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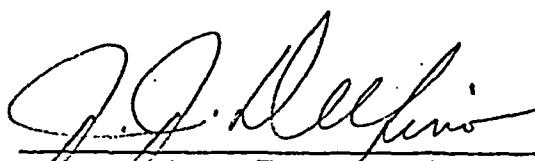
FINAL REPORT
TO
STONE AND WEBSTER ENGINEERING CORPORATION
BOSTON, MASSACHUSETTS

TERRESTRIAL ECOLOGY STUDY OF THE
MILLSTONE POINT SITE, WATERFORD, CONNECTICUT

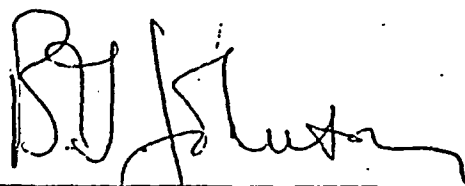
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PREFACE

The staff of the Environmental Sciences Division of Industrial BIO-TEST Laboratories, Inc. comprised the study groups for data acquisition and preparation of this report. The project was under the direction of H. S. Lewis, M.S., Head, Terrestrial Ecology Section. Dr. B.G. Johnson, Manager, Environmental Sciences Division was the senior advisor of the project. Other personnel involved in writing this report were:

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I. Introduction

The study of the terrestrial environment in the vicinity of the Millstone Point site included programs to evaluate the biotic components of the existing plant and animal communities in the site area and to identify existing effects of both natural and man-induced environmental factors in these communities.

The plant and animal programs included a comprehensive literature survey of the flora and fauna in the site area and extensive seasonal field surveys during 1973-1974.

The specific objectives of the terrestrial environmental programs were:

1. To identify existing plant communities in the vicinity of the site and to make qualitative and quantitative descriptions of selected plant communities;
2. To identify migrant and/or resident populations of mammals, birds, reptiles and amphibians, and terrestrial invertebrates in the vicinity of the site;
3. To determine the general distribution and interrelationships of existing wildlife populations;
4. To assess the utilization of existing wildlife habitats by bird and mammal populations; and
5. To determine existing effects of natural and man-induced factors on animal and plant communities in the area.

Field data utilized in preparing this report were collected during the spring (May 1973), summer (July 1973), fall (October 1973), and winter (January 1974) seasons.

II. Summary and Conclusions

On the basis of studies conducted during May, July, October 1973 and January 1974, the following results were obtained:

A. Vegetation

1. Plant communities in the site area were diverse and the species within each community differed in their tolerance to the various environmental factors characteristic of the region. Forested lands, in various stages of successional development, had biotic compositions comparable to those of the central hardwoods-hemlock zone. Near the shore, plant communities were similar to other coastal areas in Connecticut and Rhode Island.

2. A great reduction in the acreage of original communities on Millstone Point has occurred. Primary agents of environmental stress to vegetational communities include lumbering, infestations, flooding, fires, hurricanes, and conversion of native communities to farm land, residences, commercial and industrial developments, and transportation networks. Various topographic, edaphic, and physical factors associated with proximity to the coast have caused natural environmental stresses.

3. No rare or endangered plant species or unique habitats were observed during the field surveys, nor did the literature review indicate any were present.

4. Nine communities were studied at the Millstone Point site during the periods May 14-17, July 16-19, October 22-25, 1973. The following vegetational analyses were made:

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a. The old field (Site 1) was dominated by perennial forbs and grasses such as orchard grass and buckhorn plantain. Woody pioneering species were invading relatively undisturbed areas along the perimeter. Portions of this community were mowed annually.

b. The composition and structure of the mixed hardwood forest (Site 2) were influenced by an intermittent stream and natural depressions. Oaks dominated the drier upper areas, while red maple was more abundant in wet microhabitats. The stand had developed to a subclimax successional stage.

c. Species characteristic of both bottomland and upland habitats occurred in the riparian community (Site 3). Red maple and American beech were codominants. Size class distributions and core samples indicated that the community was relatively mature and stable.

d. The brackish marsh (Site 4) was connected to Long Island Sound by a channelized stream. Salt meadow grass and other salt-tolerant species dominated the marsh. Drier, raised sites, formed by spoil deposits supported a greater diversity of herbs and shrubs.

e. The transmission line corridor (Site 5) was initially cleared during the summer and fall of 1968. Woody and herbaceous species were diverse in the shrub and groundlayer strata. Pioneer species adapted to disturbed environments, as well as residual species of the cleared hardwood forests, were common.

f. The mixed hardwood forest (Site 6) had better drainage and

thereby supported more xeric species than Site 2. The stand was dominated by oaks.

g. A variety of cultivated and native plants was found in the abandoned nursery (Site 7). Vegetation typical of several stages of secondary succession was present. Perennial forbs and grasses were found in relatively open areas, and trees, shrubs, and vines typical of more advanced successional stages occurred in fence rows.

h. The beach and managed recreation area (Site 8) was developed for public recreational use. American beachgrass, beach pea, and tall wormwood were common in the primary vegetation zone. Upland sites were largely maintained by mowing, but marginal areas were dominated by Japanese honeysuckle, poison ivy, and sumac.

i. Plants along the beach community (Site 9) were subjected to harsh environmental stresses. The vegetational diversity was low. American beachgrass was the initial invader and prime stabilizer of soil. Successional advancement to woody vegetation increased with distance from the beach.

B. Mammals

1. No endangered mammalian species permanently inhabit the area that was studied.

2. Eight small mammal species totaling 454 specimens were captured in 6577 trap-nights. White-footed mice were the most abundant and widespread small mammals during the spring and fall sampling periods; this species was collected in each community sampled and accounted for 61.0%

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of the total mammal catch. Meadow voles were most abundant in October and constituted 29.7% of the total mammal catch. Less abundant species included the shorttail shrew, meadow jumping mouse, Norway rat, masked shrew, eastern chipmunk, and pine vole.

3. Small mammal habitat utilization was highest in the beach community and lowest in the mixed hardwood forest (Site 6).

4. The relative abundance of small mammals expressed as the number captured per 100 trap-nights, increased significantly ($P < 0.05$) from 3.48 in May to 9.25 in July. With the exception of the riparian community, the relative abundance increased in each community. Increases were greatest in the beach and managed recreation area, beach community, and transmission line corridor.

5. The relative abundance of small mammals, expressed as the number captured per 100 trap-nights, remained stable from July (9.25) to October (8.14).

6. Observations and/or sign of seven larger mammals were recorded during the four census periods. Cottontail rabbits, eastern gray squirrels, and woodchucks were common. Other species recorded for the Millstone Point site included the raccoon, whitetail deer, star-nosed mole, and muskrat.

C. Birds

1. No endangered avian species permanently inhabit the area that was studied.

2. Observations of 3692 birds comprising 106 species were recorded

along transect routes at the Millstone Point site during the four census periods. Residence status of these species included 39 permanent residents, 42 summer residents, 10 winter residents, and 11 migrants.

3. Predominant birds sighted during the May migration period included red-winged blackbirds, common grackles, barn swallows, and starlings. Common nesting species observed during July included the black duck, blue jay, American robin, and song sparrow. In October double-crested cormorants, Canada geese, herring gulls, starlings, and American goldfinches were most frequently sighted. Red-breasted mergansers, herring gulls, ring-billed gulls, and song sparrows were most prevalent during January.

4. During the spring (mid-May) and fall (late October) migration periods, 63 and 55 species, respectively, were sighted. Sixty-two species were observed during the summer survey and 35 were recorded during the winter census.

D. Reptiles and Amphibians

Five species of amphibians and one reptile were observed. Green frogs, leopard frogs, and wood frogs were most frequently sighted. A northern two-lined salamander, an American toad, and two eastern garter snakes were also recorded in the site area.

E. Terrestrial Invertebrates

Two hundred and thirty-seven specimens representing 2 classes, 11 orders, and 40 families of terrestrial invertebrates were collected from the old field (Site 1) and the riparian community (Site 3) during the two sampling periods. Plant bugs, dance flies, midges, and spiders were most commonly collected.

III. Methodology

A. Vegetation

Field examinations of the flora at Millstone Point were made, and representative plant communities were selected for baseline analysis of vegetational structure and composition (Figure 1). Three extensive vegetational surveys were conducted during the study period. Quantitative surveys of herbaceous and woody species were conducted during the spring (May 1973) and fall (October 1973), and herbaceous species were also sampled during the summer (July 1973) in each of the following communities:

Old field (Site 1);

Mixed hardwood forest (Site 2);

Riparian community (Site 3);

Brackish marsh (Site 4);

Transmission line corridor (Site 5);

Mixed hardwood forest (Site 6); and

Beach community (Site 9).

Qualitative surveys were conducted in an abandoned nursery (Site 7) and a beach and managed recreation area during all sampling periods.

In each wooded community, trees over 4 inches d. b. h. (diameter at breast height, i. e., 4.5 feet above ground level) and saplings over 1 inch d. b. h. were sampled by the quarter method (Curtis and Cottam 1962). Shrubs and saplings over 6 inches high and less than 1 inch d. b. h. (Phillips 1959) were sampled by the line intercept method (Canfield 1941).

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From an arbitrarily selected starting point, sampling points were distributed randomly (Snedecor and Cochran 1967) along a predetermined compass line (transect) across the greatest extent of each stand. A minimum distance, normally 50 feet, was maintained between points to insure that each succeeding point was beyond the influence of the preceding one. The length of the transect and the number of sampling points used in each community depended upon the community size. The relative frequency, relative density, and relative dominance for each tree species were determined from standard formulas (Curtis and Cottam 1962). Importance values were calculated as the sum of these relative indices (Curtis and McIntosh 1951).

At alternate sampling points, 50-foot intercepts were made perpendicular to the line of travel to sample small saplings and shrubs. The relative frequency, relative dominance, and ground cover were calculated from standard formulas (Cox 1972).

In non-forested communities where shrubs and tree species were present in conjunction with herbaceous species, 50-foot intercepts were made at alternate ground-layer quadrat points to sample woody vegetation over 6 inches tall.

Woody plants less than 6 inches high, grasses, and forbs were quantitatively sampled by the quadrat method (Wiegert 1962, Phillips 1959) using a circular 1 m² quadrat in all communities except in the old field (Site 1) and brackish marsh (Site 4) where a circular 0.1 m² quadrat was used. These quadrats were centered on each quarter point in forested communities and were

systematically distributed at 10-meter intervals along transects in all other sites.

In plant communities selected for qualitative analysis, all species that were observed were recorded and rated either abundant, common, or infrequent.

Botanical nomenclature follows Gleason (1968).

B. Mammals

During May, July, and October 1973, Museum Special snap-traps baited with peanut butter were used to sample small mammal populations in each of the plant communities selected for qualitative or quantitative analysis (Figure 1).

In each plant community selected for quantitative analysis, 90 to 100 snap-traps were set in triplicate within a radius of approximately 3 feet from a central point. Fifty traps placed in a similar manner were set in plant communities selected for qualitative analysis. An interval of 25-30 feet between stations was used. Traps were set along the same line transects that were used for vegetation analysis. Traps were normally left in the field for three nights at each station and were checked once daily. Sex, weight, and selected body measurements were recorded for each species that was captured.

All observations or sign of mammals along the transect routes were recorded. During each phase of field work, observations of mammals were made throughout the area. Mammalian nomenclature and/or identifications

follow Murie (1954), Blair et al. (1957), and Burt and Grossenheider (1964).

C. Birds

The relative abundance of birds was determined in each plant community selected for qualitative or quantitative analysis. The same transect route that was used for vegetation sampling and mammal trapping was followed when tallying bird species. Censuses were taken along the transect routes on two or three successive mornings during May, July, and October 1973 and January 1974. Transect routes averaged approximately one-quarter mile in length. Species were identified by sight or sound. Birds flying overhead were counted. Progress along each transect route was on foot, alternating between slow walking and brief pauses to look and listen.

Records were kept of bird activity and habitat use throughout the site area. Scientific and common names of each species are those of the American Ornithologists' Union (1957) and the Thirty-Second Supplement to the A. O. U. Checklist (American Ornithologists' Union 1973).

D. Reptiles and Amphibians

Reptiles and amphibians that were observed along each transect route were collected and identified. Specific searches for these animals were made in productive-looking habitats, i. e. under logs, rocks, etc. Records were kept of the habitat type from which each individual was taken. Identification and nomenclature follow Conant (1958).

E. Terrestrial Invertebrates

Terrestrial invertebrates were collected from two sampling locations at the Millstone Point site. One community dominated by herbaceous plants

and another dominated by forest vegetation were selected for sampling. These were the old field (Site 1) and riparian community (Site 3).

An aerial insect net, 16 inches in diameter and 2.5 feet deep, was used to make 50 standard sweeps of low herbaceous and shrub-type woody vegetation. One sampling consisted of two separate walks for a distance of 25 paces each. The contents of the net were emptied into a wide-mouthed jar containing 70% ethanol.

Identification and zoological nomenclature for terrestrial invertebrates follow Arnett (1968), Baker (1972), Borror and DeLong (1970), Borror and White (1970), Dillon and Dillon (1966), Holland (1968), Klots (1951), Peterson (1960) and Peterson (1967).

IV. Results and Discussion

A. Vegetation

1. Literature Review

The vegetation of Connecticut and Massachusetts has undergone phenomenal changes from the forests seen by early colonists. Original forests largely disappeared over two centuries ago. During the precolonial period most of New England was forested except for small acreages of salt marsh, rocky ridges and land cultivated by Indians (Moss 1973). The forests were composed of oak (Quercus spp.), beech (Fagus grandifolia), maple (Acer spp.), birch (Betula spp.) and hemlock (Tsuga canadensis). Eastern white pine (Pinus strobus), black cherry (Prunus serotina), chestnut (Castanea dentata), basswood (Tilia spp.), and ash (Fraxinus spp.) were the most common associates. Many of the dominant trees were over 300 years old and over 36 inches in diameter (Kienholz 1963).

Although Indians set fires to facilitate hunting (Egler and Niering 1965), and lightning and other natural phenomena took a toll of the trees (Niering and Egler 1966), forests were more rapidly decimated with the advent of white man. The land was cleared by the colonists for crops, and stone fences were constructed from loose stones in the fields. Trees were also heavily cut for lumber and fuel. Many of the large white pines were claimed by the English navy (Kienholz 1963). Land clearing continued for over 200 years, until the mid-1800's (Olson 1965). Before the Civil War about two-thirds of Connecticut's total land area of three million acres was functionally crop and pasture land,

with the remainder in forest (Niering and Egler 1966). With eastern industrialization and western lands opened for settlement, especially after the Civil War, a reverse trend began. Western grasslands proved far more fertile for agriculture than the eastern deciduous forest soil. Thus, eastern farmland was abandoned, and a succession of native plant species reinvaded the land.

Approximately two-thirds of Connecticut is now forested, and only one-third of the land is used for crops and pastures (Kienholz 1963); about 65 percent of Massachusetts is forested (Lull 1965). About half of the present forested area was reforested within the past 100 years (Stephens and Waggoner 1970). Proof of cultivated land abandonment is evident throughout Connecticut and Massachusetts by the stone walls that now traverse the forests. Olson (1965) estimated that half of the existing Connecticut woodlands are old fields in various stages of succession. The other half has always been woods but may have been cut repeatedly for lumber, firewood, and charcoal. Kienholz (1963) reported that between 71 and 80 percent of the land in Middlesex and New London Counties, Connecticut is forested. The forests of Connecticut are composed primarily of hardwoods (95%) with some softwoods (5%) (Kienholz 1963). Most of the forests are quite young and the trees are small.

Beneficial aspects of New England forests: The native vegetation of New England has developed and adapted concomitantly with other biotic and abiotic components for many thousands of years. It is therefore assumed that the forests in Connecticut and Massachusetts are the best adapted cover type for the topographic and edaphic features. The topography is quite steep

throughout much of the Connecticut River Valley area, and thus trees are the most ideal vegetation to prevent soil erosion.

Four basic hydric processes are at least partially governed by forests; these are: interception, infiltration, storage, and evapotranspiration. The forest canopy may protect the soil from the beating action of rainfall by intercepting a large portion of the precipitation. Thick humus and litter on the forest floor also intercept rainfall and keep the soil loose and friable, thereby increasing the permeability of the soil to absorb water and prevent runoff (Kienholz 1963). Infiltration of water into the soil is slow and occurs primarily along the trees' root systems. Absorbed water drains subterraneously into springs, streams and lakes. Also, since forest soils normally do not freeze to great depths in the winter in southern New England, snow melt in the spring is easily absorbed, therefore the chance of spring floods is greatly reduced by thick humus and litter. Highly permeable forest soils further benefit the entire ecosystem by equalizing stream flow so that spring time flow is reduced and low flow in summer is prevented. Evapotranspiration varies from 25 to 75 percent of the total annual precipitation, depending upon the land surface and vegetation (Smith 1966). The highest percentages are always associated with forest cover (Smith 1966). Forests are very important in maintaining a vital water supply in the New England area, both in quantity and quality.

Forests also provide unique food, cover, and living space for wildlife. For example, deer browse on the small woody growth of twigs and shrubs. Grouse find food from the great diversity of hardwood trees, and they

use the softwoods for cover. Rabbits frequently feed in meadows or at the forest's edge, but they occasionally seek cover in the forests. Environmental conditions for fish and waterfowl are also improved by the forest's effect on watersheds.

Various types of recreational activities are made possible by forests and watersheds in Connecticut and Massachusetts. For example, fishing, hunting, camping, picnicking, swimming, boating, riding, hiking, bird watching, and sightseeing are the major forms of recreation in the Connecticut River Valley area (Kienholz 1963).

Commercially, the New England forests have a history of value to man. Softwoods (e.g., white pine and hemlock) have been used for construction of ships and houses. Knotty pine trim, furniture, doors, shingles and siding have all been made from softwoods. Cedar has been used for poles and posts because of its resistance to decay. The hardwoods also have proven beneficial. Oaks, due to their great strength and beautiful grain, have been used for furniture, trim, posts, and ship building. Maple has been used for furniture, but notably in New England, it was a source of syrup and sugar. Plywood, veneer and furniture have been made from the birches. Baseball bats and other athletic equipment have been made from the ashes. Hickory, white oak, sugar maple, and birch are among the best fuel woods, although the use of wood for fuel has greatly declined in importance during the last fifty years. Several estimates have been made that predict an increase in fuel wood importance in the 1970's and 1980's. Although charcoal production from oak slabs and sawmill

waste formerly required considerable wood, its use is now greatly reduced.

Successional development of forests: New England forests have proven to be excellent sites for studying forest regeneration dynamics. A number of studies have been conducted in the area of the Connecticut River. Significant contributions to the understanding of southern New England vegetation include those of Bromley (1935) and Ogden (1961). Nichols (1913a, 1913b, 1914, 1915, 1916, 1920a, 1920b) made early descriptions of Connecticut vegetation, and Lutz (1928) and Egler (1940) wrote about Massachusetts flora. On a larger geographical scale, Braun's (1950) monumental work is quite comprehensive for deciduous forests in the eastern United States. Several of the older New England studies have drawn information from old travel diaries to make comparisons between pre-colonial, colonial, and post-colonial vegetation. Secondary succession in the deciduous forests of New England has been discussed by Braun-Blanquet (1932), Clements (1928), Oosting (1942, 1956), Raunkiaer (1934), and Weaver and Clements (1938). Almost fifty years of mixed-hardwood forest study have been documented in four south-central Connecticut tracts (Hicock et al. 1931, Collins 1962, Olson 1965, Stephens and Waggoner 1970). The forests have undergone a number of structural changes caused by various environmental stresses. Successional development of these forests varies from site to site depending upon the nature of the disturbance or stress and a combination of topographic, edaphic, and climatic factors.

After pastured or plowed fields are abandoned in southern New England a typical successional pattern is established. During the first year

after abandonment, fields are dominated by ragweed (Ambrosia spp.), horseweed (Conyza spp.) and crabgrass (Digitaria spp.) (Daubenmire 1968, Livingston 1972). Usually the ground surface is covered with lichens and mosses. These plants alter the soil by increasing the amount of humus and water retention, and in general, moderate the microclimate for the more vigorous and persistent successional perennials. From three to five years after abandonment, species such as lespedeza (Lespedeza spp.), goldenrod (Solidago spp.), aster (Aster spp.), and Queen Anne's Lace (Daucus carota) increase in importance (Beals and Westover 1971, Livingston 1972). The perennial weed stage is characterized by species with light-weight seeds that are wind dispersed over great distances. This stage usually persists between three and seven years after abandonment (Livingston 1972). After seven to ten years of abandonment, little bluestem (Andropogon scoparius) codominated by goldenrods and asters eventually succeeds many of the perennial weeds. Though less abundant, annual weeds such as ragweed, horseweed, crabgrass, and lespedeza may still be present (Hanson and Churchill 1961). Also, during this period, several small-statured shrubs and vines may invade the old field; their frequency will vary locally. These include sweetfern (Comptonia peregrina), sumac (Rhus spp.), dogwood (Cornus spp.), bittersweet (Celastrus scandens), blackberry (Rubus spp.), and Virginia-creeper (Parthenocissus quinquefolia). Usually after 15 to 20 years the stone walls are covered by tangled thickets and shrubs (Stephens and Waggoner 1970). Where land is abandoned near a tract of relatively undisturbed vegetation which can act as a seed source, succession

may be much more rapid. Bard (1952) found flowering dogwood (Cornus florida, typically represented in a climax forest, invading an old field within five years after abandonment. Several tree species known to invade fallow fields include: juniper (Juniperus spp.), birch, aspen (Populus spp.), cherry (Prunus spp.), and sassafras (Sassafras albidum). Gray birch (B. populifolia) may begin to invade old fields five to ten years after abandonment and eventually become dominant (Harlow and Harrar 1958, Livingston 1972). This tree species moderates the environment by reducing light and wind near the ground. Shade intolerant species such as little bluestem are reduced in frequency. Invading trees further modify the soil temperature, increase humidity near the ground surface, and add humus to greatly enrich the soil. Light-seeded tree species, such as gray birch and aspen, are early secondary invaders because they have windborne seeds that can travel long distances, and they are tolerant to exposed sites. However, as more trees become established the early invaders decrease, because they are intolerant of dense shade. The short-lived gray birch is eventually replaced by the relatively long-lived pitch pine (Pinus rigida) and white pine. Pines usually appear in abundance between 10 and 15 years after field abandonment (Livingston 1972). Their seeds are heavy and can be wind transported only short distances. Seeds are produced only once every three to seven years. Therefore, the time of this stage of succession depends upon the maturity of pine trees and the proximity of the trees to the disturbed area. In many New England areas, pines are commercially preferred over later successional species. By burning the area at intervals the pine stage may

be maintained (Little and Moore 1949). Pitch pine is especially fire resistant. Even when fires are hot enough to kill most of the foliage, recovery may be rapid. Older pine stands may have three strata: an upper canopy, a shrub layer and a thin herbaceous layer. Vegetation common to a pine stand includes pitch pine, quaking aspen (Populus tremuloides), large-toothed aspen (P. grandidentata), pin-cherry (Prunus pennsylvanica), eastern white pine, sheep laurel (Kalmia angustifolia), mountain laurel (K. latifolia), blueberry (Vaccinium angustifolium), huckleberry (Gaylussacia baccata), and sometimes scrub oak (Quercus ilicifolia). Little bluestem frequently occurs in open areas. Pines greatly modify the local environment by reducing light to lower strata, moderating temperatures, reducing wind, and increasing humidity. They also increase the soil acidity which reduces its fertility. However, pines are not tolerant of their own shade, and therefore, they are unable to reproduce in a mature stand (Clarke 1954). After several decades of field abandonment, in the absence of fires, pines are gradually replaced by the more shade-tolerant oaks, hickories, maples, hemlock and beech. Only those species capable of surviving strict competition for available sunlight, nutrients, and soil moisture endure. Most members of terminal, stable communities are tolerant of shade; thus, their seedlings survive and their replacement is high. The climax species are usually those with heavier seeds which must depend upon animals (squirrels and birds), rather than wind for dispersal from the immediate locale.

The compositional changes in New England forests are gradual, continual, and mosaic. As older trees die and create new openings, other trees

replace them. Most of the successional replacement species are present in mature stands in a slow-growing state for several years before they reach significant importance in the community. The climax stage of succession may occur 25 to 50 years after abandonment (Livingston 1972). Local environments dictate the dominant species in the climax or terminal stages of succession. For example, hemlocks are a climax shade tolerant species, but due to their susceptibility to fires, desiccating winds, and rather high moisture requirements, they are poorly adapted to xeric habitats such as south-facing slopes or sandy soils. Red maple (Acer rubrum) seedlings flourish on damp or swampy soils, and they are shade tolerant. Therefore, red maple perpetuates its species as a dominant in swampy habitats.

Successional trends on fallow land in southern New England (Lutz 1928) appear to be somewhat similar to those observed on the piedmont in New Jersey (Bard 1952), and on the Raritan River flood plain in New Jersey (Wistendahl 1958). A high degree of species similarity exists in these three areas, as well as in other mid-Atlantic states (Gleason and Cronquist 1963, Stalter 1973).

Successional progression of vegetation in the forest is concomitant with succession in other biotic and abiotic components. As the forest becomes mature, the leaf canopy becomes thicker and farther above the forest floor. Stratification occurs. Progressively less sunlight penetrates to the lower strata. Understory vegetation changes, and soils are modified. Both forest soil and water increase in fertility, more elements are utilized, more organic matter

is accumulated, and more biomass is produced. Alterations in forest habitats are accompanied by changes in microbial and faunal species composition. Increased stratification, spatial heterogeneity, and zonation bring about an increase in niches which reflects greater species diversity and general stability of the system.

The mature forests in southern New England are highly stratified and contain a rich diversity of life forms. Generally four distinct strata can be observed in highly developed, uneven, aged, deciduous forests. The upper canopy consists primarily of the dominant or codominant trees, such as red oak (Quercus rubra), white oak (Q. alba), scarlet oak (Q. coccinea), black oak (Q. velutina), pin oak (Q. palustris), red maple, sugar maple (A. saccharum), eastern white pine, hemlock, green ash (Fraxinus pennsylvanica), paper birch (Betula papyrifera), black birch (B. lenta), bitternut hickory (Carya cordiformis), pignut hickory (C. glabra), and mockernut hickory (C. tomentosa). Beneath this is a lower tree canopy consisting of flowering dogwood, witch hazel (Hamamelis virginiana), downy junberry (Amelanchier arborea), sassafras, black cherry, and eastern hophornbeam (Ostrya virginiana). A typical shrub stratum consists of such species as blueberry, huckleberry, mountain laurel, pinxter flower (Rhododendron nudiflorum), and mapleleaf viburnum (Viburnum acerifolium). The ground or field layer consists of herbs and ferns; its composition varies seasonally, from trilliums (Trillium spp.) and hepaticas (Hepatica spp.) in the spring to goldenrods and asters in the fall.

Succession may be set back, modified, or arrested by various disturbances. After a community disturbance occurs, the degree of set-back

and time of recovery depends upon the seral stage of succession before the disturbance, the intensity of the disturbance, and the proximity of successional species tolerant to the particular modified habitat.

The Chestnut Blight created a unique disturbance in the eastern deciduous forests by eliminating the dominant or codominant American chestnut. These trees once comprised from 10 to 60 percent of the composition in many southern New England forests (Egler and Niering 1965, Egler and Niering 1967). The climax stage of succession in southwestern New England was previously classified as an Oak-Chestnut Association. The American chestnut was less important in Massachusetts than further south in Connecticut, but its range originally extended north as far as southern Maine (Gleason and Cronquist 1963). When open environments were created by death of these trees, invasion by other species was made possible. Since the demise of American chestnut trees, New England and other eastern forests have proved to be excellent sites to study forest regeneration dynamics. Many people have predicted an oak-hickory climax replacing the oak-chestnut forest association (e.g., Spurr 1964) with sugar maple, yellow poplar (Liriodendron tulipifera) or beech dominating the more mesic sites (Braun 1950). Predictions have been made from sites studied in New England to North Carolina that the forests would quickly regenerate (Gordon 1940, Keever 1953, Nelson 1955, Woods and Shanks 1957, 1959). Others have predicted complex changes (e.g., Good 1968, Mackey and Sivec 1973) and probably much slower natural replacement. Korstian and Stickel (1927) studied American chestnut replacement in New England, New Jersey and

and Pennsylvania. They found red oak was the dominant replacement species in Connecticut, and white oak and chestnut oak (Quercus prinus) dominated in New Jersey with red maple, dogwood, and gray birch being common associates. In Pennsylvania, Augenbaugh (1935) also reported chestnut oak and red maple were the most important replacement species. In the Southern Highlands of the Great Smoky Mountains, Nelson (1955) found replacement by codominant oaks and sourwood (Oxydendrum arboreum), cucumber tree (Magnolia acuminata), yellow birch, black birch, and hemlock. Other studies in the Great Smoky Mountains found chestnut oak and red maple as the most important replacement species (Woods and Shanks 1959, Whittaker 1956). Some evidence indicates that red oak (Keever 1953) and yellow poplar (Nelson 1955) are among the dominants and red maple will be a secondary tree. In recent studies in the New Jersey Highlands, Good (1968) indicated that mesic species such as American beech, black birch, and red maple are increasing in importance with declining success of the oak species. In the Allegheny Mountains of western Pennsylvania, a blighted and lumbered oak-chestnut forest was studied by Mackey and Sivec (1973). They found the canopy of this forest, formerly dominated by as high as 70 percent American chestnut, presently was dominated by black cherry, red maple, sugar maple, black oak, black birch and sour gum (Nyssa sylvatica). Less common species included chestnut oak, white oak, sassafras, American beech, white ash (Fraxinus americana), hickories, yellow poplar, and hemlock. Black cherry and some red maple will probably undergo a gradual and continual decline as the community undergoes further successional

change within the next decade (Mackey and Sivec 1973). After approximately 70 years since the demise of the American chestnut, equilibrium has not been reached. Judging by the northern forests where the blight began, no major changes are expected soon (Oosting 1956). Since the abundance of American chestnut varied considerably in the original eastern deciduous forests from southern Maine to northern Alabama in the late 1800's, and based on present evidence of eastern forest succession, the terminal replacement species will probably be determined by local site characteristics.

Another type of succession in southern New England is the development of a pond into a deciduous forest. The first or pioneer stage is characterized by free swimming life. As the dead matter settles to form a muck layer, plants such as the green alga, Chara, anchor in the oozy pond bottom (Smith 1966). Organic matter continues to thicken on the bottom, reducing the water depth, and more nutrients are provided for successional more demanding plants. Submerged aquatics such as pondweed (Potamogeton spp.) often become so prominent that they eliminate light required by the vegetation of lower strata. Floating aquatics next invade the pond and further reduce the lower vegetation. With an increase in decaying vegetation, emergents such as cattail (Typha spp.) become dominant. At this seral stage they may cover most of the former open-water area to form a marsh. When the pond has filled with emergent species, sedges and meadow grass become dominant and form a marsh meadow. In the forested areas, the meadow vegetation is later replaced by shrubs, such as alders (Alnus spp.), willows (Salix spp.), and buttonbush

(Cephalanthus occidentalis). Shrubs give way to trees such as red maple, aspen, and elm (Ulmus spp.). As the forest builds up and the forest floor becomes drier, the intolerants fail to develop. Mesophytic species that are tolerant of shade, such as sugar maple, beech, hemlock, yellow birch (Betula lutea) and paper birch, begin to dominate the understory and subsequently replace the intolerant species. Less important trees in the mesic habitat include white pine, northern red oak, and white ash. Shrubs include mountain laurel, maple-leaf viburnum, hazelnut (Corylus americana), witch hazel and alternate-leaved dogwood (Cornus alternifolia). Several genera of ferns are also common and include: Adiantum, Athyrium, Botrychium, Osmunda, Polypodium and Polystichum. The habitat also supports a rich array of herbaceous plants, including several species of Lycopodium, spring trilliums, violets (Viola spp.), wild ginger (Asarum canadensis), bloodroot (Sanguinaria canadensis), Dutchman's breeches (Dicentra canadensis), wood aster (Aster spp.), and wood sorrel (Oxalis spp.)

Succession does not always develop to the climax vegetation typical of a region. Stable treeless areas can exist under varied climatic conditions and geographical areas. Oosting (1956) found a band of prairie surrounded by deciduous and coastal plain forests in Alabama and Mississippi. The Hempstead Plains on Long Island was once a vast treeless area comprising 60,000 acres, although it is now reduced to about 600 acres and represents the last remnant of natural prairie east of the Appalachian (MacManus 1972). Prairie glades completely encompassed by oak-hickory forests, are found in Missouri, Iowa,

and Nebraska. Clark (1954) reported that the prevailing vegetation near Plymouth, Massachusetts and on Cape Cod consisted of pine and scrub oak. This vegetation appeared to be a climax condition partly determined by fire. A mature stand of beech, maple, oak, hemlock, and yellow birch was also reported in the region on an undisturbed island. No record of fire on the island was found. Pine and scrub oak may develop successionaly beyond this stage if forest fires are prevented (Clark 1954, Little 1973), but this development will probably be extremely slow.

2. Environmental Stresses-Natural and Man Induced

Although the growth and development of plants are internal forces, they are under environmental control (Levitt 1969). Any external force-temperature, moisture, radiation, nutrient supply, or gas composition-that enhance or retards growth and development may act as a stress that can injure or kill a certain species of plant, thus altering the vegetational composition of a community. There are natural and continuous forces that result from competition among species in a given community for water, light, nutrients and space. But, some of the major environmental stresses that create pronounced effects are: forest diseases, forest insects, pesticides, forest fires, winds, rain, drought, cutting, agricultural activities, quarrying, ice, snow, and recreational activities.

Forest Diseases: Pathogens have always been a part of every natural community, however, they seldom create significant destruction to warrant alarm. But, when alien organisms are introduced into a community, or if some other environmental stress creates an unbalance, massive infestations may occur.

In New England as in other areas of the U.S. many diseases are known to attack trees. They often kill large numbers of individuals. Some result in defoliation of the forests which drain the energy reserves and change the community growth rate. Repeated defoliations may significantly alter the vegetational composition of the community.

One of the most prominent diseases to occur in the northeast

during this century is the chestnut blight, or "chestnut bark disease", (Endothia parasitica) that killed the American chestnut (Castanea dentata).

This fungal disease destroys the cambium layer and causes death by girdling the trees. The composition of the entire former oak-chestnut association was changed by the introduction of this organism in the eastern United States. Trees were reported killed from Maine to Georgia and westward to Indiana (Beattie and Diller 1954). American chestnut was an especially important component of New Jersey forests where it was a dominant or codominant species (Korstian and Stickel 1927).

The fungus was probably introduced before 1900, but its earliest record was in 1904 (Moss 1973). By 1915, most of the chestnut trees in New England had been killed. Although some chestnut sprouts may be found in the forest, they rarely survive to the sapling stage. The only control of this disease has been through the selection of disease resistant strains or by hybridization of the American species with the Japanese or Chinese species.

Another disease common to New England is white pine blister rust (Cronartium ribicola Fischer), an import from Europe, which attacks five-needle pines. After invading a community, the rust may kill seedlings in only one year, but within several years it may girdle and kill mature trees. Control is obtained by removing the alternate hosts (gooseberry and currant) within 900 feet of five-needle pine trees. Red ring rot (Fomes pini) also damages white pine. Pitch pine (Pinus rigida) can be attacked by several fungi but these rarely cause serious damage.

Several heart rot fungi cause damage to shagbark hickory (Carya ovata), mockernut hickory (C. tomentosa), sugar maple (Acer saccharum), and the oaks (Quercus spp.). Chestnut oak (Q. prinus) is more resistant to heartwood and sapwood decay fungi than other oaks. Usually trees are made vulnerable to decay fungi through fires or other physical damage. Most rot in red maple (A. rubrum) is caused by the fungus, Polyporus glomeratus. Oaks are particularly sensitive to oak wilt disease and cankers. Some are killed within several weeks after attack. Ceratocystis fagacearum is a common oak wilt pathogen of chestnut oak, and serious canker damage is caused by Strumella and Nectria fungi, especially to the Northern red oak. Several pathogens attack the seeds of eastern hemlock (Olson et al. 1959).

Forest Insects: Many species of insects are known to attack forest trees. Although some effects are of little consequence to the forest community, others are quite serious. Insect pests cause greater losses to our timber resources annually than fire (Schaffner 1959).

Chronic defoliations appear in the forest at all times (Stephens 1971). Although there are numerous types of defoliators, their damage is usually localized. Particular concern develops when massive defoliation occurs. This happens when there are sudden increases in certain insect populations. Some of the most important defoliators in the New England area are the gypsy moth (Porthetria dispar L.), spring cankerworm (Paleacrita vernata Peck), fall cankerworm (Alsophila pometaria Harris), and elm spanworm (Ennomos subsignarius Hbn.).

The gypsy moth was introduced in Massachusetts from Europe in about 1866; since then it has become widely distributed throughout New England. An estimated 1,773,846 acres of woodland in nine northeastern states were reported defoliated during the summer of 1973; 33,215 acres were defoliated in Connecticut and 43,970 acres were defoliated in Massachusetts (Agri-News, Nov. 1973).

Several oaks, such as the white and chestnut oaks, are apparently favored trees of the gypsy moth, but quaking aspen (Populus tremuloides), red maple, and several other species are frequently affected. Turner (1963) reported one-fifth of the white pines and two-thirds of the hemlock died in one Connecticut area after a single defoliation.

Other forest insects periodically create local concern. White pine cone beetle (Conophthorus coniperda) and white pine weevil (Pissodes strobi) are frequently important to the white pine (Pinus strobus). Pitch pine loopers (Lambdina athasaris pellucidaria) cause extensive damage to pitch pine. Two species of hemlock loopers (L. fiscellaria fiscellaria and L. athasaria athasaria) and the hemlock borer (Melanophila fulvo guttata) are enemies of the eastern hemlock (Tsuga canadensis). Quaking aspen and large tooth aspen (Populus grandidentata) may be heavily damaged by poplar borers (Saperda calcarata) and forest tent caterpillars (Malacosoma disstria). Hickory bark beetles (Scolytus quadrispinosus), hickory shuckworm (Laspeyresia caryana), hickory spiral borer (Agrilus arcuatus), pecan carpenterworm (Cossula magnifica), and several species of twig girdlers (Oncideres spp.)

are the most common insect enemies of the hickories. Forest tent caterpillars and bronze birch borer (Agrilis anxius) are highly injurious to the paper birch (Betula papyrifera). Orange-striped oakworm (Anisota senatoria), forest tent caterpillar, trunk-boring insects (e. g., Goes spp.) are important stresses on the oaks. Acorns (oak fruit) are damaged by various weevils (Curculio spp.), insect larvae, and cynipids. These may damage over two-thirds of the normal acorn crop. Red maple is very susceptible to insect infestations. The gall-making borer (Xylotrechus aceris) and cottony maple scale (Pulvineria vitis) are noted insects of the red maple. Plumb and Friend (1939) reported red maples nearly completely stripped by elm spanworm. Two or three seasons of stripping resulted in death of the trees. Also elm spanworm was reported to have defoliated 60 to 65 percent of the yellow birch. Mortality of defoliated trees has been associated with attack by the two-lined chestnut borer (Agrilus bilineatus Web.) (Baker 1941). In oak mortality data reported in Pennsylvania during 1953-1966 by Nichols (1968), twenty defoliators were listed as active, but oak leaf tier (Croesia semipurpurana Kearf.) was considered most important. However, nearly all dead or dying trees were infested with two-lined chestnut borer. Nichols (1970) later reported mortality of 30 to 90 percent of the oaks in isolated locales of northern Pennsylvania caused by oak leaf roller (Archips semiferranus Wlk.) infestations.

Effects on trees are dependent upon the amount of defoliation and on the time of occurrence. If defoliation occurs early in the growing season, the trees are deprived of their ability to assimilate. A second set of leaves

may be produced during the growing season at the expense of stored reserves. But, depleted reserves may result in smaller leaf size, fewer leaves, and reduced radial growth of the tree. Thus, with reduced resistance, trees are rendered susceptible to attack by other insects and diseases (Duncan and Dodson 1958, Houston and Kuntz 1964, Nichols 1968).

Defoliation increases mortality of oaks more than maples and birches (Stephens 1971). Among the oaks, white and chestnut oaks are more vulnerable than red oak. In eastern New England about 13 percent of the unfavored species and 30 percent of the favored species died after one or more defoliations occurring between 1912 and 1921 (Baker 1941). In the Connecticut River Valley of Massachusetts, defoliation by gypsy moth occurred from one to eight times in 13 years on 34 areas comprising 2641 acres (Turner 1963). Mortality ranged from 10 to 75 percent. Apparently the mortality was greatest in oaks. There has been a continual decline of oak in the Connecticut forests since 1927 (Stephens and Waggoner 1970). This may be due to the selective pressures of defoliators, as well as reductions in forest fire pressures and clearcutting. Mortality after defoliation has not always been as great in the Connecticut forests as that reported elsewhere. In the opinion of House (1952), trees in the Connecticut and Rhode Island forests may have a greater degree of resistance than in other parts of New England.

In the past, control of forest insects and diseases has been by various pesticides, mechanical and physical controls, natural controls, biological controls and cultural controls (Fichter 1966). After recent concerns

of pesticides in the ecosystems, several non-pesticide methods of control have received greater attention (Turner 1969, Reese and Becker 1972). Among these is the silvicultural control which advocates removal of tree species susceptible to insect infestations and encourages growth of unfavored species.

Pesticides: Many people consider one of the greatest stresses that man has placed on the earth's ecosystems is through the widespread use of pesticides. For example, by the end of World War II, approximately 400,000 pounds of lead arsenate was applied to areas infested or threatened by the gypsy moth, and by 1971 over 3.46 million pounds of DDT was applied in New York state (Reese and Becker 1972). Similar treatments have been applied in many New England areas of potential or actual infestations.

