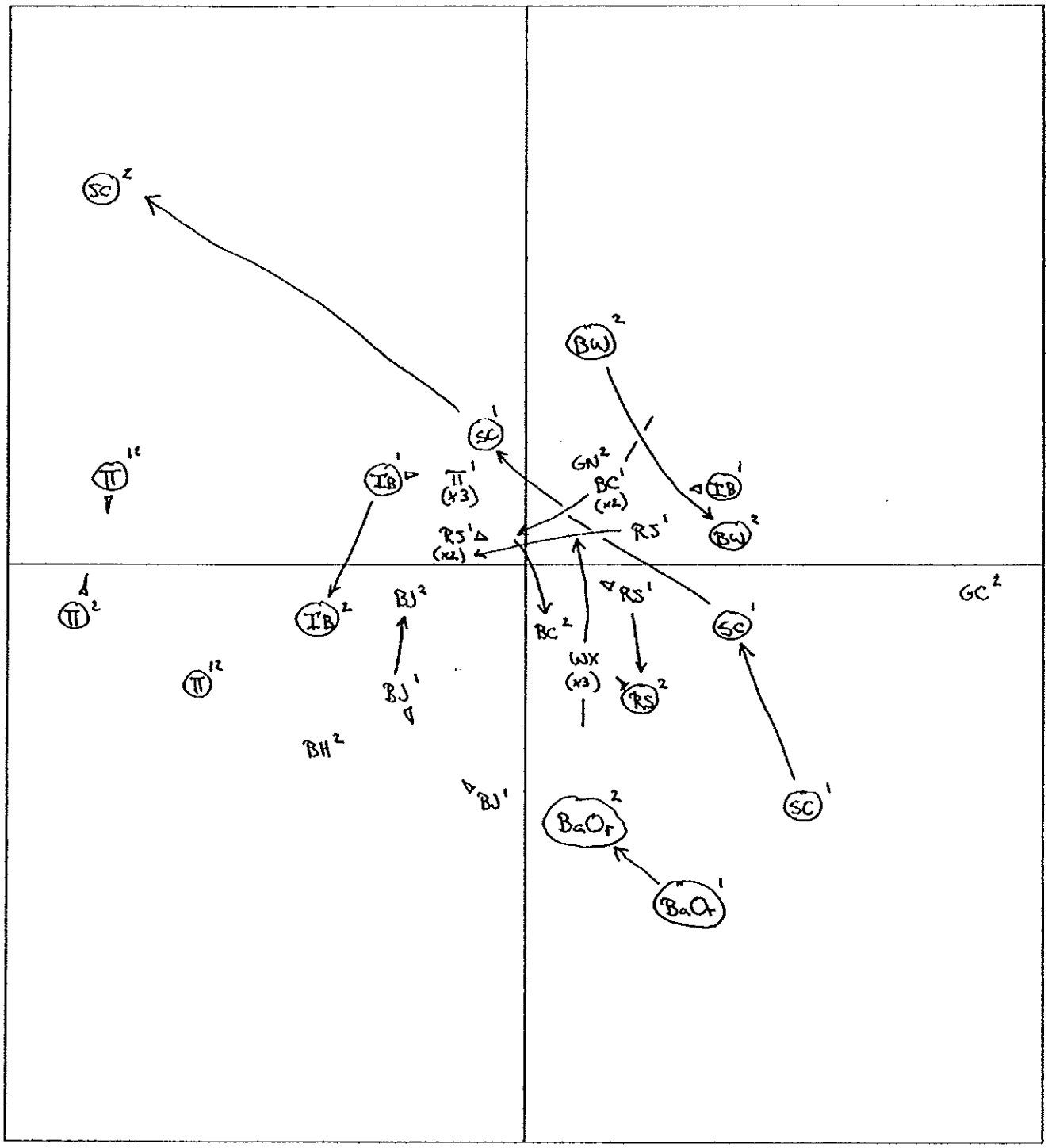


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: One (1) **Point:** (6) **GPS Location:** 41° 19.694'N 72° 24.760'W Accuracy 20'
Date: 6-1-02 **Time:** 0734 **Weather:** Clear, Light breeze, ~70°

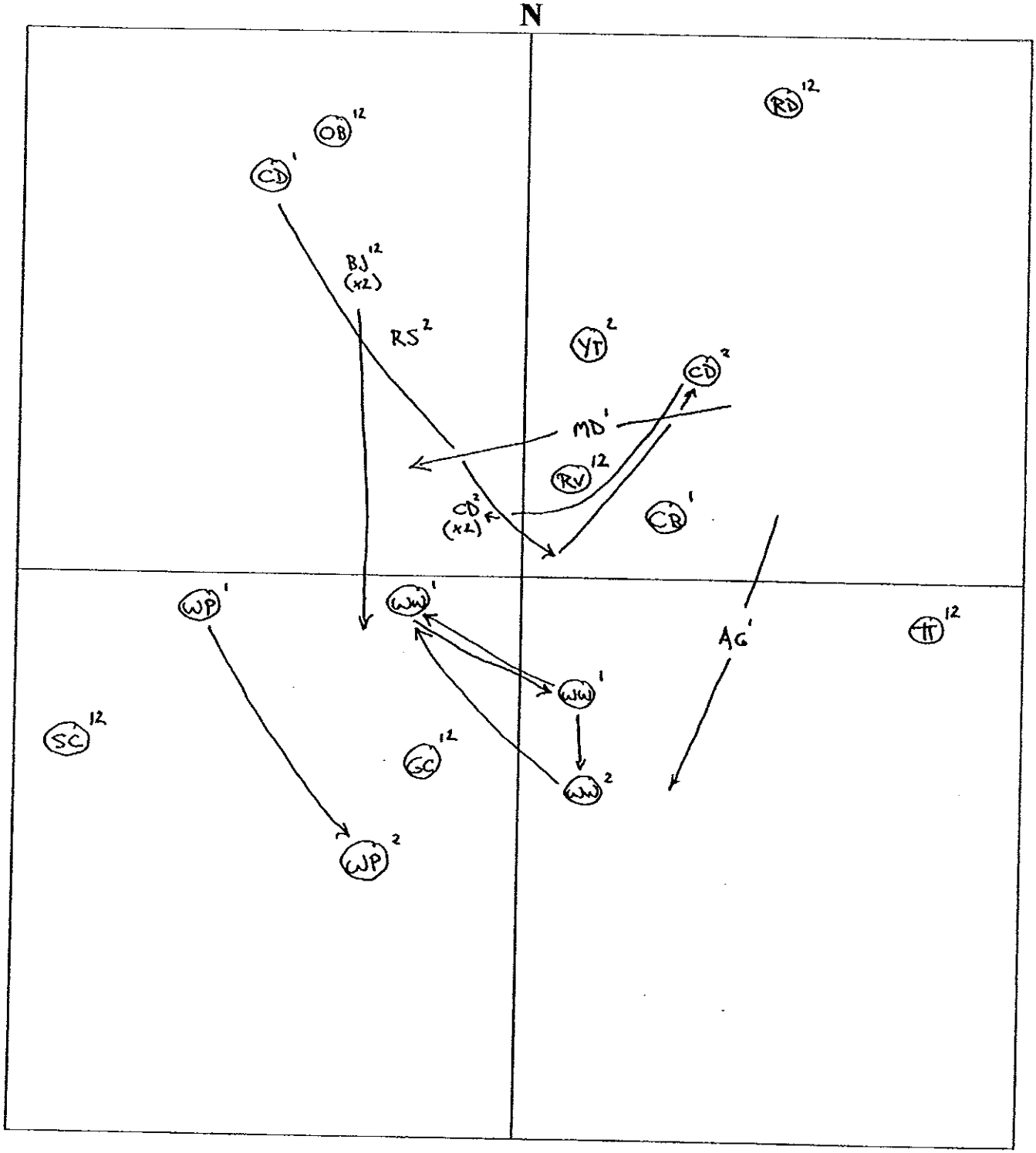
N



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

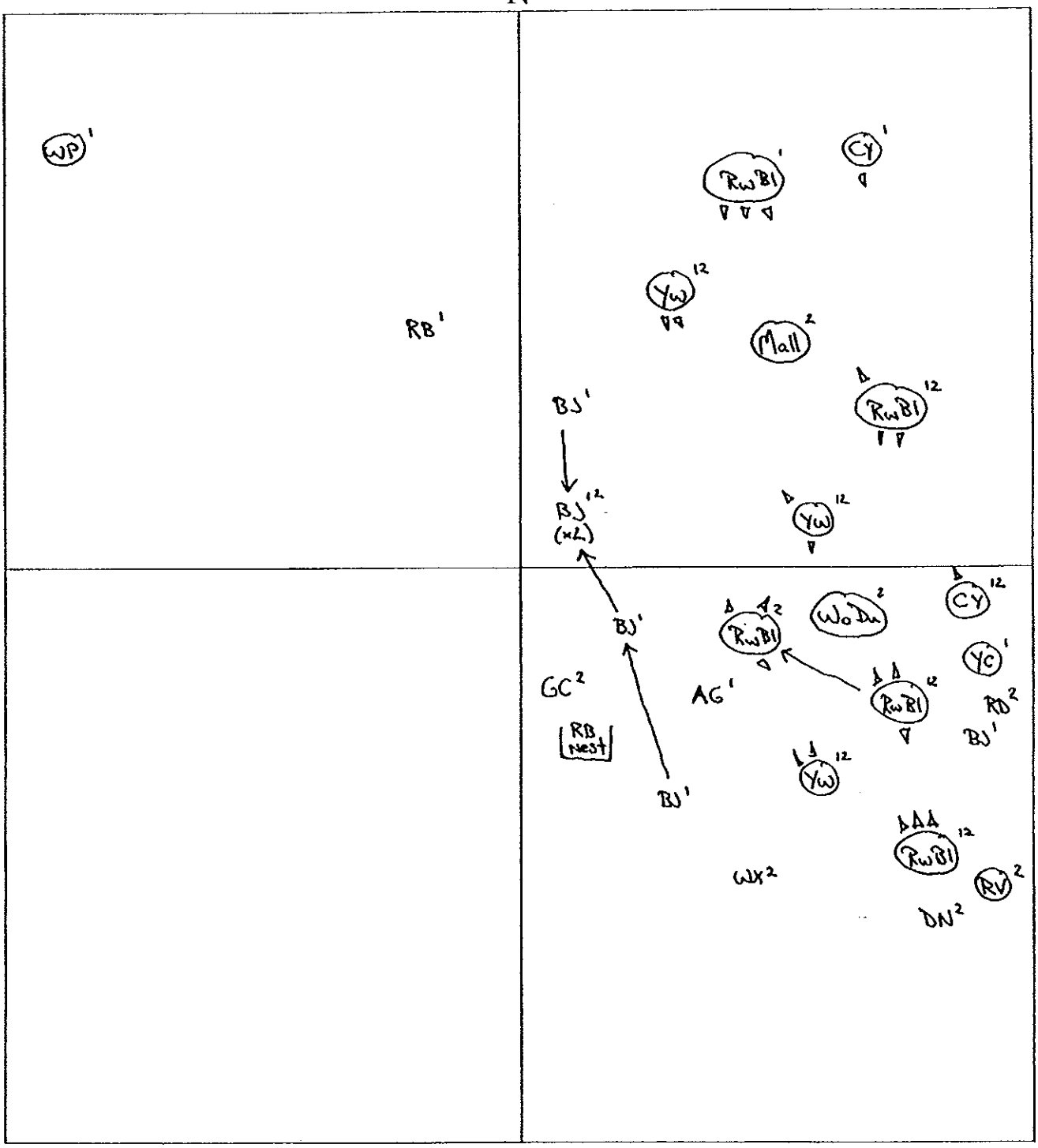
Route: One(1) **Point:** (7) **GPS Location:** 41°19.736'N 72°24.644'W Accuracy 22'
Date: 6-1-02 **Time:** 0753 **Weather:** Clear, Light breeze, ~70°F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

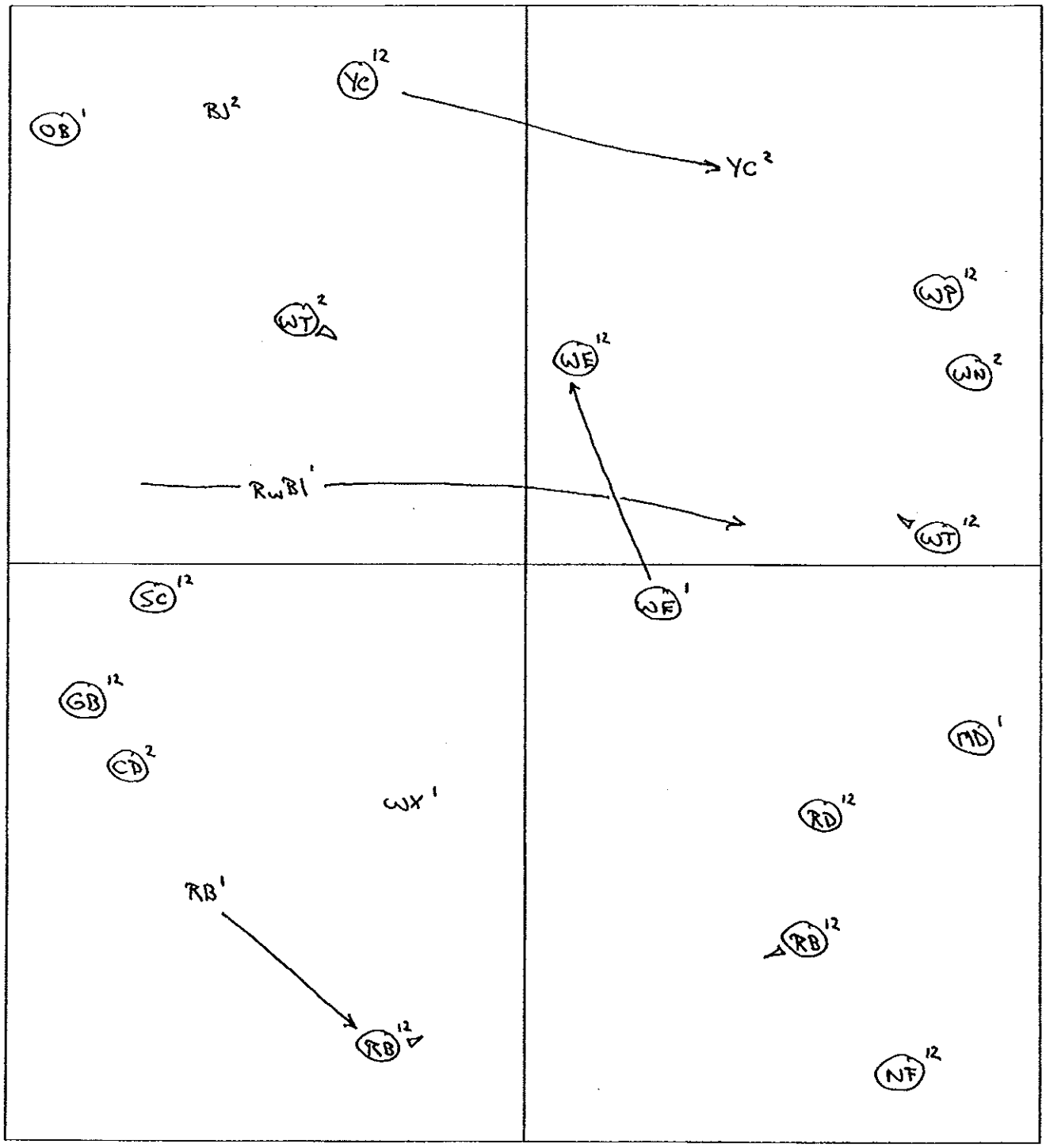
Route: Two (2) **Point:** (1) **GPS Location:** 41° 19.077' N 72° 24.938' W Accuracy 44'
Date: 6-2-02 **Time:** 0556 **Weather:** Partly cloudy, Moderate breeze, ~65° F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

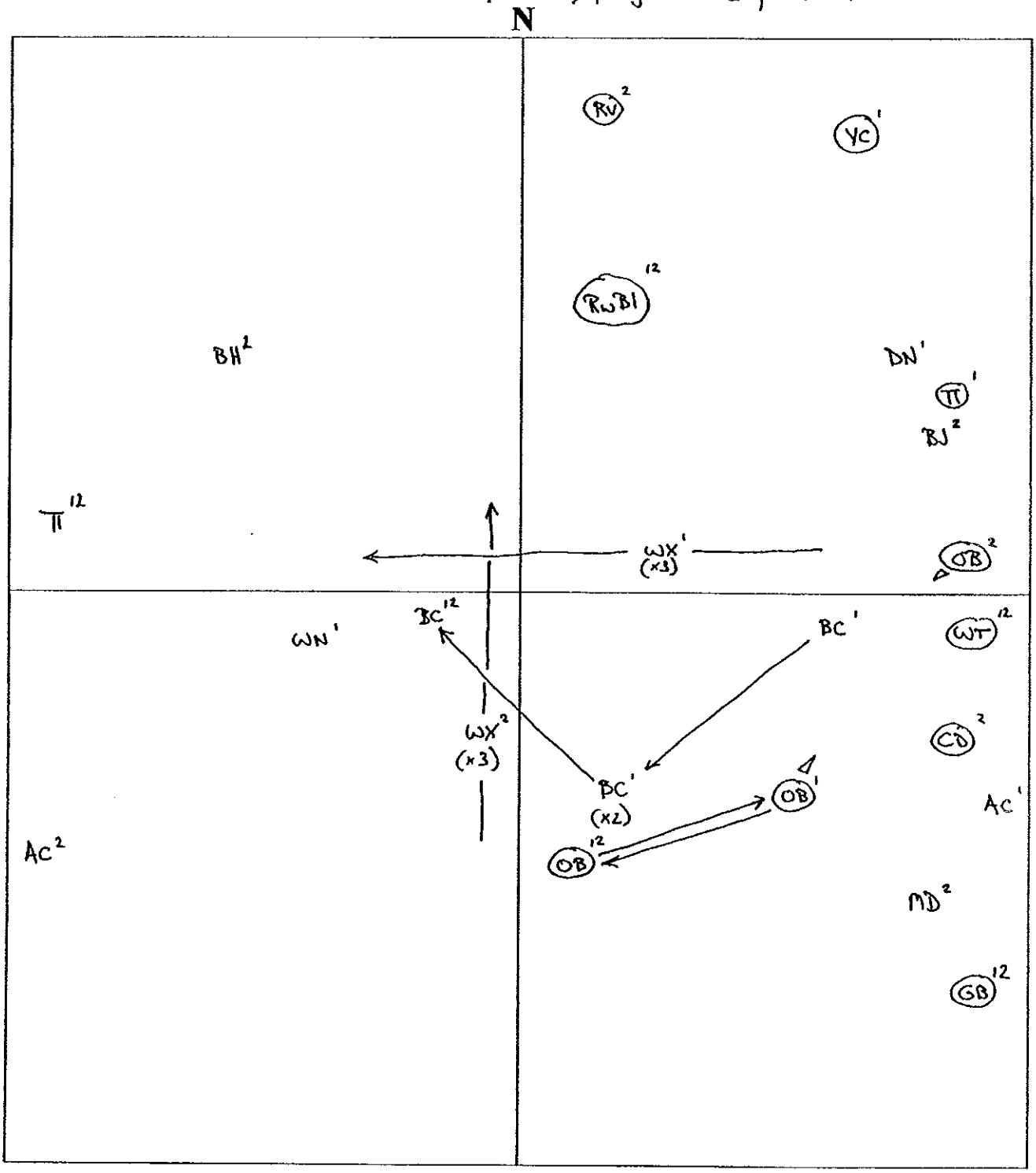
Route: Two (2) **Point:** (2) **GPS Location:** 41° 18.965'N 72° 25.000'W Accuracy 25'
Date: 6-2-02 **Time:** 0618 **Weather:** Mostly cloudy, Light breeze, ~65° F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

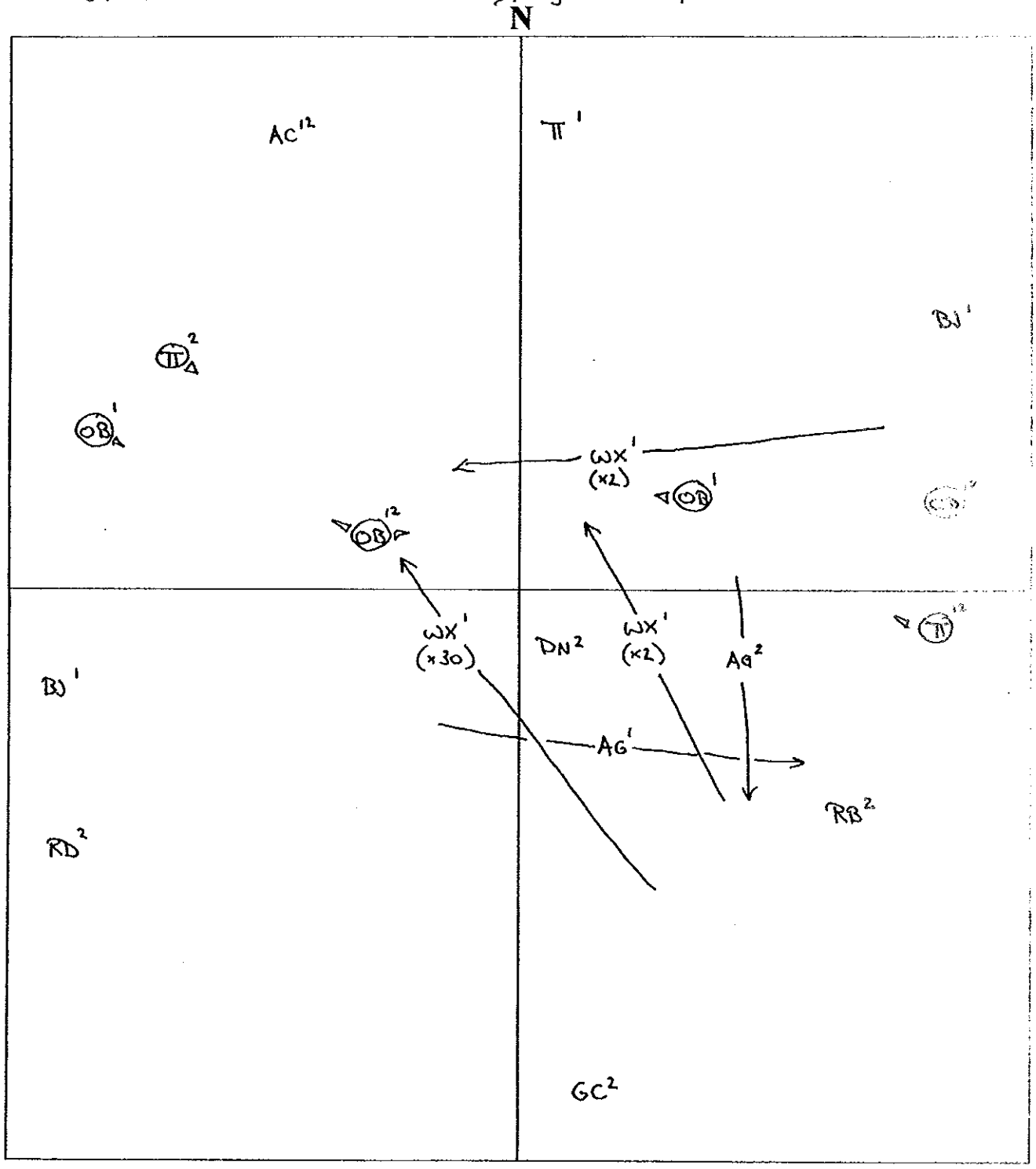
Route: Two (2) **Point:** (3) **GPS Location:** 41°18.919'N 72°25.200'W Accuracy 26'
Date: 6-2-02 **Time:** 0639 **Weather:** Partly cloudy, Light breeze, ~70°F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Two (2) **Point:** (4) **GPS Location:** 41°18.826'N 72°25.307'W Accuracy 25'
Date: 6-2-02 **Time:** 0657 **Weather:** Cloudy, Light breeze, ~70°F

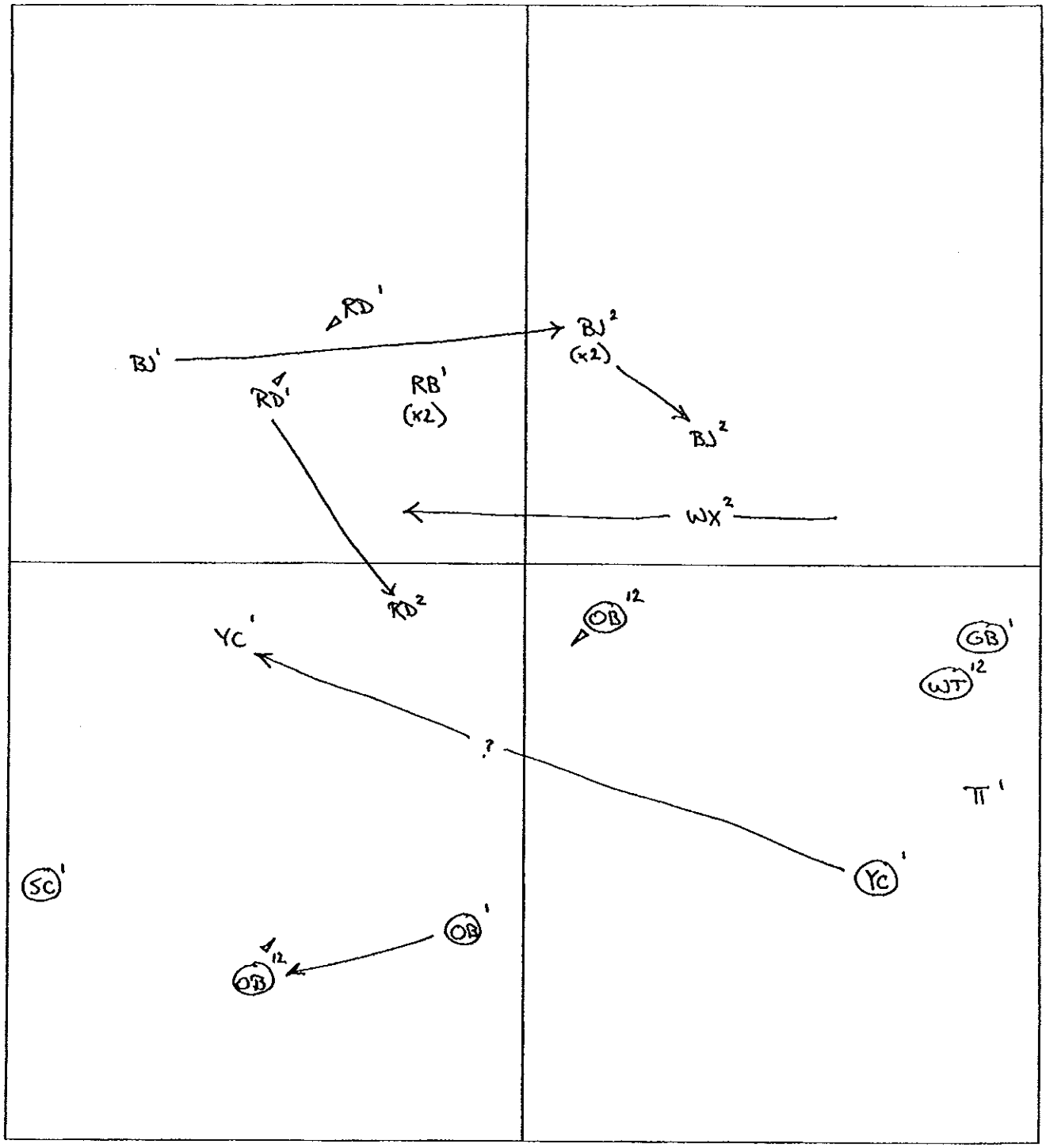


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Two (2) **Point:** (5) **GPS Location:** 41°19.010'N 72°25.199'W Accuracy 34'
Date: 6-2-02 **Time:** 0723 **Weather:** Cloudy, Light breeze, ~70°F

N



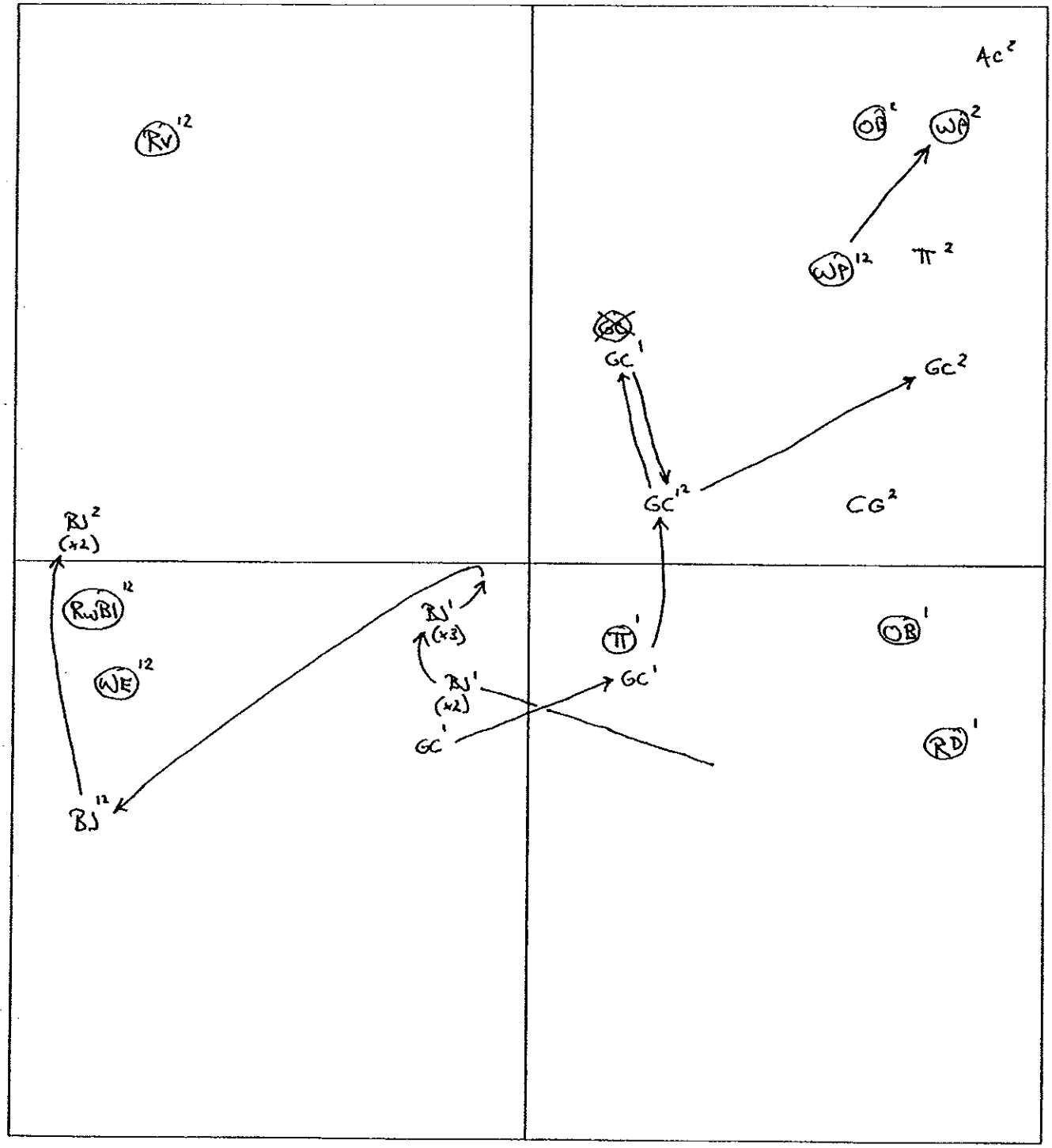
Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Three (3) **Point:** (3) **GPS Location:** 41°19.198'N 72°24.761'W Accuracy 25'

Date: 6.8.02 **Time:** 0625 **Weather:** Clear, light breeze, ~55°F

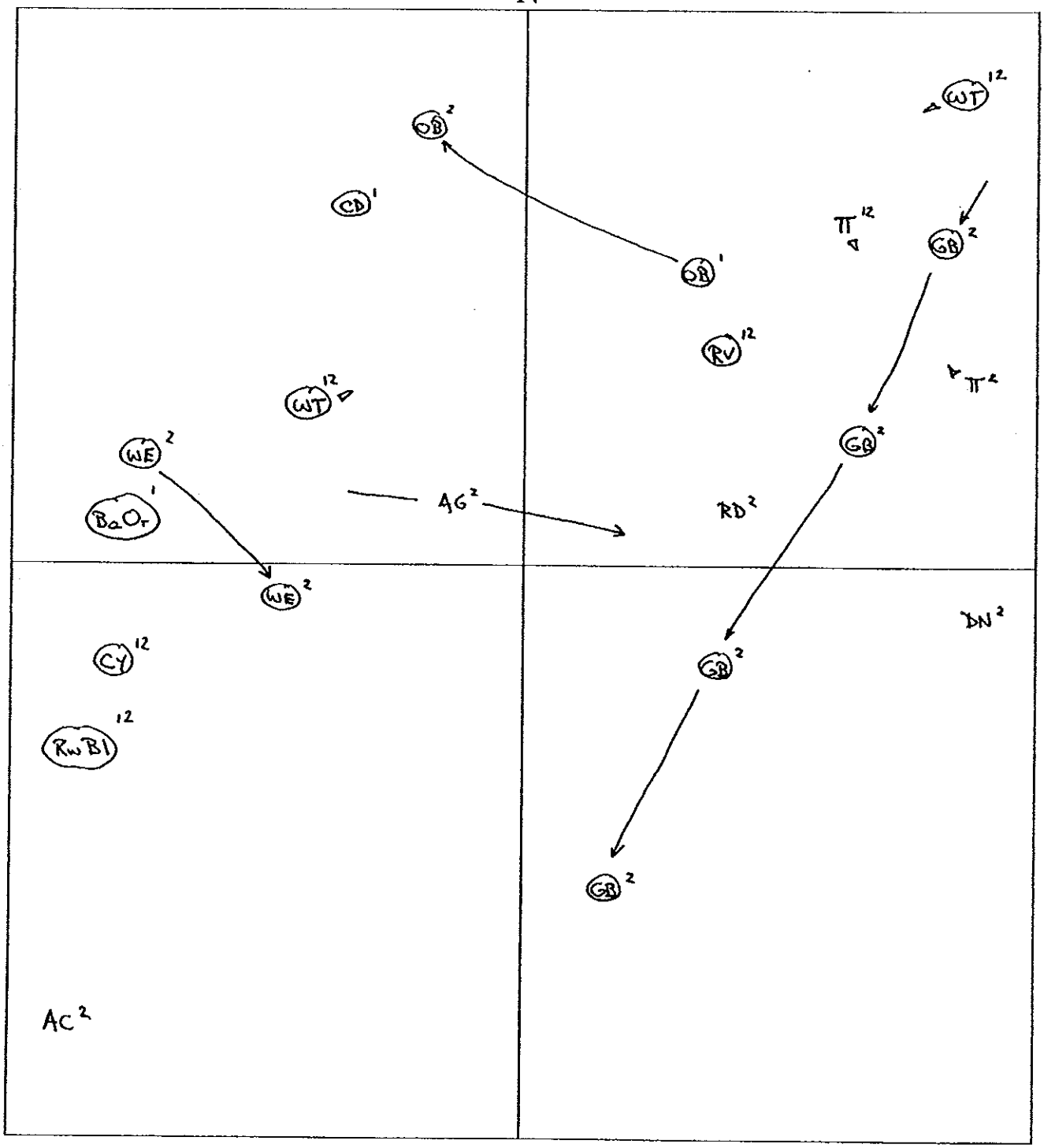
N



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Three (3) **Point:** (4) **GPS Location:** 41° 19.290'N 72° 24.841'W Accuracy 36'
Date: 6-8-02 **Time:** 0644 **Weather:** Clear, Calm / Light breeze, ~55° F

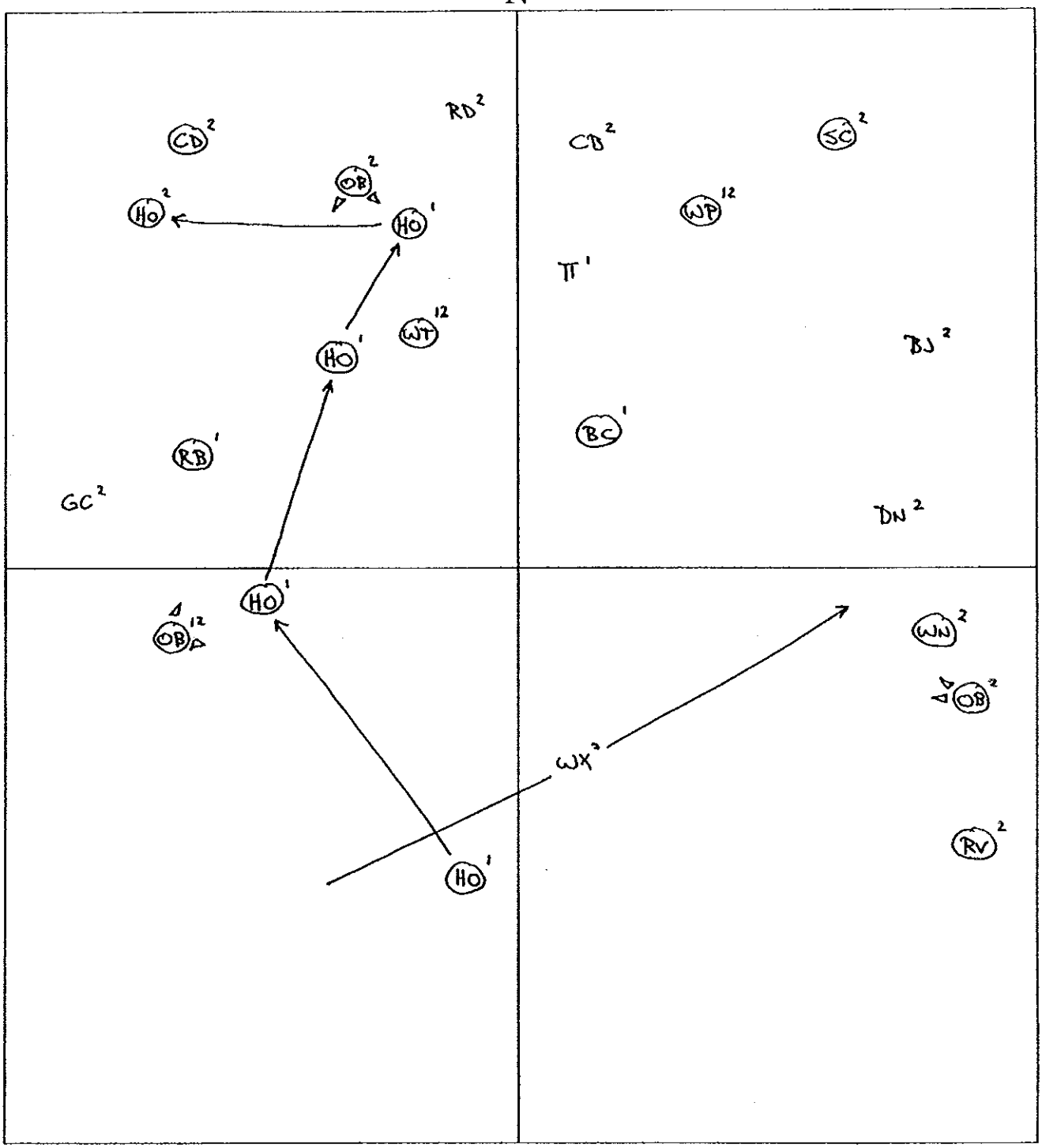


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Three (3) **Point:** (5) **GPS Location:** 41°19.426'N 72° 24.910'W Accuracy 36'
Date: 6-8-02 **Time:** 0702 **Weather:** Clear, Light breeze, ~55°F

N



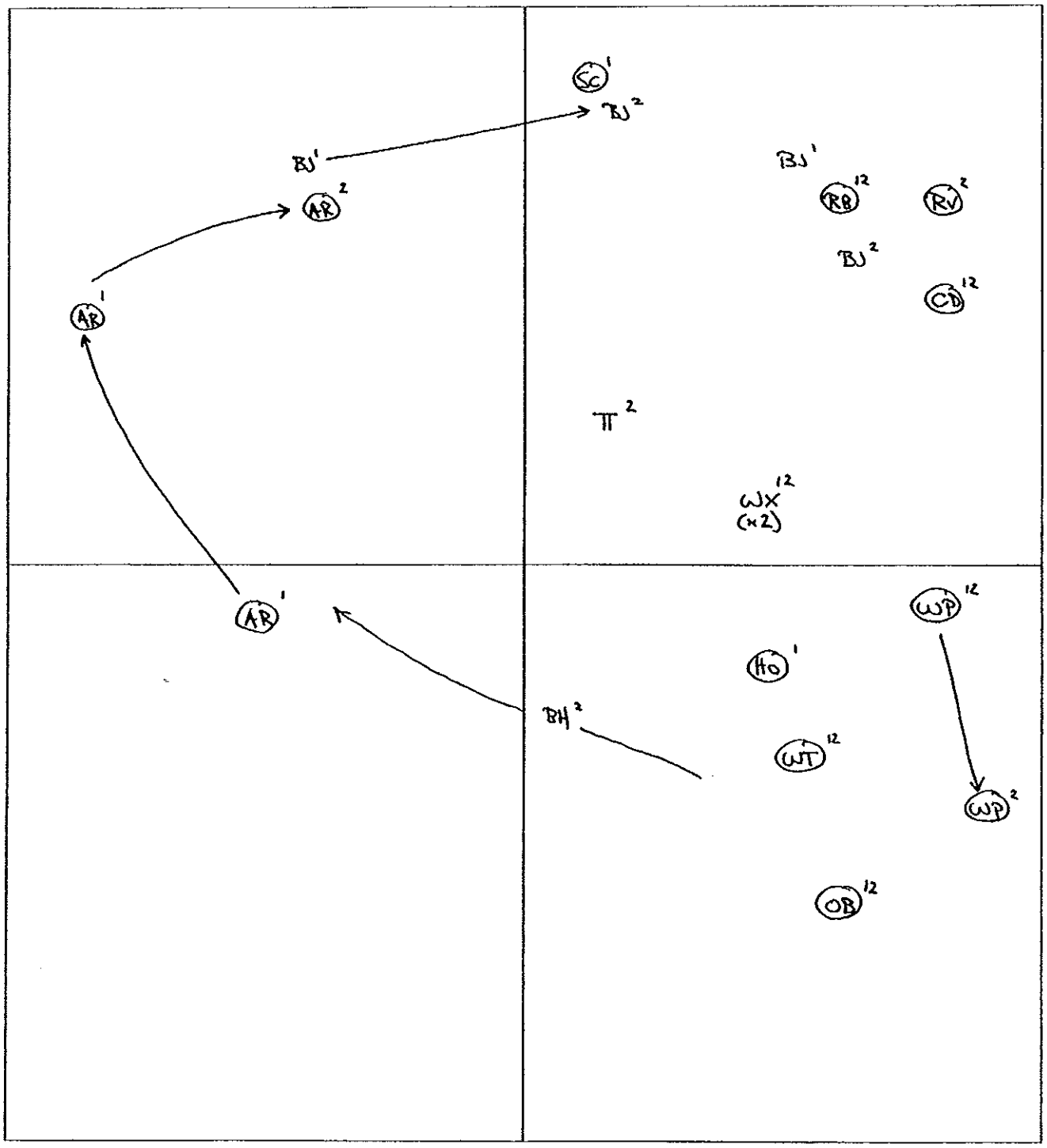
Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Three (3) **Point:** (6) **GPS Location:** 41° 19.514'N 72° 24.977'W Accuracy 27'

Date: 6-8-02 **Time:** 0722 **Weather:** Clear, Light breeze, ~55° F

N

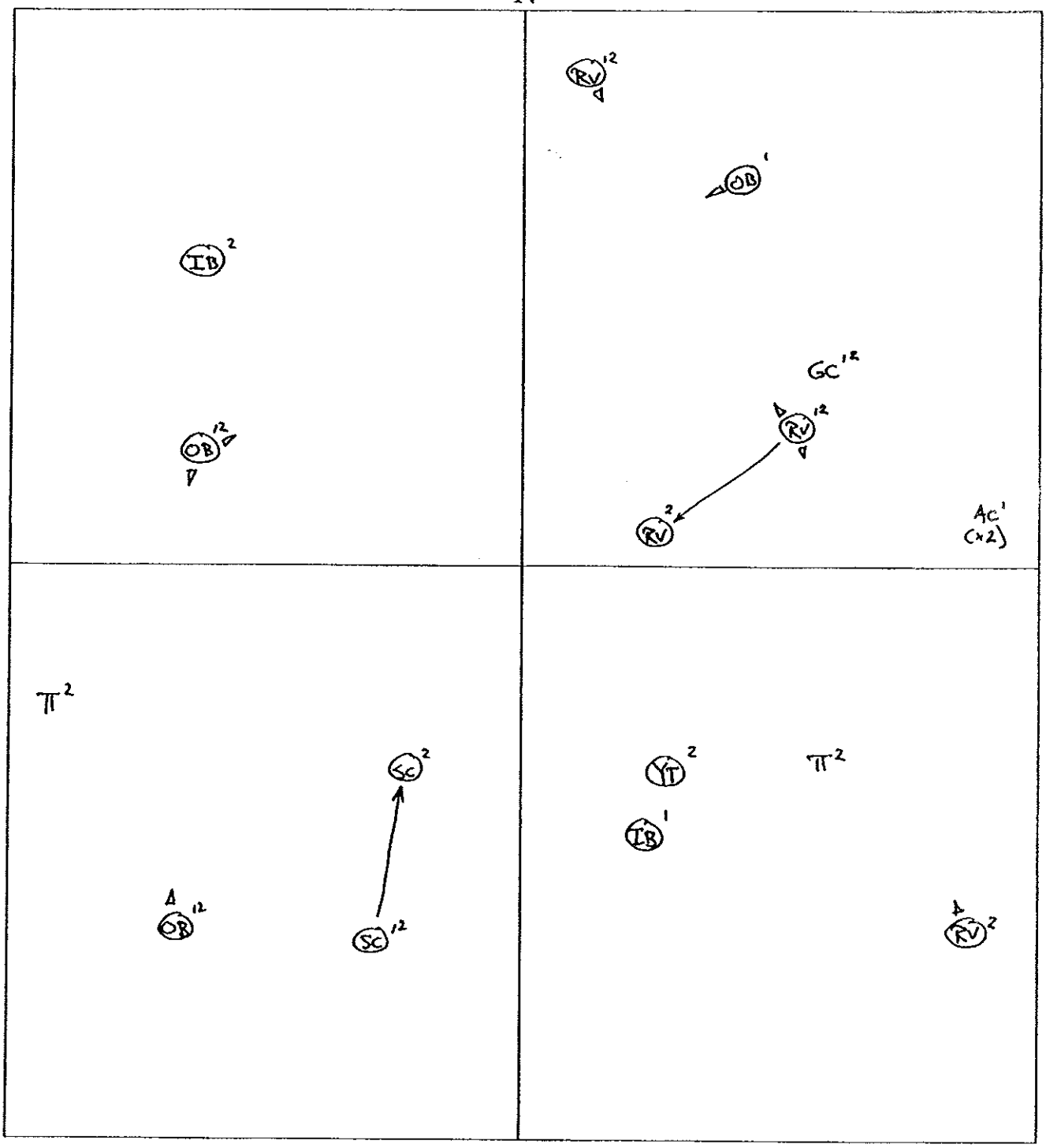


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Four (4) **Point:** (1) **GPS Location:** 41°19.666'N 72°24.541'W Accuracy 37'
Date: 6-8-02 **Time:** 0751 **Weather:** Clear, calm, ~60°F