Insect pests can be controlled initially by pesticide applications, such as DDT, at a level that will not be immediately harmful to birds and mammals. But, massive and periodic applications have been reported to create far-reaching environmental effects. For example, in East Lansing, Michigan annual spraying of elm trees to control Dutch elm disease resulted in heavy robin mortality. Another report indicated that treetop and trunk feeding birds have virtually disappeared from several sprayed areas (Wallace 1959). In Wisconsin, the density of songbirds was reported as reduced from 38 to 90 percent in pesticide sprayed areas. Hunt (1960) reported that robins in sprayed areas declined 69 to 98 percent below those of unsprayed communities. Bobwhite quail mortality has been reported at nearly 100 percent in some sprayed areas (Clawson 1958). Nesting success of red-winged blackbirds

was reduced 50 percent on areas treated in March and 100 percent on areas treated in May (Lay 1958). Numerous other studies indicate the detrimental effects of DDT and related pesticides on wildlife populations (Pesticides, Wildlife Studies, Fish and Wildlife Circular 199, Rudd 1964, Rudd and Genelly 1956). Effects on animals may be instant or delayed mortality or lowered fecundity.

Pesticides have been used to control many disease and pest organisms, but when used carelessly they create undesirable environmental stresses. Wide-spectrum pesticides have a shotgun affect on the entire community and not just on the target pest species. They not only kill the pest, but they may eradicate the parasites and predators that normally feed on the pests. They generally simplify the biotic community and create instability. Pest species usually recover more rapidly from pesticide applications than predators. Therefore, chemical measures to control pests tend to create a continuing demand for more chemical controls (Dasmann 1972). Baker (1972) stated that chemicals should be employed only as a last resort when other methods of control have failed.

Pesticides affect animal populations by interference with food chain components. If food organisms are killed within an area, dependent animals may result in mass starvation. Also, pesticides accumulate in tissues of organisms at lower levels of the food chain, and they concentrate as the material passes up through the food chain. The top or upper level organisms may receive lethal doses. The concentration of toxic substances in food chains

is referred to as biological magnification or biological amplification. The most serious and best documented examples of biological magnification are seen in certain birds of prey (Wagner 1971).

The bald eagle, the osprey, duck hawk, and peregrine falcon have all declined alarmingly in the past 15 years. The first two are fish-eaters, and the latter two feed on fish-eating birds. All of these exhibit impaired fertility and mortality. DDT and other chlorinated hydrocarbon pesticides have been found in their eggs, in the remains of fish scattered about their nests, and in their carcasses (Smith 1966).

Relationships have been made between reduction of eggshell thickness and population decline of the bald eagle (eggshell decline of 18%), osprey (eggshell decline of 25.1%), and peregrine falcon (eggshell decline of 18.8%) (Hickey and Anderson 1968). In nesting studies in Connecticut between 1960 and 1963, osprey annual rates of decline were reported as 13 to 14 percent (Ames and Mersereau 1964); a similar study in Connecticut during 1964-65 also reported an annual rate decline of 13-14 percent (Peterson 1969).

Small mammals also accumulate pesticides such as DDT. Mice and shrews were tested after a spraying of one pound of DDT per acre to control an outbreak of spruce budworm in Maine. Shrews had approximately 10-40 times the amount of DDT residue concentrated in mice. Mice are herbivores, while shrews, being carnivores, were further up the food chain. The shrew's carnivorous diet led to a concentration of 41 parts per million DDT during the year the forest was sprayed. After nine years the DDT residues were nearly

normal in mice, but they remained unusually high in shrews at 2 to 6 parts per million (Wagner 1971). Although this level of pesticide residue may have affected the shrews but little, their predators would certainly have greater concentrations.

The total degree of environmental stress that various introduced chemicals have placed on ecosystems is yet unclear, however pesticides appear to be omnipresent. They have been detected in the air (Turner 1965), rain water (Wheatley and Hardman 1965), freshwater (Cope 1966), salt water (Butler 1966), soils (Wheatley et al. 1962), muds (Keith 1966), humans (Woodwell 1967), invertebrates, fish, birds, and mammals. Pesticide residues have been found even in the remote corners of the earth. For example, they were found in plants in the Northwest Territories of Canada (Sheldon et al. 1964) and in fish, Adélie penguins, skua gulls and seals in the Antarctic (George and Frear 1966). Tests in Maine and New Brunswick, where DDT was sprayed from airplanes to control spruce budworms in forests, found that about 50 percent of the DDT did not fall to the ground (Woodwell 1967). Instead, the DDT became airborne.

By 1970, most biologists clearly realized the potential danger of losing birds that are high on food chains, such as hawks, falcons, eagles, owls, herons, egrets, and seabirds. Studies in the Long Island estuary, New York estimated that over one billion pounds of DDT alone might be circulating in the biosphere (Woodwell 1967). Much of the pesticides applied on terrestrial ecosystems eventually make their way into the oceans. Wurster (1968) found that

a DDT level of only a few parts per billion in seawater could drastically reduce photosynthesis in the phytoplankton which is the base of oceanic food chains. By passing up the food chains to the carnivorous seabirds, pesticides may eventually cycle back to the terrestrial ecosystems.

It is difficult to evaluate the effects of pesticides on soil. Soil organisms are extremely numerous and varied. A square meter of fertile soil yields 1×10^{15} bacteria, 1×10^7 roundworms, 1000 earthworms, 50 snails, 5×10^8 protozoa, 600 spiders, 40 harvestmen, 2×10^5 mites, 500 pillbugs, 500 centipedes and millipedes, 100 beetles, 200 flies, and 5×10^4 springtails (Kucera 1973). An integrated array of plants, animals and microorganisms is essential to soil fertility. Considerable evidence exists that insecticides may reduce soil fertility, especially in forest soils (Ehrlich and Ehrlich 1970). Based on Jones' data (1952), Kucera (1973) concluded that bacteria were curtailed when DDT was present at levels above 0.01 percent by weight of dry soil.

DDT breaks down slowly, and it persists for years in the soil, especially in forests (Woodwell and Martin 1964). After 15 years, 50 percent of the original application may still remain (Nash and Woolson 1967). Up to 32 pounds per acre of DDT were found in the upper layer of mud in the Long Island estuary where the marsh had been sprayed for 20 years to control mosquitoes (Woodwell 1967). According to Ehrlich and Ehrlich (1970), these concentrations are not unusual in other ecosystems. Even after spraying had been discontinued in a forest in New Brunswick, the DDT content of the soil increased from half a pound per acre to 1.8 pounds per acre in three years

between 1958 and 1961 (Woodwell 1967). Apparently the pesticide residues were released from the litter in normal turnover.

Forest Fires: In the past, fires periodically burned over large areas in New England. They were started by lightning, by Indians--both accidentally and intentionally, and by early settlers for land clearing. New England colonists reported that fires frequently burned continuously until the rains extinguished them (Bromley 1935, Day 1953). They were also started by railroad locomotives--because spark screens were not required (Moss 1973), and more recently by man to control certain species present in cultured timbers. Most unintentional forest fires have been brought under control in Massachusetts and Connecticut. The acreage burned in Connecticut was reduced from about 60,000 acres per year in 1910 to approximately 2,000 acres per year in 1945 (Kienholz 1963). Also, the number of fires have been reduced. Most Connecticut forest fires occur during the months of March (23%), April (33%), and May (14%). Smaller percentages of fires occur in other months, but increase again in the fall season to 14 percent in October (Kienholz 1963).

Past fires have created damage that has affected the present composition of New England forests. The abundance of more susceptible species has been reduced. Often several decades were required before these species were reestablished. Fires favor oaks, red maple, aspen, pin cherry, and the birches, because these species are rapid sprouters after disturbance. Desirable species such as beech, sugar maple, pines and hemlock may be

restricted to moist sites or eradicated locally as a result of fire.

The secondary effects of forest fires in New England are great. Recreational activities suffer because hiking and picnicking are restricted. The natural beauty of the forest is lost. The cost of clean-up after fires is generally much greater than the cost of harvesting live trees. Wildlife habitat is lost. And, soil protection is lost. The extent of damage largely depends upon the frequency of fires, their intensity, and the time of season of occurrence.

The extent of fire damage to a forest community is not immediately assessable, because some effects are delayed, ramifying, and synergistic. Humus and litter on the forest floor decompose gradually. They enrich the soil and improve the soil structure, especially its permeability. They also enhance the ability of the soil to hold water. Fires on the forest floor frequently destroy humus and immediately release nutrients to the upper layers of the mineral soil. With the loss of humus the forest soil is subject to severe erosion. This results in silt deposition in nearby streams. Loss of humus may also result in soil compaction, with resulting lower infiltration rates, and thus, greater soil run-off. Also, without the buffering effect of humus, soil temperatures increase in the daytime and decrease at nighttime, giving a greater soil temperature range. Numbers of soil microorganisms may be reduced by the intolerable environmental conditions and by the reduction of the humus-food substrate. The potential for epidemics of insects and diseases increases after fires.

Fires affect trees in various ways. Individual trees may be killed outright. Often fire only scars the tree trunk base, but scars allow insects and diseases to attack the tree. Death of the tree may be within weeks or decay may continue for years after a fire. Sprouts arise from the bases of many tree species after the tree has been killed, however these sprouts generally produce inferior trees to those originating from seeds.

Forest fires may occur as surface fires or as crown fires. Surface fires are the most frequent. The intensity of the fire determines the degree of damage. Minor burns damage the forest floor and injure tree bases. Under extremely dry conditions in late summer, deep organic matter in the forest soil may be burned with severe damage to standing trees. Crown fires are more restricted in occurrence. They generally occur in areas dominated by conifers and are usually more important in the western United States than in the east. Crown fires occur in the upper stratum of the forest under very dry conditions and travel rapidly.

The destructive effects of forest fires are well known, but the useful role of fires is generally less understood. Certain forest types originated and are perpetuated by periodic fires. Eastern white pine in Pennsylvania and New England is apparently maintained by fire (Lutz 1930, Cline and Spurr 1942, Hough and Forbes 1943). Also, fires are recommended to maintain the subclimax pitch-shortleaf pines in New Jersey (Lutz 1934, Moore 1939, Moore and Waldron 1940, Little 1946, Little and Moore 1949). Pitch-shortleaf pines are desired over the hardwood forest species that would successionaly follow

without human intervention, because the species composition of hardwood forests is frequently dominated by low quality oaks.

Other stresses: The vegetation of New England has been modified by man's activities since Indian occupation some 9,000 years ago. Concomitant with colonization in the 1600's massive deforestation plagued much of the Connecticut River Valley in Massachusetts and Connecticut. During the post-colonial period, lumbering, agricultural activities, and fires probably took place continuously, or at least repeatedly, throughout the nineteenth century.

Heavy winds and storms have been a recurring stress factor throughout the area. At least 18 relatively severe storms have hit southern Connecticut since 1786 (Niering and Goodwin 1962). Two violent storms, one in 1815 and one in 1938, essentially destroyed the oak forests near Stonington, Connecticut (Raup 1941). The most recent hurricane, occurring in September 1938, created heavy damage along the Connecticut River Valley area and in the middle sections of Connecticut to beyond the Massachusetts border. Kirk (1939) reported seven days of heavy rainfall associated with this storm. One station reported 17.7 inches of rain. Over 13 inches of rain fell throughout a belt 10 to 15 miles wide, from Branford, Connecticut, northeast into Massachusetts. The storm consisted of a whirling-circular movement of winds, over 300 miles in diameter, moving at a rate of 50 to 60 miles per hour. Winds were registered at 100 miles per hour in some locations. Due to previous heavy rainfall, the storm's destruction to forests was unprecedented (Meyer and Plusnin 1945). For example, over 100 hemlock, near New London,

Connecticut, measuring 24 to 36 inches dbh (diameter at breast height) blew down (Avery et al. 1940).

Drought has been another stress factor of some importance in the Connecticut River Valley area. Records from Hartford's Brainard Field indicated a normal average annual precipitation of about 44 inches. Between 1927 and 1937, average annual precipitation was 3.6 inches below normal; between 1937 and 1957, it was 1.0 inch above normal; between 1957 and 1967, it measured 6.9 inches below normal. During the period 1959 to 1969, Stephens and Hill (1971) reported that several Connecticut tracts received 8 to 15 percent less average precipitation than in the preceding 6 to 10 years. They found drought had little effect on mortality in undefoliated tracts. In woods where a single prior defoliation had occurred, the drought did not result in increased death. In an area twice defoliated, mortality was greater during the drought. Losses of oaks exceeded the averages of all major species in all tracts examined. Mortality increased with severity of drought and repeated defoliations.

Cutting has been another major influence on Connecticut and Massachusetts forests. For over 250 years these forests were exploited for cordwood, lumber, and charcoal production. By 1800, little mature or virgin timber remained. After the chestnut blight threatened the forest structure (approximately 1909), cutting for lumber began to taper off. Also, there has been a decreased demand for charcoal in the brass and iron industry, and oil has largely replaced wood for fuel. Repeated cuttings tended to eliminate the

non-sprouting species such as hemlock, and thereby, favor the sprouting hardwoods (Niering and Goodwin 1962). The wooded areas that are now dominated by hemlock are local.

Agricultural activities in southern New England reached a peak in about 1840; it is estimated that about 70 percent of Connecticut was cleared. Since that time the state has largely become reforested. Old stone walls traverse most of the present forests and outline the perimeter of formerly cleared agricultural land.

More recent disturbances include local quarrying. Granite was removed from many areas for building construction. Where top soil was removed, exposed barren areas have not become revegetated.

Other periodic natural phenomena causing damage to the structure and function of New England forests are ice and snow. Normally, catastrophic events occur infrequently, and the degree of damage is not easily nor adequately recorded.

Increased leisure time and interest in nature have brought greater recreational use, and thus more stresses, to the forests. Examples are: scarring or debarking of trees, scattering of refuse, destructive cutting, carelessness with fires, and destruction of vegetation and compaction of forest soil by motorized vehicles.

Environmental Stresses of Millstone Point: Ground surveys were made to determine the major environmental stresses on native plant communities in the vicinity of the Millstone Point site. The most common stresses

were caused by lumbering, insect infestations, flooding, fires, hurricanes, gales, and by the conversion of native communities to farm land, residences, commercial and industrial developments, and transportation networks. Several topographic, edaphic, and physical factors associated with the coastal environment have caused natural stresses.

The effects of recent disturbances on Millstone Point appear to be more localized than the initial large scale clearing of forested areas in southern Connecticut. Topographic relief is moderate, and erosion is minimal in most communities. Recreational activities, such as picnicking, swimming, and fishing, are mainly restricted to several beach areas. The transmission line corridor is affected by refuse dumping, periodic clearing, and changes in radiation absorption and albedo. Defoliation damage was observed in the hardwood forests in October 1973. Although defoliation had mainly occurred on the oaks, several other hardwood species were affected. Windthrows in the mixed hardwood forest communities were evidence of past severe storms. Near the coast, terrestrial vegetation communities were affected by salt spray, salt permeation to plant root systems, tidal inundations, a substrate with little or no true soil, and a paucity of available moisture in the well-drained soil. Winds near the beach also interact with the other stresses which make root anchorage uncertain.

Grazing and hay production are examples of agricultural activities that occur near the site. Other stresses on vegetation have resulted from quarrying and construction of roads and the Penn Central Railroad spur.

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Approximately one-fourth of the 500-acre site is currently occupied by the station buildings, quarry pond, parking lots, and construction areas (USAEC 1974).

3. The Central Hardwoods-Hemlock Zone

Millstone Point is located in the central hardwoods-hemlock forest zone (Westveld et al. 1956). Hardwoods in this zone are diverse, and are dominated by oaks (Quercus spp.) and hickories (Carya spp.) (Griswold and Ferguson 1957). Hemlock (Tsuga canadensis), a key conifer species, occurs over extensive areas as scattered individuals or as small reproductive groups that have expanded in the absence of fire (Lutz 1928). American beech (Fagus grandifolia), tulip tree (Liriodendron tulipifera), red maple (Acer rubrum), and sugar maple (A. saccharum) are locally important on lower slopes and in valley bottoms, coves and swales, while black oak (Q. velutina), scarlet oak (Q. coccinea), white oak (Q. alba), and chestnut oak (Q. prinus) are principal dominants of xeric ridges and slopes where the soil is thin. Eastern redcedar (Juniperus virginiana), black cherry (Prunus serotina), and gray birch (Betula populifolia) are characteristic of abandoned fields and pastures (Niering and Goodwin 1962, Niering and Egler 1966).

Much of Millstone Point was formerly cultivated. Recently, most of the agricultural land has lain idle and has successionaly reverted to its natural state.

Coastal marshes in the area are inhabited by halophytic grasses and herbs. The composition and structure of plant communities adjacent to coastal marshes are largely controlled by the salinity of water in the marsh. Most marshes in the region east of the Connecticut River to Rhode Island are less than 6 feet deep (Hill and Shearin 1970).

Mull and duff mull are the most common soils in this zone and true podzol mors are localized and rare (Westveld et al. 1956).

Long Island Sound tends to moderate the climate of southern New England. Therefore afternoon summer temperatures at Millstone Point are generally lower and winter temperatures are higher than locations further inland.

A mosaic of vegetational communities in a variety of successional stages exist in the study area. Variations in community development have resulted from multiple influences, both natural and man-induced. These include clearing, lumbering, cultivation, reforestation, grazing, fires, hurricanes, gales, and infestations.

4. Millstone Point Study Sites

A map showing the locations of each plant community sampled is presented in Figure 1. The distribution of the major plant communities in the site area is shown in Figure 2. Major vegetation types were selected and classified according to habitat features and dominant species in the habitat. Dominant species exert the greatest control over the community through use of a major portion of the available moisture, light, and nutrients, and modify the environment for lesser species. Habitat topography, moisture, ambient atmospheric and edaphic variations, microclimate effects, and human activities determine species composition.

Site 1 - Old Field

The old field community was located on a gradual south-facing slope at an elevation of approximately 80 feet. Portions of the study area

were mowed annually.

Species composition was similar to old fields in the Connecticut Arboretum at New London (Niering and Goodwin 1962). In May, orchard grass (Dactylis glomerata) and sweet vernal grass (Anthoxanthum odoratum) were dominants with relative frequencies of 21.8% and 20.5%, respectively (Table 1). Other significant vernal grasses and forbs included Kentucky bluegrass (Poa pratensis), bulbous buttercup (Ranunculus bulbosus), and common dandelion (Taraxacum officinale). Buckhorn plantain (Plantago lanceolata) occurred in various morphological stages in all sampling periods and had an average occurrence of 42.3%. The frequency of occurrence of redtop (Agrostis alba), velvet grass (Holcus lanatus), and timothy (Phleum pratense) increased considerably by July. During October the community consisted largely of the vegetative remains of Kentucky bluegrass and panic grass (Panicum sp.). Seasonal decline of some species, such as dwarf cinquefoil (Potentilla canadensis), which normally flourishes all season, was due to early maturation and development of the mid-grasses. These dense grasses effectively blocked light penetration and thereby reduced underlying species.

The old field was surrounded by a fencerow overgrown with vines and shrubs. A mixed hardwood stand bordered the community on the east. Many woody species had invaded the perimeter and were scattered in the old field; these included pioneer woody species such as blackberry (Rubus sp.), Japanese honeysuckle (Lonicera japonica), rose (Rosa sp.), arrowwood (Viburnum dentatum), poison ivy (Rhus radicans), and old field juniper (Juniperus communis).

Periodic artificial disturbances by man will curtail natural community development. However, woody successional species and native perennials such as broom sedge (Andropogon virginicus) and little bluestem (A. scoparius) will become increasingly important in unmowed areas. Orchard grass, sweet vernal grass, redtop, panic grass, velvet grass, and timothy will continue to dominate in mowed areas.

Site 2 - Mixed Hardwood Forest

Prior to disturbances in this community, the stand was probably contiguous to Site 6, another mixed hardwood stand. The two communities are separated by a transmission line corridor (Site 5) and construction storage areas. The woods is bisected by the Penn Central Railroad and a gravel access road to the transmission line corridor. Several stone fences traverse the site; these indicate that the community was previously cleared for agricultural use. Elevation ranges from 20 to 60 feet. Portions of the community occur on very moist soil near an intermittent stream and in natural depressions.

Red maple, a mesophyte, dominated the community near the stream and in depressions (importance value of 103.2), while black oak, a xeric species, dominated the upper slopes (importance value of 80.8) (Table 2). Black birch (Betula lenta), white oak, and sour gum (Nyssa sylvatica) were common associates. The presence of mockernut hickory (Carya tomentosa) and pignut hickory (C. glabra) indicated that the community was successionaly progressing toward an oak-hickory climax, common to the region. However, compositional modifications will occur in localized areas, particularly in wet environments or along the edge of openings.

Most trees occurred in the lower size classes (4.0-9.9 in. d.b.h.) (Table 3), but several large and relatively old trees were found. Increment borings of a 20.3 inch d.b.h. black gum tree revealed its age at 110 years old, and a 16.4 inch d.b.h. mockernut hickory was 123 years old. Due to more optimal growing conditions than were present at Site 6, this stand supported a greater basal area per acre (22967 sq. in.), percent crown cover (93.0%), and shrub cover (37.3%) (Table 4). However, the riparian community (Site 3) had a substantially larger basal area per acre (31232 sq. in.), and percent crown cover (98.0%).

Red maple, black birch, mockernut hickory, and sour gum dominated the sapling class (Table 5); they had relative densities of 18.3%, 12.8%, 12.8%, and 12.2%, respectively. Witch hazel (Hamamelis virginiana) and downy junberry (Amelanchier arborea) were abundant understory components.

Shade-intolerant tree species such as black cherry were present near openings and along the border of the community. The open perimeter also favored development of a dense shrub stratum. Arrowwood, sweet pepperbush (Clethra alnifolia), and spicebush (Lindera benzoin) were dominant shrubs (ground coverage of 11.0%, 9.7%, and 9.8%, respectively) (Table 6). Tree seedlings were scarce in the community.

Canada mayflower (Maianthemum canadense) and New York fern (Thelypteris noveboracensis) were common throughout the growing season (Table 7). Species composition in the groundlayer stratum was nearly 50% greater during July than in May or October. A delayed coastal spring season

and subfreezing temperatures prior to the fall sampling period reduced the number of herbs in May and October. The intermittent stream provided suitable microhabitats for mesophytes such as skunk cabbage (Symplocarpus foetidus), great Solomon's seal (Polygonatum canaliculatum) and ferns.

Site 3 - Riparian Community

The riparian community was less than 300 feet wide from Gardner's Wood Road on the east to an open recreational area on the west. A small stream longitudinally traversed the woods and periodically flooded low-lying areas.

The community was more mature than other forested areas at the site. Increment borings from several species revealed the community age at approximately 125 years old. However, past selective cutting was indicated. Species diversity of trees (16 species) was higher than other forested communities, but density was low (204.4 trees/acre) (Table 4). The basal area per acre of the riparian community was 87% greater than the mixed hardwood forest (Site 6) southeast of the transmission corridor and 36% greater than the mixed hardwood community (Site 2) northeast of the transmission corridor.

Red maple and American beech were community codominants with importance values of 86.1 and 55.4, respectively (Table 8). Although American beech was most dense (48.4 trees/acre), red maple had a greater relative dominance (40.7%). Black oak, black birch, and red oak were common associates, while mockernut hickory, sour gum, green ash (Fraxinus

pennsylvanica), black cherry, and white oak were of lesser importance. Associated tree species occurred in various size classes (Table 9).

Ordination and composition of the saplings were similar to that of the trees (Table 10); this reflected the stability and maturity of the community. American beech saplings were more prevalent than red maple saplings, and the former appeared to be increasing in abundance. Microhabitats were variable and both upland and lowland species flourished. Light penetration along the forest borders allowed successful reproduction of shade-intolerant species such as black cherry.

The shrub stratum was quite dense; small saplings, seedlings, and shrubs had a cover value of 44.4% (Table 11). American beech was the most prominent tree seedling while sweet pepperbush dominated the shrub species. Other important shrubs included common greenbrier (Smilax rotundifolia), arrowwood, pinxter flower (Rhododendron nudiflorum), maple-leaf viburnum (Viburnum acerifolium), spicebush, and mountain laurel (Kalmia latifolia).

In common with other forested communities in the site area, Canada mayflower was the most abundant spring herb that had persisted in vegetative form through July (Table 12). Skunk cabbage, marsh marigold (Caltha palustris), cinnamon fern (Osmunda cinnamomea), and jewelweed (Impatiens capensis) commonly occurred on low damp sites. Solomon's seal, aster (Aster sp.), and New York fern occupied the better drained habitats. The vegetational composition of low, wet microhabitats was similar to that

documented by Egler and Niering (1965) at the Yale Natural Preserve at New Haven, Connecticut.

Well-developed, untilled soil, and other suitable edaphic factors have facilitated development of the riparian forest over other hardwood communities at Millstone Point.

Site 4 - Brackish Marsh

This sea-level community lies along the eastern edge of the Millstone Point site and is connected to Long Island Sound by a channelized stream. Most of the salt marshes along the coast have been trenched to control mosquito breeding (Hill and Shearin 1970). This community was classified as a shallow coastal marsh, 2 to 5 feet deep (Hill and Shearin 1970). Portions are shallow open pools which will eventually fill with invading salt-tolerant emergents. Marsh vegetation is controlled primarily by salinity and water depth.

In May, vegetation was largely dormant, but grass sprouts had an 85% frequency of occurrence (Table 13). Bulrush (Scirpus sp.) was locally abundant throughout the sampling periods in drier areas along the west border of the community. Salt meadow grass (Spartina patens), salt grass (Distichlis spicata), Bigelow's glasswort (Salicornia bigelovii), seaside goldenrod (Solidago sempervirens), and smooth cordgrass (Spartina alterniflora) were the predominant species over the greatest extent of the marsh. In October these species had a total relative frequency of 79.6%. Common reed grass (Phragmites communis) grew on spoil banks adjacent to the channelized stream.

According to Hill and Shearin (1970), reedgrass, as well as shrubs and grasses not typical of the brackish marsh, commonly inhabit these built-up areas.

Other less abundant species characteristic of the brackish marsh included black grass (Juncus gerardi) and marsh fleabane (Pluchea purpurascens).

These occurred throughout the marsh whereas switch grass (Panicum virgatum) was found in higher areas only a few inches above high tide.

Site 5 - Transmission Line Corridor

The transmission line separates the two mixed hardwood communities (Sites 2 and 6). The corridor was cleared during the summer and fall of 1968. The topography is undulating and rocky. A shallow drainage ditch extends the length of the site. Refuge dumping occurs on the slopes of the ridge adjacent to the drainage ditch. The community is currently in early secondary succession.

A variety of herbaceous and woody pioneering species adapted to disturbed conditions was most commonly present but residual species from the former hardwood forest were also found. The corridor community had a high diversity of woody and herbaceous species (92). Gray birch, a species common to exposed sites, was the dominant tree species. It occurred primarily as seedlings and small saplings and had a relative frequency of 36.4% (Table 14). Most other seedlings originated from rootstocks or as disseminules from adjacent hardwood forests. The combined relative frequency of oaks and yellow birch (Betula lutea) was 50.0%. Blackberry, an early successional shrub, dominated the shrub stratum with a relative dominance value of 55.6%; however,

residual forest species such as mountain laurel and highbush blueberry (Vaccinium corymbosum) were also abundant. The total shrub cover was 29.0%.

Herbaceous species that were mature during the May survey included spikerush (Eleocharis sp.), common cinquefoil (Potentilla simplex), Canada mayflower, and cinnamon fern (Table 15). During the summer, whorled loosestrife (Lysimachia quadrifolia), woolly panicgrass (Panicum auburne), and redbud flourished, whereas rough goldenrod (Solidago rugosa) and broomsedge matured by autumn. Due to early frosts, herbs were scarce during the October sampling period. The presence of dry vegetative remains of asters, whorled loosestrife, sedges (Carex spp.), and rushes (Juncus spp.) indicated that these species had persisted in various stages of morphological development prior to the first frost.

Since woody species will be periodically controlled by herbicides, successional development of the transmission line corridor will be cyclic, and herbaceous vegetation will persist.

Site 6 - Mixed Hardwood Forest

This stand is similar to the mixed hardwood stand (Site 2) northwest of the transmission line corridor. Species composition and structure are comparable, but this community lacks the wet depressions conducive to localized red maple stands. Both communities occur at similar elevations, but Site 6 has better drainage.

Black oak dominated the community. It had an importance value of 98.0 (Table 16), which is over three times greater than its nearest competitor.

White oak, black birch, scarlet oak, pin oak (Quercus palustris), and red maple were the most common associates. Black cherry, American beech, mockernut hickory, and red oak were of less significance. Compared with other wooded sites, this community had the most open canopy (81.1%), the lowest basal area per acre (16668 sq. in.), and the least shrub cover (22.9%) (Table 4). Sixty-four percent of the trees occurred in the smallest size class (Table 17).

Residual earth mounds created by windthrows of past severe storms were prominent throughout the community. Increment cores taken from representative trees, such as a 113 year old American beech (18 in. d.b.h.), indicated that a few trees had survived over a century of disturbances. However, natural and man-induced stresses have left a relatively open canopy in the forest. Light penetration through the upper canopy was sufficient to support dense lower strata. The density of saplings (283.3 stems/acre) was higher in this community than in other wooded communities sampled. Various factors such as past disturbances, edaphic features, and proximity to the Long Island Sound which increased susceptibility to salt spray, may have contributed to the lower basal area value in the stand. White abaxial leaf surfaces from trees proximal to the Sound indicated transpirational salt residues.

Black oak and red maple codominated the sapling class (Table 18). Red maple, black cherry, beech, and mockernut hickory had greater importance as saplings than as trees, indicating a more mesic successional trend. However, major species of the upper canopy were also present as saplings, which indicated general reproductive success of many important species. Sassafras

(Sassafras albidum), and downy juneberry were prominent understory components. Black cherry and oaks dominated the shrub stratum, and sour gum and red maple were common associates. Huckleberry (Gaylussacia baccata) was the primary shrub species (63.0% relative dominance) with a cover value of 14.4% (Table 19). Arrowwood, blueberries, and sweet pepperbush also contributed to a total shrub and tree seedling coverage of 29.5%.

Thick litter and competition among woody seedlings precluded the development of a diverse herbaceous groundlayer (Table 20). Canada mayflower was an exceptionally dense herb, with occurrence values of 88% and 97% in May and July, respectively. Lady fern (Athyrium felix-femina) was locally prominent during summer and fall.

Site 7 - Abandoned Nursery

The abandoned nursery occupied considerable acreage at Millstone Point. The area was occasionally marshy and less than ideal for horticultural species. Many cultivated shrubs and trees were present and some were being salvaged. Many of the ornamental shrubs were rhododendrons and azaleas (Rhododendron spp.), while the trees included crimson king maple (Acer palmatum var. atropurpureum), flowering cherry (Prunus yedoensis var.), and mountain ash (Sorbus americanus). Trees and shrubs usually cultivated for arbors, hedges, and borders that were present in the community included juniper (Juniperus spp.), yew (Taxus spp.), barberry (Berberis spp.), and arbor-vitae (Thuja occidentalis) (Table 21).

Due to partial abandonment, the area is in various successional

stages. Cultivated species were qualitatively surveyed in May, and invading species from the fencerows and neighboring plant communities were analyzed in July and October. Because part of the area was only recently abandoned, annual plants such as common ragweed (Ambrosia artemisiifolia) were present (Table 21). Plantains (Plantago spp.), thistle (Cirsium sp.), lady's thumb (Polygonum persicaria), curly dock (Rumex crispus), and nightshade (Solanum dulcamara) were examples of pioneer species that invaded areas adjacent to cultivated plots and along the dirt access roads. In other open areas, redtop, sweet vernal grass, velvet grass, quackgrass (Agropyron repens), asters, goldenrod (Solidago spp.), and rough fleabane (Erigeron strigosus) were common. Woody species such as arrowwood and rose (Rosa sp.) also occurred in open areas; these species indicated advanced stages of succession. Rushes, sedges, jewelweed, and water hemlock (Cicuta maculata) were present in mesic microhabitats. Boxelder (Acer negundo), red maple, black cherry, and a variety of shrubs and vines inhabited fence rows and borders. Poison ivy, Virginia creeper (Parthenocissus quinquefolia), rose, allegheny blackberry (Rubus allegheniensis), and common greenbrier occurred frequently.

Cultivated species are normally not strong competitors; thus, a climax hardwood forest community will probably successionaly develop. Some nursery plants may persist for several decades, depending upon their natural affinity to the community type.

Site 8 - Beach and Managed Recreation Area

This area was developed by NUSCO for public use as a recreation area. The beach is a relatively narrow strip of sand with rock outcroppings.

Although the picnic area is mostly managed lawn with cultivated trees and shrubs, natural vegetation in various stages of succession occurs on marginal land. Beachgrass (Ammophila breviligulata), beach pea (Lathyrus japonicus), and tall wormwood (Artemisia caudata) occurred at the edge of the beach (Table 22). These were pioneer species that represent the first stage of vegetational zonation on a beach. Where these hardy plants were established in the sand, they provided a firmer base for species such as poison ivy, seaside goldenrod (Solidago sempervirens), common evening primrose (Oenothera biennis), rose, and northern bayberry (Myrica pensylvanica). Advanced stages of succession were evident inland. Herbs in these areas included common St. Johnswort (Hypericum perforatum), butterfly weed (Asclepius tuberosa), Bosc's panic grass (Panicum boscii), redtop, sweet vernal grass, common yarrow (Achillea millefolium), and morning glory (Ipomoea sp.). Common shrubs and vines were wine raspberry (Rubus phoenicolasius), dwarf and staghorn sumac (Rhus copalina and R. typhina), Virginia creeper, black-cap raspberry (Rubus occidentalis), huckleberry, and Japanese honeysuckle.

Apple (Malus sp.), cherry, downy junberry, and juniper were common trees in the managed picnic ground and around the visitors' center. Marginal areas were comprised of Japanese honeysuckle and poison ivy which covered the ground under thickets of staghorn and dwarf sumac. Goldenrod, Kentucky bluegrass, orchard grass, sheep sorrel (Rumex acetosella), redtop, common ragweed, and common St. Johnswort occurred in varying abundance. This mixture of weeds reflected disturbances inherent to borders between recreational and natural areas.

Sedum (Sedum sp.) grew in scarce clumps in the cracks of the extensive granitic outcroppings on Bay Point. Vegetation in this area was largely limited by the solid rock stratum and salt spray.

Site 9 - Beach Community

The beach community provided a harsh environment in which few plant species could survive. Nine species were recorded in May, eighteen in July, and twenty-four in October (Table 23).

American beachgrass with an average relative frequency of 92% strongly dominated the beach and formed the first vegetative successional zone (Table 23). Yellow toadflax (Linaria vulgaris) flourished in the spring (11.5% relative frequency), while common evening primrose (Oenothera biennis) increased substantially by July (15.9% relative frequency) and October (10.2% relative frequency). Seaside goldenrod and jimsonweed (Datura stramonium) also occurred among the beachgrass clumps. Rose shrubs, poison ivy, Virginia creeper, and field bindweed (Convolvulus arvensis) occurred throughout the community inland from the American beachgrass zone.

The environment was harsher for spermatophytes, and succession occurs slowly in areas closer to the sea. The first vegetational zones were subject to greater wave and tide influences, salt sprays, more critical soil moisture, wider ranges in soil and ambient air temperatures, stronger winds, and illusive plant anchorage. Where the sandy beach soil was enriched by an accumulation of organic litter, it provided a more favorable environment for secondary invaders. Diversity of species increased with increasing distance from the water's edge.

B. Mammals

1. Small Mammal Populations

During the May, July, and October 1973 sampling periods, eight species of mammals were recorded from nine study sites within the Millstone Point area. The most common species collected was the white-footed mouse (Peromyscus leucopus), which accounted for 61.0% of all mammals captured (Table 24). The meadow vole (Microtus pennsylvanicus) was next in abundance accounting for 29.7% of the total catch (Table 24). Other species collected included the shorttail shrew (Blarina brevicauda), meadow jumping mouse (Zapus hudsonius), Norway rat (Rattus norvegicus), masked shrew (Sorex cinereus), eastern chipmunk (Tamias striatus), and pine vole (Pitymys pinetorum). Data on sex, weight, and selected body measurements of individual species collected are presented in Appendix B, Tables 1-3.

2. Habitat Utilization

Habitat utilization, defined by Gentry et al. (1971) as the proportion of animals captured within each habitat type, was calculated for each community on a seasonal and cumulative basis (Tables 24-27). To equalize trapping effort among communities, the number of mammals captured per 100 trap-nights was used to calculate habitat utilization rather than the actual number captured.

Although habitat utilization fluctuated seasonally within communities, cumulative data for the three trapping periods indicate that the beach community (Site 9) received the greatest habitat utilization with 22.2% (Table 24). Utilization of this habitat increased from 5.3% in May to 20.1% in July. From July

to October habitat utilization of the beach community increased from 20.1% to 23.4%, although the number of captures per 100 trap-nights declined slightly. A vegetative analysis of the herbaceous stratum in the beach community indicated that little change had occurred in either the amount of cover or food through mid-October.

Based on cumulative data, habitat utilization of the mixed hardwood forest (Site 2) and beach and managed recreation area (Site 8) was 14.1% and 12.9% respectively (Table 24). The importance of the mixed hardwood forest was high in May (19.7%), but declined to 13.4% in July and 10.9% in October. However, the utilization of the beach and managed recreation area doubled from 11.3% in May to 26.1% in July and declined to 9.4% in October. Habitat utilization of the remaining study sites fluctuated seasonally but cumulatively did not exceed 10.5% during the three trapping periods (Table 24).

The white-footed mouse was the most abundant and widespread small mammal captured. Although P. leucopus was taken in all habitat types, wooded or brushy habitats adjacent to forest borders were preferred with 77.2% of this species total taken in these areas. Similar distributions of P. leucopus in continuous and dense shrub cover, or in tree dominated successional stages have been reported by Shure (1970, 1971). In southern New England, P. leucopus prefers wooded habitats dominated by white pine, hemlock, and oaks (Choate 1973).

The meadow vole preferred open grass or shrub dominated community types with 96.5% of this species total captured in these habitats. Hodgson (1972), Zimmerman (1965), and Wirtz and Pearson (1960) also reported that M. pennsylvanicus selects

areas where grassy vegetation is dominant. Sixty-three percent of the M. pennsylvanicus captures occurred in the brackish marsh (Site 4), beach and managed recreation area, and beach community. Shure (1971) documented a similar association of M. pennsylvanicus with a variety of barrier beach habitats in New Jersey.

Twenty-seven shorttail shrews were captured in seven of the habitat types (Table 24). Although B. brevicauda was not restricted to a specific habitat type, Jameson (1949) and Wetzel (1968) reported that wooded areas or rank, weedy fields are preferred by this species. Although the masked shrew was found exclusively within the transmission line corridor (Site 5), the occurrence of this species is not restricted to a specific habitat type (Tester and Marshall 1961).

Zapus hudsonius was collected in the old field (Site 1), transmission line corridor, and abandoned nursery (Site 7) (Table 24). Close association of Z. hudsonius with shrub and grass dominated habitat types has also been reported by Quimby (1951) and Shure (1971).

Three Norway rats were captured in the brackish marsh. Because of their social tolerance Norway rats will inhabit buildings wherever food and shelter are available; however, Schwartz and Schwartz (1959) reported this species may forage or live in nearby fields.

One pine vole was captured in the transmission line corridor. Studies by Hamilton (1938) and Benton (1955) revealed that P. pinetorum prefers mixed deciduous woods, woodland edges, and mixed overgrown fields containing thick

ground litter. It is unusual that only one P. pinetorum was captured, since the occurrence of this species is common in well drained upland coastal areas of Connecticut and Massachusetts (Miller and Getz 1969).

Although the eastern chipmunk was collected with snap-traps on two occasions, general observations of mammals in Tables 28-29 provide a better indication of habitat preference and relative abundance of this species.

3. Abundance and Reproduction

A significant increase ($P < 0.05$) in the relative abundance of small mammals occurred from May to July (Table 30). The relative abundance, expressed as the number captured per 100 trap-nights, increased from 3.48 in May to 9.25 in July (Table 30). With the exception of the riparian community, the relative abundance increased within each community during this time interval. Population increases were greatest in the beach and managed recreation area, beach community, and transmission line corridor (Table 30).

From July to October small mammal populations remained stable with the relative abundance declining from 9.25 to 8.14 captures per 100 trap-nights (Table 30). Although the relative abundance remained relatively stable within most of the habitat types, small mammal populations fluctuated dramatically in the abandoned nursery and the beach and managed recreation area (Table 30). The high relative abundance in the abandoned nursery during October reflected the greater amount of cover and food available to small mammals. During this same time period, however, the relative abundance of small mammals in the beach and managed recreation area decreased from

26.00 to 7.75 (Table 30). Since the rate of removal of small mammals normally is highest during the initial day of trapping and progressively declines during the remainder of the trapping period, the high relative abundance in July probably resulted because trapping was conducted on only one day.

With the exception of P. pinetorum, the relative abundance of each small mammal increased from May to July (Table 31). Three species including P. leucopus, B. brevicauda, and R. norvegicus continued to increase in relative abundance from July to October, while M. pennsylvanicus, Z. hudsonius, S. cinereus, and T. striatus declined during this period.

Species composition during each census period remained similar, with P. leucopus constituting a large portion of each catch. The proportion of P. leucopus varied from a high of 96.3% in May to a low of 44.9% in July and averaged 61.0% for the three trapping periods. Microtus pennsylvanicus accounted for 29.7% of the total catch and was most abundant in July when it represented 45.8% of the small mammals captured. Blarina brevicauda represented 5.9% of the total catch while the remaining four species Z. hudsonius, R. norvegicus, S. cinereus, T. striatus, and P. pinetorum accounted for less than 5% of the total catch.

Peromyscus leucopus accounted for 61.0% of the small mammals captured during the three census periods (Table 24). Relative abundance, expressed as the number captured per 100 trap-nights, increased from 3.35 in May to 4.15 in July to 5.14 through mid-October (Tables 25-27). Increased reproductive rates, greater seasonal activity, and an increased carrying capacity were largely responsible

for this species initial increase. Although the number of pregnant females declined to zero in October, the percentage of lactating females remained high. With a loss of an adequate food supply in the autumn, Jameson (1955) observed a cessation of breeding activity for Peromyscus spp. Apparently, a combination of environmental factors including weather and the amount of food and cover remained favorable throughout mid-October to sustain the relatively high population of P. leucopus.