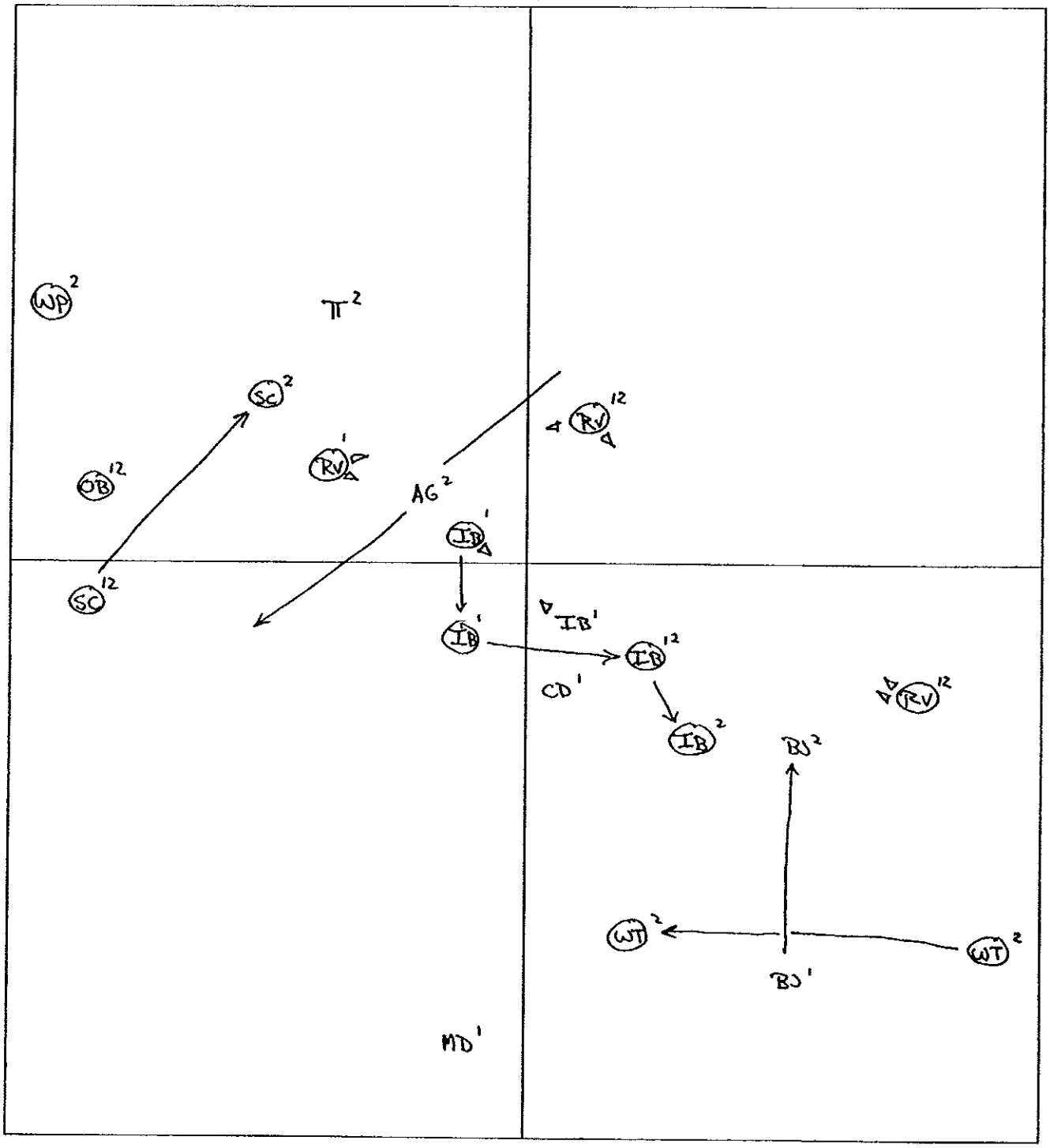
N



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

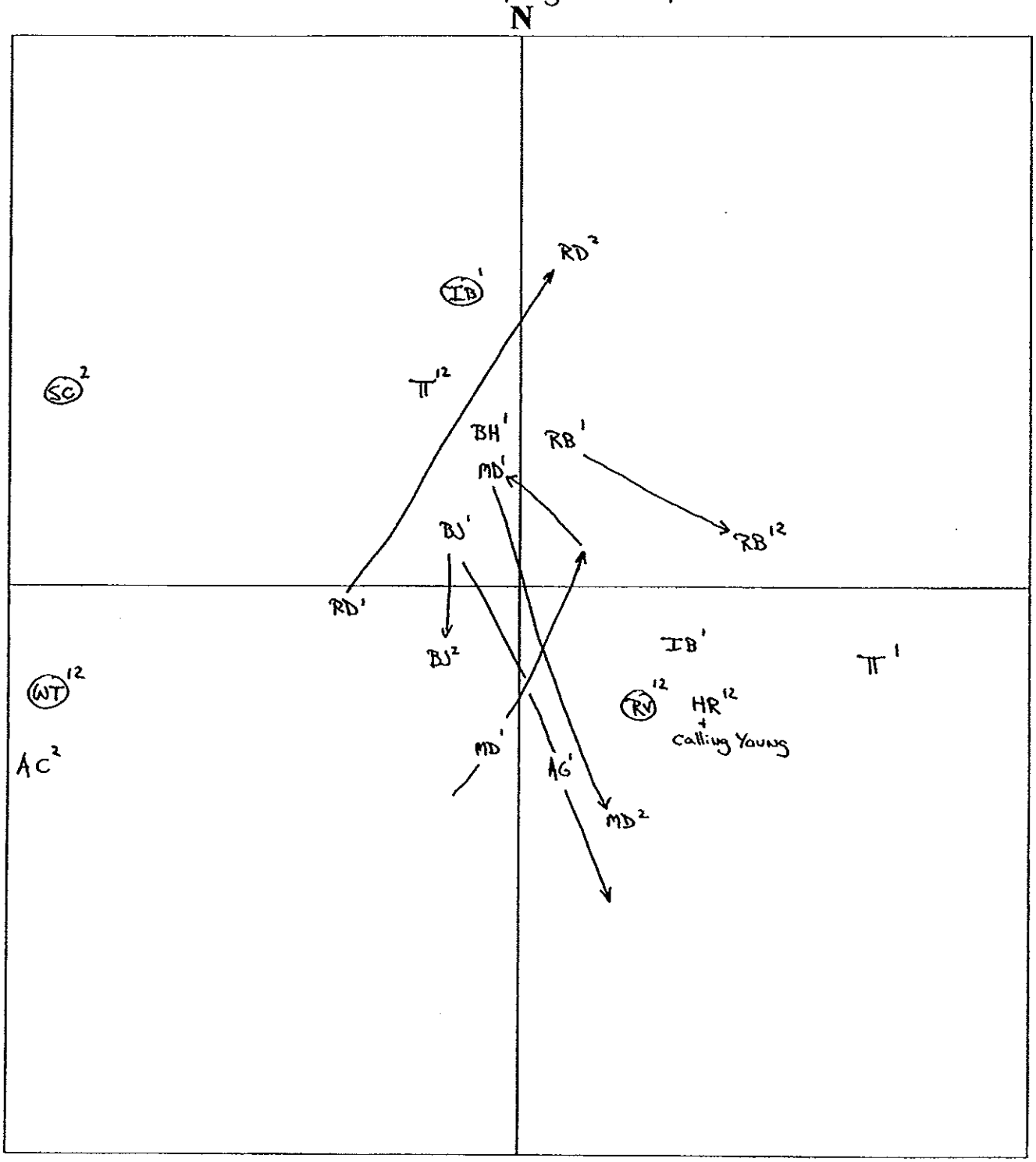
Route: Four (4) **Point:** (2) **GPS Location:** 41°19.606'N 72°24.421'W Accuracy 19'
Date: 6-8-02 **Time:** 0808 **Weather:** Clear, very light breeze, ~60°F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

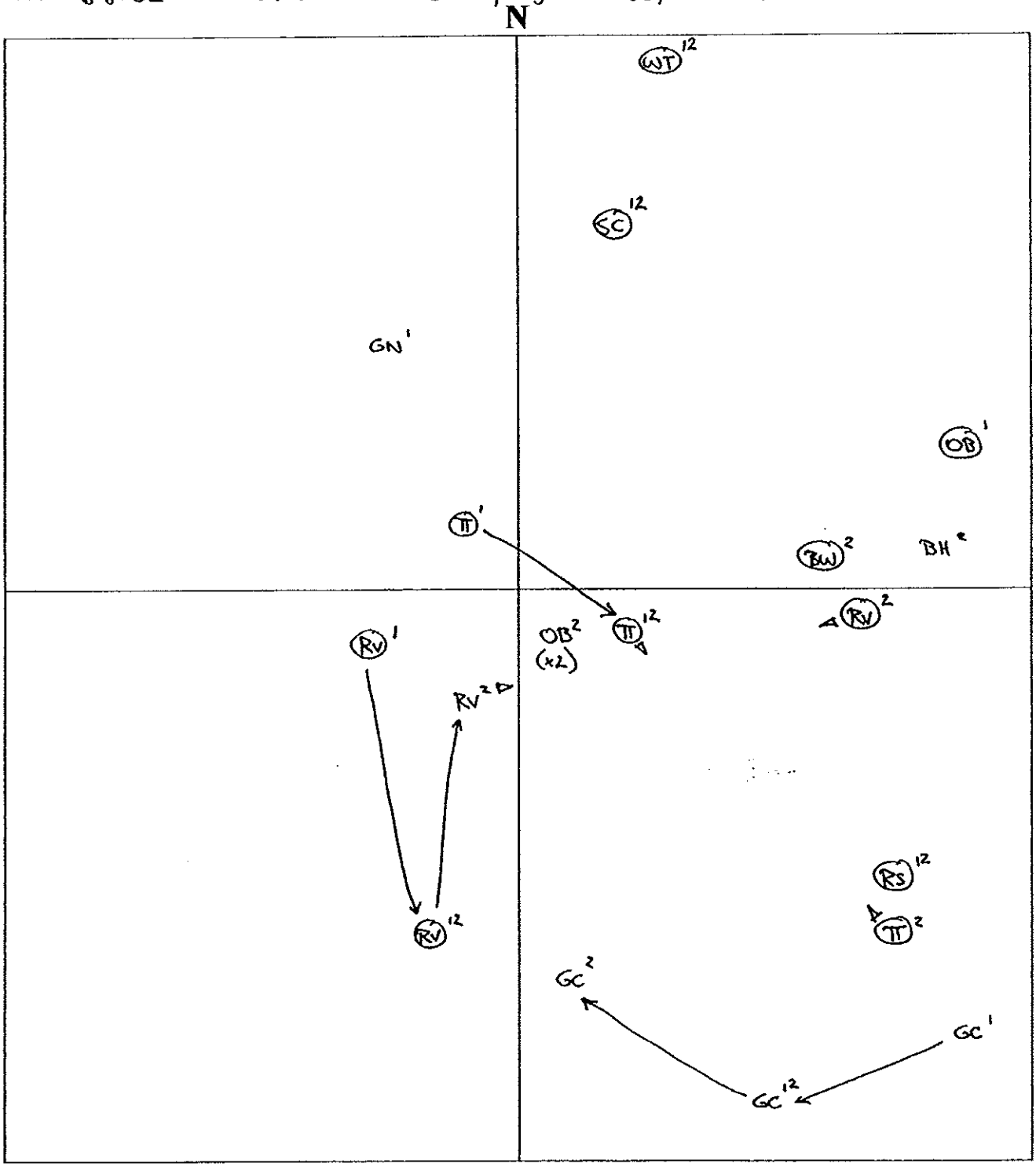
Route: Four (4) **Point:** (3) **GPS Location:** 41° 19.539'N 72°24.296'W Accuracy 29'
Date: 6-8-02 **Time:** 0826 **Weather:** Clear, Light breeze, ~65°F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

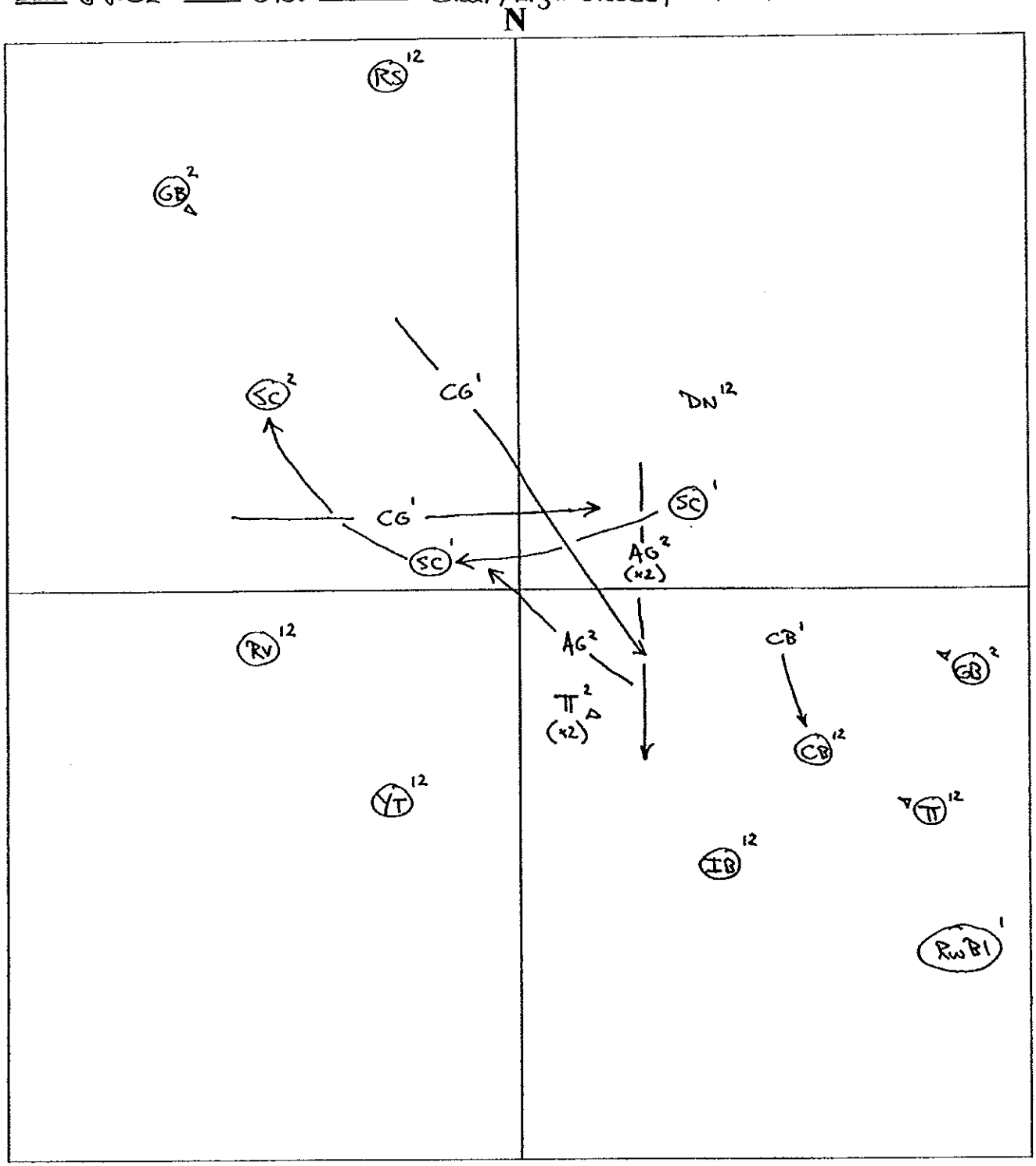
Route: Four (4) **Point:** (4) **GPS Location:** 41° 19.445' N 72° 24.176' W Accuracy 36'
Date: 6-8-02 **Time:** 0846 **Weather:** Clear, Light breeze, ~65° F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

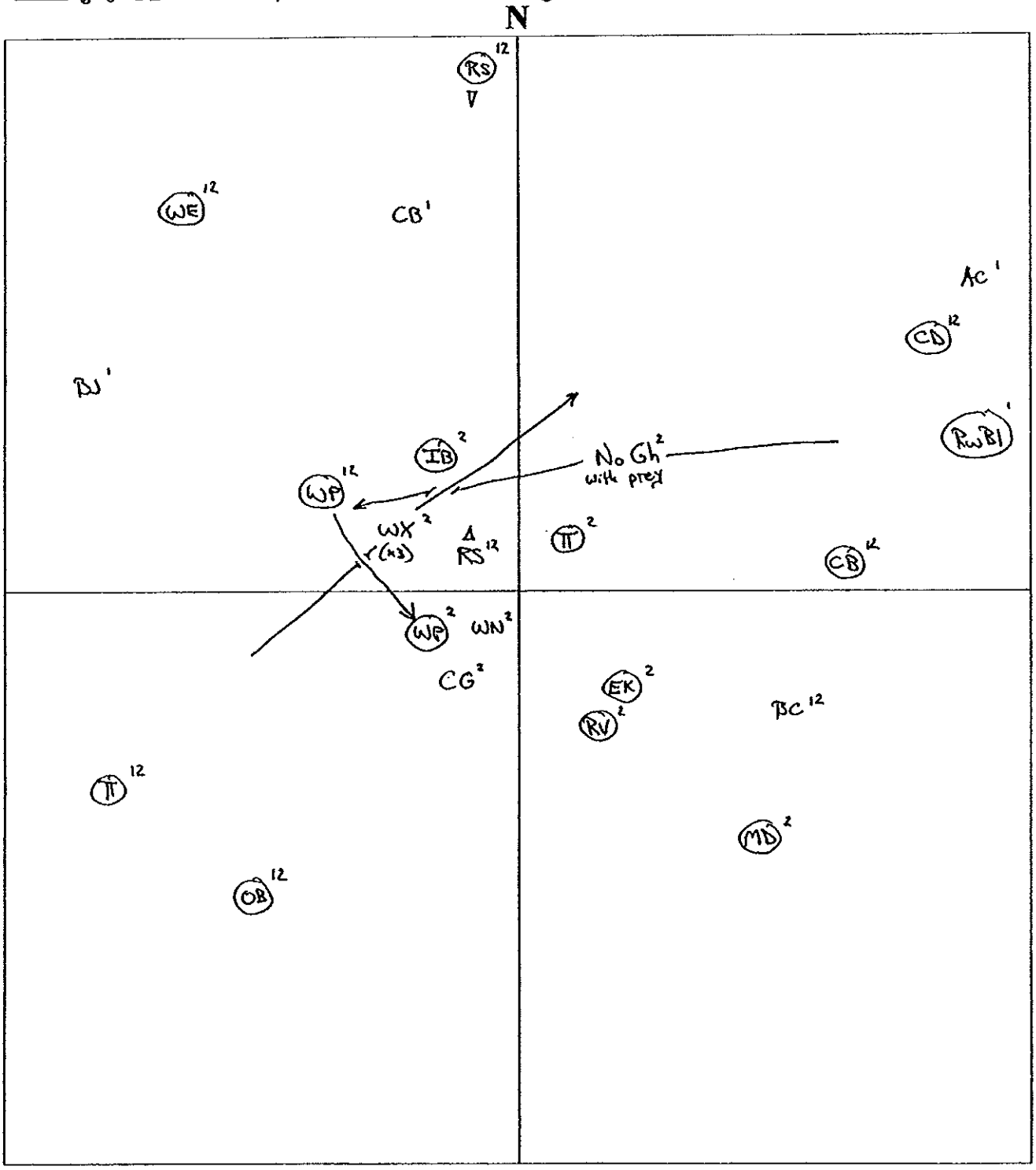
Route: Four (4) **Point:** (5) **GPS Location:** 41°19.390'N 72°24.022'W Accuracy 27'
Date: 6-8-02 **Time:** 0905 **Weather:** Clear, Light breeze, ~70°F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

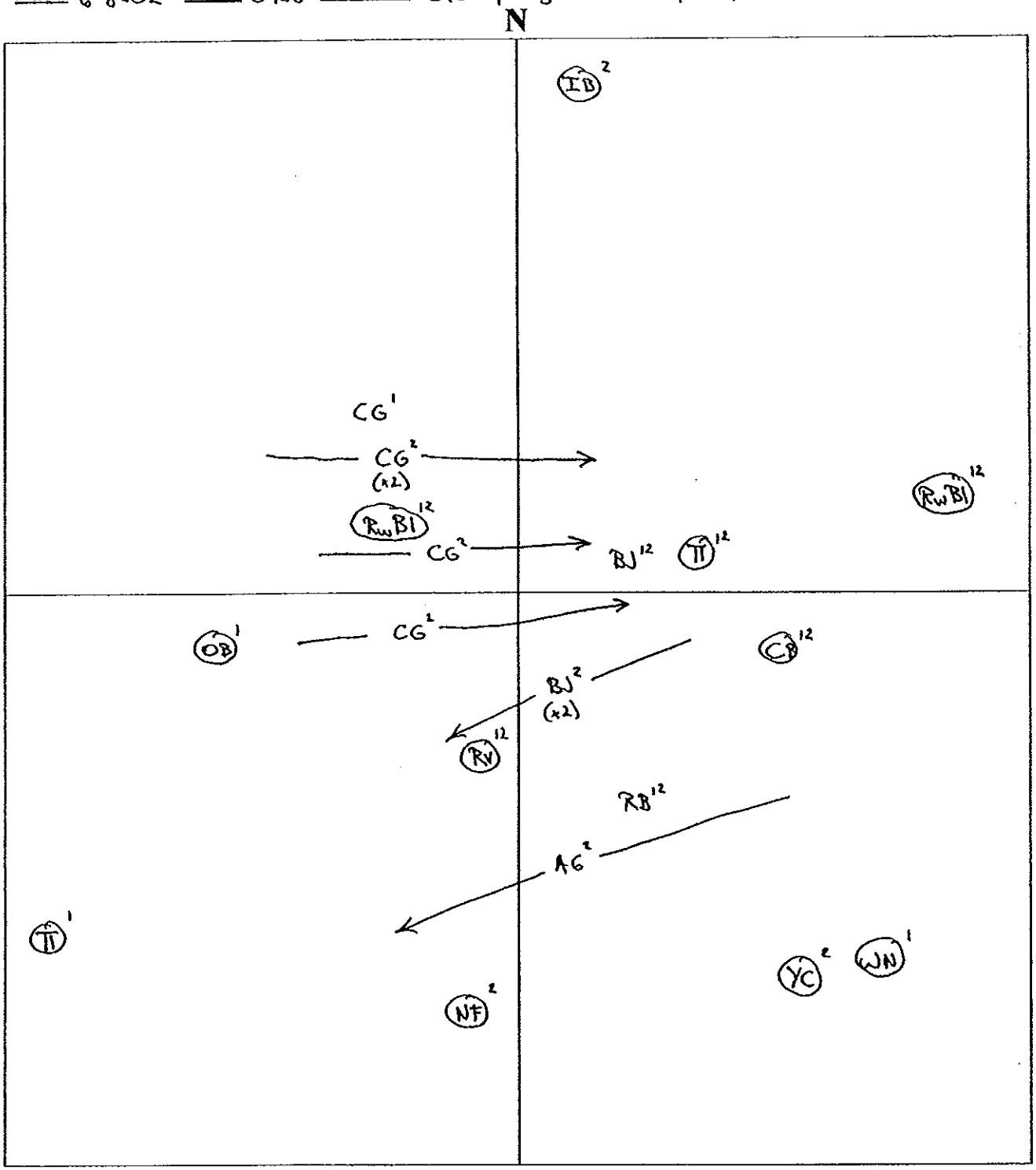
Route: Four (4) **Point:** (6) **GPS Location:** 41° 19.305'N 72° 23.869'W Accuracy 26'
Date: 6-8-02 **Time:** 0921 **Weather:** clear, light breeze, ~70°



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Four (4) **Point:** (7) **GPS Location:** 41°19.236'N 72°23.734'W Accuracy 28'
Date: 6-8-02 **Time:** 0938 **Weather:** Clear, Light breeze, ~ 70°F



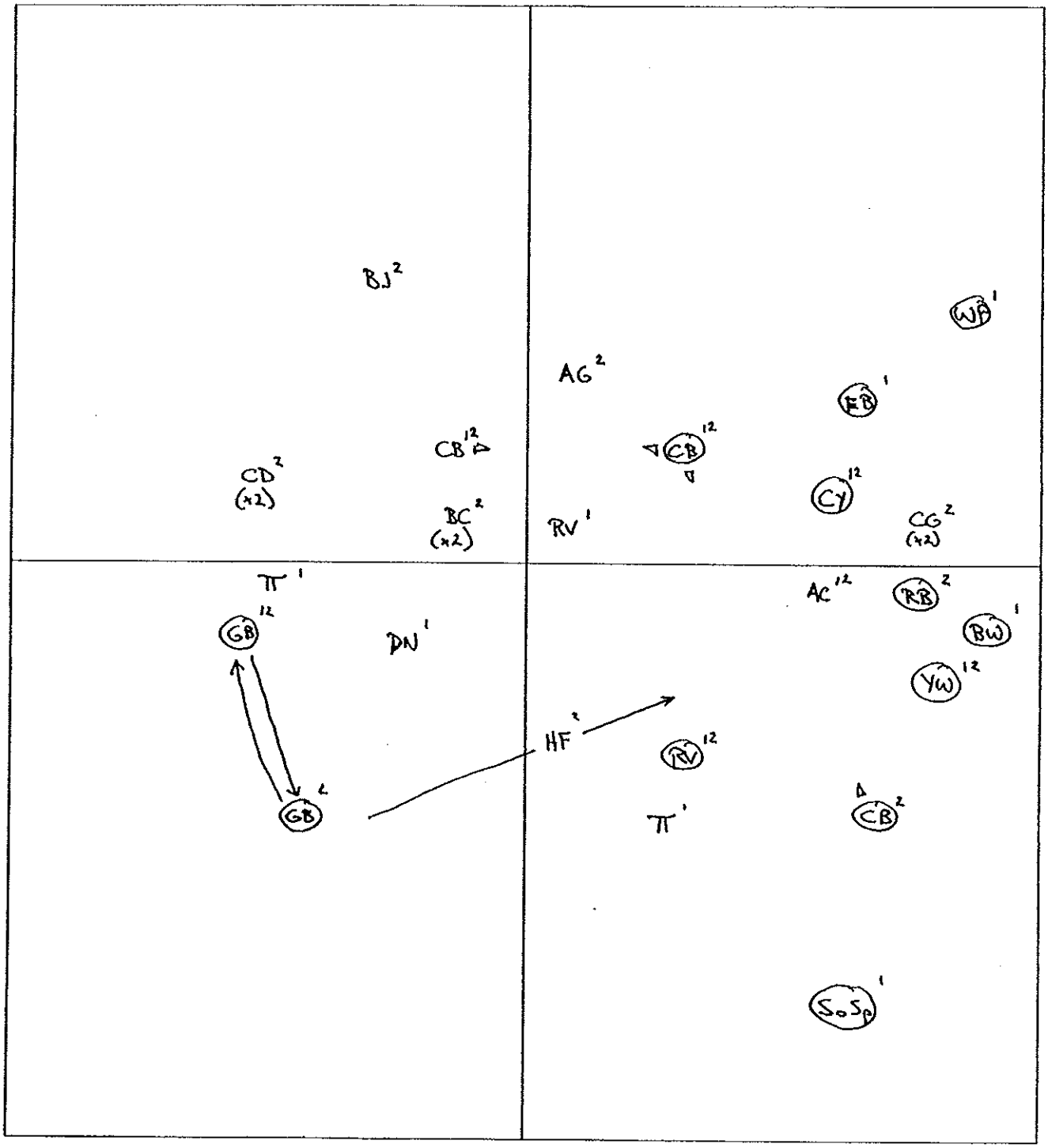
Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Four (4) **Point:** (8) **GPS Location:** 41° 19.149'N 72° 23.574'W Accuracy 29'

Date: 6-8-02 **Time:** 0956 **Weather:** Clear, Light breeze, ~ 70°F

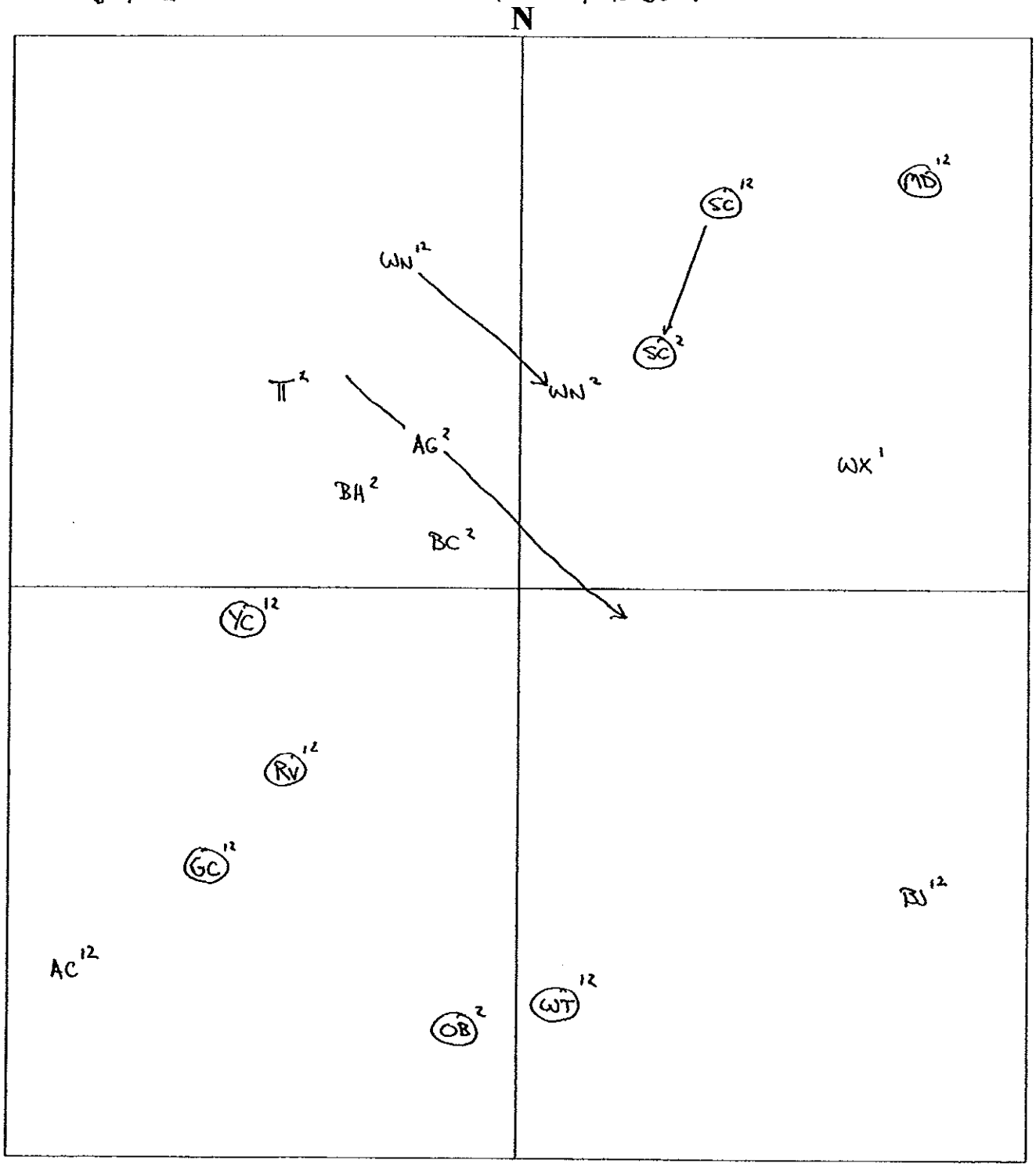
N



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

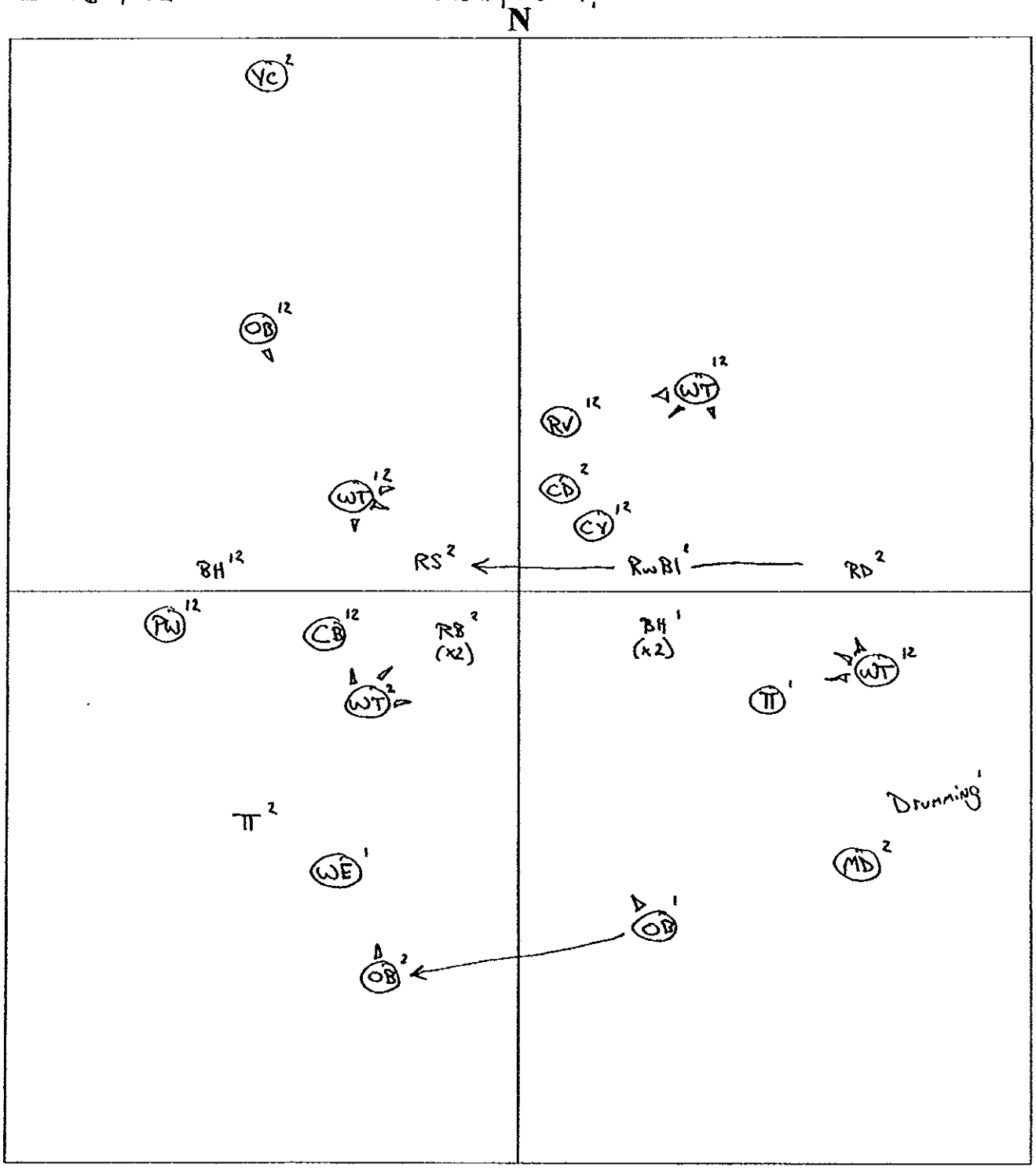
Route: Five (5) **Point:** (1) **GPS Location:** 41°19.388'N 72°25.388'W Accuracy 27'
Date: 6-9-02 **Time:** 0609 **Weather:** Clear, calm, ~60°F



Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Five (5) **Point:** (2) **GPS Location:** 41°19.280'N 72°25.378'W Accuracy 25'
Date: 6-9-02 **Time:** 0626 **Weather:** Clear, calm, ~60°F

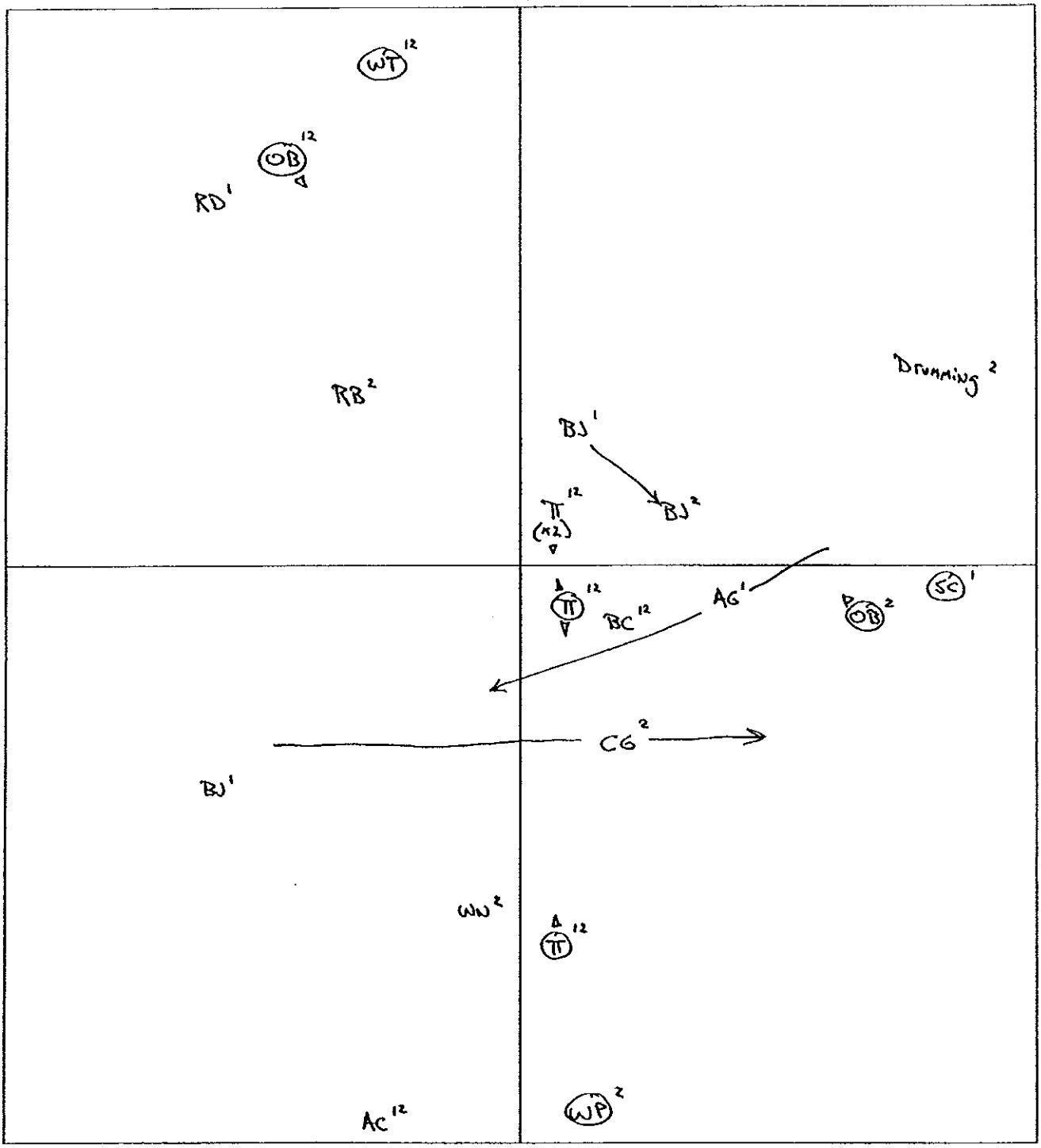


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Five (5) **Point:** (3) **GPS Location:** 41° 19.188' N 72° 25.285' W Accuracy 23'

Date: 6-9-02 **Time:** 0644 **Weather:** Clear, Light breeze, ~60° F



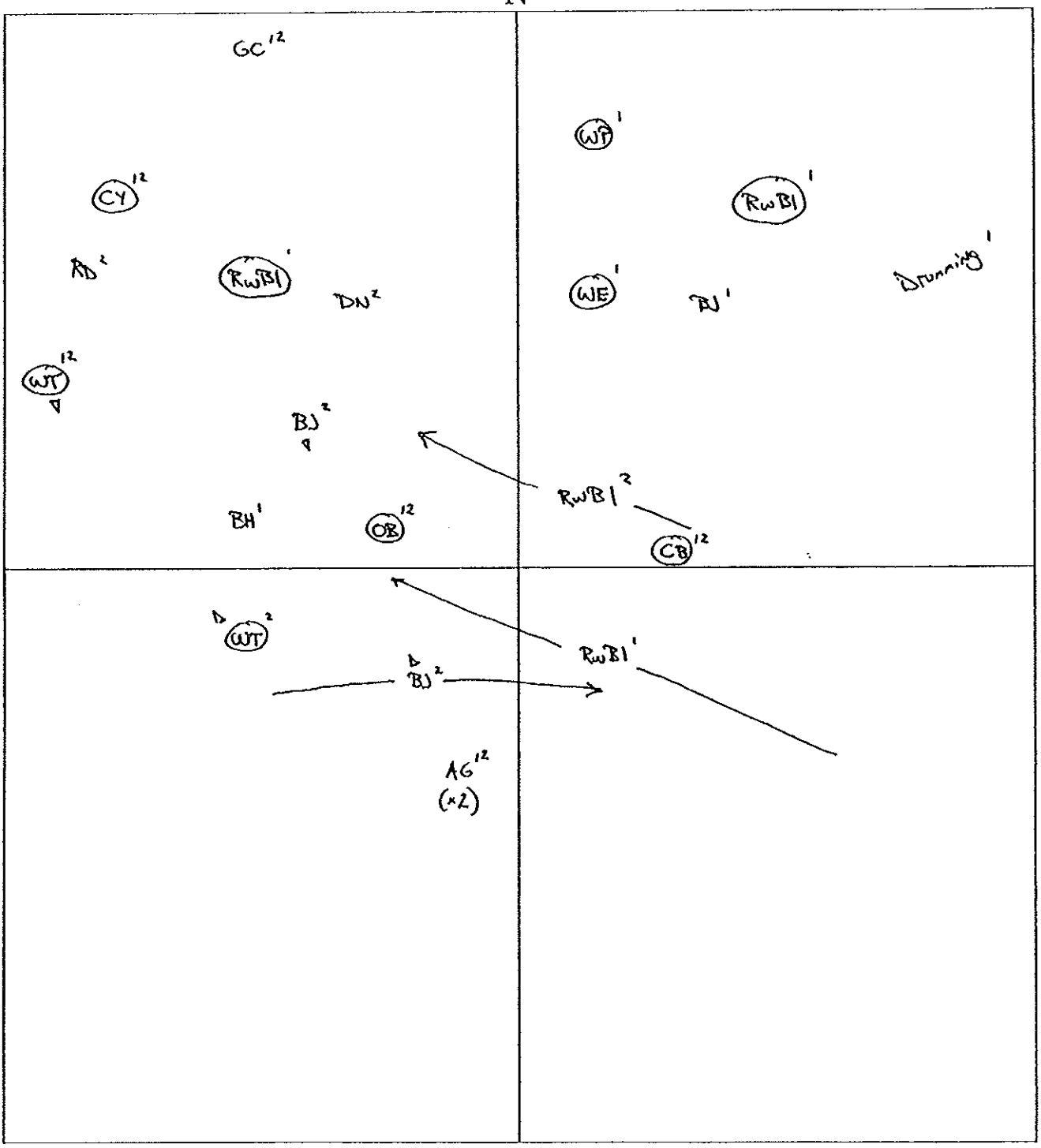
Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Five (5) **Point:** (4) **GPS Location:** 41° 19.279' N 72° 25.256' Accuracy 40'