Populations of M. pennsylvanicus fluctuated during the three census periods. The relative abundance, expressed as the number captured per 100 trap-nights, increased from 0.04 in May to 4.24 in July and declined to 2.01 by October (Tables 25-27).

Zapus hudsonius exhibited similar seasonal fluctuations with the relative abundance increasing from 0.04 captures per 100 trap-nights in May to 0.29 in July. None was captured in October. Seasonal trends of Z. hudsonius may be attributed in part to hibernation (Krutzsh 1954).

Blarina brevicauda was captured initially in July, with populations increasing from 0.38 captures per 100 trap-nights in July to 0.85 in October.

The four remaining species R. norvegicus, S. cinereus, T. striatus, and P. pinetorum exhibited slight population fluctuations. The number of these species captured is so low that inferences to the amount of seasonal change in populations cannot be drawn.

4. Measurements

The mean, range, and standard deviation were calculated for total

body length, tail length, hindfoot length, ear length, and body weight for the small mammal species captured on all study sites in the Millstone Point area during the three sampling periods (Appendix B, Tables 4-13). Differences between adult and juvenile P. leucopus and M. pennsylvanicus were most noticeable for the total length and body weight measurements (Appendix B, Tables 4-7).

A high proportion of juvenile B. brevicauda in October accounted for the large standard deviation in total length, tail length, and hindfoot length measurements (Appendix B, Table 8).

5. General Observations of Other Mammals

In addition to the small mammals that were trapped, seven additional species were either observed or their sign recorded during the four census periods (Table 28). Four species were recorded in the riparian community, while only one was observed in the beach and managed recreation area. The mixed hardwood forests (Sites 2 and 6) and the beach community accounted for 51.4% of the observations.

Visual observations or sign of cottontail rabbits (Sylvilagus spp.) were recorded in eight of the habitat types (Table 29). Cottontail rabbits were the most frequently observed larger mammal accounting for 47.2% of the sightings. Two sympatric species of cottontail rabbits, the New England cottontail (S. transitionalis) and the eastern cottontail (S. floridanus), are found in Connecticut (Linkkila 1971, Dalke 1942). Fay and Chandler (1955) noted that S. transitionalis prefers bushy woodlands, whereas S. floridanus prefers open agricultural land interspersed with bushy cover.

The eastern gray squirrel (Sciurus carolinensis) was recorded in three communities, but observations were largely restricted to the two mixed hardwood forest sites (Table 29). The eastern gray squirrel is common throughout southern New England and prefers dense deciduous forests (Hamilton 1939).

Woodchucks (Marmota monax) were abundant with 11 observations in four habitat types (Tables 28-29). Woodlands bordered by open land were preferred habitat for woodchucks.

The eastern chipmunk (T. striatus) was recorded in only three of the study sites and accounted for 12.5% of the observations. Although relatively few eastern chipmunks were observed, Wetzel (1968) reported this species is common throughout Connecticut in timber borderland habitats.

Although sign of only two raccons (Procyon lotor) was observed, this species is common throughout Connecticut (Wetzel 1968). One set of raccoon tracks was observed on mud flats in the riparian community, while the other set was recorded in the beach community (Table 29).

Although only one whitetail deer (Odocoileus virginianus) was recorded in the site area (Table 29) portions of the Millstone Point site provided favorable deer habitat. McCaffery and Creed (1969) reported that forest habitats with an abundance of forage (principally low-growing herbs and shrubs) associated with openings provide prime deer habitat. Wooded areas transversed by transmission line corridors represent somewhat similar deer habitats on the Millstone Point site. However, it is likely that intense vehicular traffic and construction activities have restricted normal patterns of deer movement in the area.

Landowners in Connecticut regard deer as a recreational asset and not an agricultural liability (McDowell and Bensen 1960).

Sign of a muskrat (Ondatra zibethicus) was observed during July in the brackish marsh (Table 29). Cuttings of emergent vegetation were sighted along the north end of the community.

The remains of a star-nosed mole (Condylura cristata) were found in the old field during October.

C. Birds

1. General Descriptions

Observations of 3692 birds comprising 106 species were recorded along nine transect routes during May, July, October 1973, and January 1974 within the Millstone Point site. The area was diverse with two types of beach habitats (Sites 8 and 9), a brackish marsh (Site 4) dominated by salt meadow grass, and an old field (Site 1) dominated by orchard grass (Figure 1). Other study areas included an abandoned nursery (Site 7) and a transmission line corridor (Site 5), both characterized by a variety of edge habitats - those areas where two or more distinctive cover types meet. The remaining study areas included a riparian community (Site 3) and two mixed hardwood forest communities (Sites 2 and 6).

Of the 106 bird species recorded in the study area, 39 were classified as permanent residents, 42 as summer residents, 10 as winter residents, and 11 as migrants (Table 32). Seasonal occurrence of individual species was based on field observations and published ornithological records (Peterson 1947, Robbins et al. 1966, Vermeer 1970, Kortright 1942, Finch 1972, a, b, c, d, Goodwin and Grandjovan 1958, Mackenzie 1961, Boyd 1962, Manter 1965, and Connecticut Audubon Society 1973). The moderating influence of the Atlantic Ocean on weather conditions during the winter partly accounted for the large number of species in the permanent resident category. Records of individual species sighted along each transect route during May, July, October 1973 and January 1974 are presented in Appendix B, Tables 14-22.

The seasonal classification for each species may vary within a given region depending upon nesting cover, food availability, weather and other environmental factors.

2. Seasonal Variations

Variation in the number of bird species observed during each sampling period reflected typical seasonal population trends. However, seasonal variations were not as extreme as in areas inland from the Atlantic Ocean where maritime climatic conditions do not prevail. The climate is somewhat more moderate and food is more readily available along the coast during winter thereby providing a more favorable environment for birds.

Surveys during the spring (mid-May) and fall (late-October) migration periods accounted for 63 and 55 species, respectively (Table 33); however, these surveys probably did not include the peak migratory movements. In southern New England peak migratory periods during spring and fall normally occur in mid to late April and late September or early October (Finch 1972, a, c). Barn swallows, (Hirundo rustica), starlings (Sturnus vulgaris), red-winged blackbirds (Agelaius phoeniceus), and common grackles (Quiscalus quiscula) were the most abundant species observed in May (Table 33). In October double-crested cormorants (Phalacrocorax auritus), Canada geese (Branta canadensis), herring gulls (Larus argentatus), starlings, and American goldfinches (Spinus tristis) were most frequently sighted.

Sixty-two bird species were observed during the summer survey (Table 33). Predominant nesting species included black ducks (Anas rubripes),

blue jays (Cyanocitta cristata), red-winged blackbirds, common grackles, and song sparrows (Melospiza melodia). The Millstone Point area offered a variety of forested, open, and freshwater and marine habitats for these species.

During the winter survey 35 bird species were recorded (Table 33). Waterfowl, gulls, and fringillids were most abundant (Table 33). Species composition and abundance were greatest in the two beach communities (Appendix B, Tables 21-22).

3. Phylogenetic Groupings

The following discussion of major phylogenetic groups pertains to various ecological characteristics of the more common and important avian species observed on the Millstone Point site.

Anseriformes: Mute swans (Cygnus olor), whistling swans (Olor columbianus), Canada geese, mallards (Anas platyrhynchos), black ducks, common goldeneyes (Bucephala clangula), buffleheads (Bucephala albeola), a common merganser (Mergus merganser), and red-breasted mergansers (Mergus serrator) were observed along transect routes in the Millstone Point area (Table 34). Flocks of Canada geese were observed migrating along the coast in October.

Mute swans were recorded during each sampling trip (Table 33). In May four cygnets were observed in the small pond adjacent to the mixed hardwood forest (Site 6). However, only two were present in July. Remains of an adult mute swan were observed in October along the abandoned road in the mixed hardwood forest (Site 6).

Black ducks were the most abundant and widespread dabbling duck, occurring in the riparian community, brackish marsh, transmission line corridor, beach and managed recreation area, and beach community (Table 34). Two broods were observed near the beach community. Although mallard broods were not observed, this species does nest in the Millstone Point area (Kortright 1942). The brackish marsh provided breeding habitat for black ducks and mallards.

Common goldeneyes, buffleheads, common mergansers, and red-breasted mergansers were common migratory species that may overwinter in the site area if open water is available (Manter 1965). Buffleheads and red-breasted mergansers were frequently sighted along the two beach communities during January (Appendix B, Tables 21-22). One pair of wood ducks (Aix sponsa) was observed during May in a shallow pond in the transmission line corridor north of Site 5.

The Long Island Sound corridor is heavily used by diving ducks (Bellrose 1968). Approximately 76,000 to 250,000 diving and 31,000 to 100,000 dabbling ducks utilize the corridor during fall migration. Estimates from winter inventories during 1960-1966, indicate that approximately 225,000 scaup overwinter between Boston and Delaware Bay annually.

Falconiformes: Raptorial birds observed in the Millstone Point area included the Cooper's hawk (Accipiter cooperii), red-tailed hawk (Buteo jamaicensis), broad-winged hawk (B. platypterus), osprey (Pandion haliaetus), and American kestrel (Falco sparverius).

The osprey was the most conspicuous raptor in the site area.

Northeast Utilities Service Company in cooperation with the Connecticut Department of Environmental Protection maintains a tall utility pole as a nesting platform. Ospreys were observed most frequently near the nesting platform along the beach community (Table 34). One pair successfully fledged two young at this site in 1973, and from 1970-1972 one-third of the ospreys in Connecticut were produced at this nesting site (USAEC 1974).

A close relationship between the reduction of eggshell thickness and population decline of the osprey has been documented by Hickey and Anderson (1968). In nesting studies in Connecticut between 1960 and 1963, Ames and Mersereau (1964) reported an annual rate of decline in osprey populations of 13 to 14 percent. A similar study in Connecticut during 1964-1965 also revealed an annual rate of decline from 13 to 14 percent (Peterson 1969).

A Cooper's hawk and a broad-winged hawk were observed over the transmission line corridor (Table 34). Because of a declining reproductive rate, the Cooper's hawk is in serious danger in the northeast (Henny and Wight 1972). Production declined from 3.53 fledglings banded per successful nest during the period 1929-45 to 2.67 banded in 1949-67. This represents a 24.4% reduction in productivity.

Single sightings of the American kestrel, the only falcon observed in the Millstone Point area, were recorded in the old field and beach communities (Table 34).

Galliformes: Bobwhite quail (Colinus virginianus) were quite abundant and widespread. This species was observed or heard in all of the plant communities except the beach community (Table 34). Forested and brushy borders along the transmission line corridor and abandoned nursery provided the most favorable habitat for bobwhites. This reflects observations by Edminster (1954) that bobwhites are closely associated with edges. Ring-necked pheasants (Phasianus colchicus) were heard or observed along the border of the old field, and in the abandoned nursery and beach and managed recreation area (Table 34). Two ruffed grouse (Bonasa umbellus) were sighted in the riparian community during October.

Ciconiiformes: The great egret (Casmerodius albus), great blue heron (Ardea herodias), green heron (Butorides virescens), black-crowned night heron (Nycticorax nycticorax), and American bittern (Botaurus lentiginosus) were observed along the two beach communities and the brackish marsh (Table 34). The occurrence of these species was primarily restricted to wet-land habitats since they are adapted for feeding on aquatic animal life. During periods of low tide, the shallow water habitats and the exposed mud and sand flats in the bay adjacent to the beach community (Site 9) provided an excellent foraging area for these species.

Charadriiformes: Three species of gulls were observed in the Millstone Point area. The herring gull and ring-billed gull (Larus delawarensis) preferred the beach communities and brackish marsh while observations of the great black-backed gull (L. marinus) were restricted to marine habitats adjacent

to the beach communities (Table 34). Exposed rocks in the bay area provided resting sites that were commonly used by the gulls during high tide. During low tide gulls fed on mollusks and crabs on the exposed tidal flats in the bay adjacent to the beach community.

Sightings of common terns (*Sterna hirundo*), a species also dependent upon an aquatic environment, were most frequent in communities utilized by gulls and herons (Table 34). The brackish marsh and bay areas adjacent to the Millstone Point site were commonly used by terns foraging for food.

Additional species in this order that were observed in the Millstone Point area included the black-bellied plover (*Squatarola squatarola*), killdeer (*Charadrius vociferus*), spotted sandpiper (*Actitis macularia*), and greater yellowlegs (*Totanus melanoleucus*). These species were sighted most frequently along the shore of the beach communities and brackish marsh. Baker (1974) reported that the principal prey of black-bellied plovers is polychaete worms and clams.

Columbiformes: With the exception of the two mixed hardwood forests, mourning doves (*Zenaida macroura*) were observed in all habitat types (Table 34). This species has a broad distribution and can be found foraging or nesting in virtually all terrestrial shrub and arboreal habitats (Hanson and Kossack 1964). Rock doves (*Columba livia*) were observed flying over the abandoned nursery and the old field.

Piciformes: The woodpecker most frequently observed was the common flicker (*Colaptes auratus*), which was most prevalent along the edge

of the transmission line corridor and in the mixed hardwood forest (Site 6) (Table 34). Common flickers were recorded in all nine communities reflecting observations by Graber and Graber (1963) that this species favors a variety of habitats including hedgerows, savanna-type areas, edge shrubbery, residential areas, and forests. Primarily forest inhabiting species, the downy woodpecker (Dendrocopos pubescens) and hairy woodpecker (D. villosus) were found most frequently in the upland hardwood forest (Site 2) and the riparian community. They were not observed in the mixed hardwood forest (Site 6) even though this area provided favorable foraging and nesting habitat.

Passeriformes:

Tyrannidae: Eastern kingbirds (Tyrannus tyrannus) were the most abundant and widespread of the flycatchers. They were found in the transmission line corridor, beach community, mixed hardwood forest (Site 6), brackish marsh and old field (Table 34). This species favored edge habitats between shrubby wooded areas and cleared or partially cleared plant communities. Observations of the great crested flycatcher (Myiarchus crinitus), eastern phoebe (Sayornis phoebe), and eastern wood pewee (Contopus virens) were restricted mainly to the mixed hardwood forest (Sites 2 and 6) and the riparian community. This distribution agrees with Karr (1968) who reported these species were found most often in bottomland forests.

Hirundinidae: Swallows were recorded in all nine communities (Table 34), but were observed most often foraging over open field or standing water habitats. The old field, brackish marsh and the pond adjacent to the

beach community provided favorable foraging habitats for swallows. The barn swallow was the most abundant and widespread, while the cliff swallow (Petrochelidon pyrrhonota) tree swallow (Iridoprocne bicolor), bank swallow (Riparia riparia), and rough-winged swallow (Stelgidopteryx ruficollis) were less numerous and were restricted to the beach communities, the brackish marsh, and the old field.

Corvidae: The blue jay and crow (Corvus brachyrhynchos) were two of the more abundant bird species sighted in the area. They were not confined to any specific habitat (Table 34). Blue jays were sighted most frequently in or along the edge of wooded habitats. Crows preferred forested areas but were observed utilizing or flying over all plant types in the site area. Both species appear to be quite versatile and capable of occupying a variety of wooded habitats.

Paridae: Black-capped chickadees (Parus atricapillus) were the most abundant and widespread member of this group occupying all the study sites except the beach community (Table 34). This species is a permanent resident in the Millstone Point area. The black-capped chickadee was most abundant in the mixed hardwood forest (Site 2) and riparian community. In Illinois Graber and Graber (1963) report that chickadees are restricted to habitats with some woody cover.

The tufted titmouse (Parus bicolor) was first recorded nesting in Connecticut in 1946 (Beddall 1963). Increased farm abandonment allowing the development of oak-hickory forests is cited as the reason for the increasing

abundance of tufted titmouse populations in southern New England (Beddall 1963). Observations of the tufted titmouse were restricted to the abandoned nursery and the wooded edge of the brackish marsh (Table 34).

Mimidae: The three members of the Family Mimidae were common and widespread in the Millstone Point area. The gray catbird (Dumetella carolinensis) was most numerous and had the broadest distribution, occurring in all nine communities (Table 34). Brown thrashers (Toxostoma rufum) were more restricted in distribution, occurring in six of the communities, while the mockingbird (Mimus polyglottos) was observed only in the transmission line corridor, brackish marsh, and old field (Table 34). Similar habitat utilization by these species has been reported by Graber et al. (1970) in Illinois where catbirds were found throughout a variety of habitats (urban areas, forest, orchard, shrubs, pastures, and marsh), while brown thrashers and mockingbirds favored hedgerows and edge communities dominated by shrubs.

Turdidae: The American robin (Turdus migratorius) was the most abundant and widespread species observed in this family. It was found in all nine communities (Table 34). Graber and Graber (1963) and Kendeigh (1945) reported that robins may be found in all types of habitats, but that they prefer residential areas, orchards, edge communities, and hedgerows. Preferred habitats of this species in the Millstone Point area included the abandoned nursery, the transmission line corridor, and the edge of the brackish marsh and the two beach communities (Table 34). The wood thrush (Hylocichla mustelina), hermit thrush (Catharus guttata), and bluebird (Sialia sialis) were

less abundant and more restricted to mixed hardwood forests (Sites 2 and 6) or their borders.

Sturnidae: Starlings were the most abundant and widespread avian species in the Millstone Point area (Table 34). Juvenile recruitment accounted for the abundance of starlings in July and October (Table 33). The relatively low number of sightings of this species during January was partially attributed to its practice of congregating in cities and other urban areas during winter. The starling is an agricultural pest as well as a serious competitor with native birds such as woodpeckers, tree swallows, purple martins (Progne subis) and eastern bluebirds (Graber et al. 1971, 1972, Martin et al. 1961, Thompson 1964).

Parulidae: Eight species of warblers were recorded during the survey. The black-and white-warbler (Mniotilta varia), blue-winged warbler (Vermivora pinus), yellow warbler (Dendroica petechia), prairie warbler (Dendroica discolor), and common yellowthroat (Geothlypis trichas) were established summer residents, while the yellow-rumped warbler (Dendroica coronata), blackburnian warbler (Dendroica fusca), and palm warbler (Dendroica palmarum) were common migrants (Table 33).

The blue-winged warbler became established in New England as a breeding species in 1932 (Boyd 1962). This uncommon warbler prefers abandoned shrubby fields interspersed with mature deciduous trees (Manter 1965, Ficken and Ficken 1968). Similar habitat preferences were observed on Millstone Point where blue-winged warblers were sighted in the beach community

transmission line corridor, riparian community and the mixed hardwood forest (Site 2) (Table 34).

In North Carolina, Parnell (1969) reported yellow warblers prefer wet thickets. Portions of the abandoned nursery and the beach and managed recreation area provided similar habitats on Millstone Point. During May and July, sightings of the yellow warbler were most common in those two habitats.

Dry thickets, stands of deciduous saplings, and wood margins provide favorable habitat for prairie warblers (Parnell 1969). Prairie warblers were sighted most frequently along the wooded borders of the transmission line corridor.

Common yellowthroats utilized moist habitats consisting of rank growths of grass, forbs, briars, shrubs, and saplings. The abandoned nursery and the edge of the transmission line corridor and mixed hardwood forest (Site 2) were preferred habitats for yellowthroats in the study area (Table 34).

Icteridae: The red-winged blackbird and common grackle were the most abundant and widespread species in this family (Table 34). The bobolink (Dolichonyx oryzivorus), eastern meadowlark (Sturnella magna), brown-headed cowbird (Molothrus ater), and northern oriole (Icterus galbula) were less abundant but still common. Red-winged blackbirds and common grackles were sighted in each of the nine habitats sampled (Table 34). Both species are capable of occupying a variety of habitats including marshes, grasslands, shrubbery, orchards, and forests (Graber and Graber 1963, Case and Hewitt 1963, Robertson 1972).

Sightings of the bobolink, eastern meadowlark, and brown-headed cowbird were generally restricted to the old field (Table 34). The northern oriole preferred woody habitats with an abundance of mature trees. Although this species was recorded at each site except the mixed hardwood forest (Site 6), it preferred mature woodlands adjacent to open areas such as the wooded borders of the brackish marsh, transmission line corridor, riparian community, and mixed hardwood forest (Site 2) (Table 34).

Fringillidae: The Family Fringillidae accounted for 16 species and approximately 15% of all bird observations along transect routes in the Millstone Point area. Common permanent residents included the cardinal (Cardinalis cardinalis), American goldfinch, field sparrow (Spizella pusilla), and song sparrow.

Beddall (1963) reported that the cardinal became established in southwestern Connecticut in 1943. Adaptability to the presence of man, climatic moderation, abandonment of farm land, and residential encroachment, were the primary reasons for the cardinal's recent range expansion. Bond (1957) reported that cardinals prefer pioneer woods over climax stands. Similar habitat preferences were observed in the Millstone Point area (Table 34).

The American goldfinch was observed in a variety of habitats, however, the beach and managed recreation area, old field, and abandoned nursery were preferred. Many observations of this species were made while it was flying over plant communities in the study area.

Field and song sparrows inhabited similar vegetation types such

as shrubby edges, old fields, marshes, and hedgerows; however, song sparrows preferred mesic habitats while the field sparrow preferred more arid areas.

The rufous-sided towhee was the most common summer fringillid in the study area. This species was most abundant in the transmission line corridor and the three wooded communities (Table 34).

Dark-eyed juncos (Junco hyemalis), tree sparrows (Spizella arborea) and white-throated sparrows (Zonotrichia albicollis) were common winter residents (Table 33). Sightings of tree sparrows and white-throated sparrows were restricted to the wooded communities while dark-eyed juncos were observed in both open and wooded areas. Winter habitat requirements of these species include dense brush cover and some patches of open ground (Davis 1973).

Less common fringillid species observed in the Millstone Point area included the rose-breasted grosbeak (Pheucticus ludovicianus), indigo bunting (Passerina cyanea), purple finch (Carpodacus purpureus), savannah sparrow (Passerculus sandwichensis), sharp-tail sparrow (Ammodramus caudacuta), vesper sparrow (Pooecetes gramineus), Lincoln's sparrow (Melospiza lincolnii), and swamp sparrow (M. georgiana).

Less Common Species: Common loons (Gavia immer) were observed in January in the bay adjacent to the two beach communities (Table 34).

A single red-necked grebe (Podiceps grisegena), a rare migrant along the Atlantic coast (Mackenzie 1961), was observed near the water intake structure in October.

Two double-crested cormorants were observed flying over the beach community in July, while 90 were recorded in October (Table 34). Similar seasonal trends were noted by Mackenzie (1961) in the Guilford area. Although the double-crested cormorant is a permanent resident, there is no evidence that this species breeds in the area (Mackenzie 1961). Exposed rocks adjacent to the two beach communities provided resting sites for double-crested cormorants.

Observations of red-eyed vireos (Vireo olivaceus) were restricted to the riparian community.

D. Reptiles and Amphibians

Of the 26 species of amphibians and 28 species of reptiles that occur in Connecticut (Connecticut State Board of Fisheries and Game, unpublished list), only five species of amphibians and one reptile were observed in the Millstone Point area (Table 35). In addition to field observations during this study, further information on distribution, habitat utilization and food habits of individual species are primarily based on studies by Conant (1958), Smith (1961) and Goin and Goin (1962).

One northern two-lined salamander (Eurycea bislineata) was captured at the edge of the stream in the riparian community (Site 3). Northern two-lined salamanders are common in wet leaves along small rocky streams in mesic forests. They feed primarily on arthropods and small worms.

One American toad (Bufo americanus) was recorded in the mixed hardwood forest (Site 6). Although this species was infrequently sighted in the study area, it has a broad ecological distribution and is capable of occupying a variety of rural and urban environments.

Green frogs (Rana clamitans melanota) were commonly sighted in the study area. This species was the most abundant amphibian recorded (16 observations) and was most frequently observed in the riparian community (Site 3), brackish marsh (Site 4), and the abandoned nursery (Site 7). Green frogs are closely associated with aquatic environments. Their diet consists primarily of mollusks, annelids and arthropods.

Six leopard frogs (Rana pipens) were observed in the transmission line

corridor (Site 5) and the abandoned nursery (Site 7). The leopard frog is frequently encountered in terrestrial habitats as well as in areas adjacent to permanent water.

Wood frogs (Rana sylvatica) were observed in the old field (Site 1) and the two mixed hardwood forests (Sites 2 and 6). Wood frogs are primarily restricted to mesic forests which contain permanent or semi-permanent ponds. Their food consists chiefly of arthropods and mollusks.

One eastern garter snake (Thamnophis sirtalis sirtalis) was captured in a Museum Special snap-trap in the riparian community (Site 3) and one in the transmission line corridor (Site 5). This species occurs in a wide variety of habitats including meadows, marshes, forests, and woodland borders. Annelids and small vertebrates comprise the bulk of this snake's diet.

E. Terrestrial Invertebrates

Two hundred and thirty-seven specimens representing 2 classes, 11 orders, and 40 families of terrestrial invertebrates were collected and identified from sweepnet samples taken in May and July 1973 from the old field (Site 1) and the riparian community (Site 3). Results of invertebrate sampling are shown in Table 36.

During both sampling periods, the relative abundance and diversity of invertebrates were greater in the old field in contrast to the riparian community. July samples provided greater numbers and diversity of organisms in both sites than May collections.

During May the most abundant invertebrates in the old field were plant

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bugs (25.6%), dance flies (23.0%), and common thrips (15.4%). In samples taken during July, the plant bug population increased and remained numerically dominant (44.4%); however, the dance flies and thrips were replaced in abundance by froghoppers (12.0%) and planthoppers (7.9%).

Midges (41.2%) were the most numerous organisms collected during May in the riparian woodland community. In July spiders (16.4%), froghoppers (12.7%), and long-legged flies (9.1%) were the most abundant groups collected.

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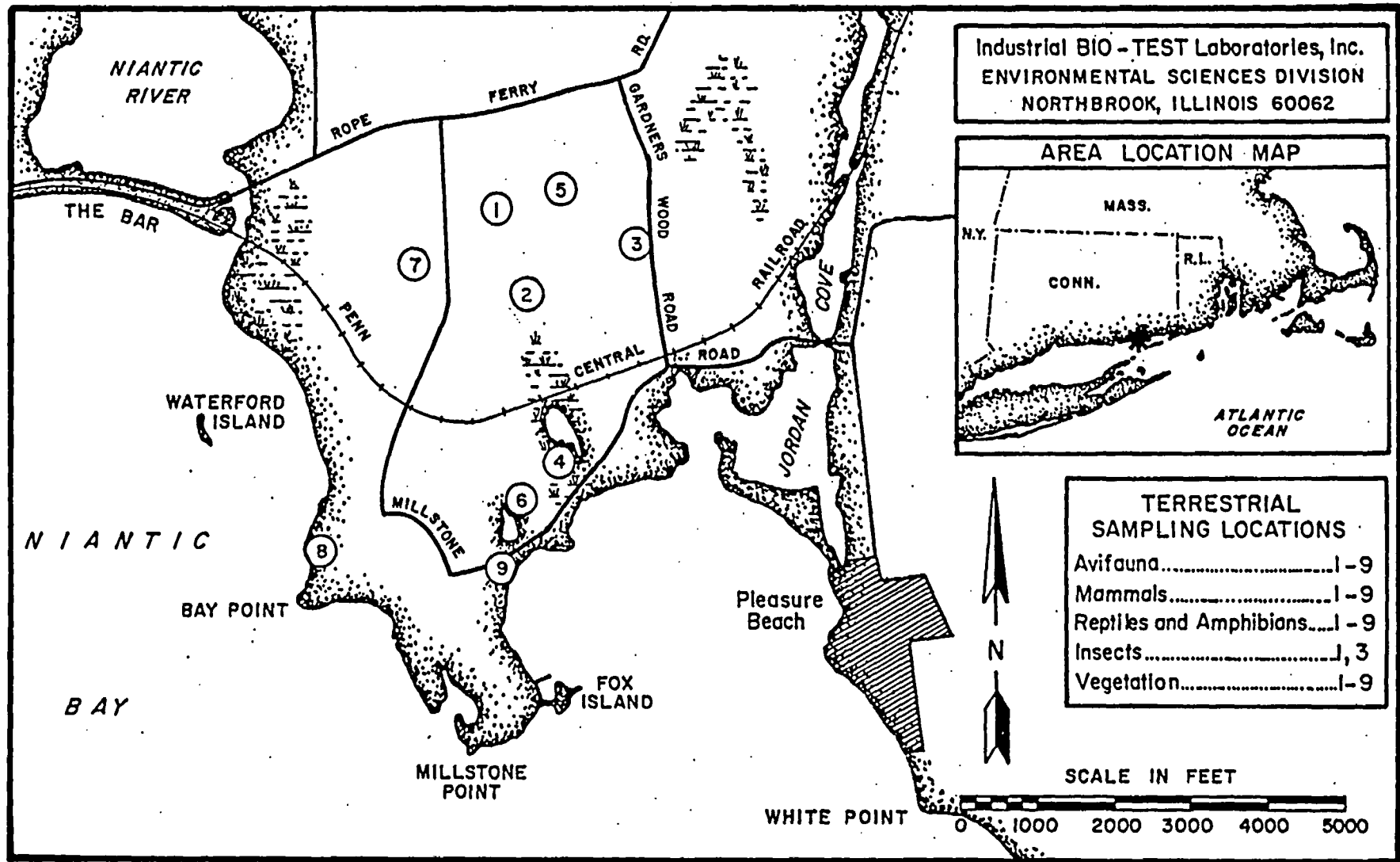


Figure 1. Terrestrial sampling locations in the vicinity of the Millstone Point site, Waterford, Connecticut.

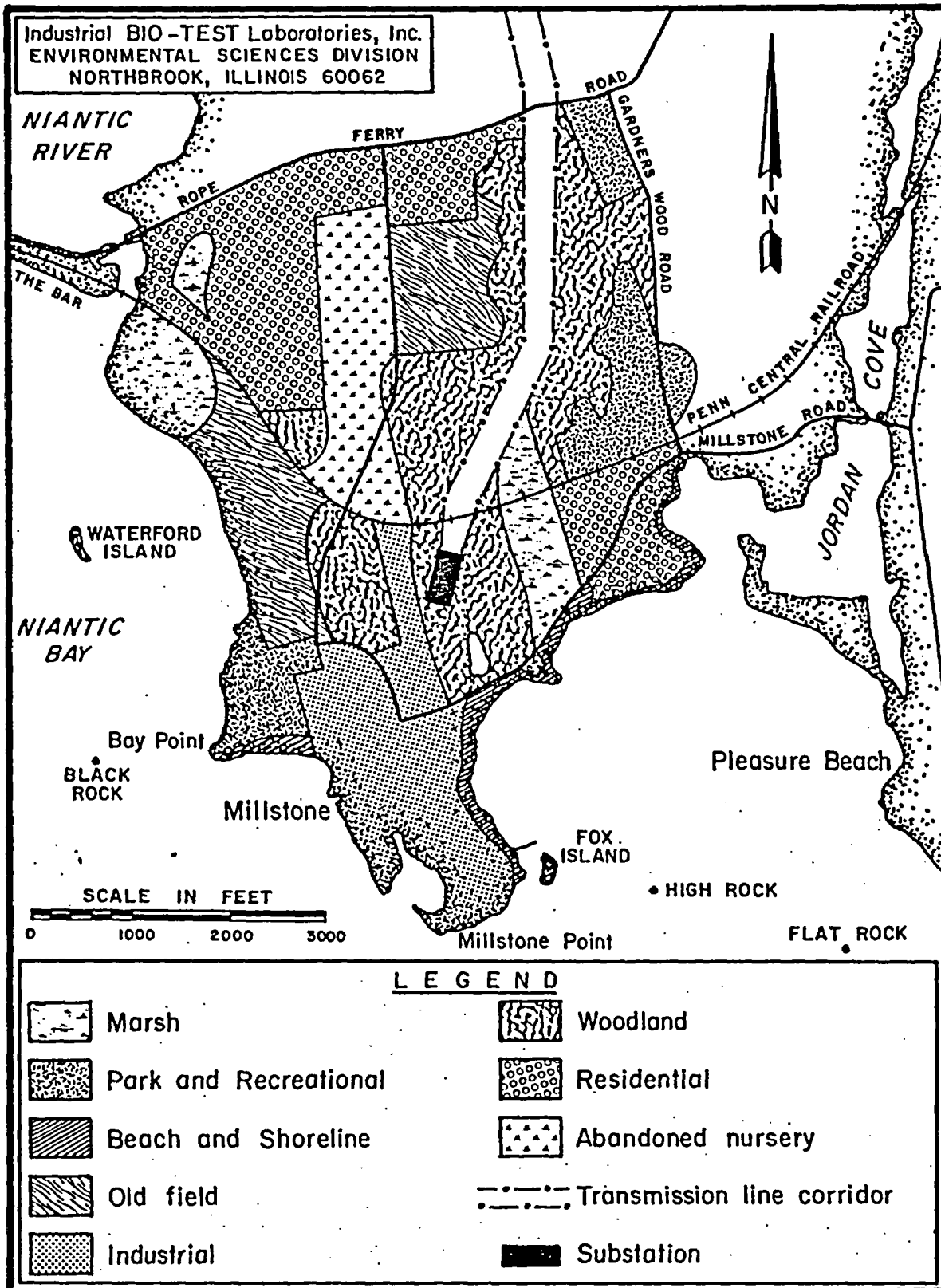


Figure 2. Distribution of vegetation communities in the vicinity of the Millstone Point site, Waterford, Connecticut.

Table 1. Analysis of herbaceous species in an old field community (Site 1) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Dactylis glomerata</u>	Orchard grass	67	21.8	45	13.3	3	0.8
<u>Anthoxanthum odoratum</u>	Sweet vernal grass	63	20.5	36	10.7	-	-
<u>Poa pratensis</u>	Kentucky bluegrass	39	12.7	6	1.8	87	23.8
<u>Plantago lanceolata</u>	Buckhorn plantain	34	11.1	48	14.2	45	12.3
<u>Ranunculus bulbosus</u>	Bulbous buttercup	22	7.2	-	-	-	-
<u>Taraxacum officinale</u>	Common dandelion	20	6.5	-	-	-	-
<u>Panicum sp.</u>	Panic grass	14	4.6	6	1.8	81	22.1
<u>Rubus sp. (imm.)</u>	Blackberry	6	1.9	4	1.2	17	4.6
<u>Compositae (imm.)</u>	Composite	5	1.6	-	-	-	-
<u>Potentilla canadensis</u>	Dwarf cinquefoil	5	1.6	-	-	2	0.5
<u>Hieracium aurantiacum</u>	Orange hawkweed	4	1.3	-	-	-	-
<u>Trifolium sp. (imm.)</u>	Clover	4	1.3	3	0.9	-	-
<u>Carex sp.</u>	Sedge	3	1.0	1	0.3	6	1.6
<u>Gramineae (imm.)</u>	Grass	3	1.0	-	-	-	-
<u>Rosa sp.</u>	Rose	3	1.0	-	-	14	3.8
<u>Viburnum dentatum</u>	Arrowwood	3	1.0	2	0.6	1	0.3
<u>Achillea millefolium</u>	Common yarrow	2	0.7	3	0.9	2	0.5
<u>Fragaria virginiana</u>	Virginia strawberry	2	0.7	3	0.9	16	4.4
<u>Lonicera japonica</u>	Japanese honeysuckle	2	0.7	4	1.2	33	9.0
<u>Oxalis stricta</u>	Yellow wood sorrel	2	0.7	-	-	3	0.8
<u>Convolvulus arvensis</u>	Field bindweed	1	0.3	-	-	-	-
<u>Prunus serotina</u>	Black cherry	1	0.3	-	-	-	-
<u>Rhus radicans</u>	Poison ivy	1	0.3	6	1.8	-	-
<u>Vaccinium corymbosum</u>	Highbush blueberry	1	0.3	-	-	-	-
<u>Agrostis alba</u>	Redtop	-	-	75	22.2	-	-
<u>Holcus lanatus</u>	Velvet grass	-	-	34	10.1	5	1.4
<u>Phleum pratense</u>	Timothy	-	-	29	8.6	-	-
<u>Crepis capillaris</u>	Smooth hawksbeard	-	-	9	2.7	-	-
<u>Agropyron repens</u>	Quackgrass	-	-	5	1.5	-	-
<u>Andropogon virginicus</u>	Broomsedge	-	-	5	1.5	15	4.1
<u>Poa compressa</u>	Canada bluegrass	-	-	4	1.2	-	-
<u>Aster sp. (imm.)</u>	Aster	-	-	2	0.6	2	0.5
<u>Asclepius syriaca</u>	Common milkweed	-	-	1	0.3	-	-
<u>Daucus carota</u>	Wild carrot	-	-	1	0.3	-	-
<u>Erigeron strigosus</u>	Rough fleabane	-	-	1	0.3	-	-
<u>Juncus sp.</u>	Rush	-	-	1	0.3	2	0.5
<u>Linaria vulgaris</u>	Yellow toadflax	-	-	1	0.3	1	0.3
<u>Ranunculus sp.</u>	Buttercup	-	-	1	0.3	-	-
<u>Rudbeckia hirta</u>	Black-eyed susan	-	-	1	0.3	-	-

Table 1. Continued.

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Rumex acetosella</u>	Sheep sorrel	-	-	1	0.3	1	0.3
<u>Paspalum sp.</u>	Paspalum	-	-	-	-	14	3.8
<u>Solidago rugosa</u>	Rough goldenrod	-	-	-	-	5	1.4
<u>Andropogon scoparius</u>	Little bluestem	-	-	-	-	2	0.5
<u>Juniperus communis</u>	Old field juniper	-	-	-	-	2	0.5
<u>Veronica sp.</u>	Speedwell	-	-	-	-	2	0.5
<u>Acer rubrum</u>	Red maple	-	-	-	-	1	0.3
<u>Chenopodium sp.</u>	Goosefoot	-	-	-	-	1	0.3
<u>Lysimachia quadrifolia</u>	Whorled loosestrife	-	-	-	-	1	0.3
<u>Myrica pennsylvanica</u>	Northern bayberry	-	-	-	-	1	0.3
<u>Prunus virginiana</u>	Choke cherry	-	-	-	-	1	0.3
Totals		307	100.1	338	100.4	366	99.8

Table 2. Analysis of trees in a mixed hardwood forest (Site 2) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a

Scientific Name	Common Name	No. Points	No. Trees	Total Basal Area (sq. in.)	% Relative Frequency	% Relative Density	% Relative Dominance	Imp. Value	Trees/Acre	BA/Acre
<u>Acer rubrum</u>	Red maple	30	58	6399	25.4	32.2	46.0	103.6	95.8	10565
<u>Quercus velutina</u>	Black oak	30	54	3529	25.4	30.0	25.4	80.8	89.3	5834
<u>Betula lenta</u>	Black birch	12	13	816	10.2	7.2	5.9	23.3	21.4	1355
<u>Quercus rubra</u>	Red oak	8	14	1071	6.8	7.8	7.7	22.3	23.2	1768
<u>Quercus alba</u>	White oak	11	11	350	9.3	6.1	2.5	17.9	18.1	574
<u>Nyssa sylvatica</u>	Sour gum	9	11	558	7.6	6.1	4.0	17.7	18.1	919
<u>Quercus coccinea</u>	Scarlet oak	5	5	346	4.2	2.8	2.5	9.5	8.3	574
<u>Carya tomentosa</u>	Mockernut hickory	5	5	234	4.2	2.8	1.7	8.7	8.3	390
<u>Quercus palustris</u>	Pin oak	3	4	327	2.5	2.2	2.4	7.1	6.5	551
<u>Fagus grandifolia</u>	American beech	2	2	45	1.7	1.1	0.3	3.1	3.3	69
<u>Carya glabra</u>	Pignut hickory	1	1	137	0.8	0.6	1.0	2.4	1.8	230
<u>Betula lutea</u>	Yellow birch	1	1	71	0.8	0.6	0.5	1.9	1.8	115
<u>Sassafras albidum</u>	Sassafras	1	1	20	0.8	0.6	0.1	1.5	1.8	23
Totals		118	180	13903	99.7	100.1	100.0	299.8	297.7	22967

- ^a Total point to plant distance = 2177.9 ft.
 Mean point to plant distance = $2177.9/180 = 12.1$ ft.
 Trees/acre = $43560/(12.1)^2 = 297.5$
 Average basal area = $13903/180 = 77.2$ in.²
 Basal area/acre = $(77.2)(297.5) = 22967$ in.²
 Percentage crown cover = 93.0

Table 3. Density of trees by size classes (trees/acre) in a mixed hardwood forest (Site 2) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Species	Size Class D.B.H. (inches)										Totals
	4.0-6.9	7.0-9.9	10.0-12.9	13.0-15.9	16.0-18.9	19.0-21.9	22.0-24.9	25.0-27.9	28.0-30.9	31.0>	
<u>Acer rubrum</u>	44.6	24.8	8.3	5.0	1.7	3.3		5.0	1.7	1.7	96.1
<u>Betula lutea</u>		1.7									1.7
<u>Betula lenta</u>	11.6	3.3	3.3	3.3							21.5
<u>Carya glabra</u>				1.7							1.7
<u>Carya tomentosa</u>	5.0		3.3								8.3
<u>Fagus grandifolia</u>	3.3										3.3
<u>Nyssa sylvatica</u>	9.9	6.6		1.7							18.2
<u>Quercus alba</u>	13.2	5.0									18.2
<u>Quercus coccinea</u>	1.7	1.7	5.0								8.4
<u>Quercus palustris</u>		3.3	3.3								6.6
<u>Quercus rubra</u>	6.6	3.3	11.6	1.7							23.2
<u>Quercus velutina</u>	19.8	47.9	19.8		1.7						89.2
<u>Sassafras albidum</u>	1.7										1.7
Totals	117.4	97.6	54.6	13.4	3.4	3.3		5.0	1.7	1.7	298.1

Table 4. Comparison of wooded communities in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Habitat	Trees/ Acre	Average Basal Area (in. ²)	B.A./Acre (in. ²)	% Crown Cover	Saplings/ Acre	% Shrub Cover ^a
Mixed Hardwood Forest (Site 2)	297.5	77.2	22967	93.0	239.0	37.3
Riparian Community (Site 3)	204.0	152.8	31232	98.0	166.0	33.7
Mixed Hardwood Forest (Site 6)	329.4	50.6	16668	81.1	283.3	22.9

^a Does not include tree seedlings found in shrub stratum.