Date: 6-9-02 **Time:** 0702 **Weather:** Clear, Light breeze, ~65° F

N

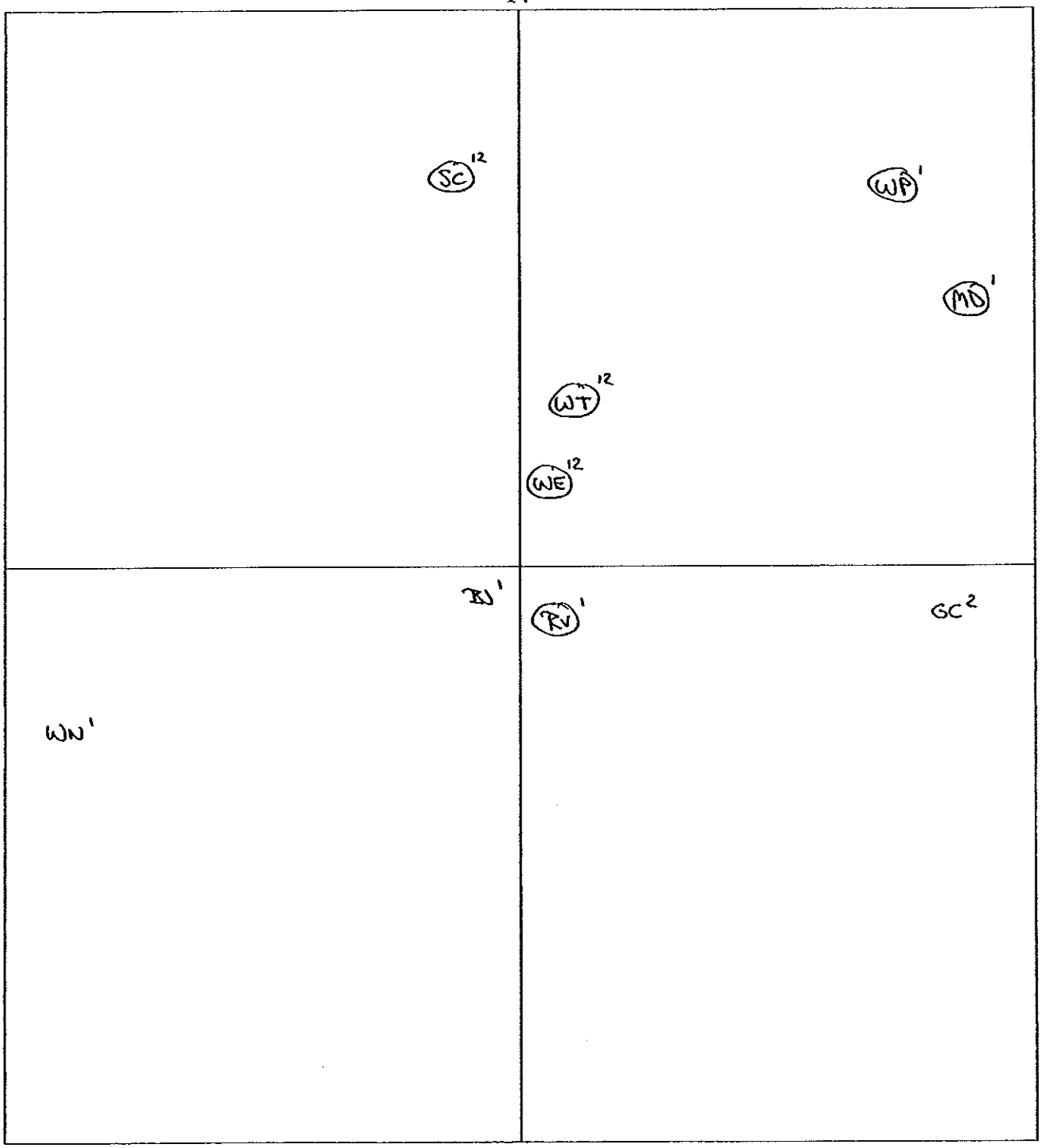


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Five (5) **Point:** (5) **GPS Location:** 41°19.148'N 72°25.552'W Accuracy 22'
Date: 6-9-02 **Time:** 0741 **Weather:** Clear, light to moderate breeze, ~70° F

N



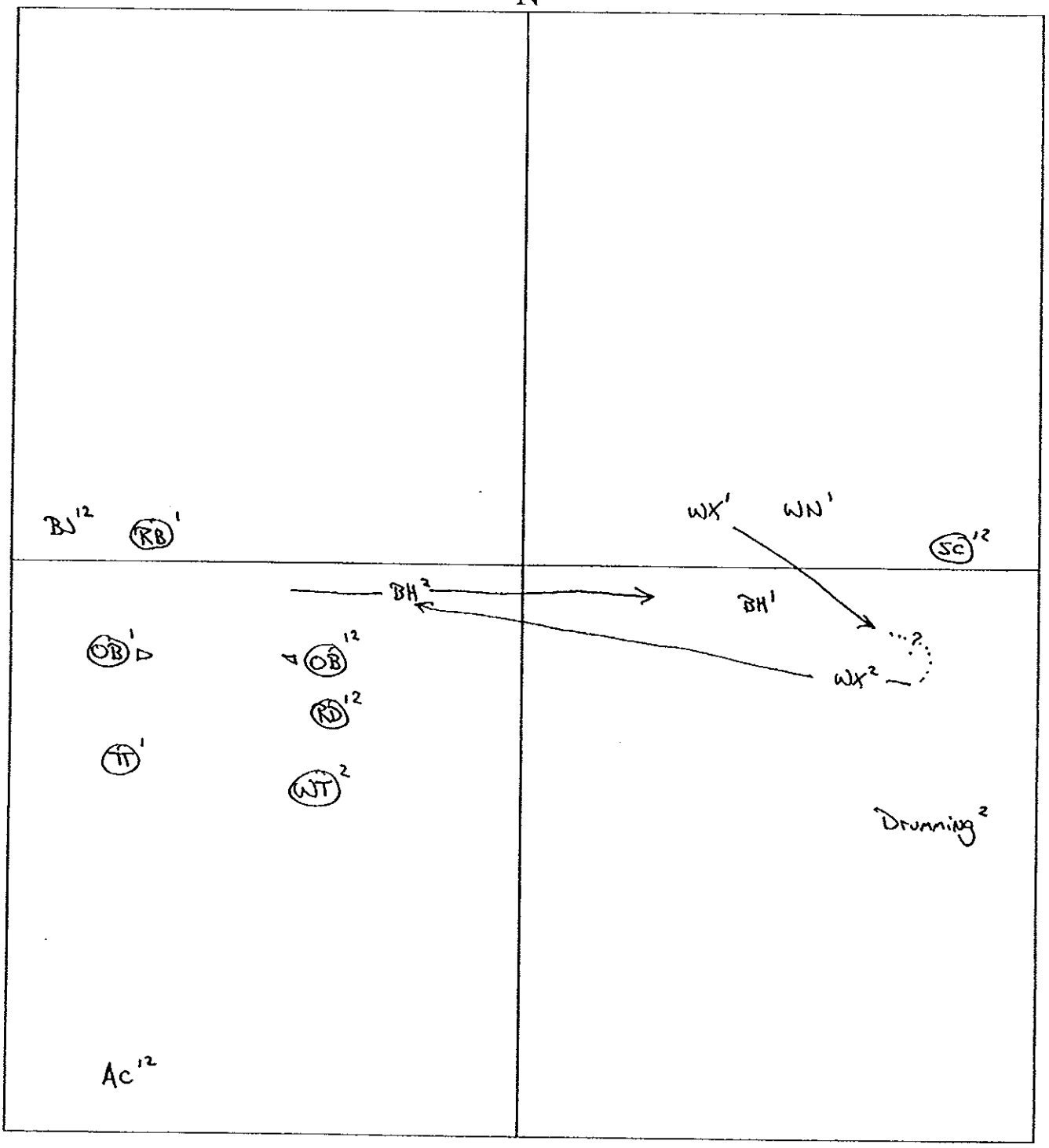
Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Five (5) **Point:** (6) **GPS Location:** 41° 19.021'N 72° 25.542'W Accuracy 28'

Date: 6-9-02 **Time:** 0759 **Weather:** Clear, Light to moderate breeze, ~ 75° F

N

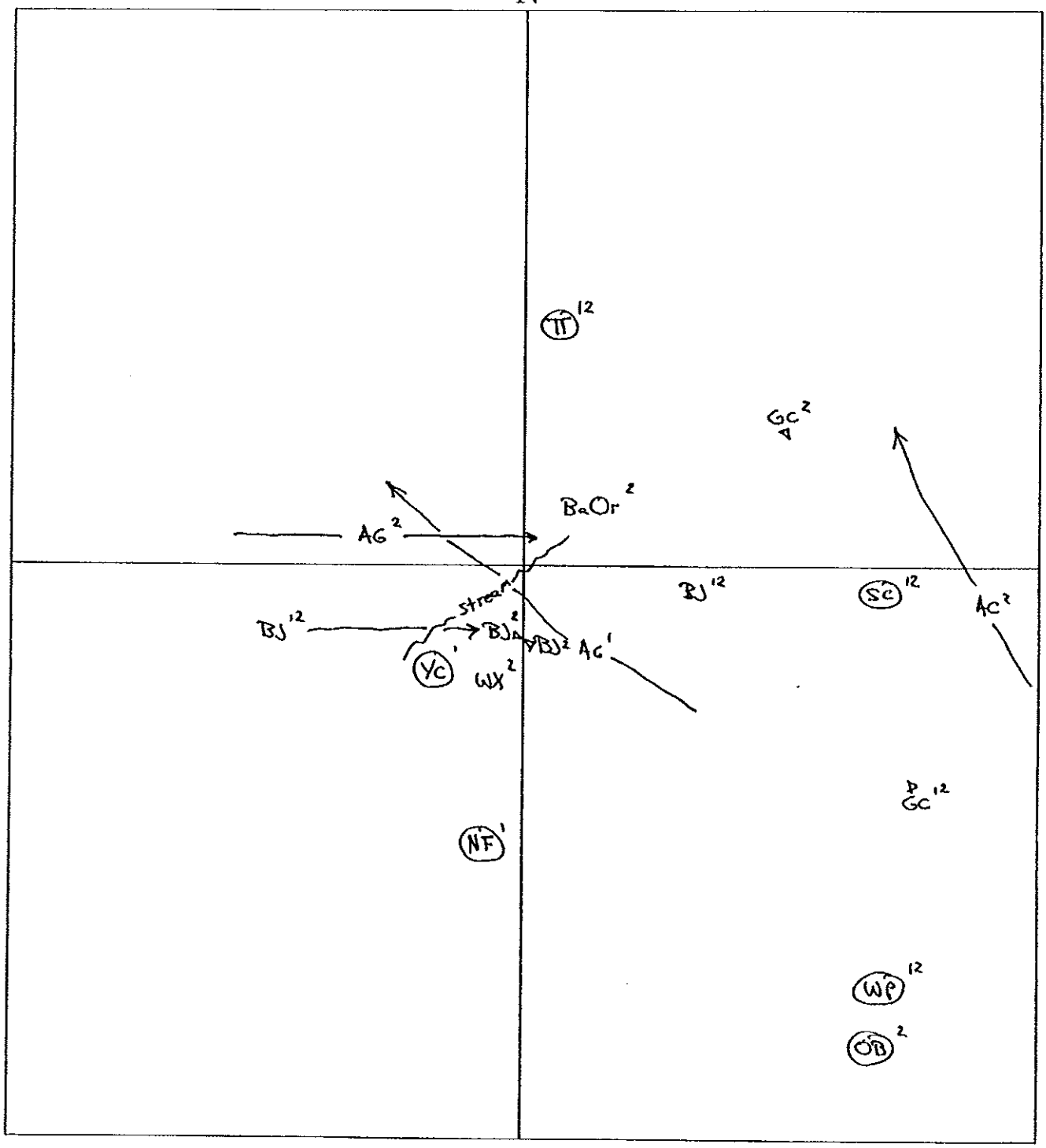


Breeding Bird Survey "The Preserve" Old Saybrook, Connecticut

Observer David Provencher

Route: Five (5) **Point:** (7) **GPS Location:** 41° 18.924' N 72° 25.510' W Accuracy 31'

Date: 6-9-02 **Time:** 0822 **Weather:** Partly sunny, breezy, ~ 70° to 75°F



Wetland Functional Assessment

The Preserve

Old Saybrook, Essex And Westbrook, CT

Prepared for: BL Group LLC

Prepared by: Environmental Planning & Soil Science
49 Lynn Road
Ivoryton, CT 06442
860-767-8425
October, 2002

Introduction

Environment Planning and Soil Science LLC was retained by the B&L Group LLC to conduct a wetlands investigation and functional assessment on a ±900 acre site that is proposed to be developed for a golf course and residences. The site is located with the Towns of Old Saybrook, Essex and Westbrook and is currently not developed. The approximate site location is shown on Figure 1. The purposes of the investigation were to: delineate on-site wetlands so that planning of the residential development could incorporate them and be considerate of this regulated resource, and; to provide background data in the form of a functional assessment that could also be used to avoid or mitigate impacts during the site planning process.

Wetlands were delineated according to the State of Connecticut statutory definition as described in Section 22a of the State Statutes. Wetlands were delineated with sequentially numberd blue and pink flagging tape and their soils, and functional values are described in further detail in this report.

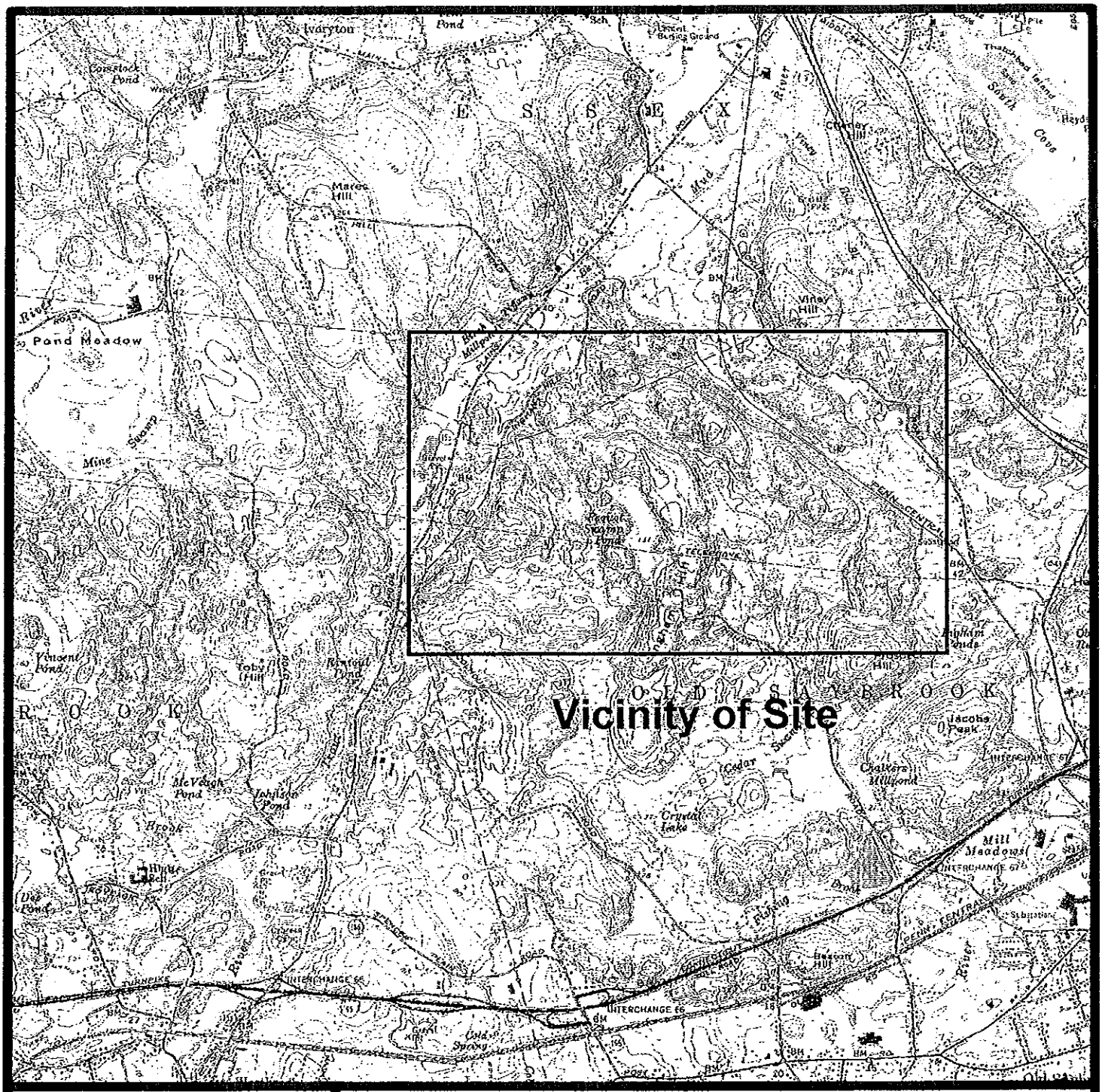
After wetland delineation was complete, the wetland resources of the site were surveyed by conducting a deliberate walk through of the site, traversing each wetland in several locations in order to collect data characteristic of that wetland. During the walk through, all vegetation identifiable was noted, described and divide into communities. The landscape, including slopes, soils, and unique features were also described. Presence of wildlife species, e.g. the animals themselves, calls, songs, scat or tracks were also noted.

This report begins with the broad-brush view of the site. A description of the various natural resources including sections on the geology and soils, vegetation, wildlife, and aesthetics is used to provide information necessary for planning purposes. A summary of wetland functions is presented in tabular form. This information is then synthesized in summary section.

Site Setting

The site is located in Middlesex County in the towns of Old Saybrook, Essex and Westbrook Connecticut, as shown on Figure 1. The local ecological context of this area, termed the Southeast hills eco-region, has been described in Dowhan and Craig (Joseph J. Dowhan and Robert J. Craig. 1976. *Rare and Endangered Species Of Connecticut And Their Habitats.* State Geological and Natural History Survey of Connecticut, The Natural Resources Center Department of Environmental Protection. Report Of Investigation No.6)

"A seaboard region, generally lying within five to seven miles of eastern Long Island Sound, Characterized by coastlands, including extensive tidal marshes, estuary areas, and sand beaches, by relatively level but rolling nearshore lands, and by protrusion of rugged and rocky upland extending to the coastline.



USGS Essex

N

W E

S

EP&SS LLC

Figure 1
Site Locus
Preserve Wetland Assessment
Old Saybrook, CT

Elevations vary from sea level to 300-400 feet. Topographic relief is maximum where rocky uplands extend to the coast, and inland along the valleys of the Connecticut and Thames rivers.

The bedrock is primarily metamorphic and igneous: Paleozoic gneisses, schists, and granites, complexly folded into belts with varying trends. Soils are developed on glacial till in the uplands, on local deposits of stratified sand, gravel and silt in the valleys, and on coastal and tidal deposits on the shores and estuaries.

The mean annual regional temperature is 51°F., the highest in the state. The average winter temperature is 32.5°F., the warmest in the state. The monthly mean minimum temperature of the coldest month is 23°F., also the warmest in the state. Mean annual minimum temperature is about 0°F. Average seasonal snowfall is 35 inches. The average length of the frost-free season is 195 days, the longest in the state. Spring warm-up, the initiation of the growing season, is, on the average, earlier than in most regions of the state, except for the North-Central Lowlands region. The average summer temperature is 70°F.; the monthly mean maximum temperature of the warmest month is 81°F. The average annual precipitation is 46 inches, with wide variations throughout the region.

On well-drained soils, the regional forest vegetation is Coastal Hardwoods, characterized by the dominance of Red, White, and especially Black, Oaks (*Quercus rubra, Q. alba, and Q velutina*), Hickories, especially Mockernut (*Carya tomentosa*), Black Cherry (*Prunus serotina*), Sassafras (*Sassafras albidum*), and, locally, Hemlock (*Tsuga canadensis*). Other tree species, characteristic of regions farther inland, are also commonly present. Red Cedar (*Juniperus virginiana*) dominates the early phases of vegetation development on old fields in this region. Several species of vines and shrubs form dense, impenetrable thickets and tangles in the open forests and woodlands; among them are Catbrier and Greenbrier (*Smilax spp.*), Poison Ivy (*Rhus radicans*), Japanese Honeysuckle (*Lonicera japonica*), and Asiatic Bittersweet (*Celastrus orbiculatus*). Significant biologic habitats of this region are salt marshes, mud flats, coastal sand beaches, offshore bird-breeding islands, and old-growth forests. The long growing season and the relatively warm winter temperature minima are reflected in the strong southeastern Coastal Plain influence on the flora and fauna. Coastal Plain tree species occurring characteristically in this region include Holly (*Ilex opaca*) and Post Oak (*Quercus stellata*). Atlantic White Cedar (*Chamaecyparis thyoides*) forms many dense, pure stands in swamps. Rare Connecticut plants characteristically found in this region include Redroot (*Lachnanthes tinctoria*), Inkberry (*Ilex glabra*), Bushy Rockrose (*Helianthemum dumosum*), Graves' Beach Plum (*Prunus gravesii*), Large Marsh-Pink (*Sabatia dodencandra*), Thread-leaved Sundew (*Drosera filiformis*), Lesser Sand-Spurrey (*Spergularia canadensis*), and several species of Panic grass (*panicum spp.*).

Characteristic breeding birds of this region are the Osprey (*Pandion haliaetus*), Hooded Warbler (*Wilsonia citrina*), Roseate Tern (*Sterna dougallii*), White-eyed Vireo (*Vireo griseus*), Sharp-tailed Sparrow (*Ammospiza caudacuta*), Orchard Oriole (*Icterus spurious*), and Carolina Wren (*Thryothorus ludovicianus*)."

The Preserve site is predominantly wooded, and those woods fit into the coastal hardwoods category as described above. The non wooded area is predominantly comprised of Pequot Swamp pond, and utility right of way, logging roads and selective cut areas. Well-used hiking and ATV trails indicate that recreational activities occur on the site. Past land use of the site evidently included farming. The abundant stonewalls indicate that the land was previously cleared and likely used (as was most of Connecticut) for farm fields until the early 20th century. The age and size of the trees supports this.

The land uses surrounding the site vary. Residential development, typically on one acre lots, surrounds much of the site. A rail line runs along much of the northeast border. Commercial uses are nearby in Essex and Old Saybrook. Open space occurs to the southwest in Old Saybrook. The most common nearby land use is residential such as that found on Ingham Hill road in both Old Saybrook and Essex.

The most striking physical characteristics of the site are the ridgelines and slopes that cut through the property. These ridges are bedrock derived and are overlain with variable depths of glacial till. Throughout the site slopes vary from very steep to nearly flat; the underlying bedrock dictates this topography. Elevations on site range from approximately 48 ft NGVD to 200 ft. NGVD. The site is within several different watersheds as indicated by the topography of Figure 1. Most portions of the site are in the upper reaches of the Mud River, Oyster River, and Trout Brook watersheds. The water quality of the intermittent streams on site is expected to be high due to the expanse of undisturbed forest.