Table 5. Analysis of saplings in a mixed hardwood forest (Site 2) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a

Scientific Name	Common Name	No. Points	No. Saplings	% Relative Frequency	% Relative Density	Saplings/Acre
<u>Acer rubrum</u>	Red maple	21	33	17.6	18.3	43.7
<u>Betula lenta</u>	Black birch	17	23	14.3	12.8	30.6
<u>Carya tomentosa</u>	Mockernut hickory	14	23	11.8	12.8	30.6
<u>Nyssa sylvatica</u>	Sour gum	13	22	10.9	12.2	29.2
<u>Hamamelis virginiana</u>	Witch hazel	7	17	5.9	9.4	22.5
<u>Prunus serotina</u>	Black cherry	10	11	8.4	6.1	14.6
<u>Betula lutea</u>	Yellow birch	7	8	5.9	4.4	10.5
<u>Quercus velutina</u>	Black oak	5	8	4.2	4.4	10.5
<u>Amelanchier arborea</u>	Downy junberry	6	6	5.0	3.3	7.9
<u>Lindera benzoin</u>	Spicebush	3	8	2.5	4.4	10.5
<u>Carya glabra</u>	Pignut hickory	4	5	3.4	2.8	6.7
<u>Fagus grandifolia</u>	American beech	3	4	2.5	2.2	5.3
<u>Quercus alba</u>	White oak	3	4	2.5	2.2	5.3
<u>Quercus rubra</u>	Red oak	2	3	1.7	1.7	4.1
<u>Viburnum dentatum</u>	Arrowwood	1	2	0.8	1.1	2.6
<u>Carpinus caroliniana</u>	American hornbeam	1	1	0.8	0.6	1.4
<u>Crataegus sp.</u>	Hawthorn	1	1	0.8	0.6	1.4
<u>Vaccinium corymbosum</u>	Highbush blueberry	1	1	0.8	0.6	1.4
Totals		119	180	99.8	99.9	238.8

^a Total point to plant distance = 2426 ft.
 Mean point to plant distance = 2426/180 = 13.5 ft.
 Sapling/acre = 43560/(13.5)² = 239.0

Table 6. Analysis of tree seedlings and shrubs in a mixed hardwood forest (Site 2) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a

Scientific Name	Common Name	No. Transects Occurred	Total Length Intercepted (ft.)	% Relative Frequency	% Relative Dominance	% Ground Cover
Tree seedlings						
<u>Prunus serotina</u>	Black cherry	1	4	50.0	66.7	0.4
<u>Nyssa sylvatica</u>	Sour gum	1	2	50.0	33.3	0.2
Totals		2	6	100.0	100.0	0.6
Shrubs						
<u>Viburnum dentatum</u>	Arrowwood	17	110	37.8	29.5	11.0
<u>Clethra alnifolia</u>	Sweet pepperbush	8	97	17.8	26.0	9.7
<u>Lindera benzoin</u>	Spicebush	5	98	11.1	26.3	9.8
<u>Smilax rotundifolia</u>	Common greenbrier	7	17	15.6	4.6	1.7
<u>Vaccinium corymbosum</u>	Highbush blueberry	5	24	11.1	6.4	2.4
<u>Rubus</u> sp.	Blackberry	1	20	2.2	5.4	2.0
<u>Hamamelis virginiana</u>	Witch hazel	1	4	2.2	1.1	0.4
<u>Ilex verticillata</u>	Black alder	1	3	2.2	0.8	0.3
Totals		45	373	100.0	100.1	37.3

^a Total transect length = 1000 ft.

Table 7. Analysis of herbaceous species in a mixed hardwood forest (Site 2) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Maianthemum canadense</u>	Canada mayflower	16	19.5	25	19.4	-	-
<u>Viburnum dentatum</u>	Arrowwood	13	15.9	16	12.4	7	13.2
<u>Thelypteris noveboracensis</u>	New York fern	11	13.4	6	4.7	8	15.1
<u>Uvularia scssilifolia</u>	Wild oats	6	7.3	2	1.6	-	-
<u>Prunus serotina</u>	Black cherry	4	4.9	4	3.1	2	3.8
<u>Dennstaedtia punctilobula</u>	Hayscented fern	3	3.7	5	3.9	-	-
<u>Symplocarpus foetidus</u>	Skunk cabbage	3	3.7	3	2.3	1	1.9
<u>Polygonatum canaliculatum</u>	Great Solomon's seal	2	2.4	-	-	-	-
<u>Arisaema triphyllum</u>	Jack-in-the-pulpit	2	2.4	3	2.3	-	-
<u>Aster sp. (imm.)</u>	Aster	2	2.4	5	3.9	-	-
<u>Clethra alnifolia</u>	Sweet pepperbush	2	2.4	7	5.4	6	11.3
<u>Gramineae</u>	Grass	2	2.4	-	-	1	1.9
<u>Impatiens capensis</u>	Jewelweed	2	2.4	3	2.3	2	3.8
<u>Lycopodium obscurum</u>	Ground pine	2	2.4	2	1.6	1	1.9
<u>Ranunculus sp.</u>	Buttercup	2	2.4	-	-	-	-
<u>Vaccinium corymbosum</u>	Highbush blueberry	2	2.4	-	-	-	-
<u>Acer rubrum</u>	Red maple	1	1.2	3	2.3	1	1.9
<u>Aralia nudicaulis</u>	Wild sarsaparilla	1	1.2	-	-	-	-
<u>Arenaria lateriflora</u>	Blunt-leaved sandwort	1	1.2	-	-	-	-
<u>Dryopteris spinulosa</u>	Spinulose woodfern	1	1.2	-	-	-	-
<u>Geranium maculatum</u>	Wild geranium	1	1.2	2	1.6	-	-
<u>Lonicera japonica</u>	Japanese honeysuckle	1	1.2	2	1.6	2	3.8
<u>Lysimachia quadrifolia</u>	Whorled loosestrife	1	1.2	1	0.8	-	-
<u>Thalictrum sp.</u>	Meadow rue	1	1.2	-	-	-	-
<u>Smilax rotundifolia</u>	Common greenbrier	-	-	7	5.4	1	1.9
<u>Rhus radicans</u>	Poison ivy	-	-	6	4.7	-	-
<u>Osmunda cinnamomea</u>	Cinnamon fern	-	-	4	3.1	5	9.4
<u>Rubus flagellaris</u>	Northern dewberry	-	-	4	3.1	3	5.7
<u>Medeola virginiana</u>	Indian cucumber-root	-	-	2	1.6	-	-
<u>Myrica pensylvanica</u>	Northern bayberry	-	-	2	1.6	-	-
<u>Osmunda regalis</u>	Royal fern	-	-	2	1.6	-	-
<u>Pteridium aquilinum</u>	Bracken fern	-	-	2	1.6	1	1.9
<u>Viburnum acerifolium</u>	Mapleleaf viburnum	-	-	2	1.6	1	1.9
<u>Athyrium filix-femina</u>	Lady fern	-	-	1	0.8	3	5.7
<u>Chimaphila maculata</u>	Spotted wintergreen	-	-	1	0.8	-	-
<u>Gaylussacia baccata</u>	Black huckleberry	-	-	1	0.8	-	-
<u>Hypericum punctatum</u>	Spotted St. Johnswort	-	-	1	0.8	-	-
<u>Lindera benzoin</u>	Spicebush	-	-	1	0.8	2	3.8

Table 7. Continued.

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Lycopodium complanatum</u>	Running pine	-	-	1	0.8	-	-
<u>Monotropa hypopithys</u>	Pinesap	-	-	1	0.8	-	-
<u>Onoclea sensibilis</u>	Sensitive fern	-	-	1	0.8	1	1.9
<u>Rhododendron nudiflorum</u>	Pinxster flower	-	-	1	0.8	-	-
<u>Carya sp.</u>	Hickory	-	-	-	-	1	1.9
<u>Mitchella repens</u>	Partridgeberry	-	-	-	-	1	1.9
<u>Quercus sp.</u>	Oak	-	-	-	-	1	1.9
<u>Sassafras albidum</u>	Sassafras	-	-	-	-	1	1.9
<u>Viola sp.</u>	Violet	-	-	-	-	1	1.9
Totals		82	99.6	129	100.7	53	100.3

Table 8. Analysis of trees in a riparian community (Site 3) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a.

Scientific Name	Common Name	No. Points	No. Trees	Total Basal Area (sq. in.)	% Relative Frequency	% Relative Density	% Relative Dominance	Imp. Value	Trees/ Acre	BA/ Acre
<u>Acer rubrum</u>	Red maple	23	34	9456	23.0	22.4	40.7	86.1	45.8	12711
<u>Fagus grandifolia</u>	American beech	16	36	3656	16.0	23.7	15.7	55.4	48.4	4903
<u>Quercus velutina</u>	Black oak	9	13	2721	9.0	8.6	11.7	29.3	17.6	3654
<u>Betula lenta</u>	Black birch	11	12	1439	11.0	7.9	6.2	25.1	16.1	1936
<u>Quercus rubra</u>	Red oak	5	12	2251	5.0	7.9	9.7	22.6	16.1	3030
<u>Carya tomentosa</u>	Mockernut hickory	6	9	700	6.0	5.9	3.0	14.9	12.1	937
<u>Nyssa sylvatica</u>	Sour gum	5	8	423	5.0	5.3	1.8	12.1	10.8	562
<u>Fraxinus pennsylvanica</u>	Green ash	5	5	512	5.0	3.3	2.2	10.5	6.7	687
<u>Prunus serotina</u>	Black cherry	5	6	160	5.0	3.9	0.7	9.6	8.0	219
<u>Quercus alba</u>	White oak	3	4	894	3.0	2.6	3.8	9.4	5.3	1187
<u>Quercus coccinea</u>	Scarlet oak	3	4	489	3.0	2.6	2.1	7.7	5.3	656
<u>Amelanchier arborea</u>	Downy juneberry	3	3	191	3.0	2.0	0.8	5.8	4.1	250
<u>Carya glabra</u>	Pignut hickory	2	2	132	2.0	1.3	0.6	3.9	2.7	187
<u>Quercus palustris</u>	Pin oak	2	2	121	2.0	1.3	0.5	3.8	2.7	156
<u>Sassafras albidum</u>	Sassafras	1	1	59	1.0	0.7	0.3	2.0	1.4	94
<u>Malus sp.</u>	Apple	1	1	24	1.0	0.7	0.1	1.8	1.4	31
Totals		100	152	23228	100.0	100.1	99.9	300.0	204.5	31200

- ^a Total point to plant distance = 2222.1 ft.
Mean point to plant distance = $2222.1/152 = 14.6$ ft.
Trees/acre = $43560/(14.6)^2 = 204.4$
Average basal area = $23228/152 = 152.8$ in.²
Basal area/acre = $(152.8)(204.4) = 31232$ in.²
Percentage crown cover = 98.0

Table 9. Density of trees by size classes (trees/acre) in a riparian community (Site 3) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Species	Size Class D.B.H. (inches)										
	4.0-6.9	7.0-9.9	10.0-12.9	13.0-15.9	16.0-18.9	19.0-21.9	22.0-24.9	25.0-27.9	28.0-30.9	31.0>	Totals
<u>Acer rubrum</u>	10.8	16.1	2.7	2.7	2.7	1.3		4.0	2.7	2.7	45.7
<u>Amelanchier arborea</u>	2.7			1.3							4.0
<u>Betula lenta</u>	1.3	4.0	4.0	4.0	2.7						16.0
<u>Carya glabra</u>	1.3		1.3								2.6
<u>Carya tomentosa</u>	4.0	2.7	2.7	2.7							12.1
<u>Fagus grandifolia</u>	16.1	12.1	8.1	8.1		1.3	2.7				48.4
<u>Fraxinus pennsylvanica</u>	2.7	1.3	1.3			1.3					6.6
<u>Malus sp.</u>	1.3										1.3
<u>Nyssa sylvatica</u>	8.1	1.3		1.3							10.7
<u>Prunus serotina</u>	8.1										8.1
<u>Quercus alba</u>	2.7			1.3					1.3		5.3
<u>Quercus coccinea</u>		1.3	1.3	2.7							5.3
<u>Quercus palustris</u>		2.7									2.7
<u>Quercus rubra</u>		5.4	1.3	2.7	2.7	2.7	1.3				16.1
<u>Quercus velutina</u>	4.0	4.0	1.3	1.3	2.7			2.7	1.3		17.3
<u>Sassafras albidum</u>		1.3									1.3
Totals	63.1	52.2	24.0	28.1	10.8	6.6	4.0	6.7	5.3	2.7	203.5

Table 10. Analysis of saplings in a riparian community (Site 3) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a.

Scientific Name	Common Name	No. Points	No. Saplings	% Relative Frequency	% Relative Density	Saplings/Acre
<u>Fagus grandifolia</u>	American beech	14	33	12.7	21.7	36.0
<u>Acer rubrum</u>	Red maple	17	26	15.5	17.1	28.4
<u>Quercus velutina</u>	Black oak	10	11	9.1	7.2	12.0
<u>Prunus serotina</u>	Black cherry	7	8	6.4	5.3	8.8
<u>Lindera benzoin</u>	Spicebush	6	9	5.5	5.9	9.8
<u>Quercus alba</u>	White oak	6	8	5.5	5.3	8.8
<u>Carya tomentosa</u>	Mockernut hickory	5	8	4.5	5.3	8.8
<u>Nyssa sylvatica</u>	Sour gum	6	6	5.5	3.9	6.5
<u>Quercus rubra</u>	Red oak	5	5	4.5	3.3	5.5
<u>Sassafras albidum</u>	Sassafras	5	5	4.5	3.3	5.5
<u>Hamamelis virginiana</u>	Witch hazel	4	6	3.6	3.9	6.5
<u>Alnus serrulata</u>	Smooth alder	4	5	3.6	3.3	5.5
<u>Amelanchier arborea</u>	Downy junberry	4	4	3.6	2.6	4.3
<u>Betula lenta</u>	Black birch	4	4	3.6	2.6	4.3
<u>Fraxinus pennsylvanica</u>	Green ash	4	4	3.6	2.6	4.3
<u>Carya glabra</u>	Pignut hickory	3	4	2.7	2.6	4.3
<u>Clethra alnifolia</u>	Sweet pepperbush	3	3	2.7	2.0	3.3
<u>Carpinus caroliniana</u>	American hornbeam	1	1	0.9	0.7	1.2
<u>Kalmia latifolia</u>	Mountain laurel	1	1	0.9	0.7	1.2
<u>Vaccinium corymbosum</u>	Highbush blueberry	1	1	0.9	0.7	1.2
Totals		110	152	99.8	100.0	166.2

^a Total point to plant distance = 2460.8 ft.
Mean point to plant distance = 2460/152 = 16.2 ft.
Saplings/acre = 43560/(16.2)² = 166.0

Table 11. Analysis of tree seedlings and shrubs in a riparian community (Site 3) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a

Scientific Name	Common Name	No. Transects Occurred	Total Length Intercepted (ft.)	% Relative Frequency	% Relative Dominance	% Ground Cover
Tree seedlings						
<u>Fagus grandifolia</u>	American beech	6	76	42.9	73.8	8.0
<u>Betula lenta</u>	Black birch	2	7	14.3	6.8	0.7
<u>Prunus serotina</u>	Black cherry	1	5	7.1	4.9	0.5
<u>Quercus sp.</u>	Oak	1	5	7.1	4.9	0.5
<u>Nyssa sylvatica</u>	Sour gum	1	4	7.1	3.9	0.4
<u>Carya glabra</u>	Pignut hickory	1	3	7.1	2.9	0.3
<u>Sassafras albidum</u>	Sassafras	1	2	7.1	1.9	0.2
<u>Amelanchier arborea</u>	Downy juneberry	1	1	7.1	1.0	0.1
Totals		14	103	99.8	100.1	10.7
Shrubs						
<u>Clethra alnifolia</u>	Sweet pepperbush	8	110	24.2	34.4	11.6
<u>Smilax rotundifolia</u>	Common greenbrier	6	68	18.2	21.3	7.2
<u>Viburnum dentatum</u>	Arrowwood	8	30	24.2	9.4	3.2
<u>Rhododendron nudiflorum</u>	Pinxter flower	3	63	9.1	19.7	6.6
<u>Viburnum acerifolium</u>	Mapleleaf viburnum	4	16	12.1	5.0	1.7
<u>Lindera benzoin</u>	Spicebush	3	25	9.1	7.8	2.6
<u>Kalmia latifolia</u>	Mountain laurel	1	8	3.0	2.5	0.8
Totals		33	320	99.9	100.1	33.7

^a Total transect length = 950 ft.

Table 12. Analysis of herbaceous species in a riparian community (Site 3) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Maianthemum canadense</u>	Canada mayflower	11	16.2	12	10.3	-	-
<u>Polygonatum biflorum</u>	Solomon's seal	8	11.8	-	-	-	-
<u>Aster sp. (imm.)</u>	Aster	6	8.8	3	2.6	-	-
<u>Thelypteris noveboracensis</u>	New York fern	6	8.8	9	7.8	5	14.3
<u>Ranunculus sp.</u>	Buttercup	5	7.4	-	-	-	-
<u>Gramineae</u>	Grass	4	5.9	2	1.7	2	5.7
<u>Amelanchier arborea</u>	Downy juneberry	3	4.4	-	-	-	-
<u>Clethra alnifolia</u>	Sweet pepperbush	3	4.4	18	15.5	7	20.0
<u>Fagus grandifolia</u>	American beech	2	2.9	2	1.7	-	-
<u>Polygonatum canaliculatum</u>	Great Solomon's seal	2	2.9	-	-	-	-
<u>Rhododendron nudiflorum</u>	Pinxter flower	2	2.9	-	-	-	-
<u>Smilacina racemosa</u>	False Solomon's seal	2	2.9	6	5.2	-	-
<u>Symplocarpus foetidus</u>	Skunk cabbage	2	2.9	6	5.2	-	-
<u>Viburnum dentatum</u>	Arrowwood	2	2.9	9	7.8	2	5.7
<u>Caltha palustris</u>	Marsh marigold	1	1.5	-	-	-	-
<u>Dryopteris spinulosa</u>	Spinulose wood fern	1	1.5	-	-	-	-
<u>Onoclea sensibilis</u>	Sensitive fern	1	1.5	2	1.7	-	-
<u>Parthenocissus quinquefolia</u>	Virginia creeper	1	1.5	1	0.9	-	-
<u>Polystichum acrostichoides</u>	Christmas fern	1	1.5	1	0.9	-	-
<u>Rhus radicans</u>	Poison ivy	1	1.5	2	1.7	-	-
<u>Rubus sp. (imm.)</u>	Blackberry	1	1.5	1	0.9	1	2.9
<u>Smilax rotundifolia</u>	Common greenbrier	1	1.5	7	6.0	6	17.1
<u>Viburnum acerifolium</u>	Mapleleaf viburnum	1	1.5	2	1.7	3	8.6
<u>Viola sp. (imm.)</u>	Violet	1	1.5	1	0.9	1	2.9
<u>Osmunda cinnamomea</u>	Cinnamon fern	-	-	7	6.0	-	-
<u>Carex sp.</u>	Sedge	-	-	4	3.4	2	5.7
<u>Impatiens capensis</u>	Jewelweed	-	-	4	3.4	-	-
<u>Lindera benzoin</u>	Spicebush	-	-	3	2.6	1	2.9
<u>Medeola virginiana</u>	Indian cucumber-root	-	-	3	2.6	-	-
<u>Arisaema triphyllum</u>	Jack-in-the-pulpit	-	-	2	1.7	-	-
<u>Lonicera japonica</u>	Japanese honeysuckle	-	-	2	1.7	-	-
<u>Acer rubrum</u>	Red maple	-	-	1	0.9	-	-
<u>Boehmeria cylindrica</u>	False nettle	-	-	1	0.9	-	-
<u>Dennstaedtia punctilobula</u>	Hayscented fern	-	-	1	0.9	-	-
<u>Lysimachia quadrifolia</u>	Whorled loosestrife	-	-	1	0.9	-	-
<u>Monotropa uniflora</u>	Indian-pipe	-	-	1	0.9	-	-
<u>Quercus alba</u>	White oak	-	-	1	0.9	-	-
<u>Thalictrum sp.</u>	Meadow rue	-	-	1	0.9	-	-
<u>Compositae</u>	Composite	-	-	-	-	1	2.9

Table 12. Continued.

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Nyssa sylvatica</u>	Sour gum	-	-	-	-	1	2.9
<u>Prunus serotina</u>	Black cherry	-	-	-	-	1	2.9
<u>Quercus sp.</u>	Oak	-	-	-	-	1	2.9
<u>Smilax glauca</u>	Glaucous greenbrier	-	-	-	-	1	2.9
Totals		68	100.1	116	100.2	35	100.3

Table 13. Analysis of herbaceous species in a brackish marsh (Site 4) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Gramineae (imm.)</u>	Grass	85	52.1	-	-	10	6.4
<u>Scirpus sp. (imm.)</u>	Bulrush	19	11.7	9	7.1	7	4.5
<u>Distichlis spicata</u>	Salt grass	17	10.4	14	11.0	22	14.0
<u>Solidago sempervirens</u>	Seaside goldenrod	17	10.4	16	12.6	9	5.7
<u>Carex sp. (imm.)</u>	Sedge	6	3.7	1	0.8	-	-
<u>Labiatae (imm.)</u>	Mint	5	3.1	3	2.4	-	-
<u>Phragmites communis</u>	Common reed grass	5	3.1	18	14.2	6	3.8
<u>Poa pratensis</u>	Kentucky bluegrass	2	1.2	4	3.1	-	-
<u>Rhus radicans</u>	Poison ivy	2	1.2	1	0.8	1	0.6
<u>Rosa sp.</u>	Rose	2	1.2	-	-	1	0.6
<u>Ammophila breviligulata</u>	American beachgrass	1	0.6	-	-	-	-
<u>Convolvulus arvensis</u>	Field bindweed	1	0.6	-	-	-	-
<u>Vaccinium corymbosum</u>	Highbush blueberry	1	0.6	-	-	-	-
<u>Spartina patens</u>	Salt meadow grass	-	-	29	22.8	56	35.7
<u>Salicornia bigelovii</u>	Bigelow's glasswort	-	-	10	7.9	23	14.6
<u>Festuca sp.</u>	Fescue grass	-	-	7	5.5	-	-
<u>Juncus gerardi</u>	Black grass	-	-	5	3.9	1	0.6
<u>Juncus sp.</u>	Rush	-	-	3	2.4	-	-
<u>Panicum virgatum</u>	Switch grass	-	-	2	1.6	-	-
<u>Rumex acetosella</u>	Sheep sorrel	-	-	2	1.6	-	-
<u>Equisetum arvense</u>	Common horsetail	-	-	1	0.8	-	-
<u>Geum sp. (imm.)</u>	Avens	-	-	1	0.8	-	-
<u>Sparganium sp.</u>	Burreed	-	-	1	0.8	-	-
<u>Spartina alterniflora</u>	Smooth cordgrass	-	-	-	-	15	9.6
<u>Pluchea purpurascens</u>	Marsh fleabane	-	-	-	-	5	3.2
<u>Atriplex sp.</u>	Orache	-	-	-	-	1	0.6
Totals		163	99.9	127	100.1	157	99.9

Table 14. Analysis of tree seedlings and shrubs in a transmission line corridor (Site 5) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a.

Scientific Name	Common Name	No. Transects Occurred	Total Length Intercepted (ft.)	% Relative Frequency	% Relative Dominance	% Ground Cover
Tree seedlings						
<u>Betula populifolia</u>	Gray birch	8	11	36.4	25.6	0.6
<u>Quercus sp.</u>	Oak	5	6	22.7	14.0	0.3
<u>Betula lutea</u>	Yellow birch	4	7	18.2	16.3	0.4
<u>Quercus rubra</u>	Red oak	2	9	9.1	20.9	0.5
<u>Ostrya virginiana</u>	Eastern hophornbeam	1	8	4.5	18.6	0.5
<u>Acer rubrum</u>	Red maple	2	2	9.1	4.7	0.1
Totals		22	43	100.0	100.1	2.4
Shrubs						
<u>Rubus allegheniensis</u>	Allegheny blackberry	24	147	26.1	29.0	8.4
<u>Rubus sp.</u>	Blackberry	8	135	8.7	26.6	7.7
<u>Kalmia latifolia</u>	Mountain laurel	10	55	10.9	10.8	3.1
<u>Vaccinium corymbosum</u>	Highbush blueberry	12	43	13.0	8.5	2.5
<u>Smilax rotundifolia</u>	Common greenbrier	6	19	6.5	3.7	1.1
<u>Rosa sp.</u>	Rose	4	25	4.3	4.9	1.4
<u>Smilax glauca</u>	Glaucous greenbrier	3	25	3.3	4.9	1.4
<u>Clethra alnifolia</u>	Sweet pepperbush	3	15	3.3	3.0	0.9
<u>Rhododendron nudiflorum</u>	Pinxter flower	4	8	4.3	1.6	0.5
<u>Rhus typhina</u>	Staghorn sumac	4	7	4.3	1.4	0.4
<u>Viburnum dentatum</u>	Arrowwood	4	7	4.3	1.4	0.4
<u>Spiraea tomentosa</u>	Steeplebush	4	5	4.3	1.0	0.3
<u>Hamamelis virginiana</u>	Witch hazel	2	4	2.2	0.8	0.2
<u>Myrica pensylvanica</u>	Northern bayberry	1	6	1.1	1.2	0.3
<u>Rhus copalina</u>	Dwarf sumac	1	3	1.1	0.6	0.2
<u>Comptonia peregrina</u>	Sweetfern	1	2	1.1	0.4	0.1
<u>Viburnum acerifolium</u>	Mapleleaf viburnum	1	1	1.1	0.2	0.1
Totals		92	507	99.9	100.0	29.0

^a Total transect length = 1750 ft.

Table 15. Analysis of herbaceous species in a transmission line corridor (Site 5) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Aster spp. (imm.)</u>	Aster	35	12.5	29	10.7	-	-
<u>Eleocharis sp.</u>	Spikerush	25	8.9	-	-	-	-
<u>Rubus allegheniensis</u>	Allegheny blackberry	24	8.6	17	6.3	9	5.4
<u>Lysimachia quadrifolia</u>	Whorled loosestrife	22	7.9	26	9.6	-	-
<u>Potentilla simplex</u>	Common cinquefoil	20	7.1	10	3.7	2	1.2
<u>Maianthemum canadense</u>	Canada mayflower	16	5.7	1	0.4	-	-
<u>Carex spp.</u>	Sedge	14	5.0	16	5.9	15	9.0
<u>Osmunda cinnamomea</u>	Cinnamon fern	13	4.6	6	2.2	-	-
<u>Gramineae (imm.)</u>	Grass	10	3.6	-	-	13	7.8
<u>Juncus sp.</u>	Rush	10	3.6	13	4.8	10	6.0
<u>Potentilla canadensis</u>	Dwarf cinquefoil	8	2.9	7	2.6	3	1.8
<u>Lonicera japonica</u>	Japanese honeysuckle	7	2.5	1	0.4	1	0.6
<u>Digitaria sp.</u>	Crabgrass	6	2.1	-	-	-	-
<u>Anthoxanthum odoratum</u>	Sweet vernal grass	5	1.8	3	1.1	-	-
<u>Aralia nudicaulis</u>	Wild sarsaparilla	4	1.4	-	-	-	-
<u>Impatiens capensis</u>	Jewelweed	4	1.4	5	1.9	-	-
<u>Phragmites communis</u>	Common reed grass	4	1.4	-	-	1	0.6
<u>Symplocarpus foetidus</u>	Skunk cabbage	4	1.4	1	0.4	-	-
<u>Arenaria lateriflora</u>	Blunt-leaved sandwort	3	1.1	-	-	-	-
<u>Arisaema triphyllum</u>	Jack-in-the-pulpit	3	1.1	-	-	-	-
<u>Cerastium vulgatum</u>	Mouse-ear chickweed	3	1.1	-	-	-	-
<u>Rumex acetosella</u>	Sheep sorrel	3	1.1	2	0.7	3	1.8
<u>Smilax rotundifolia</u>	Common greenbrier	3	1.1	4	1.5	4	2.4
<u>Betula lutea</u>	Yellow birch	2	0.7	2	0.7	1	0.6
<u>Equisetum arvense</u>	Field horsetail	2	0.7	1	0.4	-	-
<u>Fragaria virginiana</u>	Virginia strawberry	2	0.7	2	0.7	4	2.4
<u>Geranium maculatum</u>	Wild geranium	2	0.7	-	-	-	-
<u>Labiatae (imm.)</u>	Mint	2	0.7	-	-	-	-
<u>Polygonatum canaliculatum</u>	Great Solomon's seal	2	0.7	-	-	-	-
<u>Thalictrum sp.</u>	Meadow rue	2	0.7	-	-	-	-
<u>Viola lanceolata</u>	Lance-leaved violet	2	0.7	-	-	-	-
<u>Acer rubrum</u>	Red maple	1	0.4	2	0.7	-	-
<u>Betula populifolia</u>	Gray birch	1	0.4	3	1.1	2	1.2
<u>Convolvulus arvensis</u>	Field bindweed	1	0.4	-	-	1	0.6
<u>Geum sp. (imm.)</u>	Avens	1	0.4	-	-	-	-
<u>Hamamelis virginiana</u>	Witch hazel	1	0.4	1	0.4	-	-
<u>Onoclea sensibilis</u>	Sensitive fern	1	0.4	-	-	-	-
<u>Oxalis stricta</u>	Yellow wood sorrel	1	0.4	5	1.9	-	-
<u>Poa pratensis</u>	Kentucky bluegrass	1	0.4	1	0.4	-	-
<u>Prunus serotina</u>	Black cherry	1	0.4	2	0.7	-	-

Table 15. Continued.

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Quercus</u> sp. (imm.)	Oak	1	0.4	-	-	-	-
<u>Ranunculus</u> sp. (imm.)	Buttercup	1	0.4	-	-	-	-
<u>Rosa</u> sp.	Rose	1	0.4	1	0.4	1	0.6
<u>Scrophularia lanceolata</u>	Lance-leaved figwort	1	0.4	-	-	-	-
<u>Uvularia grandiflora</u>	Large-flowered bellwort	1	0.4	-	-	-	-
<u>Vaccinium corymbosum</u>	Highbush blueberry	1	0.4	2	0.7	4	2.4
<u>Viburnum acerifolium</u>	Mapleleaf viburnum	1	0.4	-	-	1	0.6
<u>Viburnum dentatum</u>	Arrowwood	1	0.4	1	0.4	3	1.8
<u>Rubus flagellaris</u>	Northern dewberry	-	-	17	6.3	11	6.6
<u>Panicum auburne</u>	Wooly panicgrass	-	-	16	5.9	-	-
<u>Solidago</u> sp. (imm.)	Goldenrod	-	-	12	4.4	-	-
<u>Kalmia latifolia</u>	Mountain laurel	-	-	6	2.2	4	2.4
<u>Agrostis alba</u>	Red top	-	-	5	1.9	8	4.8
<u>Clethra alnifolia</u>	Sweet pepperbush	-	-	5	1.9	4	2.4
<u>Ipomoea</u> sp. (imm.)	Morning glory	-	-	4	1.5	-	-
<u>Linaria vulgaris</u>	Yellow toadflax	-	-	4	1.5	3	1.8
<u>Baptisia tinctoria</u>	Wild indigo	-	-	3	1.1	-	-
<u>Galium triflorum</u>	Fragrant bedstraw	-	-	3	1.1	-	-
<u>Panicum boscii</u>	Bosc's panicgrass	-	-	3	1.1	-	-
<u>Achillea millefolium</u>	Common yarrow	-	-	2	0.7	-	-
<u>Lyonia ligustrina</u>	Maleberry	-	-	2	0.7	-	-
<u>Mimulus ringens</u>	Square-stemmed monkeyflower	-	-	2	0.7	-	-
<u>Pteridium aquilinum</u>	Bracken fern	-	-	2	0.7	-	-
<u>Sassafras albidum</u>	Sassafras	-	-	2	0.7	-	-
<u>Viola fimbriatula</u>	Northern downy violet	-	-	2	0.7	-	-
<u>Amelanchier laevis</u>	Smooth juneberry	-	-	1	0.4	-	-
<u>Apios americana</u>	Groundnut	-	-	1	0.4	-	-
<u>Berberis vulgaris</u>	Common barberry	-	-	1	0.4	-	-
Compositae (imm.)	Composite	-	-	1	0.4	-	-
<u>Holcus lanatus</u>	Velvet grass	-	-	1	0.4	-	-
<u>Lindera benzoin</u>	Spicebush	-	-	1	0.4	-	-
<u>Lycopus americanus</u>	American bugleweed	-	-	1	0.4	-	-
<u>Phytolacca americana</u>	Pokeweed	-	-	1	0.4	-	-
<u>Polygonum</u> sp.	Smartweed	-	-	1	0.4	-	-
<u>Quercus rubra</u>	Red oak	-	-	1	0.4	-	-
<u>Rhododendron nudiflorum</u>	Pinxter flower	-	-	1	0.4	1	0.6
<u>Smilax glauca</u>	Glaucous greenbrier	-	-	1	0.4	1	0.6
<u>Spiraea tomentosa</u>	Steeplebush	-	-	1	0.4	2	1.2
<u>Thelypteris noveboracensis</u>	New York fern	-	-	1	0.4	-	-

Table 15. Continued.

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Verbena</u> sp. (imm.)	Vervain	-	-	1	0.4	2	1.2
<u>Vitis</u> sp. (imm.)	Grape	-	-	1	0.4	-	-
<u>Solidago rugosa</u>	Rough goldenrod	-	-	-	-	22	13.3
<u>Panicum</u> spp.	Panic grass	-	-	-	-	13	7.8
<u>Andropogon virginicus</u>	Broomsedge	-	-	-	-	5	3.0
<u>Lycopodium obscurum</u>	Ground pine	-	-	-	-	2	1.2
<u>Cyperus</u> sp.	Sedge	-	-	-	-	1	0.6
<u>Dennstaedtia punctilobula</u>	Hayscented fern	-	-	-	-	1	0.6
<u>Epilobium</u> sp.	Willowherb	-	-	-	-	1	0.6
<u>Eupatorium perfoliatum</u>	Boneset	-	-	-	-	1	0.6
<u>Hypericum</u> sp.	St. Johnswort	-	-	-	-	1	0.6
<u>Juniperus virginiana</u>	Eastern redcedar	-	-	-	-	1	0.6
<u>Myrica pensylvanica</u>	Northern bayberry	-	-	-	-	1	0.6
<u>Polygonum arifolium</u>	Halberd-leaved tearthumb	-	-	-	-	1	0.6
<u>Typha latifolia</u>	Common cattail	-	-	-	-	1	0.6
Totals		280	100.3	270	100.2	166	99.7

Table 16. Analysis of trees in a mixed hardwood forest (Site 6) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a

Scientific Name	Common Name	No. Points	No. Trees	Total Basal Area (sq. in.)	% Relative Frequency	% Relative Density	% Relative Dominance	Imp. Value	Trees/Acre	BA/Acre
<u>Quercus velutina</u>	Black oak	33	76	3243	28.0	38.0	32.0	98.0	125.2	5334
<u>Quercus alba</u>	White oak	13	22	1015	11.0	11.0	10.0	32.0	36.2	1667
<u>Betula lenta</u>	Black birch	15	19	837	12.7	9.5	8.3	30.5	31.3	1383
<u>Quercus coccinea</u>	Scarlet oak	14	22	660	11.9	11.0	6.5	29.4	36.2	1083
<u>Quercus palustris</u>	Pin oak	14	22	591	11.9	11.0	5.8	28.7	36.2	967
<u>Acer rubrum</u>	Red maple	11	13	1242	9.3	6.5	12.3	28.1	21.4	2050
<u>Prunus serotina</u>	Black cherry	4	6	1646	3.4	3.0	16.3	22.7	9.9	2717
<u>Fagus grandifolia</u>	American beech	4	7	373	3.4	3.5	3.7	10.6	11.5	617
<u>Carya tomentosa</u>	Mockernut hickory	5	7	252	4.2	3.5	2.5	10.2	11.5	417
<u>Quercus rubra</u>	Red oak	2	3	105	1.7	1.5	1.0	4.2	4.9	167
<u>Hamamelis virginiana</u>	Witch hazel	1	1	111	0.8	0.5	1.1	2.4	1.6	183
<u>Populus grandidentata</u>	Bigtooth aspen	1	1	29	0.8	0.5	0.3	1.6	1.6	50
<u>Sassafras albidum</u>	Sassafras	1	1	18	0.8	0.5	0.2	1.5	1.6	33
Totals		118	200	10122	99.9	100.0	100.0	299.9	329.1	16668

- ^a Total point to plant distance = 2305.0 ft.
 Mean point to plant distance = 2305.0/200 = 11.5 ft.
 Trees/acre = 43560/(11.5)² = 329.4
 Average basal area = 10122/200 = 50.6 in.²
 Basal area/acre = (50.6)(329.4) = 16668 in.²
 Percent crown cover = 81.1

Table 17. Density of trees by size classes (trees/acre) in a mixed hardwood forest (Site 6) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Species	Size Class D.B.H. (inches)									Totals	
	4.0-6.9	7.0-9.9	10.0-12.9	13.0-15.9	16.0-18.9	19.0-21.9	22.0-24.9	25.0-27.9	28.0-30.9		31.0>
<u>Acer rubrum</u>	13.2	1.6	1.6	1.6		1.6	1.6				21.2
<u>Betula lenta</u>	16.5	8.2	3.3	1.6							29.6
<u>Carya glabra</u>	1.6										1.6
<u>Carya tomentosa</u>	6.6	4.9									11.5
<u>Fagus grandifolia</u>	3.3	6.6	1.6								11.5
<u>Hamamelis virginiana</u>			1.6								1.6
<u>Populus grandidentata</u>	1.6										1.6
<u>Prunus serotina</u>	4.9	1.6	1.6							1.6	9.7
<u>Quercus alba</u>	23.1	8.2	1.6	1.6	1.6						36.1
<u>Quercus coccinea</u>	24.7	11.5									36.2
<u>Quercus palustris</u>	29.6	6.6									36.2
<u>Quercus rubra</u>	1.6	3.3									4.9
<u>Quercus velutina</u>	82.4	28.0	9.9	1.6	3.3						125.2
<u>Sassafras albidum</u>	1.6										1.6
Totals	210.7	80.5	21.2	6.4	4.9	1.6	1.6			1.6	328.5

Table 18. Analysis of saplings in a mixed hardwood forest (Site 6) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a

Scientific Name	Common Name	No. Points	No. Saplings	% Relative Frequency	% Relative Density	Saplings/Acre
<u>Quercus velutina</u>	Black oak	25	42	17.1	21.0	59.5
<u>Acer rubrum</u>	Red maple	25	39	17.1	19.5	55.2
<u>Prunus serotina</u>	Black cherry	17	23	11.6	11.5	32.6
<u>Quercus alba</u>	White oak	16	20	11.0	10.0	28.3
<u>Carya tomentosa</u>	Mockernut hickory	13	15	8.9	7.5	21.2
<u>Fagus grandifolia</u>	American beech	10	14	6.8	7.0	19.8
<u>Betula lenta</u>	Black birch	10	10	6.8	5.0	14.2
<u>Amelanchier arborea</u>	Downy junberry	8	10	5.5	5.0	14.2
<u>Quercus coccinea</u>	Scarlet oak	8	10	5.5	5.0	14.2
<u>Sassafras albidum</u>	Sassafras	3	5	2.1	2.5	7.1
<u>Quercus palustris</u>	Pin oak	3	4	2.1	2.0	5.7
<u>Quercus rubra</u>	Red oak	3	3	2.1	1.5	4.2
<u>Rhododendron nudiflorum</u>	Pinxter flower	2	2	1.4	1.0	2.8
<u>Carya glabra</u>	Pignut hickory	1	1	0.7	0.5	1.4
<u>Malus sp.</u>	Apple	1	1	0.7	0.5	1.4
<u>Nyssa sylvatica</u>	Sour gum	1	1	0.7	0.5	1.4
Totals		146	200	100.1	100.0	283.2

^a Total point to plant distance = 2474.8 ft.
 Mean point to plant distance = $2474.8/200 = 12.4$ ft.
 Saplings/acre = $43560/(12.4)^2 = 283.3$

Table 19. Analysis of tree seedlings and shrubs in a mixed hardwood forest (Site 6) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973)^a

Scientific Name	Common Name	No. Transects Occurred	Total Length Intercepted (ft.)	% Relative Frequency	% Relative Dominance	% Ground Cover
Tree seedlings						
<u>Prunus serotina</u>	Black cherry	6	41	22.2	43.6	2.8
<u>Quercus sp.</u>	Oak	5	13	18.5	13.8	0.9
<u>Nyssa sylvatica</u>	Sour gum	4	7	14.8	7.4	0.5
<u>Acer rubrum</u>	Red maple	3	7	11.1	7.4	0.5
<u>Quercus alba</u>	White oak	2	8	7.4	8.5	0.6
<u>Quercus velutina</u>	Black oak	1	8	3.7	8.5	0.6
<u>Sassafras albidum</u>	Sassafras	2	2	7.4	2.1	0.1
<u>Fagus grandifolia</u>	American beech	1	4	3.7	4.3	0.3
<u>Quercus coccinea</u>	Scarlet oak	1	2	3.7	2.1	0.1
<u>Amelanchier arborea</u>	Downy junberry	1	1	3.7	1.1	0.1
<u>Carya glabra</u>	Pignut hickory	1	1	3.7	1.1	0.1
Totals		27	94	99.9	99.9	6.6
Shrubs						
<u>Gaylussacia baccata</u>	Black huckleberry	21	209	48.8	63.0	14.4
<u>Viburnum dentatum</u>	Arrowwood	8	43	18.6	13.0	3.0
<u>Vaccinium sp.</u>	Blueberry	5	29	11.6	8.7	2.0
<u>Clethra alnifolia</u>	Sweet pepperbush	2	36	4.7	10.8	2.5
<u>Rhododendron nudiflorum</u>	Pinxter flower	2	8	4.7	2.4	0.6
<u>Smilax rotundifolia</u>	Common greenbrier	2	3	4.7	0.9	0.2
<u>Rosa sp.</u>	Rose	2	2	4.7	0.6	0.1
<u>Vaccinium corymbosum</u>	Highbush blueberry	1	2	2.3	0.6	0.1
Totals		43	332	100.1	100.0	22.9

^a Total transect length = 1450 ft.

Table 20. Analysis of herbaceous species in a mixed hardwood forest (Site 6) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Malanthemum canadense</u>	Canada mayflower	22	26.5	34	22.1	-	-
<u>Gaylussacia baccata</u>	Black huckleberry	10	12.0	19	12.3	13	24.1
<u>Prunus serotina</u>	Black cherry	9	10.8	11	7.1	1	1.9
<u>Viburnum dentatum</u>	Arrowwood	7	8.4	10	6.5	2	3.7
<u>Quercus sp. (imm.)</u>	Oak	7	8.4	-	-	5	9.3
<u>Rhus radicans</u>	Poison ivy	5	6.0	4	2.6	-	-
<u>Gramineae</u>	Grass	5	6.0	1	0.6	3	5.6
<u>Lysimachia quadrifolia</u>	Whorled loosestrife	3	3.6	3	1.9	-	-
<u>Rosa sp.</u>	Rose	3	3.6	-	-	-	-
<u>Osmunda cinnamomea</u>	Cinnamon fern	3	3.6	2	1.3	-	-
<u>Acer rubrum</u>	Red maple	2	2.4	7	4.5	1	1.9
<u>Aster sp. (imm.)</u>	Aster	2	2.4	5	3.2	1	1.9
<u>Vaccinium corymbosum</u>	Highbush blueberry	2	2.4	6	3.9	8	14.8
<u>Parthenocissus quinquefolia</u>	Virginia creeper	1	1.2	-	-	-	-
<u>Pteridium aquilinum</u>	Bracken fern	1	1.2	3	1.9	-	-
<u>Rubus sp.</u>	Blackberry	1	1.2	1	0.6	4	7.4
<u>Athyrium filix-femina</u>	Lady fern	-	-	7	4.5	6	11.1
<u>Quercus rubra</u>	Red oak	-	-	7	4.5	-	-
<u>Carex sp. (imm.)</u>	Sedge	-	-	6	3.9	-	-
<u>Monotropa uniflora</u>	Indian-pipe	-	-	4	2.6	-	-
<u>Smilax rotundifolia</u>	Common greenbrier	-	-	4	2.6	1	1.9
<u>Trientalis borealis</u>	Starflower	-	-	4	2.6	-	-
<u>Clethra alnifolia</u>	Sweet pepperbush	-	-	3	1.9	2	3.7
<u>Rhododendron nudiflorum</u>	Pinxter flower	-	-	2	1.3	-	-
<u>Smilax glauca</u>	Glaucous greenbrier	-	-	2	1.3	2	3.7
<u>Chimaphila maculata</u>	Spotted wintergreen	-	-	1	0.6	1	1.9
<u>Danthonia sp.</u>	Oat grass	-	-	1	0.6	-	-
<u>Lonicera japonica</u>	Japanese honeysuckle	-	-	1	0.6	-	-
<u>Luzula campestris</u>	Hairy woodrush	-	-	1	0.6	-	-
<u>Lycopodium complanatum</u>	Running pine	-	-	1	0.6	-	-
<u>Lycopodium obscurum</u>	Ground pine	-	-	1	0.6	-	-
<u>Medeola virginiana</u>	Indian cucumber-root	-	-	1	0.6	-	-
<u>Quercus alba</u>	White oak	-	-	1	0.6	2	3.7
<u>Smilacina racemosa</u>	False Solomon's seal	-	-	1	0.6	-	-
<u>Solidago flexicaulis</u>	Zigzag goldenrod	-	-	-	-	1	1.9
<u>Thelypteris noveboracensis</u>	Hayscented fern	-	-	-	-	1	1.9
Totals		83	99.7	154	99.1	54	100.4

Table 21. Qualitative survey of cultivated trees and shrubs, and native species in an abandoned nursery (Site 7) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	Occurrence ^a
Cultivated trees		
<u>Acer palmatum</u> var. <u>atropurpureum</u>	Crimson king	C
<u>Cornus florida</u>	Flowering dogwood	C
<u>Cornus florida</u> var. <u>rubra</u>	Pink flowering dogwood	C
<u>Malus floribunda</u>	Flowering crab apple	C
<u>Prunus cerasitera</u> var. <u>pissardi</u>	Japanese flowering cherry	C
<u>Prunus yedoensis</u>	Flowering cherry	C
<u>Prunus yedoensis</u> var. <u>flore-plena</u>	Double flowering cherry	C
<u>Sorbus americana</u>	American mountain ash	C
Cultivated shrubs		
<u>Andromeda glaucophylla</u>	Bog rosemary	C
<u>Berberis thunbergii</u>	Japanese barberry	C
<u>Berberis vulgaris</u>	European barberry	C
<u>Ilex opaca</u>	American holly	C
<u>Juniperis chinensis</u> var. <u>pfitzeriana</u>	Pfitzer's juniper	C
<u>Juniperis communis</u>	Common juniper	C
<u>Juniperis virginiana</u>	Eastern redcedar	C
<u>Philadelphus coronarius</u>	Mock-orange	C
<u>Pieris japonica</u>	Pieris	C
<u>Rhododendron</u> spp. (deciduous)	Azaleas	C
<u>Rhododendron</u> spp. (evergreen)	Rhododendron	C
<u>Taxus cuspidata</u>	Japanese yew	C
<u>Thuja occidentalis</u>	American arbor-vitae	C
Native trees		
<u>Acer negundo</u>	Boxelder	I
<u>Acer rubrum</u>	Red maple	C
<u>Prunus serotina</u>	Black cherry	C
Native shrubs		
<u>Aronia arbutifolia</u>	Red chokeberry	I
<u>Parthenocissus quinquefolia</u>	Virginia creeper	C
<u>Rhus radicans</u>	Poison ivy	A
<u>Rosa</u> sp.	Rose	C
<u>Rubus allegheniensis</u>	Allegheny blackberry	C
<u>Rubus flagelleris</u>	Northern dewberry	I
<u>Smilax rotundifolia</u>	Common greenbrier	C
<u>Spiraea tomentosa</u>	Steeplebush	I
<u>Vaccinium corymbosum</u>	Highbush blueberry	I
<u>Viburnum dentatum</u>	Arrowwood	A
<u>Vitis</u> sp.	Grape	I
Native herbs		
<u>Agropyron repens</u>	Quackgrass	I
<u>Agrostis alba</u>	Redtop	C
<u>Ambrosia artemisiifolia</u>	Common ragweed	I
<u>Anthoxanthum odoratum</u>	Sweet vernal grass	C
<u>Asclepius incarnata</u>	Swamp milkweed	I
<u>Aster</u> sp. (imm.)	Aster	C
<u>Carex</u> sp.	Sedge	C
<u>Cicuta maculata</u>	Water hemlock	C
<u>Cirsium vulgare</u>	Bull thistle	I
<u>Dennstaedtia punctilobula</u>	Hayscented fern	I

Table 21. Continued.

Scientific Name	Common Name	Occurrence ^a
<u>Erigeron strigosus</u>	Rough fleabane	I
<u>Galium aparine</u>	Catchweed bedstraw	I
<u>Holcus lanatus</u>	Velvet grass	A
<u>Impatiens capensis</u>	Jewelweed	C
<u>Ipomoea sp.</u>	Morning glory	I
<u>Juncus sp.</u>	Rush	C
<u>Phleum pratense</u>	Timothy	C
<u>Plantago lanceolata</u>	Buckhorn plantain	C
<u>Plantago rugelii</u>	Blackseed plantain	C
<u>Polygonum persicaria</u>	Lady's thumb	I
<u>Rumex crispus</u>	Curly dock	C
<u>Sisyrinchium sp.</u>	Blue-eyed grass	I
<u>Solanum dulcamera</u>	Nightshade	C
<u>Solidago graminifolia</u>	Narrow-leaved goldenrod	C
<u>Solidago rugosa</u>	Rough goldenrod	C

^aA= Abundant; frequently found, wide distribution.

C= Common; often found, scattered distribution.

I= Infrequent; seldom found, scattered distribution.

Table 22. Qualitative survey of trees, shrubs, and herbs in a beach and managed recreation area (Site 8) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	Occurrence ^a
Trees		
<u>Amelanchier arborea</u>	Downy juneberry	I
<u>Betula populifolia</u>	Gray birch	I
<u>Juniperus virginiana</u>	Eastern red cedar	C
<u>Malus sp.</u>	Apple	A
<u>Prunus avium</u>	Sweet cherry	I
<u>Prunus serotina</u>	Black cherry	A
<u>Salix sp.</u>	Willow	I
Shrubs		
<u>Celastrus scandens</u>	Climbing bittersweet	I
<u>Gaylussacia baccata</u>	Black huckleberry	C
<u>Lonicera japonica</u>	Japanese honeysuckle	A
<u>Myrica pensylvanica</u>	Northern bayberry	C
<u>Parthenocissus quinquefolia</u>	Virginia creeper	I
<u>Rhus copalina</u>	Dwarf sumac	C
<u>Rhus radicans</u>	Poison ivy	A
<u>Rhus typhina</u>	Staghorn sumac	A
<u>Rosa sp.</u>	Rose	C
<u>Rubus sp.</u>	Blackberry	I
<u>Rubus phoenicolasius</u>	Wineberry	I
<u>Sambucus canadensis</u>	American elder	I
<u>Viburnum dentatum</u>	Arrowwood	C
Herbs		
<u>Achillea millefolium</u>	Common yarrow	I
<u>Agropyron repens</u>	Quackgrass	I
<u>Agrostis alba</u>	Red top	C
<u>Ambrosia artemisiifolia</u>	Common ragweed	I
<u>Ammophila breviligulata</u>	American beachgrass	C
<u>Andropogon scoparius</u>	Little bluestem	C
<u>Anthoxanthum odoratum</u>	Sweet vernal grass	C
<u>Artemisia caudata</u>	Tall wormwood	C
<u>Asclepius syriaca</u>	Common milkweed	I
<u>Asclepius tuberosa</u>	Butterflyweed	I
<u>Aster sp. (imm.)</u>	Aster	I
<u>Chrysanthemum leucanthemum</u>	Ox-eye daisy	I
<u>Dactylus glomerata</u>	Orchard grass	I
<u>Holcus lanatus</u>	Velvetgrass	I
<u>Hypericum perforatum</u>	Common St. Johnswort	C
<u>Ipomoea sp.</u>	Morning glory	I
<u>Juncus sp.</u>	Rush	C
<u>Lactuca sp.</u>	Lettuce	C
<u>Lathyrus japonicus</u>	Beach pea	C
<u>Oenothera biennis</u>	Common evening primrose	I
<u>Panicum boscii</u>	Bosc's panic grass	C
<u>Phleum pratense</u>	Timothy	I
<u>Phytolacca americana</u>	Pokeweed	I
<u>Plantago lanceolata</u>	Buckhorn plantain	I
<u>Poa pratensis</u>	Kentucky bluegrass	I
<u>Polygonum scandens</u>	Climbing false buckwheat	I

Table 22. Continued.

Scientific Name	Common Name	Occurrence ^a
<u>Rumex acetosella</u>	Sheep sorrel	I
<u>Sedum sp.</u>	Sedum	I
<u>Smilacina racemosa</u>	False Solomon's seal	I
<u>Solanum dulcamara</u>	Nightshade	I
<u>Solidago sempervirens</u>	Seaside goldenrod	C
<u>Solidago sp. (imm.)</u>	Goldenrod	C
<u>Spartina alterniflora</u>	Smooth cordgrass	C

- ^a
- A = Abundant, frequently found, wide distribution.
 - C = Common, often found, scattered distribution.
 - I = Infrequent, seldom found, scattered distribution.

Table 23. Analysis of herbaceous species in a beach community (Site 9) in the vicinity of the Millstone Point site, Waterford, Connecticut (1973).

Scientific Name	Common Name	May		July		October	
		No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency	No. of Quadrats	% Relative Frequency
<u>Ammophila brevigulata</u>	American beachgrass	72	69.2	25	30.5	41	41.8
<u>Linaria vulgaris</u>	Yellow toadflax	12	11.5	4	4.9	1	1.0
<u>Rhus radicans</u>	Poison ivy	5	4.8	4	4.9	7	7.1
<u>Poa pratensis</u>	Kentucky bluegrass	4	3.9	-	-	-	-
<u>Rumex acetosella</u>	Sheep sorrel	4	3.9	-	-	-	-
<u>Parthenocissus quinquefolia</u>	Virginia creeper	3	2.9	5	6.1	1	1.0
<u>Convolvulus arvensis</u>	Field bindweed	2	1.9	5	6.1	1	1.0
<u>Achillea millefolium</u>	Common yarrow	1	1.0	1	1.2	1	1.0
<u>Oxalis stricta</u>	Yellow wood sorrel	1	1.0	-	-	-	-
<u>Oenothera biennis</u>	Common evening primrose	-	-	13	15.9	10	10.2
<u>Lactuca sp. (imm.)</u>	Lettuce	-	-	5	6.1	2	2.0
<u>Agropyron repens</u>	Quackgrass	-	-	4	4.9	-	-
<u>Rosa sp.</u>	Rose	-	-	3	3.7	1	1.0
<u>Solidago sempervirens</u>	Seaside goldenrod	-	-	3	3.7	5	5.1
<u>Datura stramonium</u>	Jimsonweed	-	-	2	2.4	5	5.1
<u>Daucus carota</u>	Wild carrot	-	-	2	2.4	-	-
<u>Ipomoea sp.</u>	Morning glory	-	-	2	2.4	-	-
<u>Cirsium arvense</u>	Canada thistle	-	-	1	1.2	5	5.1
<u>Cyperus strigosus</u>	Umbrella sedge	-	-	1	1.2	-	-
<u>Labiatae (imm.)</u>	Mint	-	-	1	1.2	-	-
<u>Solanum dulcamera</u>	Nightshade	-	-	1	1.2	1	1.0
<u>Elymus virginicus</u>	Virginia wildrye	-	-	-	-	3	3.1
<u>Spartina alterniflora</u>	Smooth cordgrass	-	-	-	-	3	3.1
<u>Euphorbia sp.</u>	Spurge	-	-	-	-	2	2.0
<u>Rubus sp.</u>	Blackberry	-	-	-	-	2	2.0
<u>Ambrosia artemisiifolia</u>	Common ragweed	-	-	-	-	1	1.0
<u>Atriplex glabriuscula</u>	Orache	-	-	-	-	1	1.0
<u>Digitaria sp.</u>	Crabgrass	-	-	-	-	1	1.0
<u>Panicum sp.</u>	Panic grass	-	-	-	-	1	1.0
<u>Quercus rubra</u>	Red oak	-	-	-	-	1	1.0
<u>Umbelliferae</u>	Parsley	-	-	-	-	1	1.0
<u>Viburnum dentatum</u>	Arrowwood	-	-	-	-	1	1.0
Totals		104	100.1	82	100.0	98	99.6

Table 24. Total number of mammals captured, number of mammals captured per 100 trap-nights, percent composition of each species, and the percent utilization of each community in the vicinity of the Millstone Point site, Waterford, Connecticut (May, July, and October 1973).

Species	Old Field (Site 1)		Mixed Hardwood Forest (Site 2)		Riparian (Site 3)		Brackish Marsh (Site 4)		Transmission Line Corridor (Site 5)		Mixed Hardwood Forest (Site 6)	
	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN
<u>Peromyscus leucopus</u>	1	0.12	76	8.45	50	5.63	20	2.22	32	3.56	37	4.12
<u>Microtus pennsylvanicus</u>	26	3.04	7	0.78	-	-	23	2.56	23	2.56	-	-
<u>Blarina brevicauda</u>	12	1.40	2	0.22	3	0.34	-	-	-	-	2	0.22
<u>Zapus hudsonius</u>	1	0.12	-	-	-	-	-	-	5	0.56	-	-
<u>Rattus norvegicus</u>	-	-	-	-	-	-	3	0.33	-	-	-	-
<u>Sorex cinereus</u>	-	-	-	-	-	-	-	-	2	0.22	-	-
<u>Tamias striatus</u>	-	-	-	-	1	0.11	-	-	-	-	1	0.11
<u>Pitymys pinetorum</u>	-	-	-	-	-	-	-	-	1	0.11	-	-
Community totals	40	4.67	85	9.45	54	6.08	46	5.11	63	7.00	40	4.45
% a		7.0		14.1		9.1		7.6		10.5		6.6

Table 24. Continued.

Species	Abandoned Nursery (Site 7)		Beach and Managed Recreation Area (Site 8)		Beach Community (Site 9)		Totals		Percent Composition of Each Species
	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	
<u>Peromyscus leucopus</u>	20	4.44	12	3.57	29	6.44	277	4.21	61.0
<u>Microtus pennsylvanicus</u>	8	1.78	13	3.87	35	7.78	135	2.05	29.7
<u>Blarina brevicauda</u>	1	0.22	4	1.19	3	0.67	27	0.41	5.9
<u>Zapus hudsonius</u>	1	0.22	-	-	-	-	7	0.11	1.6
<u>Rattus norvegicus</u>	-	-	-	-	-	-	3	0.04	0.6
<u>Sorex cinereus</u>	-	-	-	-	-	-	2	0.03	0.4
<u>Tamias striatus</u>	-	-	-	-	-	-	2	0.03	0.4
<u>Pitymys pinetorum</u>	-	-	-	-	-	-	1	0.02	0.3
Community totals	30	6.67	29	8.63	67	14.88	454	6.90	
%a		10.0		12.9		22.2		100.0	

^a Percent utilization of each plant community.

Table 25. Total number of mammals captured, number of mammals captured per 100 trap-nights, percent composition of each species, and the percent utilization of each community in the vicinity of the Millstone Point site, Waterford, Connecticut (May 1973).

	Old Field (Site 1)		Mixed Hardwood Forest (Site 2)		Riparian (Site 3)		Brackish Marsh (Site 4)		Transmission Line Corridor (Site 5)		Mixed Hardwood Forest (Site 6)	
	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN
<u>Peromyscus leucopus</u>	1	0.33	18	6.00	21	7.05	9	3.00	4	1.33	10	3.33
<u>Microtus pennsylvanicus</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pitymys pinetorum</u>	-	-	-	-	-	-	-	-	1	0.33	-	-
<u>Zapus hudsonius</u>	-	-	-	-	-	-	-	-	1	0.33	-	-
Community totals	1	0.33	18	6.00	21	7.05	9	3.00	6	2.00	10	3.33
% ^a		1.1		19.7		23.1		9.8		6.6		10.9

Table 25. Continued.

Species	Abandoned Nursery (Site 7)		Beach and Managed Recreation Area (Site 8)		Beach Community (Site 9)		Totals		Percent Composition of Each Species
	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	
<u>Peromyscus leucopus</u>	-	-	5	3.45	7	4.67	75	3.35	96.3
<u>Microtus pennsylvanicus</u>	-	-	-	-	1	0.67	1	0.04	1.1
<u>Pitymys pinetorum</u>	-	-	-	-	-	-	1	0.04	1.1
<u>Zapus hudsonius</u>	-	-	-	-	-	-	1	0.04	1.1
Community totals	-	-	5	3.45	8	5.33	78	3.48	
% ^a				11.3		17.5		100.0	

^a Percent utilization of each plant community.

Table 26. Total number of mammals captured, number of mammals captured per 100 trap-nights, percent composition of each species, and the percent utilization of each community in the vicinity of the Millstone Point site, Waterford, Connecticut (July 1973).

Species	Old Field (Site 1)		Mixed Hardwood Forest (Site 2)		Riparian (Site 3)		Brackish Marsh (Site 4)		Transmission Line Corridor (Site 5)		Mixed Hardwood Forest (Site 6)	
	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN
<u>Microtus pennsylvanicus</u>	15	5.86	7	2.33	-	-	21	7.00	11	3.67	-	-
<u>Peromyscus leucopus</u>	-	-	32	10.67	14	4.76	3	1.00	17	5.67	11	3.69
<u>Blarina brevicauda</u>	2	0.78	1	0.33	1	0.34	-	-	-	-	1	0.34
<u>Zapus hudsonius</u>	1	0.39	-	-	-	-	-	-	4	1.33	-	-
<u>Sorex cinereus</u>	-	-	-	-	-	-	-	-	2	0.67	-	-
<u>Tamias striatus</u>	-	-	-	-	1	0.34	-	-	-	-	1	0.34
Community totals	18	7.03	40	13.33	16	5.44	24	8.00	34	11.33	13	4.36
% ^a		7.1		13.4		5.5		8.0		11.4		4.4

Table 26. Continued.

Species	Abandoned Nursery (Site 7)		Beach and Managed Recreation Area (Site 8)		Beach Community (Site 9)		Totals		Percent Composition of Each Species
	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	
<u>Microtis pennsylvanicus</u>	4	2.67	9	18.00	22	14.67	89	4.24	45.8
<u>Peromyscus leucopus</u>	-	-	3	6.00	7	4.67	87	4.15	44.9
<u>Blarina brevicauda</u>	1	0.67	1	2.00	1	0.67	8	0.38	4.1
<u>Zapus hudsonius</u>	1	0.67	-	-	-	-	6	0.29	3.1
<u>Sorex cinereus</u>	-	-	-	-	-	-	2	0.10	1.1
<u>Tamias striatus</u>	-	-	-	-	-	-	2	0.10	1.1
Community totals	6	4.00	13	26.00	30	20.00	194	9.25	
% ^a		4.0		26.1		20.1		100.0	

^a Percent utilization of each plant community.

Table 27. Total number of mammals captured, number of mammals captured per 100 trap-nights, percent composition of each species, and the percent utilization of each community in the vicinity of the Millstone Point site, Waterford, Connecticut (October 1973).

Species	Old Field (Site 1)		Mixed Hardwood Forest (Site 2)		Riparian (Site 3)		Brackish Marsh (Site 4)		Transmission Line Corridor (Site 5)		Mixed Hardwood Forest (Site 6)	
	No.	Per 100 TN	No.	Per 100 TN	No.	Per 100 TN	No.	Per 100 TN	No.	Per 100 TN	No.	Per 100 TN
<u>Peromyscus</u> <u>leucopus</u>	-	-	26	8.7	15	5.07	8	2.67	11	3.67	16	5.33
<u>Microtus</u> <u>pennsylvanicus</u>	11	3.67	-	-	-	-	2	0.67	12	4.0	-	-
<u>Blarina</u> <u>breviceauda</u>	10	3.33	1	0.33	2	0.68	-	-	-	-	1	0.33
<u>Rattus</u> <u>norvegicus</u>	-	-	-	-	-	-	3	1.0	-	-	-	-
Community Totals	21	7.0	27	9.03	17	5.74	13	4.33	23	7.67	17	5.67
% ^a	8.5		10.9		7.0		5.2		9.4		6.9	

Table 27. Continued.

Species	Abandoned Nursery (Site 7)		Beach and Managed Recreation Area (Site 8)		Beach Community (Site 9)		Totals		Percent Composition of Each Species
	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	No.	No. Per 100 TN	
<u>Peromyscus leucopus</u>	20	13.33	4	2.82	15	10.0	115	5.14	63.1
<u>Microtus pennsylvanicus</u>	4	2.67	4	2.82	12	8.0	45	2.01	24.7
<u>Blarina brevicauda</u>	-	-	3	2.11	2	1.33	19	0.85	10.4
<u>Rattus norvegicus</u>	-	-	-	-	-	-	3	0.13	1.6
Community Totals	24	16.0	11	7.75	29	19.33	182	8.14	
% ^a		19.4		9.4		23.4		100.1	

^a Percent utilization of each plant community.

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Table 28. Summary of the number of individual mammal species observations and/or signs recorded along transect routes in the environs of the Millstone Point site, Waterford, Connecticut (May 1973-January 1974).

Species	May	July	Oct.	Jan.	Species Total
Cottontail rabbit (species?)	7	20	6	1	34
Eastern gray squirrel	1	2	7	3	13
Woodchuck	3	5	3	-	11
Eastern chipmunk	4	3	2	-	9
Raccoon	-	2	-	-	2
Whitetail deer	-	-	1	-	1
Star-nosed mole	-	-	1	-	1
Muskrat	-	1	-	-	1
Monthly totals	15	33	20	4	72

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Table 29. Number of mammal signs and/or observations recorded along transect routes in the vicinity of the Millstone Point site, Waterford, Connecticut (May 1973 - January 1974).

Species	Number and/or Signs Observed				Species Total
	May	July	October	January	
Old field (Site 1)					
Cottontail rabbit (species?)	1	2	-	-	3
Star-nose mole	-	-	1	-	1
Mixed hardwood forest (Site 2)					
Eastern gray squirrel	1	-	4	3	8
Eastern chipmunk	-	1	2	-	3
Cottontail rabbit (species?)	-	1	a	1	2
Riparian community (Site 3)					
Eastern chipmunk	3	2	-	-	5
Cottontail rabbit (species?)	-	1	-	-	1
Woodchuck	-	1	-	-	1
Raccoon	-	1	-	-	1
Brackish marsh (Site 4)					
Eastern chipmunk	1	-	-	-	1
Muskrat	-	1	-	-	1
Eastern gray squirrel	-	1	-	-	1
Transmission line corridor (Site 5)					
Woodchuck	1	1	1	-	3
Cottontail rabbit (species?)	a	2	-	-	2
Whitetail deer	-	-	1	-	1
Mixed hardwood forest (Site 6)					
Cottontail rabbit (species?)	1	3	2	-	6
Eastern gray squirrel	-	1	3	-	4
Abandoned nursery (Site 7)					
Cottontail rabbit (species?)	3	2	-	a	5
Woodchuck	-	1	1	-	2
Beach and managed recreation area (Site 8)					
Cottontail rabbit (species?)	2	2	3	a	7
Beach community (Site 9)					
Cottontail rabbit (species?)	a	7	1	-	8
Woodchuck	2	2	1	-	5
Raccoon	-	1	-	-	1
Monthly totals	15	33	20	4	72

^aNumerous sign, however the actual number was not estimated.

Table 30. Number of snaptrap-nights, mammals captured, and number of mammals captured per 100 snaptrap-nights in nine habitat types in the environs of the Millstone Point site, Waterford, Connecticut (15-17 May, 17-19 July and 23-25 October 1973).

Habitat Type	Number of Snaptrap-Nights			Number of Mammals Captured			Number of Mammals Captured/100 Snaptrap-Night		
	May	July	Oct.	May	July	Oct.	May	July	Oct.
Old field (Site 1)	300	256	300	1	18	21	0.33	7.03	7.00
Mixed hardwood forest (Site 2)	300	300	299	18	40	27	6.00	13.33	9.03
Riparian (Site 3)	298	294	296	21	16	17	7.05	5.44	5.74
Brackish marsh (Site 4)	300	300	300	9	24	13	3.00	8.00	4.33
Transmission line corridor (Site 5)	300	300	300	6	34	23	2.00	11.33	7.67
Mixed hardwood forest (Site 6)	300	298	300	10	13	17	3.33	4.36	5.67
Abandoned nursery (Site 7)	150	150	150	0	6	24	0.00	4.00	16.00
Beach and managed recreation area (Site 8)	144	50	142	5	13	11	3.47	26.00	7.75
Beach community (Site 9)	150	150	150	8	30	29	5.33	20.00	19.33
Totals and average	2242	2098	2237	78	194	182	3.48	9.25	8.14

Table 31. Number of mammals captured per 100 trap-nights, and the net change per 100 trap-nights from May to July and from July to October at the Millstone Point site, Waterford, Connecticut.

Species	Number Captured per 100 Trapnights			Net Change per 100 Trapnights	
	May	July	October	May to July	July to October
<u>Peromyscus leucopus</u>	3.35	4.15	5.14	+0.80	+0.99
<u>Microtus pennsylvanicus</u>	0.04	4.24	2.01	+4.20	-2.23
<u>Blarina brevicauda</u>	-	0.38	0.85	+0.38	+0.47
<u>Zapus hudsonius</u>	0.04	0.29	-	+0.25	-0.29
<u>Rattus norvegicus</u>	-	-	0.13	-	+0.13
<u>Sorex cinereus</u>	-	0.10	-	+0.10	-0.10
<u>Tamias striatus</u>	-	0.10	-	+0.10	-0.10
<u>Pitymys pinetorum</u>	0.04	-	-	-0.04	-
Total	3.48	9.25	8.14	+5.77	-1.11

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Table 32. Residency status of the bird species observed in the Millstone Point site area, Waterford, Connecticut.

Scientific Name	Common Name	Permanent Resident	Summer Resident	Winter Resident	Migrant
<u>Gavia immer</u>	Common loon			X	
<u>Podiceps grisegena</u>	Red-necked grebe				X
<u>Phalacrocorax auritus</u>	Double-crested cormorant	X			
<u>Olor columbianus</u>	Whistling swan				X
<u>Cygnus olor</u>	Mute swan	X			
<u>Branta canadensis</u>	Canada goose				X
<u>Anas platyrhynchos</u>	Mallard	X			
<u>Anas rubripes</u>	Black duck	X			
<u>Aix sponsa</u>	Wood duck		X		
<u>Bucephala clangula</u>	Common goldeneye			X	
<u>Bucephala albeola</u>	Bufflehead			X	
<u>Mergus merganser</u>	Common merganser			X	
<u>Mergus serrator</u>	Red-breasted merganser			X	
<u>Accipiter cooperii</u>	Cooper's hawk	X			
<u>Buteo jamaicensis</u>	Red-tailed hawk	X			
<u>Buteo platypterus</u>	Broad-winged hawk		X		
<u>Pandion haliaetus</u>	Osprey		X		
<u>Falco sparverius</u>	American kestrel	X			
<u>Bonasa umbellus</u>	Ruffed grouse	X			
<u>Colinus virginianus</u>	Bobwhite	X			
<u>Phasianus colchicus</u>	Ring-necked pheasant	X			
<u>Casmerodius albus</u>	Great egret		X		
<u>Ardea herodias</u>	Great blue heron	X			
<u>Butorides virescens</u>	Green heron		X		
<u>Nycticorax nycticorax</u>	Black-crowned night heron		X		
<u>Botaurus lentiginosus</u>	American bittern		X		
Rallidae	Rail (species ?)		X		
<u>Rallus elegans</u>	King rail		X		
<u>Squatarola squatarola</u>	Black-bellied plover			X	
<u>Charadrius vociferus</u>	Killdeer	X			
<u>Actitis macularia</u>	Spotted sandpiper		X		
<u>Totanus melanoleucus</u>	Greater yellowlegs				X
<u>Larus marinus</u>	Great black-backed gull	X			
<u>Larus argentatus</u>	Herring gull	X			
<u>Larus delawarensis</u>	Ring-billed gull	X			
<u>Sterna hirundo</u>	Common tern		X		
<u>Columba livia</u>	Rock dove	X			
<u>Zenaidura macroura</u>	Mourning dove	X			
<u>Chaetura pelagica</u>	Chimney swift		X		
<u>Megasceryle alcyon</u>	Belted kingfisher	X			
<u>Colaptes auratus</u>	Common flicker	X			
<u>Dendrocopos villosus</u>	Hairy woodpecker	X			
<u>Dendrocopos pubescens</u>	Downy woodpecker	X			
<u>Tyrannus tyrannus</u>	Eastern kingbird		X		
<u>Myiarchus crinitus</u>	Great crested flycatcher		X		
<u>Sayornis phoebe</u>	Eastern phoebe		X		
<u>Contopus virens</u>	Eastern wood pewee		X		
<u>Hirundo rustica</u>	Barn swallow		X		
<u>Petrochelidon pyrrhonota</u>	Cliff swallow		X		
<u>Iridoprocne bicolor</u>	Tree swallow		X		
<u>Riparia riparia</u>	Bank swallow		X		
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow		X		
<u>Cyanocitta cristata</u>	Bluejay	X			
<u>Corvus brachyrhynchos</u>	Common crow	X			
<u>Parus atricapillus</u>	Black-capped chickadee	X			

Table 32. Continued.

Scientific Name	Common Name	Permanent Resident	Summer Resident	Winter Resident	Migrant
<u>Parus bicolor</u>	Tufted titmouse	X			
<u>Sitta carolinensis</u>	White-breasted nuthatch	X			
<u>Troglodytes aedon</u>	House wren		X		
<u>Troglodytes troglodytes</u>	Winter wren			X	
<u>Mimus polyglottos</u>	Mockingbird		X		
<u>Dumetella carolinensis</u>	Gray catbird		X		
<u>Toxostoma rufum</u>	Brown thrasher		X		
<u>Turdus migratorius</u>	American robin	X			
<u>Hylocichla mustelina</u>	Wood thrush		X		
<u>Catharus guttata</u>	Hermit thrush		X		
<u>Sialia sialis</u>	Eastern bluebird	X			
<u>Bombycilla cedrorum</u>	Cedar waxwing				X
<u>Sturnus vulgaris</u>	Starling	X			
<u>Vireo philadelphicus</u>	Philadelphia vireo				X
<u>Vireo olivaceus</u>	Red-eyed vireo		X		
<u>Mniotilta varia</u>	Black-and-white warbler		X		
<u>Vermivora pinus</u>	Blue-winged warbler		X		
<u>Dendroica petechia</u>	Yellow warbler		X		
<u>Dendroica coronata</u>	Yellow-rumped warbler				X
<u>Dendroica fusca</u>	Blackburnian warbler				X
<u>Dendroica discolor</u>	Prairie warbler		X		
<u>Dendroica palmarum</u>	Palm warbler				X
<u>Geothlypis trichas</u>	Common yellowthroat		X		
<u>Passer domesticus</u>	House sparrow	X			
<u>Dolichonyx oryzivorus</u>	Bobolink		X		
<u>Sturnella magna</u>	Eastern meadowlark	X			
<u>Agelaius phoeniceus</u>	Red-winged blackbird	X			
<u>Quiscalus quiscula</u>	Common grackle		X		
<u>Molothrus ater</u>	Brown-headed cowbird		X		
<u>Icterus galbula</u>	Northern oriole		X		
<u>Piranga olivacea</u>	Scarlet tanager		X		
<u>Cardinalis cardinalis</u>	Cardinal	X			
<u>Pheucticus ludovicianus</u>	Rose-breasted grosbeak		X		
<u>Passerina cyanea</u>	Indigo bunting		X		
<u>Carpodacus purpureus</u>	Purple finch	X			
<u>Spinus tristis</u>	American goldfinch	X			
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee		X		
<u>Passerculus sandwichensis</u>	Savannah sparrow	X			
<u>Ammodramus caudatus</u>	Sharp-tailed sparrow	X			
<u>Poocetes gramineus</u>	Vesper sparrow		X		
<u>Junco hyemalis</u>	Dark-eyed junco			X	
<u>Spizella arborea</u>	Tree sparrow			X	
<u>Spizella pusilla</u>	Field sparrow	X			
<u>Zonotrichia albicollis</u>	White-throated sparrow			X	
<u>Melospiza lincolni</u>	Lincoln's sparrow				X
<u>Melospiza georgiana</u>	Swamp sparrow				X
<u>Melospiza melodia</u>	Song sparrow	X			

Table 33. The number of individual bird species observed during May, July, October 1973, and January 1974 sampling periods in the Millstone Point site area, Waterford, Connecticut.

Scientific Name	Common Name	May	July	October	January
<u>Gavia immer</u>	Common loon	-	-	-	6
<u>Podiceps grisegena</u>	Red-necked grebe	-	-	1	-
<u>Phalacrocorax auritus</u>	Double-crested cormorant	-	2	90	-
<u>Olor columbianus</u>	Whistling swan	2	-	-	-
<u>Cygnus olor</u>	Mute swan	11	12	6	3
<u>Branta canadensis</u>	Canada goose	-	-	115	-
<u>Anas platyrhynchos</u>	Mallard	7	1	29	13
<u>Anas rubripes</u>	Black duck	10	70	19	21
<u>Aix sponsa</u>	Wood duck	2	-	-	-
<u>Bucephala clangula</u>	Common goldeneye	-	-	-	1
<u>Bucephala albeola</u>	Bufflehead	3	-	3	20
<u>Mergus merganser</u>	Common merganser	1	-	-	-
<u>Mergus serrator</u>	Red-breasted merganser	-	-	-	30
<u>Accipiter cooperii</u>	Cooper's hawk	-	-	-	1
<u>Buteo jamaicensis</u>	Red-tailed hawk	-	-	-	1
<u>Buteo platypterus</u>	Broad-winged hawk	1	1	-	-
<u>Pandion haliaetus</u>	Osprey	6	9	-	-
<u>Falco sparverius</u>	American kestrel	-	-	2	-
<u>Bonasa umbellus</u>	Ruffed grouse	-	-	2	-
<u>Colinus virginianus</u>	Bobwhite	8	29	28	2
<u>Phasianus colchicus</u>	Ring-necked pheasant	-	1	4	-
<u>Casmerodius albus</u>	Great egret	3	4	1	-
<u>Ardea herodias</u>	Great blue heron	3	1	24	1
<u>Butorides virescens</u>	Green heron	8	6	-	-
<u>Nycticorax nycticorax</u>	Black-crowned night heron	6	17	36	-
<u>Botaurus lentiginosus</u>	American bittern	-	2	-	-
Rallidae	Rail (species ?)	1	-	-	-
<u>Rallus elegans</u>	King rail	1	-	-	-
<u>Squatarola squatarola</u>	Black-bellied plover	-	-	1	1
<u>Charadrius vociferus</u>	Killdeer	1	9	1	6
<u>Actitis macularia</u>	Spotted sandpiper	-	2	-	-
<u>Totanus melanoleucus</u>	Greater yellowlegs	2	-	40	-
<u>Larus marinus</u>	Great black-backed gull	-	-	10	5
<u>Larus argentatus</u>	Herring gull	36	62	125	40
<u>Larus delawarensis</u>	Ring-billed gull	21	1	6	24
<u>Sterna hirundo</u>	Common tern	19	35	-	-
<u>Columba livia</u>	Rock dove	23	33	4	2
<u>Zenaidura macroura</u>	Mourning dove	14	18	76	1
<u>Chaetura pelagica</u>	Chimney swift	1	6	-	-
<u>Megaceryle alcyon</u>	Belted kingfisher	-	10	8	1
<u>Colaptes auratus</u>	Common flicker	5	25	10	-
<u>Dendrocopos villosus</u>	Hairy woodpecker	-	2	3	2
<u>Dendrocopos pubescens</u>	Downy woodpecker	4	5	1	-
<u>Tyrannus tyrannus</u>	Eastern kingbird	2	17	-	-
<u>Myiarchus crinitus</u>	Great crested flycatcher	2	1	-	-
<u>Sayornis phoebe</u>	Eastern phoebe	1	1	-	-
<u>Contopus virens</u>	Eastern wood pewee	-	1	1	-
<u>Hirundo rustica</u>	Barn swallow	45	59	-	-
<u>Petrochelidon pyrrhonota</u>	Cliff swallow	-	11	-	-
<u>Iridoprocne bicolor</u>	Tree swallow	1	5	-	-
<u>Riparia riparia</u>	Bank swallow	4	3	-	-
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow	-	18	-	-
<u>Cyanocitta cristata</u>	Bluejay	36	52	65	16
<u>Corvus brachyrhynchos</u>	Common crow	14	25	40	6

Table 33. Continued.

Scientific Name	Common Name	May	July	October	January
<u>Parus atricapillus</u>	Black-capped chickadee	6	44	51	18
<u>Parus bicolor</u>	Tufted titmouse	-	5	1	-
<u>Sitta carolinensis</u>	White-breasted nuthatch	-	-	-	1
<u>Troglodytes aedon</u>	House wren	4	7	1	-
<u>Troglodytes troglodytes</u>	Winter wren	-	-	-	1
<u>Mimus polyglottos</u>	Mockingbird	5	5	2	-
<u>Dumetella carolinensis</u>	Gray catbird	23	16	5	-
<u>Toxostoma rufum</u>	Brown thrasher	3	3	2	-
<u>Turdus migratorius</u>	American robin	25	47	66	2
<u>Hylocichla mustelina</u>	Wood thrush	-	3	-	-
<u>Catharus guttata</u>	Hermit thrush	-	-	3	-
<u>Sialia sialis</u>	Eastern bluebird	3	-	-	-
<u>Bombycilla cedrorum</u>	Cedar waxwing	-	-	8	-
<u>Sturnus vulgaris</u>	Starling	41	132	139	12
<u>Vireo philadelphicus</u>	Philadelphia vireo	-	-	2	-
<u>Vireo olivaceus</u>	Red-eyed vireo	2	-	-	-
<u>Mniotilta varia</u>	Black-and-white warbler	1	-	-	-
<u>Vermivora pinus</u>	Blue-winged warbler	10	1	-	-
<u>Dendroica petechia</u>	Yellow warbler	9	6	-	-
<u>Dendroica coronata</u>	Yellow-rumped warbler	-	-	36	-
<u>Dendroica fusca</u>	Blackburnian warbler	-	-	2	-
<u>Dendroica discolor</u>	Prairie warbler	10	3	-	-
<u>Dendroica palmarum</u>	Palm warbler	-	-	1	-
<u>Geothlypis trichas</u>	Common yellowthroat	33	23	-	-
<u>Passer domesticus</u>	House sparrow	11	24	-	2
<u>Dolichonyx oryzivorus</u>	Bobolink	7	-	-	-
<u>Sturnella magna</u>	Eastern meadowlark	2	6	5	5
<u>Agelaius phoeniceus</u>	Red-winged blackbird	100	80	-	20
<u>Quiscalus quiscula</u>	Common grackle	100	69	-	-
<u>Molothrus ater</u>	Brown-headed cowbird	4	-	-	-
<u>Icterus galbula</u>	Northern oriole	23	18	-	-
<u>Piranga olivacea</u>	Scarlet tanager	1	-	-	-
<u>Cardinalis cardinalis</u>	Cardinal	2	3	4	-
<u>Pheucticus ludovicianus</u>	Rose-breasted grosbeak	1	-	-	-
<u>Passerina cyanea</u>	Indigo bunting	-	1	-	-
<u>Carpodacus purpureus</u>	Purple finch	1	3	1	-
<u>Spinus tristis</u>	American goldfinch	8	42	92	-
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	14	39	-	-
<u>Passerculus sandwichensis</u>	Savannah sparrow	-	8	2	-
<u>Ammospiza caudacuta</u>	Sharp-tailed sparrow	-	-	-	1
<u>Poocetes gramineus</u>	Vesper sparrow	-	-	3	-
<u>Junco hyemalis</u>	Dark-eyed junco	-	-	8	2
<u>Spizella arborea</u>	Tree sparrow	-	-	-	3
<u>Spizella pusilla</u>	Field sparrow	7	21	25	20
<u>Zonotrichia albicollis</u>	White-throated sparrow	-	-	18	-
<u>Melospiza lincolni</u>	Lincoln's sparrow	-	-	3	-
<u>Melospiza georgiana</u>	Swamp sparrow	-	-	13	-
<u>Melospiza melodia</u>	Song sparrow	36	61	48	32
Total number		796	1226	1292	322
Total species		63	62	55	35

Table 34. Number of sightings of avian species along transect routes through nine habitat types in the vicinity of the Millstone Point site, Waterford, Connecticut (May, July, October 1973, and January 1974).