Surficial Geology and Soils

Southern New England was overlain by glacial ice as recently as 12,000-15,000 years ago. The materials that the glaciers deposited over top the local bedrock determine the surficial geology of the region and of the Preserve site. Glacial deposits are generally divided into three categories: glacial till (un-stratified sand, silt and rock), glaciofluvial (water sorted, stratified sand and gravel), and glaciolacustrine (stratified sand, silt and clay that settled out in lakebeds). The types of glacial deposit present on the Preserve site are glacial till, glacial outwash and a small area of alluvium, with till predominating, The soils formed in till deposits typically have sandy loam to silt loam textures and can be very shallow to bedrock, as evidenced by the many outcrops on the site. The slopes are variable throughout the site and lead to differences in soil mapping classification as listed by the NRCS. Table 1 is a summary table of the soils found on the site. Note that Ridgebury, Leicester, and Whitman soils are the predominant soil type of on site wetlands, and is described in Table 1.

Table 1 - Soil Types and Properties at the Preserve Site

Soil Series	Parent Material	Drainage Class	Texture/Characteristics
*Adrian	Organic Matter	Very Poorly Drained	Very Rocky Fine Sandy Loam

Canton and Charlton	Glacial Till	Well Drained	Very Rocky Fine Sandy Loam
Carlisle	Organic Matter	Very Poorly Drained	Very Stony Fine Sandy Loam
Charlton-Hollis	Glacial Till	Well to Somewhat Excessively Drained	Loamy
Hinckley	Glacial Outwash	Excessively Drained	Sandy & Gravelly
Hollis-Charlton	Glacial Till	Well to Somewhat Excessively Drained	Loamy
Hollis	Glacial Till	Well to Somewhat Excessively Drained	Loamy
*Leicester, Ridgebury, Whitman	Glacial Till	Somewhat Poorly to Very Poorly Drained	Very Stony Complex
Paxton and Montauk	Glacial Till	Well Drained	Loamy
*Saco	Alluvium	Very Poorly Drained	Sandy and Gravelly
Sudbury	Glacial Outwash	Moderately Well to Somewhat Poorly Drained	Sandy and Gravelly
*Walpole	Glacial Outwash	Poorly Drained	Sandy & Gravelly
Woodbridge	Glacial Till	Moderately Well Drained	Loamy

* Wetland soil types

The Adrian and Carlisle soils are found in the larger wetlands such as 19 and 35. These soils form in areas where water persists throughout the year and anaerobic conditions lead to the accumulation of slowly decaying organic matter.

The Hollis, Charlton/ and Canton soils, as shown in Table 1, are quite similar. They are all formed in glacial till of similar texture and composition. The primary difference between the soil map units is the depth to bedrock and small textural variations.. Areas that include Hollis soils are quite shallow to bedrock. Canton and Charlton soils are deeper typically have more than 2 feet of soil over bedrock. In the past these soils were used for agricultural purposes but on the site they are currently wooded support a variety of mixed hardwoods.

Table 2 Summary of Primary Wetland Functions

Wetland ID	Groundwater Recharge/Discharge	Flood flow Alteration	Fish and Shellfish Habitat	Sediment/Toxicant Retention	Nutrient Removal	Production Export	Sediment/Shoreline Stabilization	Wildlife Habitat
1	X	X				X		X
2								X
3	X	X		X	X	X		X
4	X	X				X		X
5	X	X				X		X
6	X					X		X
7	X			X				X
8	X	X		X	X			X
9								X
10	X	X				X		X
11	X	X		X	X	X		X
12	X							X
13	X			X	X	X		X
14	X			X	X	X		X
15	X	X				X		X
16	X	X	X	X	X	X	X	X
17	X	X		X	X			X
18	X	X			X	X	X	X
19	X	X	X			X	X	X
20	X							X
21	X							X
22	X	X				X		X
23								X
24								X

ing wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Mineral, fine grained, or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream, or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation is present by dense vegetation.
17. Other

NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands, and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers or estuaries.

CONSIDERATIONS/QUALIFIERS

1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.
4. Potential sources of excess nutrients present in the watershed above the wetland.
5. Wetland saturated for most of the season. Ponded water is present in the wetland.
6. Deep organic/sediment deposits are present.
7. Slowly drained mineral, fine grained, or organic soils, are present.
8. Dense vegetation is present.
9. Emergent vegetation and/or dense woody stems are dominant.
10. Aquatic diversity/abundance sufficient to utilize nutrients.
11. Opportunity for nutrient attenuation exists.
12. Vegetation diversity/abundance sufficient to utilize nutrients.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

13. Waterflow through this wetland is diffuse.
14. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
15. Water moves slowly through this wetland.
16. Other

PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for man or other living organisms.

CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland
3. Economically or commercially used products found in this wetland.

4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. "Flushing" of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants which are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/SHORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize stream banks and shorelines against erosion.

CONSIDERATIONS/QUALIFIERS

1. Indications of erosion, siltation present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
5. A distinct step between the open waterbody or stream and the adjacent land exists (i.e. sharp bank) with dense roots throughout.
6. Wide wetland (>10') bordering watercourse, lake, or pond.
7. High flow velocities in the wetland.
8. Potential sediment sources present upstream.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy absorbing emergents and/or shrubs bordering watercourse, lake or pond.
14. Vegetation comprised of large trees and shrubs which withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation comprised of dense resilient herbaceous layer which stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other

WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.[2]

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g.brushland, wood land, active farmland, or idle land) at least 500 feet in width.
6. Wetland contiguous with other wetland systems connected by watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.

9. Wetland exhibits a high degree of interspersion of vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g. tree/shrub/vine /grasses/mosses/etc.)
16. Plant/animal indicator species present.
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife, and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species present.
23. Signs of wildlife habitat enhancement present (birdhouses, nesting boxes, food sources, etc.).
24. Other

RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.

CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake, associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research.

CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.

6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site available.
12. Direct access to pond or lake at potential educational site available.
13. No known safety hazards within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland primarily urban.
2. Upland surrounding wetland developing rapidly.
3. More than 3 acres of shallow permanent open water occur in wetlands (less than 6.6 feet deep) including streams .
4. Three or more wetland classes present.
5. Deep and/or shallow marsh, or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occurring in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake at potential educational site.
12. Two or more wetland classes visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants, or plants which turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings occur within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures or associated features occur within the wetland.
24. Wetland contains critical habitat for a state or federally listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.

28. Wetland has local significance because it has biological, geological, or other features which are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.

CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes visible from primary viewing locations.
2. Emergent marsh and/or open water visible from primary viewing locations.
3. Diversity of vegetation species visible from primary viewing locations.
4. Wetland dominated by flowering plants, or plants which turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ES ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.
3. Other

Appendix B
Assessment Data

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use wooded & powerlines Distance to nearest roadway or other development 0' (power line)

Dominant wetland systems present PFO PEM Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RCK Date 2008

Wetland Impact: NA

Type_____ Area_____

Evaluation based on:

Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N ✓

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 3, 4, 5, 7, 11, 13	✓	Seeps noted in field
Floodflow Alteration	✓		2, 3, 5, 6, 7, 8, 15, 18	✓	Basin shaped wetland
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1, 2, 4, 6, 10, 12		Powerlines = small source
Nutrient Removal	✓		4, 5, 7, 10, 14		"
Production Export			1, 2, 4, 8, 10, 18	✓	
Sediment/Shoreline Stabilization	✓		1, 2, 3, 4, 6,		Minor function along powerlines
Wildlife Habitat	✓		4, 5, 6, 7, 8, 11, 14, 16, 17	✓	Powerlines add diversity
Recreation	✓		4, 5, 7		Remote
Educational Scientific Value	✓		5,		Remote
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		1, 2, 3, 6, 7, 8, 10, 11	✓	Good views from surrounding hill sides
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 1

VEGETATIVE

Trees

- Eastern Hemlock *(Tsuga Canadensis)*
- Red Maple *(Acer rubrum)*
- Red Oak *(Quercus rubra)*
- Tree-of-Heaven *(Ailanthus altissima)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- Japanese Barberry (Berberis thunbergii)
- Mapleleaf Viburnum *(Viburnum acerifolium)*
- Red Maple *(Acer rubrum)*
- Sassafras *(Sassafras albidum)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Tulip Poplar *(Liriodendron tulipifera)*
- Wild Sarsaparilla *(Aralia nudicaulis)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Burr-Reed *(Sparganium sp.)*
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea)*
- Hay-scented Fern *(Dennstaedtia punctilobula)*
- Jewelweed *(Impatiens capensis)*
- Lady fern *(Athyrium Filix-femina)*
- New York Fern *(Thelypteris noveboracensis)*
- Partridgeberry *(Mitchella repens)*
- Poison Ivy *(Rhus radicans)*
- Rush *(Juncus Canadensis)*
- Reed *(Phragmites communis)*
- Sedge *(Carex crinita)*
- Sedge *(Carex folliculata)*
- Sedge *(Carex intumescens)*
- Sedge *(Carex lurida)*
- Sensitive Fern *(Onoclea sensibili)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Soft Rush *(Juncus effuses)*
- Sphagnum Moss *(Sphagnum sp.)*
- Steeplebush *(Spiraea tomentosa)*
- Tussock Sedge *(Carex stricta)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Violet *(Violaceae sp.)*
- Water-pennywort *(Hydrocotyle americana)*
- Wool Grass *(Scirpus cyperinus)*

WILDLIFE

Amphibians

- Wood Frog (juvenile) *(Rana sylvatica)*

Birds

- Rufous-sided Towhee *(Pipilo erythrophthalmus)*
- White Breasted? Nut Hatch *(Sitta carolinensis)*

Invertebrates

- None Identified

Mammals

- Chipmunk *(Tamias striatus)*

COMMENTS

- PF01 PEM
- Groundwater discharge, water course forms where wetland narrows
- :

Wetland 1

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development 600'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? yes If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 2

Latitude_____ Longitude_____

Prepared by:_____ Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		2, 4, 5, 8, 15		Wetland is small bowl, permits water infiltration
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export		✓			
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓			✓	Function tied to large, nearby wetland (#1)
Recreation		✓			
Educational Scientific Value		✓			
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics		✓			
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 2

VEGETATIVE

Trees

- Blackgum *(Nyssa sylvatica)*
- Eastern Hemlock *(Tsuga Canadensis)*
- Red Maple *(Acer rubrum)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Sweet Pepper Bush *(Clethra alnifolia)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea)*
- Princess Pine *(Lycopodium sp.)*
- Royal Fern *(Osmunda regalis)*
- Sedge *(Carex lurida)*

WILDLIFE

Amphibians

- Redback Salamander *(Plethodon cinereus)*

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- None Identified

COMMENTS

- PF01
- Vernal Pool Characteristics: Pool approximately 20' x 30', deep basin-shaped depression, water stained leaves and tree trunks.
- :

Wetland 2

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO * altered Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Road, residential, wooded Distance to nearest roadway or other development 0'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system?_____ If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 3

Latitude_____ Longitude_____

Prepared by: RCR Date [illegible]

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 4, 5, 10, 11, 15, 16,	✓	wetland is @ till / outwash contact
Floodflow Alteration	✓		2, 3, 5, 6, 7, 8, 11, 15,	✓	wetland is basin shaped
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1, 2, 4, 6, 8,	✓	Road is source
Nutrient Removal	✓		3, 4, 5, 7, 10, 13, 14	✓	Road is source
Production Export	✓		1, 2, 4, 10,	✓	wetland has outlet
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		5, 7, 8, 11, 16, 20,	✓	
Recreation	✓		4, 5, 10, 11,		wetland access is good
Educational Scientific Value	✓		3, 5, 10,		"
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		4, 6, 8, 9,		
ES Endangered Species Habitat					
Other					

*Refer to back up list of numbered considerations.

Notes:

SPECIES LIST - WETLAND 3

VEGETATIVE

Trees

- Red Maple *(Acer rubrum)*

Shrubs/Saplings

- Arrow-wood Viburnum (Viburnum recognitum)
- High-Bush Blueberry *(Vaccinium corymbosum)*
- Japanese Bar Berry *(Berberis thunbergii)*
- Mapleleaf Viburnum *(Viburnum acerifolium)*
- Red Maple *(Acer rubrum)*
- Sassafras *(Sassafras albidum)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- White Elm (Ulmus americana L.)
- Winterberry Holly (Ilex verticillata)
- Witch Hazel *(Hamamelis virginiana)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Canada Mayflower *(Maianthemum canadense)*
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea)*
- Jack-In-The-Pulpit (Arisaema sp.)
- New York Fern *(Thelypteris noveboracensis)*
- Poison Ivy *(Rhus radicans)*
- Royal Fern *(Osmunda regalis)*
- Sensitive Fern *(Onoclea sensibili)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Sphagnum Moss *(Sphagnum sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Violet *(Violaceae sp.)*

WILDLIFE

Amphibians

- Redback Salamander *(Plethodon cinereus)*

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PF01, floodflow alteration
- Vernal Pool Characteristics: basin-shaped depression, water-stained leaves and tree trunks
- :

Wetland 3

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~600'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 1

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 5, 7, 13, 15	✓	Seeps present along steep slopes
Floodflow Alteration	✓		2, 3, 5, 6, 7, 13, 14, 18	✓	Lower part of wetland broad & flat.
Fish and Shellfish Habitat					
Sediment/Toxicant Retention		✓	3, 4, 6, 8, 10,		Wetland has capacity for this function, but no sources noted
Nutrient Removal		✓	3, 6, 7, 8, 9, 10, 13, 15		Wetland has capacity for this function but no sources of nutrients noted.
Production Export	✓		1, 2, 4, 7, 10, 11, 12, 14	✓	Export evident via intermittent watercourse
Sediment/Shoreline Stabilization	✓		2, 5, 6, 9, 12		Minor stabilization along intermittent watercourse channel
Wildlife Habitat	✓		1, 2, 3, 4, 5, 6, 7, 8, 11, 16, 17, 22,	✓	Wetland is large & part of a large habitat block – largely undisturbed
Recreation	✓		4, 5, 6,		Wetland is not very accessible
Educational Scientific Value	✓		2, 5, 13		Poor access, lacks diversity
Uniqueness/Heritage		✓			Uniqueness lacking
Visual Quality/Aesthetics	✓		3, 6, 7, 8, 10		Wetland is scenic but is remote and lacks visual diversity
ES Endangered Species Habitat		✓			
Other					

Notes:

*Refer to back up list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? Yes or a "habitat island"?_____

Adjacent land use Road / residential / woods Distance to nearest roadway or other development ~10ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 8

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 5, 10, 15	✓	
Floodflow Alteration	✓		2, 3, 5, 6, 7, 9, 15	✓	Basin shaped area retains water
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1, 2, 4, 5, 6, 8, 9,	✓	Ingham Hill Rd is source
Nutrient Removal	✓		4, 5, 7, 12	✓	Ingham Hill Rd is source
Production Export	✓		1, 2, 9, 14		Export limited; wetland confined by road
Sediment/Shoreline Stabilization	✓	✓			No permanent shoreline
Wildlife Habitat *	✓		5, 7, 8, 11, 16, 17, 26,	✓	Though disturbed by road, wetland is part of large habitat block
Recreation	✓		4, 5,		
Educational Scientific Value	✓		5, 10,		Limited habitat types are available
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		6, 8, 9		
ES Endangered Species Habitat					
Other					

*Refer to back up list of numbered considerations.

Notes: Has pond breeding amphibian habitat

SPECIES LIST - WETLAND 8

VEGETATIVE

Trees

- Beech *(Fagus grandifolia)*
- Red Maple *(Acer rubrum)*
- Red Oak *(Quercus rubra)*

Shrubs/Saplings

- Arrow-wood Viburnum (Viburnum recognitum)
- Beech *(Fagus grandifolia)*
- High-Bush Blueberry *(Vaccinium corymbosum)*
- Japanese Bar Berry (Berberis thunbergii)
- Raspberry *(Rubus sp)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Winterberry Holly (Ilex verticillata)

Herbaceous

- Christmas Fern (Polystichum acrostichoides)
- New York Fern *(Thelypteris noveboracensis)*
- Royal Fern *(Osmunda Regalis)*
- Sedge *(Carex intumesense)*
- Sensitive Fern *(Onoclea sensibili)*
- Sphagnum Moss *(Sphagnum sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Violet *(Violaceae)*

WILDLIFE

Amphibians

- None Identified

Birds

- Red-eyed Vireo *(Vireo olivaceus)*

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- Vernal Pool characteristics: basin shaped depression, water-stained leaves and tree trunks
- PF01, floodflow alteration
- :

Wetland 8

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~350'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 9

Latitude_____ Longitude_____

Prepared by: RCR Date 2003

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 5, 7, 10, 12		Has minor G.W. discharge
Floodflow Alteration	✓		2, 3, 5, 7, 15		Wetland lacks significant storage capacity
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			No sed tox sources nearby
Nutrient Removal		✓			No excess nutrient sources nearby
Production Export	✓		1, 4,		Little detrites present for export
Sediment/Shoreline Stabilization		✓			No shoreline present
Wildlife Habitat	✓		1, 3, 4, 5, 7, 8, 11, R,	✓	Wetland part of large habitat block
Recreation	✓		4, 5,		Wetland suitable for passive recreation
Educational Scientific Value	✓		2, 4, 5, 10,		
Uniqueness/Heritage		✓	R,		Lacks unique aspects
Visual Quality/Aesthetics	✓		1, 5, 7, 8, 10, 11, 12		Wetland has appealing open sightline
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

Wetland 10

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use wooded, railroad, power lines Distance to nearest roadway or other development -0-

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 11

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 3, 4, 5, 7, 11, 16,	✓	Wetland discharges to sand & gravel aquifer
Floodflow Alteration	✓		2, 3, 5, 6, 7, 9, 13,	✓	Wetland is large w/ broad flat areas
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1, 2, 4, 5, 6, 8, 9, 10, 12, 13, 14	✓	Powerlines, railroad are sources
Nutrient Removal	✓		4, 5, 7, 8, 9, 14,	✓	Powerlines, railroad are sources
Production Export	✓		1, 2, 4, 7, 10,	✓	Detrites exported via watercourse
Sediment/Shoreline Stabilization	✓		2, 3, 6, 9,		Minor function; small watercourse
Wildlife Habitat	✓		5, 7, 8, 11, 13, 16,	✓	Wetland is part of large habitat block
Recreation	✓		4, 5, 7,		ATV use noted.
Educational Scientific Value	✓		5, 10,		
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓			✓	Excellent view from hillside to the west
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 11

VEGETATIVE

Trees

- Eastern Hemlock *(Tsuga Canadensis)*
- Red Maple *(Acer rubrum)*
- White Oak *(Quercus alba)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Mountain Laurel *(Kalmia latifolia L.)*
- Sassafras *(Sassafras albidum)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Tulip Poplar (Liriodendron tulipifera L.)
- Winterberry Holly *(Ilex laevigata)*

Herbaceous

- Arrow-leafed Tearthumb *(Polygonum arifolium)*
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea)*
- Dark Green Bulrush *(Scirpus atrovirens)*
- Deer-Tongue Grass *(Panicum clandestinum)*
- False Hellebore *(Veratrum viride)*
- False Nettle *(Boehmeria cylindrical)*
- Jewelweed *(Impatiens capensis)*
- Long-awned Wood Grass *(Brachyelytrum erectum)*
- Marsh Fern *(Thelypteris palustris)*
- Mud-plantain *(Alisma triviale)*
- New York Fern *(Thelypteris noveboracensis)*
- Northern Bedstraw *(Galium boreale)*
- Princess Pine *(Lycopodium sp.)*
- Royal Fern *(Osmunda regalis L.)*
- Sensitive Fern *(Onoclea sensibili)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Smaller Enchanter's Nightshade *(Circaea alpina)*
- Soft Rush *(Juncus effuses)*
- Sphagnum Moss *(Sphagnum sp.)*
- Spotted St. Johnswort *(Hypericum punctatum)*
- Violet *(Violaceae sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*

WILDLIFE

Amphibians

- Green Frog *(Rana clamitans melanota)*

Birds

- Black-capped Chickadee *(Poecile atricapillus)*
- Red-eyed Vireo *(Vireo olivaceus)*
- Rufous-sided Towhee *(Pipilo erythrophthalmus)*

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PF01
- Wetland is bisected by a logging road
- Floodflow alteration, ground water recharge/discharge
- A small water course flows through
- :

Wetland 11

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~500 ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? yes If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 12

Latitude_____ Longitude_____

Prepared by: RLR Date 2007

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 5, 7, 9, 10, 11, 12	✓	Wetland is isolated depression; allows infiltration
Floodflow Alteration	✓		2, 3, 5, 6, 7, 15		Wetland is isolated from larger ~~wet~~ systems
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export	✓		1, 2, 4, 7, 14		Export lacking due to lack of good outlet
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat *	✓		1, 3, 4, 5, 7, 8, 11, 13, 17, 20	✓	Wetland part of a large habitat block
Recreation	✓		4, 5, 1		Suited for limited passive recreation
Educational Scientific Value	✓		2, 4, 5, 10		
Uniqueness/Heritage		✓			Lacks unique attributes
Visual Quality/Aesthetics	✓		5, 6, 7, 8, 10		Good constrast to local outcrops
ES Endangered Species Habitat					
Other					

Notes: * Contains pond breeding amphibian habitat

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 12

VEGETATIVE

Trees

- Beech *(Fagus grandifolia)*
- Pin Oak *(Quercus palustris)*
- Red Maple *(Acer rubrum)*
- Sassafras *(Sassafras albidum)*
- Witch Hazel *(Hamamelis virginiana)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- High-Bush Blueberry *(Vaccinium corymbosum)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea*
- Marsh Fern *(Thelypteris palustris)*
- New York Fern *(Thelypteris noveboracensis)*
- Princess Pine *(Lycopodium sp.)*
- Sensitive Fern *(Onoclea sensibili)*
- Sphagnum Moss *(Sphagnum sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*

WILDLIFE

Amphibians

- Green Frog (adult) *(Rana clamitans melanota)*
- Wood Frog *(Rana sylvatica)*

Birds

- None Identified

Invertebrates

- Black Fly *(Simulium)*
- Damsel Fly *(Zygoptera* suborder)
- Dragon Fly *(Anisoptera* suborder)
- Water strider *(Gerris argentatus)*
- Whirligig Beetle *(Gyrindae)*

Mammals

- Chipmunk *(Tamias striatus)*
- White Tailed Deer *(Odocoileus virginianus)*
- Squirrel *(Sciurus carolinensis)*

COMMENTS

- Vernal Pool characteristics: basin shaped depression, water stained leaves and bark on trees, contained approximately six inches of water in late June.
- PF01, floodflow alteration
- :

Wetland 12

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded, powerlines, field Distance to nearest roadway or other development ~200 ft

Dominant wetland systems present RU Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 13

Latitude_____ Longitude_____

Prepared by: RCR Date [illegible]