Species	Habitat Type ^a									Total
	Beach (Site 9)	Brackish Marsh ^b (Site 4)	Beach & Managed Recreation Area (Site 8)	Old Field (Site 1)	Abandoned Nursery (Site 7)	Transmission Line Corridor (Site 5)	Riparian (Site 3)	Mixed Hardwood Forest (Site 6)	Mixed Hardwood Forest (Site 2)	
Common loon	2	-	4	-	-	-	-	-	-	6
Double-crested cormorant	19	-	73	-	-	-	-	-	-	92
Mute swan	15	-	2	-	-	-	-	15	-	32
Mallard	23	15	2	-	-	2	8	-	-	50
Black duck	52	55	6	-	-	1	6	-	-	120
Common goldeneye	1	-	-	-	-	-	-	-	-	1
Bufflehead	23	-	3	-	-	-	-	-	-	26
Red-breasted merganser	12	-	18	-	-	-	-	-	-	30
Osprey	12	-	-	1	-	-	-	2	-	15
American kestrel	1	-	-	-	1	-	-	-	-	2
Great egret	2	3	3	-	-	-	-	-	-	8
Green heron	1	9	-	2	-	1	1	-	-	14
Black-crowned night heron	44	6	-	-	-	-	1	8	-	59
Black-bellied plover	2	-	-	-	-	-	-	-	-	2
Spotted sandpiper	1	-	1	-	-	-	-	-	-	2
Great black-backed gull	10	-	5	-	-	-	-	-	-	15
Herring gull	78	15	109	15	17	24	3	1	1	263
Ring-billed gull	21	1	17	-	7	4	-	2	-	52
Common tern	21	11	22	-	-	-	-	-	-	54
Rock dove	1	-	-	30	31	-	-	-	-	62
Mourning dove	5	2	4	5	8	73	12	-	-	109
Belted kingfisher	4	7	2	-	-	-	4	2	-	19
Common flicker	2	7	4	2	4	7	3	7	4	40
Downy woodpecker	1	-	-	1	1	2	3	-	2	10
Eastern kingbird	5	1	-	2	-	9	-	2	-	19
Eastern phoebe	1	-	-	-	-	-	1	-	-	2
Barn swallow	23	13	8	18	3	24	3	11	1	104
Tree swallow	1	-	-	2	2	-	-	1	-	6
Bank swallow	1	3	-	3	-	-	-	-	-	7
Rough-winged swallow	2	5	2	8	1	-	-	-	-	18
Bluejay	12	28	10	19	19	21	22	23	15	169
Common crow	6	9	3	4	5	15	9	21	13	85
Gray catbird	5	4	5	2	5	2	8	6	7	44
American robin	19	7	27	17	19	38	6	3	4	140
Starling	50	20	48	40	43	94	25	-	4	324
Blue-winged warbler	1	-	-	-	-	3	1	-	6	11
Yellow warbler	2	-	4	1	6	1	-	-	1	15
Common yellowthroat	3	-	6	5	8	17	5	1	11	56
House sparrow	18	-	6	11	-	2	-	-	-	37
Red-winged blackbird	21	28	11	60	19	27	13	8	13	200
Common grackle	45	18	39	30	10	5	14	6	2	169
Northern oriole	4	7	2	1	3	6	7	11	-	41
Purple finch	3	-	2	-	-	-	-	-	-	5
American goldfinch	8	9	32	35	42	10	1	-	5	142
Savannah sparrow	9	-	-	-	-	1	-	-	-	10
Lincoln's sparrow	1	-	-	-	-	-	-	-	2	3
Song sparrow	67	9	28	-	28	33	5	1	6	177
Common merganser	-	1	-	-	-	-	-	-	-	1
Bobwhite	-	1	1	8	18	15	13	5	6	67
Great blue heron	20	5	-	-	-	-	-	3	1	29
American bittern	-	1	-	-	-	1	-	-	-	2

Table 34. Continued.

Species	Habitat Type									Total
	Beach (Site 9)	Brackish Marsh (Site 4)	Beach & Managed Recreation Area (Site 8)	Old Field (Site 1)	Abandoned Nursery (Site 7)	Transmission Line Corridor (Site 5)	Riparian (Site 3)	Mixed Hardwood Forest (Site 6)	Mixed Hardwood Forest (Site 2)	
King rail	-	1	-	-	-	-	-	-	-	1
Rail (species ?)	-	1	-	-	-	-	-	-	-	1
Greater yellowlegs	-	42	-	-	-	-	-	-	-	42
Great crested flycatcher	-	1	-	-	-	-	-	2	-	3
Black-capped chickadee	3	5	24	7	14	10	26	7	23	119
Tufted titmouse	-	2	-	-	4	-	-	-	-	6
White-breasted nuthatch	-	1	-	-	-	-	-	-	-	1
House wren	1	2	-	-	1	-	1	-	7	12
Mockingbird	-	2	-	6	-	4	-	-	-	12
Brown thrasher	-	1	-	1	1	3	1	-	1	8
Warbler (species ?)	-	2	1	-	3	2	-	4	25	37
Prairie warbler	-	1	-	-	-	11	-	-	1	13
Rufous-sided towhee	-	4	-	1	-	16	14	8	10	53
Red-necked grebe	-	-	1	-	-	-	-	-	-	1
Canada goose	20	15	-	65	-	-	15	-	-	115
Hermit thrush	-	-	1	-	1	-	-	1	-	3
Sharp-tailed sparrow	-	-	1	-	-	-	-	-	-	1
Whistling swan	-	-	2	-	-	-	-	-	-	2
Sandpiper (species ?)	-	-	3	-	-	-	-	-	-	3
Dark-eyed junco	-	-	4	2	-	-	4	-	-	10
Chimney swift	-	-	1	3	-	3	-	-	-	7
Cliff swallow	-	-	7	4	-	-	-	-	-	11
Cedar waxwing	-	-	8	-	-	-	-	-	-	8
Ring-necked pheasant	-	-	1	1	3	-	-	-	-	5
Yellow-rumped warbler	-	-	8	-	23	3	-	2	-	36
Killdeer	6	-	1	2	-	7	-	-	1	17
Bobolink	-	-	-	6	1	-	-	-	-	7
Eastern meadowlark	-	-	-	13	2	3	-	-	-	18
Brown-headed cowbird	-	-	-	4	-	-	-	-	-	4
Sparrow (species ?)	-	-	2	-	6	1	-	-	-	9
Cardinal	-	-	-	3	1	2	3	-	-	9
Field sparrow	-	-	19	10	16	23	3	-	2	73
Broad-winged hawk	-	-	-	-	1	1	-	-	-	2
Rose-breasted grosbeak	-	-	-	-	1	-	-	-	-	1
Cooper's hawk	-	-	-	-	-	1	-	-	-	1
Winter wren	-	-	-	-	1	-	-	-	-	1
Palm warbler	-	-	-	-	1	-	-	-	-	1
Vesper sparrow	-	-	-	-	3	-	-	-	-	3
Tree sparrow	-	-	-	-	3	-	-	-	-	3
White-throated sparrow	-	-	-	-	3	-	5	5	5	18
Swamp sparrow	-	-	4	-	3	-	6	-	-	9
Indigo bunting	-	-	-	-	-	-	1	-	-	1
Wood thrush	-	-	-	-	-	1	-	1	1	3
Eastern bluebird	-	-	-	-	-	1	-	-	2	3
Red-eyed vireo	-	-	-	-	-	-	2	-	-	2
Black-and-white warbler	-	-	-	-	-	-	1	-	-	1
Eastern wood pewee	-	-	-	-	-	1	1	-	-	2
Ruffed grouse	-	-	-	-	-	-	2	-	-	2
Hairy woodpecker	-	-	-	1	2	-	2	-	2	7
Woodpecker (species ?) ^C	-	-	-	-	-	-	1	-	2	3
Nuthatch (species ?)	-	-	-	-	-	-	-	1	1	2

Table 34. Continued.

Species	Habitat Type									Total
	Beach (Site 9)	Brackish Marsh (Site 4)	Beach & Managed Recreation Area (Site 8)	Old Field (Site 1)	Abandoned Nursery (Site 7)	Transmission Line Corridor (Site 5)	Riparian (Site 3)	Mixed Hardwood Forest (Site 6)	Mixed Hardwood Forest (Site 2)	
Vireo (species ?)	-	-	-	-	-	-	-	-	4	4
Philadelphia vireo	-	-	-	-	-	-	-	2	-	2
Blackburnian warbler	-	-	-	-	-	-	-	-	2	2
Scarlet tanager	-	-	-	-	-	-	-	-	1	1
Red-tailed hawk	-	-	-	-	-	-	-	-	1	1
Total number	710	380	597	451	394	537	256	172	195	3692
Total species	52	43	50	41	45	46	39	30	35	106

- a Habitat types are arranged left to right in order of increasing successional development.
- b Not sampled in January 1974.
- c Not included in the species total.

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Table 35. Summary of reptiles and amphibians observed in May, July, and October 1973 in the environs of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	May	July	October
Old Field (Site 1)				
<u>Rana sylvatica</u>	Wood frog	-	2	-
Mixed hardwood forest (Site 2)				
<u>Rana sp.</u>	Frog	1	-	-
<u>Rana sylvatica</u>	Wood frog	-	2	-
Riparian community (Site 3)				
<u>Thamnophis sirtalis sirtalis</u>	Eastern garter snake	-	-	1
<u>Eurycea bislineata bislineata</u>	Northern two-lined salamander	-	1	-
<u>Rana clamitans melanota</u>	Green frog	-	1	-
Brackish marsh (Site 4)				
<u>Rana clamitans melanota</u>	Green frog	-	13	-
Transmission line corridor (Site 5)				
<u>Thamnophis sirtalis sirtalis</u>	Eastern garter snake	-	-	1
<u>Rana pipiens</u>	Leopard frog	-	2	-
Mixed hardwood forest (Site 6)				
<u>Bufo americanus</u>	American toad	-	1	-
<u>Rana sylvatica</u>	Wood frog	-	4	-
Abandoned nursery (Site 7)				
<u>Rana pipiens</u>	Leopard frog	-	4	-
<u>Rana clamitans melanota</u>	Green frog	-	2	-

Tabl. 3. Enumeration of terrestrial invertebrates collected from the old field (Site 1) and the riparian community (Site 3) in the vicinity of the Millstone Point site, Waterford, Connecticut (May and July 1973).

Scientific Name	Common Name	Site 1				Site 3			
		May		July		May		July	
		N ^a	% ^b	N	%	N	%	N	%
Arthropoda	Arthropods								
Arachnida	Arachnids								
Arancae	Spiders								
Tetragnathidae	four-jawed spiders	- ^c	-	1	0.8	-	-	-	-
Thomisidae	crab spiders	-	-	-	-	-	-	1	16.4
Unidentifiable Araneae		-	-	2	1.6	1	5.9	9	-
Acarina	Mites and ticks								
Unidentifiable immatures		-	-	-	-	2	11.7	-	-
Insecta	Insects								
Collembola	Springtails								
Sminthuridae		1	2.6	-	-	-	-	-	-
Orthoptera	Grasshoppers, crickets, etc.								
Acrididae	short-horned grasshoppers	-	-	1	0.8	-	-	-	-
Tettigoniidae	long-horned grasshoppers	-	-	1	0.8	-	-	-	-
Thysanoptera	Thrips								
Phlaethripidae		1	2.6	-	-	-	-	-	-
Thripidae	common thrips	6	15.4	4	3.2	-	-	-	-
Hemiptera	Bugs								
Lygaeidae	seed bugs	-	-	1	0.8	-	-	-	-
Miridae	plant or leaf bugs	10	25.6	56	44.4	-	-	-	-
Nabidae	damselfly bugs	-	-	1	0.8	-	-	-	-
Pentatomidae	stink bugs, etc.	-	-	6	4.7	-	-	1	1.8
Unidentifiable immatures		-	-	-	-	-	-	3	5.4
Homoptera	Hoppers, aphids, etc.								
Aphididae	plantlice	-	-	3	2.4	-	-	-	-
Cercopidae	froghoppers	-	-	15	12.0	-	-	7	12.7
Cicadellidae	leafhoppers	2	5.1	6	4.7	-	-	1	1.8
Delphacidae	planthoppers	-	-	10	7.9	-	-	2	3.7
Unidentifiable immatures		-	-	-	-	-	-	2	3.7
Coleoptera	Beetles								
Alleculidae	comb-clawed beetles	-	-	-	-	-	-	1	1.8
Cantharidae	soldier beetles	5	12.8	-	-	-	-	-	-
Cerambycidae	long-horned beetles	-	-	-	-	-	-	1	1.8
Chrysomelidae	leaf beetles	-	-	-	-	-	-	1	1.8
Coccinellidae	ladybird beetles	-	-	1	0.8	-	-	-	-
Curculionidae	snout beetles	-	-	1	0.8	-	-	-	-
Scarabaeidae	scarab beetles	-	-	1	0.8	-	-	-	-
Lepidoptera	Butterflies and moths								
Liparidae	tussock moths, etc.	1	2.6	-	-	1	5.9	-	-
Unidentifiable Lepidoptera		-	-	4	3.2	-	-	2	3.7

Table 33. (continued).

Scientific Name	Common Name	Site 1				Site 3			
		May		July		May		July	
		N	%	N	%	N	%	N	%
Diptera	Flies								
Asilidae	robber flies	-	-	-	-	-	-	1	1.8
Calliphoridae	blow flies	-	-	1	0.8	-	-	1	1.8
Cecidomyiidae	gall midges	-	-	-	-	-	-	1	1.8
Chamaemyiidae	aphid flies	-	-	1	0.8	-	-	-	-
Chironomidae	midges	-	-	-	-	7	41.2	1	1.8
Culicidae	mosquitoes	-	-	-	-	-	-	1	1.8
Dolichopodidae	long-legged flies	-	-	2	1.6	-	-	5	9.1
Empididae	dance flies	9	23.0	-	-	2	11.7	-	-
Muscidae	muscids	-	-	-	-	-	-	1	1.8
Mycetophilidae	fungus gnats	-	-	-	-	-	-	2	3.7
Sciaridae	dark-winged fungus gnats	-	-	-	-	1	5.9	2	3.7
Syrphidae	flower flies	-	-	5	3.9	-	-	-	-
Tipulidae	crane flies	-	-	-	-	1	5.9	1	1.8
Unidentifiable Diptera		-	-	1	0.8	-	-	5	9.1
Hymenoptera	Wasps, ants, bees, etc.								
Formicidae	ants	-	-	1	0.8	1	5.9	-	-
Halictidae	halictid bees	1	2.6	1	0.8	-	-	-	-
Ichneumonidae	ichneumon wasps	-	-	-	-	-	-	3	5.4
Tenthredinidae	common sawflies	3	7.7	-	-	-	-	-	-
Unidentifiable Hymenoptera		-	-	-	-	1	5.9	-	-
Total Number of Organisms		39		126		17		55	
Total Number of Families		10		21		6		19	

^a Number of organisms^b Percent composition^c Dash indicates not present

APPENDIX A

**PHYLOGENETIC SPECIES LIST
PLANTS OF THE MILLSTONE POINT SITE
WATERFORD, CONNECTICUT**

Flora of Millstone Point

LYCOPODIALES

Lycopodiaceae (Clubmoss Family)

Lycopodium obscurum L.

L. complanatum L.

EQUISETALES

Equisetaceae (Horsetail Family)

Equisetum arvense L.

FILICALES

Osmundaceae (Royal Fern Family)

Osmunda cinnamomea L.

O. regalis L.

Polypodiaceae (Polypody Family)

Dennstaedtia punctilobula (Michx.) Moore.

Pteridium aquilinum (L.) Kuhn.

Onoclea sensibilis L.

Athyrium felix-femina (L.) Roth.

Thelypteris noveboracensis (L.) Nieuwl.

Dryopteris austriaca var. spinulosa (Müll.) Fior. = D. spinulosa

Polystichum acrostichoides (Michx.) Schott.

CONIFERAE

Taxaceae (Yew Family)

Taxus cuspidata Sieb. & Zucc.

Cupressaceae (Cypress Family)

Thuja occidentalis L.

Juniperus communis L.

J. virginiana L.

J. chinensis var. pfitzeriana Mast.

PANDANALES

Typhaceae (Cattail Family)

Typha latifolia L.

Sparganiaceae (Burreed Family)

Sparganium L. sp.

GRAMINALES

Gramineae (Grass Family)

Festuca L. sp.

Poa compressa L.

P. pratensis L.

Distichlis spicata (L.) Greene.

Phragmites communis Trin.

Dactylis glomerata L.

Agropyron repens (L.) Beauv.

Elymus virginicus L.

Holcus lanatus L.

Danthonia Lam. & DC. sp.

Ammophila breviligulata Fern.

Agrostis stolonifera L. = A. alba

Phleum pratense L.

Spartina patens (Ait.) Muhl.

S. alterniflora Loisel.

Anthoxanthum odoratum L.

Digitaria Heist. sp.

Paspalum L. sp.

Panicum L. spp.

P. virgatum L.

P. auburne Ashe.

P. boscii Poir.

Andropogon scoparius Michx.

A. virginicus L.

Cyperaceae (Sedge Family)

Cyperus L. sp.

C. strigosus L.

Eleocharis R. Br. sp.

Scirpus L. sp.

Carex L. spp.

ARALES

Araceae (Arum Family)

Arisaema triphyllum (L.) Schott.

Symplocarpus foetidus (L.) Nutt.

LILIALES

Juncaceae (Rush Family)

Juncus L. sp.

J. gerardi Loisel.

Luzula campestris (L.) DC.

Liliaceae (Lily Family)

Smilacina racemosa (L.) Desf.

Maianthemum canadense Desf.

Uvularia grandiflora Sm.

U. sessilifolia L.

Polygonatum canaliculatum (Muhl.) Pursh.

Medeola virginiana L.

Smilax glauca Walt.

S. rotundifolia L.

Iridaceae (Iris Family)

Sisyrinchium L. sp.

SALICALES

Salicaceae (Willow Family)

Populus grandidentata Michx.

Salix L. sp.

MYRICALES

Myricaceae (Bayberry Family)

Myrica asplenifolia L. = Comptonia peregrina

M. pensylvanica Loisel.

JUGLANDALES

Juglandaceae (Walnut Family)

Carya glabra (Mill.) Sweet.
C. tomentosa (Poir.) Nutt.

FAGALES

Betulaceae (Birch Family)

Ostrya virginiana (Mill.) K. Koch.
Carpinus caroliniana Walt.
Betula lutea Michx.
B. lenta L.
B. populifolia Marsh.
Alnus serrulata (Ait.) Willd.

Fagaceae (Beech Family)

Fagus grandifolia Ehrh.
Quercus alba L.
Q. palustris Muench.
Q. velutina Lam.
Q. borealis Michx. = Q. rubra
Q. coccinea Muench.

URTICALES

Urticaceae (Nettle Family)

Boehmeria cylindrica (L.) Sw.

POLYGONALES

Polygonaceae (Smartweed Family)

Rumex acetosella L.
R. crispus L.
Polygonum L. sp.
P. arifolium L.
P. persicaria L.
P. scandens L.

CARYOPHYLLALES

Chenopodiaceae (Goosefoot Family)

Chenopodium L. sp.
Atriplex L. sp.
A. glabriuscula Edmonston.
Salicornia bigelovii Torr.

Phytolaccaceae (Pokeweed Family)

Phytolacca americana L.

Caryophyllaceae (Pink Family)

Cerastium vulgatum L.
Arenaria lateriflora L.

RANALES

Ranunculaceae (Crowfoot Family)

Caltha palustris L.
Ranunculus L. spp.
R. bulbosus L.
Thalictrum L. sp.

Berberidaceae (Barberry Family)

Berberis vulgaris L.
B. thunbergi DC.

Lauraceae (Laurel Family)

Sassafras albidum (Nutt.) Nees.
Lindera benzoin (L.) Blume.

ROSALES

Crassulaceae (Orpine Family)

Sedum L. sp.

Saxifragaceae (Saxifrage Family)

Philadelphus coronarius L.

Hamamelidaceae (Witch Hazel Family)

Hamamelis virginiana L.

Rosaceae (Rose Family)

Spiraea tomentosa L.

Fragaria virginiana Duchesne.

Potentilla canadensis L.

P. simplex Michx.

Geum L. sp.

Rubus L. sp.

R. allegheniensis Porter.

R. flagellaris L.

R. phoenicolasius Maxim.

Rosa L. spp.

Prunus virginiana L.

P. serotina Ehrh.

P. avium L.

P. cerasifera var. pissardii Koehne.

P. yedoensis Matsum.

P. yedoensis var. flore-plena Matsum.

Pyrus malus L. = Malus sp.

Malus floribunda Sieb.

Aronia arbutifolia (L.) Ell.

Sorbus americana Marsh.

Crataegus L. sp.

Amelanchier arborea (Michx. f.) Fern.

A. laevis Wieg.

Fabaceae (Bean Family)

Baptisia tinctoria (L.) R. Br.

Trifolium L. sp.

Lathyrus maritimus (L.) Bigel. = L. japonica

Apios americana Medic.

GERANIALES

Oxalidaceae (Wood Sorrel Family)

Oxalis stricta L.

Geraniaceae (Geranium Family)

Geranium maculatum L.

Euphorbiaceae (Spurge Family)

Euphorbia L. sp.

SAPINDALES

Anacardiaceae (Cashew Family)

Rhus radicans L.

R. copallinum L. = R. copalina

R. typhina L.

Aquifoliaceae (Holly Family)

Ilex opaca Ait.

I. verticillata (L.) Gray.

Celastraceae (Staff-tree Family)

Celastrus scandens L.

Aceraceae (Maple Family)

Acer rubrum L.

A. negundo L.

A. palmatum var. atropurpureum Van Houtte.

Balsaminaceae (Touch-me-not Family)

Impatiens biflora Walt. = I. capensis Meerb.

RHAMNALES

Vitaceae (Grape Family)

Vitis L. spp.

Parthenocissus quinquefolia (L.) Planch.

PHRIETALES

Hypericaceae (St. Johnswort Family)

Hypericum L. sp.

H. perforatum L.

H. punctatum Lam.

Violaceae (Violet Family)

Viola L. sp.
V. fimbriatula Sm.
V. lanceolata L.

MYRTALES

Onagraceae (Evening Primrose Family)

Epilobium L. sp.
Oenothera biennis L.

UMBELLALES

Araliaceae (Ginseng Family)

Aralia nudicaulis L.

Umbelliferae (Parsley Family)

Daucus carota L.
Cicuta maculata L.

Cornaceae (Dogwood Family)

Cornus florida L.
C. florida var. rubra West.
Nyssa sylvatica Marsh.

ERICALES

Clethraceae (White Alder Family)

Clethra alnifolia L.

Ericaceae (Heath Family)

Monotropa hypopithys L.
M. uniflora L.
Chimaphila maculata (L.) Pursh.
Rhododendron L. spp.
R. nudiflorum (L.) Torr.
Kalmia latifolia L.
Pieris japonica D. Don.

Lyonia ligustrina (L.) DC.
Gaylussacia baccata (Wang.) K. Koch.
Vaccinium L. spp.
V. corymbosum L.

PRIMULALES

Primulaceae (Primrose Family)

Lysimachia quadrifolia Sims.
Trientalis borealis Raf.

GENTIANALES

Oleaceae (Olive Family)

Fraxinus pennsylvanica Marsh.

Asclepiadaceae (Milkweed Family)

Asclepius tuberosa L.
A. incarnata L.
A. syriaca L.

POLEMONIALES

Convolvulaceae (Morning-glory Family)

Ipomoea L. sp.
Convolvulus arvensis L.

Verbenaceae (Vervain Family)

Verbena L. sp.

Labiatae (Mint Family)

Lycopus americanus Muhl.

Solanaceae (Nightshade Family)

Solanum dulcamara L.
Datura stramonium L.

Scrophulariaceae (Figwort Family)

Mimulus ringens L.
Scrophularia lanceolata Pursh.
Linaria vulgaris Hill.
Veronica L. sp.

PLANTAGINALES

Plantaginaceae (Plantain Family)

Plantago lanceolata L.
P. rugelii Decne.

RUBIALES

Rubiaceae (Madder Family)

Mitchella repens L.
Galium aparine L.
G. triflorum Michx.

Caprifoliaceae (Honeysuckle Family)

Viburnum dentatum L.
V. acerifolium L.
Sambucus canadensis L.
Lonicera japonica Thunb.

ASTERALES

Compositae (Composite Family)

Rudbeckia hirta L.
Ambrosia artemisiifolia L.
Achillea millefolium L.
Chrysanthemum leucanthemum L.
Artemisia campestris L. = A. caudata
Solidago L. spp.
S. sempervirens L.
S. flexicaulis L.
S. rugosa Mill.
S. graminifolia (L.) Salisb.
Aster L. spp.
Erigeron strigosus Muhl.

Pluchea purpurascens (Sw.) DC.

Eupatorium perfoliatum L.

Cirsium vulgare (Savi) Tenore.

C. arvense (L.) Scop.

Hieracium aurantiacum L.

Crepis capillaris (L.) Wallr.

Taraxacum officinale Weber.

Lactuca L. sp.

APPENDIX B

WILDLIFE DATA

MILLSTONE POINT SITE

WATERFORD, CONNECTICUT

Table 1. Summary of mammal trapping in the environs of the Millstone Point site, Waterford, Connecticut (May 1973).

Species	Common Name	Sex	Body Length (mm)	Tail Length (mm)	Weight (g)
Old field (Site 1)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	82	74	21
Mixed hardwood forest (Site 2)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	85	85	32
<u>P. leucopus</u>	White-footed mouse	F	89	77	25
<u>P. leucopus</u>	White-footed mouse	F	89	84	29
<u>P. leucopus</u>	White-footed mouse	F	79	73	22
<u>P. leucopus</u>	White-footed mouse	F	92	88	29
<u>P. leucopus</u>	White-footed mouse	F	93	87	30
<u>P. leucopus</u>	White-footed mouse	F	91	75	29
<u>P. leucopus</u>	White-footed mouse	F	89	77	31
<u>P. leucopus</u>	White-footed mouse	F	90	78	29
<u>P. leucopus</u>	White-footed mouse	F	--	67	--
<u>P. leucopus</u>	White-footed mouse	M	86	79	26
<u>P. leucopus</u>	White-footed mouse	M	94	82	29
<u>P. leucopus</u>	White-footed mouse	M	81	81	21
<u>P. leucopus</u>	White-footed mouse	M	91	77	29
<u>P. leucopus</u>	White-footed mouse	M	87	78	28
<u>P. leucopus</u>	White-footed mouse	M	86	--	27
<u>P. leucopus</u>	White-footed mouse	M	91	73	27
<u>P. leucopus</u>	White-footed mouse	M	92	82	28
Riparian (Site 3)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	89	85	39

Table 1. Continued.

Species	Common Name	Sex	Body Length (mm)	Tail Length (mm)	Weight (g)
<u>Peromyscus leucopus</u>	White-footed mouse	F	79	76	23
<u>P. leucopus</u>	White-footed mouse	F	86	76	34
<u>P. leucopus</u>	White-footed mouse	F	83	74	24
<u>P. leucopus</u>	White-footed mouse	F	86	79	28
<u>P. leucopus</u>	White-footed mouse	F	91	74	28
<u>P. leucopus</u>	White-footed mouse	F	93	72	26
<u>P. leucopus</u>	White-footed mouse	F	98	74	26
<u>P. leucopus</u>	White-footed mouse	F	89	66	19
<u>P. leucopus</u>	White-footed mouse	M	77	76	25
<u>P. leucopus</u>	White-footed mouse	M	90	72	23
<u>P. leucopus</u>	White-footed mouse	M	94	80	29
<u>P. leucopus</u>	White-footed mouse	M	78	77	26
<u>P. leucopus</u>	White-footed mouse	M	88	78	25
<u>P. leucopus</u>	White-footed mouse	M	87	--	21
<u>P. leucopus</u>	White-footed mouse	M	86	70	28
<u>P. leucopus</u>	White-footed mouse	M	87	80	27
<u>P. leucopus</u>	White-footed mouse	M	90	69	20
<u>P. leucopus</u>	White-footed mouse	F	61	67	8
<u>P. leucopus</u>	White-footed mouse	M	62	63	9
<u>P. leucopus</u>	White-footed mouse	M	65	73	12
Brackish marsh (Site 4)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	85	88	22
<u>P. leucopus</u>	White-footed mouse	F	91	77	24
<u>P. leucopus</u>	White-footed mouse	F	96	74	20

Table 1. Continued..

Species	Common Name	Sex	Body Length (mm)	Tail Length (mm)	Weight (g)
<u>Peromyscus leucopus</u>	White-footed mouse	M	81	69	21
<u>P. leucopus</u>	White-footed mouse	M	81	87	27
<u>P. leucopus</u>	White-footed mouse	M	93	79	24
<u>P. leucopus</u>	White-footed mouse	M	93	73	26
<u>P. leucopus</u>	White-footed mouse	F	56	56	9
<u>P. leucopus</u>	White-footed mouse	F	63	58	8
Transmission line corridor (Site 5)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	88	79	25
<u>P. leucopus</u>	White-footed mouse	F	91	84	29
<u>P. leucopus</u>	White-footed mouse	M	92	74	28
<u>P. leucopus</u>	White-footed mouse	M	91	79	24
<u>Pitymys pinetorum</u>	Pine vole	M	76	22	17
<u>Zapus hudsonius</u>	Eastern jumping mouse	M	65	115	16
Mixed hardwood forest (Site 6)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	82	73	20
<u>P. leucopus</u>	White-footed mouse	F	92	83	26
<u>P. leucopus</u>	White-footed mouse	F	85	67	18
<u>P. leucopus</u>	White-footed mouse	M	87	80	22
<u>P. leucopus</u>	White-footed mouse	M	91	83	24
<u>P. leucopus</u>	White-footed mouse	M	94	74	24
<u>P. leucopus</u>	White-footed mouse	M	86	80	20
<u>P. leucopus</u>	White-footed mouse	M	86	--	26
<u>P. leucopus</u>	White-footed mouse	M	89	71	25
<u>P. leucopus</u>	White-footed mouse	M	86	78	21

Table 1. Continued.

Species	Common Name	Sex	Body Length (mm)	Tail Length (mm)	Weight (g)
Beach and managed recreation area (Site 8)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	90	87	30
<u>P. leucopus</u>	White-footed mouse	F	94	78	31
<u>P. leucopus</u>	White-footed mouse	M	88	76	25
<u>P. leucopus</u>	White-footed mouse	M	77	--	20
<u>P. leucopus</u>	White-footed mouse	M	91	74	27
Beach Community (Site 9)					
<u>Peromyscus leucopus</u>	White-footed mouse	F	94	98	25
<u>P. leucopus</u>	White-footed mouse	F	87	85	23
<u>P. leucopus</u>	White-footed mouse	F	88	--	24
<u>P. leucopus</u>	White-footed mouse	F	88	77	20
<u>P. leucopus</u>	White-footed mouse	M	86	84	27
<u>P. leucopus</u>	White-footed mouse	F	69	--	10
<u>P. leucopus</u>	White-footed mouse	M	64	57	7
<u>Microtus pennsylvanicus</u>	Meadow vole	F	91	44	62

Table 2. Summary of mammal trapping in the environs of the Millstone Point site, Waterford, Connecticut (July 1973).

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Hind Length (mm)	Foot Length (mm)	Ear Length (mm)	Weight (gm)
Old field (Site 1)								
<u>Blarina brevicauda</u>	Shorttail shrew	M	129	27	15	5		24.4
<u>Blarina brevicauda</u>	Shorttail shrew	F	127	28	15	4		20.8
<u>Microtus pennsylvanicus</u>	Meadow vole	F	155	40	21	40		47.2
<u>M. pennsylvanicus</u>	Meadow vole	F	163	44	21	15		37.0
<u>M. pennsylvanicus</u>	Meadow vole	M	178	42	22	18		55.4
<u>M. pennsylvanicus</u>	Meadow vole	F	180	44	23	16		59.6
<u>M. pennsylvanicus</u>	Meadow vole	M	128	38	19	14		17.9
<u>M. pennsylvanicus</u>	Meadow vole	M	162	43	21	16		49.3
<u>M. pennsylvanicus</u>	Meadow vole	F	162	41	20	17		42.2
<u>M. pennsylvanicus</u>	Meadow vole	M	140	42	21	15		30.1
<u>M. pennsylvanicus</u>	Meadow vole	F	111	29	19	11		15.3
<u>M. pennsylvanicus</u>	Meadow vole	F	122	36	20	12		15.9
<u>M. pennsylvanicus</u>	Meadow vole	F	159	39	21	18		46.4
<u>M. pennsylvanicus</u>	Meadow vole	F	144	36	20	14		34.0
<u>M. pennsylvanicus</u>	Meadow vole	F	148	39	20	15		27.3
<u>M. pennsylvanicus</u>	Meadow vole	M	118	33	18	11		17.0
<u>M. pennsylvanicus</u>	Meadow vole	M	111	34	20	13		16.3
<u>Zapus hudsonius</u>	Meadow jumping mouse	F	206	134	31	12		9.8
Mixed hardwood forest (Site 2)								
<u>Blarina brevicauda</u>	Shorttail shrew	M	132	27	14	5		23.3
<u>Peromyscus leucopus</u>	White-footed mouse	F	189	88	21	18		30.7
<u>P. leucopus</u>	White-footed mouse	M	182	83	21	18		24.6
<u>P. leucopus</u>	White-footed mouse	F	172	79	21	19		24.9
<u>P. leucopus</u>	White-footed mouse	F	172	78	19	17		26.1
<u>P. leucopus</u>	White-footed mouse	F	181	92	21	20		27.8
<u>P. leucopus</u>	White-footed mouse	M	184	87	22	18		26.6
<u>P. leucopus</u>	White-footed mouse	M	190	90	20	18		27.8
<u>P. leucopus</u>	White-footed mouse	M	174	79	21	18		21.4
<u>P. leucopus</u>	White-footed mouse	M	178	84	20	19		25.2
<u>P. leucopus</u>	White-footed mouse	M	181	84	21	19		28.2
<u>P. leucopus</u>	White-footed mouse	M	159	72	19	17		16.7
<u>P. leucopus</u>	White-footed mouse	M	161	74	21	18		16.9
<u>P. leucopus</u>	White-footed mouse	M	140	66	19	17		11.3
<u>P. leucopus</u>	White-footed mouse	M	108	50	17	13		6.7
<u>P. leucopus</u>	White-footed mouse	F	121	57	20	15		8.2
<u>P. leucopus</u>	White-footed mouse	-	-	-	-	-		-
<u>P. leucopus</u>	White-footed mouse	M	180	84	21	18		27.6
<u>P. leucopus</u>	White-footed mouse	M	157	78	21	17		19.3
<u>P. leucopus</u>	White-footed mouse	F	188	91	19	19		28.6
<u>P. leucopus</u>	White-footed mouse	M	168	82	21	18		24.8
<u>P. leucopus</u>	White-footed mouse	F	-	-	19	18		22.7
<u>P. leucopus</u>	White-footed mouse	F	174	80	21	18		25.6
<u>P. leucopus</u>	White-footed mouse	F	130	63	19	18		10.4
<u>P. leucopus</u>	White-footed mouse	F	134	64	20	16		11.0
<u>P. leucopus</u>	White-footed mouse	M	174	86	21	18		21.9
<u>P. leucopus</u>	White-footed mouse	M	161	74	20	17		18.8
<u>P. leucopus</u>	White-footed mouse	M	179	83	21	19		25.0
<u>P. leucopus</u>	White-footed mouse	M	180	87	19	19		25.8
<u>P. leucopus</u>	White-footed mouse	M	161	75	21	17		20.1
<u>P. leucopus</u>	White-footed mouse	F	173	82	21	16		29.7
<u>P. leucopus</u>	White-footed mouse	M	154	73	20	16		13.6
<u>P. leucopus</u>	White-footed mouse	F	-	-	19	18		10.2

Table 2. Continued.

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Blind Foot Length (mm)	Ear Length (mm)	Weight (gm)
<u>Microtus pennsylvanicus</u>	Meadow vole	F	162	40	21	15	43.2
<u>M. pennsylvanicus</u>	Meadow vole	M	170	45	20	15	47.3
<u>M. pennsylvanicus</u>	Meadow vole	F	175	49	20	16	49.0
<u>M. pennsylvanicus</u>	Meadow vole	F	114	35	18	13	15.6
<u>M. pennsylvanicus</u>	Meadow vole	M	112	34	20	11	16.2
<u>M. pennsylvanicus</u>	Meadow vole	M	134	37	19	14	20.0
<u>M. pennsylvanicus</u>	Meadow vole	F	120	31	18	13	17.0
Riparian (Site 3)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	127	26	15	3	19.0
<u>Tamias striatus</u>	Eastern chipmunk	M	227	82	33	17	75.9
<u>Peromyscus leucopus</u>	White-footed mouse	M	182	92	20	19	22.2
<u>P. leucopus</u>	White-footed mouse	M	163	77	20	18	17.8
<u>P. leucopus</u>	White-footed mouse	F	157	74	20	18	15.7
<u>P. leucopus</u>	White-footed mouse	F	176	85	21	19	18.2
<u>P. leucopus</u>	White-footed mouse	M	178	80	20	19	25.7
<u>P. leucopus</u>	White-footed mouse	F	174	81	20	17	24.2
<u>P. leucopus</u>	White-footed mouse	F	149	69	19	17	15.3
<u>P. leucopus</u>	White-footed mouse	M	168	78	21	17	18.8
<u>P. leucopus</u>	White-footed mouse	F	169	80	20	16	19.1
<u>P. leucopus</u>	White-footed mouse	M	180	85	20	19	21.4
<u>P. leucopus</u>	White-footed mouse	M	150	67	20	18	18.5
<u>P. leucopus</u>	White-footed mouse	M	154	79	20	18	19.1
<u>P. leucopus</u>	White-footed mouse	F	137	67	20	18	16.6
<u>P. leucopus</u>	White-footed mouse	M	-	-	21	17	15.6
Brackish marsh (Site 4)							
<u>Peromyscus leucopus</u>	White-footed mouse	M	189	90	21	19	28.0
<u>P. leucopus</u>	White-footed mouse	F	168	79	20	19	19.4
<u>P. leucopus</u>	White-footed mouse	M	187	93	20	17	24.0
<u>Microtus pennsylvanicus</u>	Meadow vole	M	185	45	21	16	59.3
<u>M. pennsylvanicus</u>	Meadow vole	M	150	39	21	14	42.2
<u>M. pennsylvanicus</u>	Meadow vole	M	131	39	20	15	24.9
<u>M. pennsylvanicus</u>	Meadow vole	F	148	41	20	14	30.7
<u>M. pennsylvanicus</u>	Meadow vole	-	-	-	-	-	-
<u>M. pennsylvanicus</u>	Meadow vole	-	-	-	-	-	-
<u>M. pennsylvanicus</u>	Meadow vole	-	-	-	-	-	-
<u>M. pennsylvanicus</u>	Meadow vole	F	132	32	19	14	17.0
<u>M. pennsylvanicus</u>	Meadow vole	M	161	41	22	16	36.9
<u>M. pennsylvanicus</u>	Meadow vole	F	181	50	21	14	50.4
<u>M. pennsylvanicus</u>	Meadow vole	M	176	45	22	16	51.2
<u>M. pennsylvanicus</u>	Meadow vole	F	183	51	20	16	53.3
<u>M. pennsylvanicus</u>	Meadow vole	M	135	40	20	13	22.8
<u>M. pennsylvanicus</u>	Meadow vole	F	98	29	17	8	8.1
<u>M. pennsylvanicus</u>	Meadow vole	M	125	37	20	13	16.6
<u>M. pennsylvanicus</u>	Meadow vole	M	135	39	20	14	23.9
<u>M. pennsylvanicus</u>	Meadow vole	M	137	40	21	14	29.3
<u>M. pennsylvanicus</u>	Meadow vole	M	133	31	20	14	24.0
<u>M. pennsylvanicus</u>	Meadow vole	M	-	37	21	13	21.9
<u>M. pennsylvanicus</u>	Meadow vole	F	104	29	18	11	10.6
<u>M. pennsylvanicus</u>	Meadow vole	M	101	27	19	10	10.2
Transmission Corridor (Site 5)							
<u>Sorex cinereus</u>	Masked shrew	M	98	39	11	5	4.3
<u>Soricidae</u>	Shrew	F	94	37	11	6	3.4
<u>Peromyscus leucopus</u>	White-footed mouse	M	171	78	21	18	28.0
<u>P. leucopus</u>	White-footed mouse	M	179	80	21	18	24.8

Table 2. Continued.

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Hind Foot Length (mm)	Ear Length (mm)	Weight (gm)
<u>P. leucopus</u>	White-footed mouse	M	172	81	21	19	19.9
<u>P. leucopus</u>	White-footed mouse	M	172	86	21	19	20.0
<u>P. leucopus</u>	White-footed mouse	F	182	85	21	20	25.8
<u>P. leucopus</u>	White-footed mouse	M	178	79	22	19	28.4
<u>P. leucopus</u>	White-footed mouse	M	174	83	20	17	21.9
<u>P. leucopus</u>	White-footed mouse	M	175	80	21	19	27.7
<u>P. leucopus</u>	White-footed mouse	F	174	79	21	17	24.0
<u>P. leucopus</u>	White-footed mouse	F	161	74	20	17	21.7
<u>P. leucopus</u>	White-footed mouse	M	162	76	20	18	21.4
<u>P. leucopus</u>	White-footed mouse	M	163	75	21	16	22.7
<u>P. leucopus</u>	White-footed mouse	F	154	74	19	17	15.7
<u>P. leucopus</u>	White-footed mouse	M	162	82	20	17	16.4
<u>P. leucopus</u>	White-footed mouse	M	156	76	21	19	16.3
<u>P. leucopus</u>	White-footed mouse	M	132	60	19	16	11.0
<u>P. leucopus</u>	White-footed mouse	M	165	74	21	18	24.7
<u>P. leucopus</u>	White-footed mouse	M	149	37	15	14	27.0
<u>Microtus pennsylvanicus</u>	Meadow vole	M	149	37	15	14	27.0
<u>M. pennsylvanicus</u>	Meadow vole	F	159	35	20	16	54.5
<u>M. pennsylvanicus</u>	Meadow vole	F	149	44	20	14	30.0
<u>M. pennsylvanicus</u>	Meadow vole	M	140	38	21	14	39.3
<u>M. pennsylvanicus</u>	Meadow vole	F	122	36	20	13	17.1
<u>M. pennsylvanicus</u>	Meadow vole	M	168	41	20	15	59.4
<u>M. pennsylvanicus</u>	Meadow vole	M	167	42	22	17	42.9
<u>M. pennsylvanicus</u>	Meadow vole	M	151	38	21	15	37.6
<u>M. pennsylvanicus</u>	Meadow vole	F	135	36	19	14	21.3
<u>M. pennsylvanicus</u>	Meadow vole	M	117	26	19	11	14.7
<u>M. pennsylvanicus</u>	Meadow vole	M	127	32	19	14	17.7
<u>Zapus hudsonius</u>	Meadow jumping mouse	F	189	110	26	11	12.0
<u>Z. hudsonius</u>	Meadow jumping mouse	M	204	115	30	14	17.1
<u>Z. hudsonius</u>	Meadow jumping mouse	F	225	136	31	13	18.3
<u>Z. hudsonius</u>	Meadow jumping mouse	M	213	132	30	12	12.4
Mixed hardwood forest (Site 6)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	118	26	14	5	15.4
<u>Tamias striatus</u>	Eastern chipmunk	M	236	84	35	14	91.8
<u>Peromyscus leucopus</u>	White-footed mouse	M	179	85	21	17	23.4
<u>P. leucopus</u>	White-footed mouse	M	149	74	21	14	17.2
<u>P. leucopus</u>	White-footed mouse	F	-	-	20	18	25.5
<u>P. leucopus</u>	White-footed mouse	M	164	78	20	16	19.7
<u>P. leucopus</u>	White-footed mouse	M	164	78	21	18	18.3
<u>P. leucopus</u>	White-footed mouse	M	147	69	20	17	19.7
<u>P. leucopus</u>	White-footed mouse	M	157	72	21	17	17.6
<u>P. leucopus</u>	White-footed mouse	M	159	66	21	16	23.6
<u>P. leucopus</u>	White-footed mouse	M	170	85	21	17	17.0
<u>P. leucopus</u>	White-footed mouse	F	-	-	20	16	12.0
<u>P. leucopus</u>	White-footed mouse	M	142	72	21	18	11.2
Abandoned nursery (Site 7)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	116	25	14	5	18.0
<u>Microtus pennsylvanicus</u>	Meadow vole	M	158	44	21	14	54.6
<u>M. pennsylvanicus</u>	Meadow vole	F	107	29	18	11	10.9
<u>M. pennsylvanicus</u>	Meadow vole	M	102	26	17	10	9.6
<u>M. pennsylvanicus</u>	Meadow vole	-	-	-	-	-	-
<u>Zapus hudsonius</u>	Meadow jumping mouse	F	195	124	30	13	10.1
Beach and managed recreation area (Site 8)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	126	27	14	5	23.3
<u>Peromyscus leucopus</u>	White-footed mouse	M	178	85	21	18	24.4

Table 2. Continued.

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Hind Foot Length (mm)	Ear Length (mm)	Weight (gm)
<u>P. leucopus</u>	White-footed mouse	M	167	71	20	19	21.1
<u>P. leucopus</u>	White-footed mouse	M	175	77	21	17	24.6
<u>Microtus pennsylvanicus</u>	Meadow vole	M	181	52	22	17	55.8
<u>M. pennsylvanicus</u>	Meadow vole	F	160	45	20	15	51.0
<u>M. pennsylvanicus</u>	Meadow vole	F	145	37	20	13	35.9
<u>M. pennsylvanicus</u>	Meadow vole	F	165	43	21	12	54.3
<u>M. pennsylvanicus</u>	Meadow vole	M	126	36	19	10	22.2
<u>M. pennsylvanicus</u>	Meadow vole	F	167	48	20	14	48.4
<u>M. pennsylvanicus</u>	Meadow vole	M	154	39	21	13	49.7
<u>M. pennsylvanicus</u>	Meadow vole	M	178	50	21	10	46.9
<u>M. pennsylvanicus</u>	Meadow vole	F	170	45	21	14	42.7
Beach community (Site 9)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	121	25	14	5	18.4
<u>Peromyscus leucopus</u>	White-footed mouse	M	180	81	20	18	24.3
<u>P. leucopus</u>	White-footed mouse	M	186	91	20	20	28.0
<u>P. leucopus</u>	White-footed mouse	M	162	76	19	17	20.5
<u>P. leucopus</u>	White-footed mouse	M	165	75	21	19	22.0
<u>P. leucopus</u>	White-footed mouse	F	178	80	20	19	21.1
<u>P. leucopus</u>	White-footed mouse	M	155	73	21	18	19.9
<u>P. leucopus</u>	White-footed mouse	F	146	70	20	17	13.4
<u>Microtus pennsylvanicus</u>	Meadow vole	M	155	36	21	15	46.7
<u>M. pennsylvanicus</u>	Meadow vole	M	152	45	21	14	29.7
<u>M. pennsylvanicus</u>	Meadow vole	F	159	40	20	16	47.4
<u>M. pennsylvanicus</u>	Meadow vole	M	174	40	22	16	55.8
<u>M. pennsylvanicus</u>	Meadow vole	M	174	50	22	15	58.7
<u>M. pennsylvanicus</u>	Meadow vole	M	162	44	22	15	56.1
<u>M. pennsylvanicus</u>	Meadow vole	M	165	46	21	15	37.9
<u>M. pennsylvanicus</u>	Meadow vole	F	178	43	22	16	62.4
<u>M. pennsylvanicus</u>	Meadow vole	M	163	42	21	16	48.2
<u>M. pennsylvanicus</u>	Meadow vole	F	165	44	21	16	48.9
<u>M. pennsylvanicus</u>	Meadow vole	M	170	46	21	16	46.9
<u>M. pennsylvanicus</u>	Meadow vole	M	156	42	21	15	37.4
<u>M. pennsylvanicus</u>	Meadow vole	M	161	43	20	16	33.4
<u>M. pennsylvanicus</u>	Meadow vole	M	149	40	20	15	33.4
<u>M. pennsylvanicus</u>	Meadow vole	M	179	41	20	16	56.5
<u>M. pennsylvanicus</u>	Meadow vole	F	185	46	21	16	60.6
<u>M. pennsylvanicus</u>	Meadow vole	M	184	48	21	16	55.5
<u>M. pennsylvanicus</u>	Meadow vole	M	156	43	21	15	28.3
<u>M. pennsylvanicus</u>	Meadow vole	F	157	43	21	14	30.4
<u>M. pennsylvanicus</u>	Meadow vole	-	-	-	-	-	-
<u>M. pennsylvanicus</u>	Meadow vole	-	-	-	-	-	-
<u>M. pennsylvanicus</u>	Meadow vole	-	-	-	-	-	-

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Table 3. Summary of mammal trapping in the environs of the Millstone Point site, Waterford, Connecticut (October 1973).

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Hind Foot Length (mm)	Ear Length (mm)	Weight (gm)
Old field (Site 1)							
<u>Blarina brevicauda</u>	Shorttail shrew	M	129	24	14	5	20.3
<u>B. brevicauda</u>	Shorttail shrew	F	123	14	15	4	18.5
<u>B. brevicauda</u>	Shorttail shrew	F	131	27	15	5	21.3
<u>B. brevicauda</u>	Shorttail shrew	F	125	25	15	5	16.1
<u>B. brevicauda</u>	Shorttail shrew	F	114	25	15	4	19.9
<u>B. brevicauda</u>	Shorttail shrew	F	124	24	14	5	18.1
<u>B. brevicauda</u>	Shorttail shrew	F	128	26	15	5	21.5
<u>B. brevicauda</u>	Shorttail shrew	M	124	23	15	5	24.8
<u>B. brevicauda</u>	Shorttail shrew	F	120	20	15	5	18.0
<u>B. brevicauda</u>	Shorttail shrew	M	127	25	14	6	18.1
<u>Microtus pennsylvanicus</u>	Meadow vole	M	139	35	21	-	27.6
<u>M. pennsylvanicus</u>	Meadow vole	M	149	39	22	15	33.0
<u>M. pennsylvanicus</u>	Meadow vole	M	147	36	21	13	33.2
<u>M. pennsylvanicus</u>	Meadow vole	F	179	39	31	14	60.0
<u>M. pennsylvanicus</u>	Meadow vole	M	141	35	21	11	31.4
<u>M. pennsylvanicus</u>	Meadow vole	M	121	31	19	13	18.3
<u>M. pennsylvanicus</u>	Meadow vole	M	109	24	16	9	11.1
<u>M. pennsylvanicus</u>	Meadow vole	M	124	30	20	13	18.3
<u>M. pennsylvanicus</u>	Meadow vole	M	132	30	18	13	19.2
<u>M. pennsylvanicus</u>	Meadow vole	F	160	40	21	14	52.7
<u>M. pennsylvanicus</u>	Meadow vole	M	135	34	20	13	27.6
Mixed hardwood forest (Site 2)							
<u>Blarina brevicauda</u>	Shorttail shrew	M	120	22	15	5	17.8
<u>Peromyscus leucopus</u>	White-footed mouse	M	167	78	21	17	19.9
<u>P. leucopus</u>	White-footed mouse	M	174	78	21	17	25.0
<u>P. leucopus</u>	White-footed mouse	F	161	74	20	16	18.5
<u>P. leucopus</u>	White-footed mouse	F	174	83	20	19	21.7
<u>P. leucopus</u>	White-footed mouse	F	185	83	21	17	24.3
<u>P. leucopus</u>	White-footed mouse	-	140	39	21	18	26.9
<u>P. leucopus</u>	White-footed mouse	M	157	74	21	18	20.5
<u>P. leucopus</u>	White-footed mouse	F	139	63	19	16	10.9
<u>P. leucopus</u>	White-footed mouse	M	168	75	20	-	16.4
<u>P. leucopus</u>	White-footed mouse	M	172	76	21	17	21.7
<u>P. leucopus</u>	White-footed mouse	F	158	68	20	16	19.7
<u>P. leucopus</u>	White-footed mouse	F	188	88	20	17	23.9
<u>P. leucopus</u>	White-footed mouse	M	167	75	20	16	22.8
<u>P. leucopus</u>	White-footed mouse	M	145	58	19	14	16.5
<u>P. leucopus</u>	White-footed mouse	F	142	60	18	15	14.3
<u>P. leucopus</u>	White-footed mouse	M	140	57	19	16	12.8
<u>P. leucopus</u>	White-footed mouse	M	166	82	21	16	19.1
<u>P. leucopus</u>	White-footed mouse	F	173	81	21	16	19.8
<u>P. leucopus</u>	White-footed mouse	M	172	78	19	17	21.6
<u>P. leucopus</u>	White-footed mouse	F	152	66	19	15	18.2
<u>P. leucopus</u>	White-footed mouse	M	150	65	21	15	18.2
<u>P. leucopus</u>	White-footed mouse	M	150	61	19	15	17.8
<u>P. leucopus</u>	White-footed mouse	F	165	70	21	17	18.8
<u>P. leucopus</u>	White-footed mouse	M	143	64	19	15	16.3
<u>P. leucopus</u>	White-footed mouse	M	96	5	21	16	20.2
<u>P. leucopus</u>	White-footed mouse	-	-	-	-	-	-
Riparian (Site 3)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	123	23	14	15	18.0
<u>B. brevicauda</u>	Shorttail shrew	F	116	22	14	5	19.0
<u>Peromyscus leucopus</u>	White-footed mouse	F	183	82	20	18	26.9
<u>P. leucopus</u>	White-footed mouse	M	182	79	21	16	22.7
<u>P. leucopus</u>	White-footed mouse	M	164	73	21	17	17.6

Table 3. Continued.

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Hind Foot Length (mm)	Ear Length (mm)	Weight (gm)
Riparian (Site 3) Continued							
<u>Peromyscus leucopus</u>	White-footed mouse	F	167	78	20	17	17.4
<u>P. leucopus</u>	White-footed mouse	F	176	84	20	16	19.9
<u>P. leucopus</u>	White-footed mouse	F	178	75	21	19	22.5
<u>P. leucopus</u>	White-footed mouse	F	171	76	20	18	20.8
<u>P. leucopus</u>	White-footed mouse	F	155	67	20	17	17.2
<u>P. leucopus</u>	White-footed mouse	F	163	72	20	16	17.4
<u>P. leucopus</u>	White-footed mouse	F	156	70	21	16	14.2
<u>P. leucopus</u>	White-footed mouse	M	168	76	20	17	20.7
<u>P. leucopus</u>	White-footed mouse	M	183	89	20	17	20.8
<u>P. leucopus</u>	White-footed mouse	F	159	74	20	17	18.0
<u>P. leucopus</u>	White-footed mouse	F	157	72	22	15	19.4
<u>P. leucopus</u>	White-footed mouse	F	124	28	21	16	24.4
Brackish marsh (Site 4)							
<u>Peromyscus leucopus</u>	White-footed mouse	M	159	74	20	19	14.2
<u>P. leucopus</u>	White-footed mouse	M	-	74	20	-	-
<u>P. leucopus</u>	White-footed mouse	F	183	88	20	18	22.1
<u>P. leucopus</u>	White-footed mouse	M	147	66	20	17	12.9
<u>P. leucopus</u>	White-footed mouse	M	149	65	20	17	15.4
<u>P. leucopus</u>	White-footed mouse	M	146	66	21	16	17.0
<u>P. leucopus</u>	White-footed mouse	M	160	77	20	16	17.3
<u>P. leucopus</u>	White-footed mouse	M	164	77	20	16	15.4
<u>Microtus pennsylvanicus</u>	Meadow vole	M	172	44	22	14	48.0
<u>M. pennsylvanicus</u>	Meadow vole	M	147	38	21	15	34.0
<u>Rattus norvegicus</u>	Norway rat	M	282	122	36	21	95.2
<u>R. norvegicus</u>	Norway rat	M	285	125	37	21	101.6
<u>R. norvegicus</u>	Norway rat	M	271	120	34	19	95.9
Transmission corridor (Site 5)							
<u>Peromyscus leucopus</u>	White-footed mouse	F	169	77	21	17	18.7
<u>P. leucopus</u>	White-footed mouse	M	169	76	20	16	22.5
<u>P. leucopus</u>	White-footed mouse	F	184	87	21	18	20.3
<u>P. leucopus</u>	White-footed mouse	M	168	69	21	17	18.0
<u>P. leucopus</u>	White-footed mouse	F	167	79	19	17	76.1
<u>P. leucopus</u>	White-footed mouse	F	129	57	19	15	10.4
<u>P. leucopus</u>	White-footed mouse	M	158	73	20	17	14.3
<u>P. leucopus</u>	White-footed mouse	M	155	70	19	18	16.1
<u>P. leucopus</u>	White-footed mouse	M	174	75	21	17	21.7
<u>P. leucopus</u>	White-footed mouse	M	174	82	21	18	16.9
<u>P. leucopus</u>	White-footed mouse	F	150	64	21	14	16.7
<u>Microtus pennsylvanicus</u>	Meadow vole	M	154	39	22	14	40.2
<u>M. pennsylvanicus</u>	Meadow vole	M	157	37	22	14	37.2
<u>M. pennsylvanicus</u>	Meadow vole	M	145	36	21	13	31.1
<u>M. pennsylvanicus</u>	Meadow vole	F	147	37	20	13	29.0
<u>M. pennsylvanicus</u>	Meadow vole	M	163	47	21	14	42.0
<u>M. pennsylvanicus</u>	Meadow vole	M	136	34	19	13	26.4
<u>M. pennsylvanicus</u>	Meadow vole	M	146	38	20	14	31.4
<u>M. pennsylvanicus</u>	Meadow vole	M	150	35	22	-	-
<u>M. pennsylvanicus</u>	Meadow vole	M	146	36	20	14	35.6
<u>M. pennsylvanicus</u>	Meadow vole	M	149	47	22	14	46.7
<u>M. pennsylvanicus</u>	Meadow vole	M	160	44	21	13	44.0
<u>M. pennsylvanicus</u>	Meadow vole	M	155	41	22	3	34.4
Mixed hardwood forest (Site 6)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	115	21	16	4	15.1
<u>Peromyscus leucopus</u>	White-footed mouse	F	180	81	20	17	21.7
<u>P. leucopus</u>	White-footed mouse	M	98	4	20	17	21.5

Table 3. Continued.

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Hind Foot Length (mm)	Ear Length (mm)	Weight (gm)
Mixed hardwood forest (Site 6) Continued							
<u>Peromyscus leucopus</u>	White-footed mouse	F	161	67	19	14	19.6
<u>P. leucopus</u>	White-footed mouse	F	182	79	19	18	28.5
<u>P. leucopus</u>	White-footed mouse	F	159	65	20	15	18.6
<u>P. leucopus</u>	White-footed mouse	M	173	74	20	16	19.8
<u>P. leucopus</u>	White-footed mouse	M	165	79	21	17	18.0
<u>P. leucopus</u>	White-footed mouse	F	140	61	20	15	14.6
<u>P. leucopus</u>	White-footed mouse	F	175	81	19	17	18.5
<u>P. leucopus</u>	White-footed mouse	M	165	72	21	17	17.1
<u>P. leucopus</u>	White-footed mouse	M	181	84	20	17	20.0
<u>P. leucopus</u>	White-footed mouse	M	160	72	21	16	21.7
<u>P. leucopus</u>	White-footed mouse	F	93	2	21	16	18.6
<u>P. leucopus</u>	White-footed mouse	M	168	76	20	15	24.3
<u>P. leucopus</u>	White-footed mouse	M	157	72	21	15	19.6
<u>P. leucopus</u>	White-footed mouse	M	160	70	20	15	17.6
Abandoned nursery (Site 7)							
<u>Peromyscus leucopus</u>	White-footed mouse	M	161	71	20	17	14.0
<u>P. leucopus</u>	White-footed mouse	M	157	74	20	19	16.6
<u>P. leucopus</u>	White-footed mouse	M	177	84	22	17	19.1
<u>P. leucopus</u>	White-footed mouse	M	157	72	20	17	17.1
<u>P. leucopus</u>	White-footed mouse	F	159	73	21	17	18.9
<u>P. leucopus</u>	White-footed mouse	F	162	72	20	17	16.4
<u>P. leucopus</u>	White-footed mouse	F	154	63	21	17	18.0
<u>P. leucopus</u>	White-footed mouse	F	155	73	20	17	17.0
<u>P. leucopus</u>	White-footed mouse	M	155	70	20	16	16.2
<u>P. leucopus</u>	White-footed mouse	F	169	72	21	18	20.6
<u>P. leucopus</u>	White-footed mouse	M	155	73	20	17	14.0
<u>P. leucopus</u>	White-footed mouse	F	176	81	20	17	22.7
<u>P. leucopus</u>	White-footed mouse	F	165	74	21	18	16.0
<u>P. leucopus</u>	White-footed mouse	F	146	65	20	17	12.0
<u>P. leucopus</u>	White-footed mouse	M	156	69	20	17	17.8
<u>P. leucopus</u>	White-footed mouse	M	177	84	20	18	19.4
<u>P. leucopus</u>	White-footed mouse	M	157	72	21	16	19.5
<u>P. leucopus</u>	White-footed mouse	F	145	65	20	13	16.2
<u>P. leucopus</u>	White-footed mouse	F	147	67	20	13	14.8
<u>P. leucopus</u>	White-footed mouse	M	130	55	18	14	10.8
<u>Microtus pennsylvanicus</u>	Meadow vole	M	164	45	22	15	42.2
<u>M. pennsylvanicus</u>	Meadow vole	M	140	38	21	13	32.2
<u>M. pennsylvanicus</u>	Meadow vole	M	152	43	22	13	35.6
<u>M. pennsylvanicus</u>	Meadow vole	M	167	40	22	14	44.2
Beach and managed recreation area (Site 8)							
<u>Blarina brevicauda</u>	Shorttail shrew	M	134	22	15	5	20.2
<u>B. brevicauda</u>	Shorttail shrew	M	112	16	8	4	19.5
<u>B. brevicauda</u>	Shorttail shrew	F	107	18	8	5	18.3
<u>Peromyscus leucopus</u>	White-footed mouse	M	159	74	21	17	14.8
<u>P. leucopus</u>	White-footed mouse	M	162	73	20	18	19.8
<u>P. leucopus</u>	White-footed mouse	M	167	78	20	17	18.6
<u>P. leucopus</u>	White-footed mouse	F	-	89	22	19	-
<u>Microtus pennsylvanicus</u>	Meadow vole	M	169	40	21	14	49.3
<u>M. pennsylvanicus</u>	Meadow vole	F	175	45	22	16	61.5
<u>M. pennsylvanicus</u>	Meadow vole	M	165	40	19	15	41.8
<u>M. pennsylvanicus</u>	Meadow vole	M	134	33	21	13	31.6
Beach community (Site 9)							
<u>Blarina brevicauda</u>	Shorttail shrew	F	125	24	14	4	18.1
<u>B. brevicauda</u>	Shorttail shrew	F	120	23	15	4	18.4
<u>Peromyscus leucopus</u>	White-footed mouse	M	117	25	20	16	24.1
<u>P. leucopus</u>	White-footed mouse	F	171	74	19	18	21.1

Table 3. Continued.

Species	Common Name	Sex	Total Length (mm)	Tail Length (mm)	Hind Foot Length (mm)	Ear Length (mm)	Weight (gm)
Beach community (Site 9) Continued							
<u>Peromyscus leucopus</u>	White-footed mouse	M	170	78	19	15	20.9
<u>P. leucopus</u>	White-footed mouse	M	157	74	19	15	17.9
<u>P. leucopus</u>	White-footed mouse	M	159	70	19	15	16.1
<u>P. leucopus</u>	White-footed mouse	F	177	80	20	17	25.6
<u>P. leucopus</u>	White-footed mouse	M	158	77	20	15	17.4
<u>P. leucopus</u>	White-footed mouse	-	-	-	-	-	-
<u>P. leucopus</u>	White-footed mouse	F	150	64	19	17	15.7
<u>P. leucopus</u>	White-footed mouse	F	152	66	21	18	15.6
<u>P. leucopus</u>	White-footed mouse	M	165	73	20	17	17.9
<u>P. leucopus</u>	White-footed mouse	F	150	68	19	15	16.4
<u>P. leucopus</u>	White-footed mouse	M	156	68	21	15	17.1
<u>P. leucopus</u>	White-footed mouse	F	140	58	19	13	15.0
<u>P. leucopus</u>	White-footed mouse	M	156	76	20	15	13.1
<u>Microtus pennsylvanicus</u>	Meadow vole	M	172	43	19	13	58.1
<u>M. pennsylvanicus</u>	Meadow vole	M	153	42	21	14	36.9
<u>M. pennsylvanicus</u>	Meadow vole	M	167	44	20	14	47.1
<u>M. pennsylvanicus</u>	Meadow vole	M	147	38	18	12	52.7
<u>M. pennsylvanicus</u>	Meadow vole	M	151	36	20	13	38.7
<u>M. pennsylvanicus</u>	Meadow vole	M	174	45	21	13	45.8
<u>M. pennsylvanicus</u>	Meadow vole	M	146	39	20	13	31.9
<u>M. pennsylvanicus</u>	Meadow vole	M	154	40	21	14	37.4
<u>M. pennsylvanicus</u>	Meadow vole	M	143	37	20	14	29.0
<u>M. pennsylvanicus</u>	Meadow vole	M	155	37	21	13	39.2
<u>M. pennsylvanicus</u>	Meadow vole	M	142	38	20	13	38.6
<u>M. pennsylvanicus</u>	Meadow vole	M	164	41	22	15	53.3

Table 4. Seasonal comparisons of morphological parameters of adult Peromyscus leucopus in the vicinity of the Millstone Point site, 1973.

Parameter	Mean			Range			Standard Deviation			Sample Size		
	May	July	October	May	July	October	May	July	October	May	July	October
Total length (mm)	166.7	172.4	169.8	150-92	147-190	150-188	8.0	10.0	9.0	62	59	56
Tail length (mm)	77.9	80.5	76.8	66-98	66-93	64-89	6.0	5.9	6.1	63	59	57
Hindfoot length (mm)	- ^a	20.5	20.3	-	19-22	19-22	-	0.7	0.7	-	61	63
Ear length (mm)	-	18.0	16.7	-	16-20	14-19	-	1.0	1.2	-	61	63
Weight (gm)	25.7	23.5	20.6	19-39	17.0-30.7	16.0-28.5	3.8	3.4	2.8	67	61	63

^a Parameter not measured.

Table 5. Seasonal comparisons of morphological parameters of immature Peromyscus leucopus in the vicinity of the Millstone Point site, 1973.

Parameter	Mean			Range			Standard Deviation			Sample Size		
	May	July	October	May	July	October	May	July	October	May	July	October
Total length (mm)	122.5	147.0	152.8	102-138	108-176	129-174	11.8	16.0	9.3	6	21	48
Tail length (mm)	62.3	70.1	68.7	56-73	50-85	55-82	6.7	8.1	6.4	6	21	49
Hindfoot length (mm)	- ^a	19.9	19.9	-	17-21	18-21	-	1.0	0.8	-	24	49
Ear Length (mm)	-	16.9	16.1	-	13-19	13-19	-	1.4	1.4	-	24	49
Weight (gm)	9.0	14.0	16.0	7-12	6.7-18.2	10.4-20.7	1.6	3.3	2.4	7	24	48

^a Parameter not measured.

Table 6. Seasonal comparisons of morphological parameters of adult Microtus pennsylvanicus in the vicinity of the Millstone Point site, 1973.

Parameter	Mean			Range			Standard Deviation			Sample Size		
	May	July	October	May	July	October	May	July	October	May	July	October
Total length (mm)	135.0	161.7	155.1	135-135	131-185	132-179	0.0	13.8	11.6	1	57	38
Tail length (mm)	44.0	42.4	39.7	44-44	31-52	30-47	0.0	4.3	3.8	1	58	38
Hindfoot length (mm)	- ^a	20.7	20.8	-	15-23	18-22	-	1.1	1.1	-	58	39
Ear length (mm)	-	15.1	13.7	-	10-18	12-16	-	1.4	0.8	-	58	38
Weight (gm)	62.0	44.2	40.2	62.0-62.0	21.9-62.4	19.2-61.5	0.0	11.1	9.6	1	58	38

^a Parameter not measured.

Table 7. Seasonal comparisons of morphological parameters of immature Microtus pennsylvanicus in the vicinity of the Millstone Point site, 1973.

Parameter	Mean		Range		Standard Deviation		Sample Size	
	July	October	July	October	July	October	July	October
Total length (mm)	120.7	128.3	98-156	109-141	14.0	12.5	24	6
Tail length (mm)	33.6	31.5	26-43	24-35	4.8	4.2	24	6
Hindfoot length (mm)	19.0	19.3	17-21	16-21	1.1	1.9	24	6
Ear length (mm)	12.9	11.8	8-19	9-13	2.4	1.8	24	6
Weight (gm)	17.0	22.2	8.1-30.1	11.1-31.4	5.4	7.6	24	6

Table 8. Seasonal comparisons of morphological parameters of Blarina brevicauda in the vicinity of the Millstone Point site, 1973.

Parameter	Mean		Range		Standard Deviation		Sample Size	
	July	October	July	October	July	October	July	October
Total length (mm)	124.5	121.9	116-132	107-134	5.6	6.9	8	19
Tail length (mm)	26.4	22.3	25-28	14-27	1.1	3.4	8	19
Hindfoot length (mm)	14.4	13.9	14-15	8-15	0.5	2.1	8	19
Ear length (mm)	4.6	4.7	3-5	4-6	0.7	0.6	8	19
Weight (gm)	20.3	19.0	15.4-24.4	15.1-24.8	3.2	2.1	8	19

Table 9. Seasonal comparisons of the morphological parameters of Zapus hudsonius in the vicinity of the Millstone Point Site, 1973.

Parameter	Mean		Range		Standard Deviation		Sample Size	
	May	July	May	July	May	July	May	July
Total length (mm)	180.0	205.3	180-180	189-225	0.0	12.8	1	6
Tail length (mm)	115.0	125.2	115-115	110-136	0.0	10.7	1	6
Hindfoot length (mm)	- ^a	29.7	-	26-31	-	1.9	1	6
Ear length (mm)	-	12.5	-	11-14	-	1.0	1	6
Weight (gm)	16.0	13.3	16.0-16.0	9.8-18.3	0.0	3.6	1	6

^a Parameter not measured.

Table 10. Comparisons of morphological parameters of Rattus norvegicus in the vicinity of the Millstone Point site, October 1973.

Parameter	Mean	Range	Standard Deviation	Sample Size
Total length (mm)	279.3	271-285	7.4	3
Tail length (mm)	122.3	120-125	2.5	3
Hindfoot length (mm)	35.7	34-37	1.5	3
Ear length (mm)	20.3	19-21	1.2	3
Weight (gm)	97.6	95.2-101.6	3.5	3

Table 11. Comparisons of morphological parameters of Sorex cinereus in the vicinity of the Millstone Point-site, July 1973.

Parameter	Mean	Range	Standard Deviation	Sample Size
Total length (mm)	96.0	94-98	2.8	2
Tail length (mm)	38.0	37-39	1.4	2
Hindfoot length (mm)	11.0	11-11	0.0	2
Ear length (mm)	5.5	5-6	0.7	2
Weight (gm)	3.9	3.4-4.3	0.6	2

Table 12. Comparisons of morphological parameters of Tamias striatus in the vicinity of the Millstone site, July 1973.

Parameter	Mean	Range	Standard Deviation	Sample Size
Total length (mm)	231.5	227-236	6.4	2
Tail length (mm)	83.0	82-84	1.4	2
Hindfoot length (mm)	34.0	33-35	1.4	2
Ear length (mm)	15.5	14-17	2.1	2
Weight (gm)	83.9	75.9-91.8	11.2	2

Table 13. Comparisons of morphological parameters of Pitymys pinetorum in the vicinity of the Millstone Point site, May 1973.

Parameter	Mean	Range	Standard Deviation	Sample Size
Total length (mm)	98	98-98	0.0	1
Tail length (mm)	22	22-22	0.0	1
Hindfoot length (mm)	- ^a	-	-	-
Ear length (mm)	-	-	-	-
Weight (gm)	17.0	17.0-17.0	0.0	1

^a Parameter not measured.

Table 14. Summary of May, July, October 1973, and January 1974 transect counts of birds in an old field (Site 1) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed														
		May				July				October				January		
		15th	16th	17th	% ^a	16th	18th	19th	%	23rd	24th	25th	%	10th	11th	%
<u>Branta canadensis</u>	Canada goose	-	-	-	-	-	-	-	-	-	65	-	48.5	-	-	-
<u>Pandion halliaetus</u>	Osprey	-	1	-	0.7	-	-	-	-	-	-	-	-	-	-	-
<u>Phasianus colchicus</u>	Ring-necked pheasant	-	-	-	-	-	-	1	0.9	-	-	-	-	-	-	-
<u>Colinus virginianus</u>	Bobwhite	2	-	-	1.4	1	-	3	3.6	-	-	-	-	2	3.1	-
<u>Butorides virescens</u>	Green heron	1	-	1	1.4	-	-	-	-	-	-	-	-	-	-	-
<u>Charadrius vociferus</u>	Killdeer	-	-	1	0.7	-	-	1	0.9	-	-	-	-	-	-	-
<u>Larus argentatus</u>	Herring gull	1	-	3	2.8	-	-	3	2.7	-	2	-	1.5	-	6	9.4
<u>Columba livia</u>	Rock dove	-	10	13	16.3	-	-	3	2.7	-	4	-	3.0	-	-	-
<u>Zenaidura macroura</u>	Mourning dove	2	-	-	1.4	-	-	1	0.9	-	1	1	1.5	-	-	-
<u>Chaetura pelagica</u>	Chimney swift	-	-	-	-	1	2	-	2.7	-	-	-	-	-	-	-
<u>Colaptes auratus</u>	Common flicker	-	-	-	-	-	-	1	0.9	-	1	-	0.7	-	-	-
<u>Dendrocopos villosus</u>	Hairy woodpecker	-	-	-	-	-	-	-	-	-	-	-	-	1	1.6	-
<u>Dendrocopos pubescens</u>	Downy woodpecker	-	-	-	-	-	-	-	-	-	1	-	0.7	-	-	-
<u>Tyrannus tyrannus</u>	Eastern kingbird	-	-	-	-	-	-	2	1.8	-	-	-	-	-	-	-
<u>Hirundo rustica</u>	Barn swallow	5	2	-	4.9	3	6	2	10.0	-	-	-	-	-	-	-
<u>Petrochelidon pyrrhonota</u>	Cliff swallow	-	-	-	-	4	-	-	3.6	-	-	-	-	-	-	-
<u>Iridoprocne bicolor</u>	Tree swallow	-	-	-	-	-	2	-	1.8	-	-	-	-	-	-	-
<u>Riparia riparia</u>	Bank swallow	-	-	-	-	-	3	-	2.7	-	-	-	-	-	-	-
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow	-	-	-	-	4	2	2	7.2	-	-	-	-	-	-	-
<u>Cyanocitta cristata</u>	Bluejay	3	1	1	3.5	-	-	2	1.8	3	3	3	6.7	1	2	4.7
<u>Corvus brachyrhynchos</u>	Common crow	-	-	-	-	-	-	2	1.8	-	1	-	0.7	-	1	1.6
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	2	1.4	-	-	-	-	-	1	-	0.7	-	4	6.3
<u>Mimus polyglottos</u>	Mockingbird	2	2	1	3.5	-	-	1	0.9	-	-	-	-	-	-	-
<u>Dumetella carolinensis</u>	Gray catbird	1	-	-	0.7	1	-	-	0.9	-	-	-	-	-	-	-
<u>Toxostoma rufum</u>	Brown thrasher	-	-	1	0.7	-	-	-	-	-	-	-	-	-	-	-
<u>Turdus migratorius</u>	American robin	1	-	-	0.7	-	-	4	3.6	1	7	3	7.5	-	1	1.6
<u>Sturnus vulgaris</u>	Starling	-	-	1	0.7	1	3	5	8.1	3	5	11	14.2	-	11	17.2
<u>Dendroica petechia</u>	Yellow warbler	-	1	-	0.7	-	-	-	-	-	-	-	-	-	-	-
<u>Geothlypis trichas</u>	Common yellowthroat	1	1	1	2.1	-	1	1	1.8	-	-	-	-	-	-	-
<u>Passer domesticus</u>	House sparrow	1	5	2	5.6	-	-	1	0.9	-	-	-	-	-	2	3.1
<u>Dolichonyx oryzivorus</u>	Bobolink	3	2	1	4.2	-	-	-	-	-	-	-	-	-	-	-
<u>Sturnella magna</u>	Eastern meadowlark	1	1	-	1.4	-	2	4	5.4	-	-	1	0.7	2	2	6.3
<u>Agelaius phoeniceus</u>	Red-winged blackbird	12	8	8	19.8	-	4	8	10.9	-	-	-	-	-	20	31.3
<u>Quiscalus quiscula</u>	Common grackle	10	11	3	17.0	3	-	3	5.4	-	-	-	-	-	-	-
<u>Molothrus ater</u>	Brown-headed cowbird	-	4	-	2.8	-	-	-	-	-	-	-	-	-	-	-
<u>Icterus galbula</u>	Northern oriole	-	1	-	0.7	-	-	-	-	-	-	-	-	-	-	-
<u>Cardinalis cardinalis</u>	Cardinal	-	-	2	1.4	-	-	1	0.9	-	-	-	-	-	-	-
<u>Spinus tristis</u>	American goldfinch	3	-	-	2.1	4	4	6	12.7	-	15	3	13.4	-	-	-
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	-	-	-	-	-	-	1	0.9	-	-	-	-	-	-	-
<u>Junco hyemalis</u>	Dark-eyed junco	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3.1
<u>Spizella pusilla</u>	Field sparrow	2	-	-	1.4	-	-	1	0.9	-	-	-	-	1	6	10.9

^a Percentage occurrence of individuals of each species during a three or two day sampling period.