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 3, 4, 5, 7, 9, 11, 12, 15	✓	Wetland discharges to sand & gravel aquifer
Floodflow Alteration		✓			Wetlands narrow w/ little storage
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1, 2, 4, 6, 8, 10	✓	Powerlines / ATVs are source
Nutrient Removal	✓		4, 7, 12	✓	Powerlines / ATVs are source
Production Export	✓		1, 2, 4, 10, 11	✓	Stream carries detritus down gradient
Sediment/Shoreline Stabilization	✓		1, 2, 3, 5, 7, 9		
Wildlife Habitat	✓		3, 4, 5, 6, 7, 8, 10	✓	Part of large habitat block
Recreation	✓		4, 5		
Educational Scientific Value	✓		2, 4, 5, 10		Limited habitat diversity
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		5, 6, 7, 8, 10, 11		Stream is attractive / steep gradient
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 13 – HIGHLINE RIGHT OF WAY

VEGETATIVE

Trees

- None present

Shrubs/Saplings

- Grape *(Vitis sp.)*
- High-Bush Blueberry *(Vaccinium corymbosum)*
- Raspberry *(Rubous sp.)*
- Spice Bush *(Lindera benzoin)*

Herbaceous

- Arrow-leaved Tearthumb *(Polygonum sagittatum)*
- Cinnamon Fern *(Osmunda cimmamomea*
- Common St. JohnsWort *(Hypericum perforatum)*
- Deer-Tongue Grass *(Panicum clandestunum)*
- Fowl Meadow Grass *(Glyceria striata)*
- Green Briar *(Smilax rotundifolia)*
- Goldenrod *(Compositae sp.)*
- New York Fern *(Thelypteris noveboracensis)*
- Panic Grass *(Pinicum agrostoides)*
- Princess Pine *(Lycopodium sp.)*
- Sedge *(Carex crinita)*
- Sedge *(Carex lurida)*
- Sensitive Fern *(Onoclea sensibili)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Soft Rush *(Juncus effuses)*
- Sphagnum Moss *(Sphagnum sp.)*
- Spinulose Wood Fern *(Dryopteris spinulosa)*
- Steeplebush *(Spiraea tomentosa)*
- Strawberry *(Fragaria sp.)*
- Violet *(Violaceae sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Wild Mint *(Mentha arvensis)*

WILDLIFE

Amphibians

- Green Frog *(Rana clamitans melanota)*

Birds

- None Identified

Invertebrates

- Grasshopper

Mammals

- Chipmunk *(Tamias striatus)*
- White Tailed Deer *(Odocoileus virginianus)*
- Squirrel *(Sciurus carolinensis)*

COMMENTS

- Open area beneath power lines, floodflow alteration
- :

Wetland 13

Wetland 14

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development 0' (powerline)

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland?_____ Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 15

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1,2) 5) 7) 9) 10) 12)	✓	wetland has shallow GW discharge
Floodflow Alteration	✓		2) 3, 5) 6; 7) 13, 14) 15	✓	wetland has good area to store water
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1; 2) 4) 5) 6) 8) 10)		small exposure to powerlines / ATVs
Nutrient Removal	✓		4) 7) 13; 14		small exposure to powerlines / ATVs
Production Export	✓		1) 2) 4)	✓	Detrites is transported downstream
Sediment/Shoreline Stabilization		✓			No shoreline
Wildlife Habitat	✓		3) 4) 5) 6) 7) 8) 11) 17)	✓	wetland is part of large habitat block
Recreation	✓		4, 5)		
Educational Scientific Value	✓		2) 4) 5, 10		
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		1, 2) 10, 11		
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

Wetland 15

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Road, wooded Distance to nearest roadway or other development 0 ft

Dominant wetland systems present POW, PSS, PFO, RU Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top/middle

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 16

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 3, 4, 7, 8, 9, 11, 15	✓	wetland discharges to sand & gravel aquifer
Floodflow Alteration	✓		2, 3, 5, 6, 7, 8, 9, 15, 16	✓	Pond provides flood storage
Fish and Shellfish Habitat	✓		1, 2, 4, 5, 7, 8, 9, 10, 12, 16	✓	Pond has sunfish population
Sediment/Toxicant Retention	✓		1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 14, 15	✓	Ingham Hill Rd is source
Nutrient Removal	✓		2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15	✓	Ingham Hill Rd is source
Production Export	✓		1, 2, 4, 6, 7, 8, 9, 10, 11, 12	✓	Export somewhat limited by outlet pipe
Sediment/Shoreline Stabilization	✓		2, 3, 5, 6, 9, 12, 14	✓	Shoreline is well anchored by vegetation
Wildlife Habitat	✓		5, 7, 8, 9, 11, 13, 14, 15, 19, 20-22	✓	Good habitat diversity
Recreation	✓		2, 4,		Limited water based recreation, Good for passive rec.
Educational Scientific Value	✓		3, 5, 8, 10, 12,		Good habitat diversity
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		1, 2, 6, 8,		Primary view point is @ road.
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

Wetland 17

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~100ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top/mid

How many tributaries contribute to the wetland?_____ Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 19

Latitude_____ Longitude_____

Prepared by: RJR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 4, 5, 7, 13, 13, 14,	✓	Wetland has large surface area interacting w/ local water table
Floodflow Alteration	✓		2, 3, 8, 6, 7, 8, 16, 18	✓	wetland has large storage in various areas
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1, 2, 3, 4-9, 10, 11, 12, 14, 16		Wetland has capacity but negligible sources
Nutrient Removal	✓		3-8, 9, 10, 11, 2 13, 15		wetland has capacity but negligible sources
Production Export	✓		1, 2, 4, 7, 10, 11	✓	Detritus carried downstream
Sediment/Shoreline Stabilization	✓		1, 2, 3, 5, 6, 9, 12, 13, 14,	✓	streambank is well stabilized
Wildlife Habitat	✓		1, 2, 3, 4, 5, 6, 7, 8, 13, 14, 15, 16, 20	✓	Good habitat diversity
Recreation	✓		4, 5, 7,	✓	Neighbors noted hiking / hunting
Educational Scientific Value	✓		2, 3, 5,		site is remote for ed. purposes
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		1, 5, 6, 7, 8, 11	✓	
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 18

VEGETATIVE

Trees

- Ash *(Fraxinus sp.)*
- Beech *(Fagus grandifolia)*
- Red Maple *(A cer rubrum)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- High Bush Blueberry *(Vaccinium corymbosum)*
- Japanese Barberry *(Berberis thunbergii DC.)*
- Mountain Laurel *(Kalmia latifolia L.)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Winterberry Holly *(Ilex sp.)*

Herbaceous

- Burr-Reed (Sparganium sp.)
- Canada May flower *(Maianthemum canadense)*
- Cinnamon Fern *(Osmunda cimmamomea*
- False Hellebore *(Veratrum viride)*
- Mad-Dog Skullcap *(Scutellaria lateriflora)*
- New York Fern *(Thelypteris noveboracensis)*
- Princess Pine *(Lycopodium sp.)*
- Sedge *(Carex lurida)*
- Sedge *(Carex intumescens)*
- Sedge (Sedge sp.)
- Sensitive Fern *(Onoclea sensibili)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Sphagnum Moss *(Sphagnum sp.)*
- Violet *(Violaceae sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Water-pennywort *(Hydrocotyle americana)*

WILDLIFE

Amphibians

- Green Frog (Adult) *(Rana clamitans melanota)*
- Wood Frog (adult) *(Rana sylvatica)*
- Wood Frog (juvenile) *(Rana sylvatica)*

Birds

- Veery Catharus fuscescens

Invertebrates

- Water Strider *(Gerris argentatus)*

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- Stream, ground-water discharge, floodflow alteration.
- :

Wetland 18

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No (altered, dam) Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~200ft

Dominant wetland systems present PFO, POW, RU, PSS Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top/middle

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 17

Latitude_____ Longitude_____

Prepared by: RCP Date [illegible]

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1,2,5,7,9,12,13,15	✓	Many seeps noted
Floodflow Alteration	✓		2,3,5,6,7,16	✓	-Pond w/ dam provides storage Broad areas of wetland provide storage
Fish and Shellfish Habitat	✓		1,2,3,4,5,8,9,10,12,16,17	✓	-Pond contains fish, lower reaches of stream may be seasonal habitat
Sediment/Toxicant Retention	✓		3,4,5,6,8,10,12		Sources lacking
Nutrient Removal	✓		2,3,5,6,7,8,9,10,11,12,14		Sources lacking
Production Export	✓		1,2,4,5,6,7,8,9,11,12	✓	Significant areas below Pequot Swamp Pond send detritus down stream.
Sediment/Shoreline Stabilization	✓		3,5,9,12,13,14	✓	Shores have good vegetation
Wildlife Habitat *	✓		1-8,9,11-21	✓	Excellent diversity of cover types
Recreation	✓		2,4,5,6	✓	Fishing limited, good passive rec. spot
Educational Scientific Value	✓		2,3,4,5,10,12	✓	
Uniqueness/Heritage	✓		3,4,5,6,7,13,14,15,16,17,19,23	✓	Pond is unique on site; has old dam
Visual Quality/Aesthetics	✓		1-8,10,12,23	✓	Pond has excellent aesthetics.
ES Endangered Species Habitat					
Other					

Notes: * provides habitat for pond breeding amphibians

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 19 - VERNAL POOL

VEGETATIVE

Trees

- Blackgum *(Nyssa sylvatica)*
- Red Maple *(A cer rubrum)*
- Red Oak *(Quercus rubra)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Blackgum *(Nyssa sylvatica)*
- High Bush Blueberry *(Vaccinium corymbosum)*
- Maleberry *(Lyonia ligustrina)*
- Red Maple *(A cer rubrum)*
- Rosebay Rhododendron *(Rhododendron maximum)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Winterberry Holly *(Ilex sp.)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea*
- False Hellebore *(Veratrum viride)*
- Green Briar *(Smilax rotundifolia)*
- Jack-In-The-Pulpit *(Arisaema atrorubens)*
- Marsh Fern *(Thelypteris palustris)*
- Royal Fern *(Osmunda regalis)*
- Sedge (Carex intumescens)
- Sensitive Fern *(Onoclea sensibili)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Sphagnum Moss *(Sphagnum sp.)*
- Tussock Sedge *(Carex stricta)*

WILDLIFE

Amphibians

- Finger Nail Clam *(Sphaerium sp.)*
-
- Spring Peeper (juvenile) *(Pseudacris crucifer)*
- Wood Frog (adult) *(Rana sylvatica)*
- Wood Frog (juvenile) *(Rana sylvatica)*

Birds

- None Identified

Invertebrates

- Deer Fly *(Chrysops* sp.)

Mammals

- Chipmunk *(Tamias striatus)*
- White Tailed Deer *(Odocoileus virginianus)*
- Squirrel (*Sciurus carolinensis*)

COMMENTS

- PF01 C/E
- Vernal Pool characteristics: dense leaf litter, spent egg masses
-

SPECIES LIST - WETLAND 19 – PEQUOT SWAMP POND

VEGETATIVE

Trees

- Red Maple *(A cer rubrum)*

Shrubs/Saplings

- Japanese Bar Berry *(Berberis thunbergii)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Tulip Poplar (Liriodendron tulipifera)

Herbaceous

- Canada May Flower *(Maianthemum canadense)*
- Grape
- Pond-lily *(Nymphaea odorata)*
- New York Fern *(Thelypteris noveboracensis)*
- Royal Fern *(Osmunda regalis)*
- Sensitive Fern *(Onoclea sensibili)*
- Soft Rush *(Juncus effusus)*
- Swamp Loosestrife *(Decodon verticillatus)*
- Wool Grass *(Scirpus cyperinus)*

WILDLIFE

Amphibians

- Bull Frog *(Rana catesbeiana)*

Birds

- None identified *Damsel fly*

Invertebrates

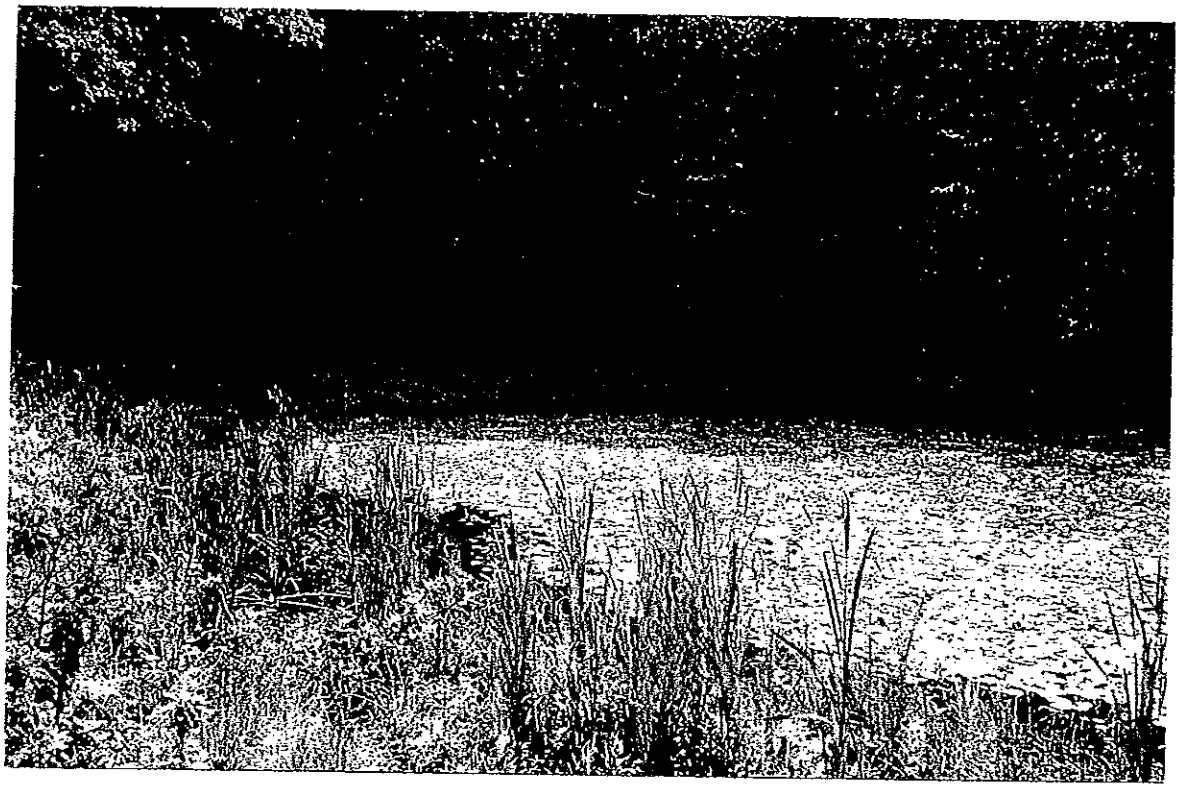
- Dragon fly

Mammals

- Chipmunk *(Tamias striatus)*

COMMENTS

- PF01 C/E
- Vernal Pool characteristics: dense leaf litter, spent egg masses
-



Wetland 19

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development 7100ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? yes If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		5, 13	✓	seeps noted
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export		✓			
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		1, 3, 4, 5, 7, 8	✓	Valued as part of large habitat block
Recreation		✓			
Educational Scientific Value		✓			
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics		✓			
ES Endangered Species Habitat					
Other					

*Refer to back up list of numbered considerations.

Notes:

SPECIES LIST - WETLAND 20

VEGETATIVE

Trees

- Beech *(Fagus grandifolia)*
- Black Birch *(Betula lenta L.)*
- Red Maple *(Acer rubrum)*
- Red Oak *(Quercus coccinea)*

Shrubs/Saplings

- Mapleleaf Viburnum *(Viburnum acerifolium)*
- Mountain Laurel *(Kalmia latifolia)*
- Witch Hazel *(Hammamelis virginiana)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea)*
- Green Briar *(Smilax rotundifolia)*
- New York Fern *(Thelypteris noveboracensis)*

WILDLIFE

Amphibians

- None Identified

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- Chipmunk *(Tamias striatus)*
- White Tailed Deer *(Odocoileus virginianus)*
- Squirrel (*Sciurus carolinensis*)

COMMENTS

- PF01
- No water course or water
- Low species diversity
- :

Wetland 20

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use wooded Distance to nearest roadway or other development >100ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? yes If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RLR Date [illegible]

Wetland Impact:
Type_____ Area_____

Evaluation based on: ✓
Office ✓ Field_____

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		5,15	✓	wetland provides infiltration
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export		✓			
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat *	✓		1,3,4,5,7,8,11,20	✓	wetland is part of large habitat block
Recreation	✓		4,5		
Educational Scientific Value	✓		2,5,10		
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		5,6,7,8,11,12		
ES Endangered Species Habitat					
Other					

*Refer to back up list of numbered considerations.

Notes: *Has pond breeding amphibian habitat

SPECIES LIST - WETLAND 21

VEGETATIVE

Trees

- Blackgum *(Nyssa sylvatica)*
- Red Maple *(Acer rubrum)*

Shrubs/Saplings

- High Bush Blueberry *(Vaccinium corymbosum)*
- Sweet Pepper Bush *(Clethra alnifolia)*

Herbaceous

- Canada Mayflower *(Maianthemum canadense)*
- New York Fern *(Thelypteris noveboracensis)*
- Green Briar *(Smilax rotundifolia)*
- Royal Fern *(osmunda regalis L.)*
- Marsh Fern *(Thelypteris palustris)*
- Sensitive Fern *(Onoclea sensibilis L)*

WILDLIFE

Amphibians

- None Identified

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- Chipmunk *(Tamias striatus)*
- Squirrel *(Sciurus carolinensis)*
- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- Open under story – sunlight reaches the forest floor
- July 1, 2002 – no standing water
- :

Wetland 21

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~700'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 22

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1,2,5,7,9,10,12	✓	
Floodflow Alteration	✓		2,3,5,6,7,14,15	✓	site has areas of ponding/retention
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export	✓		1,2,3,7,10	✓	Provides detritus to down stream systems
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat *	✓		1-5,7,8,11,13,17,20	✓	Wetland is part of large habitat block
Recreation	✓		4,5		
Educational Scientific Value	✓		2,4,5,10		
Uniqueness/Heritage		✓	~~7,8,10,11~~		
Visual Quality/Aesthetics	✓		7,8,10,11		
ES Endangered Species Habitat					
Other					

Notes: * Wetland has pond breeding amphibian habitat

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 22

VEGETATIVE

Trees

- Beech *(Fagus grandifolia)*
- Iron Wood *(Ostrya virginiana)*
- Red Maple *(Acer rubrum)*
- Red Oak *(Quercus coccinea)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- High-Bush Blueberry *(Vaccinium corymbosum)*
- Mountain Laurel *(Kalmia latifolia)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Tulip Poplar *(Liriodendron tulipifera)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Canada May flower *(Maianthemum canadense)*
- Cinnamon Fern *(Osmunda cimnamomea)*
- Green Briar *(Smilax rotundifolia)*
- Marsh Fern *(Thelypteris palustris)*
- New York Fern *(Thelypteris noveboracensis)*
- Partridgeberry *(Mitchella repens)*
- Princess Pine *(Lycopodium sp.)*
- Royal Fern *(Osmunda regalis)*
- Sedge *(Carex intumescens)*
- Sedge *(Sedge sp.)*
- Sensitive Fern *(Onoclea sensibili)*
- Sphagnum Moss *(Sphagnum sp.)*
- Violet *(Violaceae sp.)*

WILDLIFE

Amphibians

- Marbled Salamander *(Ambystoma opacum)*
- Wood Frog (adult) *(Rana sylvatica)*
- Wood Frog (juvenile) *(Rana sylvatica)*

Birds

- None Identified

Invertebrates

- Damsel Fly *(Zygoptera* suborder)

Mammals

- Chipmunk *(Tamias striatus)*

COMMENTS

- PF01, ground water discharge, floodflow alteration.
- Vernal Pool Characteristics: water stained leaves and tree trunks, basin shaped depression.
- Marbled Salamander was found in upland, adjacent to wetland
-

Wetland 22

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~1500'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge		✓			
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export		✓			
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		1, 3, 4, 5, 7, 8	✓	This wetland contributes to the overall wildlife habitat on the site
Recreation		✓			
Educational Scientific Value		✓			
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics		✓			
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 23

VEGETATIVE

Trees

- Red Maple *(A cer rubrum)*
- Red Oak *(Quercus rubra)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- Red Maple *(A cer rubrum)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea)*
- Hay-scented Fern *(Dennstaedtia punctilobula)*
- Hog-Peanut *(Amphicarpa bracteata)*
- Mud-Plantains *(Heteranthera)*
- New York Fern *(Thelypteris noveboracensis)*
- Northern Bedstraw *(Galium boreale)*
- Rattlesnake-Grass *(Glyceria Canadensis)*
- Sedge *(Carex sp.)*
- Sensitive Fern *(Onoclea sensibili)*
- Violet *(Violaceae sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*

WILDLIFE

Amphibians

- None Identified

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- Small area – no defined depression
- An intermittent water course exits this wetland
- :

Wetland 23

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~1400'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland?_____ Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office_____ Field_____

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge		✓			Small size of wetland limits function
Floodflow Alteration		✓			small size
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			No sources
Nutrient Removal		✓			No sources
Production Export		✓			
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat *	✓		1, 3, 4, 5, 7, 8, 11,	✓	Valued as part of overall block of habitat
Recreation		✓			
Educational Scientific Value		✓			
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics		✓			
ES Endangered Species Habitat					
Other					

Notes: * Has pond breeding amphibian habitat

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 24

VEGETATIVE

Trees

- Red Maple *(Acer rubrum)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- Spice Bush *(Lindera benzoin)*
- Winterberry Holly *(Iiex laevigata)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea*
- Marsh Fern *(Thelypteris palustris)*
- New York Fern *(Thelypteris noveboracensis)*
- Sedge *(Carex intumescens)*
- Sensitive Fern *(Onoclea sensibili)*
- Sphagnum Moss *(Sphagnum sp.)*

WILDLIFE

Amphibians

- Desiccating egg masses
- Wood Frog (juvenile) *(Rana sylvatica)*

Birds

- None Identified

Invertebrates

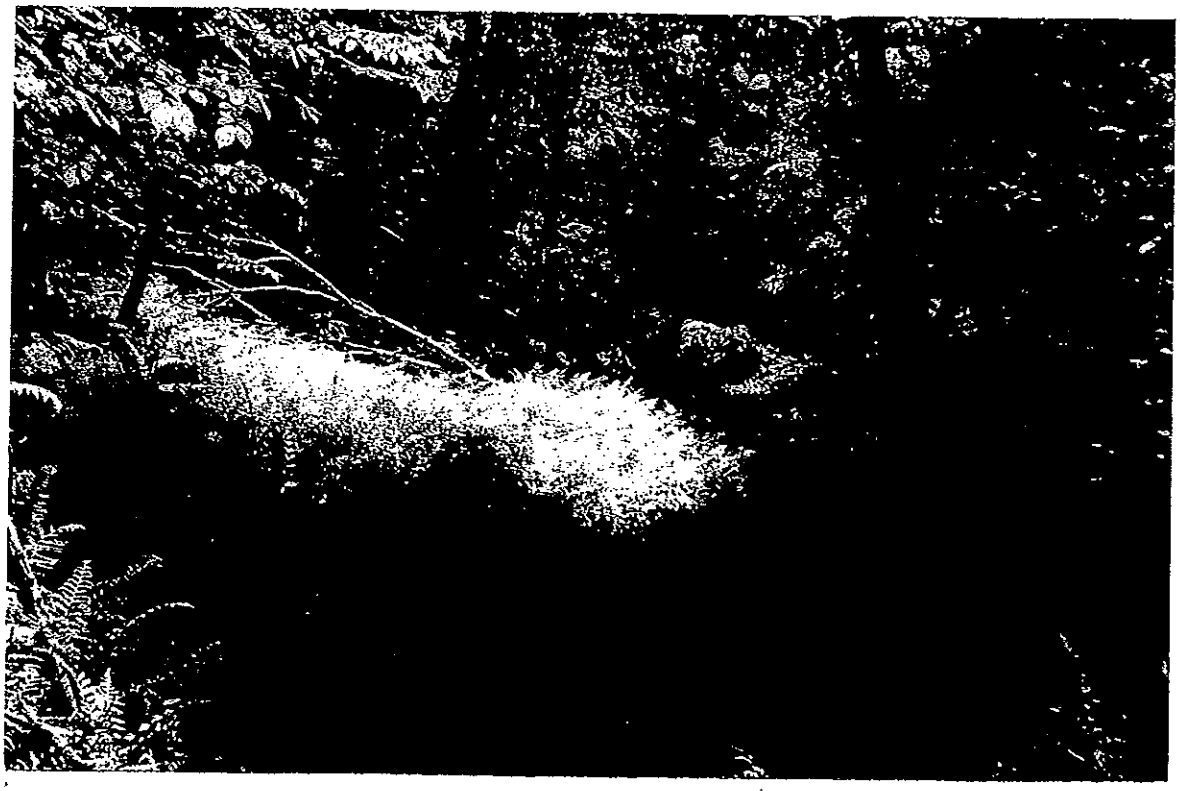
- Damsel Fly *(Zygoptera* suborder)

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- Vernal pool characteristics: basin-shaped depression, water stained leaves and tree trunks.
- An intermittent water course enters and exits the wetland
- Open understory, visual quality/aesthetics
-
- :



Wetland 25

NO PHOTO AVAILABLE

Wetland 27

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~800 ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? yes If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge		✓			
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export		✓			
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		1, 3, 4, 5, 7, 8	✓	Valued as part of large habitat block
Recreation		✓			
Educational Scientific Value		✓			
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics		✓			
ES Endangered Species Habitat					
Other					

Notes: Wetland is small, isolated, and functions like surrounding upland.