Table 15. Summary of May, July, October 1973, and January 1974 transect counts of birds in an upland hardwood forest (Site 2) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed															
		May				July				October				January			
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%	10th	11th	%	
<u>Buteo jamaicensis</u>	Red-tailed hawk	-	-	-	-	-	-	-	-	-	-	-	-	1	-	9.1	
<u>Colinus virginianus</u>	Bobwhite	-	1	1	2.3	1	1	1	5.8	1	-	-	2.1	-	-	-	
<u>Ardea herodias</u>	Great blue heron	-	-	-	-	-	-	-	-	-	-	-	-	1	-	9.1	
<u>Charadrius vociferus</u>	Killdeer	-	-	-	-	-	-	1	1.9	-	-	-	-	-	-	-	
<u>Larus argentatus</u>	Herring gull	-	-	-	-	-	-	-	-	-	-	1	2.1	-	-	-	
<u>Colaptes auratus</u>	Common flicker	-	1	-	1.1	-	-	-	1.9	-	2	1	6.3	-	-	-	
<u>Dendrocopos sp.</u>	Woodpecker (species?)	-	-	-	-	-	-	1	1.9	-	-	1	2.1	-	-	-	
<u>Dendrocopos villosus</u>	Hairy woodpecker	-	-	-	-	2	-	-	3.9	-	-	-	-	-	-	-	
<u>Dendrocopos pubescens</u>	Downy woodpecker	1	-	1	2.3	-	-	-	-	-	-	-	-	-	-	-	
<u>Hirundo rustica</u>	Barn swallow	-	-	-	-	1	-	-	1.9	-	-	-	-	-	-	-	
<u>Cyanocitta cristata</u>	Bluejay	-	3	-	3.4	-	2	-	3.9	4	3	1	16.7	1	1	18.2	
<u>Corvus brachyrhynchos</u>	Common crow	-	3	-	3.4	-	-	1	1.9	2	4	1	14.6	1	1	18.2	
<u>Parus atricapillus</u>	Black-capped chickadee	-	2	-	2.3	2	6	4	23.5	2	2	-	8.3	-	5	45.3	
<u>Sitta sp.</u>	Nuthatch (species?)	-	-	-	-	-	-	1	1.9	-	-	-	-	-	-	-	
<u>Troglodytes aedon</u>	House wren	1	1	1	3.4	2	1	1	7.8	-	-	-	-	-	-	-	
<u>Dumetella carolinensis</u>	Gray catbird	3	2	2	8.1	-	-	-	-	-	-	-	-	-	-	-	
<u>Toxostoma rufum</u>	Brown thrasher	-	-	-	-	-	1	-	1.9	-	-	-	-	-	-	-	
<u>Turdus migratorius</u>	American robin	-	-	1	1.1	-	-	2	3.9	1	-	-	2.1	-	-	-	
<u>Hylocichla mustelina</u>	Wood thrush	-	-	-	-	-	-	1	1.9	-	-	-	-	-	-	-	
<u>Sialia sialis</u>	Eastern bluebird	-	1	1	2.3	-	-	-	-	-	-	-	-	-	-	-	
<u>Sturnus vulgaris</u>	Starling	-	-	1	1.1	1	-	2	5.8	-	-	-	-	-	-	-	
<u>Vireo sp.</u>	Vireo (species?)	-	4	-	4.6	-	-	-	-	-	-	-	-	-	-	-	
Parulidae	Wood warbler (species?)	-	7	5	13.9	-	-	-	-	13	-	-	27.1	-	-	-	
<u>Vermivora pinus</u>	Blue-winged warbler	1	3	2	6.9	-	-	-	-	-	-	-	-	-	-	-	
<u>Dendroica petechia</u>	Yellow warbler	1	-	-	1.1	-	-	-	-	-	-	-	-	-	-	-	
<u>Dendroica fusca</u>	Blackburnian warbler	-	-	-	-	-	-	-	-	2	-	-	4.2	-	-	-	
<u>Dendroica discolor</u>	Prairie warbler	-	-	1	1.1	-	-	-	-	-	-	-	-	-	-	-	
<u>Geothlypis trichas</u>	Common yellowthroat	-	3	7	11.6	-	1	-	1.9	-	-	-	-	-	-	-	
<u>Agelaius phoeniceus</u>	Red-winged blackbird	6	3	2	12.8	-	2	-	3.9	-	-	-	-	-	-	-	
<u>Quiscalus quiscula</u>	Common grackle	-	-	2	2.3	-	-	-	-	-	-	-	-	-	-	-	
<u>Piranga olivacea</u>	Scarlet tanager	-	1	-	1.1	-	-	-	-	-	-	-	-	-	-	-	
<u>Spinus tristis</u>	American goldfinch	-	-	-	-	2	2	1	9.8	-	-	-	-	-	-	-	
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	1	1	2	4.6	1	3	2	11.7	-	-	-	-	-	-	-	
<u>Spizella pusilla</u>	Field sparrow	-	1	-	1.1	-	-	1	1.9	-	-	-	-	-	-	-	
<u>Zonotrichia albicollis</u>	White-throated sparrow	-	-	-	-	-	-	-	-	5	-	-	10.4	-	-	-	
<u>Melospiza lincolni</u>	Lincoln's sparrow	-	-	-	-	-	-	-	-	2	-	-	4.2	-	-	-	
<u>Melospiza melodia</u>	Song sparrow	-	6	-	6.9	-	-	-	-	-	-	-	-	-	-	-	

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Table 16. Summary of May, July, and October 1973 transect counts of birds in a brackish marsh (Site 4) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed											
		May				July				October			
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%
<u>Branta canadensis</u>	Canada goose	-	-	-	-	-	-	-	-	-	15	-	12.6
<u>Anas platyrhynchos</u>	Mallard	2	-	-	1.9	-	-	1	0.6	2	4	6	10.1
<u>Anas rubripes</u>	Black duck	-	-	3	2.9	12	28	4	28.0	1	7	-	6.7
<u>Mergus merganser</u>	Common merganser	1	-	-	0.9	-	-	-	-	-	-	-	-
<u>Colinus virginianus</u>	Bobwhite	-	-	-	-	-	-	1	0.6	-	-	-	-
<u>Casmerodius albus</u>	Great egret	-	-	-	-	-	2	-	1.2	1	-	-	0.8
<u>Ardea herodias</u>	Great blue heron	-	1	-	0.9	1	-	-	0.6	1	1	1	2.5
<u>Butorides virescens</u>	Green heron	1	1	2	3.8	1	2	2	3.1	-	-	-	-
<u>Nycticorax nycticorax</u>	Black-crowned night heron	2	-	-	1.9	1	-	3	2.5	-	-	-	-
<u>Botaurus lentiginosus</u>	American bittern	-	-	-	-	-	1	-	0.6	-	-	-	-
<u>Rallus sp.</u>	Rail (species?)	1	-	-	0.9	-	-	-	-	-	-	-	-
<u>Rallus elegans</u>	King rail	-	1	-	0.9	-	-	-	-	-	-	-	-
<u>Totanus melanoleucus</u>	Greater yellowlegs	-	1	1	1.9	-	-	-	-	12	11	17	33.6
<u>Larus argentatus</u>	Herring gull	4	-	-	3.8	1	-	2	1.9	5	-	3	6.7
<u>Larus delawarensis</u>	Ring-billed gull	-	1	-	0.9	-	-	-	-	-	-	-	-
<u>Sterna hirundo</u>	Common tern	-	-	5	4.8	2	2	2	3.8	-	-	-	-
<u>Zenaidra macroura</u>	Mourning dove	1	-	-	0.9	1	-	-	0.6	-	-	-	-
<u>Megasceryle alcyon</u>	Belted kingfisher	-	-	-	-	2	-	1	1.9	2	1	1	3.7
<u>Colaptes auratus</u>	Common flicker	-	1	-	0.9	1	-	4	3.1	-	1	-	0.8
<u>Tyrannus tyrannus</u>	Eastern kingbird	-	-	-	-	1	-	-	0.6	-	-	-	-
<u>Myiarchus crinitus</u>	Great-crested flycatcher	-	-	-	-	1	-	-	0.6	-	-	-	-
<u>Hirundo rustica</u>	Barn swallow	3	3	1	6.8	2	-	4	3.8	-	-	-	-
<u>Riparia riparia</u>	Bank swallow	1	2	-	2.9	-	-	-	-	-	-	-	-
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow	-	-	-	-	3	-	2	3.1	-	-	-	-
<u>Cyanocitta cristata</u>	Bluejay	2	6	3	10.6	5	3	3	7.0	1	2	3	5.0
<u>Corvus brachyrhynchos</u>	Common crow	2	-	-	1.9	1	-	-	0.6	5	-	1	5.0
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	-	-	2	2	1	3.1	-	-	-	-
<u>Parus bicolor</u>	Tufted titmouse	-	-	-	-	-	1	-	0.6	1	-	-	0.8
<u>Sitta carolinensis</u>	White-breasted nuthatch	-	-	-	-	-	-	-	-	-	1	-	0.8
<u>Troglodytes aedon</u>	House wren	-	-	-	-	1	-	1	1.2	-	-	-	-
<u>Mimus polyglottos</u>	Mockingbird	-	-	-	-	-	-	1	0.6	-	1	-	0.8
<u>Dumetella carolinensis</u>	Gray catbird	3	-	-	2.9	-	1	-	0.6	-	-	-	-
<u>Toxostoma rufum</u>	Brown thrasher	-	1	-	0.9	-	-	-	-	-	-	-	-
<u>Turdus migratorius</u>	American robin	-	-	1	0.9	2	1	2	3.1	-	1	-	0.8
<u>Sturnus vulgaris</u>	Starling	4	1	5	9.7	3	-	3	3.8	4	-	-	3.4
Parulidae	Wood warbler (species?)	-	-	-	-	-	-	-	-	2	-	-	1.7
<u>Dendroica discolor</u>	Prairie warbler	-	1	-	0.9	-	-	-	-	-	-	-	-
<u>Agelaius phoeniceus</u>	Red-winged blackbird	6	2	4	11.6	6	-	9	9.5	-	-	-	-
<u>Quiscalus quiscula</u>	Common grackle	1	8	2	10.6	4	2	1	4.4	-	-	-	-
<u>Icterus galbula</u>	Northern oriole	1	1	1	2.9	4	-	-	2.5	-	-	-	-
<u>Spinus tristis</u>	American goldfinch	1	2	-	2.9	-	1	1	1.2	2	2	-	3.4
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	-	2	1	2.9	1	-	-	0.6	-	-	-	-
<u>Melospiza melodia</u>	Song sparrow	1	1	1	2.9	1	2	2	3.1	-	1	-	0.8

Table 17. Summary of May, July, October 1973, and January 1974 transect counts of birds in a riparian community (Site 3) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed														
		May				July				October			January			
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%	10th	11th	%
<u>Branta canadensis</u>	Canada goose	-	-	-	-	-	-	-	-	-	15	-	14.2	-	-	-
<u>Anas platyrhynchos</u>	Mallard	-	2	-	2.7	-	-	-	-	-	-	4	3.8	-	2	14.3
<u>Anas rubripes</u>	Black duck	-	1	-	1.3	-	-	-	-	2	3	-	4.7	-	-	-
<u>Bonasa umbellus</u>	Ruffed grouse	-	-	-	-	-	-	-	-	-	2	-	1.9	-	-	-
<u>Colinus virginianus</u>	Bobwhite	-	2	-	2.7	1	2	-	4.8	-	-	8	7.5	-	-	-
<u>Butorides virescens</u>	Green heron	-	1	-	1.3	-	-	-	-	-	-	-	-	-	-	-
<u>Nycticorax nycticorax</u>	Black-crowned night heron	-	-	-	-	1	-	-	1.6	-	-	-	-	-	-	-
<u>Larus sp.</u>	Gull (species?)	-	-	-	-	-	-	-	-	-	-	-	-	1	1	14.3
<u>Larus argentatus</u>	Herring gull	1	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-
<u>Zenaidra macroura</u>	Mourning dove	1	-	-	1.3	-	-	-	-	-	11	-	10.4	-	-	-
<u>Megaceryle alcyon</u>	Belted kingfisher	-	-	-	-	-	1	2	4.8	1	-	-	0.9	-	-	-
<u>Colaptes auratus</u>	Common flicker	-	-	-	-	1	-	1	3.2	-	-	1	0.9	-	-	-
<u>Dendrocopos sp.</u>	Woodpecker (species?)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7.1
<u>Dendrocopos villosus</u>	Hairy woodpecker	-	-	-	-	-	-	-	-	1	-	1	1.9	-	-	-
<u>Dendrocopos pubescens</u>	Downy woodpecker	-	2	-	2.7	-	1	-	1.6	-	-	-	-	-	-	-
<u>Sayornis phoebe</u>	Eastern phoebe	-	1	-	1.3	-	-	-	-	-	-	-	-	-	-	-
<u>Contopus virens</u>	Eastern wood pewee	-	-	-	-	-	1	-	1.6	-	-	-	-	-	-	-
<u>Hirundo rustica</u>	Barn swallow	-	1	2	4.0	-	-	-	-	-	-	-	-	-	-	-
<u>Cyanocitta cristata</u>	Bluejay	1	1	4	8.1	4	5	-	14.5	2	1	2	4.7	-	2	14.3
<u>Corvus brachyrhynchos</u>	Common crow	-	-	2	2.7	-	3	-	4.8	1	1	2	3.8	-	-	-
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	2	2.7	3	4	2	14.5	5	2	6	12.3	-	-	14.3
<u>Troglodytes aedon</u>	House wren	1	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-
<u>Dumetella carolinensis</u>	Gray catbird	1	-	4	6.7	-	2	1	4.8	-	-	-	-	-	-	-
<u>Toxostoma rufum</u>	Brown thrasher	-	1	-	1.3	-	-	-	-	-	-	-	-	-	-	-
<u>Turdus migratorius</u>	American robin	-	1	-	1.3	-	-	-	-	1	3	1	4.7	-	-	-
<u>Sturnus vulgaris</u>	Starling	-	1	4	6.7	-	-	-	-	-	20	-	18.9	-	-	-
<u>Vireo olivaceus</u>	Red-eyed vireo	-	-	2	2.7	-	-	-	-	-	-	-	-	-	-	-
<u>Mniotilta varia</u>	Black-and-white warbler	-	1	-	1.3	-	-	-	-	-	-	-	-	-	-	-
<u>Vermivora pinus</u>	Blue-winged warbler	-	1	-	1.3	-	-	-	-	-	-	-	-	-	-	-
<u>Geothlypis trichas</u>	Common yellowthroat	-	-	1	1.3	1	2	1	6.4	-	-	-	-	-	-	-
<u>Agelaius phoeniceus</u>	Red-winged blackbird	5	4	3	16.2	-	1	-	1.6	-	-	-	-	-	-	-
<u>Quiscalus quiscula</u>	Common grackle	5	5	4	18.9	-	-	-	-	-	-	-	-	-	-	-
<u>Icterus galbula</u>	Northern oriole	1	1	2	5.4	1	2	-	4.8	-	-	-	-	-	-	-
<u>Cardinalis cardinalis</u>	Cardinal	-	-	-	-	-	2	-	3.2	1	-	-	0.9	-	-	-
<u>Passerina cyanea</u>	Indigo bunting	-	-	-	-	-	-	1	1.6	-	-	-	-	-	-	-
<u>Spinus tristis</u>	American goldfinch	-	-	-	-	-	-	1	1.6	-	-	-	-	-	-	-
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	-	1	-	1.3	2	10	1	20.9	-	-	-	-	-	-	-
<u>Junco hyemalis</u>	Dark-eyed junco	-	-	-	-	-	-	-	-	-	2	2	3.8	-	-	-
<u>Spizella pusilla</u>	Field sparrow	-	-	1	1.3	-	1	-	1.6	-	-	-	-	1	7.1	-
<u>Zonotrichia albicollis</u>	White-throated sparrow	-	-	-	-	-	-	-	-	-	5	-	4.7	-	-	-
<u>Melospiza melodia</u>	Song sparrow	-	-	-	-	-	1	1.6	-	-	-	-	-	4	28.6	-

Table 18. Summary of May, July, October 1973, and January 1974 transect counts of birds along a transmission line corridor (Site 5) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed														
		May				July				October				January		
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%	10th	11th	%
<u>Anas platyrhynchos</u>	Mallard	-	2	-	3.3	-	-	-	-	-	-	-	-	-	-	-
<u>Anas rubripes</u>	Black duck	-	-	-	-	1	-	-	0.3	-	-	-	-	-	-	-
<u>Accipiter cooperii</u>	Cooper's hawk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Buteo platypterus</u>	Broad-winged hawk	-	-	-	-	1	-	-	-	-	-	-	-	-	6.7	-
<u>Colinus virginianus</u>	Bobwhite	-	-	-	-	2	3	2	2.6	1	7	-	4.1	-	-	-
<u>Butorides virescens</u>	Green heron	-	-	1	1.7	-	-	-	-	-	-	-	-	-	-	-
<u>Botaurus lentiginosus</u>	American bittern	-	-	-	-	-	1	-	0.3	-	-	-	-	-	-	-
<u>Charadrius vociferus</u>	Killdeer	-	-	-	-	3	2	2	2.6	-	-	-	-	-	-	-
<u>Larus argentatus</u>	Herring gull	1	1	2	6.7	1	4	1	2.2	-	6	4	5.2	-	4	26.7
<u>Larus delawarensis</u>	Ring-billed gull	-	-	1	1.7	1	-	-	0.3	-	-	-	-	-	2	13.3
<u>Zenaidra macroura</u>	Mourning dove	-	1	2	5.0	1	-	8	3.3	55	5	-	31.1	-	1	6.7
<u>Chaetura pelagica</u>	Chimney swift	-	-	-	-	-	-	3	1.1	-	-	-	-	-	-	-
<u>Colaptes auratus</u>	Common flicker	-	1	-	1.7	-	4	2	2.2	-	-	-	-	-	-	-
<u>Dendrocopos pubescens</u>	Downy woodpecker	-	-	-	-	-	2	-	0.7	-	-	-	-	-	-	-
<u>Tyrannus tyrannus</u>	Eastern kingbird	-	-	-	-	3	3	3	3.3	-	-	-	-	-	-	-
<u>Contopus virens</u>	Eastern wood pewee	-	-	-	-	-	-	-	-	1	-	-	0.5	-	-	-
<u>Hirundo rustica</u>	Barn swallow	-	-	-	-	16	3	5	8.8	-	-	-	-	-	-	-
<u>Cyanocitta cristata</u>	Bluejay	-	1	-	1.7	-	6	1	2.6	2	5	2	4.7	-	4	26.7
<u>Corvus brachyrhynchos</u>	Common crow	-	1	3	6.7	-	-	2	0.7	-	9	-	4.7	-	-	-
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	-	-	-	4	-	1.4	-	3	1	2.1	-	2	13.3
<u>Mimus polyglottos</u>	Mockingbird	-	-	-	-	-	3	-	1.1	1	-	-	0.5	-	-	-
<u>Dumetella carolinensis</u>	Gray catbird	-	-	-	-	-	1	1	0.7	-	-	-	-	-	-	-
<u>Toxostoma rufum</u>	Brown thrasher	-	-	-	-	-	1	1	0.7	-	1	-	0.5	-	-	-
<u>Turdus migratorius</u>	American robin	-	-	-	-	1	7	4	4.4	2	18	6	13.5	-	-	-
<u>Hylocichla mustelina</u>	Wood thrush	-	-	-	-	-	1	-	0.3	-	-	-	-	-	-	-
<u>Sialia sialis</u>	Eastern bluebird	-	1	-	1.7	-	-	-	-	-	-	-	-	-	-	-
<u>Sturnus vulgaris</u>	Starling	1	1	-	3.3	3	34	33	25.9	2	5	15	11.4	-	-	-
Parulidae	Wood warbler (species?)	-	-	-	-	-	-	-	-	-	-	2	1.0	-	-	-
<u>Vermivora pinus</u>	Blue-winged warbler	-	2	1	5.0	-	-	-	-	-	-	-	-	-	-	-
<u>Dendroica petechia</u>	Yellow warbler	-	-	-	-	-	1	-	0.3	-	-	-	-	-	-	-
<u>Dendroica coronata</u>	Yellow-rumped warbler	-	-	-	-	-	-	-	-	-	3	-	1.6	-	-	-
<u>Dendroica discolor</u>	Prairie warbler	3	2	3	13.5	-	2	1	1.1	-	-	-	-	-	-	-
<u>Geothlypis trichas</u>	Common yellowthroat	1	3	3	11.8	1	6	3	3.7	-	-	-	-	-	-	-
<u>Passer domesticus</u>	House sparrow	-	2	-	3.3	-	-	-	-	-	-	-	-	-	-	-
<u>Sturnella magna</u>	Eastern meadowlark	-	-	-	-	-	-	-	-	-	3	-	1.6	-	-	-
<u>Agelaius phoeniceus</u>	Red-winged blackbird	1	4	2	11.8	3	12	5	7.4	-	-	-	-	-	-	-
<u>Quiscalus quiscula</u>	Common grackle	1	3	-	6.7	-	-	1	-	-	-	-	-	-	-	-
<u>Icterus galbula</u>	Northern oriole	-	-	-	-	-	6	-	2.2	-	-	-	-	-	-	-
Fringillidae	Sparrow (species?)	-	-	-	-	-	-	-	-	-	1	-	0.5	-	-	-
<u>Cardinalis cardinalis</u>	Cardinal	-	-	-	-	-	-	-	-	1	-	1	1.0	-	-	-
<u>Spinus tristis</u>	American goldfinch	-	-	1	1.7	1	3	2	2.2	3	-	-	1.6	-	-	-
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	2	-	2	6.7	4	3	5	4.4	-	-	-	-	-	-	-
<u>Passerculus sandwichensis</u>	Savannah sparrow	-	-	-	-	-	-	-	-	1	-	-	0.5	-	-	-
<u>Spizella pusilla</u>	Field sparrow	-	-	-	-	3	8	5	5.9	2	3	1	3.1	-	1	6.7
<u>Melospiza georgiana</u>	Swamp sparrow	-	-	-	-	-	-	-	-	1	4	1	3.1	-	-	-
<u>Melospiza melodia</u>	Song sparrow	-	2	1	5.0	5	6	4	5.5	10	4	1	7.8	-	-	-

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Table 19. Summary of May, July, October 1973, and January 1974 transect counts of birds in a mixed hardwood forest (Site 6) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed														
		May				July				October				January		
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%	10th	11th	%
<u>Cygnus olor</u>	Mute swan	1	5	5	18.9	-	-	4	5.4	-	-	-	-	-	-	-
<u>Pandion haliaetus</u>	Osprey	-	2	-	3.4	-	-	-	-	-	-	-	-	-	-	-
<u>Colinus virginianus</u>	Bobwhite	-	-	-	-	3	-	2	6.8	-	-	-	-	-	-	-
<u>Ardea herodias</u>	Great blue heron	-	2	-	3.4	-	-	-	-	1	-	-	2.9	-	-	-
<u>Nycticorax nycticorax</u>	Black-crowned night heron	3	1	-	6.8	-	3	1	5.4	-	-	-	-	-	-	-
<u>Larus argentatus</u>	Herring gull	-	-	-	-	-	-	-	-	-	-	-	-	1	16.7	-
<u>Larus delawarensis</u>	Ring-billed gull	-	2	-	3.4	-	-	-	-	-	-	-	-	-	-	-
<u>Megaceryle alcyon</u>	Belted kingfisher	-	-	-	-	-	2	-	2.7	-	-	-	-	-	-	-
<u>Colaptes auratus</u>	Common flicker	-	-	-	-	1	2	4	9.5	-	-	-	-	-	-	-
<u>Tyrannus tyrannus</u>	Eastern kingbird	-	1	1	3.4	-	-	-	-	-	-	-	-	-	-	-
<u>Myiarchus crinitus</u>	Great-crowned flycatcher	-	-	2	3.4	-	-	-	-	-	-	-	-	-	-	-
<u>Hirundo rustica</u>	Barn swallow	3	3	5	18.9	-	-	-	-	-	-	-	-	-	-	-
<u>Iridoprocne bicolor</u>	Tree swallow	-	-	1	1.7	-	-	-	-	-	-	-	-	-	-	-
<u>Cyanocitta cristata</u>	Bluejay	-	-	1	1.7	5	3	6	19.1	2	3	2	20.6	-	1	16.7
<u>Corvus brachyrhynchos</u>	Common crow	1	-	1	1.7	4	3	1	10.9	3	3	5	32.4	-	-	-
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	-	-	2	1	1	5.4	-	-	-	-	-	3	50.0
<u>Sitta sp.</u>	Nuthatch (species?)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	16.7
<u>Dumetella carolinensis</u>	Gray catbird	1	2	-	5.1	-	1	1	2.7	-	-	1	2.9	-	-	-
<u>Turdus migratorius</u>	American robin	-	1	-	1.7	1	-	1	2.7	-	-	-	-	-	-	-
<u>Hyllocichla mustelina</u>	Wood thrush	-	-	-	-	1	-	-	1.3	-	-	-	-	-	-	-
<u>Catharus guttata</u>	Hermit thrush	-	-	-	-	-	-	-	-	-	-	1	2.9	-	-	-
<u>Vireo philadelphicus</u>	Philadelphia vireo	-	-	-	-	-	-	-	-	-	2	-	5.9	-	-	-
Parulidae	Wood warbler (species?)	-	-	-	-	-	-	-	-	-	4	-	11.8	-	-	-
<u>Dendroica coronata</u>	Yellow-rumped warbler	-	-	-	-	-	-	-	-	2	-	-	5.9	-	-	-
<u>Geothlypis trichas</u>	Common yellowthroat	-	-	-	-	1	-	-	1.3	-	-	-	-	-	-	-
<u>Agelaius phoeniceus</u>	Red-winged blackbird	1	-	2	5.1	2	3	-	6.8	-	-	-	-	-	-	-
<u>Quiscalus quiscula</u>	Common grackle	-	-	-	-	-	6	-	8.2	-	-	-	-	-	-	-
<u>Icterus galbula</u>	Northern oriole	4	3	3	17.2	1	-	-	1.3	-	-	-	-	-	-	-
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	1	1	-	3.4	3	2	1	8.2	-	-	-	-	-	-	-
<u>Zonotrichia albicollis</u>	White-throated sparrow	-	-	-	-	-	-	-	-	-	4	1	14.7	-	-	-
<u>Melospiza melodia</u>	Song sparrow	-	-	-	-	-	-	1	1.3	-	-	-	-	-	-	-

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Table 20. Summary of May, July, October 1973, and January 1974 transect counts of birds in an abandoned nursery (Site 7) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed															
		May				July				October				January			
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%	10th	11th	%	
<u>Falco sparverius</u>	American kestrel	-	-	-	-	-	-	-	-	1	-	-	0.6	-	-	-	
<u>Buteo platypterus</u>	Broad-winged hawk	-	1	-	1.3	-	-	-	-	-	-	-	-	-	-	-	
<u>Colinus virginianus</u>	Bobwhite	1	-	-	1.3	2	3	1	4.8	-	11	-	6.6	-	-	-	
<u>Phasianus colchicus</u>	Ring-necked pheasant	-	-	-	-	-	-	-	-	1	2	-	1.8	-	-	-	
<u>Larus argentatus</u>	Herring gull	2	-	-	2.6	1	3	2	4.8	3	-	2	3.0	2	2	15.4	
<u>Larus delawarensis</u>	Ring-billed gull	-	1	2	3.9	-	-	-	-	-	-	-	-	4	15.4	-	
<u>Columba livia</u>	Rock dove	-	-	-	-	-	9	20	23.3	-	-	-	-	-	2	7.7	
<u>Zenaidura macroura</u>	Mourning dove	-	-	2	2.6	2	1	2	4.0	1	-	-	0.6	-	-	-	
<u>Colaptes auratus</u>	Common flicker	-	1	-	1.3	-	2	-	1.6	-	-	1	0.6	-	-	-	
<u>Dendrocopos villosus</u>	Hairy woodpecker	-	-	-	-	-	-	-	-	-	1	-	0.6	1	-	3.8	
<u>Dendrocopos pubescens</u>	Downy woodpecker	-	-	-	-	-	1	-	0.8	-	-	-	-	-	-	-	
<u>Hirundo rustica</u>	Barn swallow	2	1	-	3.9	-	-	-	-	-	-	-	-	-	-	-	
<u>Iridoprocne bicolor</u>	Tree swallow	-	-	-	-	-	2	-	1.6	-	-	-	-	-	-	-	
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow	-	-	-	-	-	1	-	0.8	-	-	-	-	-	-	-	
<u>Cyanocitta cristata</u>	Bluejay	-	2	-	2.6	1	-	2	1.6	1	8	3	7.2	1	1	7.7	
<u>Corvus brachyrhynchos</u>	Common crow	1	-	-	1.3	1	-	-	-	-	2	-	1.2	-	1	3.8	
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	-	-	-	3	3	4.8	3	5	-	4.8	-	-	-	
<u>Parus bicolor</u>	Tufted titmouse	-	-	-	-	-	-	4	3.2	-	-	-	-	-	-	-	
<u>Troglodytes aedon</u>	House wren	-	-	-	-	-	-	1	0.8	-	-	-	-	-	-	-	
<u>Troglodytes troglodytes</u>	Winter wren	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3.8	
<u>Dumetella carolinensis</u>	Gray catbird	-	1	-	1.3	-	-	1	0.8	1	1	1	1.8	-	-	-	
<u>Toxostoma rufum</u>	Brown thrasher	-	-	-	-	-	-	-	-	1	-	-	0.6	-	-	-	
<u>Turdus migratorius</u>	American robin	1	3	-	5.2	2	2	1	4.0	-	4	5	5.4	-	1	3.8	
<u>Catharus guttatus</u>	Hermit thrush	-	-	-	-	-	-	-	-	1	-	-	0.6	-	-	-	
<u>Sturnus vulgaris</u>	Starling	2	5	3	13.1	-	1	5	4.8	1	26	-	16.2	-	-	-	
Parulidae	Wood warbler (species?)	-	-	-	-	-	-	-	-	3	-	-	1.8	-	-	-	
<u>Dendroica petechia</u>	Yellow warbler	1	-	-	1.3	-	4	1	4.8	-	-	-	-	-	-	-	
<u>Dendroica coronata</u>	Yellow-rumped warbler	-	-	-	-	-	-	-	-	20	-	3	13.8	-	-	-	
<u>Dendroica palmarum</u>	Palm warbler	-	-	-	-	-	-	-	-	1	-	-	0.6	-	-	-	
<u>Geothlypis trichas</u>	Common yellowthroat	1	2	3	7.8	-	-	2	1.6	-	-	-	-	-	-	-	
<u>Dolichonyx oryzivorus</u>	Bobolink	1	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	
<u>Sturnella magna</u>	Eastern meadowlark	-	-	-	-	-	-	-	-	-	1	-	0.6	1	-	3.8	
<u>Agelaius phoeniceus</u>	Red-winged blackbird	5	4	5	18.4	-	2	3	4.0	-	-	-	-	-	-	-	
<u>Quiscalus quiscula</u>	Common grackle	6	3	1	11.8	-	-	-	-	-	-	-	-	-	-	-	
<u>Icterus galbula</u>	Northern oriole	-	-	-	-	-	-	3	2.4	-	-	-	-	-	-	-	
Fringillidae	Sparrow (species?)	-	-	-	-	-	-	-	-	5	-	1	3.6	-	-	-	
<u>Cardinalis cardinalis</u>	Cardinal	-	-	-	-	-	-	-	-	-	1	-	0.6	-	-	-	
<u>Pheucticus ludovicianus</u>	Rose-breasted grosbeak	1	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	
<u>Spinus tristis</u>	American goldfinch	-	-	-	-	3	3	4	8.0	32	-	-	19.2	-	-	-	
<u>Poocetes gramineus</u>	Vesper sparrow	-	-	-	-	-	-	-	-	1	2	-	1.8	-	-	-	
<u>Spizella arborea</u>	Tree sparrow	-	-	-	-	-	-	-	-	-	-	-	-	3	-	11.5	
<u>Spizella pusilla</u>	Field sparrow	-	1	2	3.9	1	1	-	1.6	3	2	-	3.0	6	-	23.1	
<u>Zonotrichia albicollis</u>	White-throated sparrow	-	-	-	-	-	-	-	-	-	3	-	1.8	-	-	-	
<u>Melospiza georgiana</u>	Swamp sparrow	-	-	-	-	-	-	-	-	-	3	-	1.8	-	-	-	
<u>Melospiza melodia</u>	Song sparrow	2	3	5	13.1	5	9	4	14.5	-	-	-	-	-	-	-	

Table 21. Summary of May, July, October 1973, and January 1974 transect counts of birds along a beach community and managed recreation area (Site 8) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed														
		May				July				October				January		
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%	10th	11th	%
<u>Gavia immer</u>	Common loon	-	-	-	-	-	-	-	-	-	-	-	-	1	3	6.3
<u>Podiceps grisegena</u>	Red-necked grebe	-	-	-	-	-	-	-	-	-	-	1	0.3	-	-	-
<u>Phalacrocorax auritis</u>	Double-crested cormorant	-	-	-	-	-	-	-	-	36	26	11	20.8	-	-	-
<u>Cygnus olor</u>	Mute swan	-	-	-	-	-	-	-	-	-	-	2	0.6	-	-	-
<u>Olor columbianus</u>	Whistling swan	-	-	2	2.1	-	-	-	-	-	-	-	-	-	-	-
<u>Anas platyrhynchos</u>	Mallard	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3.1
<u>Anas rubripes</u>	Black duck	-	-	6	6.4	-	-	-	-	-	-	-	-	-	-	-
<u>Bucephala albeola</u>	Bufflehead	-	-	-	-	-	-	-	-	-	-	1	0.3	1	1	3.1
<u>Mergus serrator</u>	Red-breasted merganser	-	-	-	-	-	-	-	-	-	-	-	-	6	12	28.1
<u>Collinus virginianus</u>	Bobwhite	-	-	1	1.0	-	-	-	-	-	-	-	-	-	-	-
<u>Phasianus colchicus</u>	Ring-necked pheasant	-	-	-	-	-	-	-	-	-	-	1	0.3	-	-	-
<u>Casmerodius albus</u>	Great egret	-	-	3	3.1	-	-	-	-	-	-	-	-	-	-	-
<u>Scolopacidae</u>	Sandpiper (species?)	-	-	-	-	1	-	2	2.4	-	-	-	-	-	-	-
<u>Charadrius vociferus</u>	Killdeer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Actitis macularia</u>	Spotted sandpiper	-	-	-	-	1	-	0.8	-	-	-	-	-	-	-	-
<u>Larus marinus</u>	Great black-backed gull	-	-	-	-	-	-	-	-	1	1	2	1.3	-	1	1.6
<u>Larus argentatus</u>	Herring gull	5	-	2	7.4	2	2	3	5.7	21	50	9	25.0	13	2	23.4
<u>Larus delawarensis</u>	Ring-billed gull	-	3	1	4.2	-	-	-	-	1	-	5	1.9	7	-	10.9
<u>Sterna hirundo</u>	Common tern	1	1	10	12.7	2	6	2	8.2	-	-	-	-	-	-	-
<u>Zenaidura macroura</u>	Mourning dove	-	-	3	3.2	1	-	-	-	-	-	-	-	-	-	-
<u>Chaetura pelagica</u>	Chimney swift	-	-	1	1.0	-	-	-	-	-	-	-	-	-	-	-
<u>Megasceryle alcyon</u>	Belted kingfisher	-	-	-	-	-	-	-	-	1	-	1	0.6	-	-	-
<u>Colaptes auratus</u>	Common flicker	1	-	-	1.0	-	-	-	-	3	-	-	0.9	-	-	-
<u>Hirundo rustica</u>	Barn swallow	4	-	-	4.2	-	2	2	3.2	-	-	-	-	-	-	-
<u>Petrochelidon pyrrhonota</u>	Cliff swallow	-	-	-	-	7	-	-	5.7	-	-	-	-	-	-	-
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow	-	-	-	-	2	-	-	1.6	-	-	-	-	-	-	-
<u>Cyanocitta cristata</u>	Bluejay	-	-	5	5.3	-	-	1	0.8	1	2	1	1.3	-	-	-
<u>Corvus brachyrhynchos</u>	Common crow	-	-	-	-	-	-	3	2.4	-	-	-	-	-	-	-
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	-	-	4	-	-	3.2	6	9	3	5.6	-	2	3.1
<u>Dumetella carolinensis</u>	Gray catbird	1	1	1	3.2	-	1	-	0.8	-	1	-	0.3	-	-	-
<u>Turdus migratorius</u>	American robin	5	5	2	12.7	1	2	1	3.2	11	-	-	3.4	-	-	-
<u>Catharus guttata</u>	Hermit thrush	-	-	-	-	-	-	-	-	-	1	-	0.3	-	-	-
<u>Bombycilla cedrorum</u>	Cedar waxwing	-	-	-	-	-	-	-	-	-	-	8	2.5	-	-	-
<u>Sturnus vulgaris</u>	Starling	4	1	1	6.4	1	3	12	13.1	5	20	-	7.8	-	1	1.6
<u>Parulidae</u>	Wood warbler (species?)	-	-	-	-	-	-	-	-	-	1	-	0.3	-	-	-
<u>Dendroica petechia</u>	Yellow warbler	2	1	1	4.2	-	-	-	-	-	-	-	-	-	-	-
<u>Dendroica coronata</u>	Yellow-rumped warbler	-	-	-	-	-	-	-	-	2	4	2	2.5	-	-	-
<u>Geothlypis trichas</u>	Common yellowthroat	-	-	-	-	3	1	2	4.9	-	-	-	-	-	-	-
<u>Passer domesticus</u>	House sparrow	-	-	-	-	-	2	4	4.9	-	-	-	-	-	-	-
<u>Agelaius phoeniceus</u>	Red-winged blackbird	2	3	1	6.4	2	1	2	4.1	-	-	-	-	-	-	-
<u>Quiscalus quiscula</u>	Common grackle	1	1	3	5.3	2	22	10	27.8	-	-	-	-	-	-	-
<u>Icterus galbula</u>	Northern oriole	1	-	1	2.1	-	-	-	-	-	-	-	-	-	-	-
<u>Fringillidae</u>	Sparrow (species?)	-	-	-	-	-	-	-	-	-	-	2	0.6	-	-	-
<u>Carpodacus purpureus</u>	Purple finch	-	-	1	1.0	-	-	-	-	-	1	-	0.3	-	-	-
<u>Spinus tristis</u>	American goldfinch	-	-	1	1.0	-	-	1	0.8	1	26	3	9.4	-	-	-
<u>Ammospiza caudacuta</u>	Sharp-tailed sparrow	-	-	-	-	-	-	-	-	-	-	-	-	1	1.6	-
<u>Junco hyemalis</u>	Dark-eyed junco	-	-	-	-	-	-	-	-	-	4	-	1.3	-	-	-
<u>Spizella pusilla</u>	Field sparrow	-	-	-	-	-	-	-	-	2	12	-	4.4	-	5	9.4
<u>Melospiza georgiana</u>	Swamp sparrow	-	-	-	-	-	-	-	-	-	4	-	1.3	-	-	-
<u>Melospiza melodia</u>	Song sparrow	-	2	3	5.3	2	1	3	4.9	1	7	4	3.8	3	2	7.8

Table 22. Summary of May, July, October 1973 and January 1974 transect counts of birds along a beach community (Site 9) in the vicinity of the Millstone Point site, Waterford, Connecticut.

Scientific Name	Common Name	Number of Birds Observed														
		May				July				October				January		
		15th	16th	17th	%	17th	18th	19th	%	23rd	24th	25th	%	10th	11th	%
<u>Gavia immer</u>	Common loon	-	-	-	-	-	-	-	-	-	-	-	1	1	1.6	
<u>Phalacrocorax auritus</u>	Double-crested	-	-	-	-	-	-	2	0.7	6	6	5	8.2	-	-	-
<u>Cygnus olor</u>	Mute swan	-	-	-	-	4	4	-	2.9	4	-	-	1.9	3	-	2.4
<u>Branta canadensis</u>	Canada goose	-	-	-	-	-	-	-	-	-	20	-	9.6	-	-	-
<u>Anas platyrhynchos</u>	Mallard	1	-	-	0.9	-	-	-	-	4	8	1	6.3	7	2	7.3
<u>Anas rubripes</u>	Black duck	-	-	-	-	7	-	18	9.3	3	-	3	2.9	11	10	16.9
<u>Bucephala clangula</u>	Common goldeneye	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.8
<u>Bucephala albeola</u>	Bufflehead	1	1	1	2.7	-	-	-	-	1	1	-	1.0	14	4	14.5
<u>Mergus serrator</u>	Red-breasted merganser	-	-	-	-	-	-	-	-	-	-	-	-	7	5	9.7
<u>Pandion haliaetus</u>	Osprey	1	1	1	2.7	3	3	3	3.3	-	-	-	-	-	-	-
<u>Falco sparverius</u>	American kestrel	-	-	-	-	-	-	-	-	-	-	1	0.5	-	-	-
<u>Casmerodius albus</u>	Great egret	-	-	-	-	2	-	-	0.7	-	-	-	-	-	-	-
<u>Ardea herodias</u>	Great blue heron	-	-	-	-	-	-	-	-	7	12	1	9.6	-	-	-
<u>Butorides virescens</u>	Green heron	-	-	-	-	1	-	-	0.3	-	-	-	-	-	-	-
<u>Nycticorax nycticorax</u>	Black-crowned night heron	-	-	-	-	-	4	4	2.9	12	16	8	17.3	-	-	-
<u>Squatarola squatarola</u>	Black-bellied plover	-	-	-	-	-	-	-	-	1	-	-	0.5	1	-	0.8
<u>Charadrius vociferus</u>	Killdeer	-	-	-	-	-	-	-	-	-	-	-	-	2	4	4.8
<u>Actitis macularia</u>	Spotted sandpiper	-	-	-	-	-	1	0.3	-	-	-	-	-	-	-	-
<u>Larus marinus</u>	Great black-backed gull	-	-	-	-	-	-	-	-	3	2	1	2.9	2	2	43.2
<u>Larus argentatus</u>	Herring gull	11	2	1	12.7	5	15	17	13.8	4	11	4	9.1	5	3	6.5
<u>Larus delawarensis</u>	Ring-billed gull	1	8	1	9.0	-	-	-	-	-	-	-	-	9	2	8.9
<u>Sterna hirundo</u>	Common tern	1	-	1	1.8	-	3	16	7.0	-	-	-	-	-	-	-
<u>Columba livia</u>	Rock dove	-	-	-	-	-	-	1	0.3	-	-	-	-	-	-	-
<u>Zenaida macroura</u>	Mourning dove	2	-	-	1.8	1	-	-	0.3	-	2	-	1.0	-	-	-
<u>Megaceryle alcyon</u>	Belted kingfisher	-	-	-	-	-	-	2	0.7	1	-	-	0.5	1	-	0.8
<u>Colaptes auratus</u>	Common flicker	-	-	-	-	1	1	-	0.7	-	-	-	-	-	-	-
<u>Dendrocopos pubescens</u>	Downy woodpecker	-	-	-	-	-	-	1	0.3	-	-	-	-	-	-	-
<u>Tyrannus tyrannus</u>	Eastern kingbird	-	-	-	-	1	2	2	1.8	-	-	-	-	-	-	-
<u>Sayornis phoebe</u>	Eastern phoebe	-	-	-	-	-	-	1	0.3	-	-	-	-	-	-	-
<u>Hirundo rustica</u>	Barn swallow	9	1	-	9.0	-	2	11	4.8	-	-	-	-	-	-	-
<u>Riparia riparia</u>	Bank swallow	1	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-
<u>Iridoprocne bicolor</u>	Tree swallow	-	-	-	-	-	-	1	0.3	-	-	-	-	-	-	-
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow	-	-	-	-	-	2	-	0.7	-	-	-	-	-	-	-
<u>Cyanocitta cristata</u>	Bluejay	2	-	-	1.8	-	2	1	1.1	1	2	2	2.4	-	2	1.6
<u>Corvus brachyrhynchos</u>	Common crow	-	-	-	-	-	1	3	1.4	-	-	-	-	-	2	1.6
<u>Parus atricapillus</u>	Black-capped chickadee	-	-	-	-	-	-	-	-	2	1	-	1.4	-	-	-
<u>Troglodytes aedon</u>	House wren	-	-	-	-	-	-	-	-	-	-	1	0.5	-	-	-
<u>Dumetella carolinensis</u>	Gray catbird	-	-	-	-	1	3	1	1.8	-	-	-	-	-	-	-
<u>Turdus migratorius</u>	American robin	3	-	1	3.6	-	7	6	4.8	-	-	2	1.0	-	-	-
<u>Sturnus vulgaris</u>	Starling	3	3	-	5.4	6	3	13	8.2	3	19	-	10.6	-	-	-
<u>Vermivora pinus</u>	Blue-winged warbler	-	-	-	-	1	-	-	0.3	-	-	-	-	-	-	-
<u>Dendroica petechia</u>	Yellow warbler	1	1	-	1.8	-	-	-	-	-	-	-	-	-	-	-
<u>Geothlypis trichas</u>	Common yellowthroat	-	-	-	-	-	2	1	1.1	-	-	-	-	-	-	-
<u>Passer domesticus</u>	House sparrow	1	-	-	0.9	7	2	8	6.3	-	-	-	-	-	-	-
<u>Agelaius phoeniceus</u>	Red-winged blackbird	4	-	3	6.3	3	5	6	5.2	-	-	-	-	-	-	-
<u>Quiscalus quiscula</u>	Common grackle	14	6	10	27.2	2	10	3	5.5	-	-	-	-	-	-	-
<u>Icterus galbula</u>	Northern oriole	2	1	-	2.7	-	1	-	0.3	-	-	-	-	-	-	-
<u>Carpodacus purpureus</u>	Purple finch	-	-	-	-	-	3	-	1.1	-	-	-	-	-	-	-
<u>Spinus tristis</u>	American goldfinch	-	-	-	-	-	3	-	1.1	2	1	2	2.4	-	-	-
<u>Passerculus sandwichensis</u>	Savannah sparrow	-	-	-	-	-	2	6	2.9	-	1	-	0.5	-	-	-
<u>Melospiza lincolni</u>	Lincoln's sparrow	-	-	-	-	-	-	-	-	-	1	-	0.5	-	-	-
<u>Melospiza melodia</u>	Song sparrow	4	2	3	8.1	2	2	11	5.5	5	12	3	9.6	13	10	18.5