*Refer to back up list of numbered considerations.

Wetland 28

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~400'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 29

Latitude_____ Longitude_____

Prepared by: RCR Date [illegible]

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1,2,5,7,10,13	✓	Spring @ upper end of wetland
Floodflow Alteration	✓		2,3,5,6,14	✓	Wetland becomes broad & flat @ edge of site
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export	✓		1,2,4,11	✓	Export is via watercourse
Sediment/Shoreline Stabilization	✓		2,5,6,9,		small stream indicates that this function is minor
Wildlife Habitat	✓		1,2,3,4,5,6,7,8,11,30	✓	Wetland is part of large habitat block
Recreation	✓		4,5	✓	
Educational Scientific Value	✓		2,4,5,10		
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓			✓	Excellent open view through wetland (rare on site)
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 29

VEGETATIVE

Trees

- Blackgum *(Nyssa sylvatica)*
- Pin Oak *(Wuercus palustris)*
- Red Maple *(Acer rubrum)*
- Red Oak *(Quercus rubra)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- High Bush Blueberry *(Vaccinium corymbosum)*
- Mountain Laurel *(Kalmia latifolia L.)*
- Red Oak *(Quercus rubra)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Tulip Poplar *(Liriodendron tulipifera)*

Herbaceous

- Arrow-leaved Tearthumb (Polygonum sagittatum L.)
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea*
- Water-pennywort *(Hydrocotyle americana)*
- Green Briar *(Smilax rotundifolia)*
- Jewelweed (Impatiens capensis)
- Marsh Fern *(Thelypteris palustris)*
- New York Fern *(Thelypteris noveboracensis)*
- Poison Ivy *(Rhus radicans)*
- Rattlesnake-Grass *(Glyceria Canadensis)*
- Sedge *(Carex Lurida)*
- Sensitive Fern *(Onoclea sensibilis L)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Sphagnum Moss *(Sphagnum sp.)*
- Soft Rush *(Juncus effuses)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Violet *(Viola sp.)*

WILDLIFE

Amphibians

- Wood Frog (juvenile) *(Rana sylvatica)*

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PF01
- Open under story – sunlight reaches the forest floor, ground water discharge at up reaches of wetland, internittent water course, floodflow alteration, aesthetically pleasing.
- :

Wetland 29

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~1100ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 30

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1,2,5,7,10,12	✓	Seeps noted
Floodflow Alteration		✓			lacks good storage area
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export	✓		1,2,1	✓	Via intermittent watercourse
Sediment/Shoreline Stabilization		✓			No shoreline
Wildlife Habitat	✓			✓	
Recreation	✓		4,5		
Educational Scientific Value	✓		2,4,5,10		
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		5,6,7,10,11		
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 30

)

VEGETATIVE

Trees

- Ash *(Fraxinus sp.)*
- Beech *(Fagus grandifolia)*
- Blackgum *(Nyssa sylvatica)*
- Iron Wood *(Ostrya virginiana)*
- White Oak *(Quercus alba)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- Japanese Bar Berry *(Berberis thunbergii)*
- Mapleleaf Viburnum *(Viburnum acerifolium)*
- Raspberry *(Rubus sp.)*
- Spice Bush *(Lindera benzoin)*
- Witch Hazel *(Hammamelis virginiana)*

Herbaceous

- Canada May flower *(Maianthemum canadense)*
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea*
- Grape *(Vitis sp.)*
- Jack-In-The-Pulpit (Arisaema sp.)
- New York Fern *(Thelypteris noveboracensis)*
- Partridge Berry *(Mitchella repens)*
- Sensitive Fern *(Onoclea sensibilis L)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Violet *(Viola sp.)*
- White Wood Aster *(Aster divaricatus)*

WILDLIFE

Amphibians

- None Identified

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PF01
- Under story varies from open to somewhat dense, some trees have large buttswell
- :

Wetland 30

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development >2000'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 31

Latitude_____ Longitude_____

Prepared by: RCR Date [illegible]

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office_____ Field_____

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1,2,6,7,9,12	✓	Seeps noted
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export	✓		1,2,4	✓	Export is via intermittent watercourse
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		1,3,4,5,7,8,16	✓	Habitat value as part of large block
Recreation	✓		4,5		
Educational Scientific Value	✓		2,4,5,10		
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		5,6,7,8,10,11		Wetland has good, open aspect.
ES Endangered Species Habitat					
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 31

VEGETATIVE

Trees

- Blackgum *(Nyssa sylvatica)*
- Red Maple *(Acer rubrum)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- Iron Wood *(Ostrya virginiana)*
- Mountain Laurel *(Kalmia latifolia L.)*
- Sassafras *(Sassafras albidum)*

Herbaceous

- Blue-eyed grass (Sisyrinchium sp.)
- Broad Beech Fern *(Thelypteris hexagonoptera)*
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea*
- Grape *(Vitis sp.)*
- Jack-In-The-Pulpit (Arisaema sp.)
- Marsh Fern *(Thelypteris palustris)*
- New York Fern *(Thelypteris noveboracensis)*
- Panic Grass *(Pinicum agrostoides)*
- Royal Fern *(Osmunda regalis L.)*
- Sedge *(Carex crinita)*
- Sensitive Fern *(Onoclea sensibilis L)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Smaller Enchanter's Nightshade *(Circaea alpina)*
- Sphagnum Moss *(Sphagnum sp.)*
- Violet *(Viola sp.)*

WILDLIFE

Amphibians

- Red-Spotted Newt *(Notophthalmus viridescens viridescens)*

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PF01
- Intermittent water course exits wetland
- :

Wetland 31

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use wooded; power lines Distance to nearest roadway or other development 0' (power line)

Dominant wetland systems present PEM, PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland?: 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RCS Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 6, 7, 13	✓	Water seeping out @ bedrock interface
Floodflow Alteration	✓		2, 3, 5, 6, 9		
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention	✓		1, 2, 7, 8, 10, 11	✓	Powerlines/ATVs are source
Nutrient Removal	✓		3, 4, 7, 15	✓	Powerlines/ATVs are source
Production Export	✓		1, 2, 4	✓	Export via watercourse
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		3, 5, 7, 8, 11, 13	✓	
Recreation	✓		4, 5		
Educational Scientific Value	✓		2, 4, 5, 10		
Uniqueness/Heritage	✓		32 - state species present	✓	Box turtle found by other consultant
Visual Quality/Aesthetics	✓		1, 2, 8, 10, 11	✓	Good contrast; outcrop vs. wetland
ES Endangered Species Habitat	✓			✓	Box turtle found by other consultant
Other					

*Refer to back up list of numbered considerations.

Notes:

SPECIES LIST - WETLAND 32 – HIGHLINE RIGHT OF WAY

)

VEGETATIVE

Trees

- No trees are present

Shrubs/Saplings

- Arrow-wood Viburnum (Viburnum recognitum)
- Red Oak *(Quercus rubra)*
- Rose Rosa Multiflora
- Sweet Pepper Bush *(Clethra alnifolia)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea*
- Dark Green Bulrush *(Scirpus atrovirens)*
- Deer-Tongue Grass *(Panicum clandestinum)*
- Grape *(Vitis sp.)*
- Green Briar *(Smilax rotundifolia)*
- Hay-scented Fern *(Dennstaedtia punctilobula)*
- Marsh Fern *(Thelypteris palustris)*
- Mud-plantain *(Alisma triviale)*
- New York Fern *(Thelypteris noveboracensis)*
- Panic Grass *(Pinicum agrostoides)*
- Royal Fern *(Osmunda regalis L.)*
- Rush *(Juncus Canadensis)*
- Sedge *(Carex folliculata)*
- Sedge *(Carex lurida)*
- Sensitive Fern *(Onoclea sensibili)*
- Soft Rush *(Juncus effuses)*
- Sphagnum Moss *(Sphagnum sp.)*
- Steeplebush *(Spiraea tomentosa)*
- Strawberry *(Fragaria sp.)*
- Violet *(Viola sp.)*
- Virginia Creeper *(Parthenocissus quinquefolia)*
- Virginia Meadow-Beauty *(Rhexia mariana)*
- Wool Grass *(Scirpus cyperinus)*

WILDLIFE

Amphibians

- None Identified

Birds

- Northern Cardinal *(Cardinalis cardinalis)*

Invertebrates

- Bumble Bee *(Bombus hortorum)*
- Butterfly Skipper??? *Bob look up*
- Dragon Fly *(Anisoptera* suborder)

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PEM
- Intermittent water course, power line crossing
- :

SPECIES LIST - WETLAND 32 – WOODED AREA
)

VEGETATIVE

Trees

- Beech *(Fagus grandifolia)*
- Blackgum *(Nyssa sylvatica)*
- Eastern Hemlock *(Tsuga Canadensis)*
- Red Maple *(Acer rubrum)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Japanese Bar Berry *(Berberis thunbergii)*
- Mapleleaf Viburnum *(Viburnum acerifolium)*
- Mountain Laurel *(Kalmia latifolia L.)*
- Spice Bush *(Lindera benzoin)*

Herbaceous

- Canada May flower *(Maianthemum canadense)*
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea*
- Club Moss *(Lycopodium annotinum)*
- Green Briar *(Smilax rotundifolia)*
- Jack-In-The-Pulpit (Arisaema sp.)
- New York Fern *(Thelypteris noveboracensis)*
- Partridge Berry *(Mitchella repens)*
- Royal Fern *(Osmunda regalis L.)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Sphagnum Moss *(Sphagnum sp.)*
- Violet *(Viola sp.)*

WILDLIFE

Amphibians

- None Identified

Birds

- Wild Turkey??

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PF01
- Intermittent water course
- :

Wetland 32

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~300'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 6, 7, 10	✓	
Floodflow Alteration	✓		2, 3, 5, 6, 7	✓	Broad basin ponds water
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export	✓		1, 2, 4, 11	✓	via intermittent watercourse
Sediment/Shoreline Stabilization	✓		2, 5, 9, 16		in watercourse banks well vegetated
Wildlife Habitat *	✓		1, 2, 3, 4, 5, 6, 7, 8, 16, 22	✓	Part of larger system
Recreation	✓		4, 5		
Educational Scientific Value	✓		2, 4, 5, 10	✓	
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		5, 6, 7, 8, 10, 11		
ES Endangered Species Habitat					
Other					

Notes: * Wetland has pond breeding amphibian habitat

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 33

VEGETATIVE

Trees

- Beech *(Fagus grandifolia)*
- Black Ash *(Fraxinus nigra)*
- Red Maple *(Acer rubrum)*
- Yellow Birch *(Betula alleghaniensis)*

Shrubs/Saplings

- Beech *(Fagus grandifolia)*
- Black Ash *(Fraxinus nigra)*
- Japanese Bar Berry *(Berberis thunbergii)*
- Mapleleaf Viburnum *(Viburnum acerifolium)*
- Mountain Laurel *(Kalmia latifolia L.)*
- Red Maple *(Acer rubrum)*
- Spice Bush *(Lindera benzoin)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Winterberry Holly *(Iiex laevigata)*

Herbaceous

- Canada May flower *(Maianthemum canadense)*
- Christmas Fern *(Polystichum acrostichoides)*
- Cinnamon Fern *(Osmunda cimmamomea*
- Green Briar *(Smilax rotundifolia)*
- Jack-In-The-Pulpit (Arisaema sp.)
- Marsh Fern *(Thelypteris palustris)*
- New York Fern *(Thelypteris noveboracensis)*
- Royal Fern *(Osmunda regalis L.)*
- Sensitive Fern *(Onoclea sensibili)*
- Skunk Cabbage *(Symplocarpus foetidus)*
- Virginia Creeper *(Parthenocissus quinquefolia)*

WILDLIFE

Amphibians

- Green Frog *(Rana clamitans melanota)*

Birds

- Red-Shouldered Hawk *(Buteo lineatus)*
- Woodpecker

Invertebrates

- Dragon Fly *(Anisoptera* suborder)
- Water Boatman *(Corixa sp.)*
- Water Strider *(Gerris sp.)*
- Yellow-Legged Meadowhawk *(Sympetrum vicinum)*

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- PF01
- Vernal Pool Characteristics: contained approximately 12" to 16" of water in places as of 7/16/02, basin-shaped depression is very broad and deep, water-stained leaves and tree trunks, many trees have buttswell.
- Drains into wetland systems 18 and 35, open under story, floodflow alteration
- :

Wetland 33

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"?_____

Adjacent land use Wooded Distance to nearest roadway or other development ~300'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 34

Latitude_____ Longitude_____

Prepared by: RCR Date_____

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 6, 12	✓	Spring noted
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export	✓		1, 2, 4,	✓	Wetland continues offsite to a watercourse
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		1, 2, 3, 4, 5, 7, 8,	✓	Wetland is part of large habitat block
Recreation	✓		4, 5		
Educational Scientific Value	✓		1, 4, 5, 10		
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics	✓		4, 5, 7, 8, 10, 11		Good visual contrast
ES Endangered Species Habitat					
Other					

*Refer to back up list of numbered considerations.

Notes:

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? Yes or a "habitat island"?_____

Adjacent land use [illegible] Distance to nearest roadway or other development ~200ft

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? Top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 39

Latitude_____ Longitude_____

Prepared by: RCA Date [illegible]

Wetland Impact: NO
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N ✓

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		1, 2, 7, 8, 9, 10, 13, 15	✓	Evidence of shallow gw discharge along wetland edge
Floodflow Alteration	✓		2, 3, 5, 6, 7, 8, 9, 15		This small, upper-watershed wetland does store water high up in the watershed
Fish and Shellfish Habitat		✓			Not present
Sediment/Toxicant Retention		✓	4, 5, 8, 10, 12, 13		The wetland could serve this function, but [illegible] not present
Nutrient Removal		✓	7, 12, 13, 14, 15		The wetland could serve this function, but sources are not present
Production Export	✓		1, 2, 4, 6, 12, 13	✓	Biomass is transported out via the intermittent [illegible]
Sediment/Shoreline Stabilization		✓			NO shoreline
Wildlife Habitat	✓		1, 3, 4, 5, 6, 7, 8, 11, 15, 16, 17, 18, 20	✓	
Recreation	✓		4, 5,		Could be used for passive recreation
Educational Scientific Value	✓		2, 4, 5, 12, 15,		
Uniqueness/Heritage		✓	5, 12, 13, 14,		Wetland has unique flora - [illegible]
Visual Quality/Aesthetics					
ES Endangered Species Habitat		✓			
Other					

Notes:

*Refer to back up list of numbered considerations.

SPECIES LIST - WETLAND 39

VEGETATIVE

Trees

- Blackgum *(Nyssa sylvatica)*
- Green Ash (Fraxinus pennsylvanica)
- Red Oak *(Quercus rubra)*

Shrubs/Saplings

- High Bush Blueberry *(Vaccinium corymbosum)*
- Iron Wood *(Ostrya virginiana)*
- Mapleleaf Viburnum *(Viburnum acerifolium)*
- Sassafras *(Sassafras albidum)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- White Oak *(Quercus alba)*
- Winterberry Holly (Ilex verticillata)
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea)*
- Green Briar *(Smilax rotundifolia)*
- Hay-scented Fern *(Dennstaedtia punctilobula)*
- Hog-Peanut *(Amphicarpa bracteata)*
- Marsh Fern *(Thelypteris palustris)*
- New York Fern *(Thelypteris noveboracensis)*
- Royal Fern *(Osmunda Regalis)*
- Sedge *(Carex intumesense)*
- Sensitive Fern *(Onoclea sensibili)*
- Virginia Creeper *(Parthenocissus quinquefolia)*

WILDLIFE

Amphibians

- Wood Frog (juvenile) *(Rana sylvatica)*

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- White Tailed Deer *(Odocoileus virginianus)*

COMMENTS

- Vernal Pool Characteristics: basin-shaped depression, water-stained leaves and tree trunks, some trees have large buttswell
- Intermittent water course exits wetland
- :

Wetland 39

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? NO Is wetland part of a wildlife corridor? YES or a "habitat island"?_____

Adjacent land use_____ Distance to nearest roadway or other development ~1750 ft

Dominant wetland systems present_____ Contiguous undeveloped buffer zone present YES

Is the wetland a separate hydraulic system? YES If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 110

Latitude_____ Longitude_____

Prepared by: RGR Date_____

Wetland Impact: NA

Type_____ Area_____

Evaluation based on:

Office ✓ Field ✓

Corps manual wetland delineation completed? Y_____ N ✓

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		2, 4, 5, 6, 13		Small, local [illegible]
Floodflow Alteration	✓		5, 6, 7		[illegible]
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓	3, 6		[illegible]
Nutrient Removal		✓			As above
Production Export		✓			Wetland contains [illegible]
Sediment/Shoreline Stabilization		✓			No shoreline
Wildlife Habitat	✓		1, 3, 4, 5, 6, 7, 8, 10	✓	Valued as part of the larger system nearby
Recreation	✓		4, 5		
Educational Scientific Value	✓		3, 4, 5, 10		[illegible]
Uniqueness/Heritage		✓	5, 12, 16		[illegible]
Visual Quality/Aesthetics	✓		5, 7, 8, 10, 11		
ES Endangered Species Habitat		✓			
Other					

*Refer to back up list of numbered considerations.

Notes:

SPECIES LIST - WETLAND 40

)

VEGETATIVE

Trees

- Blackgum *(Nyssa sylvatica)*
- Red Maple *(Acer rubrum)*

Shrubs/Saplings

- Sweet Pepper Bush *(Clethra alnifolia)*

Herbaceous

- Cinnamon Fern *(Osmunda cimmamomea)*
- Princess Pine *(Lycopodium sp.)*
- Skunk Cabbage *(Symplocarpus foetidus)*

WILDLIFE

Amphibians

- None identified

Birds

- None Identified

Invertebrates

- None Identified

Mammals

- None Identified

COMMENTS

- Approximate size of wetland - 15' x 20'
- Minimal functional value
- :

SPECIES LIST - WETLAND 41

VEGETATIVE

Trees

- Red Maple *(Acer rubrum)*

Shrubs/Saplings

- High-Bush Blueberry *(Vaccinium corymbosum)*
- Mountain Laurel *(Kalmia latifolia L.)*
- Sweet Pepper Bush *(Clethra alnifolia)*
- Yellow Birch *(Betula alleghaniensis)*

Herbaceous

- Canada May flower *(Maianthemum canadense)*
- Cinnamon Fern *(Osmunda cimmamomea)*
- Royal Fern *(Osmunda regalis)*

WILDLIFE

Amphibians

- Spring Peeper (juvenile) *(Pseudacris crucifer)*
- Spotted Salamander *(Ambystoma maculatum)*

Birds

- None Identified

Invertebrates

- Deer Fly *(Chrysops* sp.)

Mammals

- None Identified

COMMENTS

- Vernal Pool Characteristics: deep, basin-shaped depression, water-stained leaves and tree trunks, trees have buttsweil
- Spotted Salamander was located in adjacent upland
- :

Wetland 41

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"?_____

Adjacent land use Wooded / residential Distance to nearest roadway or other development ~100'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? NO If not, where does the wetland lie in the drainage basin? top

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. 42

Latitude_____ Longitude_____

Prepared by: RCR Date 2002

Wetland Impact:
Type_____ Area_____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y____ N____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge		✓			
Floodflow Alteration		✓			
Fish and Shellfish Habitat		✓			
Sediment/Toxicant Retention		✓			
Nutrient Removal		✓			
Production Export		✓			
Sediment/Shoreline Stabilization		✓			
Wildlife Habitat	✓		4, 5, 7, 8, 11	✓	Has habitat value as part of overall site
Recreation		✓			
Educational Scientific Value		✓			
Uniqueness/Heritage		✓			
Visual Quality/Aesthetics		✓			
ES Endangered Species Habitat		✓			
Other					

*Refer to back up list of numbered considerations.

Notes:

SPECIES LIST - WETLAND 42

VEGETATIVE

Trees

- Beech *(Fagus grandifolia)*
- Red Maple *(Acer rubrum)*
- Red Oak *(Quercus coccinea)*

Shrubs/Saplings

- Sassafras *(Sassafras albidum)*
- Sweet Pepper Bush *(Clethra alnifolia)*

Herbaceous

- Canada May Flower *(Maianthemem canadense)*
- Cinnamon Fern *(Osmunda cimmamomea)*
- Green Briar *(Smilax rotundifolia)*
- New York Fern *(Thelypteris noveboracensis)*
- Partridgeberry *(Mitchella repens)*
- Princess Pine *(Lycopodium sp.)*
- Sphagnum Moss *(Sphagnum sp.)*
- Spotted Wintergreen *(Chimaphila maculata)*

WILDLIFE

Amphibians

Birds

- None Identified

Invertebrates

- Sow Bugs *(Oniscus asellus)*

Mammals

- None Identified

COMMENTS

- Open under story
- :

Wetland 42